PREVENTIF: JURNAL KESEHATAN MASYARAKAT
FAKULTAS KESEHATAN MASYARAKAT UIVERSITAS TADULAKO
http://jurnal.fkm.untad.ac.id/index.php/preventif
ISSN (P) 2088-3536 ISSN (E) 2528-3375

Measles Surveillance Evaluation; Systems Approach at The Palu City Health Department In 2024

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ABSTRACT

Measles is an airborne disease with a very high transmission rate. There has been a global increase in both morbidity and mortality due to measles. In 2023, outbreaks occurred in several regions, particularly in Central Sulawesi, with Palu City being notably affected. This study aimed to evaluate the surveillance activities following the measles outbreak in the jurisdiction of the Palu City District Health Office, employing a systems approach. This research using descriptive quantitative method. Respondents included surveillance officers from the Palu City Health Office and those from the Puskesmas (community health centers) within its area. Data were collected through interviews and observations. The findings revealed several issues in the input aspect of surveillance, including overlapping roles for surveillance officers (87%), a lack of knowledge transfer to new personnel (7%), insufficient tactical funding for outbreak responses (100%), and inadequate computer resources at some health centers to support surveillance activities (14%). In the process aspect, challenges included the absence of designated contact persons from hospitals for all public health centers (PHCs) (70%), delays in the timely collection of zero case data (14%), and inconsistent data processing with sub-district stratification among PHCs. Regarding the output aspect, reports were often not delivered promptly, and the dissemination of information was limited to internal stakeholders.

***Keywords** : Surveillance ; Measles ; System Evaluation ; Outbreak*

Published by:
Tadulako University
Address:
Jl.Soekarno Hatta KM 9. Kota Palu, Sulawesi Tengah, Indonesia.
Phone: +6282197505707
Email: preventifjournal.fkm@gmail.com

Article history :
Received : 28 04 2025
Received in revised form : 18 06 2025
Accepted : 20 06 2025
Available online : 31 08 2025

INTRODUCTION

An outbreak is a disaster that can lead to a health crisis. According to the Ministry of Health, outbreaks are the second most common non-natural disaster in Indonesia, after fires, at 36.92%. Measles can cause outbreaks.(1).

Measles is a contagious disease known as morbilli or measles, caused by viruses and characterized by fever, weakness, cough, inflammation of the eye membrane, as well as red spots on the skin (2). Vaccines are one of the ways that can be done to prevent measles disease. Now the measles vaccine is safely available and is provided free of charge in several countries, as well as in Indonesia (3). However, based on WHO data, around 128,000 people died in 2021 due to measles, and the majority were toddlers (4). In 2022, the global incidence of measles improved, but a widespread outbreak affected 37 countries, up from 22 in 2021. Indonesia is on the list of countries at risk for travelers.(5).

Cases of measles in Indonesia itself increased as much as seven times in 2022 compared to 2021, where the trend improvement started to happen from February until June 2022 (1). Accordingto a report from RRI, it is known that the improvement in measles cases was as much as 32 times in 2023 compared with 2022. The five provinces experiencing the most measles outbreaks(6) in 2022 are West Sumatra, East Java, North Sumatra, Banten, and Central Java (1). Although Central Sulawesi was not included in the top five contributors to the measles outbreak in 2022, Central Sulawesi is one of the provinces that also experienced an outbreak in 2023.

Data from the Ministry of Health indicates that in Central Sulawesi, there are 175 measles suspects, with 7 confirmed cases, of which 4 were not immunized. By the end of 2023, the Palu City Health Service expects to examine 809 suspected cases, marking a fourfold increase from the previous year. This rise in measles cases in Indonesia is attributed to decreased routine immunization during the COVID-19(7) pandemic.. In

addition, the public perception of the disappearance of measles cases in Indonesia also shows results in a lower number of immunization achievements(8).

In response, strengthening surveillance needs to be done to quickly discover and report cases for early handling of measles(9)cases. A surveillance evaluation system is required for the prevention and control of a detrimental disease of public health(10) . The aim is for the results evaluation to become material improvements and guidelines for taking the next step. Besides that, surveillance needs an adequate system evaluation to optimize the achievement of the elimination and eradication of vaccine-preventable diseases (PVD)(11).

Due to the measles outbreak in the Palu City Health Department area, it's crucial to evaluate Measles Surveillance (Post-Outbreak) in 2024 to enhance prevention and control efforts. The author emphasizes the importance of this study.

