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Survival Analysis of Breast Cancer Patients at Andalas University Hospital from 2019 to 2023

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ABSTRACT

Background: Breast cancer is one of the leading health problems among women worldwide, including in Indonesia. More than 80% of cases in Indonesia are diagnosed at an advanced stage and are associated with low survival rates.

Objective: This study aims to analyze the survival of breast cancer patients at Andalas University Hospital from 2019 to 2023.

Methods: This study employed a retrospective cohort design. Secondary data were collected from breast cancer patients at Andalas University Hospital between 2019 and 2023. A total of 52 breast cancer patients were selected using simple random sampling. The data were analyzed using survival analysis methods, including the log-rank test, Kaplan–Meier curves, and Cox regression.

Results: During the five-year observation period, 63.5% of patients experienced the event of interest. Most breast cancer patients at Andalas University Hospital from 2019 to 2023 were over 45 years old (75.0%), unemployed (69.2%), diagnosed at clinical stage IV (40.4%), had anemia (51.9%), and received combination therapy (59.6%). A significant association was found between cancer stage and patient survival. However, age, employment status, type of treatment, and anemia status were not significantly associated with breast cancer patient survival.

INTRODUCTION

Breast cancer is the most common type of cancer among women worldwide. Globally, it ranks second among all types of cancer and is the fourth leading cause of cancer-related deaths.[1–3]. Of all cancer cases in women, approximately 31% are breast cancer [4]. According to GLOBOCAN data from 2022, there were an estimated 2.3 million new cases of breast cancer, with around 680,000 deaths [3]. By the end of 2020, approximately 7.8 million women were living with a breast cancer diagnosis made more than five years earlier, making it the most prevalent type of cancer worldwide [5].

In developing countries such as Indonesia, breast cancer represents a major public health concern with a significant impact on women's health [6]. The high mortality rate in these regions is largely attributed to delays in screening and early diagnosis, with about 70% of new cases being detected at an advanced stage

[7,8]. In 2022, Indonesia reported 408,661 new cancer cases and 242,988 cancer-related deaths, with breast cancer being the leading cause of cancer mortality among women [3,9]. The incidence rate of breast cancer in Indonesia was 41.8 per 100,000 population, with a mortality rate of 14.4 per 100,000 population [9]. These data underscore the critical need for effective prevention strategies, early detection programs, timely and appropriate treatment, and comprehensive rehabilitation services to improve outcomes and quality of care for breast cancer patients in Indonesia [10].

In West Sumatra Province, data from the Provincial Health Office reported that 4,741 cancer patients were treated in provincial hospitals, with 472 of these cases resulting in death. Andalas University Hospital (RS Unand) is one of the referral hospitals that provides comprehensive radiotherapy services, equipped with advanced facilities such as a CT simulator, C-Arm, brachytherapy, and a linear accelerator. Along with Dr. M. Djamil Central General Hospital, RS Unand serves as a key radiotherapy center in the West Sumatra region. As cancer cases continue to rise, the number of patients utilizing radiotherapy services has also increased.

As one of the hospitals with advanced radiotherapy facilities, Andalas University Hospital (RS Unand) has reported a steady increase in the number of patients utilizing these services [11]. Over the past three years, the number of cases rose from 210 in 2019 to 226 in 2020, and reached 242 in 2021. This trend highlights the urgency of evaluating the effectiveness of care and patient survival outcomes. Breast cancer patients may live up to 20 years following diagnosis [12]. However, five-year survival rates vary significantly depending on the stage at diagnosis. Patients diagnosed at stage I have a 100% five-year survival rate, whereas those at stages II, III, and IV have survival rates of approximately 90%, 70%, and 25%, respectively [13]. This indicates that only about 25% of patients diagnosed with stage IV breast cancer survive beyond five years. A study conducted by Arlinda Sari Wahyuni in 2008 reported a five-year survival rate of 0.48 for breast cancer patients [14].

Survival analysis can be used to assess the duration of patient survival from the time of diagnosis or the start of treatment until the occurrence of a specific event, such as death, recovery, or disease recurrence [15]. The main benefits of survival analysis include: (1) estimating the probability of survival within a given time frame, (2) evaluating the health status of a population, (3) comparing survival outcomes between groups, and (4) identifying event rates over a certain period [16]. Data used in survival analysis typically include observations of individuals who have experienced the event (uncensored) as well as those who have not experienced the event by the end of the observation period (censored) [17].

