Electronic Medical Record Implementation for Regional-based Disease Trend Analysis in Semarang City

Hanif Pandu Suhito[1*], Prahita Indriana Raniasmi[2], Sholikun[3]
[1]Faculty of Health, Universitas Dian Nuswantoro, Semarang City, Indonesia
[2,3]Semarang City Health Office, Semarang City, Indonesia
Correspondence author: mashanifps@gmail.com

Abstract. Electronic medical records (SIMPUS) has been implemented since 2019 in Semarang City, enabling community health centers to store patient medical data efficiently. Decision-making in disease control must be based on data and evidence-based approaches. The objective of this study is to display trends of disease based on visits to health centers in Semarang City. Using data from routine services provided by 37 health centers (Puskesmas) from 2020 to June 2024, a total of 8.669.287 patients were included. A quantitative descriptive analysis approach was used to determine the distribution of disease based on top 10 diagnoses, age groups, districts, and time periods. The results show that Acute upper respiratory infections of multiple and unspecified sites (J06) have increased and become top rank in the last three years. Hypertension (I10) also increased with the number of cases still high as runner up. Most of the cases in the top 10 diseases increase in number of cases from year to year. The sub-district of Tembalang, Semarang Barat, and Pedurungan tend to have the highest number of patient visits. Based on age groups, the most frequent visits to the health center are adults and pre-elderly groups, followed by teenagers and toddlers. This is related to the types of cases that are most often found. This trend analysis can be used to determine changes in patient visit patterns at Semarang community health centers from year to year and can help in comparing morbidity rates so it can help in determining health policy in Semarang.

Keywords : electronic medical record implementation, trend analysis, disease

I. BACKGROUND

In this digital era, management information systems play an important role in various sectors, including health services. In general, a management information system is defined as a system that provides information used to support operations, management and decision making of an organization [1]. One implementation of management information systems in health services is the use of medical records.

Based on the explanation of the Minister of Health Regulation No 24/2022 concerning Electronic Medical Record, a medical record is a file containing notes and documents including the patient's identity, examination results, treatment that has been given, as well as other actions and services that have been provided to the patient [2]. The benefit of medical records is that they serve as a basis for patient care and treatment.

Medical records are divided into two, namely conventional medical records and electronic medical records. Conventional medical records are notes about the patient and the history of the disease written on a piece of paper and will be added later if information related to the patient increases and the signature of the patient or the patient's family is added to this type of medical record [3]. Electronic Medical Records (EMR) are data records created using electronic systems intended for administering medical records [4], one of the main innovations that has changed the way health information is managed and monitored . With EMR, health workers can manage, analyze and accumulate patient medical record data, enabling medical workers to make decisions that are faster, more effective and organized. Medical records can also be used as evidence of the quality of human resource performance in health care facilities [5]. In addition, EMR facilitates more consistent and standardized data collection, which supports more in-depth and relevant analysis of health trends from year to year. Many countries in the world have implemented EMR, especially developed countries, but it cannot be denied that several developing countries have also started to implement it. Some of these countries include America, the United States, England, Australia, Portugal, Taiwan and Iran [6], the EMR system is implemented in various cities and regions in the country, including large cities in Indonesia. Semarang City has implemented EMR in 37 Community Health Centers since 2019, which is implemented in the form of an application called the Community Health Center Management Information System (SIMPUS). SIMPUS is a Community Health Center Management Application where the main function is managing patient data starting from

registration, registration, examination and patient treatment. The benefits of SIMPUS are to simplify and speed up services, establish procedures and service standards and obtain accurate information data [7]. It is hoped that SIMPUS can improve the management of community health centers appropriately and effectively. SIMPUS data processing procedures are based on information technology that is timely, accurate, complete and effective to support the management decision making process [8]. By utilizing information technology, a data visualization was created from SIMPUS called the Ckrawala Buana system.

Ckrawala Buana is a Health Area Vulnerability System for Semarang City Based on Service Data Analytics. Ckrawala Buana can be accessed using a browser on a computer or mobile device connected to the internet. From the results of the Ckrawala Buana visualization, there are no detailed data analysis results so further analysis is needed.

This study aims to see the results of the visualization analysis contained in Ckrawala Buana by describing the distribution of diseases, the highest diseases and trends in health center visits. This can be used as a basis for making health policies and as an illustration for further improvements in health data management. Thus, it is hoped that implementation SIMPUS and the results of the Ckrawala Buana analysis can provide significant contributions and references to improving the quality of health services, disease prevention efforts, disease control at the regional level and the best health programs to improve the level of public health in Semarang City.

II. METHOD

The method used in this study is descriptive quantitative research. By using service data obtained from SIMPUS at 37 health centers 2020 to June 2024, with a total of 8.669.287 visit. So this research uses a quantitative descriptive analysis approach to determine patient characteristics based on age and gender, diagnosis most, regional analysis, and annual trends in visits where visualization and statistical analysis are found in the Ckrawala Buana System.