METHODS

The study used a descriptive quantitative method to evaluate surveillance activities following a measles outbreak in the Palu City Health Department's work area. Respondents included surveillance officers from the Palu City Health Service and local Health Centers. Data collection occurred in July 2024 through interviews and observations, utilizing both primary data (open questionnaires) and secondary data (measles records). Findings were analyzed based on CDC surveillance criteria using descriptive tabulation.

RESULTS

Based on interviews and observations conducted at the Palu City Health Department and 13 Health Centers within its jurisdiction, the results of the data collection can be summarized as follows:

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Surveillance Input Aspects for Measles

Surveillance Capacity

Table 1 Distribution of Education Level and Length of Service Surveillance Officer in the Palu City Health Department Work Area

Category	Amount	Percentage (%)
Type of Education		
Nursing Diploma	1	7
Bachelor of Public Health	11	79
Master of Public Health	1	7
Surveillance Training		
Once	13	93
No Once	1	7
Duration of Surveillance Assignment		
< 1 Year	2	14
1-5 Years	7	50
6-10 Years	5	36
Double Position		
Double	8	57
Single	6	43

Source : Primary Data 2024

According to Table 1, the majority of health center officers in the Palu City Health Service have a Bachelor of Public Health (79%), while the least represented are those with a Nursing Diploma and Master of Public Health (7% each). Most officers have 1-5 years of service, with a few having less than 1 year. Additionally, 93% of the officers have undergone training related to surveillance, and 57% hold dual positions or tasks.

Funding

Funding is essential for surveillance activities, with all health centers receiving allocated funds from the BOK program for measles surveillance. Most funds are carried over from the previous year, and drafts are submitted by surveillance officers. While they believe the funding aligns with budgeted amounts, they recognize it may be insufficient during an

outbreak, as it's based on typical case estimates. Additionally, funds for epidemiological investigations support PD3I screenings, transport, and SKDR activities.

Facilities and Infrastructure

The support facilities for surveillance comprise registers, reporting formats, computer systems, and transportation. Below is a description of the current condition of the existing facilities:

Case Register for Diphtheria

The case register for measles at all health centers is maintained through daily entries recorded by health professionals during examinations. This process is coordinated with the health information system of the health center, as well as with midwives in village clinics. Reports are compiled and submitted weekly through the Early Warning, Alert, and Response System (EWARS), in addition to monthly reports compiled via the Surveillance, Tracking, and Performance (STP) system.

Reporting Forms

The availability of reporting forms for measles cases at health centers within the jurisdiction of the Palu City Health Service is outlined in Table 2.

Table 2 Availability of Reporting and Surveillance Forms in the Palu City Health Department Work Area

Format Type	Amount	%
W1	13	93
W2	13	93
STP	14	100
PE Measles	14	100

Source : Primary Data 2024

Based on Table 2, it can be observed that the majority of health center surveillance officers utilize specific reporting forms. The most commonly used forms are the STP form and the Measles PE form, with a total of 14 (100%) reports recorded.

Provision of Computer Facilities, Personal Protective Equipment (PPE), Transportation, and Communication Equipment

Computer facilities, PPE, transportation, and communication tools are essential components that support the implementation of the surveillance system. The study results indicate that not all health center surveillance officers have access to computer devices for surveillance activities. Specifically, 2 (14%) officers do not have computers to aid in their surveillance work. Those who lack computer access manually summarize their activity results in a report book. Further details can be found in Table 3 below:

Table 3 Availability of Data Collection Devices for Surveillance in the Palu City Health Department Works

Type infrastructure	Amount	Persentage(%)
Computer	12	86
Mobile Phone	11	79
Record Books (Recap)	9	64
Guidelines for Investigation and Response to Incidents Outside of	9	64

Type infrastructure	Amount	Persentage(%)
Normal Contagious Diseases and Food Poisoning (2017 Edition)		
Spreadsheet	13	93
Personal Protective Equipment (PPE)	14	100

Source : Primary Data 2024

The officer health center has essential facilities to support effective operations, particularly in the use of personal protective equipment (PPE) during epidemiological investigations. All employees wear masks (100% usage), while gloves (86%), lab coats

(71%), protective headgear (36%), and eye protection (29%) are also utilized. A significant challenge is the limited availability of the "Book Summary and Books Guidelines for Investigation and Response to Incidents of Contagious Diseases and Food Poisoning, 2017 Edition," as most relevant data is stored digitally. Approximately 71% of officers use specialized computers for field surveillance, and all surveillance officers have access to transportation, with 57% using personal vehicles.

