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# PREVALENCE OF MEASLES AND VACCINATION COVERAGE AMONG INFANTS AND PRESCHOOL-AGED CHILDREN AT MAIWAND TEACHING HOSPITAL

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**Abstract**

**Background:** Measles is a highly contagious viral illness and continues to be a major cause of morbidity and mortality among children globally, particularly in low- and middle-income countries. Despite the widespread availability of a safe and effective vaccine, measles outbreaks remain common in regions with low immunization coverage. In Afghanistan, ongoing conflict, displacement, and limited access to healthcare services have contributed to suboptimal vaccination rates, placing children at increased risk. This study aimed to assess the prevalence of measles and examine associated factors—such as vaccination status, age distribution, and complications—among pediatric patients admitted to Maiwand Teaching Hospital in Kabul, Afghanistan.

**Methods:** A hospital-based cross-sectional study was conducted at Maiwand Teaching Hospital, affiliated with Kabul University of Medical Sciences, from January 1 to December 31, 2022. The study included all pediatric patients aged 1 month to 156 months (13 years) who were admitted with a clinical diagnosis of measles during the study period. Data were collected using structured forms and included patient demographics, measles vaccination status, clinical presentation, complications, and outcomes. Descriptive statistics were used to summarize patient characteristics, and inferential statistical analyses were performed to assess associations between variables. Data analysis was conducted using SPSS software, version 25.

**Results:** During the study period, a total of 3,850 children were hospitalized, of whom 998 (25.9%) were diagnosed with measles. The vast majority of affected children (88.7%) were under five years old, and 54.2% were male. A large proportion (86%) had not received any measles vaccination, while 7.6% had received a single dose and 6.4% had completed two doses. Complications were frequently observed, with pneumonia (79%), diarrhea (36.8%), and oral thrush (22%) being the most commonly reported. Nearly all patients (99.6%) recovered following appropriate medical care, though a small number with severe complications succumbed to the illness.

**Conclusions:** The study reveals a high prevalence of measles among pediatric inpatients at Maiwand Teaching Hospital, with a significant number of cases occurring in unvaccinated children. These findings highlight the urgent need to enhance immunization efforts and strengthen public health interventions to mitigate measles-associated illness and death in Afghanistan.

**Keywords:** Measles, Prevalence, Vaccination, Pediatrics, Hospitalized Children, Complications, Afghanistan

## Introduction

Measles is a highly transmissible viral illness that mainly affects young children, despite the availability of a safe and effective vaccine. The virus spreads through respiratory droplets from infected individuals. Early symptoms commonly include high fever, cough, nasal congestion, conjunctivitis, and the presence of Koplik's spots inside the mouth. Typically, a distinctive maculopapular rash emerges several days later, beginning on the face and subsequently spreading to other parts of the body. While measles vaccination has dramatically decreased the global incidence and mortality associated with the disease, measles remains a significant cause of illness and death in children, especially in low- and middle-income countries (LMICs). The World Health Organization (WHO) estimates that measles is responsible for approximately one million deaths each year, with the greatest impact observed in regions such as Africa and Asia. (1). In Afghanistan, measles outbreaks persist despite ongoing efforts to increase vaccination coverage, leaving a considerable segment of the population vulnerable to infection. According to data from the Ministry of Public Health of Afghanistan, more than 25,000 measles cases were reported in 2017, predominantly affecting children under 10 years of age. Complications arising from measles—including pneumonia, diarrhea, otitis media, and encephalitis—are major contributors to elevated morbidity and

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mortality rates, particularly among children who have not received sufficient immunization. (1, 2, 3, 4, 6, 12, 13, 14). This study aims to determine the prevalence of measles among pediatric patients admitted to Maiwand Teaching Hospital in Kabul, Afghanistan, and to investigate the relationship between measles occurrence and variables such as vaccination status, age, gender, and place of residence (7, 9, 10, 13). Additionally, the research intends to assess the clinical outcomes and complications linked to measles infections in hospitalized children. Gaining insight into these factors is essential for enhancing immunization programs and public health policies aimed at decreasing the impact of measles in Afghanistan (8, 15).

**Methods**

**Study Design**

This cross-sectional study was conducted at Maiwand Teaching Hospital, Kabul University of Medical Sciences (KUMS), Kabul, Afghanistan, from January 1st to December 31st, 2022. The study was approved by the Ethical Review Committee of the KUMS. Informed consent was obtained from the parents or guardians of the participants.

