# Basic Analysis of The Epidemiological Surveillance Data of Measles from The National Institute of Public Health in Mali 2020-2024, July 2025

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## Summary

### Introduction

*Measles is an acute disease caused by a virus of the Morbillivirus genus, belonging to the paramyxovirus family. It is more common in infants aged 5-6 months and young adults and can lead to severe, even fatal complications. Measles is one of the most contagious diseases in the world. The objective of our study was to analyze the epidemiological surveillance data of measles at the National Institute of Public Health (INSP) from 2020 to 2024 to inform health authorities.*

### Materials and Methods

*We conducted a cross-sectional descriptive study using data from the measles surveillance database at INSP. The tools used were the laboratory register, notification forms, and the measles database. The data were analyzed using Epi Info 7.5.2 after entering missing data and cleaning the database.*

### Results

*In total, we had 6040 suspected cases sampled, of which 2859 were IgM positive. The male sex was predominant with 53%. The most affected age group was 0-5 years. The unvaccinated were the most represented at 97.52%.*

### Conclusion

*This analysis has allowed us to observe the largest number of suspected and confirmed cases of measles, with the age group most affected. However, a strengthening of routine vaccination is necessary.*

**Keywords:** Analysis, Measles Data, InspNevis

## 1. Introduction

Measles is an acute disease caused by a virus of the Morbillivirus genus, belonging to the paramyxovirus family. It is highly contagious, characterized by a maculopapular rash (non-vesicular), fever, rhinitis (nasal discharge), cough, irritability, conjunctivitis, tearing, and an enanthem (Koplik's spots in 70% of cases) on the oral and labial mucosa [1].

It is more common in infants aged 5-6 months and young adults, and can lead to serious, even fatal complications. The incubation period usually lasts 10 to 11 days, ranging from 7 to 18 days, and it is clinically silent. However, a moderate fever and slight respiratory signs were observed shortly after contamination. The illness begins with an invasion phase lasting 2 to 4 days, characterized by a progressive fever that can reach 40 °C, along with general malaise and headaches.

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Measles is one of the most contagious diseases in the world, transmitted by contact with infected nasal or pharyngeal secretions (coughing or sneezing) or by breathing air contaminated by a person with measles. According to the WHO, in 2021, there were 103,088 suspected cases (43,203 confirmed) reported worldwide, compared to 153,222 suspected cases (81,638 confirmed) during the same period in 2020. In 2023, the number of cases of measles is estimated at 10.3 million, representing a 20% increase compared to 2022, according to new estimates from the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) of the United States [2-5].

It is estimated that measles was responsible for more than 2 million deaths associated worldwide each year, for about 30 million people affected. Africa is particularly impacted by the surge in measles cases due to delays in child vaccination, with a 400% increase in the first three months of 2022 compared to the same period in 2021. From January to March, nearly 17,500 cases of this highly contagious viral disease were reported on the continent, where twenty countries reported measles outbreaks, eight more than during the first three months of 2021. According to the WHO, in 2021, Africa recorded 37,993 suspected cases with 22,376 confirmed cases compared to 56,356 suspected cases with 41,392 confirmed cases in 2020. In Mali, from January to July 2022, out of 1,056 tested samples, we obtained 626 positive cases of measles, which is 10.11%, and during the entire year of 2022, 3,159 suspected cases were reported by the regions, among which 2,037 blood samples were received at the INSP, representing 64.48% of the suspected cases, and 784 tested positive, representing 38.48%. Measles remains one of the main preventable diseases through vaccination, but it continues to be a major public health problem in several low or middle-income countries, including Mali. Despite efforts made under the Expanded Program on Immunization (EPI) and the implementation of the regional measles elimination plan, outbreaks still occur, reflecting shortcomings in vaccination coverage and in the performance of the surveillance system. Indeed, given the resurgence of measles cases reported to the INSP since 2020, we deemed it necessary to analyze the epidemiological surveillance database of measles from INSP 2020 – 2024, the results of which will serve to guide strategic decisions, direct resources, and strengthen prevention and response policies [6].

## 1.1. Objectives
### 1.1.1. General Objective
• Analyze the epidemiological surveillance data of measles at the INSP from 2020 - 2024 in July 2025.

### 1.1.2. Specific Objectives
• Describe the sociodemographic characteristics of the reported cases,
• Identify the most affected groups.

## 2. Materials and Methods
### 2.1. Study Framework
Our study was conducted at the National Institute of Public Health (INSP), located on the Koulikoro Road at the Hippodrome in Commune II, Bamako.

