

Trends and characteristics of suspected measles outbreaks in Lumajang during 2022

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ABSTRACT

Measles is a highly contagious, acute illness that can transmit the measles virus close to 100% of susceptible contacts and can cause fatalities. This study aimed to describe the trend and distribution of the characteristics of the suspected measles outbreak in Lumajang regency during 2022. This research used secondary data. The sampling technique used was total sampling, with the inclusion criteria of all suspected measles cases included in the scope of the Lumajang District Health Office in 2022, namely 49 people. This study used univariate analysis to describe the trend of suspected measles and the frequency distribution of the characteristics of suspected measles. Epi Info version 7.2.5.0 is used for the analysis process. The results showed that 100% of suspected measles had a fever and developed a maculopapular rash. Other symptoms that often appeared in suspected measles were cough and runny nose, approximately 14.29%. 49 people were suspected of measles cases with 53% women and 47% men. Rogotrunan Primary Healthcare was the most 43.69% suspected source. Nearly half of suspected measles came from the age group 1-4 years (42.86%), Where the 1-year-old was the youngest up to 60 years old was the oldest. Of the 49 suspected measles, one-third (32.65%) had incomplete immunization status. The primary healthcare with the highest suspected measles rate was the primary healthcare with the measles-rubella immunization coverage not reaching the national target of 90%. The timely identification of measles cases is crucial. Active surveillance for measles disease should be conducted for every confirmed measles case to assure timely reporting of suspected cases in the population known to be affected as well as other segments of the community that may be at high risk of exposure or in low vaccination coverage.

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INTRODUCTION

The Ministry of Health reported an outbreak of high transmission of measles in Indonesia in 2022. The number of measles cases was 3,341. These cases spread across 223 regencies/cities in 31 provinces. The number of these cases was obtained over a period of 1 year from January to December 2022. When compared to 2021 there was a significant increase of approximately 32 times (Rokom, 2023). Measles is caused by the paramyxovirus of genus Morbillivirus. The virus often spreads from person to person by direct touch or airborne respiratory droplets. Infected individuals may experience a high fever during the incubation period, which lasts on average 14 days. Coughing and runny nose come next, and then a rash may appear all over the body. Diarrhea, otitis media, pneumonia, encephalitis, seizures, and mortality are the most common complications of the illness (Blakely et al., 2020).

Measles is a highly contagious, acute illness that can transmit the measles virus close to 100% of susceptible contacts and can cause fatalities (European Centre for Disease Prevention and Control, 2023). If a person does not have good immunity, the chance of being infected with measles is 90 percent. Because it is highly contagious, the required herd immunity is also high. However, measles is one of the vaccine-preventable diseases (Chin & Kandun, 2007). Prevention of measles can only be obtained from immunization, so immunization according to the schedule must be carried out so that children are protected from measles. Immunization coverage has decreased significantly due to the COVID-19 pandemic, so many children are not immunized. At that time, especially at the start of the pandemic, there was a decrease in measles immunization coverage for children. During the pandemic, from 2020 to 2022, immunization coverage in most districts/cities did not meet the national immunization coverage target. This ultimately reduces herd immunity in society. Unlike the pre-pandemic period, the spread of measles was under control. This means that cases of measles transmission are only sporadic, not in the form of epidemics or outbreaks. Measles does not only affect children, if it is an adult who has low immunity, he is at risk of infection. Children who have not been fully vaccinated can still be infected with measles. It's just that, the impact of the disease is not too heavy because you already have a low level of immunity. The severe impact of measles will be felt by those who have not been immunized at all, which are vulnerable to complications from other diseases such as pneumonia, inflammation of the brain, and malnutrition.

Someone who gets measles will experience a phase of initial symptoms, such as high fever, cough, runny nose, and red eyes. This phase is the phase that is most infectious. In addition, measles transmission is not done through skin contact, but through airborne droplets, saliva splashes when coughing, sneezing, talking, or through nasal secretions. Measles will be very dangerous if complications occur. The impact can cause severe diarrhea to death. The biggest concern about measles is the complications. Complications for measles are generally severe. If measles affects a child who is malnourished, this child can immediately be accompanied by complications such as severe diarrhea, pneumonia, pneumonia, inflammation of the brain, and infection in the lining of the eye which can lead to blindness.

