

Trends and Projections of Breast Cancer Cases in a Private Hospital in Bandung, West Java, Indonesia, 2018-2033: A Hospital Registry-Based Study

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Abstract

Breast cancer is the most commonly diagnosed cancer among women in Indonesia, making trend monitoring essential for service planning. Objective: To analyze trends and project breast cancer cases for 2026–2033 by age group and domicile at a private hospital in West Java, Indonesia. This retrospective study used hospital cancer registry data from Santosa Bandung Kopo Hospital. All cases recorded in 2018–2025 were included using total sampling (n=8,884). Joinpoint regression estimated the annual percent change (APC) and average annual percent change (AAPC); projections were obtained by extrapolating the AAPC. Results: Cases increased with an AAPC of 14.44% (95% CI:9.26-19.86; p=0.001), slowing in 2023–2025 (APC=-4.82%; 95% CI:22.91-17.53; p=0.510). The 45–54 year group had the most cases, while the 65–74 year group had the fastest increase (AAPC = 19.58%; 95% CI:13.64–25.83; p=0.001). Patients from outside Bandung were the largest domicile group, whereas Bandung Regency showed the fastest increase (AAPC=16.09%; 95% CI: 11.68–20.67; p=0.001). Projected cases rose from 8,884 in 2025 to in 2033. Conclusion: Projections assume historical AAPC continues and represent hospital service demand scenarios, not definitive population predictions.

Keywords: breast cancer; cancer registry; trend analysis; projection; joinpoint regression

1. Introduction

Breast cancer is the most common cancer globally and drives substantial mortality.(Freihat et al., 2025) Global action is required, particularly in transitioning countries with rising incidence and high death rates. (Arnold et al., 2022) In Indonesia, cancer is a public health problem with a high prevalence. Based on the National Cancer Plan 2024–2034 which refers to GLOBOCAN 2022 estimates, there were more than 408,661 new cases and almost 242,099 deaths due to cancer. Breast cancer ranks first in incidence and mortality in women, with an incidence rate of 41.8 per 100,000 population.(Ferlay et al., 2024)(Filho et al., 2025)

In West Java Province, the burden of breast cancer is also quite high, as shown by the number of suspected cases of breast cancer and the results of early detection

examinations (SADANIS) in recent years. (Kementerian Kesehatan RI, 2024b) (Kementerian Kesehatan RI, 2024a)

Monitoring this burden depends on cancer registration systems that record, manage, and monitor neoplasm cases in a planned, structured, and continuous manner. Indonesia follows World Health Organization standards through CanReg5, and has developed SRIKANDI nationally and SIREKAN in West Java. Hospital cancer registries complement these systems because they hold routinely recorded diagnosis dates, patient age, and domicile, which allow hospitals to monitor case trends and anticipate demand for diagnostic, treatment, and oncology services.

One of the health service facilities that has a cancer service center and cancer registration team is Santosa Hospital Bandung Kopo. The Cancer Service Center at Santosa Hospital Bandung Kopo was

founded in 2016 and began implementing cancer registration using CanReg5 since 2018. The registration data includes patient identity, demographic characteristics, cancer information, date of cancer occurrence, and the patient's latest status. The existence of this data makes it possible to use the cancer registry not only as a means of recording and reporting, but also as a data source for analyzing case developments and planning health services. (Kementerian Kesehatan RI, 2024b)

Based on cancer registration data at Santosa Hospital Bandung Kopo, breast cancer is the type of cancer with the highest number of recorded cases. Data for the 2018–2025 period after the cleaning and validation process was carried out showed 8,884 cases of breast cancer. The number of recorded cases has changed from year to year and generally shows an increasing trend during the observation period. This condition shows the need to analyze patterns of changes in cases temporally and estimate case developments in the future period. Information regarding case trends can be used as a basis for anticipating the need for breast cancer examination, diagnosis and treatment services.

