Research Article ISSN 2835-6276

American Journal of Medical and Clinical Research & Reviews

Measles Outbreak Investigation in Nbeika Commune, Tagant Region, Mauritania, January 2024

Mohamedou Hmeied Maham[1,2], Abderrahman Mahmoud Mabarekchi[3], Bedi Taleb[2,4], Ahmed Meska Malainine[2,5], Nah Talba[2], Mohamedou Mohamed Ahmed[2,5].

[1] Field Medicine Service, General Directorate of Health Services of the Armed Forces and Security, Ministry of National Defense, Mauritania.

[2]Mauritanian Association of Field Epidemiology (AMET).

[3]Operations Department, National Public Health Emergency Operations Centre, Mauritania.

[4]National Institute for Public Health Research (INRSP), Mauritania.

[5]Expanded Program on Immunization, Ministry of Health, Mauritania.

*Correspondence: Dr. Mohamedou HMEIED MAHAM

Received: 28 Feb 2025; Accepted:05 Mar 2025; Published: 15 Mar 2025

Citation: Dr. Mohamedou Hmeied Maham. Measles Outbreak Investigation in Nbeika Commune, Tagant Region, Mauritania, January 2024. AJMCRR. 2025; 4(3): 1-8.

Abstract

Introduction

Measles is a disease caused by a virus of the *Paramyxoviridae* family. The measles virus is usually transmitted through direct contact or through the air, infecting the respiratory tract before spreading throughout the body. A measles epidemic has been reported in the commune of Nbeika by the Regional Directorate of Health of Tagant. After the laboratory confirmation of the outbreak, it became necessary to investigate this outbreak to take stock of the situation.

Methods:

A descriptive cross-sectional study was conducted from 7 to 14 January 2024 on suspected cases of measles in the Tagant region. Active tracing was carried out at the level of health facilities in reporting districts to identify cases that met the case definition. The data was analyzed with Epi Info 7.2 and Excel 2020 and presented in the form of tables, graphs and maps.

Results:

A total of 59 cases of measles have been reported as of 14/01/2024, including 6 laboratory-confirmed cases and 53 epidemiologically confirmed cases. Fifty-six percent of cases are women, with a sex ratio (F/M) of 1.3. The average age was 17 ± 13. The adult age group is most affected by measles, followed by the 5 to 14 age group. Of the reported cases, 98% of measles cases were unvaccinated. Patients were presented with fever, rash and cough.

Conclusions:
The outbreak was confirmed by the laboratory of the National Institute for Public Health Research, with the commune of Nbeika reporting 98% of cases. The response to the outbreak allowed for good case management and the organization of a response vaccination campaign that vaccinated 428 people aged 12 months to 50 years.

Keywords: Investigation, Epidemic, Measles, Tagant, Mauritania.

Introduction

Measles is a disease caused by a virus of the *paramyxoviridés*. The measles virus is usually transmitted through direct contact or through the air, infecting the respiratory tract and then spreading throughout the body[1]. The incubation period for measles ranges from 7 to 14 days. Measles is a human disease, and no reservoir is known in animals. Measles outbreaks can lead to outbreaks that can cause many deaths, especially among malnourished young children[2]. It is a disease for which there is a vaccine. Before the introduction of vaccination in 1963, large measles outbreaks occurred every 2 to 3 years, causing up to 2.6 million deaths per year[3–5]. The implementation of the Expanded Program on Immunization and the establishment of regional measles elimination plans have significantly reduced measles-related morbidity and mortality, particularly in Africa[6]. According to the World Health Organization (WHO), in 2018, some 9,769,600 cases of measles were reported worldwide, with 142,200 deaths[7]. In Mauritania, a measles outbreak began in week 52 of 2022, followed by a period of significant increase in the number of cases until an epidemic peak recorded during the Week 4 of 2023[8]. The first case of the outbreak was reported in a refugee from M'berra camp. The total number of weekly cases gradually decreased in the following weeks. At May 7, 2023, the country has reported 285 suspected cases of measles, including 186 confirmed positive cases with 111 positive IgM tests and 75 epidemiologically linked cases[8]. Between January 1 and May 12 2024, Mauritania has reported 2,384 suspected cases of measles in 49 districts, with 280 confirmed cases whose 81 by epidemiological links and 199 by laboratory tests[9]. Since December 20, 2023, the Tagant Region has started to register suspected cases of measles that have affected the district of Moudjria, mainly the commune of Nbeika. A measles epidemic has been reported by the Tagant regional health directorate in the commune of Nbeika. Measles cases have also been reported from other locations of the region outside the Nbeika. After the laboratory confirmation of the outbreak, it became necessary to investigate the outbreak to take stock of the situation in the affected areas. We have initiated an investigation to confirm the epidemic and guide response actions.

