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EPIDEMIOLOGY OF MEASLES AND RUBELLA IN YOGYAKARTA CITY 2013-2022

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ABSTRACT

Introduction: Measles and Rubella are still a public health problem in Indonesia, including in Yogyakarta. Extraordinary Measles and Rubella Incidents in the City of Yogyakarta are still being reported. In 2022, there will be 2 cases. Nevertheless, measles and Rubella have a high potential for transmission, death and cause more severe complications. This study aims to determine the trend of measles and Rubella cases in Yogyakarta from 2013-2022.

Methods: This study used a descriptive research design. Data on measles and rubella cases were taken from the Yogyakarta City Health Office Case Based Measles Surveillance (CBMS) report for 2013-2022. Results: Measles and Rubella cases tend to decrease in 2018-2021 and increase again in 2022. Of the 2928 suspected measles, the majority were women (50.8%) and aged over 15 years. There were 459 confirmed cases of measles and 468 instances of Rubella. Of the two cases of measles and Rubella, most suffered from children.

Conclusion: Laboratory-confirmed incidences of measles and rubella are found in all areas of the subdistrict and are more prevalent in children. Strengthening the body's resistance and immunity to measles-rubella infection must be done to prevent measles-rubella outbreaks with transmission in the school environment.

Keywords: Measles, Rubella, Surveillance, Yogyakarta City

INTRODUCTION

During 2000–2016, global measles incidence decreased by 87% from 145 to 19 cases per million population. The number of reported cases decreased from 853,479 in 2000 to 132,490 in 2016. However, since 2016 the cases have increased to reach 869,770 cases reported in 2019, with an incidence of 120 cases per million population and an estimated more than 207,500 deaths due to measles.¹ Measles has long-term consequences by predisposing to other infections through prolonged immunosuppressive effects lasting for 2 to 3 years after infection and contributing to malnutrition in children. Rubella also has long-term consequences for the estimated 103,000 babies born with congenital rubella syndrome.²

National measles surveillance data for 2021 reported 132 laboratory-confirmed cases of measles, 267 laboratory-confirmed cases of rubella, and 1 report of an Extraordinary Event. In 2022, there will be 2889 laboratory-confirmed measles, 562 laboratory-confirmed Rubella cases, and 62 reports of extraordinary events. This figure

shows an increase in cases in 2022 of 22 times for laboratory-confirmed measles, 2 times for laboratory-confirmed rubella, and 7.75 times for extraordinary events (outbreak).³

Yogyakarta Province Health Service's 2022 surveillance report for diseases that can be prevented by immunization (PD3I) reports an increasing trend in cases of pertussis, hepatitis B, and measles. In 2021, 117 suspected measles were reported with 62 laboratory-confirmed cases positive for measles and 80 positive for rubella. In 2022, suspected cases will increase 3.7 times to 433 cases.⁴ The 2021 Yogyakarta City Health Service Case Based Measles Surveillance (CBMS) report recorded 29 suspected measles cases 0 laboratory-confirmed measles cases and 2 laboratory-confirmed rubella cases.⁵ In 2022 suspected measles cases increased 2.8 times to 82 cases and laboratory confirmed positive 9 cases of measles and 8 positive cases of rubella (an increase of 4 times). In 2021, there were no reported outbreaks of measles or rubella in the Yogyakarta City area, but in 2022 there was 1 incident that met the criteria for an extraordinary event of

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measles in the Mantrijeron kemantren area.⁶

Measles is an infectious disease caused by morbillivirus. This disease is very contagious, especially in people who do not have immunity to the virus. Symptoms that appear when infected with the virus that causes measles are fever, maculopapular rash cough, runny nose, or red eyes. A person will show symptoms of measles between 7-18 days with an average of 10 days from the entry of the virus into the body. Measles is dangerous because it can cause complications and even cause death. Complications that often arise are diarrhea and bronchopneumonia. Another disease similar to measles known as Rubella is also caused by a virus, namely the Rubivirus type togavirus. Symptoms include mild fever and maculopapular rash accompanied by enlarged glands behind the ears. The incubation period is around 12-21 days. Rubella is fatal if it attacks pregnant women, especially in the early trimester because it can cause abortion, stillbirth, and congenital defects (Congenital Rubella Syndrome/CRS). Measles and rubella

spread through droplets and airborne transmission.⁷ The only reservoir for measles is humans, it is not known that other animals are the reservoir and there are no known asymptomatic carriers. For airborne transmission, the measles virus can survive for up to 2 hours in a closed room even if the sufferer has left the room. Measles often appears in late winter or spring in temperate climates and is endemic.⁸

