**MAPPING HEALTH INFORMATION SYSTEM FOR BREAST CANCER PATIENTS THROUGH AN EPIDEMIOLOGICAL STUDY AT THE PROF.W.Z. JOHANNES GENERAL HOSPITAL AND ITS DISTRIBUTION IN EAST NUSA TENGGARA PROVINCE**

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**Abstract**

**Background.** Mapping the spread of disease patients with the Geographic Information System (GIS) helps provide information on who comes for treatment at the hospital. Prof. W.Z. Johannes General Hospital Kupang can easily find out all recorded in medical record data with Geographic Information System (GIS), according to epidemiological variables (time, place, and person). East Nusa Tenggara province has 0.05 in the percentage of breast cancer prevalence, which is the highest among all types of cancer in women.

**Objectives:** This research aims to analyze breast cancer patients' medical records of 2017-2019 at Prof. W.Z. Johannes Hospital Nusa Tenggara Timur.

**Method:** The study design used in the research is a Geographic Information System (GIS) modelling through spatial analysis to obtain an overview of the distribution of breast cancer epidemiological variables.

**Result**: Kupang City still had the highest rate, as many as 60 patients in 2019. For 2018, the highest cases occurred in January with 18 patients, and in 2019 there were 31 patients as the highest number. The number of cases in 2019 was 91 patients, followed by 83 patients in 2018 and 74 in 2017

**Conclusion:** Breast Cancer patients have increased from 2017 - 2019 at WZ Johannes General Hospital Kupang, in which Kupang City and Kupang District had the highest distribution.

Keyword: Epidemiology, Ca Mamae, Mapping, Geographic Information System (GIS)

**INTRODUCTION**

One critical breast cancer surveillance method in monitoring public health is an analysis using a Geographical Information System (GIS), used to determine the epidemiology, disease trends, and location of patients' distribution, namely the formation of an area around the object with a certain distance from the object of the case, and to analyze surveillance data, primarily disease surveillance [6]. Risk assessment and early warning identified using space-time permutation model analysis, a statistical spatial test method with clusters based on time and place [6].

Cancer cause cells have uncontrollable grow, forming a mass as tumour [7]. The emerging cancer cells destroy the surrounding healthy cells and spread rapidly, pushing the healthy cells and taking their nutrients. In general, breast cancer patients mostly detected their conditions after an advanced stage [2]. Breast cancer is the proliferation of epithelial cell malignancies that limit the breast's ducts or lobes [11]. Breast carcinoma is a malignant tumour, and it is usually an adenocarcinoma originating from the lactiferous ducts' epithelial cells in the mammary glandular lobules [8]. Other causes of this cancer must be known whether there has been a history of cancer in the patients' family, hormone therapy, breast X-rays, consumption of unhealthy food, smoking, and hormones [18].

**Breast Cancer Risk Factors**. The causes of cancer are not certainly known, including the causes of breast cancer. However, several internal and external hormones increase a person's risk of breast cancer. Some of the breast cancer risk hormones are gender, age, family history, early menstrual period, and late menopause. Meanwhile, other hormones associated with the increasing of breast cancer risks: postmenopausal obesity, the use of estrogen and progestin hormones at the menopause stage, smoking behaviour, and consumption of hormones, are modifiable risks [16].

Breast cancer Pathophysiology shows the proliferation of malignant epithelial cells that restrict the breast's ducts or lobes. There is only cell hyperplasia with atypical cell development initially. These cells then develop to carcinoma in situ and activate the stroma. Breast cancer shows the proliferation of malignant epithelial cells that restrict the ducts or lobes of the breast. There is only cell hyperplasia with atypical cell development initially. These cells then develop to carcinoma in situ and induce the stroma. Cancer takes seven years to grow from a single cell into an enormous mass to be palpable. There are about 25% of breast cancers have metastasized at the size [11]. The spread of breast cancer occurs by direct invasion to the breast parenchyma, along the ducts or lobules on the surface skin, and extending through the breast's lymphatic tissue. The regional lymph nodes involved are the axillary, internal mammary, and supraclavicular glands [12]. Cancer cells passed through the lymphatic channels then eventually enter the blood vessels and directly invade the blood vessels, affecting any organ, the most common places are bones, lungs, liver, pleura, adrenals, skin, and brain [17].