Age is a component of human biology in determining Marc Lalonde's health and is an important characteristic in the epidemiology of breast cancer. The risk of breast cancer tends to increase with age, especially in older women. More than two-thirds of invasive breast cancer cases occur in women aged 55 years or older, indicating a link between the aging process and the development of breast cancer. Biological and hormonal changes that occur throughout a woman's life can cause different characteristics at each age phase. Therefore, analysis by age group is needed to describe the distribution patterns and changes in breast cancer cases more specifically. (Ayman, Malek, & Amin, 2023)

The age groupings in this study refer to the age groups used by the Surveillance, Epidemiology, and End Results (SEER) Program, namely 15–44 years, 45–54 years, 55–64 years, 65–74 years, and ≥ 75 years. This

grouping is used to classify cases based on age groups so that the pattern of breast cancer cases can be analyzed in a more structured manner in each age group. Based on these groupings, this study used five age groups, namely 15–44 years, 45–54 years, 55–64 years, 65–74 years, and ≥ 75 years. (National Cancer Institute, 2026)

Apart from age, patient domicile was analyzed to describe the geographic distribution of breast cancer cases receiving services at Santosa Hospital Bandung Kopo. Domicile information is not used to measure the risk of breast cancer, but to show the distribution of cases based on the patient's area of residence. This geographic information can provide an overview of the area of origin of patients receiving services and can be supporting information in considering resource distribution and health service strategies. (Ng et al., 2023)

Previous studies have mostly focused on epidemiological features, case distribution, factors associated with breast cancer, or case trends over time. There is still a gap in the use of hospital-based cancer registry data to analyze temporal trends as well as describe case patterns based on age group and domicile and use them to estimate the number of recorded cases in the future period. To identify changes in trends, an analytical method is needed that is able to describe changes in the rate of cases over time. Joinpoint Regression is a temporal trend analysis method that can identify trend change points (joinpoints) and calculate Annual Percent Change (APC) and Average Annual Percent Change (AAPC). (Clegg et al., 2009) This method allows changes in case rates in different periods to be identified more specifically compared to trend analysis which only describes general changes. In this study, Joinpoint Regression was used to analyze trends in breast cancer cases for the 2018–2025 period and obtain APC and AAPC values, while projections for 2026–2033 were carried out by extrapolating the AAPC values obtained from the results of trend analysis. (Li et al., 2022; Xu et al, 2020)

Different from previous studies which generally analyzed trends or distribution of cases separately, this study integrates analysis of temporal trends, age distribution, domicile patterns, and projections of service needs using hospital-based cancer registry data. The novelty of the research addresses that gap by integrating hospital registry data, Joinpoint regression, age and domicile analysis, and case projection in one framework for service planning..

Therefore, this study aimed to analyze temporal trends (2018–2025), age characteristics, and domicile of breast cancer cases, and to project the number of cases for 2026–2033 using hospital registry data from a private hospital in West Java, Indonesia..

2. Method

This research uses a quantitative analytical design with a retrospective approach. Secondary data was obtained based on cancer registration at one of the main private cancer referral hospitals in Bandung City, West Java for the period 2018–2025, when the research was carried out from December 2025 to February 2026. Therefore, the findings reflect patients treated at this facility and do not represent the breast cancer burden of any specific region. Accordingly, the projections should be interpreted as estimates of hospital service demand, not population incidence.

Study population and case definition.

This retrospective study used data from the cancer registry of the Cancer Center, Santosa Hospital Bandung Kopo. The study population comprised all breast cancer patients recorded in the registry between January 2018 and December 2025, and data were extracted from December 2025 to February 2026. A total sampling technique was applied to all records meeting the eligibility criteria.

A case was operationally defined as one unique patient with a first recorded diagnosis of breast cancer (ICD-10 code C50) in the registry during the study period. The year of diagnosis was used to assign each case to a calendar year.

Inclusion criteria: (1) a diagnosis of breast cancer coded C50 in the registry; (2) a diagnosis date within 2018–2025; and (3) a valid medical record number (MRN) or national identification number (NIK).