The timely identification, notification, and examination of measles cases are crucial as they can aid in curtailing the transmission of the disease through early detection and immunization of vulnerable individuals (Gastanaduy et al., 2019). Active surveillance for measles disease should be conducted for every confirmed measles case to assure timely reporting of suspected cases in the population known to be affected as well as other segments of the community that may be at high risk of exposure or in whom vaccination coverage is known to be low. Efforts should be made to obtain clinical specimens for viral detection (see "Laboratory Testing" section above). Active surveillance should be maintained until at least two incubation periods after the last confirmed case is reported (e.g., two maximum incubation periods [21 days from exposure to rash] or 42 days after rash onset in the last case). To prevent more and more people from being infected by measles, it is necessary to strengthen measles surveillance. It means cases of suspected measles-rubella, namely patients who have fever and rashes, specimens must be taken and examined in the laboratory. So, strengthening surveillance is carried out by immediately finding suspected cases of

measles-rubella and immediately reporting them so that patients can be treated immediately and carry out further examinations.

An area is called an outbreak if there are at least 2 cases of measles in that area that have been laboratory confirmed and these cases have an epidemiological relationship. Based on a preliminary study of surveillance officers from the Lumajang District Health Office, in Lumajang District, there is an increase in the number of suspected measles in 2022 compared to previous years. Of the 49 samples that were examined in the laboratory, 9 were positive based on laboratory test results, 2 of which had a relationship in person, place, and time when studied based on epidemiology. So, it can be concluded that Lumajang Regency is included in the Measles Outbreak category. In addition, Measles-Rubella outbreak status can also be determined if the area meets the set criteria, that is if there are five or more suspected cases of measles-rubella within four consecutive weeks and there is an epidemiological relationship that will find out through this study, finding characteristics of suspected cases of measles-rubella important for early treatment and carry out further examinations because time for measles confirmed take to long time for test laboratory and the treatment may be late if . This study aimed to describe the trend and characteristics of the suspected measles outbreaks in the Work Area of the Lumajang District Health Office in 2022.

RESEARCH METHOD

This descriptive epidemiological research aimed to describe the trend and characteristics of the suspected measles outbreaks in the Work Area of the Lumajang District Health Office in 2022. This research used secondary data; the data needed was obtained from other people or other places and not done by researchers themselves, such as data obtained from health services and agencies. This study used disease data obtained from the Lumajang District Health Office (Budiarto, 2001; Budiarto & Dewi Anggraeni, 2002). The population in this research was data on measles reports in Lumajang Regency 2022. The research sample used data CMBS report from the 2022 Lumajang Regency, which contained suspected measles. Suspected measles is defined as any case with minimal symptoms of fever and maculopapular rash unless it has been laboratory proven to be caused by another cause. Other symptoms with cough, coryza, and conjunctivitis. If acute fever-rash surveillance may also be suspected of rubella by the healthcare worker (Kemenkes, 2020; World Health Organization, 2022). The sampling technique used in this study is total sampling (Sugiyono, 2019), with the inclusion criteria of all suspected measles cases included in the scope of the Lumajang District Health Office in 2022. The sample in this research used all data suspecting measles in Lumajang District Health Office in 2022 containing 49 measles suspected. The characteristic that researched suspected measles month by month, were primary healthcare, gender, age, and immunization status. This research used data from January to December 2022. Primary health included 13 (thirteen) public health center in District Lumajang, there is Yosowilangun, Summersari, Sukodono, Rogotrunan, Randuagung, Pronojiwo, Pasrujambe, Pasirian, Padang, Labruk Kidul, Kunir, Klakah, and Bades. Gender was categorized as male and female. Age was categorized into 5 (fifth) - under 1 year, 1 - 4 years, 5 - 9 years, 10 - 15 years, and upper 15 years. Immunization status indicated by complete, incomplete, not previously vaccinated, and don't know. This study used univariate analysis to describe the trend of suspected measles and the frequency distribution of the characteristics of suspected measles. Epi Info version 7.2.5.0 is used for the analysis process. Epi Info is an analysis application that worldwide use for rapid assessment of disease outbreaks (CDC, 2016).

