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Descriptive analysis of measles cases seen in a tertiary health facility in Sokoto, Northwest Nigeria – implication of disease eradication

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ABSTRACT

Introduction

Measles is a vaccine preventable viral disease that affects mostly children under-five years of age. It is highly contagious infection associated with high morbidity and mortality.

Objective

To describe the morbidity and mortality pattern of measles cases in person, place and time.

Methods

A health facility based study and cross sectional descriptive study design was used. All cases of measles that presented at the facility from January to June 2016 were profiled and their medical records reviewed. Representative blood samples were taken and analyzed using the Enzyme linked immunosorbent assay (ELISA) method for the diagnosis of measles. Data was entered into MS Excel version 2016 and later analysed using Epi-info version 7.

Results

A total of 149 patients were seen over a period of 6 months. They represent 88 males and 61 females with a male to female ratio of 2:1. The median age of the cases was 30 months (range of 108 months to 9 month). The trend analysis shows a steady increased in number of cases from January with the month of March having the highest number of 46 cases, then there was steady decline for the subsequent months. Only 14 children, which accounted for 9.4% were reported to have being vaccinated against measles, while majority, 135 that represented 90.6% were not. Seven deaths were recorded; all were males and among cases that never received vaccine against measles, giving Case fatality rate (CFR) of 5.0%. Measles specific immunoglobulin M (IgM) was detected in all the blood samples that were sent for investigations.

Conclusion

Nearly all the cases did not receive measles vaccine and among the deaths recorded, none had been vaccinated against measles. Concerted efforts are required by all stakeholders to ensure every child is completely immunized in line with the global measles elimination strategy.

Keywords: Measles, Cases, Sokoto, Under-Fives

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INTRODUCTION

Measles virus also called rubeola belongs to the paramyxoviridae family of morbillivirus. It is a single stranded RNA virus that encodes six virion structural proteins.[1] Three of these proteins are in the envelope, comprising a matrix (M) protein that plays a key role in viral assembly and two types of glycoprotein projections (peplomers). One of the projections is a hemagglutinin (H), which mediates adsorption to cell surfaces; the other (F) mediates cell fusion, hemolysis, and viral entry into the cell. No neuraminidase activity is present.[2] Measles virus has only one serotype restricted to human infection. However, minor antigenic and genetic variations among wild type measles strains exist. These variations can enable more precise epidemiologic tracking of outbreaks and their origins.[1, 2]

The virus is spread through airborne by droplet spread or by direct contact with the nasal and throat secretions of infected persons. The incubation period is usually 10 to 14 days after exposure. The clinical manifestations of measles include high grade fever, cough, runny nose, and red eyes. Koplik's spots seen inside the mouth opposite the second molar tooth are diagnostic of measles.[3] A characteristic red, maculo-papular rash which starts on the face and then spreads to the rest of the body begins three to five days after the start of symptoms. The severity and outcome of measles varies depending on a number of host and environmental factors.[2, 3] The risk of developing severe or fatal measles increases for those aged <5 years, living in overcrowded conditions, who are malnourished (especially with vitamin A deficiency), and those with immunological disorders, such as advanced HIV infection.[4]

Globally, in the year 2013, there were 145, 700 measles deaths mostly among children under the age of five. Measles vaccination resulted in a 75% drop in measles deaths between 2000 and 2013 worldwide. In 2013, about 84% of the world's children received one dose of measles vaccine by their first birthday through routine health services – up from 73% in 2000. During 2000-2013, measles vaccination prevented an estimated 15.6 million deaths making measles vaccine one of the best buys in public health.[5, 6]

In Nigeria, measles is endemic and a leading cause of under-five mortality and morbidity. The disease was said to be responsible for 1% of deaths in under-fives in 2013.7 The failure to deliver at least one dose of measles vaccine to all infants remains the main reason for high measles morbidity and mortality as 95% coverage is required to interrupt measles transmission.8 In line with the Global elimination plan, Nigeria's objective was to reduce measles mortality by 95% in 2015 and achieve elimination by 2020. Measles vaccination directly contributes to the reduction of <5yr mortality and hence to the achievement of millennium development goal five of reducing < 5yr mortality rate by 2/3 by 2015. From 2005 to date, Nigeria conducted 1 catch up campaign in 2005 and 3 follow –up campaigns in subsequent years.[6, 7]