Exclusion criteria: (1) records with a missing diagnosis date; (2) records with a diagnosis other than C50 or coded as metastasis to the breast from another primary site; and (3) records that could not be uniquely identified because of missing or invalid identifiers.

Each patient was counted only once. Duplicates were identified in three steps. First, records sharing the same MRN or NIK were treated as the same patient. Second, for records with a missing or invalid NIK, a match on full name, date of birth, and sex was used to detect possible duplicates, followed by manual verification against the medical record. Third, when a patient had more than one record, the entry with the earliest diagnosis date was retained as the incident case and later entries (for example, follow-up visits or repeat registrations) were removed.

Research variables consist of trends in breast cancer cases, projected number of cases in 2026–2033, age, and domicile. Trends were analyzed using the Joinpoint Regression model to obtain Annual Percentage Change (APC) and Average Annual Percentage Change (AAPC) values. Age was categorized into 15–44 years, 45–54 years, 55–64 years, 65–74 years, and ≥ 75 years, while domicile was grouped into Bandung City, Bandung Regency, and outside the region.

Data collection was carried out through documentation studies of cancer registration data from the CanReg5 and SIREKAN systems which are available in electronic format. The instruments used were documentation sheets and Microsoft Excel software and the Joinpoint Regression Program.

Data processing includes editing, data entry, cleaning, and tabulation. Data analysis was carried out univariately to describe the distribution of variables, as well as trend analysis using Joinpoint Regression with a log-linear model and Poisson

assumptions to identify changes in trends. The projection of the number of cases was carried out using the AAPC value with the trend projection formula for the period 2026–2033.

$$\hat{Y}_{t+h} = Y_t(1 + AAPC)^h$$

Information:

$\hat{Y}_{t+h}$ = Projected Value in the 20th year + h

Y_t = Observation value in the last year of data

AAPC = Average Annual Percentage Change (in decimal form)

h = Number of years forward since the last year of data

This projection is a historical growth scenario that assumes that the 2018–2025 AAPC of 14.44% continues over the 2026–2033 period. Projected results are not intended to be definitive predictions because changes in referral patterns, service capacity, policies and early detection coverage may result in different developments.

This research has received ethical approval No.DP.04.03/F.XVIII.1.3.1 /107/-2026 from the Tasikmalaya Ministry of Health Polytechnic Ethics Commission. Data confidentiality is maintained by not including the patient's identity, and the data is used only for research purposes.

3. Results and Discussion

Distribution of Breast Cancer Cases at Santosa Hospital Bandung Kopo

Table 1. Distribution of Breast Cancer Cases

Year	Number of Cases	Percentage (%)
2018	608	7%
2019	736	8%
2020	815	9%
2021	886	10%
2022	1,175	13%
2023	1,639	18%
2024	1,707	19%
2025	1,318	15%
Total	8,884	100%

Based on cancer registration data for the 2018–2025 period, 8,884 breast cancer cases were obtained which had undergone a data verification and cleaning process. Each patient is counted once as a case, so visits or episodes of care from the same patient are not counted as new cases. The highest number of cases was recorded in 2024 with 1,707 cases (19%), while the lowest number was recorded in 2018 with 608 cases (7%).

Table 2. Distribution of Breast Cancer Cases Recorded in the Hospital Registry by Age Group, 2018-2025

Age Group	Number of recorded Cases	Proportion of Hospital Cases (%)
15-44 Years	2305	25.9%
45-54 Years	3217	36.2%
55-64 Years	2238	25.2%
65-74 Years	927	10.4%
≥75 Years	197	2.2%
Total	8,884	100%

Note: Counts and proportions describe the residential origin of patients recorded in a single hospital registry. They do not represent geographic incidence or population risk, as no population denominator was available for each area.

Based on Table 2, Distribution of Breast Cancer Cases Recorded in the Hospital Registry by Age Group during 2018-2025 show that the 45-54 year age group is the group with the highest number of recorded cases.