Based on the aforementioned background, this study aims to analyze the survival of breast cancer patients at Andalas University Hospital during the period of 2019 to 2023. The findings are expected to provide

insights into the effectiveness of treatment services and serve as a foundation for developing strategies to improve the quality of cancer care in Indonesia, particularly for breast cancer patients in West Sumatra.

METHODS

This study employed a quantitative approach using an observational analytic design with a retrospective cohort study framework. The research was conducted at Andalas University Hospital between April and November 2024. The primary focus of this study was to evaluate the survival of breast cancer patients who underwent treatment at the hospital between 2019 and 2023.

Time was defined as the follow-up duration from the initial diagnosis of breast cancer until death or the end of the observation period. Patients were considered censored if they were still alive at the end of the study, were lost to follow-up, or discontinued observation for other reasons. The event of interest was death occurring during the study period.

The study population included all patients diagnosed with breast cancer and undergoing treatment at Andalas University Hospital during the five-year period from 2019 to 2023. The sample consisted of patients who met the inclusion criteria: having complete medical records, receiving at least one primary treatment modality (radiotherapy, chemotherapy, or surgery), and not lost to follow-up during the observation period. Sampling was conducted using simple random sampling with the aid of computer software to ensure that each member of the population had an equal chance of being selected as a study participant.

The required sample size was determined using the Lemeshow formula for survival studies, taking into account the survival rate reported in previous research. Based on a study by Arlinda Sari Wahyuni, the five-year survival rate for breast cancer patients was 48%. Using this parameter, the minimum required sample size for this study was calculated to be 52 patients.

For the sampling process, a simple random sampling technique was employed, in which all individuals in the population had an equal opportunity to be selected. The randomization was performed using a computer-based application. Data were analyzed using survival analysis methods, including the log-rank test, Kaplan-Meier survival curves, and Cox proportional hazards regression. Cox proportional hazards regression analysis was performed to assess the association and the magnitude of the effect of each independent variable on the dependent variable, expressed as a Hazard Ratio (HR). Variables were considered significantly associated when the p-value was ≤ 0.05 .

RESULTS AND DISCUSSION

The results of the study on 52 breast cancer patients from 2019 to 2023 showed that 63.5% experienced an event (i.e., patients who had died by the end of the observation period). This is presented in Table 1.

Table 1. Frequency Distribution of Final Status of Breast Cancer Patients at Andalas University Hospital, 2019–2023

Final Status	Frequency	%
Censored	19	36.5
Event	33	63.5
Total	52	100.0

The characteristics of breast cancer patients at Andalas University Hospital from 2019 to 2023 showed that the majority were over 45 years old (75.0%) and unemployed (69.2%). Most patients were diagnosed at clinical stage IV (40.4%). In addition, the majority of patients had anemia (51.9%) and received combination therapy (59.6%). These characteristics are presented in the table below.

Table 2. Frequency Distribution of Breast Cancer Patient Characteristics at Andalas University Hospital, 2019–2023

Variable	Frequency	%
Age		
≥ 45 years	39	75.0
< 45 years	13	25.0
Employment Status		
Unemployed	36	69.2
Employed	16	30.8
Cancer Stage		
Stage 1	3	5.87
Stage 2	10	19.2
Stage 3	18	34.6
Stage 4	21	40.4
Anemia Status		
Anemia	27	51.9
Non-anemia	25	48.1
Type of Treatment		
Radiotherapy	19	36.5
Chemotherapy	2	3.8
Combined therapy	31	59.6

The findings of this study are consistent with research by Elmika (2020), which reported that the majority of breast cancer cases occurred in the 45–64 age group (60.5%). Breast cancer generally affects middle-aged and elderly women [18].

The Relationship Between Age and Survival Among Breast Cancer Patients

This study found a significant difference in the survival curves between age groups, with a log-rank p-value of 0.045 (< 0.05). Furthermore, the analysis yielded a p-value of 0.053 (> 0.05), indicating that age was not significantly associated with the survival of breast cancer patients. There was a notable difference in the average survival time between patients aged ≥ 45 years and those aged < 45 years. These findings are

consistent with the study conducted by Ayuza (2020), which reported that age groups demonstrated differences in mean survival time [19]. The risk of breast cancer increases with age, with the majority of cases diagnosed after the age of 50 [20]. In particular, younger patients diagnosed at advanced stages tend to experience more aggressive tumor progression and a higher risk of recurrence [21].