Methods

Scope of the study

Mauritania is a country in West Africa with an area of 1,036,000 km2. It borders Algeria to the northeast, Western Sahara to the northwest, Mali to the east and southeast, Senegal to the southwest and the Atlantic Ocean to the west. The national territory is divided into 15 regions and each of them is subdivided into districts (63 in total). The districts are subdivided into communes (216 communes in total). Our study takes place in the Tagant Region and more precisely in the commune of Nbeika. Tagant is an administrative region located in central Mauritania, also known as the Tagant Plateau or the Crocodile Desert. Its capital is Tidjikdja. At the time of the 2000 General Population and Housing

Census (RGPH), the Tagant had 76,620 inhabitants. Tagant is bordered by six other administrative regions, to the north by the Adrar, to the east by the Hodh Ech Chargui, to the south by the Hodh El Gharbi and the Assaba, to the west by the Brakna and the Trarza. The three departments of the Tagant region are Moudjeria, Tichit and Tidjikja **(Figure 1)**. The two districts are Khoudya and Rachid. The Tagant has ten communes: Tidjikdja, Moudjeria, Tichitt, Lekhcheb, El Wahatt, Soudoud, Tensigh, Boubacar Ben Amer, Lehsira and Nbeika [10]. Population movements across the border with other regions influence coverage rates, which are often not real.

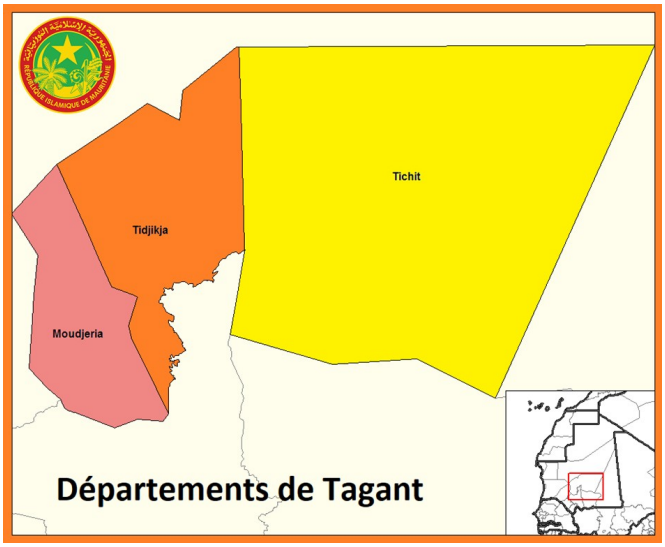

Figure 1: Map of the departments of the wilaya of Tagant in Mauritania (source [17])

Dates and sites of the investigation:

From January 7 to 14, 2024, we included in the investigation all suspected cases of measles that are found in the consultation registers at the level of the health facilities in Nbeika.

Study population and sampling

Our study population was drawn from the villages and localities of Nbeika. All suspected measles cases were reported to the Regional Health Directorate or found in the community or registries during the investigation, all children aged 0-14 years and adults aged 15 years and older living in one of the villages in the Nbeika health area were included in the study. The sample for this study includes anyone who showed signs suggestive of measles during the study period. This is an exhaustive sample.