Table 3. Distribution of Breast Cancer Cases Recorded in the Hospital Registry by Patient Domicile, 2018-2025

Domicile Group	Number of recorded Cases	Proportion of Hospital Cases (%)
Regency Bandung	2,703	30%
Bandung City	2,800	32%
Outside City/Regency. Bandung	3,381	38%
Total	8,884	100%

Note: Counts and proportions describe the residential origin of patients recorded in a single hospital registry. They do not represent geographic incidence or population risk, as no population denominator was available for each area.

Based on Table 3, breast cancer cases according to domicile show that the majority of patients come from outside Bandung City/Regency, followed by Bandung City and Bandung Regency with relatively similar number of cases.

Trends in Breast Cancer Cases at Santosa Hospital Bandung Kopo

Table 4. Results of Joinpoint Regression Analysis of Breast Cancer Cases 2018–2025

Trend Period	Period	APC/AAPC (%)	95% CI	p-value
Trend 1	2018–2023	23.19	15.68–31.19	0.002*
Trend 2	2023–2025	–4.82	–22.91–17.53	0.510
The whole period	2018–2025	14.44	9.26–19.86	<0.001*

*Statistically significant at $p < 0.05$.

APC: Annual Percent Change;

AAPC: Average Annual Percent Change;

CI: confidence interval.

The following is a graph of breast cancer cases at Santosa Hospital Bandung Kopo for 2018–2025.

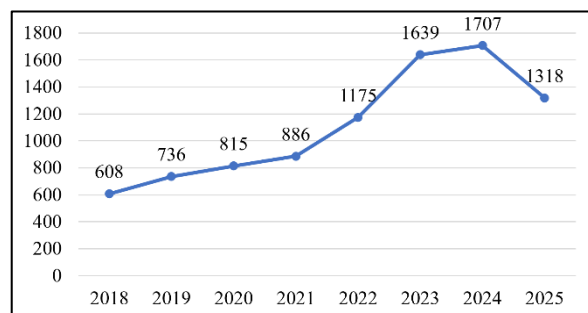


Figure 1. Graph of Breast Cancer Cases at Santosa Hospital Bandung Kopo

The results of the analysis show Joinpoint regression identified one change point in 2023. From 2018 to 2023, recorded

breast cancer cases increased significantly (APC = 23.19%; 95% CI: 15.68–31.19; $p = 0.002$). From 2023 to 2025, recorded cases decreased, but the change was not statistically significant (APC = –4.82%; 95% CI: –22.91 to 17.53; $p = 0.510$). Over the whole period, recorded cases increased significantly (AAPC = 14.44%; 95% CI: 9.26 to 19.86; $p < 0.001$).

Table 5. Results of Joinpoint Regression Analysis Based on Age Characteristics 2018–2025

Ex. Age (years)	Period	APC (%)	95% CI	p-value
15–44	2018–2023	21.45	8.91–35.43	0.010*
15–44	2023–2025	–11.13	–39.83–31.25	0.41
45–54	2018–2023	26.01	12.55–41.09	0.010*
45–54	2023–2025	–8.06	–37.22–34.64	0.53
55–64	2018–2023	21.29	16.14–26.67	0.010*
55–64	2023–2025	1.76	–11.40–16.88	0.72
65–74	2018–2023	26.82	17.82–36.49	0.010*
65–74	2023–2025	3.25	–17.44–29.13	0.68
≥75	2018–2020	–12.90	–46.55–41.93	0.43
≥75	2020–2025	13.53	3.21–24.89	0.02*

*Statistically significant at $p < 0.05$.

APC: Annual Percent Change;

CI: confidence interval.

Table 6. AAPC Values from Joinpoint Regression Analysis Based on Age Characteristics 2018–2025

Ex. Age (years)	Period	AAPC	95% CI	p-value
15–44	2018–2025	11.08%	2.16–20.78	0.010*
45–54	2018–2025	15.16%	5.93–25.19	0.010*
55–64	2018–2025	15.36%	11.84–18.99	<0.001*
65–74	2018–2025	19.58%	13.64–25.83	<0.001*
≥75	2018–2025	5.25%	–4.34–15.81	0.29

*Statistically significant at $p < 0.05$.
APC: Annual Percent Change;
AAPC: Average Annual Percent Change;
CI: confidence interval.