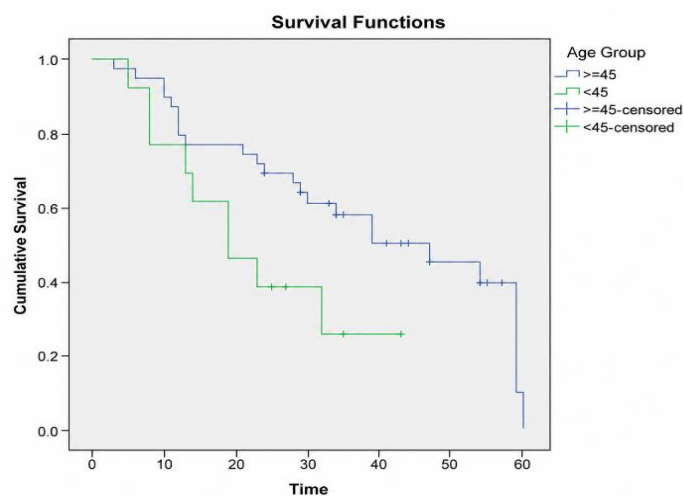


Figure 1. Kaplan-Meier Survival Curve Based on Age

Figure 1 shows that breast cancer patients under the age of 45 had a lower survival probability compared to those aged 45 and older. Patients aged ≥ 45 years had a mean survival time of 39 months, with 50% experiencing the event by month 47. In contrast, patients aged < 45 years had a mean survival time of 23 months, with 50% experiencing the event by month 19.

The Relationship Between Employment Status and Survival Among Breast Cancer Patients

This study did not find any significant differences in the survival curves of breast cancer patients based on employment status, with a log-rank p-value of 0.527 (> 0.05). These results indicate that there is no significant difference in the mean survival time between employed and unemployed breast cancer patients.

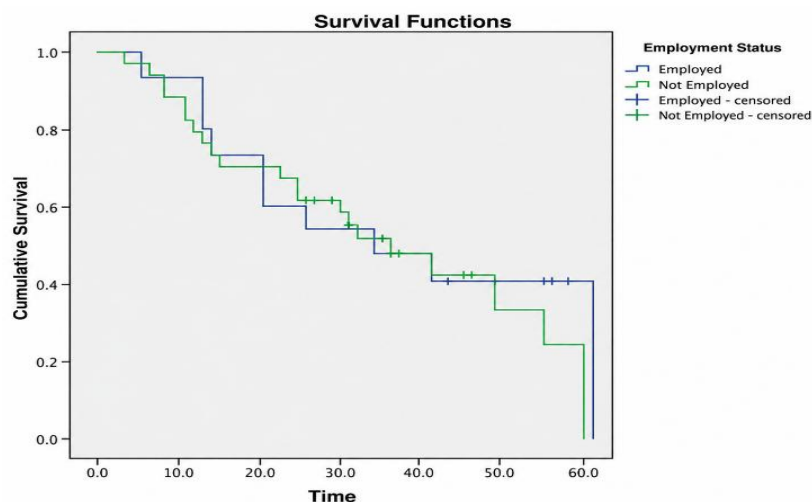


Figure 2. Kaplan-Meier Survival Curve Based on Employment Status

Figure 2 shows no apparent difference in survival probability based on employment status. Among breast cancer patients who were unemployed, the mean survival time was 35 months, with 50% experiencing the event by month 39. In comparison, employed patients had a mean survival time of 37 months, with 50% experiencing the event by month 32.

The Relationship Between Cancer Stage and Survival Among Breast Cancer Patients

This study did not find a statistically significant difference in the survival curves of breast cancer patients based on clinical stage according to the log-rank test ($p = 0.120$). This result indicates that the overall survival distributions across clinical stages were not significantly different in the Kaplan–Meier analysis. However, Cox proportional hazards regression analysis demonstrated a statistically significant association between clinical stage and survival ($p = 0.044$). In the Cox regression model, patients diagnosed at clinical stage IV had a higher risk of mortality compared with those diagnosed at clinical stage I (HR = 1.59; 95% CI: 1.014-2.494). This analysis was conducted using a multivariable Cox proportional hazards model, and the proportional hazards assumption was assessed prior to the analysis.