Types of Breast Cancer [4], cancer cells remaining in their structure are noninvasive or in situ cancer cells. Meanwhile, cancer cells that spread beyond the ducts' basement membrane and lobules are invading-cancer cells. Several types of breast cancer, including:

1. Carcinoma in situ. The proliferation of malignant epithelial cells that remain confined in the terminal duct.
2. Invasive breast cancer spread from breast structures. This cancer has the potential to metastasize. The two main types of invasive breast cancer are carcinomas of the lobules and ducts.
3. Paget's disease. The disease usually affects the epidermal tissue of the nipple, and there is discharge from the nipple, skin changes such as eczema, nipple retraction, and sometimes thickening the primary breast tissue.
4. Inflammatory breast cancer. The type of cancer shows swelling and redness of the skin's breasts and oedema with the breast lower tissue.

Breast Cancer Prevention [3], many lifetime factors affect a woman's risk of developing breast cancer. Some elements hardly to be changed, such as ageing or a family history of breast cancer. Every woman can best prevent herself from getting breast cancer by maintaining personal health, including ideal body weight, doing regular exercise (at least four hours a week), having adequate and regular sleep hours, limiting alcohol consumption. Healthy people need to avoid exposure to cancer- carcinogens and chemicals, limiting exposure to radiation such as X-rays.

**METHOD**

This study's design is an Observational Analysis with a Cross-Sectional approach using Geographical Information System (GIS) modelling through spatial analysis to obtain an overview of the spatial distribution of ca mammae patients' epidemiological variables in all districts in East Nusa Tenggara. Data obtained directly from Prof. W.Z Johannes General Hospital Kupang between 2017 and 2019. This study's sampling technique was total sampling, which covered all recorded medical records on all population members or the whole population [10]. The sample size was 74 cases in 2017, 83 in 2018, and 91 totalled in 2019.

**RESULTS AND DISCUSSION**

**Education**

**Table 1. Distribution of Breast Cancer Patients based on the education level**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Education | | | | | | |
| Primary School | Junior High | Senior High | Undergraduate | Graduate | Post-Graduate | Total |
| 2017 | 1 | 0 | 37 | 14 | 19 | 3 | 74 |
| 2018 | 0 | 0 | 38 | 17 | 28 | 0 | 83 |
| 2019 | 4 | 2 | 37 | 21 | 27 | 0 | 91 |
| Total | 5 | 2 | 112 | 52 | 74 | 3 | 248 |

Out of the total number of 248 breast cancer patients, there was 112 high school graduate, 74 graduate education; there were 52 undergraduate; 5 with primary school graduate; there was three post-graduate education, and the lowest was junior high school graduate many as two patients. Educated community groups tend to be more aware of preventing the disease [13-15, 10].

**Occupation**

**Table 2. Distribution of Breast Cancer patients based on Occupation**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Occupation | | | | | | |
| Civil Servant | Military/Police | Private Sector | Priest | Farmer | Housewife | TOTAL |
| 2017 | 30 | 1 | 21 | 0 | 4 | 10 | 74 |
| 2018 | 21 | 1 | 33 | 1 | 0 | 27 | 83 |
| 2019 | 30 | 0 | 20 | 0 | 10 | 31 | 91 |
| Total | 81 | 2 | 74 | 1 | 14 | 68 | 248 |

Based on the results of a study on 248 breast cancer, the highest breast cancer patients were civil servants with 30 cases, followed by the private sector workers with 21 issues; there were ten housewives; there were four farmers, and 1 Indonesian Military / Police. In 2018, the highest number of breast cancer patients came from private-sector workers with 33 cases, followed by housewives as many as 27 instances; Civil servants as many as 21 cases; one patient came from Military officer/Police Officer and one Priest. In 2019, the highest breast cancer were housewives, which had 31 patients, followed by Civil servants as many as 30 cases, then there were 20 cases came from private-sector workers, and there were also ten farmers [13-15, 10].