Data collection

Data Collection Source and Tool

As soon as we arrived in Nbeika on January 7, 2024, we actively searched for suspected and confirmed cases by epidemiological link at the community level by interview based on the clinical signs contained in the community case definition. We used patients and their parents/guardians, consultation records, expanded program on immunization (EPI) registries, and copies of survey forms as sources of information for data collection. The collection tools used included a literature review grid.

Data collection technique

As soon as we arrived at the Nbeika On January 07, 2024, we conducted the active search for suspected and epidemiologically confirmed cases at the community level by interview based on the clinical signs contained in the community case definition contained in the third edition of the Ministry of Health of Mauritania[11]. The measles epidemic threshold (usually more than 5 cases per month, in a district). If 2 out of 5 suspected cases of measles are confirmed by the laboratory, the outbreak is confirmed.

- **Suspected case:** anyone with fever, generalized maculopapular (non-vesicular) rash and cough, cold or conjunctivitis (red eyes), or anyone with suspected measles by a clinician.
- **Confirmed case:** A suspected laboratory-confirmed case (positive IgM antibody test) or epidemiologically linked to confirmed cases or

an outbreak.

- **Operational case definition**: Any person who has resided in the commune of Nbeika since December 20, 2023, and who has presented clinical and/or biological signs of measles.

Investigation Team

The investigation team consisted of a physician, a field epidemiologist, two nurses, a community volunteer, a biologist, a hygienist and two drivers.

Study Variables

The main variables of the study are grouped as follows: sociodemographic characteristics: age, sex, residence, origin; clinical characteristics: clinical signs, case definition, vaccination coverage; knowledge of measles by the population; Biological characteristics: presence or absence of measles IgM in the blood.

Data analysis

The data collected was entered into a linear list and then analyzed using Excel and Epi Info. We presented the results in the form of graphs. We calculated the proportions, the mean, the extent, the number of cases by age group and by locality.

Ethical considerations

Ethical and deontological aspects were considered in our study. Our study was carried out with the authorization of the health authorities of Mauritania for data acquisition and analysis. The names and surnames of the cases have been anonymized to guarantee confidentiality.

Results

Case Description

The index case was identified in the city of Nbeika. He is a 41-year-old man living in Nbeika city and working as a trader and transporter in the axis of Jemjiya (locality of the commune of Nbeika which is 75 km from the city of Nbeika) and Nbeika city. The subject has improved a lot.

In total, we included fifty-nine suspected measles cases, including thirty-two children (all unvaccinated) **(Figure 2).** Six cases were laboratory-confirmed, and fifty-three cases were epidemiologically linked **(Figure 3).** Fifty-six percent of cases are female, with a sex ratio (F/M) of 1.3. The average age was 17 years ± 13 years.

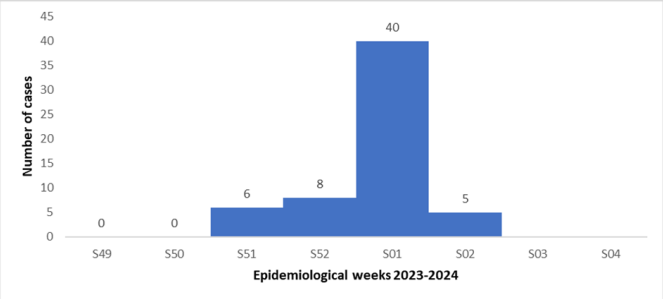

Figure 2: Evolution of the number of measles cases in Nbeika, Tagant, Mauritania December 2023 to January 2024

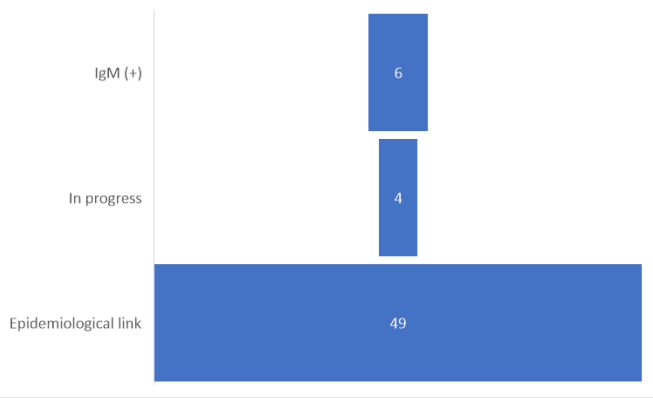

Figure 3: Diagnosis of measles cases in stages, Nbeika commune, Moudjria District, Tagant Region, Mauritania, December 2023 to January 2024