Areas at high risk of measles are areas that have the potential for measles Extraordinary Events (KLB) to occur, which can be mapped based on immunization coverage, population density, slum areas, nutritionally vulnerable areas, areas that are difficult to reach or far from health services and areas where community groups do not receive immunization.⁹ All kemantren areas in Yogyakarta City are densely populated areas. Yogyakarta City is the most populous Regency/City in DIY Province.

Surveillance for measles and rubella is carried out through the Case-Based Measles Surveillance (CBMS) program. CBMS is a measles

surveillance program by records each suspected measles case individually (case line listed) in a report format and carries out laboratory confirmation with the serological examination (IgM) and investigation within 2 x 24 hours after the report is received.¹⁰ In this program, every patient who comes to the Community Health Center or Hospital with symptoms of heat and rash accompanied by one of the symptoms of cough, runny nose, or red eyes will be identified as measles suspect and a measles laboratory examination will be carried out. If the measles IgM result is negative then the Rubella examination will be continued. At the start of CBMS implementation in Yogyakarta City, measles patient data was reported using the monthly hardcopy C1 Measles report format. Furthermore, in 2010-2014 reporting used electronic mail (email) facilities. Since 2017, measles reporting has used SIMPUS while hospitals still use email.

The Yogyakarta City Health Service has implemented CBMS since 2008, carried out by 18 UPT Puskesmas. Health centers in the working area of the Yogyakarta City Health Service

consist of Mantrijeron, Kraton, Mergangsan, Umbulharjo 1, Umbulharjo 2, Kotagede 1, Kotagede 2, Gondokusuman 1, Gondokusuman 2, Danurejan 1, Danurejan 2, Pakualaman, Gondomanan, Ngampilan, Wirobrajan, Gedongtengen, Jetis and Tegalrejo Community Health Center. The Puskesmas records every suspected case of measles that comes to the Puskesmas as well as case reports from other health facilities (Hospitals, Clinics, Independent Practicing Doctors) in its work area and takes blood samples and sends them to the Yogyakarta Health and Calibration Laboratory Center (BLKK) for examination. Measles and Rubella serology. Furthermore, the puskesmas will carry out case investigations to look for additional cases and carry out vigilance in the area.

The results of the laboratory examination will be informed by the Yogyakarta BLKK to the Community Health Center. Measles case reports are summarized in the C1 report format and reported to the Yogyakarta City Health Service before the 10th of each month via

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email. The C1 Measles report contains individual information on suspected measles cases in the form of case identity (case epid number, name, age, gender, and address), date of onset of symptoms of fever, rash, and other additional symptoms, measles, and rubella immunization status, administration of vitamin A and examination results serological laboratory. Since 2016, the mechanism for reporting suspected measles has been integrated with SIMPUS, so that the Community Health Center does not need to send emails, but the Health Service can see the measles summary in SIMPUS. The C1 Recap data will then be processed by the Yogyakarta City Health Service using the MS application. Excel to find out the trend of cases, see the distribution of cases based on age and gender, immunization status, and laboratory examination results and presented in the form of tables and graphs.

METHOD

This study used a descriptive research design to determine the epidemiological picture of measles and rubella cases in Yogyakarta City.

