Research Article ISSN 2639-9458

Microbiology & Infectious Diseases

# Acute Fever and Rash in Children in the Health District of Commune VI, Bamako, Mali

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**Received:** 15 Jun 2026; **Accepted:** 21 Jul 2026; **Published:** 02 Aug 2026

**Citation:** Abdoulaye Mamadou Traoré, Mariam Maiga, Mamadou Gassama, et al. Acute Fever and Rash in Children in the Health District of Commune VI, Bamako, Mali. Microbiol Infec Dis. 2026; 10(4): 1-5.

## ABSTRACT

***Background:*** *Acute fever and rash in children are common and have multiple aetiologies, dominated by infectious diseases. We conducted this study in a densely populated urban area characterized by high mobility and the presence of bus stations. Our objectives were to determine the morbidity associated with fever and rash and to describe their clinical features and evolution.*

***Methodology:*** *We performed a cross-sectional study from January to December 2020, including all cases of acute fever and rash at the Reference Health Centre of Commune VI in Bamako (Mali). Epidemiological, clinical and outcome variables were taken into account.*

***Results:*** *We recorded 110 cases of fever and rash out of 8,242 children, which represents a frequency of 1.33%. A male predominance (60%, sex ratio = 1.5) and a higher prevalence in children aged 0 to 24 months (60.90%) were noted. The aetiologies were measles (69/110; 62.7%) and varicella (41/110; 37.3%). These diseases occur year-round, with a measles peak during hotter periods (April–May) and a varicella peak in May and December. The lesions, primarily exanthemas, were maculopapular (50.9%), vesicular (26.4%), crusted (10.9%) and desquamative (11.8%). An enanthem was found in 44.59% of the children. These occurred in the context of MAM (9.1%) and SAM (1.8%). Following the management, the clinical course was marked by pulmonary complications (3.6%) and 100% recovery rate.*

***Conclusion:*** *The aetiologies of acute fever and rash at the Reference Health Centre of Commune VI were measles and varicella, both of which are vaccine-preventable diseases. It is essential to strengthen routine immunization and surveillance through the early detection of cases.*

## Keywords
Rash, Fever, Commune VI, Bamako.

## Introduction
Skin rashes are a common reason for pediatric consultations, particularly in paediatric emergency departments. Their varied aetiology is dominated by infectious causes. In the series by Hormi et al., infectious causes were the most common (59.8%), with viral infections being the predominant cause (45.9%). Bacterial infections (13.9%) mainly consisted of extensive impetigo and dermo-hypodermitis [1]. Apart from infections, drug eruptions (14.8%), acute or revealing inflammatory skin conditions (eczema, psoriasis, pityriasis rosea) (11.5%), and allergies (acute urticaria, erythema pigmentosum fixum) (6.5%) are also causes of rashes [1]. Among viral infectious causes, measles and varicella appear to be the most prevalent [2].

In Mali, despite the availability of free measles immunization for all target groups under the Expanded Programme on Immunization (EPI), the country has experienced several measles outbreaks; 40% of health districts (30 out of 75) across the country have recorded a measles outbreak every year since 2019 [3,4].

Commune VI of the Bamako District, as a densely populated urban area characterized by high mobility among young people due to the presence of bus stations, provides a favorable environment for infectious diseases, mostly epidemic-prone diseases, and this is compounded by insufficient immunization coverage.

However, despite the significance of these infectious diseases in this context, the prevalence of fever and rash as a reason for consultation and/or hospitalization in children remains poorly documented in this area. Therefore, this study aims to address this gap.

Our objectives were to determine the morbidity associated with fever and rash, to describe their clinical features, and to assess their short-term course.

## Methods

We performed a cross-sectional descriptive study with prospective data collection. Data collection took place over a 12-month period from January to December 2020. The study population consisted of all children aged 0 to 15 years seen as outpatients and/or hospitalized in the pediatrics department of the Commune VI Reference Health Centre (equivalent to a district hospital).

The study included all children aged 0 to 15 years presenting with fever associated with a skin and/or mucosal rash. Diagnosis was primarily clinical, based on the presence of macules, papules, pustules or vesicles.