Distribution of cases by locality

47.54% (28/59) of the cases were in Lekreyaa, 20.33% (12/59) of the cases were in Nwejhenne, and 17% (10/59) of the cases were in Jemjiya **(Figure 4).**

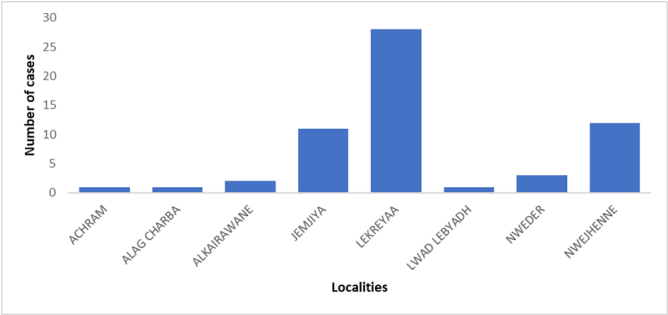

Figure 4: Measles case numbers by locality, Nbeika commune, Moudjria District, Tagant Region, Mauritania, December 2023 to January 2024

Interpreting the Data Analysis

The epidemic curve shows that the first reported case of measles dates to week 51 of 2023, the epidemic peak was reached in week 01 of 2024 before the curve begins to descend to 5 cases in epidemiological week 02 of 2024 **(Figure 2).** The adult age group is the most affected by measles (49.15%) and followed by the 5-14 age group (30.5%). No case of death has been detected. The low case fatality rate during this outbreak could be explained by early management of cases and the quality of this care.

Distribution of cases according to clinical signs

All cases (100%) had the main signs of measles: fever, rash and cough.

Discussion

The results of this study on the measles outbreak in Nbeika reveal several important points that are comparable to other similar studies. The index case, a 41-year-old man, was identified in the city of Nbeika. Interestingly, this individual, although unvaccinated, showed significant improvement after infection. This could be attributed to prompt and effective management, as observed in other studies [12]. The response to the epidemic has made it possible to organize a vaccination of confirmed cases which has made it possible to vaccinate 428 people aged 12 months to 50 years. The inclusion of 59 suspected measles cases, including 32 unvaccinated children, highlights the critical importance of vaccination. A similar study conducted in Mali also showed that the majority of measles cases were unvaccinated children, highlighting the impact of vaccination coverage on the spread of the disease[13]. The distribution of cases by locality shows that Lekreyaa was the most affected, followed by Nwejhenne and Jemjiya. This geographic distribution is consistent with the results of a study conducted in Ethiopia, where some localities had a higher concentration of cases due to factors such as population density and limited access to health services[14]. Analysis of epidemiological data shows that the first case reported dates to week 51, 2023, with an epidemic peak reached in week 01, 2024. This epidemic curve is similar to that observed during a measles outbreak in the Democratic Republic of Congo, where a rapid peak was followed by a gradual decrease in cases thanks to effective public health interventions[15]. The adult age group being the most affected (49.15%), followed by the 5-14 age group (30.5%), is a notable result. A study conducted in India also showed that adults accounted for a significant proportion of measles cases, which could be due to waning immunity or insufficient vaccination coverage in this age group[16].

The absence of deaths during this epidemic could be explained by the early and quality management of cases. A study in Bangladesh showed that prompt management of measles cases could significantly reduce mortality, even in resource-limited settings[17]. Finally, all cases had the main clinical signs of measles: fever, rash and cough. These symptoms are consistent with those reported in the literature, confirming the typical nature of the clinical presentation of measles.