The following is a graph of breast cancer cases based on age characteristics at Santosa Hospital Bandung Kopo in 2018-2025.

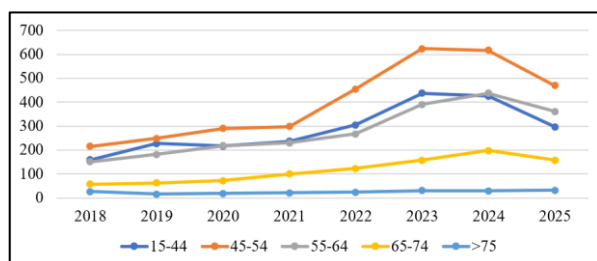


Figure 2. Graph of Breast Cancer Cases Based on Age Characteristics at Santosa Hospital Bandung Kopo

Based on data on breast cancer cases based on age characteristics, the age group with the highest number of cases is 45-54 years old. This age group showed an increase in the number of cases until 2023, then decreased in 2025. Based on the results of the Joinpoint Regression analysis, the 65-74 year age group showed the highest average rate of increase in cases during the observation period. This age group experienced an increase in the initial observation period until 2023, then still showed a rate of increase in the period after the change point, although the increase was lower than in the 2018-2023 period. Meanwhile, the age group ≥ 75 years shows a different pattern with a change in trend point in 2020, namely a decrease in the initial observation period, followed by an increase in the following period.

Table 7. Results of Joinpoint Regression Analysis Based on Domicile Characteristics 2018-2025

Domicile	Period	APC (%)	95% CI	P-value
District Bandung	2018-2023	24.05	17.56-30.99	0.001*
District Bandung	2023-2025	-1.6	-17.39-17.07	0.780
Bandung	2018-2023	18.41	8.17-29.61	0.009*

Bandung	2023-2025	-0.3	-26.49-35.10	0.980
Outside City/Regency.	2018-2023	26.49	20.10-39.66	0.005*
Bandung Outside City/Regency.	2023-2025	-10.70	-36.50-25.57	0.368

*Statistically significant at $p < 0.05$. APC: Annual Percent Change; CI: confidence interval.

Table 8. AAPC Values from Joinpoint Regression Analysis Based on Domicile Characteristics 2018-2025

Domicile	Period	AAPC (%)	95% CI	p-value
Bandung Regency	2018-2025	16.09	11.68-20.67	<0.001*
Bandung	2018-2025	12.72	5.45-20.49	<0.001*
Outside City/Regency. Bandung	2018-2025	14.51	6.33-23.32	<0.001*

*Statistically significant at $p < 0.05$.

APC: Annual Percent Change;
AAPC: Average Annual Percent Change;
CI: confidence interval.

The following is a graph of breast cancer cases based on domicile characteristics at Santosa Hospital Bandung Kopo in 2018-2025.

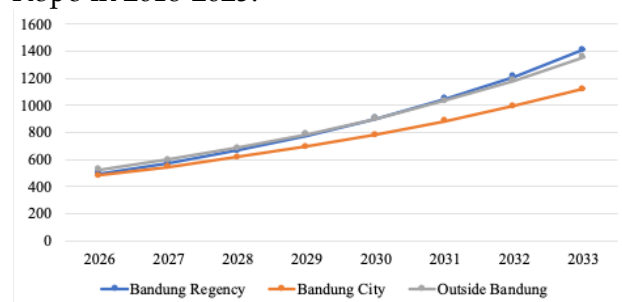


Figure 3. Graph of Breast Cancer Recorded Cases Based on Domicile Characteristics

Based on data on breast cancer cases based on domicile characteristics, the majority of cases recorded came from outside the city/district. Bandung. Based on Table 8, the results of the Joinpoint

Regression analysis, Bandung Regency shows the highest average rate of increase in recorded cases during the observation period compared to other domicile groups. The increase in the initial observation period occurred in all domicile groups and showed a change in trend in 2023. After this change point, all domicile groups showed a decreasing trend in the number of recorded cases, but this change was not statistically significant.