Data on measles and rubella cases was taken from the individual-based measles surveillance report or Case-Based Measles Surveillance (CBMS) of the Yogyakarta City Health Service for 2013-2022. This research will take suspected measles cases, laboratory-confirmed measles cases, and laboratory-confirmed Rubella cases. Suspected measles are cases with minimal symptoms of fever and maculopapular rash, excluding cases that have been laboratory-confirmed as other cases. Laboratory confirmed measles is a measles suspect who has been laboratory confirmed with a positive result for measles virus (positive measles IgM) and has not received measles-rubella immunization in the last 4-6 weeks before the rash appeared. Meanwhile, laboratory-confirmed rubella is a measles suspect who has been laboratory confirmed with a positive result for rubella virus (positive rubella IgM) and did not receive measles-rubella immunization in the last 4-6 weeks before the rash appeared.¹⁰

CBMS data in the form of data recaps from 18 Community Health Centers throughout Yogyakarta City is then

processed using Ms. Excel and presented in graphic form to describe annual and monthly case trends, distribution of cases based on outbreaks, distribution by place and distribution of cases based on age and gender.

To determine priority areas, an area map is used to compare the size of the problem between regions. For this purpose, the measles surveillance guidelines recommend using incidence figures. ⁹ In this study, mapping was created using the QGIS application. The mapping was made based on the Kemantren area (sub-district) by calculating the incidence rate (Incidence Rate/IR) of measles and rubella in each Kemantren area. The city of Yogyakarta is divided into 14 Kemantren areas including Mantrijeron, Kraton, Mergangsan, Umbulharjo, Kotagede, Gondokusuman, Danurejan, Pakualaman, Gondomanan, Ngampilan, Wirobrajan, Gedongtengen, Jetis and Tegalrejo. ¹

To analyze it, the IR per kemantren is differentiated based on a gradation of light to dark colors starting with white if the IR is equal to 0 or there are no cases and then the interpretation is

that the higher the IR, the darker the color. Furthermore, the data presented in the form of graphs and area maps is interpreted based on the analysis results and compared with the appropriate literature.

This research protocol has received approval from the Ahmad Dahlan Yogyakarta University Research Ethics Committee. Informed consent was given to all participants and participation was voluntary.

RESULTS AND DISCUSSION

The annual trend during 2013-2022 is quite fluctuating for trends in suspect findings, laboratory-confirmed measles and laboratory-confirmed rubella (Figure 1). Findings of suspected measles increased from 2014 to 2017, and there was a significant decrease in 2018. Although it increased again in 2019, it decreased again in 2020-2021. Findings of suspected measles will increase again in 2022.

Laboratory-confirmed measles and laboratory-confirmed rubella cases had a fluctuating trend from 2013 to 2017 with the opposite pattern between the measles and rubella trends. After 2017, both cases tended

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to decline until 2019 and increased again in 2019. During 2013-2017 the number of suspected cases was in the 300-500 range, but in 2018-2022 it was < 200. Laboratory-confirmed measles and rubella also experienced the same trend, in 2013-2017 cases reached above 100 but starting in 2018 they fell to < 50. In 2018 there was a decrease in cases after the rubella measles immunization campaign in August 2017. The government carried out a rubella measles immunization campaign for ages 9 months to < 15 years in 2017 covering 6 provinces on the island. Java (Phase 1). Next, phase II was carried out in 2018 outside Java (28 provinces).¹¹ Ristiani said that the decline in measles cases in 2014-2019 in Badung Regency, Bali was after the MR immunization campaign was

carried out.¹²

In 2020 and 2021, the trend of cases decreased along with the increase in COVID-19 cases in the city of Yogyakarta. At this time, visits from patients other than Covid-19 are relatively down in all Community Health Centers throughout the city of Yogyakarta, possibly because the pandemic conditions are causing people to be afraid to go to Health Facilities for fear of being infected, the high number of Covid cases has also led to prioritization of health facility services for Covid-19, resulting in measles surveillance reports receiving less attention from officers, health protocol policies such as limiting crowds and wearing masks for the public also help reduce the rate of transmission of measles and rubella.