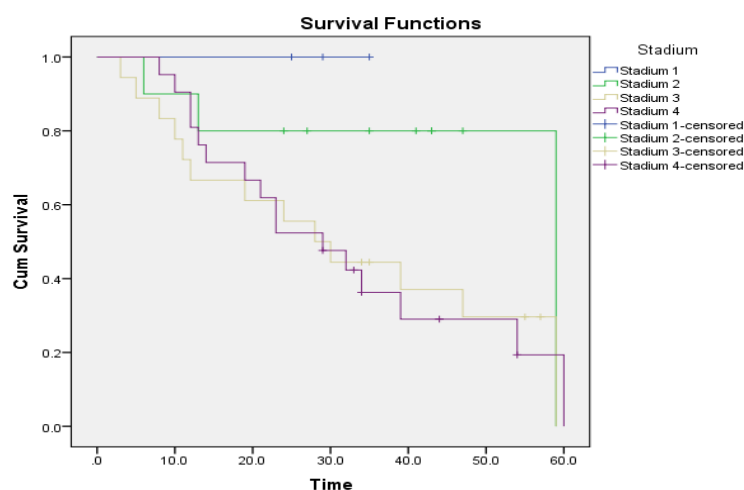


Figure 3. Kaplan-Meier Survival Curve by Clinical Stage

Figure 3 shows that patients diagnosed at clinical stage IV have a lower survival probability compared to those diagnosed at clinical stage I. This finding is consistent with the study by Jessika Aurora Samosir, which reported that breast cancer patients at stage I have a significantly lower risk of experiencing an event compared to those at stage IV [22]. Among stage IV patients, those with the HR-/HER2- subtype demonstrated the poorest prognosis, with a median overall survival (OS) of only 11 months [23]. Another study reporting similar findings was conducted by Maulida in 2019. The survival probability observed based on clinical stage was 94.4% in early-stage breast cancer and 50.3% in advanced-stage

disease. The lower survival rate in advanced stages is attributed to greater lymph node involvement, indicating a reactive immune response. Furthermore, in advanced stages, the cancer has typically metastasized to other organs, resulting in impaired organ function and increased susceptibility to infections [24].

Association Between Anemia Status and Breast Cancer Patient Survival

This study did not find any significant differences in the survival curves of breast cancer patients based on anemia status, with a log-rank p-value of 0.521 (> 0.05). There was no difference in the average survival time between patients with anemia and those without anemia.

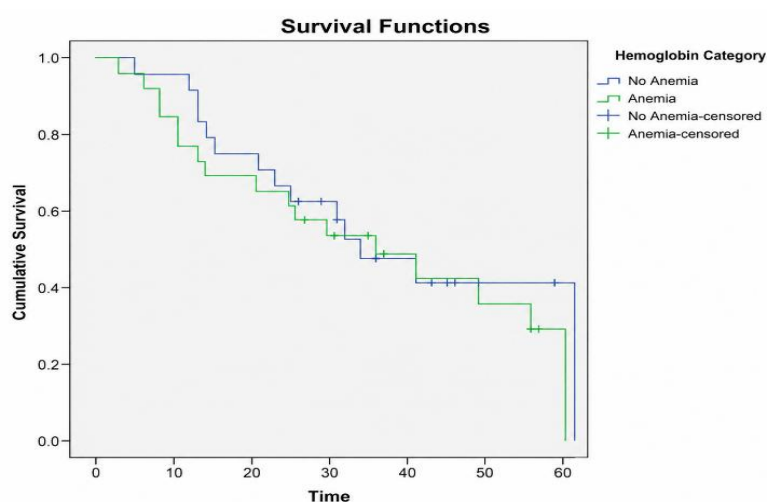


Figure 4. Kaplan-Meier Survival Curve Based on Anemia Status

Figure 4 illustrates that there is no significant difference in survival probability based on the anemia status of breast cancer patients. Patients with anemia had a mean survival time of 35 months, with 50% experiencing the event at month 39. In contrast, non-anemic patients had a mean survival time of 38 months, with 50% experiencing the event at month 32. Although this difference was not statistically significant (log-rank $p = 0.521$), it is important to consider nutritional status, including iron levels, as part of a broader health promotion strategy to potentially improve survival outcomes among breast cancer patients [25].