RESULTS AND DISCUSSIONS

The results showed that 100% of suspected measles had a fever and developed a maculopapular rash. In addition, other symptoms that often appeared in suspected measles were cough and runny nose, approximately 14.29% (Table 1). The trend of suspected measles from month to month in 2022 in the Work Area of the Lumajang Health Service tends to fluctuate. The highest number of

suspects of measles was in June and December, namely 8 suspects of measles, while the lowest number of suspects was in April with 1 suspect of measles (Figure 1).

Table 1. Symptom Distribution of Suspected Measles in the Work Area of the Lumajang District Health Office in 2022

Symptoms	Total (n=49)	Persentase (%)
Fever		
Yes	49	100,00
No	0	0,00
Maculopapular Rash		
Yes	49	100,00
No	0	0,00
Others		
Arthralgia	2	4,08
Nauseous	4	8,16
Runny nose	7	14,29
Cough	7	14,29
Seizures	3	6,12
Red eye	1	2,04
Diarrhea	5	10,24
Congested	2	4,08
Itchy rash	1	2,04
Swallow pain	1	2,04
Nothing	19	38,78

In total, there were 49 people suspected of measles in 2022 in Lumajang. The Rogotruman Primary Healthcare was the most suspected source as many as 17 or 43.69% of people (Figure 2). The second position was Labruk Kidul Primary Healthcare at 6 (12.25%) and the third was Sukodono Primary Healthcare at 5 (10.20%). Suspected measles in women and men didn't much different, with 53% women and 47% men (Figure 3). Nearly half of suspected measles came from the age group 1-4 years, namely 21 people (42.86%), where the 1-year-old was the youngest up to 60 years old was the oldest (Figure 4). Of the 49 suspected measles, one-third (32.65%) had incomplete immunization status and not previously vaccinated by 12% (Figure 5). Most of the measles suspects came from the Rogotruman Public Health Center, which targeted immunization status below the national target of 80%. The primary healthcare with the highest suspected measles rate was the primary healthcare with the measles-rubella immunization coverage not reaching the national target of 90% (figure 6).

Trends of Suspected Measles in the Work Area of the Lumajang District Health Office in 2022

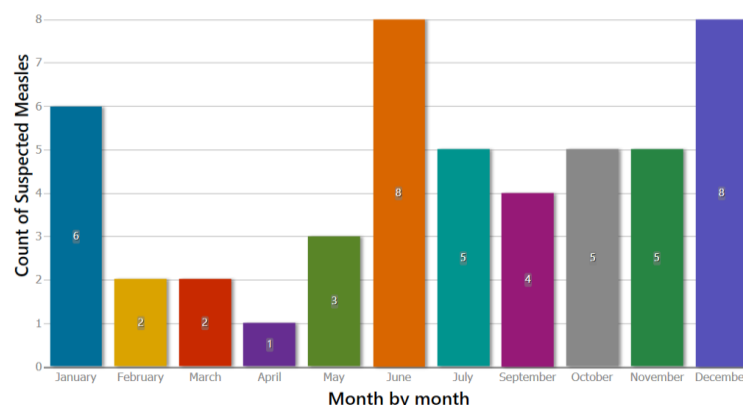


Figure 1. Trends of Suspected Measles in the Work Area of the Lumajang District Health Office in 2022

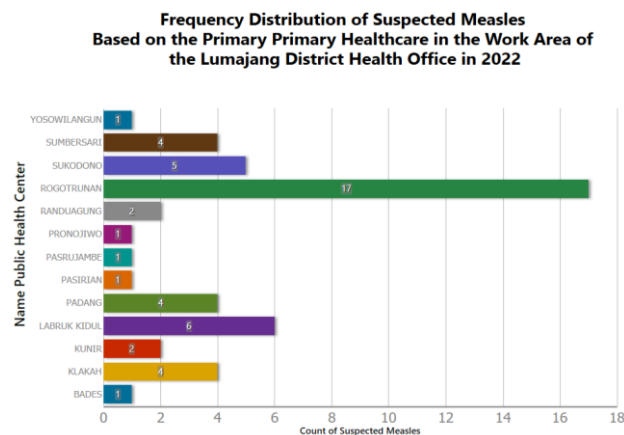


Figure 2. Frequency Distribution of Suspected Measles Based on the Primary Primary Healthcare in the Work Area of the Lumajang District Health Office in 2022