**Participants**

All children, aged 1 month to 156 months, who were admitted to the Pediatrics Department of Maiwand Teaching Hospital during the study period and diagnosed with measles were included in the study. A total of 998 children with a clinical diagnosis of measles were enrolled. The sampling method used was non-probability consecutive sampling, whereby all eligible patients presenting within the defined time frame were included in the study.

**Data Collection**

Data were collected through a structured questionnaire that included demographic details (age, gender, and residency), vaccination history, clinical symptoms, and any complications observed during hospitalization.

Measles Diagnosis

Measles was diagnosed based on the clinical presentation of typical symptoms, including fever, cough, conjunctivitis, coryza, maculopapular rash, and Koplik's spots.

Vaccination Status

Vaccination status was categorized as follows:

- No dose received.
- One dose received.
- Two doses received.

Laboratory Testing

Measles IgM antibody testing was performed on all participants to confirm the diagnosis. The test was conducted using an ELISA-based method, and results were interpreted by a qualified laboratory technician.

Clinical Management

All patients received Vitamin A supplementation based on their age:

- 50,000 IU for children under 6 months.
- 100,000 IU for children aged 6–12 months.
- 200,000 IU for children above 12 months.

Chest radiographs were taken for all patients as part of routine care, regardless of respiratory symptoms. The radiographs were interpreted by a certified radiologist.

**Statistical Analysis**

Data were analyzed using SPSS version 25 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to summarize demographic characteristics, vaccination status, and clinical outcomes. Pearson's correlation analysis was used to determine associations between measles severity and factors such as age, vaccination status, gender, and complications. A p-value of <0.05 was considered statistically significant.

**Results**

During the 12-month study period, Maiwand Teaching Hospital in Kabul admitted a total of 3,850 children, of whom 998 (25.9%) were diagnosed with measles (Table 1). The age distribution of measles cases was as follows: 387 (38.8%) infants aged 1 to 12 months, 498 (49.9%) children aged 13 to 60 months, 90 (9%) children aged 61 to 120 months, and 23 (2.3%) children aged 121 to 159 months (Table 2). Among the measles cases, 541 (54.2%) were male and 457 (45.8%) were female, yielding a male-to-female ratio of 1.2:1 (Table 3). Regarding residency, the majority of measles cases originated from urban areas of Kabul, accounting for 80.8% of cases, while rural areas reported only 19.2% of cases during the period from January 1 to December 31, 2022 (Table 4). Regarding vaccination status, most patients (86.0%) had not received any dose of the measles vaccine. In this study, 84.7% of

Serological ELISA tests returned positive results, confirming measles infection. The IgM test served as a diagnostic tool for identifying measles cases after the appearance of skin rashes on the second day (Table 6). Among the complications observed in measles patients, pneumonia was the most prevalent, affecting 79.0% of cases. Diarrhea and oral thrush were also

**Table 1**: Prevalence of patients with Measles according to the total number of hospitalized patients.

| Clients | Number of patients | Percentage |
|---|---|---|
| Other diseases | 2852 | 74.1 |
| measles patients | 998 | 25.9 |
| All hospitalized patients | 3850 | 100.0 |

**Table 2**: Distribution of children studied by age.

**Table 4**: Distribution of Measles based on address.

| address | Number of patients |
|---|---|
| Urban | 806( 80.8%) |
| Rural | 192( 19.2%) |
| Total | 998 ( 100.0%) |

**Table 5**: Distribution of children studied by vaccination status

| vaccination status | Number of patients |
|---|---|
| one doses | 76 (7.6%) |
| two dose | 64( 6.4%) |
| Not taken | 858 86.0%) |
| Total | 998 ( 100.0%) |

**Table 6**: Distribution of children studied by Measles IgM

| Age | Number of patients | Mean ± Std. Deviation |
|---|---|---|
| 1-12m | 387 (38.8 %) | 30.62 ± 2.91 |
| 13-60m | 498 (49.9%) | |
| 61-120m | 90 ( 9.0 %) | |
| 121-156m | 23 (2.3%) | |
| Total | 998 ( 100.0%) | |

**Table 3**: Distribution of children studied by Gender.

| Gender | Number of patients |
|---|---|
| male | 541 (54.2%) |
| female | 457 ( 45.8%) |
| Total | 998 (100%) |

**Table 7**: Distribution of children studied by complication

| complication | Number of patients |
|---|---|
| Pneumonia | 789 ( 79.0%) |
| Diarrhea | 367 ( 36.8%) |
| Oral Thrush | 220 ( 22.0%) |
| Croup | 7 (0.7%) |
| Encephalitis | 4( 0.4%) |
| Bleeding | 4 ( 0.4%) |

**Table 8**: Distribution of children studied by Outcome

| outcome | Number of patients |
|---|---|

Measles continues to pose a significant public health challenge, especially in low- and middle-income countries such as Afghanistan, where vaccination coverage remains suboptimal. The present study offers valuable data on the prevalence of measles and its associated risk factors among children hospitalized at Maiwand Teaching Hospital in Kabul. Notably, a substantial proportion of measles cases occurred in unvaccinated children, underscoring a critical immunization gap that facilitates ongoing disease transmission and outbreaks (8, 9, 10, 14).