Projection of Breast Cancer Cases at Santosa Hospital Bandung Kopo

Table 9. Breast Cancer Projection Results Based on Historical Growth Scenarios

Year	Number of Cases
2026	1,508
2027	1,726
2028	1,975
2029	2,261
2030	2,587
2031	2,960
2032	3,388
2033	3,877

The following is a graph of the projected results of breast cancer cases at Santosa Hospital Bandung Kopo for 2025-2033.

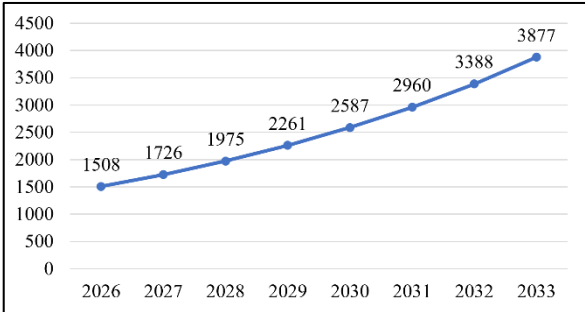


Figure 4. Breast Cancer Case Projection Graph

Case projections for 2026–2033 were carried out using AAPC for the entire 2018–2025 period as the basis for extrapolation. The overall AAPC selection was based on

the results of Joinpoint analysis which showed that the trend change in the 2023–2025 period was not statistically significant. Therefore, the overall AAPC is used as a basis for generating case projections based on the average trend over the entire observation period.

In Table 9, the overall projection results based on AAPC are 14.44%, showing a tendency to increase the number of cases until 2033.

Table 10. Projected Results of Breast Cancer Cases Based on Age Characteristics

Ex. Age (years)	Year								Total
	2026	2027	2028	2029	2030	2031	2032	2033	
15-44	33	36	40	45	50	55	62	68	3.9
	0	6	7	2	2	8	0	8	23
45-54	54	62	71	82	95	1.0	1.2	1.4	7.4
	1	3	8	7	2	96	62	54	73
55-64	41	48	55	63	73	85	98	1.1	5.7
	6	0	4	9	7	1	1	32	90
65-74	18	22	27	32	38	46	55	66	3.0
	9	6	0	3	6	2	2	1	69
≥75	34	35	37	39	41	44	46	48	32
									4

The following is a graph of the results of projections of breast cancer cases based on age characteristics at Santosa Hospital Bandung Kopo for 2025-2033.

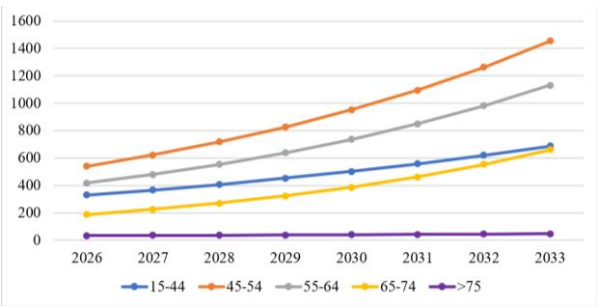


Figure 5. Projection graph of breast cancer cases based on age characteristics

Based on Table 10 of Projection results, all age groups show a tendency to increase the number of breast cancer cases during the 2026–2033 period. The 45-54 year age group is projected to remain the group with the highest number of cases, followed by the 55-64 year age group. The age groups 15-44

years, 65-74 years and ≥ 75 years also show a trend in increasing the number of cases during the Projection period.