Measles is an endemic disease in Nigeria, with recurrent outbreaks occurring at irregular intervals. Measles transmission in Nigeria occurs through all months of the year, but peaks in the dry season (February, March and April). Measles transmission also sometimes occurs immediately after the end of the rainy season and often reaches epidemic proportions in the dry season.[8,9] In Nigeria, measles is still a leading cause of under-five mortality and morbidity. The disease was said to be responsible for one per cent of deaths in under-fives in 2013 in Nigeria.[10]

Sokoto state remains one of Nigerian states with recurrent measles outbreak in the past decade. In an earlier report on infant mortality in Sokoto, it was established that measles is among the five leading causes of death in the state.[10] On December 26, 2015 a suspected case of measles was seen at a Primary Health Center (PHC) in Sokoto North local government area (LGA). Also in early January 2016 to late March, 2016, there was a massive outbreak of Measles in Sokoto reported just three months after a supplementary immunization activities.[11]

We set out to describe the morbidity and mortality pattern of measles cases in person, place and time as seen in the pediatrics department of Usmanu Danfodiyo University Teaching Hospital (UDUTH), Sokoto from January to June, 2016.

MATERIAL AND METHODS

Study Area

The study was conducted at the Pediatrics and Medical Microbiology departments of Usmanu Danfodiyo University Teaching Hospital, Sokoto.

Study Design

This was a descriptive, cross sectional and prospective.

Study Population

This comprises of all cases of measles in children that are less than 15 years old who presented at UDUTH. We defined a suspected measles case as any person, who presented to Pediatrics department of UDUTH Sokoto, State with fever, maculopapular (non-vesicular) rash and any of the following: cough, coryza (runny nose) or conjunctivitis or any person in whom a physician suspects measles.[10] We defined a probable case as any person that presented to Pediatrics department of UDUTH Sokoto, State who has been epidemiologically linked to a confirmed case. A confirmed measles case was defined as any suspected case with laboratory confirmation of measles-specific IgM antibodies, who had not received measles vaccination within 30 days before the specimen was collected.[10]

Study Period

January 2016 to June, 2016.

Sampling Method

We recruited all the cases during the study period.

Specimen Collection and Analysis

We collected 2 mls of venous blood from the first patient for every week of admission. This was analyzed at Medical Microbiology Laboratory of UDUTH Sokoto using the Enzyme linked immunosorbent assay (ELISA) method looking for the specific Measles IgM antibodies.

Data Analysis

Data was entered into MS Excel version 2016 and this was later transferred and analyzed using Epi-info version 7. Univariate and multivariate analysis were used when necessary to describe the study variables in time, persona and place. Health mapper was used to show the local government area (LGA) of origin for the cases.

Ethical Considerations

Ethical clearance was sought from the Ethics and Research committee of Usmanu Danfodiyo University Teaching Hospital, Sokoto.

RESULTS

A total of 149 patients were seen over a period of 6 months. They represent 88 males and 61 females with a male to female ratio of 2:1. The median age of the cases was 30 months (range of 108 months to 9 month). The age group distribution of cases in month shows that those in the 10 to 24 months' category had the highest frequency of 66(44.3%) while those in 49 to 58 months' category had the lowest frequency of 2(1.3%).

Table 1 Distribution of Cases Based on Age (In Months)

Age (Month)	Frequency	Percentage
≤ 9	17	11.4
10-24	66	44.3
25-48	43	28.9
49-58	2	1.3
>58	21	14.1

The trend analysis shows a steady increase in number of cases from January with the month of March having the highest number of 46 cases, then there was steady decline for the subsequent months with one case only being recorded for the month of June (Figure 1). Epidemiologic week 9 had the highest number of cases (17) seen while in epidemiologic week 24 the least number of case (1) was seen (Figure 2). Only 14 children, which accounted for 9.4% were reported to have being vaccinated against measles, while majority, 135 that represented 90.6% were not

(Figure 3). Seven deaths were recorded; all were males and among cases that never received vaccine against measles, giving Case fatality rate (CFR) of 5.0%.

