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Exploring Breast Cancer Stigma Among Family Caregivers in Indonesia: A Cross-Sectional Study

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ABSTRACT

Stigma among family-caregivers of women with breast cancer remains a poorly understood barrier to quality care, particularly in low-and middle-income countries (LMICs). Despite their crucial role in supporting patients, evidence on caregiver stigma remains limited. This study aimed to examine stigma among family-caregivers in Indonesia, identify the predominant stigma domains, and explore associated sociodemographic factors. A cross-sectional study was conducted among 92 family-caregivers recruited from 80 Community Health Centers in Bandung, Indonesia. Participants completed a questionnaire on sociodemographic characteristics and the Family Caregiver Stigma Questionnaire, comprising four domains: internal stigma, social isolation, perceived stigma, and reactions. Data were analyzed using descriptive statistics, Friedman and Bonferroni post hoc tests, and multiple linear regression. Overall stigma was high, with a median score of 1.00, 84.6% of the maximum score. Pairwise comparisons showed that internal stigma and social isolation were significantly more prominent than the other stigma domains. No significant differences were found between perceived stigma and reactions or between internal and perceived stigma. Multiple linear regression showed no significant associations between stigma and age, sex, education, or relationship with the patient $p > 0.05$. These findings indicate that caregiver stigma is primarily characterized by internalized negative beliefs and social isolation rather than demographic characteristics. This study provides novel evidence on the multidimensional nature of caregiver stigma in Indonesia and highlights priority targets for intervention. Culturally appropriate psychoeducational and family-centered strategies should focus on reducing internal stigma and strengthening social connectedness. Future studies should examine psychosocial determinants to develop more targeted anti-stigma

interventions.

Keywords
Breast Cancer
Caregiver
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Stigma

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Introduction

Breast cancer is the most common type of cancer in women and a leading cause of death worldwide. According to the 2022 Global Burden of Cancer (GLOBOCAN), the highest prevalence and mortality rates for breast cancer are recorded in women, at 44% and 15.5%, respectively [1]. This prevalence is increasing annually by approximately more than 2 million people per year and is projected to increase by approximately 30% by 2035 [2].

Data in Indonesia, the prevalence of new cases and deaths from breast cancer in Indonesia according to Globocan in 2024 was 68,858 people out of a total of around 396,914 people or around 16.6% and the highest breast cancer mortality rate reached 14.4/100,000 population [3]. The health profile in West Java Province shows an increasing incidence of breast cancer. According to the 2018 Basic Health Research (Riskesdas), the prevalence of breast cancer in West Java was 1.41 per thousand, or approximately 186,809 people out of a population of 48,683,861 [4]. In 2020, health status profile of Bandung City shows that the number of breast cancer cases in 2019 was around 500 people and increased to around 600 people in 2020 [5].

The incidence of breast cancer is relatively high. Breast cancer has physical and psychological impacts on diagnosed women [6], [7], as well as the social and economic impacts for the community and the government. Breast cancer management is realized through the "Cancer-Free Indonesia" Program with "Saling Jaga, Saling Peduli" (Mutual Care), which is part of the "Pink Ribbon" program run by the Indonesian Breast Cancer Foundation (YKPI) of the Global Cancer Observatory Indonesia and the Ministry of Health of the Republic of Indonesia to achieve the Vision of a Cancer-Free Indonesia 2034 [1], [8], and nurses who have competence in psychosocial care in the community [9]. However, this program has not been optimally achieved due to the still-uncontrolled nature of breast cancer and the difficulty of detecting recurrences due to the stigma surrounding the disease. The increasing number of cases also increases the potential for negative stigma surrounding women diagnosed with breast cancer within their families and society.