Table 11. Projected Results of Breast Cancer Cases Based on Domicile Characteristics

Domicile	Year								Total
	2026	2027	2028	2029	2030	2031	2032	2033	
Bandung Regency	497	577	670	777	902	1.047	1.216	1.412	7,098
Bandung City	486	548	617	696	784	884	996	1.123	6,134
Outside Bandung	526	602	689	789	904	1.035	1.185	1.357	7,087

The following is a graph of the results of projections of breast cancer cases based on domicile characteristics at Santosa Hospital Bandung Kopo for 2026-2033.

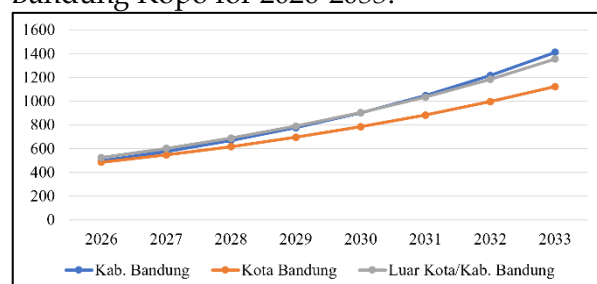


Figure 6. Projection graph of breast cancer cases based on domicile characteristics

Based on the results of domicile characteristic projections, all domicile groups show a tendency to increase the number of breast cancer cases during the 2026–2033 period. Bandung Regency is projected to have the highest number of cases at the end of the projection period. This is related to the rate of increase in cases recorded in Bandung Regency which is the highest compared to other domicile groups, so that based on extrapolation results, the number of cases in Bandung Regency is projected to increase until it becomes the highest at the end of the period.

Discussion

All data analyzed in this study were final (closed) data verified by the hospital, covering all cases recorded during 2018-

2025. Thus, the trends identified describe variations in the number of cases recorded at this hospital during the observation period.

The increase in recorded cases in the early period may be associated with the expanding coverage of early detection of breast cancer in Indonesia, although this could not be tested with the present data. According to the Indonesian Health Profile, SADANIS examination coverage among women aged 30-50 years rose from 1.4% in 2018-2020 to 16.5% in 2021-2023. Higher examination coverage may increase the number of cases identified in health facilities because more women undergo clinical examination. However, although the clinical breast examination (CBE) program has been implemented since 2007, community participation in screening remains relatively low, so some cases may still be undetected (Kementerian Kesehatan RI, 2024a) (Ng et al., 2023)

From 2023 to 2025, recorded cases decreased, but the change was not statistically significant. This period coincided with a decline in national SADANIS examination coverage to 14.67% in 2022-2024 (Kementerian Kesehatan RI, 2025). This pattern may suggest that changes in the number of cases recorded in hospitals are partly associated with changes in early detection coverage and health service utilization; however, this study did not collect data on screening activity, referral sources, or service access, so this remains a hypothesis. The non-significant change may also reflect random variation over a short period. It should therefore not be interpreted as a decrease in breast cancer risk in the population, and may instead reflect slower growth in the number of cases detected and recorded at this hospital. (Kementerian Kesehatan RI, 2025)

Based on the completeness of cancer registration data, the age variable in all cases analyzed was recorded completely. The completeness of the age variable is an important aspect in managing cancer registration because this data can be used to identify the distribution and trends of cases

based on age groups. Good data completeness also supports the use of cancer registries as a source of information in analyzing and planning cancer services in hospitals. Previous research regarding the implementation of a hospital-based cancer registry also shows that the completeness of patient variables is one aspect that needs to be considered in managing cancer registration with the data completeness level for the age variable being 100% (Gondhowiardjo et al., , 2020).

From a health information management perspective, utilization of cancer registries for trend analysis requires ongoing data quality control. Medical and Health Information Records play a role in ensuring the completeness of variables, accuracy of diagnosis codes and morphology, consistency of diagnosis dates, controlling patient duplication, validation of domicile, and timeliness of recording. Integration of cancer registries with hospital information systems, anatomical pathology, radiology, and referral systems can improve data completeness and traceability. The results of trend analysis can then be used as supporting information in planning service capacity, personnel needs, diagnostic and therapeutic facilities, as well as evaluating the quality of evidence-based cancer services and by implementing evidence-based early detection strategies.