**Suspected case of measles:** Anyone presenting with a fever, a widespread maculopapular (non-vesicular) measles-like rash, and a cough, a cold or conjunctivitis (red eyes).

### Suspected case of varicella

Sudden onset of a generalized maculopapular rash, concurrently with the presence of papules, vesicles, pustules or crusts appearing on the trunk and face before spreading to the extremities, with no other apparent cause.
PCR enabled the etiological diagnosis in some cases.

Comprehensive sampling was carried out for all cases. Consent from the parent and/or legal guardian was a prerequisite for the child's inclusion.

Information was collected using a pre-established questionnaire. The data were entered into an Excel database and then analyzed using SPSS version 12.0. The variables collected were related to sociodemographic, clinical and outcome characteristics.

## Results

During the study period, we recorded 110 cases of fever and rash out of 8,242 children seen at the paediatric department of the Commune VI Reference Health Centre, which represents a frequency of 1.33%. These comprised 69 cases of measles (62.7%) and 41 cases of varicella (37.3%).

Males predominated in our series, accounting for 60% of the cases versus 40% for females; the sex ratio (male-to-female) was 1.5.

Measles was most commonly diagnosed in children aged 0 to 24 months, accounting for 60.90% of cases. Children aged over 59 months were the predominant age group during the varicella outbreak (Figure 1).

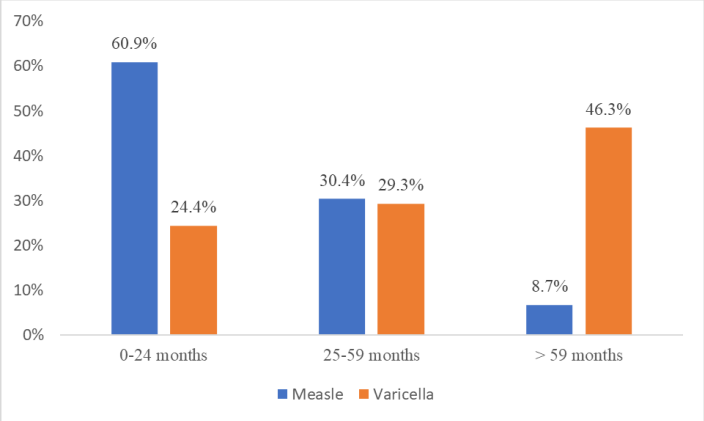


**Figure 1:** Distribution of children according to rash aetiology.

### Annual distribution of cases

Measles and varicella occur year-round, with a peak in April and May for measles and in May and December for varicella (Figure 2).

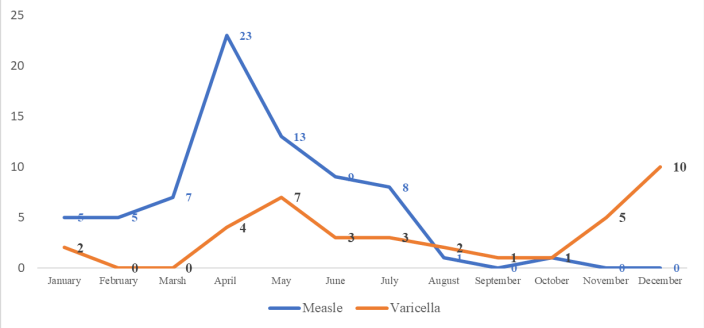


**Figure 2:** Annual distribution of measles and varicella cases.

### Clinical and outcome characteristics

The children's mothers reported that 72.7% of the children were up to date with their immunizations in accordance with the Expanded Programme on Immunization (EPI) schedule in Mali, compared with 27.3%.

In our sample, 35.5% of the children had a cough only; 34.5% presented with catarrhal symptoms consisting of cough,

conjunctivitis and rhinitis. Pruritus was observed in 23.6%.

The rash (exanthema) was maculopapular in 50.9% of children, followed by vesicles in 26.4% and crust in 10.9%. An enanthema was observed in 44.59% of children.

Nutritional status was normal in 89.1% of the children. However, 9.1% of the children were suffering from moderate acute malnutrition (MAM) and 1.8% were suffering from severe acute malnutrition (SAM).