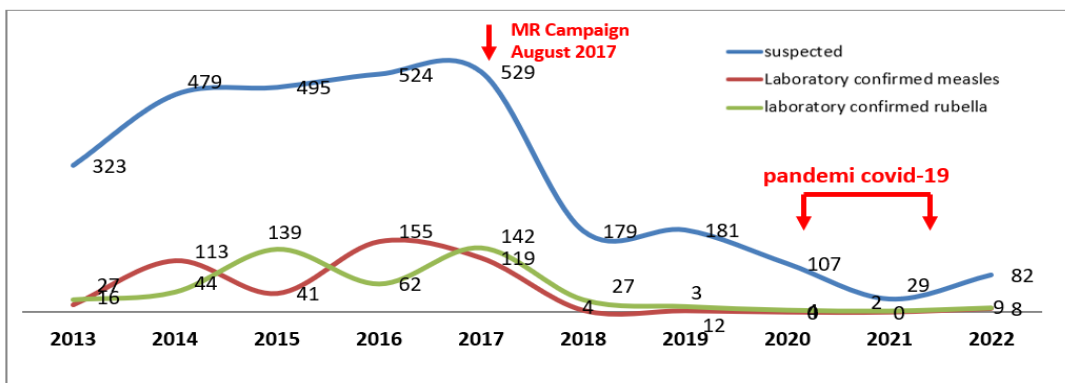


Figure 1. Annual Trend of Suspects, Laboratory Confirmed Measles, and Laboratory Confirmed Rubella in Yogyakarta City 2013-2022

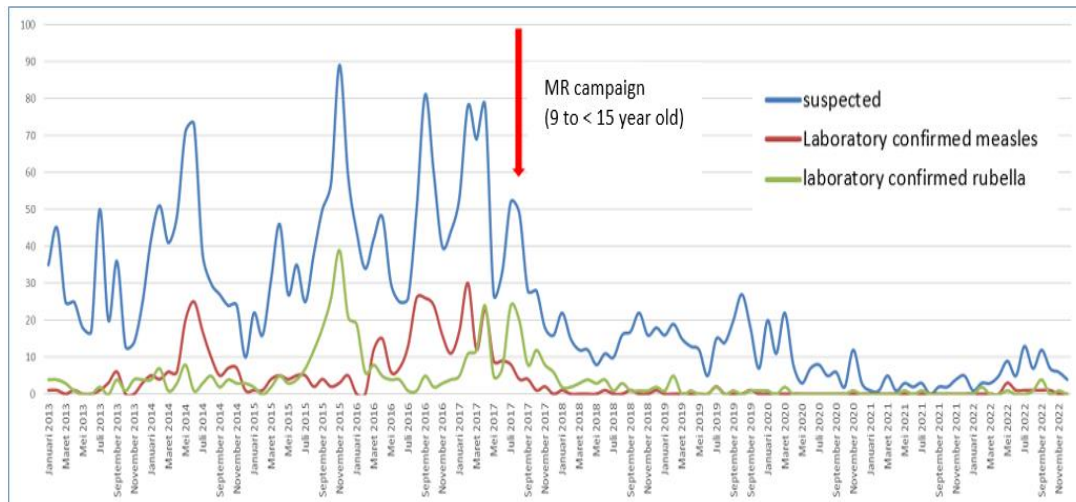


Figure 2. Monthly Trend of Suspects, Laboratory Confirmed Measles, and Laboratory Confirmed Rubella in Yogyakarta City 2013-2022

Monthly Trend of Laboratory Confirmed Measles and laboratory-confirmed Confirmed Rubella each year on average increases in the early and late trimesters, around March April, and September-October (Figure 2). These months coincide with the transition or change of seasons from dry to rainy or vice versa. During this transition period, the weather is unpredictable which causes people to get sick easily.

Laboratory-confirmed cases of Measles and Rubella occurred in all kemantren (sub-district) areas in

Yogyakarta City (Figure 4 and Figure 5). The incidence of measles and rubella appears to be evenly high in 2014-2017 because in those years there were outbreaks of measles and rubella (Figure 3). The highest incidence almost every year is in the Kotagede and Umbulharjo kemantren areas. These two kemantren border each other and both also have areas that directly border the Bantul Regency area. The high incidence rate in these two schools was due to the occurrence of extraordinary cases of measles and rubella.