Based on domicile characteristics, the highest number of recorded cases came from outside Bandung City/Regency. Most of the patients come from the West Java region. The large number of recorded cases from outside Bandung City and Regency shows may reflect the wide catchment area where patients receive services. These patterns may be influenced by referral systems, accessibility, availability of cancer services, and patient preferences. However, these factors were not analyzed so the explanation requires further research.

Although the number of recorded cases from Bandung Regency is relatively lower compared to other regions, this group shows the highest rate of increase. The increase in the number of recorded cases from Bandung

Regency may be related to changes in referral patterns, access to services, early detection activities, service capacity, or completeness of recording. However, these factors were not analyzed in this study so this relationship cannot be confirmed. On the other hand, the Bandung City domicile group showed the lowest rate of increase even though the number of recorded cases was quite high. This may be influenced by the existence of several other cancer referral hospitals in Bandung City, such as RSUP Dr. Hasan Sadikin and RSUD Welas Asih, so that patient distribution is not centralized in one health service facility.

Projection results show that the number of breast cancer cases at Santosa Hospital Bandung Kopo is projected to increase, assuming historical trends continue in the 2026–2033 period. This increase follows from extrapolating the historical trend which still shows positive growth, as well as the possibility of increasing early detection coverage and access to health services. Implementation of the Ministry of Health's policy regarding strengthening promotive, preventive and active screening activities in hospitals providing cancer services also may influence the number of cases detected earlier. (Kementerian Kesehatan RI, 2024b)

In terms of age characteristics, the 45–54 year group is projected to remain the group with the highest number of recorded cases until 2033. In terms of domicile characteristics, Bandung Regency is projected to experience the highest increase in the number of cases until it becomes the group with the largest number of recorded cases at the end of the projection period. Meanwhile, groups outside the City/Regency of Bandung continue to show a high contribution of cases may reflect the hospital's role in the regional referral network.

4. Research Limitations

This study has several limitations. First, the data came from a single hospital, so the results describe recorded cases and services at that hospital, not population incidence, and cannot be used to compare

risk between ages or regions because no population denominator was used. Second, as retrospective registry data, they may be affected by recording errors, coding inconsistencies, residual duplication, and changes in recording practices, and the validity of domicile could not be verified. Third, referral patterns, service access, hospital capacity, and early detection coverage may influence recorded cases, but they could not be analyzed quantitatively because data on referral source and screening history were unavailable. Fourth, the Joinpoint analysis used only eight annual data points, so trend estimates, especially for 2023-2025, are uncertain. Fifth, the projections assume that historical trends continue and do not account for changes in policy, service capacity, technology, or other external factors.

5. Conclusion

Recorded breast cancer cases at Santosa Hospital Bandung Kopo increased significantly over 2018-2025 (AAPC = 14.44%), with a non-significant decrease after 2023. The 45-54 year group had the largest number of recorded cases, while the 65-74 year group showed the fastest increase. Cases came not only from Bandung City and Regency but also from outside the two areas, which may reflect the hospital's role in the regional referral network. Based on historical growth scenarios, projected hospital-recorded cases are expected to increase during 2026-2033. These projections are conditional on the continuation of historical trends and may change with shifts in referral patterns, early detection coverage, service capacity, or registry data quality. They represent hospital service demand, not population incidence. Hospital management can use them to plan diagnostic, treatment, and oncology work-force capacity with annual review, and to strengthen registry quality and integration with the hospital information system.

These projections can support hospital planning in three ways. First, management should use the projected caseload

from 1,318 cases in 2025 to 3,877 in 2033 to phase capacity in diagnostic services, treatment facilities, and oncology staffing, with annual targets reviewed against actual case-load. Second, early detection and education programs should be targeted at at-risk groups to manage future demand. Third, the cancer registry should be integrated with the hospital information system using standardized fields (diagnosis date, ICD-10 code, stage, and unique patient identifier) so that projections can be updated every year.

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