**Frequency Distribution of Suspected Measles
Based on Gender in the Work Area of
the Lumajang District Health Office in 2022**

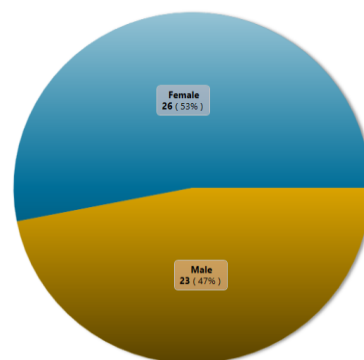


Figure 3. Frequency Distribution of Suspected Measles Based on Gender in the Work Area of the Lumajang District Health Office in 2022

**Frequency Distribution of Suspected Measles Based on Age Group
in the Work Area of the Lumajang District Health Office in 2022**

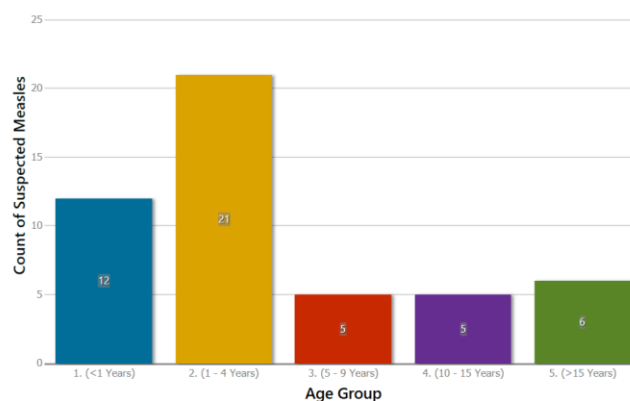


Figure 4. Frequency Distribution of Suspected Measles Based on Age Group in the Work Area of the Lumajang District Health Office in 2022

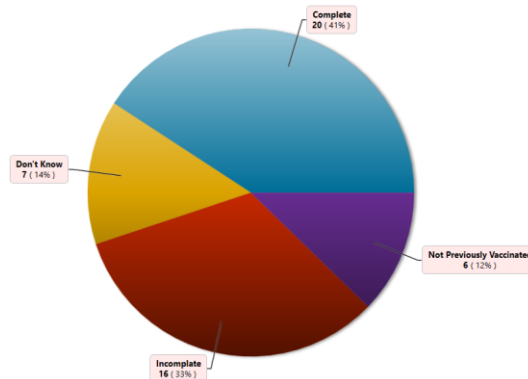
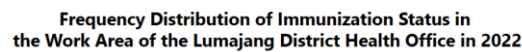


Figure 5. Frequency Distribution of Immunization Status in the Work Area of the Lumajang District Health Office in 2022

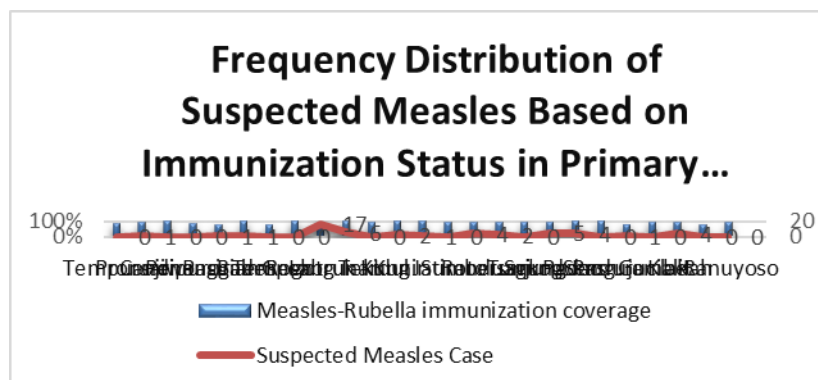


Figure 6. Frequency Distribution of Suspected Measles Based on Immunization Status in Primary Healthcare in Lumajang 2022