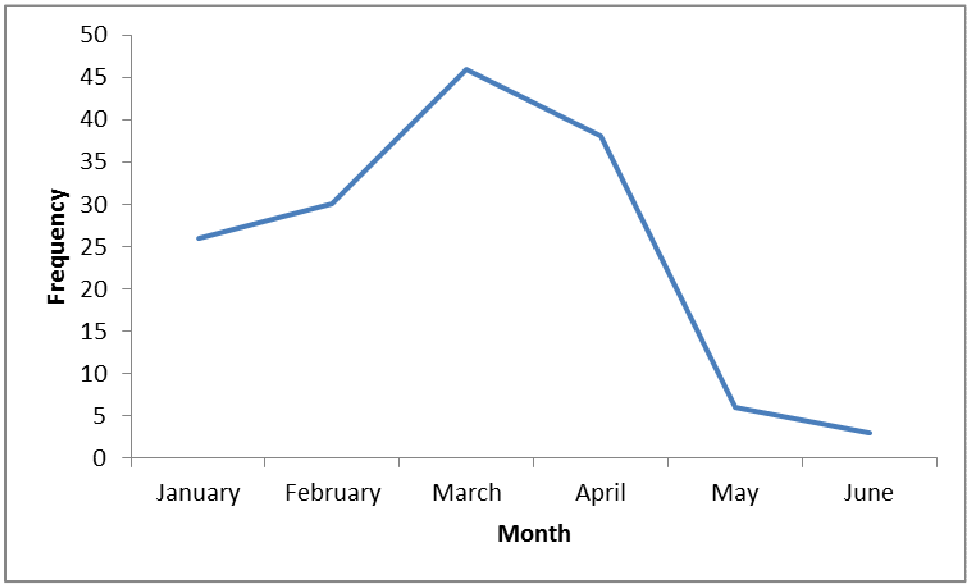

Fig 1 Trend Analysis of Measles Cases Seen in UDUTH between January to June, 2016

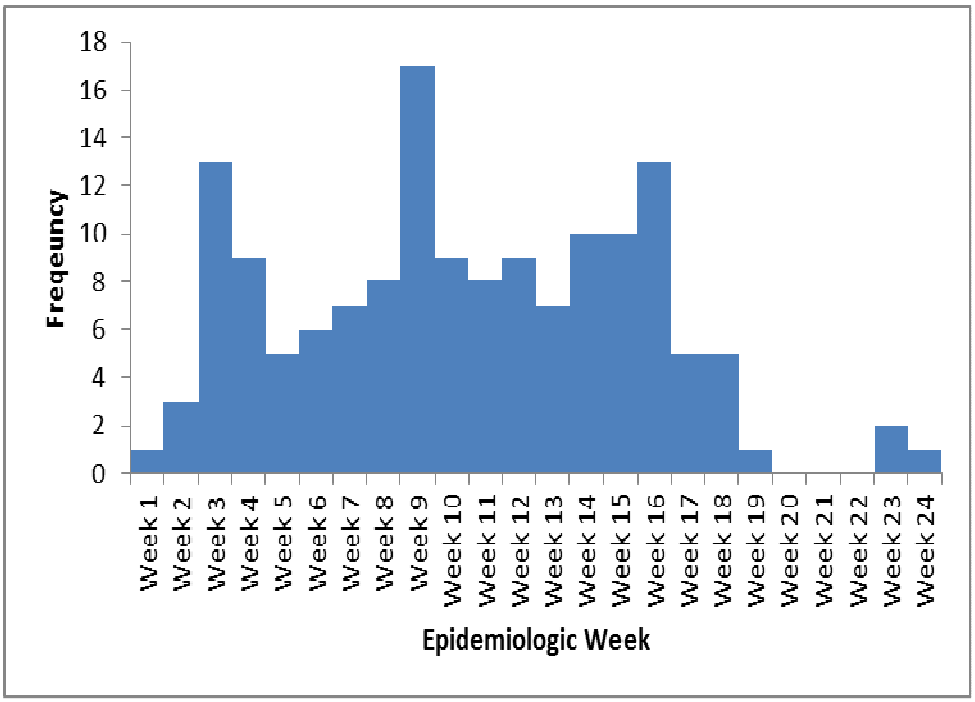

Fig 2 Measles Cases as Seen During the Epidemiologic Week 1 to 24 in UDUTH between January to June, 2016