**Age**

**Table 3. Distribution of Breast Cancer based on age**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Year | Age | | | | | |
| < 30 | 31 - 40 | 41 -50 | 51 – 60 | >60 | TOTAL |
| 2017 | 1 | 5 | 30 | 31 | 7 | 74 |
| 2018 | 3 | 71 | 25 | 33 | 11 | 83 |
| 2019 | 3 | 14 | 33 | 32 | 9 | 91 |
| Total | 7 | 90 | 88 | 96 | 27 | 248 |

The highest age of breast cancer patient was at the age range between 51 and 60 years old 0f 31 patients, followed by 30 patients at the age range between 41 and 50 years, then there were seven patients at the age range above 60 years old; there were five patients at the age range between 31 and 40 years old, and there was one person as the lowest at the age under 30 years old. In 2018, the highest was patients who were 31-40 years old, followed by 33 patients from the age range between 51 and 60 years old, then there were 25 patients, aged from 41 to 50 years, 11 patients were above 60 years old, and there were three patients as the lowest of under 30 years old. In 2019, the highest case was between the age of 41 and 50 years old as many as 33 patients, followed by 32 patients, aged 51 to 60 years, and then there were 14 patients of the Age 31 to 40 years old; there were nine patients of the age above 60 years old. The lowest case was under 30 years old, as many as three patients [13-15, 10].

**Distribution of Breast Cancer According to Time**

**Figure 1 Distribution of Breast Cancer by time (2017-2019).**

There were 248 breast cancers; in February 2017, the most cases were 23 patients; For 2018, the highest cases occurred in January with 18 patients, and in 2019 there were 31 patients as the highest number. The number of cases in 2019 was 91, followed by 83 in 2018 and 74 in 2017. [13-15].

**Distribution of Breast Cancer According to District**

**Figure 2. Distribution of breast cancer by the district in East Nusa Tenggara Province (2017-2019)**

The spread of breast cancer cases in all districts in East Nusa Tenggara Province, the highest in Kupang Regency with 33 patients in 2017; Kupang City had 48 patients in 2018, while in 2019, there were 60 cases. [13-15].

**Mapping of Breast Cancer by districts in East Nusa Tenggara Province (2017-2019)**

|  |
| --- |
| C:\Users\TOSHIBA\Downloads\WhatsApp Image 2020-10-15 at 07.57.51.jpeg  C:\Users\TOSHIBA\Downloads\WhatsApp Image 2020-10-15 at 07.57.52.jpeg  C:\Users\TOSHIBA\Downloads\WhatsApp Image 2020-10-15 at 07.57.53 (1).jpeg |

**Figure 3 Mapping of breast cancer based on the District of Origin in East Nusa Tenggara province, 2017 - 2019**

Figure 3.4, based on the mapping of the distribution of breast cancer cases by District in East Nusa Tenggara province, showed that red shading had dominated Kupang District and Kupang City during the year 2017 2019.

**Conclusion**

Breast cancer cases have increased according to the epidemiological variables and based on the research results on breast cancer cases prevalence, from 2017 until 2019 at Prof. W.Z. Johannes General Hospital Kupang, there were as many as 74 in 2017, 83 in 2018, and 91 in 2019, Kupang City and Kupang district were the highest in cases distribution.

**Funding**

The research is independent research with all funding borne by the researcher.