### 2.2. The National Institute of Public Health
The INSP is a public institution with a scientific and technological character, created by law N°2019-023/AN of July 3, ratifying ordinance N°2019-011/P-RM of March 27, establishing the National Institute of Public Health (INSP). It has legal personality with administrative and financial management autonomy. It is the result of the merger of the former research structures of the Ministry of Health, which included the National Institute of Public Health Research (INRSP), the Research and Documentation Center for Child Survival (CREDOS), the National Agency for Food Safety (ANSSA), and the National Support Center for Disease Control (CNAM), which encompasses autonomous units such as the Vaccine Development Center (CVD), the Influenza Center, the Pharmacovigilance Center, and the Department of Emergency Operations (DOUSP) [7].

### 2.3. Department Laboratory
• Ensure the reference in the field of biomedical diagnosis;
• Participation in technical training, improvement, and specialization of management;
• Promotion of national and international cooperation in the field of research, training, and disease control
• Participation in the implementation of public health policies, programs, and strategies.

### 2.4. This Department Includes Five Services Including [5].
• The medical biology laboratory service,
• The research and expertise service in bacteriology, parasitology, and mycology,
• The research and expertise service in virology and emerging and re-emerging viruses,
• The pharmacology and toxicology service,
• The integrative medicine and chronic disease biology service

**Figure 1: Image from The National Institute of Public Health, 2024**

Mali is bordered to the northwest by Mauritania, to the northeast by Algeria, to the east by Niger, to the southeast by Burkina Faso, to the south by Côte d'Ivoire, to the southwest by Guinea, and to the west by Senegal. It covers an area of 1,241,238 km² with a population of 23,121,321 inhabitants in 2024. Mali has 11 regions, 75 districts, 14 hospitals, 62 CSRéF, and 1,605 CSComs. The health sector policy of Mali is built on a pyramidal structure consisting of the operational level (Community Health Center (CSCom), Health Reference Center (CSRef)), the intermediate level (regional hospitals, regional health directorates), and the central level (national directorates, 3rd reference hospitals) [8,9].

**2.5. Study Type**
We conducted a cross-sectional descriptive study using data from the measles surveillance database from 2020 to 2024 at the INSP.

**2.6. Study Period**
Our study took place from July 1 to July 31, 2025.

**2.7. Study Population**
Our study population included all suspected measles cases received at the National Reference Laboratory (NRL) for measles at the INSP from January 1, 2020 to December 31, 2024.

**2.8. Definition Of Measles Case**
• Suspected case: any person presenting with fever, a generalized maculopapular rash (non-vesicular) and cough, cold, or conjunctivitis (red eyes), or any person for whom a clinician suspects measles.
• Confirmed case: Presumed case confirmed in the laboratory (positive IgM antibody test) or having an epidemiological link with confirmed cases or an
• Outbreak [10].

**2.9. Studied Variables**
The age, gender, profession, residence, dates of consultation, sampling, reception, laboratory result, and vaccination status.

**2.10. Collection Techniques and Tools**
• Technique: Our data was extracted from the LNR measles database.
• Tools: We used the following documents: the laboratory register, the measles database, and the notification forms to complete the missing information.

**2.11. Data Processing and Analysis**
The processing and analysis of the data were carried out using Excel, Epi Info 7.5.2, and QGIS 3.34.1 after entering the missing data and cleaning the database. We calculated frequencies, averages, and the results will be presented in the form of tables, graphs, and a map.

**2.12. Ethical Considerations**
For this study, data were collected with the consent of INSP officials, kept anonymous using the epidemiological number assigned to suspected cases upon receipt of samples, and recorded in the database.