Recent studies show that family caregivers of women with breast cancer often face affiliate stigma, but evidence is limited. Most studies focus on developing stigma measurement tools rather than examining the prevalence of stigma and its causes among caregivers from

different sociocultural backgrounds [10]. Most findings come from high-income or East Asian countries, not from low- and middle-income countries such as Indonesia. In Indonesia, family-centered caregiving is valued, beliefs are diverse, and misconceptions about cancer persist. Research here mainly covers patient psychosocial issues, like treatment delays and emotional burdens, but rarely addresses caregiver stigma—even though caregivers are vital to cancer care [11]. Evidence on prevalence, characteristics, and causes of caregiver stigma in Indonesia is scarce. This lack of data blocks the development of culturally relevant psychosocial interventions and support. We must address these gaps. Caregiver stigma harms psychological well-being, caregiving, social life, help-seeking, and support for women with breast cancer. Research in Indonesia will add to global knowledge of cancer stigma and guide culturally sensitive nursing interventions, caregiver programs, and health policies to improve family-centered cancer care.

This study addresses a critical gap by exploring breast cancer stigma among family caregivers in Indonesia using a cross-sectional design. By establishing foundational knowledge on stigma levels, caregiver characteristics, and their associations in the Indonesian context, the study clarifies why it is significant: it offers the first substantive baseline data in Indonesia, a setting with unique cultural and caregiving values. These findings are pivotal in informing culturally tailored stigma-reduction programs, caregiver education, and psychosocial support. Ultimately, the study will directly advance the quality and relevance of support for Indonesian caregivers, while contributing valuable insight to global cancer stigma research.

Material and Methods

A. Study Design and Setup

A cross-sectional study with analytical and correlational components was conducted from January 2026 to March 2026. This study took place in 80 Community Health Centers in the Bandung City area. Ethical approval for this study was obtained from the Research Ethics Committee of Universitas Aisyiyah Bandung, approval No. 1545/Kep.01/Unisa-Bandung/I/2026 prior to data collection.

B. Study Population and Sampling Techniques

This study targeted family caregivers of breast cancer patients registered at community health centers (Puskesmas) in Bandung City. Participants who were not affiliated with the target community health centers or who did not provide consent to complete the questionnaire were excluded. Participants were allocated proportionally within each region based on the number of family caregivers of breast cancer patients registered at the Bandung City Community Health Centers. Convenience sampling was used due to logistical constraints, specifically the inability to contact all family caregivers of breast cancer patients for random

sampling. To reduce potential bias, we ensured diversity in age, gender, and education across the Bandung City Community Health Centers.

C. Sample Size Calculation

The sample size is calculated based on the empirical formula of total proportional size; sample size = [max (number of variable dimensions) × (10 −20 times)] × [1 + (10%–15%)]. The adequacy of the sample size has a minimum standard of ten times the number of measured variable dimensions [12]. In this study, the stigma variable has four dimensions. Therefore, the minimum sample size was 92 people (4 × 20 × 1.15). Therefore, 92 participants completed the questionnaire and were included in the analysis.

D. Research Instruments

The Indonesian-language questionnaire consisted of two sections. The first section covered sociodemographic data, education, and questions related to understanding of stigma, including age, gender, community health center location, residence, family income, personal experiences of family caregivers with breast cancer (including their personal and family history of breast cancer), and whether they were a husband, child, or sibling with breast cancer.

The second section includes an adapted breast cancer Family Caregiver Stigma questionnaire, developed and validated by Xiaofan Bu et al. in 2025 for a population of caregivers of women with breast cancer [10]. This questionnaire consists of 24 items that measure four domains of stigma:

- Factor 1: Internal stigma domain (numbers 1-7)
- Factor 2: social isolation domain (numbers 8 – 15)
- Factor 3: perceived stigma domain (numbers 16-20)
- Factor 4: reaction domain (numbers 21-24)

Responses were assessed using a two-point Guttman scale (1 = agree, 0 = disagree), with higher scores indicating higher levels of stigma. We calculated the average score for each domain (the sum of the domain item scores divided by their number), and the total average score for all items in the breast cancer family caregiver stigma questionnaire. The reliability of this questionnaire was assessed using the results of the instrument's psychometric testing in the form of a Content Validity Index (CVI) and an instrument reliability index of 0.80–1.00. The Family Caregiver Stigma Questionnaire was created and checked by Xiaofan Bu et al. (2025). It showed strong measurement quality. The tool was examined to determine whether it measured what it was supposed to, using a method that examined groups of questions. Four groups were found, matching the main types of caregiver stigma: feeling bad about oneself, being socially isolated, believing that others look down on you, and others' reactions. The questionnaire worked well overall and gave consistent results. It held up over time when given again. People's scores on stigma went up as their burden increased. Scores decreased as self-

esteem and social support increased. Higher stigma is linked to lower self-esteem and social support.