A suspected measles outbreak occurs if there were five (5) or more suspected cases of measles-rubella within four (4) consecutive weeks and there were epidemiologically linked or five reported clinical measles cases during a 30-day period within a defined geographic area (Kemenkes, 2020; World Health Organization, 2022). The result of this study found that 100% of suspected measles had a fever and developed a maculopapular rash. In addition, other symptoms that often appeared in suspected measles were cough and runny nose, approximately 14.29%. Measles is associated with fever and rash, but these are clinical signs of several diseases which can lead to misdiagnosis. The incubation period for measles is around 7-21 days. A discrete erythematous rash develops on the patient's face and neck the day after the disappearance of Koplik's spots. After that, the rash spreads all over the body. Usually, they last for 3-7 days. The patient was considered highly contagious 4 days before the appearance of the first rash. The maculopapular rash after a few days becomes hyperpigmented which can be used as a hallmark of measles infection (Husada et al., 2020; World Health Organization, 2022).

Measles generally characterized was fever and a maculopapular skin rash (Laksono et al., 2020; Rota et al., 2016), which is accompanied by immune clearance of measles virus (MV) that infected lymphocytes and myeloid cells enter the dermis, where the infection spreads to the susceptible cells in the vicinity of dermal papillae, hair follicles, sebaceous glands, and blood vessels in the superficial dermis. The infection spreads laterally and apically to the epidermis in a nectin-4-dependent manner. The infection is cleared several days later by infiltrating immune cells, accompanied by the appearance of edema and hyperemia that give the appearance of an erythematous morbilliform rash (Laksono et al., 2020)

The maculopapular rash was not only found in measles disease, but COVID-19, viral exanthema, scarlet fever, rubella, drug eruptions, and secondary syphilis (Anggraini, 2021).

Maculopapular rash divide vesicular or non-vesicular. Measles included non-vesicular maculopapular rash (Brown et al., 2022; Murugan et al., 2022). For a non-vesicular rash, exclude measles can other diseases such as streptococcal and meningococcal infection, enterovirus, syphilis, and infectious mononucleosis (Epstein-Barr virus or Cytomegalovirus). So suggested specific investigation and management (Brown et al., 2022).

Rogotruman Primary Healthcare was the most (43.69%) suspected measles source located in the center of Lumajang District including the urban area. Another study found that in large urban areas, even where measles vaccine coverage is high, the number of susceptible infants and children may still be sufficient to sustain transmission. Conditions such as high birth rates, overcrowding, and the influx of large numbers of susceptible children from rural areas can facilitate measles transmission (Pan American Health Organization, 2005). Measles occurrence is related to urbanization because of the high entry of migrants and high population density; cities have become important hubs for the spread of infectious diseases (Ali & Maalin, 2021). Measles virus transmission through air (included Air Borne Disease) spreads through a cough or sneezing through contact with saliva or nasal secretion from a person infected to another person (Khongthaw & Geetha, 2022). Population size and density are important urban risk factors for respiratory pathogens such as measles (NIPH, 2020).

In this study, among suspected measles cases, the percentage of females was higher than males. Another study found that male was higher than female. Previous studies have found that sex differences in the incidence rate of measles may be related to an imbalance in the expression of genes encoded on the X and Y chromosomes of the host, where the phenomenon of X chromosome inheritance and expression leads to weaker male immunity and increased women survival following an immunological challenge (Green et al., 2022; Schurz et al., 2019). Changes in the male-to-female morbidity ratio with age may reflect differences between the sexes in the immune and endocrine systems. The possible role of sex hormones remains largely unknown (Eshima et al., 2012; Green et al., 2022). Another connection with the effects after immunization, men may be more susceptible to measles than women (Green et al., 2022). A few other studies have reported no gender difference. The reason for the findings may be the difference in the gender ratio in study areas or due to the differential attitude of the parents toward a female child (Mishra et al., 2009).