Conclusion

The resurgence of measles outbreaks is attributed to the failure to adhere to the immunization schedule, due to the continued displacement of some nomadic populations in the region. The investigation of the measles epidemic took place mainly in the commune of Nbeika, which reported 99% of the cases. The epidemic has been confirmed by the INRSP laboratory. The total number of cases reported as of 14/01/2024 is 59 cases. The index case of this epidemic comes from the Nbeika city. The response to the epidemic has allowed for good management of cases and the organization of vaccination for confirmed cases, which has made it possible to vaccinate 428 people aged 12 months to 50 years. Measles is endemic in the region visited (Tagant), particularly in their northern part where poorly vaccinated nomad's transhumance to the interior of Mali. This study highlights the importance of vaccination and epidemiological surveillance in preventing and controlling measles outbreaks.

Main activities:

In response to this measles epidemic, several response actions have been implemented, including case management, strengthening surveillance and vaccination.

Coordination

1. Team meeting with Moudjeria District Hakem and MCM
2. Team meeting every morning before departure on the field at the health center (CS) level.
3. IMS Meetings
4. Developing the response plan to the epidemic
5. A batch of support drugs was unloaded at the health center (CS) of Nbeika in the presence of the MCM and the major of the CS.
6. Divide the team into two groups for intervention in two different axes (northern axis, southern axis)
7. Development of the field work plan

Surveillance

1. Popularization of an updated version of the measles case definition in the SC.
2. Investigation and data collection of symptomatic and epidemiologically confirmed cases.
3. Active Case Search

Laboratory

1. Four field samples including (04) nasopharyngeal samples and 02 blood samples in symptomatic cases.

Pickup

1. Consultation of cases at home for certain cases.
2. Distribution of medicines.
3. Infusion of cases at home for some cases.

Vaccination

1. The response to the epidemic has made it possible to organize a vaccination of confirmed cases which has made it possible to vaccinate 428 people aged 12 months to 50 years.

Salary received

1. Antipyretics
2. Vitamin A (Adults and Children)
3. Pest control treatment
4. Other

Communication (CREC)

1. Raising awareness of the need to vaccinate children.
2. Raising awareness about the disease for families visited at home.

3. Follow-up visits and clinical assessment at home with affected families.

What we know about this subject

- Measles is a contagious viral disease.
- Biological confirmation is essential to confirm the epidemic.
- Measles outbreak response strategies include case management and reactive vaccination.

What this study adds

- This investigation allowed the population to know the importance of vaccination.
- Unvaccinated children were vaccinated to prevent the spread of the disease.

Recommendations

Recommendations to the Ministry of Health

- Strengthen the epidemiological surveillance system (training of staff on the ISRM, laboratory system, training of rapid response teams, stock of emergency medicines, supervision and monitoring to strengthen the completeness and timeliness of surveillance reports and the local use of data by health structures, laboratory system);
- Strengthen immunization coverage across the country through the organization of a vaccination campaign (AVS) in response to the measles epidemic and to reduce the number of susceptible people that has accumulated over time.
- Strengthen vaccination coverage in the commune of Nbeika and the Tagant region through the implementation of a strategy adapted to nomadic populations.
- Strengthen coordination between health services and community actors to improve awareness and epidemiological surveillance and the effectiveness of immunization services.

Recommendations to the CNOUSP and other partners

- Support the Ministry of Health in the implementation of the recommendations.
- Undertake actions with CNOUSP in neighboring countries for the implementation of measles outbreak response activities in the border areas with Mauritania to limit cross-border transmission of measles.

Competing interests

The authors do not declare any conflict of interest.

Authors' contributions

MHM, AMM, BT, and AMM developed the investigation protocol, collected, analyzed, and interpreted the data, and wrote the manuscript. NT, MMA contributed to the interpretation of the data and the revision of the manuscript. All authors have read and approved the latest version of the manuscript.

Thanks

Our thanks go to the management team of the district of Moudjéria for the support provided. Our thanks also go to CNOUSP, the Ministry of Health of Mauritania, for the financial and material support that has made this work possible.