The observed measles prevalence of 25.9% among hospitalized children aligns with recent national and regional reports highlighting recurrent outbreaks within Afghanistan. This persistence reflects complex socio-political barriers to vaccination, including insecurity, displacement, limited healthcare infrastructure, and vaccine hesitancy, all of which hinder the achievement of herd immunity (6, 8, 9, 10). These factors collectively contribute to maintaining measles as a leading cause of morbidity and mortality in Afghan children.

Consistent with global trends, our data reveal that children under five years of age, particularly those between 1 and 5 years, bear the highest disease burden. This heightened vulnerability is likely attributable to incomplete immunization schedules and the increased susceptibility of younger children to infectious agents. Similar patterns have been documented in other resource-limited settings, where gaps in vaccine coverage perpetuate the incidence of vaccine-preventable diseases like measles (2, 4, 8).

The study also highlights the substantial rate of severe complications associated with measles infection, including pneumonia (79.0%), diarrhea (36.8%), and oral thrush (22.0%). These complications are consistent with existing literature, which identifies pneumonia as the primary cause of measles-related fatalities, accounting for up to 80% of deaths in affected children in developing countries (4, 5, 6, 13, 16, 18). The high complication rates emphasize the urgent need for early diagnosis, timely therapeutic interventions, and the administration of vitamin A supplementation, which has proven efficacy in reducing disease severity and mortality.

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benefiting from more robust surveillance systems. However, the lower vaccination coverage in rural areas suggests a latent risk of outbreaks due to limited healthcare access and potential underreporting. This urban-rural dichotomy indicates the necessity for targeted public health strategies that address regional disparities in immunization delivery (1, 3, 7).

While the findings provide important insights, the study is subject to certain limitations. The cross-sectional design precludes causal inferences between risk factors and measles incidence. Moreover, reliance on clinical diagnosis without confirmatory serological testing may introduce diagnostic inaccuracies. Future research should employ longitudinal designs with larger sample sizes and incorporate laboratory confirmation to better elucidate disease dynamics and transmission patterns. Such studies would enhance understanding of measles epidemiology and inform more effective control and prevention strategies.

**Conclusions**

The study revealed a high prevalence of measles among hospitalized children at Maiwand Teaching Hospital, with most cases occurring in unvaccinated individuals, particularly children under five and those from urban areas. Common complications such as pneumonia and diarrhea highlight the urgent need for early diagnosis and effective treatment. Strengthening immunization coverage through enhanced routine vaccination programs, targeted campaigns, and public awareness initiatives is essential to reducing measles incidence and associated complications in Afghanistan. Ongoing surveillance and research remain crucial to evaluate intervention effectiveness and guide future public health strategies.

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**Limitations**

The unavailability of data on other important aspects of the Resurgence of Measles and smallpox

The sample size is one of the major limitations of the study. This could pave the way for further detailed research in the future.

**Authors 'contributions**

Khesrow Ekram (KE) conceptualized the manuscript, reviewed the literature, wrote the original draft, and designed the study. Mohammed Akber Ibrahemi (MAI), Babrak Jamal (BJ), Abdul Wali Wali (AWW), Mohammad Sharif Sediqi (MSS), and Abdul Muhib Sharifi (AMS) collected the data and conducted the conservative pediatrics ward treatment. Mansoor Aslamzai (MA) conducted the neonatal treatment of the patient. All authors edited the manuscript and supervised the entire study process, read and approved the final manuscript.

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**Availability of data and materials**

The datasets generated and analyzed during the current study are available from the Corresponding author on reasonable request.

**Declarations**

**Ethics approval and consent to participate**

The ethical approval for the survey and the study was provided by the Ethics Committee of the Pediatric Department of Medical Sciences (Kabul, Afghanistan). For children less than 10 years old, written informed consent was taken from the Parent/caregiver. For adolescents 10–13 years old, informed consent was taken from parents/caregivers as well as the adolescents. The serum sample collection and the entire study were in accordance with the relevant guidelines and regulations.

**Consent for publication**

Not applicable.

**Competing interests**

None of the authors has any conflict of interest to declare.

Afghanistan.

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