During the course of the illness, four children developed a complication in the form of pneumonia. All the children (100%) made a full recovery (Table 1).

**Table 1:** Distribution of children according to clinical and outcome characteristics among those admitted for fever and rash.

| Characteristics | | Absolute frequency | Relative frequency |
|---|---|---|---|
| **Immunization status according to the EPI schedule** | Vaccinated | 80 | 72.7% |
| | Unvaccinated | 30 | 27.3% |
| **Nutritional status** | Normal | 98 | 89.1% |
| | MAM* | 10 | 9.1% |
| | SAM** | 2 | 1.8% |
| **Clinical signs** | Catarrh | 38 | 34.5% |
| | Cough | 39 | 35.5% |
| | Pruritus | 26 | 23.6% |
| | Maculopapular | 56 | 50.9% |
| | Vesicle | 29 | 26.4% |
| | Crust | 12 | 10.9% |
| | Desquamation | 13 | 11.8% |
| | Enanthem | 49 | 44.54% |
| **Complications** | Pneumonia | 4 | 3.6% |
| | No complications | 106 | 96.4% |
| **Outcome** | Recovery | 110 | 100% |
| | Death | 0 | 0 |

MAM*: Moderate acute malnutrition; SAM**: Severe acute malnutrition.

## Discussion

### From an epidemiological perspective

Despite the availability of an effective and free vaccine against measles and varicella as part of the Expanded Programme on Immunization (EPI), the prevalence of these diseases among children in the Commune VI Health District was 1.33%. Measles is the most common aetiology, accounting for 62.7% of fever and rash (69 cases out of 110) and a morbidity rate of 0.84%.

Our findings demonstrate that measles circulates year-round, with a peak occurring between March and May (Figure 2). Our findings demonstrate that measles circulates year-round, with a peak occurring between March and May (Figure 2). This peak coincides with the hot season of the year, when hot, dry winds blow. From June onwards, there was a gradual decline during the rainy season, which runs from June to October, and remained stable until December (a relatively cooler period). Measles is permanently endemic in urban areas across Africa. There is, however, an epidemic resurgence during the dry season, as the virus rapidly loses its virulence in a humid atmosphere [5].

In our study, approximately 10% of fever and rash occurred in malnourished children. Lomanga-Lomboto et al. reported that, in addition to malnutrition, lack of immunization and vitamin A supplementation were factors associated with the onset of measles [6].

Concerning the absence of immunity acquired through immunization, 27.3% of children in our study were not fully vaccinated. Similarly, none of the children with measles and varicella had received a dose of vitamin A. In the Democratic Republic of the Congo (DRC), 65% of children who developed measles had not received the measles vaccine (MCV) versus 35% who had already received it but still developed measles [7]. This is a conflict zone where access to immunization was limited. Three decades of routine immunization programmes have contributed to a dramatic drop in vaccine-preventable diseases such as measles in countries like Mali. In Mali, 70% of children aged 9 months to 14 years had been vaccinated with the combined MMR (Measles – Mumps - Measles) in 2022 (National Immunization Centre Report 2022). There is a gap to be filled. Sato et al. demonstrated a significant negative correlation between the incidence of measles and measles vaccine coverage [8]. Missed opportunities for immunization are major obstacles to achieving adequate immunization coverage among the EPI's target populations. This is by no means a rare phenomenon in Africa. According to Lokale Lohose et al., the factors associated with missed opportunities for immunization are low health literacy, staff turnover among healthcare workers, and parents' occupation [9]. Fears and misconceptions were also common reasons for non-vaccination [10].

Varicella is the primary infection caused by the Varicella-Zoster Virus (VZV). It is a common childhood illness caused by the VZV virus, which is responsible for outbreaks affecting mainly children under the age of 10. We identified 41 cases, accounting for 37.3% of fever and rash and 0.50% of morbidity in the paediatric department at the Reference Health Centre in Commune VI in the Bamako District. In Togo, Wateba et al. reported that, out of a total of 86 severe varicella cases among 645 cases recorded, children aged 2 to 5 years accounted for 67% of cases [11].