E. Data Collection

Data were collected using a Google Forms questionnaire. Collaborators distributed the questionnaire through community health center (Puskesmas) cadre groups, namely WhatsApp groups at selected community health centers. The form included the research aims and objectives, guaranteed anonymity, and consent. To avoid duplicate responses, the Google Forms settings were adjusted to receive one response per email (without collecting emails to ensure anonymity). Participants who did not provide consent were excluded.

F. Statistical Analysis

The data were analyzed using IBM Statistical Package for Social Science (SPSS) software version 29 (IBM Corp.). Categorical variables were Continuous variables (breast cancer family caregiver stigma questionnaire scores) were tested for normality and found to be non-parametrically distributed. Therefore, the variables were summarized using the median (min–max). Inferential testing using the Mann–Whitney U test was used to compare group medians. Multiple linear regression analysis was conducted to identify factors associated with stigma scores among breast cancer family caregivers. Prior to correlation and regression analyses, stigma questionnaire scores were logarithmically transformed to meet the normality assumption required for linear regression results. A p-value ≤ 0.05 was considered statistically significant

Results

Table 1 presents descriptive statistics for the breast cancer family caregiver stigma questionnaire. Internal stigma showed a median score of 1.00, ranging from 0.00 to 1.00, indicating substantial variability among respondents.

Table 1. Descriptive statistics of the breast cancer family caregiver stigma questionnaire

Stigma	Agree[1] n (%)	Disagree[2] n (%)	Median (Min-Max)
Internal stigma			1.00 (0.00-1.00)
I will avoid talking too much about my family member's breast cancer with others.	89 (96.7)	3 (3.3)	
When I am with my family members who have breast cancer, I am sometimes more-quiet.	60 (65.2)	32 (34.8)	
After my family member was diagnosed with breast cancer, I lost touch with relatives and friends.	72 (78.3)	20 (21.7)	
After my family member was diagnosed with breast cancer, I became more concerned about what other people thought.	86 (93.5)	6 (6.5)	
After my family member was diagnosed with breast cancer, I was afraid to participate in social activities because I was afraid people would ask about my family's breast cancer status.	85 (92.4)	7 (7.6)	

Stigma	Agree[1] n (%)	Disagree[2] n (%)	Median (Min-Max)
I was reluctant to allow my family to attend social activities because I was worried that others would find out that she had breast cancer.	82 (89.1)	10 (10.9)	
I am afraid to attend breast cancer related activities because I am worried that others will suspect that my family member has breast cancer.	77 (83.7)	15 (16.3)	
Social isolation			1.00 (0.00-1.00)
I feel nervous or embarrassed when my family members need to talk about their breast cancer in public.	61 (66.3)	31 (33.7)	
After a family member was diagnosed with breast cancer, I was afraid of others noticing or judging her sex life.	54 (58.7)	38 (41.3)	
I don't want anyone else to know that my family member was diagnosed with breast cancer.	83 (90.2)	9 (9.8)	
I feel embarrassed when other people talk to me that my family member has breast cancer.	76 (82.6)	16 (17.4)	
I felt ashamed and regretful for not being able to afford the expensive treatment.	78 (84.8)	14 (15.2)	
After my family member underwent breast cancer treatment, I felt uncomfortable when people stared at her chest or head.	61 (66.3)	31 (33.7)	
I don't want other people to see my family members emaciated after suffering from breast cancer.	82 (89.1)	10 (10.9)	
I have advised my family not to tell anyone else that someone in our family has breast cancer.	77 (83.7)	15 (16.3)	
Perceived stigma			1.00 (0.00-1.00)
I'm worried that other people will think there's a hereditary risk of breast cancer in my family.	85 (92.4)	7 (7.6)	
After my family member had breast cancer, I felt strange looks from other people.	79 (85.9)	13 (14.1)	
After my family member had breast cancer, I felt like someone was talking about our family or about the disease.	84 (91.3)	8 (8.7)	
After my family member was diagnosed with breast cancer, I often felt someone staring at her chest or head.	85 (92.4)	7 (7.6)	
After my family member was diagnosed with breast cancer, other people were reluctant to have contact with our family.	76 (82.6)	16 (17.4)	
Reaction			1.00 (0.00-1.00)
After my family member was diagnosed with breast cancer, my family and I were discriminated against or excluded from social activities (meals, parties, etc.).	86 (93.5)	6 (6.5)	
After my family member was diagnosed with breast cancer, I avoided communicating with her.	85 (92.4)	7 (7.6)	
After my family member was diagnosed with breast cancer, I tried to distance myself from her.	79 (85.9)	13 (14.1)	
After my family received treatment for breast cancer, I felt humiliated or embarrassed about her appearance (e.g., missing breasts, hair loss, hyperpigmentation, and weight changes).	86 (93.5)	6 (6.5)	
Total stigma caregiver score			1.00 (0.00-1.00)