Association Between Treatment Modality and Survival of Breast Cancer Patients

In this study, no significant difference was found in the survival curves of breast cancer patients based on treatment modality, with a log-rank p-value of 0.646 (> 0.05). The mean survival time of breast cancer patients did not significantly vary among those who received radiotherapy, chemotherapy, or combination therapy, as shown in Figure 5.

These findings are consistent with the study by Ayuza (2020), which reported no statistically significant association between treatment factors (hormone therapy, radiotherapy, and targeted therapy) and survival

among young breast cancer patients in Padang City [19]. However, contrasting results were reported by Ru Wang (2019), who found that radiotherapy and chemotherapy were significantly associated with improved survival in breast cancer patients [26].

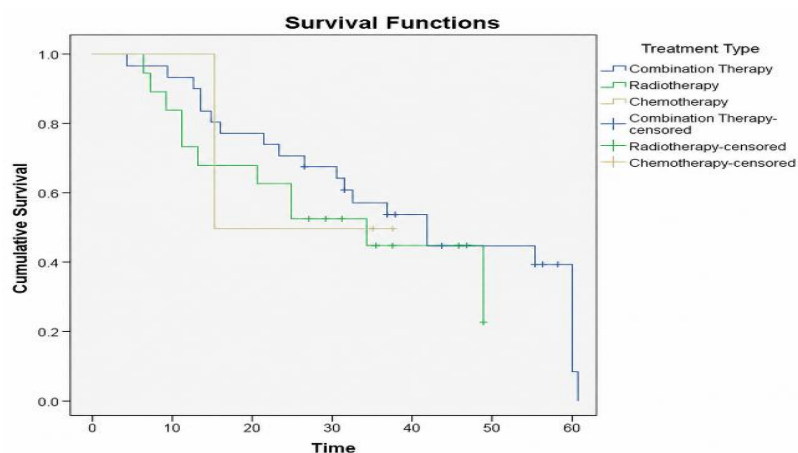


Figure 5. Kaplan-Meier Survival Curve Based on Treatment Modality

Figure 5 shows that breast cancer patients who underwent radiotherapy had an average survival time of 29 months, with 50% experiencing an event at 32 months. Patients who received chemotherapy had an average survival time of 24 months, with 50% experiencing an event at 13 months. Meanwhile, patients who received a combination of radiotherapy and chemotherapy had an average survival time of 38 months, with 50% experiencing an event at 39 months.

These findings are consistent with a study by Rifki Pradika, which reported that breast cancer patients undergoing chemotherapy had a higher survival probability compared to those who did not receive treatment for breast cancer [27]. Furthermore, according to the National Cancer Institute (2021), the addition of chemotherapy in breast cancer management significantly improves the 5-year survival rate, increasing it from 60% to 88% among high-risk groups [28].

This study has several limitations that should be considered when interpreting the findings. First, this study used a retrospective cohort design based on secondary data obtained from medical records. Therefore, the quality and completeness of the data depended on the accuracy of the documentation in the medical records. Some potentially important clinical variables that may influence the survival of breast cancer patients, such as tumor molecular subtype, treatment adherence, and comorbid conditions, were not fully available and therefore could not be included in the analysis.

Second, the sample size in this study was relatively limited and derived from a single referral hospital, which may limit the generalizability of the findings to broader populations of breast cancer patients.

Third, the observation period was restricted to the available data from 2019 to 2023, resulting in variations in follow-up time among patients that may influence the estimation of survival outcomes. Future studies are recommended to include larger sample sizes, involve multiple healthcare facilities, and incorporate more comprehensive clinical and biological variables to provide a more robust understanding of the factors associated with breast cancer survival.