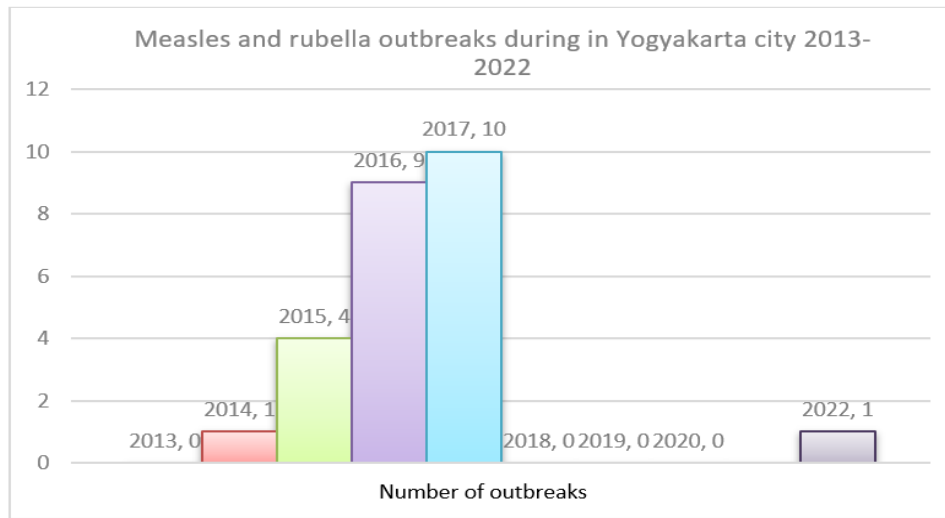


Figure 3. Distribution of Laboratory Confirmed Measles based on subdistrict incidence rates in Yogyakarta City 2013-2022

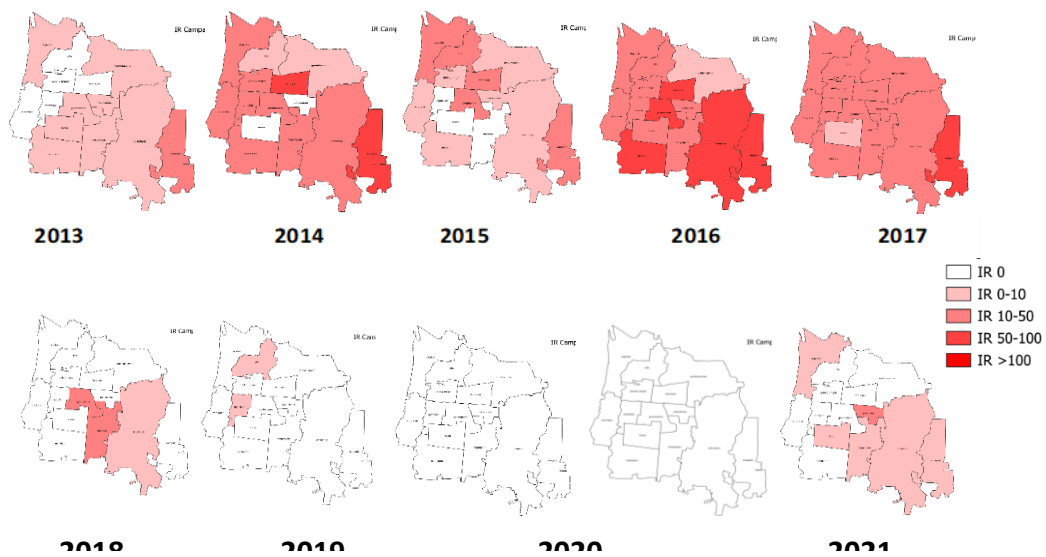


Figure 4. Distribution of Laboratory Confirmed Measles based on subdistrict incidence rates in Yogyakarta City 2013-2022