[1]Agree included: slightly agree, moderately agree, and strongly agree
[2]Disagree included: slightly disagree, moderately disagree, and strongly disagree

Descriptive statistics of breast cancer caregiver stigma 24 items. The highest stigma was found in the internal stigma domain (M = 1.00), with 96.7% of participants stating that they will avoid talking too much about my family member's breast cancer with others. Social isolation domain (M = 1.00), with 90.2% of participants stating that they don't want others to know that their family member was diagnosed with breast cancer. In the perceived stigma domain (M = 1.00),

with 92.4% of participants stating that they were worried that others would think there was a risk of breast cancer running in their family and after my family member was diagnosed with breast cancer, I often felt someone staring at her chest or head. In the reaction domain (M = 1.00), with 93.5% of participants stating that after my family member was diagnosed with breast cancer, my family and I were discriminated against or excluded from social activities (meals, parties, etc.) and after my family member received treatment for breast cancer, I felt humiliated or embarrassed about her appearance (e.g., missing breast, hair loss, hyperpigmentation, and weight changes). Meanwhile, the lowest stigma was in the social isolation domain (M = 1.00), with 65.2% of participants stating. When they are with their family members who have breast cancer, they are sometimes quieter (Table 1).

Table 2 summarizes stigma domain scores across participant characteristics among 92 breast cancer family caregivers. Median scores for internal stigma, social isolation, perceived stigma, and reaction are presented with observed ranges.

Table 2. Variation in total scores of stigma domains of breast cancer family caregivers with participant characteristics (n=92)

Characteristics	Total n (%)	M (min-max) Internal stigma	Social isolation	Perceived stigma	Reaction
Gender		1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)
• Man	41 (44.6)				
• Woman	51 (55.4)				
p-value	< 0.001				
Age		1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)
• < 40 years	16 (17.4)				
• ≥ 40 years	76 (82.6)				
*p-value**	< 0.001				
Education		1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)
• No school	1 (1,1)				
• Elementary School	20 (21.7)				
• Junior High School	23 (25.0)				
• Senior High School	41 (44.6)				
• Diploma	2 (2,2)				
• Bachelor	5 (5.4)				
*p-value**	< 0.001				
Relationship with patients		1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)	1.00 (0.00-1.00)
• Husband	40 (43.5)				
• Child	44 (47.8)				
• You	8 (8.7)				
*p-value**	< 0.001				

*p-value was calculated using MW test (Mann Whitney U test)
[a,b,c] are significant (P-value < 0.05)

Variation in breast cancer caregiver stigma scores based on sociodemographics. Of the 92 participants, ages ranged from 29 to 55 years with a mean of 45.78 ± 7.33 SD. Most caregivers were female (55.4%), with most aged over 40 years, with a high school education (44.6%), and most related to the breast cancer patient as a child (47.8%) (Table 2).

Table 3 presents differences in stigma domain scores according to participant characteristics among 92 family caregivers. Median scores and observed ranges are reported to facilitate comparison across relevant caregiver subgroups.