III. RESULTS AND DISCUSSION

A. CHARACTERISTICS OF PERSONAL HEALTH RECORD USERS IN SEMARANG

Based on data obtained from SIMPUS from 2020 to June 2024, data on the characteristics of Semarang City health center patients were obtained in the form of age and gender, which were visualized in the Ckrawala Buana system as follows:
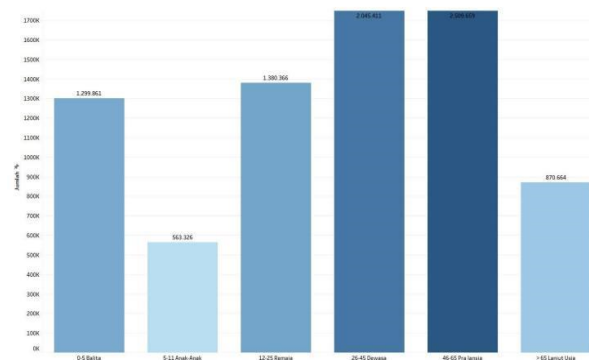
a. Age

Figure 1. Total Semarang City Health Center Visits Based on Age (2020-June 2024)

Based on Figure 1, the age range with the most visits is elderly (46-65 years) with 2,509,659, followed by adults (26-45 years) with 2,045,411, teenagers (12-25 years) with 1,380,366, toddlers (0-5 years) as many as 1,299,861, elderly (65+) 870,664, and children (5-11 years) as many as 563,326. Based on the details above, the age range of patients who make the most visits are the elderly (46-65 years) with a percentage of 30% of all patient characteristics.
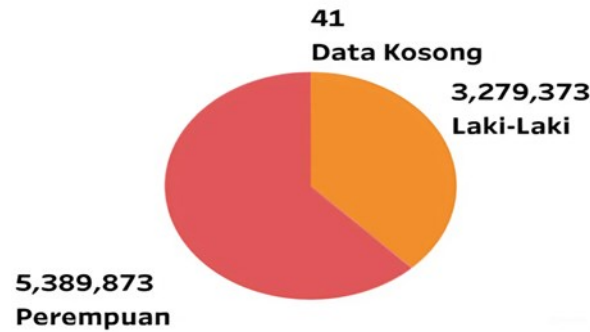
b. Gender

Figure 2. Total Semarang City Health Center Visits Based on Gender (2020-June 2024)

Based on Figure 2, data on health center visitors was found to be 3,279,373 men and 5,389,873 women. Based on the details above, female patients are the ones who visit the health center the most at 62%.

A. *10 Diagnoses Most*

Based on data obtained from SIMPUS from 2020 to June 2024, 10 diagnoses were obtained most in Semarang City which is visualized in the Ckrawala Buana system as follows:
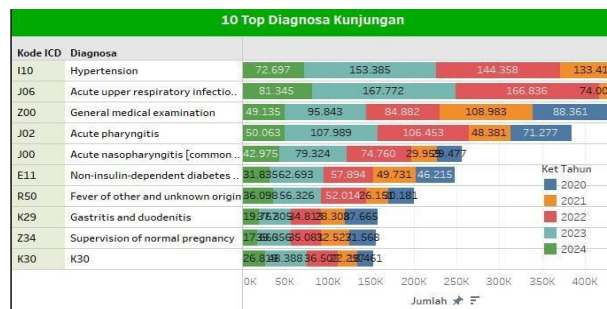

Figure 3. 10 Highest Diagnoses of Semarang City Health Center Visits (2020-June 2024)

Based on Figure 3 above, Acute Upper Respiratory Infection (J06) is the most common diagnosis in the last 3 years (2022-June 2024), followed by Hypertension (I10). It was then found that Hypertension (I10) was the most common diagnosis in 2020 and 2021, followed by the General Medical Examination (Z00).

B. Regional Analysis

Based on data obtained from SIMPUS from 2020 to June 2024, health center visits from 16 sub-districts in Semarang City were obtained which were visualized in the Ckrawala Buana system as follows :
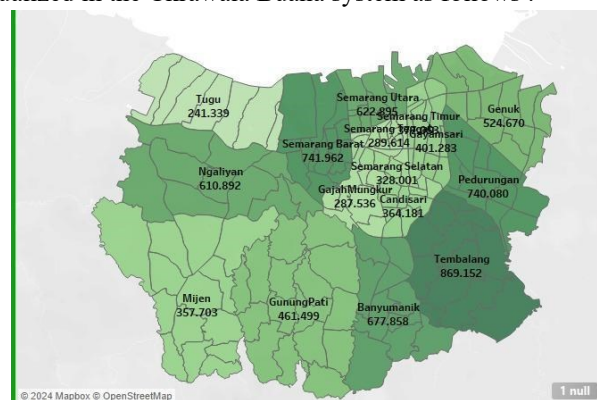

Figure 4. Total Semarang City Health Center Visits per District (2020-June 2024)

Based on Figure 4 above, the area with the most health center patient visits is Tembalang District, with a total of 869,152 visits, dominated by patients diagnosed with Hypertension (I10) at 72,768 and General Medical Examination (Z00) at 50,085. Next, West Semarang District had a total of 741,962 visits, with the most diagnoses being Hypertension (I10) at 76,726 and Acute Respiratory Infection (J06) at 54,483. Meanwhile, Pedurungan District recorded a total of 740,080 visits, with the most diagnoses being General Medical Examination (Z00) at 53,173 and Acute Respiratory Tract Infection (J06) at 49,332.