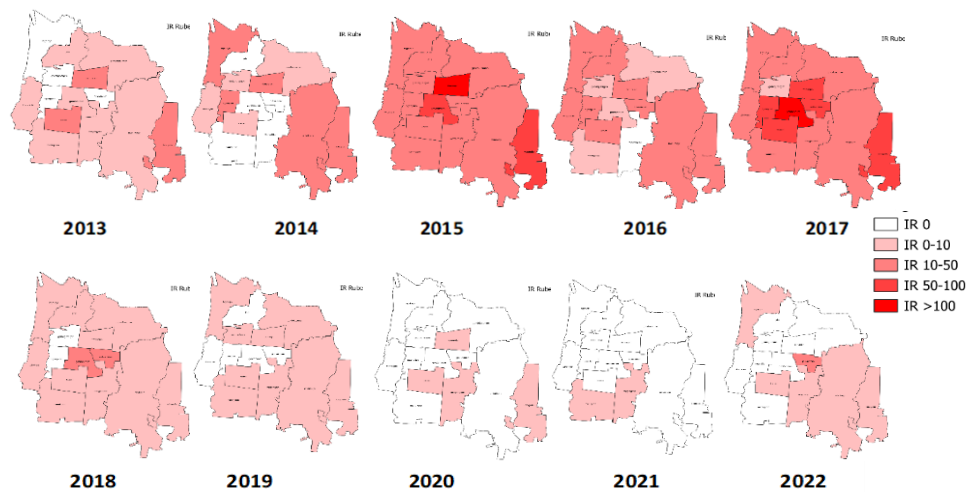


Figure 5. Distribution of Laboratory Confirmed Rubella based on subdistrict incidence rates in Yogyakarta City 2013-2022

The total number of laboratory-confirmed measles cases over 10 years was mostly found in the 1-4 year age group at 27% and the 5-9 year age group (Figure 6). A similar thing happened in 2013-2015. In 2016 the highest was in the 1-4-year age group, in 2017 the highest was in the > 15-year age group. In 2018, it was found evenly distributed in all age groups, except for the 10-14-year-old group, there were no laboratory-confirmed cases of measles. for 2019 it was only found in the age group >15 years. In 2020 and 2021, there were no positive laboratory-confirmed cases of measles or rubella. In 2022, the highest will be in the <1 year age

group. This condition is in accordance with the annual measles epidemiology report in Europe which states that the age groups most affected are those aged < 1 year and 1-4 years. In 2022, 80% of them will not have received immunization. 13 Santoso in his research in Karawang City found that the largest age group for positive measles was the 1-4-year-old group, while for rubella-positive cases it was mostly distributed in the 5-9-year-old age group (Figure 7).¹⁴ Utulu in research in Niger also stated that the distribution of measles cases was highest in the 1-4 year age group (41.4%)¹⁵, in line with Jamaludin's research at the Kalumata health

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center, Ternate stated that the largest age group suffering from measles was age group 0 -5 years. 16 The highest incidence of measles cases in Cirebon City studied by Nurani was in the age

group < 5 years. 17 Asriati in Rubella epidemiology in DIY reported that the highest incidence of rubella was in the age group less than 15 years.¹⁸

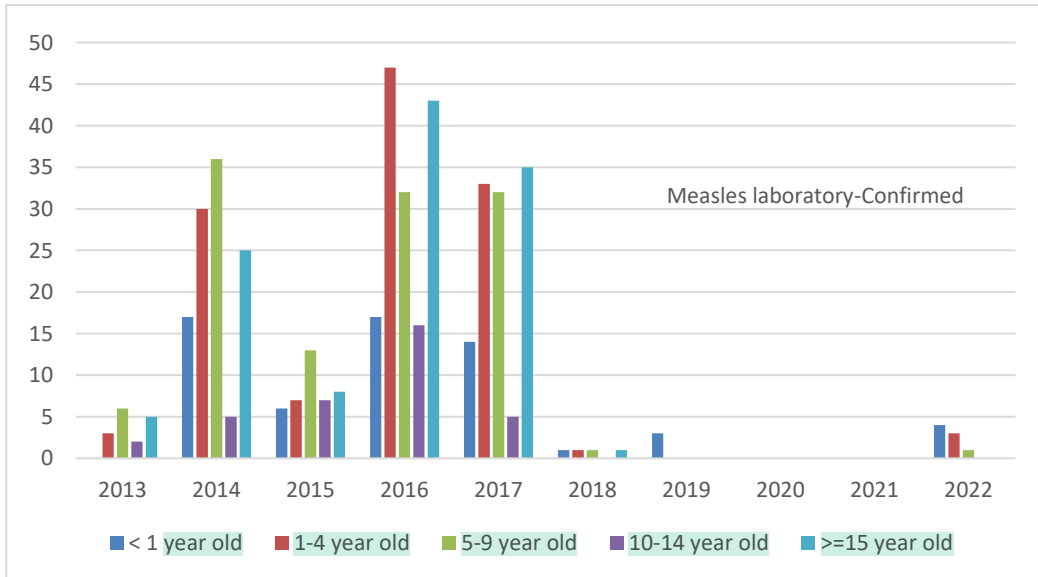


Figure 6. Distribution of laboratory-confirmed measles by age group in Yogyakarta City 2013-2022