References

1. S O. Trends in measles in Commune VI of the District of Bamako from 2014 to 2018. Mali Public Health. 2020; 23–8.
2. Key Facts: Measles - February 2015 - World | ReliefWeb [Internet]. 2015 [cited 2024 Dec 22]. Available from: https://reliefweb.int/report/world/principaux-rep-res-rougeole-f-vrier-2015
3. La rougeole – The Lancet [Internet]. [cited 2024 Dec 22]. Available from: https://

www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02004-3/abstract
4. Plemper RK. Measles Resurgence and Drug Development. Curr Doctrine Virol. 2020 Apr; 41:8–17.
5. Measles [Internet]. [cited 2024 Dec 22]. Available from: https://www.who.int/fr/news-room/fact-sheets/detail/measles
6. The (not surprising) return of measles. The medical press training. 2021 May 1; 2(2):135–42.
7. Measles [Internet]. [cited 2024 Dec 22]. Available from: https://www.bag.admin.ch/bag/fr/home/krankheiten/krankheiten-im-ueberblick/masern.html
8. News | MyVaccines [Internet]. [cited 2024 Dec 27]. Available from: https://www.mesvaccins.net/web/news/20819-epidemie-de-rougeole-en-mauritanie-le-point
9. Weekly bulletins on outbreaks and other emergencies | WHO | Regional Office for Africa [Internet]. 2024 [cited 2024 Dec 27]. Available from: https://www.afro.who.int/health-topics/disease-outbreaks/outbreaks-and-other-emergencies-updates
10. WILAYA OF TAGANT | culture [Internet]. [cited 2024 Dec 22]. Available from: https://www.culture.gov.mr/fr/node/10
11. WHO-AF-WHE-10-2019-fre.pdf [Internet]. [cited 2024 Dec 22]. Available from: https://iris.who.int/bitstream/handle/10665/331261/WHO-AF-WHE-10-2019-fre.pdf
12. Masson E. P1-3 - Investigation of measles cases in Mbera Camp, Mauritania, 2023 [Internet]. EM-Consulte. [cited 2024 Dec 22]. Available from: https://www.em-consulte.com/article/1676146/p1-3-investigation-des-cas-de-rougeole-dans-le-cam
13. Amaguiré Sy EHI, Barry D, Traoré B, Boly A, Koné B, Dembélé A, Coulibaly OY, Tounkara A, Keita NM, Diourté G, Dara S, Sanogo I, Magazani A, Sawadogo B, Otshudiandjeka OJB, Diallo F, Laurent M, Keita H, Yanogo PK, Meda N. Profile epidemiological of the measles au Mali de 2009 à 2018. Journal of Interventional Epidemiology and Public Health [Internet]. 2021 Sep 24 [cited 2024 Dec 22]; 4 (3). Available from: https://www.afenet-journal.net/content/series/4/3/8/full/
14. Measles – Ethiopia [Internet]. [cited 2024 Dec 22]. Available from: https://www.who.int/fr/emergencies/disease-outbreak-news/item/2023-DON460
15. Measles outbreak in the Democratic Republic of the Congo: WHO and UNICEF concerned about the spread of the epidemic in the former province of Katanga | WHO | Regional Office for Africa [Internet]. 2024 [cited 2024 Dec 22]. Available from: https://www.afro.who.int/fr/news/epidemie-de-rougeole-en-republique-democratique-du-congo-loms-et-lunicef-preoccupes-par
16. Anatomy of an epidemic: Measles hits urban India [Internet]. [cited 2024 Dec 22]. Available from: https://www.gavi.org/fr/vaccineswork/anatomie-epidemie-rougeole-frappe-inde-urbaine
17. Khanal S, Bohara R, Chacko S, Sharifuzzaman M, Goodson JL, Dabbagh A, Kretsinger K, Dhongde D, Bahl S, Thapa A. Progress towards measles elimination in Bangladesh, WEEKLY EPIDEMIOLOGICAL RECORD. 2017; (29).
18. Map of the wilaya of Tagant [Internet]. Gifex. 2023 [cited 2024 Dec 27]. Available from: https://gifex.com/fr/fichier/carte-de-la-wilaya-de-tagant/