**Ethics Approval and Consent to Participate**

This study got the ethics approval by the health research ethics committee of the Faculty of Public Health, University of Nusa Cendana No. 2020180 – KEPK

**Human and Animal Rights**

The study did not use experimental animals in sampling

**Consent for Publication**

Prof. W.Z Johannes General Hospital's medical staff gave the consent to use Prof. W.Z Johannes General Hospital Kupang's medical records as data in this study.

**Conflict of Interest**

Based on the results of ethical studies and researchers' statements, there is no conflict of interest, financial or otherwise.

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Declared none

**References**

[1] Andrews, Gilly. (2010). Buku Ajar Kesehatan Reproduksi Wanita Edisi 2.Jakarta: EGC.

[2] Alvita Brilliana R. Arafah, H. B. N. (2017). Faktor yang Berhubungan Dengan Perilaku Ibu Rumah Tangga Melakukan Pemeriksaan Payudara Sendiri (SADARI) 143–153.

[3] American Cancer Society. (2015). Recommendations For Early Breast Cancer Detection In Women Without Breast Symptoms. Available: http://www.cancer.org/cancer/breastcancer/moreinformation/breastcancerearly detection/breast-cancer-early-detection-acs-recs (diakses 19 Mei 2020).

[4] Centers for Disease Control and Prevention. (2016). What Are The Risk Factors of Breast Cancer. Available: http://www.cdc.gov/cancer/breast/basic\_info/risk\_factors.htm (diakses 19 Mei 2020).

[5] Centers for Disease Control and Prevention. (2016). What Can I Do To Reduce My Risk of Breast Cancer. Available: http://www.cdc.gov/cancer/breast/basic\_info/prevention.htm (diakses 19 Mei 2020).

[6] Eddy Prahasta. 2009 Sistem Informasi Geografis konsep-konsep dasar (Prespektif Geodasi dan Geomatika) Bandung Informatika.

[7] Handayani, F. W., Muhtadi, A., Farmasi, F., Padjadjaran, U., Dara, T., Manis, K.,& Aktif, S. (2013). Aktivitas Anti Kanker Payudara Beberapa Tanaman Herbal. Farmaka, 4, 1–15.

[8] Moore & Dalley.(2013). Anatomi Berorientasi Klinis Edisi 5 Jilid 1. Jakarta:Penerbit Erlangga.

[9] National Breast Cancer Foundation. (2015). Signs and Symptoms. Available: http://www.nationalbreastcancer.org/breast-cancer-symptoms-and-signs (diakses 19 Mei 2020).

[10] Notoatmodjo, S. (2011). *Kesehatan Masyarakat Ilmu dan Seni.* Jakarta: PT Rineka Cipta.

[11] Price & Wilson.(2014). Patofisiologi Volume 2 Edisi 6. Jakarta: EGC.

[12] Rasjidi, Imam. (2010). Epidemiologi Kanker pada Wanita. Jakarta: CV.Sagung Seto.

[13] Rekam Medik. (2017). Rekam Medik RSUD Prof. Dr. W.Z. Johanes Kupang 2017. Kupang

[14] Rekam Medik. (2018). Rekam Medik RSUD Prof. Dr. W.Z. Johanes Kupang 2018. Kupang

[15] Rekam Medik. (2019). Rekam Medik RSUD Prof. Dr. W.Z. Johanes Kupang 2019. Kupang

[16] Ricky, Rachmawaty, R., & Syam, Y.(2018). Efektifitas progressive muscle relaxation terhadap kecemasan pada pasien kanker payudara yangmenjalani kemoterapi. Jurnal Terpadu Ilmu Kesehatan, 7, no 2, 101–221.

[17] Smeltzer & Bare. (2012). Textbooks of Medical – Surgical Nursing12thEdition Volume 1.

[18] Tanjung, A. R., & Hadi, E. N. (2018). Proceedings of International Conference on Applied Science and Health ICASH-A54 Female Students' Perception On Breast Cancer Detection Using Breast Self-Examinantion ( SADARI ) Proceedings of International Conference on Applied Science and Health.(3), 369–373.