Table 3. Difference test of variation in total scores of the stigma domain of family caregivers with participant characteristics (n=92)

Stigma	Total N (%)	Median (min-max)
Internal stigma		1.00 (0.00-1.00)
• Yes	544 (85.7)	
• No	91 (14.3)	
*p-value**	< 0.001	
Social isolation		1.00 (0.00-1.00)
• Yes	572 (77.7)	
• No	164 (22.3)	
*p-value**	< 0.001	
Perceived Stigma	76 (82.6)	1.00 (0.00-1.00)
• Yes	409 (88.9)	
• No	51 (11.1)	
*p-value**	< 0.001	
Reaction		1.00 (0.00-1.00)
• Yes	336 (91.3)	
• No	32 (8.7)	
*p-value**	< 0.001	

*p-value was calculated using the MW test (Mann-Whitney U test)
[a,b,c] are significant (P-value < 0.05)

The internal stigma scores of those who agreed were significantly higher than those who disagreed (85.7% vs 14.3%), social isolation (77.7% vs 22.3%), perceived stigma (88.9% vs 11.1%), and reactions (91.3% vs 8.7%) (Table 3).

Table 4 compares stigma domain scores using the Friedman test. Median and interquartile range values are presented alongside mean ranks to identify differences in stigma levels across the assessed domains.

Table 4. Comparison of Stigma Domain Scores Using the Friedman Test

Domain	Median (IQR)	Mean Rank
Internal stigma	1 (0-1)	2.47
Social isolation	1 (0-1)	2.29
Perceived stigma	1 (0-1)	2.61
Reactions	1 (0-1)	2.63

Friedman test: χ^2 = 52,686, df = 3, p < 0.001

The Friedman test results showed significant differences in scores across the four stigma domains: internal stigma, perceived stigma, social isolation, and reaction (χ^2 = 52.686; df = 3;

p < 0.001). This indicates that the level of stigma experienced by family caregivers varies across domains (Table 4).

Table 5 presents Bonferroni-adjusted pairwise comparisons among stigma domains. Adjusted *p*-values are reported to identify statistically significant differences between domain pairs while controlling for multiple comparisons.

Table 5. Bonferroni-Adjusted Pairwise Comparisons Among Stigma Domains

Domain	*P* Bonferroni
Internal stigma vs social isolation	<0.001
Internal stigma vs perceived stigma	0.100
Internal stigma vs reactions	0.001
Social isolation vs perceived stigma	<0.001
Social isolation vs reactions	<0.001
Perceived stigma vs reactions	0.710

Post hoc analysis with Bonferroni correction showed that internal stigma scores were significantly higher than social isolation (p < 0.001); social isolation scores were significantly higher than perceived stigma (p < 0.001); social isolation scores were significantly higher than reactions (p < 0.001); and internal stigma scores were significantly higher than reactions (p = 0.001). There were no significant differences between perceived stigma and reactions (p = 0.710), or between internal stigma and perceived stigma (p = 0.100). Although the reactions domain had the highest mean rank, post hoc analysis indicated that internal stigma and social isolation were significantly higher than the other domains. Therefore, internal stigma and social isolation may be considered more dominant based on these statistical comparisons, rather than solely on mean rank (Table 5).

Table 6 presents multiple linear regression results identifying factors associated with stigma. Regression coefficients (β), 95% confidence intervals, and *p*-values indicate the direction, magnitude, precision, and statistical significance of associations.

Table 6. Results of Multiple Linear Regression Analysis of Factors Related to Stigma

Variable	β	95% CI	P-value
Gender	-36.820	0.000- 0.000	0.988
Age	-0.018	0.782-1.233	0.875
Education	-0.288	0.195-2.886	0.675
Relationship with patients	18.354	0.000-0.000	0.999
	R^2	**F**	**P-value**
	0.186	**0.782**	**0.540**

Remark: β = standardized regression coefficient; CI = confidence interval 95%; R^2= Adjusted R^2; F=F statistic; P-value=significance.

The results of a multiple linear regression analysis showed that age, gender, education, and relationship to the patient were not significantly associated with stigma after adjustment (all p > 0.05). Thus, there is no evidence that these four variables are independent predictors of stigma in the study population. The multiple linear regression model was not significant (F = 0.782; p = 0.540). Age, gender, education, and relationship with the patient were not

significantly associated with stigma. The adjusted R^2 value of 0.186 indicates that the model explains only approximately 18.6% of the variation in stigma scores, with the remaining 81.4% attributable to other factors not examined (Table 6).