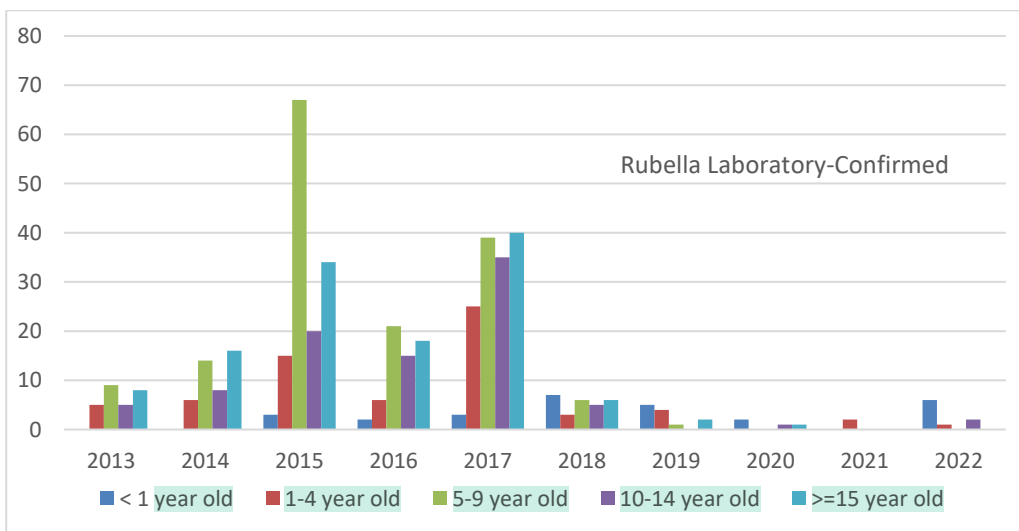


Figure 7. Distribution of laboratory-confirmed Rubella by age group in Yogyakarta City, 2013-2022

The gender proportion of total measles suspects for 1 year 2013-2022 was almost evenly distributed

between men and women, with more women (51%) than men (49%). The annual proportion of women was

found to be greater in 2013, 2014, 2015, and 2016. Meanwhile, a greater proportion of men was found in 2016, 2018, 2019, 2020, 2021 and 2022 (Figure 8).

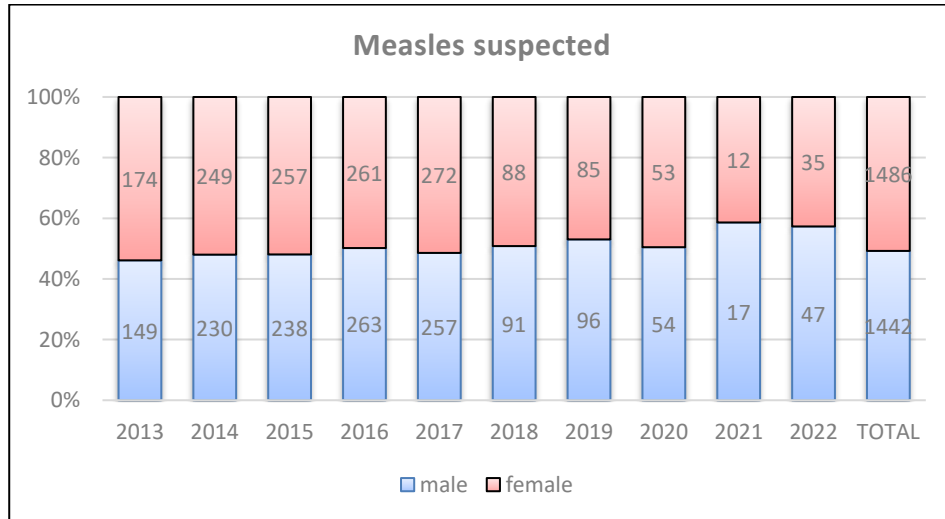


Figure 8. Trend of suspected measles based on gender in Yogyakarta City 2013-2022