Most cases were reported in aged less than five years. Measles was one of the most common infectious diseases, affecting most children at an early age, same with suspected measles. That is related to mostly unvaccinated or under-vaccinated children under the age of 5 years (WHO, 2023a). This is related to vaccination where it is not yet time to get the vaccine but almost all children have contracted this disease (WHO Regional Office for Africa, 2015). In the age group under 5 years, most have never had measles before no antibodies have yet been formed. In that age group, toddlers have not been immunized (Nurani et al., 2012). Measles can be a serious problem for children. Children younger than 5 years of age and adults older than 20 years of age are more likely to suffer from complications. Common complications are ear infections and diarrhea. Serious complications include pneumonia and encephalitis (CDC, 2020).

The result found that one-third (32.65%) had incomplete immunization status. The other study found accessibility to the vaccination sites, no schooling of mothers, and the place of children born (home or outside) were associated with incomplete vaccination (Jani et al., 2008). The primary healthcare with the highest suspected measles rate was the primary healthcare with the measles-rubella immunization coverage not reaching the national target of 90%. Measles is preventable by vaccination namely MMR (prevent from measles, mumps, and rubella), which provides lifelong immunity in most recipients. The measles vaccine has been in use for nearly 60 years. It is safe, effective, and inexpensive. Vaccination is recommended for all susceptible children and adults for whom the vaccine is not contraindicated. Children get two doses of MMR vaccine recommended by the CDC, the first dose at 12 through 15 months of age, and the second dose at 4 through 6 years of age. Two doses of MMR vaccine are about 97% effective at preventing measles; one dose is about 93% effective (CDC, 2021; WHO, 2023b).

All suspected cases of measles should be reported to public health authorities as mandated ie all patients with fever and a maculopapular (non-vesicular) rash as suspected cases of measles.

Whereafter, patients with clinically suspected measles or other clinical warning signs should be treated in a care facility with isolation capacity – a single room is preferred, separating clinically suspected and confirmed cases. During an outbreak, early and adequate treatment and clinical case management of clinically suspected measles patients is essential to reducing measles morbidity and mortality (WHO, 2020).

When a patient is suspected of having measles, an investigation of the case should be initiated immediately. Case investigations must be timely and thorough. Further ensuring patient diagnosis and appropriate medical follow-up for affected persons by identifying sources of infection, locating people who may have been exposed, and isolating potentially infectious persons to prevent transmission of the disease in the community. Individuals suspected of having measles, and who plan to visit their medical provider should inform the healthcare provider of the reason for their visit so that precautions can be taken to limit their exposure to other patients or vulnerable staff. In addition, suspected cases of measles are advised to minimize interaction with others until measles can be ruled out (Maryland Department of Health and Mental Hygiene, 2017).

Research on the characteristics of suspected measles was crucial to catch all people who have symptoms of measles which will then be carried out epidemiological investigations in less than 2 × 24 hours for a response to outbreaks and laboratory tests to confirmation of cases advantageous monitoring the progress of measles-rubella elimination (Kemenkes, 2020).

CONCLUSION

All of the suspected measles had a fever and developed a maculopapular rash. Other symptoms that often appeared in suspected measles were cough and runny nose, approximately 14.29%. 49 people were suspected of measles cases with 53% women and 47% men. Rogotrunan Primary Healthcare was the most 43.69% suspected source. Nearly half of suspected measles came from the age group 1-4 years (42.86%), Where the 1-year-old was the youngest up to 60 years old was the oldest. Of the 49 suspected measles, one-third (32.65%) had incomplete immunization status. The primary healthcare with the highest suspected measles rate was the primary healthcare with the measles-rubella immunization coverage not reaching the national target of 90%. The characteristics of suspected cases of measles-rubella under five years old and had incomplete immunization status so the recommendation prevention is a priority complete immunization measles-rubella for under 5 years. Future research needs to know the timely identification, notification, and examination of measles cases because that is crucial for measles-rubella treatment. Preventing the transmission of the disease through early detection. Active surveillance for measles disease should be conducted for every confirmed measles case to assure timely reporting of suspected cases in the population known to be affected as well as other segments of the community that may be at high risk of exposure or in low vaccination coverage. The advantage is that it saves effort and time since the data obtained covers the entire area of Lumajang Regency. Further research is needed on how to describe cases from suspected to confirmed cases, risk factors, and implementation of epidemiological investigations.

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