C. Annual Trends

Based on data obtained from SIMPUS from 2020 to June 2024, the trend of Semarang City Health Center visits was obtained, whih is visualized in the Ckrawala Buana system as follows:
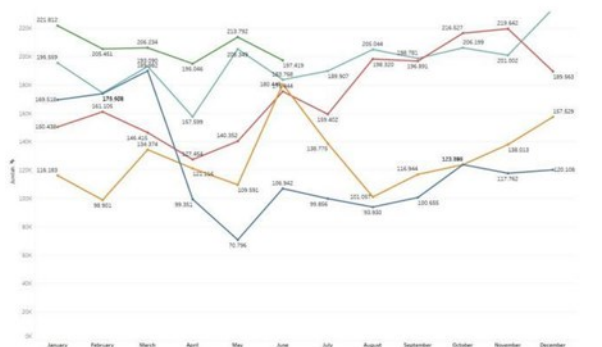

Figure 5. Trends in Semarang City Health Center Visits (2020-June 2024)

Based on Figure 5 above, the following is an analysis of trends in visits to Semarang City health centers:

In 2020, the start of the year showed relatively high visitation numbers, but there was a sharp decline from April to May. This decrease was most likely caused by the initial impact of the COVID-19 pandemic, where there was a reduction in activities in the community to deal with the spike in cases, such as PSBB (Large-Scale Social Restrictions) which had an impact on health center visits. In May 2020 there was the Idul Fitri holiday and there was an increase in community activity, so that starting June 2020 the number of visits increased again due to an increase in COVID-19 cases.

In 2021, there will be an increase in health center visits which tend to be stable at the beginning of the year. There was the highest spike in June, which then decreased in August and increased again until the end of the year. This increase may be related to the presence of cases of the new Delta variant of Covid.

2022 shows a consistent upward trend, with some significant spikes in certain months such as August, September, October, and November. This may be related to the implementation of PPKM in the Java-Bali region and the emergence of the spread of a new variant, namely Omicron.

In 2023, visit numbers will remain high with fluctuations in certain months. A large spike occurred in May, August and October, this can be related to the trend of ISPA cases in Indonesia in the period January to September 2023 which is quite high, namely in the range of 1.5-1.8 million cases nationally [18] . The three provinces with the highest incidence of Acute Upper Respiratory Infection cases are Central Java, West Java and DKI Jakarta. December closed 2023 with the highest spike compared to previous years, reaching 233,880 visits.

In 2024, the upward trend continues from 2023 with visit numbers generally higher than in previous years, but data from January to June shows a stable and slightly slow downward trend. This year may be the year with the highest number of health center visits on average compared to previous years or it may continue the downward trend from the beginning of the year to the end of the year, considering that data on Semarang City health center visits in 2024 is still limited to June.

IV.CONCLUSIONS AND SUGGESTIONS

Based on analysis of SIMPUS data visualized through the Ckrawala Buana application in the period 2020 to June 2024, several conclusions were obtained, namely, the elderly age range (46-65 years) is the one who visits the health center

the most , contributing 30% of the total visits , bro. Female patients visit the health center more often than men , with the percentage of female visits being 62% and male visits being 38% of the total visits.

Acute Upper Respiratory Infection (J06) or what is commonly called ARI are the most common in the last three years. According to basic health research (Riskesdas), 2018 There are 1,017,290 people reported suffering from Acute Upper Respiratory Infection in Indonesia [19] . This high figure is due to the easy spread and transmission of this disease , during 2020-June 2024 the sub-districts of North Semarang and West Semarang contributed the highest Acute Upper Respiratory Infection.

Hypertension is a health problem with a high prevalence. According to basic health research (Riskesdas), in 2018 there were 658,201 people suffering from hypertension in Indonesia [19]. In the city of Semarang itself, hypertension dominates in the sub-districts of West Semarang and Tembalang

Based on an analysis of the areas visited by public health centers in Semarang City, Tembalang District has the highest number of visits, followed by West Semarang and Pedurungan. And in the annual trend analysis, there is a trend pattern of visits to Community Health Centers which shows seasonal fluctuations with certain months experiencing spikes.

Some evaluations and suggestions that can be given are, the Community Health Center must improve services for the elderly because the majority of health center visitors come from that age range, and special health programs for women. Prevention and management programs should focus on acute respiratory infections and hypertension because these diseases are the most frequently admitted to Semarang City Health Centers. Prepare for a surge in visits during peak months and continue to monitor data to adjust health policies according to community needs. And most importantly, health resources must be prioritized in sub-districts with the highest visits and illnesses , such as West Semarang and North Semarang, as well as increasing access in the regions with low visits.

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