CONCLUSION

Breast cancer patients experienced an event rate of 63.5% over the five-year observation period. The majority of breast cancer patients at Universitas Andalas Hospital (RS Unand) from 2019 to 2023 were over 45 years old (75.0%), unemployed (69.2%), at clinical stage IV (40.4%), anemic (51.9%), and received combination therapy (59.6%). Based on the Kaplan-Meier survival curves, there was a significant difference in survival curves by age group, although no significant hazard ratio (HR) was observed. Cox regression analysis revealed a significant association between cancer stage and survival outcomes. In contrast, age, employment status, type of treatment, and anemia status were not significantly associated with the survival of breast cancer patients.

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REFERENCES

1. Icanervilia, A.V.; Chorida, L.; Van Asselt, A.D.I.; Vervoort, J.P.M.; Postma, M.J.; Rengganis, A.A.; Kardinah, K. Early Detection of Breast Cancer in Indonesia: Barriers Identified in a Qualitative Study. *Asian Pac J Cancer Prev* **2023**, *24*, 2749–2755, doi:10.31557/APJCP.2023.24.8.2749.
2. Ji, P.; Gong, Y.; Jin, M.-L.; Hu, X.; Di, G.-H.; Shao, Z.-M. The Burden and Trends of Breast Cancer From 1990 to 2017 at the Global, Regional, and National Levels: Results From the Global Burden of Disease Study 2017. *Front Oncol* **2020**, *10*, 650, doi:10.3389/fonc.2020.00650.
3. Bray, F.; Laversanne, M.; Sung, H.; Ferlay, J.; Siegel, R.L.; Soerjomataram, I.; Jemal, A. Global Cancer Statistics 2022: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians* **2024**, *74*, 229–263, doi:10.3322/caac.21834.
4. Yan, Q.; Deng, Y.; Zhang, Q. A Comprehensive Overview of Metaplastic Breast Cancer: Features and Treatments. *Cancer Sci* **2024**, *115*, 2506–2514, doi:10.1111/cas.16208.
5. Suyatno; Andinata, B.; Wibisana, I.G.; Pasaribu, E.T.; Triputra, Y.; Putri, M.W.; A., S.; Gondhowiardjo; Kardinah; Mangesti, U. *Panduan Tatalaksana Kanker Payudara*; Perhimpunan Ahli Bedah Onkologi Indonesia (PERABOI), 2023;
6. Solikhah, S.; Lianawati, L.; Matahari, R.; Rejeki, D.S.S. Determinants of Breast Cancer Screening Practice among Women in Indonesia: A Nationwide Study. *Asian Pac J Cancer Prev* **2021**, *22*, 1435–1441, doi:10.31557/APJCP.2021.22.5.1435.