Methodology

Interviews with the Head of the Palu City Health Department confirm that measles surveillance in Palu City follows the Ministry of Health Regulation No. 45 of 2014. Surveillance is conducted through both active methods, such as weekly hospital visits and health center reports, and passive methods that gather data from health centers, polyclinics, and hospitals. Active surveillance at health centers includes confirming rumors and tracing contacts during investigations, while passive surveillance relies on collected data.

Surveillance Process Aspects for Measles

Data Collection and Recording

The first step in measles surveillance is the reporting of cases, which begins at the lowest levels—Health Centers, Health Posts, and homes. Weekly updates are processed every Sunday by the Palu City Health Office, which receives reports from all health centers and homes in the city. Each reporting unit, including Health Centers and homes, transmits data to a central server, which is input into the SKDR system via WhatsApp. Since there are two reporting units for measles cases to SKDR, the Health Department primarily reviews data input from the Health Centers. Essentially, the input from Health Centers is based on reports received from homes throughout Palu City.

For further clarity, please refer to the accompanying diagram.

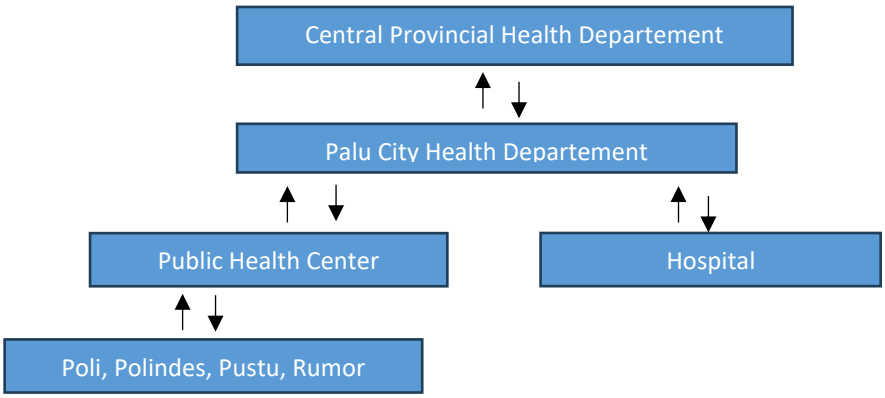

Figure 1 Level of Measles Case Reporting in the Palu City Health Service Work Area

To enhance surveillance related to SKDR data input in the Palu City Health Department, a spreadsheet has been implemented, allowing health centers to access real-time data on sick individuals. Suspected measles cases must be reported within 24 hours using the MR01 form. If incomplete, an epidemiological investigation is required. Health centers also need to report weekly measles cases via SKDR by Monday, with the latest reports due Tuesday.

Epidemiological investigations for suspected cases are conducted by health center officers, and completed MR01 forms are sent to the Palu City Health Office for data entry into the MR02 form, which is forwarded to the Central Sulawesi Provincial Health Department. In outbreaks, reporting is done using the MR05 form, summarizing data from MR02.

Some health centers face challenges in timely MR01 submissions, resulting in delays. Additionally, 70% of surveillance officers lack designated Contact Persons from hospitals for confirming positive measles cases, and there is partial reporting (64%) of cases from

hospitals. Despite 86% of health centers compiling reports within 24 hours, one center (7%) failed to submit a monthly report, and two centers (14%) did not report zero cases.

Output of Measles Surveillance

The surveillance information within the Palu City Health Department area is sufficiently informative. Surveillance reporting is routine; however, there are still two health centers that do not submit their reports on time, and several others are late in sending their MR01 reports. Out of 364 suspected measles cases, 213 (58.55%) were confirmed positive based on laboratory inspection results. However, discrepancies exist between the annual reporting of suspected measles cases and complete data reports from the Health Department.

Information Dissemination

Information dissemination is conducted systematically by both health centers and health department providers. Health centers report weekly to the head of the health center through an epidemiological bulletin and distribute information to community networks such as village midwives, cadres, and allied programs like the Surveillance Program and TGC. Higher-level health department providers disseminate information to santé service heads via the SKDR bulletin and relay information to the provincial health department, facilitating feedback and evaluation for health centers. However, routine reporting or feedback mechanisms to households or private clinics have yet to be established.

DISCUSSION

Surveillance Input Aspects for Measles Surveillance

Surveillance Workforce

The effective implementation of surveillance largely depends on the workforce's competency, particularly in Palu City's health centers, where most staff have public health education. However, only one staff member has a Nursing Diploma, highlighting the need

for at least one qualified surveillance officer per center. Many surveillance officers have received training in programs organized by the Central Sulawesi Provincial Health Department, which benefits their knowledge and skills.