**3. Results**
In total, we had 6,040 suspected cases, including 2,859 confirmed cases, representing a 47.33% positivity rate. The median age was 4, with a range from 0 to 80 years. Males were the most prevalent, representing 53%.
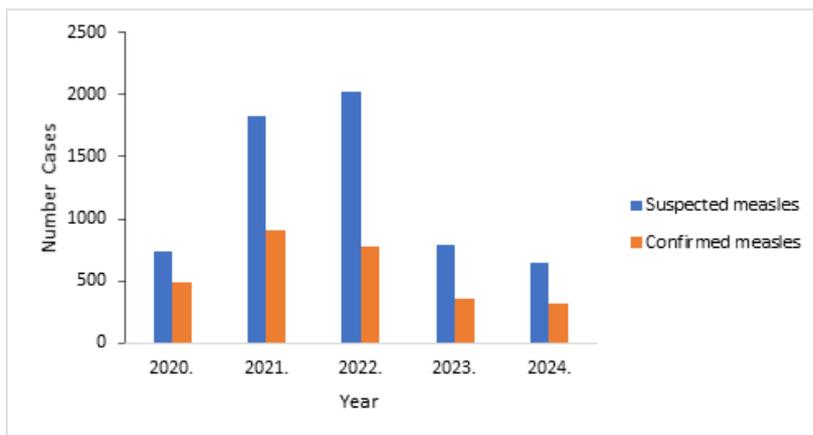
**Figure 2: Distribution of Suspected Measles Cases Collected by Year at The Insp 2020-2024 the Year 2022 Recorded More Suspected Cases Collected, and the Year 2021 Recorded More Confirmed Cases.**
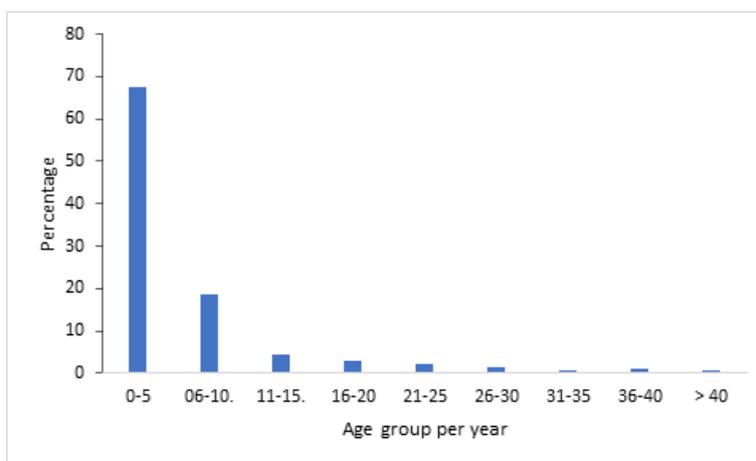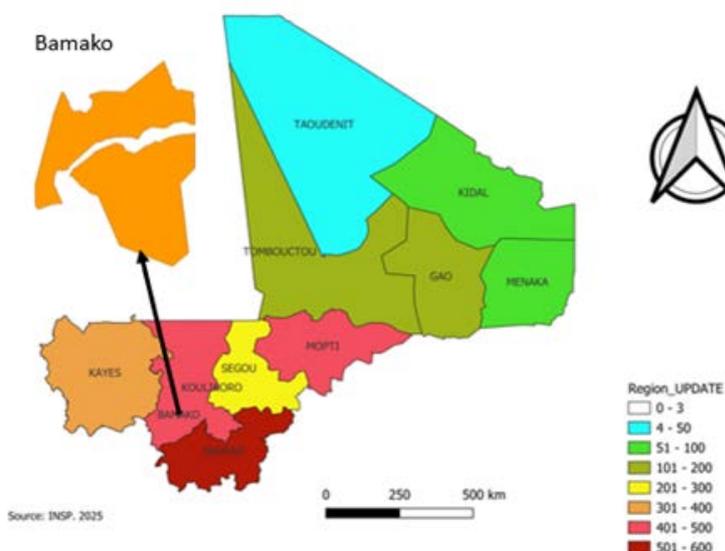


**Figure 3: Distribution of Confirmed Measles Cases by Age Group Per Year, Insp 2020-2024 Children Aged 0-5 Were the Most Affected**



**Map 1: Distribution of Confirmed Measles Cases at The National Institute of Public Health (NIPH) By Region of Mali, 2020– 2024**

The most affected areas were the Sikasso region, followed by the Koulikoro region.

| Vaccination status | Number | Percentage |
|---|---|---|
| Vaccinated | 71 | 2,48 |
| Unvaccinated | 2788 | 97,52 |
| Total | 2 859 | 100 |

**Table 1: Distribution of Confirmed Measles Cases by Vaccination Status at The National Institute of Public Health (NIPH) 2020–2024**

The unvaccinated were in the majority with 97,52%.

## 4. Discussion
From 2020 to 2024, the INSP received 6,040 measles samples, of which 2,859 returned positive (IgM), representing a positivity rate of 47.33%. Our results are comparable to those of Ouedraogo et al. in 2024 in Burkina Faso, with 1,800 results reported, including 1,145 positive results, representing a positivity rate of 63.61%. The analysis shows that the male gender was the most represented with 52.67%. Our result is similar to that of Coulibaly et al. in Koulikoro in 2019 who found 56.25%. The majority of cases came from the Sikasso region followed by Koulikoro this result similar to that of Ouedraogo et al. in 2024 in Burkina Faso who found that cases were higher in the South-West region followed by the North region. Unvaccinated measles cases represented 97.52% in our study. This high rate could be explained by the fact that the COVID 19 pandemic had paralyzed the health system 2020 to 2021. Our result is comparable to the study by Ouédraogo et al. in Burkina Faso in 2024, which found 57.57% of unvaccinated people. The age group under 5 years was the most affected, which could explain the failure to achieve the vaccination target (95% coverage). Our result is similar to that of Togola et al., who found that under 5 years was the most affected [11,12].

## 5. Conclusion
Baseline analysis allowed us to observe the highest number of measles cases in 2022, followed by 2021. The majority of cases originated from Sikasso, followed by Koulikoro. Males predominated in our study. Children aged 0-5 years remain the most affected age group, highlighting the insufficient vaccination coverage. However, routine vaccination must be strengthened.

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