In France, Maris et al. reported 105 cases with a median age of 2.1 years [1–4.2 years] [12]. Varicella is not exclusive to children. In Burkina Faso, the periodic prevalence of varicella was 6.2% and accounted for 14.6% of fever and rash at the Yalgado Ouédraogo University Hospital Centre; children were more commonly affected, accounting for 52.6% of cases [13]. In the DRC, serological data made possible to report a seroprevalence (antibodies against VZV) of 8% among children aged 6 to 59 months in a sample of 7,195 children. The likelihood of seropositivity increased with age, socio-economic status, the mother's level of education and residency in rural areas [14].

Although cases of varicella are reported year-round, peaks were

observed in May (corresponding to the hot season) and December (the cool period). In France, varicella occurs in seasonal outbreaks that take place in late winter and spring [15].

### Diagnostic findings

### Type of lesion

We observed a predominance of maculopapular lesions (50.9%), vesicles (26.4%) and crusts (10.9%). The rash was in the desquamation stage in 11.9% of cases. This polymorphism in the clinical presentation of fever and rash in children was also reported by Hormi et al., in whose study the rashes observed were predominantly maculopapular (42.6%), followed by vesicular or bullous forms (20.5%), urticarial (15.6%), purpuric or petechial (11.5%) and erythrodermic or non-specific diffuse [1].

### Established Diagnosis

Two diagnoses were established: measles and varicella. In the case of measles, the diagnosis was established in the majority of children on the basis of clinical findings, namely: an oculo-respiratory catarrh (comprising rhinitis, conjunctivitis and cough), the presence of Köplick's spots (enanthema), which appear as a scattering of small whitish spots on an erythematous base and may spread to cover the entire oral cavity (cheeks, lips, gums), and the spread of the lesions in a 'spreading oil' pattern. In general, the diagnosis of measles is exclusively clinical in tropical settings. Although the clinical presentation of measles appears fairly typical, many conditions resemble it, so that biological confirmation of the diagnosis is necessary, based on rT-PCR or serology [16]. Nationwide, the use of serological tests is becoming increasingly widespread. Thus, 364 IgM tests were positive out of 796 samples in 2023, and 333 IgM tests were positive out of 656 in 2024 [3]. In France, Floret reported that the diagnosis was confirmed by rT-PCR in only 11 cases, or 15.9% [16].

The diagnosis of varicella was clinical in all cases in our series. In a meta-analysis, only 10% of studies in Africa had combined serological and clinical criteria for the definition of varicella cases [17].

### Clinical course

The clinical course was marked by complications such as pulmonary superinfection. However, a favorable outcome with complete recovery was observed in all children. Varicella is usually a mild disease. Nevertheless, complications are possible. We noted one case of pulmonary superinfection. In Burkina Faso, pulmonary (42.1%), haematological (42.1%) and cutaneous (36.8%) complications were reported in patients with varicella, regardless of age [13]. In France, the primary reason for hospitalization in children with varicella was the presence of one or more complications (83.3%), including skin complications (34%), gastrointestinal complications (19.8%), pulmonary complications (17.6%), neurological complications (15.3%) and ENT complications (8.8%) [15]; being under 5 years of age is the main risk factor for complications and death [18]. Although we have not recorded any deaths, varicella remains a life-threatening disease. In Burkina Faso, a 10% mortality rate has been reported in cases of varicella [13].

In the course of hospitalization, the clinical course was complicated by pulmonary superinfection in three patients with measles; the outcome was marked by recovery in 100% of cases. However, measles is a life-threatening disease. In Mali, between 2009 and 2018, a case fatality rate of 0.45% (29 deaths/6,461) was reported by Sy et al., with children under 5 years old accounting for 50.97% of cases and 75.86% of deaths [19].

## Conclusion

Despite the fact that immunization is free and available to all children aged 0 to 59 months under the EPI programme, fever and rash—including measles and varicella—account for a significant proportion of childhood morbidity in Commune VI in the District of Bamako. Routine immunization and early case detection need to be strengthened.


## Acknowledgements

- The chief medical officer of the local referral health center for agreeing to allow the study to take place at his healthcare facility.
- The children and their parents for taking part in the study.
- All the staff at the center for their help in looking after the children.


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