Discussion

As a key family member in the healthcare environment, caregivers must be highly empathetic and aware of the impact of stigma, as caregivers' perceptions of breast cancer directly impact the patient's clinical care and health [13], [14]. Cancer caregivers also play an important role in accessing, interpreting, and applying health information for patients, making caregiver health literacy an important component of effective cancer care [15]. Moreover, communication that fails to make patients and family caregivers feel adequately informed, heard, and supported may adversely affect their cancer-care experiences [16]. However, although breast cancer is widely considered a stigmatized topic due to its close connection to women's identity and its socially sensitive nature, both locally and globally [17], stigma among caregivers, who support and assist patients throughout treatment, has not been sufficiently explored. Recognizing this gap, we used an adapted version of the breast cancer family caregiver stigma tool to evaluate the extent of family caregiver stigma toward breast cancer and identify associated factors. To our knowledge, this is the first study conducted in Bandung City and Indonesia using a stigma questionnaire among family caregivers, which could serve as a stepping stone to evaluate breast cancer stigma in the general population. We aim to use our findings to identify needed adjustments to the current nursing care delivery system, with the ultimate goal of supporting broader public health initiatives.

The high median breast cancer family caregiver stigma scores (above 95% of the maximum 7 points) observed likely reflect strong internal stigma of family caregivers, consistent with previous studies [18], who demonstrated a lack of cancer literacy among participants in breast cancer family caregiver education or training. However, even minimal levels of stigma warrant clinical attention, as evidence confirms that this can manifest through microaggressions or implicit bias that compromise the quality of care [19]. This highlights the need for interventions such as early, structured education and training that go beyond simply understanding caregiver knowledge to encompass non-judgmental communication, active listening, and self-awareness. Evidence from a systematic review and meta-analysis indicates that psychoeducational interventions can improve several psychological and informational outcomes among caregivers of patients with cancer [20]. Supporting breast cancer caregivers in developing these skills may therefore help create a care environment where patients feel heard, respected, and safe. However, some areas of stigma are more prominent than others.

Lower levels of stigma were also found in the internal stigma domain (65.2%), followed by the social isolation domain. Meanwhile, respondents also stigmatized the sections on

perceived stigma and reactions. Having internal stigma as the highest-scoring domain and social isolation as the lowest-scoring domain aligns with the multidimensional nature of stigma described in previous studies [21], [22]. More broadly, a systematic review and meta-analysis of women with breast cancer showed that stigma is associated with multiple psychosocial characteristics, including depression, coping, social support, self-efficacy, self-esteem, and body image [23]. Participants' high internal stigma domain scores may therefore reflect both concerns about breast cancer outcomes in Indonesia and exposure to inaccurate or incomplete cancer information. Indonesia's documented breast cancer mortality and frequent late-stage diagnosis may further reinforce perceptions of disease severity [1]. Among the 62% of family caregivers who primarily relied on social media for health information in our study, the quality of information encountered online may also be relevant. Recent evidence among adult social-media users showed that lower social-media informational awareness was associated with stronger cancer-fatalistic beliefs, although these findings were derived from a U.S. population and should not be interpreted as directly causal in the present Indonesian sample [24]. Breast cancer family caregiver education and training should therefore incorporate critical evaluation of online health content, survivor experiences, and accurate information regarding cancer prognosis and treatment outcomes.

This reform in providing education must accompany the expansion of the national screening program because low health literacy and misconceptions about diseases remain important barriers to early detection and utilization of health services [25][26]. Achieving this also requires equipping the public and future healthcare providers with clear, evidence-based information about cancer outcomes and proactively addressing fatalistic beliefs through structured education and communication. Cancer stigma can contribute to social exclusion, reduced social participation, psychological distress, and delayed health-seeking, emphasizing the need for stigma reduction to be incorporated into broader cancer-control programs [27]. Physical changes caused by cancer treatment, such as alopecia and surgical scars, may also affect cancer patients' relationships and social interactions, contributing to experiences of rejection and isolation [28], [29]. Especially in breast cancer, where mastectomy is one of the main lines of treatment, some cultures consider it a disfiguring procedure. In Indonesian society, misconceptions about breast cancer, including beliefs related to transmission and disease severity, may further contribute to social avoidance [6], [9], [30]. However, through greater familiarity with cancer treatment, caregivers may better understand that cancer is not contagious and may become less likely to perceive interventions such as mastectomy solely in terms of disfigurement or disability.