Structured interviews indicate that continuous training is vital for enhancing officers' performance. However, some newly assigned officers lack formal training, hindering knowledge transfer from experienced personnel. This gap leads to uncertainties in implementing measles surveillance.

Additionally, many officers carry dual responsibilities, which can negatively impact their primary tasks and lead to delays in outbreak responses. This issue reflects findings from Blitar District, where the overlap in roles is linked to officer rotations and unclear organizational structures, often resulting in suboptimal task execution(13).

Funding

All health center officials report that their funding is sourced from BOK (Special Allocation Funds). Officers develop budget proposals based on estimates from the previous year. However, these budgets are typically designed for standard operational situations and do not account for the possibility of outbreaks. Consequently, none of the health center staff report feeling underfunded, as the allocations are self-determined.

Most funds from BOK are utilized for screening activities and support SKDR (Surveillance, Control, and Response). This use aligns with the Indonesian Ministry of Health Regulation No. 42 of 2022, which outlines the technical guidelines for utilizing Non-Physical Special Allocation Funds in the health sector for the fiscal year 2023. The regulation specifies that funds can be employed at the district or city level for early detection efforts, disease prevention, response initiatives, signal verification, and epidemiological investigations.

Facilities and Infrastructure

The facilities and infrastructure utilized by the health centers to monitor officer health cover several aspects, including the registration and recording of diphtheria cases. Based on study results, it was found that reporting comes from various sources, including health centers, village midwives, clinics, and households. The registration process employs both manual and computerized systems.

The advancement of technology has made data collection easier, enhancing both case recording and confirmation. Some health center officers indicated that the use of communication tools like WhatsApp and Google Forms facilitates efficient data collection, whether it originates from health centers or external sources. These communication platforms also enable officers to confirm the presence of a disease before conducting direct epidemiological investigations. Information technology has made the surveillance system more effective and efficient, not only supporting surveillance activities but also leveraging computer software for better management (14).

However, the implementation of computer technology across Indonesia, especially in rural regions, remains uneven. Research findings support this claim, indicating that not all health center officers have adopted computerized systems; some still rely on manual methods. This is evident in the fact that there is at least one health center where manual data collection occurs, and the results of case investigations are not recorded in a summary book. The lack of training related to surveillance activities has prevented some officers from adapting to these technological advancements (15).

In terms of personal protective equipment (PPE), the appropriate use of PPE is essential for the activities conducted. If the activity involves drawing blood, the officers involved must be part of a laboratory team that follows the standard PPE protocols.

Regarding transportation, some larger health centers utilize personal transportation for fieldwork. However, not all officers are permitted to use personal vehicles, as field

activities are viewed as professional duties. The use of personal transportation is not continuous and is adjusted based on the field situation. Officers will utilize health center transportation whenever available.

Method

Surveillance of measles is executed by the Palu City Health Department in conjunction with the health centers in its jurisdiction. This surveillance includes both active and passive components. Active surveillance is conducted by health center officers, who confirm rumors and investigate suspected cases, while officers conduct routine home visits. In addition to active surveillance, passive surveillance takes place through polyclinics at health centers and the collection of SKDR data via Google Spreadsheets.

As outlined in Peraturan Menteri Kesehatan Republik Indonesia Nomor 45 Tahun 2014, surveillance is categorized into active and passive methods. Active surveillance involves obtaining data directly from public health facilities or other data sources through epidemiological investigations, whereas passive surveillance is predicated on receiving data from public health facilities or alternative sources in the form of medical records, patient registration books, morbidity/mortality reports, activity reports, community reports, and other forms.

Process

Data Collection and Recording (Not all health centers have a Hospital contact person, and some health centers report zero case)

The process of collecting and recording data at the Palu City Health Service has followed the technical instructions for measles and rubella released in 2020 (16). Data collection is conducted tiered, from Form MR01 to Form MR06. The data in Form MR01 should be submitted to the Palu City Health Department as soon as it is completed. However, there are still some health centers that do not adhere to the stipulated timelines for collecting MR01

data. To address this issue, the Health Service routinely approaches individuals to remind them to submit any outstanding data.

Timeliness is a crucial variable in data measurement. Collecting data promptly ensures its quality and relevance during critical periods(17). Another challenge faced during the data collection process is the lack of a Contact Person from the Hospital. This is essential for confirming cases of measles, as outlined in the technical guidelines for measles and rubella. The Hospital needs to establish a contact person from various units to be included in the hospital surveillance team(16). This person is responsible for accurately reporting cases of diseases that could potentially lead to outbreaks(18).