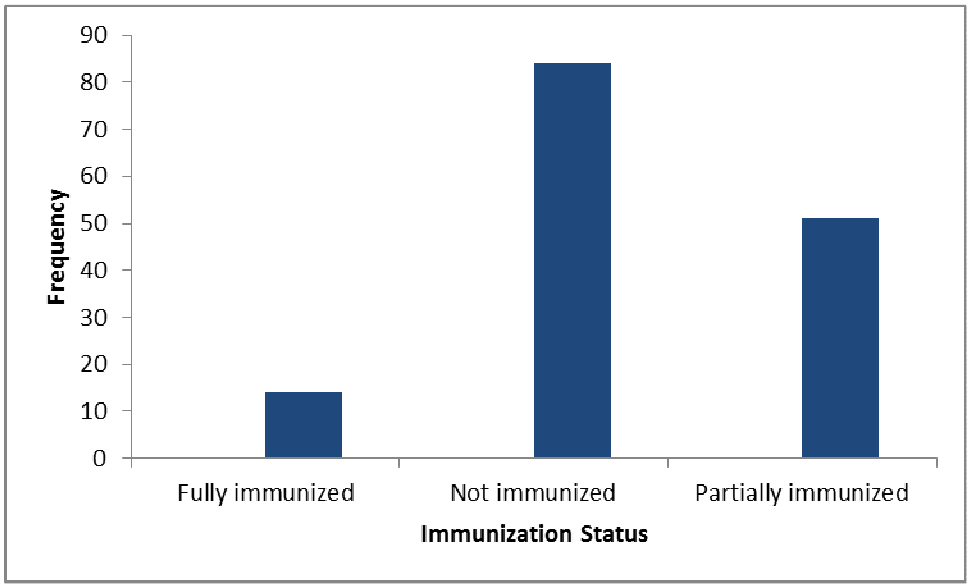

Fig 3 Immunization Status of Measles Cases Seen in UDUTH between January to June, 2016

The cases were from eleven local government areas (LGA) across three states of northwestern Nigeria. One case was from Batagarawa LGA of Katsina State and also there was one case each from Suru and Jega LGA of Kebbi State. There were eight LGAs in Sokoto where the patients originated from and this were; one case each from Yabo and Tangaza LGA. Two cases from Bodinga LGA while Seven cases were each from Dange-Shuni and Kware LGA. Sokoto North had 37 cases while Wamako had 44 and the highest of 47 was from Sokoto South (Figure 4). Measles specific immunoglobulin M (IgM) was detected in all the 21 blood samples that were sent for investigations.