As a result, family caregivers of breast cancer patients may be less likely to avoid breast cancer survivors and more likely to perceive them as capable of maintaining social roles than

individuals with limited contact with cancer patients. Although contact with breast cancer patients helped reduce feelings of awkwardness, personal responsibility, and financial discrimination, our findings suggest that it had no significant impact on other stigmatizing beliefs, such as perceived stigma. Similarly, previous research has reported persistent stigma despite familiarity with cancer [10]. The persistence of perceived stigma surrounding the severity and life-threatening nature of breast cancer may stem from deeply ingrained cultural beliefs or personal experiences caring for advanced or fatal cases. Cancer-related fears are also highly relevant to caregivers themselves. A systematic review and meta-analysis found that fear of cancer recurrence among caregivers can be comparable to that experienced by survivors and is associated with anxiety and depression [31]. These emotional experiences may therefore persist even after direct exposure to breast cancer, particularly when interactions involve advanced illness or poor outcomes. Initial or superficial contact may not provide sufficient depth or emotional engagement to meaningfully challenge internalized assumptions about stigmatizing reactions. This suggests that clinical exposure alone may not be sufficient to address all aspects of stigma.

However, previous research suggests that combining exposure with structured education can produce more positive changes in attitudes [25]. Similarly, our results indicate that having a clinical understanding of breast cancer does not necessarily change perceptions of internal stigma. Given that family caregivers represent important home-based care providers, their attitudes are crucial because patients expect empathy and support rather than stigma from those providing care. Contrary to expectations, breast cancer family caregivers with a personal history of breast-related conditions had higher stigma scores, particularly for internal feelings, social isolation, and reactions. Although one might anticipate that personal experience would foster greater empathy and reduce stigma [10], the opposite pattern was observed. Individuals who have experienced breast health issues may themselves have encountered fear, stigma, or negative social responses, potentially influencing their subsequent attitudes toward similar conditions. This demonstrates the importance of addressing emotional responses as part of caregiver education. Evidence from systematic reviews indicates that supportive interventions for family caregivers of patients with cancer can improve psycho-emotional, social, and daily-functioning outcomes, although intervention components and effectiveness vary considerably [32].

The study found that stigma varied across domains. Bonferroni-corrected post hoc analysis showed internal stigma was higher than social isolation ($p < 0.001$) and reactions ($p = 0.001$). Social isolation also significantly differed from perceived stigma ($p < 0.001$) and reactions ($p < 0.001$). There was no difference between perceived stigma and reactions ($p = 0.710$) or between internal and perceived stigma ($p = 0.100$). Although reactions had the

highest mean rank, pairwise comparisons show that internal stigma and social isolation are more dominant. These domains consistently stood apart. Thus, family caregivers bear the greatest burden from internalizing negative beliefs and from social disconnection, rather than from overt emotional reactions.

The key recommendation is to improve health communication, correct misinformation, and strengthen health literacy to address internal stigma and social isolation among caregivers. While this study did not measure health literacy, exposure to misinformation, or education levels, previous evidence highlights the importance of misconceptions and limited access to understandable information. Therefore, targeted strategies should be tested in future research to determine their effectiveness in reducing stigma and isolation [33]. Evidence regarding health-literacy interventions for informal caregivers remains limited, but available studies indicate that interventions frequently target understanding of disease, treatment, day-to-day care, self-care, and engagement with healthcare providers [34]. Rather than recommending broad educational reforms, this study therefore recommends that future interventions specifically target internal stigma and social isolation, as these domains were prominent in the present sample. Future research should examine the roles of caregiver health literacy, breast cancer knowledge, and exposure to misinformation in shaping these domains. These steps may directly inform the design of more effective, evidence-based educational interventions [35].