In contrast to suspected cases, the gender proportion of laboratory-confirmed measles in 2013-2022 as a whole was more male at 236 cases (52%). Similar proportions occurred in 2013, 2014, 2015, 2017 and 2022. A larger proportion of women occurred in 2016 and 2018. Meanwhile, in 2019-2020 there were no laboratory-confirmed cases of measles (Figure 1).

In contrast to the trend of laboratory-confirmed measles, the gender proportion of laboratory-confirmed rubella cases in 2013-2022 as a whole was more female, with 254 cases (54%). Annual data for the proportion of women occurred more in 2014,

2015, 2016, 2017, and 2018. For the proportion of men, it occurred more in 2013, 2019, 2021, and 2022 (Figure 9).

Utulu's research in Niger reported that there were no significant differences in the gender of confirmed cases of measles. 19 Andriani in research on the relationship between toddler characteristics, age at measles immunization, history of exclusive breastfeeding, and clinical measles in Sidoarjo Regency found that gender had no relationship to the incidence of measles, the immune system of each toddler is more influential in the incidence of measles.²⁰

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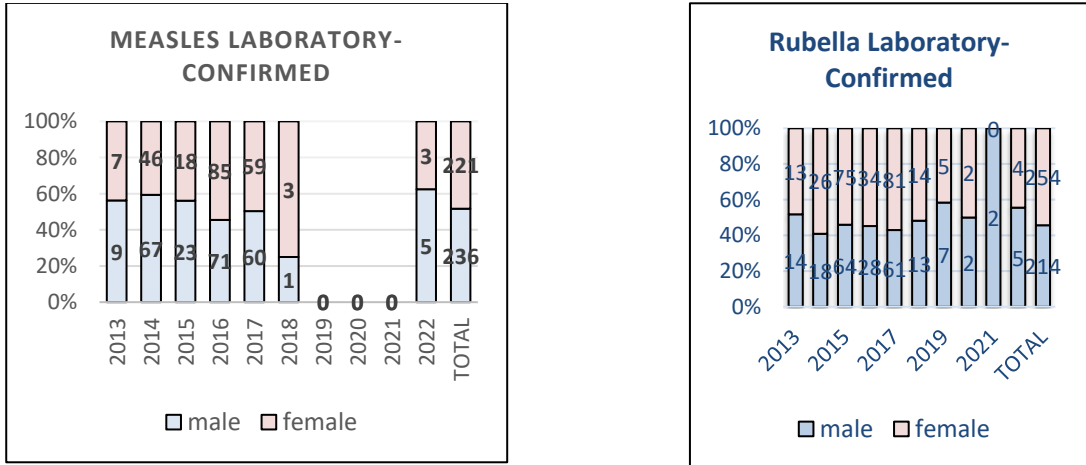


Figure 9. Trend of Laboratory Confirmed Measles Cases and Laboratory Confirmed Ruella by Gender in Yogyakarta City 2013-2022

CONCLUSION

Measles cases in Yogyakarta City tended to decrease from 2013 to 2021 and increased again in 2022. Over the past 10 years, 2928 measles suspects were reported with a greater proportion of cases being women (50.8%) than men (49.2%).) and highest in the age group over 15 years. For laboratory-confirmed positive cases of measles, 459 patients were reported with a higher proportion of males (51.6%) than females (48.4%) and the age group 1-4 years. Meanwhile, there were 468 cases that were laboratory-confirmed positive for Rubella, with a higher proportion of women (54.3%) than men (45.7%) and the age group 5-9 years. The 1-4 year-old age group is classified as an age whose immune

system is not yet fully formed, so they need good nutritional intake and receive immunizations to increase their immune system. The 5-9 year age group is a school age group that is very vulnerable to disease transmission in the school environment. Efforts to prevent and break the chain of transmission in the school environment are absolutely necessary for efforts to prevent and control Measles-rubella in the City of Yogyakarta.

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