7. Ferlay, J.; Soerjomataram, I.; Dikshit, R.; Eser, S.; Mathers, C.; Rebelo, M.; Parkin, D.M.; Forman, D.; Bray, F. Cancer Incidence and Mortality Worldwide: Sources, Methods and Major Patterns in GLOBOCAN 2012. *Int J Cancer* **2015**, *136*, E359-386, doi:10.1002/ijc.29210.
8. Kementerian Kesehatan RI Kanker Payudara Paling Banyak di Indonesia, Kemenkes Targetkan Pemerataan Layanan Kesehatan. *Sehat Negeriku* 2022.
9. Kementerian Kesehatan RI *Rencana Kanker Nasional 2024-2034*; Kementerian Kesehatan Republik Indonesia, 2024;
10. Kementrian Kesehatan RI *Pedoman nasional pelayanan kedokteran tata laksana kanker payudara*; 2018; Vol. NOMOR HK.0, pp. 1–111;.
11. Data Pusat Radioterapi | Welcome to Perhimpunan Onkologi Radiasi Indonesia.
12. Narod, S.A.; Giannakeas, V.; Sopik, V. Time to Death in Breast Cancer Patients as an Indicator of Treatment Response. *Breast Cancer Res Treat* **2018**, *172*, 659–669, doi:10.1007/s10549-018-4935-3.
13. Survival for Breast Cancer Available online: <https://www.cancerresearchuk.org/about-cancer/breast-cancer/survival> (accessed on 12 June 2025).
14. Wahyuni, A.S. Analisis Ketahanan Hidup 5 Tahun Pada Penderita Kanker Payudara Di Rumah Sakit Kanker Dharmais, Universitas Indonesia, 2008.
15. Kleinbaum, D.G. *Survival Analysis: A Self-Learning Text - 2nd Edition*; Springer-Verlag New York, 2005; ISBN 9780387239187.
16. Kleinbaum, D.G.; Klein, M. *Survival Analysis: A Self-Learning Text Third Edition*; Springer: New York, 2012; ISBN 978-1-4419-6646-9.
17. Collett, D. *Modelling Survival Data in Medical Research*; 3rd Editio.; Chapman and Hall/CRC: New York, 2015; ISBN 9781439856789.
18. Elmika, E.; Adi, S.M. DOI: [Http://Dx.Doi.Org/10.33846/Sf11101](http://Dx.Doi.Org/10.33846/Sf11101) Gambaran Umur, Dan Jenis Kelamin Pasien Kanker Payudara Di RS Ibnu Sina Kota Makassar Elma Elmika. *Penelitian Kesehatan Suara Forikes* **2020**, *11*, 422–424.
19. Ayuza, M.; Harahap, W.A.; Rustam, R.; Nindrea, R.D. Faktor Yang Berpengaruh Terhadap Disease Free Survival Dan Overall Survival Pada Pasien Kanker Payudara Usia Muda Di Kota Padang Tahun 2008 - 2018. *Jurnal Kesehatan Andalas* **2020**, *9*, 65–73, doi:10.25077/jka.v9i1s.1157.
20. Centers for Disease Control and Prevention (CDC) Breast Cancer Risk Factors Available online: <https://www.cdc.gov/breast-cancer/risk-factors/index.html> (accessed on 27 April 2025).
21. Evi Susanti Sinaga, R.A.A.; Hutajulu, S.H. Analisis Ketahanan Hidup 5 Tahun Pada Pasien Kanker Payudara Di RS Sardjito Provinsi Yogyakarta, Indonesia Analysis of 5-Year Survival of Patients Treated for Breast Cancer at Sardjito Hospital in Yogyakarta Province, Indonesia. *Berita Kedokteran Masyarakat* **2017**, *33*, 67–72.
22. Samosir, J.A.; Maruddani, D.A.I.; Statistika, D.; Diponegoro, U. Perbandingan Model Regresi Stratified Cox Dan Extended Cox Pada Analisis Survival Penderita Kanker Payudara. *JURNAL GAUSSIAN* **2024**, *13*, 59–69, doi:10.14710/j.gauss.13.1.59-69.
23. Li, X.; Zhang, X.; Liu, J.; Shen, Y. Prognostic Factors and Survival According to Tumour Subtype in Women Presenting with Breast Cancer Bone Metastases at Initial Diagnosis: A SEER-Based Study. *BMC Cancer* **2020**, *20*, 1–12, doi:10.1186/s12885-020-07593-8.
24. MAULIDA, E.A. ANALISIS KETAHANAN HIDUP PENDERITA KANKER PAYUDARA MENGGUNAKAN REGRESICOX PROPORTIONAL HAZARDDAN METODE KAPLAN MEIER. **2019**, 1–23.
25. Escala-Garcia, M.; Morra, A.; Canisius, S.; Chang-Claude, J.; Kar, S.; Zheng, W.; Bojesen, S.E.; Easton, D.; Pharoah, P.D.P.; Schmidt, M.K. Breast Cancer Risk Factors and Their Effects on Survival: A Mendelian Randomisation Study. *BMC Medicine* **2020**, *18*, 1–10, doi:10.1186/s12916-020-01797-2.
26. Wang, R.; Zhu, Y.; Liu, X.; Liao, X.; He, J.; Niu, L. The Clinicopathological Features and Survival Outcomes of Patients with Different Metastatic Sites in Stage IV Breast Cancer. *BMC Cancer* **2019**, *19*, 1–12, doi:10.1186/s12885-019-6311-z.

27. Pradika, R.; Priatna, B.A. Aplikasi Metode Kaplan Meier Sebagai Penduga Ketahanan Hidup Penderita Kanker Payudara. *Jurnal EurekaMatika* **2021**, *9*, 35–44, doi:10.17509/jem.v7i2.22133.
28. Suganda, A.; Wiratmoko, W.; Marhayuni, E.; Yuniastini Grading Grade 3 Grade 2 Grade 1 Total Frekuensi. *Medika Malahayati* **2021**, *5*, 77–82.