This study found that internal stigma and social isolation are the main domains of stigma among family caregivers of women with breast cancer. Internal stigma was higher than social isolation and reactions, while social isolation differed from perceived stigma and reactions. These results reinforce the multidimensional nature of caregiver stigma. A recent psychometric study among caregivers of women with breast cancer also identified internal stigma, social isolation, perceived stigma, and reactions as core dimensions [36]. Our findings contrast with some studies from high-income settings, where perceived stigma or emotional responses may be expressed differently. This difference may reflect sociocultural context. In Indonesia, caregiving commonly occurs within family-centered relationships, and decisions and communication about serious illness may involve multiple family members. Evidence from Asian cancer settings similarly indicates that family harmony, implicit communication, and family-centered decision making are important cultural features of cancer care [37]. Such cultural patterns may strengthen caregiving commitment while also making caregivers reluctant to express psychological distress openly. Consequently, stigma may be manifested through internalization and social withdrawal rather than overt emotional reactions.

Methodological differences may also explain variations across studies. We studied family caregivers of women with breast cancer using a multidimensional stigma instrument, whereas other investigations have included caregivers of different patient groups or focused

primarily on patients themselves. Variations in measurement tools, study designs, participant characteristics, and cultural settings can therefore lead to differences in reported stigma domains. Our study did not measure health literacy or caregiving competence. Prior research indicates that caregiver health literacy is relevant to information processing, communication, coping, and care provision [28], although our findings cannot establish such an association. In summary, internal stigma and social isolation were predominant within this Indonesian study population, but these findings should not be generalized to all caregiver groups. Multicenter and cross-cultural studies are needed to determine whether caregiver characteristics, health literacy, healthcare systems, and cultural beliefs explain variations in stigma across countries [25], [37].

Conclusion

Breast cancer stigma among family caregivers is relatively high, although some aspects are lower than others. Breast cancer stigma levels were associated with participants' sociodemographic characteristics such as gender, age, education, and family relationships, as well as other factors such as contact with breast cancer patients and personal history of breast problems. Given their future role as advocates for healthcare providers, breast cancer family caregivers must be equipped with the empathy and understanding necessary to combat stigma at home and in the community. Targeted interventions should involve educational reforms that integrate anti-stigma training, taking into account high-risk groups such as children of patients. Future research should expand to include breast cancer family caregiver populations and adopt longitudinal designs to evaluate the effectiveness of stigma-reduction strategies. Broader cross-cultural comparisons could also reveal how different educational and healthcare systems mediate stigma, offering more global solutions to address this critical public health issue in low- and middle-income countries.

Interpret the practical implications of the statistical findings. The analysis showed that age, sex, education, and relationship to the patient did not independently predict stigma. Demographic factors alone cannot identify caregivers at higher risk. Therefore, the findings do not justify targeting anti-stigma interventions based only on demographic profiles. The domain analysis provides clearer guidance for developing interventions. Pairwise comparisons with Bonferroni correction showed that internal stigma and social isolation stood out. Thus, anti-stigma efforts should focus on caregivers' negative beliefs, shame, self-blame, and social withdrawal. Demographics are less important. Educational efforts are more effective if they include coping strategies, normalize emotional experiences, boost self-efficacy, and connect caregivers to social support. These approaches align with the main stigma dimensions identified in the study.

Because demographic predictors were not significant, stigma likely depends more on psychosocial and caregiving factors. Demographics seem less important. Previous studies point to caregiving burden, psychological distress, health literacy, breast cancer knowledge, coping strategies, social support, and caregiving duration as possible influences. However, this study did not assess these variables. We cannot evaluate their impact here. Future research should include these factors to identify high-risk caregiver groups and develop evidence-based interventions. In summary, anti-stigma programs should align with the primary areas of stigma identified in this study. They should not focus on specific demographic groups. By targeting these dimensions, interventions are grounded in solid evidence. This makes stigma reduction efforts more effective for family caregivers of breast cancer patients.

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Conflict of Interest

The authors declare no conflict of interest.

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