Additionally, another issue identified is that two health centers have yet to report zero cases. Reporting zero cases is vital to verify whether any cases are occurring or to confirm that monitoring is effective. If the surveillance system fails to report zero cases, it cannot distinguish between “no detected cases” and “failed reports.” Reporting zero cases helps eliminate uncertainty in the data and clarify whether the area really has no cases or has cases but has not been reported(19).

Data Processing and Presentation (there are still a number of health centers that have not processed data based on stratified sub-districts, resulting in double workload issues)

Research has shown that a significant portion of the big data collected has been processed and presented by surveillance officers. The presentation is based on interviews conducted through the Excel application as raw data, along with the SKDR bulletin generated weekly, which serves as a key tool for early vigilance.

Presenting data in tables and graphs facilitates better understanding of the results from data collection for readers(16). Furthermore, according to the technical surveillance instructions for measles and rubella, it is acknowledged that data representation in the form

of tables, graphs, and spot maps can greatly assist in analyzing the information presented. However, a large portion of the data has not yet been presented in the form of maps or mapping. Data analysis through mapping can effectively provide a description of disease distribution based on administrative boundaries, thereby simplifying problem-solving processes. This capability allows us to identify specific clusters, which is essential for efficient planning and implementation of Outbreak Response Interventions (ORI) and determining priority areas(20,21).

Problems identified within the surveillance system for measles regarding data processing and presentation include the fact that there remain health centers that have not processed and classified data by sub-district. This issue is often raised by surveillance officers, who are burdened by an overwhelming number of tasks. Timely input and processing of data are crucial for presenting up-to-date information. However, health center surveillance officers also have additional responsibilities, which can sometimes hinder the appropriate and timely processing of data .

Output

Information

Based on the study results, it is evident that the information provided by the surveillance officers is quite informative. However, there are still issues, particularly regarding the timeliness of the reports. There are discrepancies in the reporting of cases between the Health Service and other health centers. For instance, the data concerning measles cases reported annually does not align with the raw data from health services, primarily due to delays in reporting.

Timeliness is crucial in surveillance activities and is a key indicator of its effectiveness. Accurate and timely data collection is essential, as it enables a swift investigation and the implementation of control measures. This prompt action can be initiated as soon as

possible(22). The accuracy of reporting time directly impacts the speed or delay in the actions taken within the surveillance system(12).

Dissemination of Information

The dissemination of information has been carried out by the health center and the Palu City Health Department. However, this dissemination has primarily been internal, limited to communication between surveillance officers and the lead through reports or bulletins. From interviews conducted, it is clear that there has been little dissemination of information to external parties, such as clinics or private healthcare providers.

Collaborating with private clinics can be challenging as they often operate independently, and the health service may lack the capacity to effectively implement reporting and dissemination results in a persuasive manner.

Moreover, the dissemination of information from the health service has not been maximized. Currently, information is provided only through the SKDR bulletin on a weekly basis, without any comparative analysis with previous weeks or time periods. This lack of comparative data hinders the ability to provide relevant insights regarding case trends over time. It does not comply with the technical guidelines for measles and rubella, which recommend that dissemination of results and feedback should occur monthly to health centers, hospitals, and private health facilities. This should be done through official letters, meetings, emails, SMS, WhatsApp, or phone calls(16).

CONCLUSIONS AND RECOMMENDATIONS

The implementation of measles surveillance at the Palu City Health Department follows the Technical Guidelines for Measles and Rubella (2020) and the Minister of Health Regulation No. 45 of 2024 concerning health surveillance organization. Several issues have been identified regarding the input aspect of surveillance: there are still instances of double positioning among surveillance officers, knowledge transfer to new officers has not yet

occurred, there are no tactical funds available for handling outbreaks, and not all health centers possess the necessary computing devices to support surveillance activities. In terms of the process aspect, some health centers do not have designated contact persons for house-to-house notifications of sick individuals. Additionally, there are health centers that often do not collect zero case data in a timely manner, and not all centers are conducting data processing with sub-district stratification. Lastly, regarding the output aspect, reports are not consistently provided on time, and the dissemination of new information is not adequately reaching internal stakeholders. Therefore, it is necessary to design requirements that are accordance with the duties and function of the position and also the clear SOP for transfer knowledge activities to the replacing officers. Apart from that, clear planning is needed regarding cost design for outbreaks that can move statically.

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