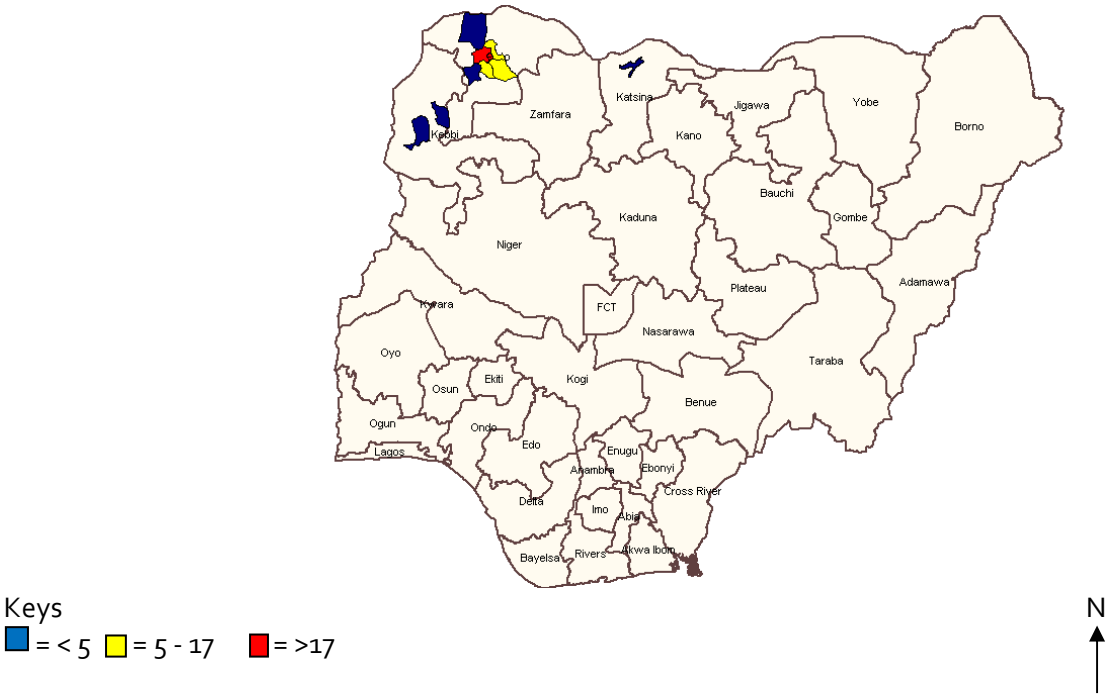

Fig 4 Map of Nigeria Showing the Eleven Local Government Area of Origin for the Cases across Three States

DISCUSSION

Our study provides a database of the hospital based pattern of measles cases from a tertiary health center. There was a male preponderance for measles cases from our study similar to the work of Aliyu at a similar health facility like ours in Kano.[12]

Our study findings demonstrate majority of the measles cases occurring in those less than 59 months (5 years) with the highest age at 108 month (9 years). This was similar to a study done by Ibrahim [11] and colleagues in the same state around the same period; although their study was community based and they used a higher sample size. The implication of this finding is that all efforts toward measles prevention should be directed toward children especially the under-fives.

Our analysis shows peak measles cases in the month of March. This was slightly similar to the findings of Etuk in Calabar and it coincides with the natural history and epidemiology of measles; where cases are normally seen between the months of November to May.[13] The finding is in contrast to the work of Aliyu from Kano wherein he reported more cases in April and May.[12]

We recorded an abysmal low non-vaccination status amongst the cases with all the mortality recorded among the unvaccinated group expectedly. This is a worrisome finding and it negates Government effort on routine immunization and supplementary immunization activities. Precisely six weeks to our investigation, a statewide supplemental immunization activity (SIA) for measles was held in Sokoto state (November 21–25, 2015).[11] Although, it has been widely reported that SIAs would only give a temporary impact and for a long term lasting impact, a comprehensive national scheduled immunization plan must be susatined.[14] This further reinforce the need for us to strengthened our routine immunization services in Nigeria.

Our study recorded a relatively low CFR rate which is below the national average of 11%. This was in contrast to the study of Grais *et al* in Dong district of Adamawa State where a CFR of 23.4% was recorded.[15] The possible hypothesis for our low CFR is possibly because this is a hospital based study where the patients received adequate medical and nursing care, probably if it were from a community setting we may have had a higher CFR.

Our study was limited because it was a single facility based analysis and might not be representative of the actual community based status. Although, this hospital is a major referral center and one of the only three teaching hospitals in the entire of the northwestern states of Nigeria. We however, recommend a multi-facility based study in the future so as to provide wider information.

CONCLUSION

Despite governments' effort at all levels in improving immunization coverage, nearly all the cases did not receive measles vaccine and among the deaths recorded, none had been vaccinated against measles. More efforts are required by all stakeholders to ensure every child is completely immunized. Affected patients were managed at a special isolation ward. Hand hygiene and barrier nursing were implemented. The low mortality (5%) recorded might be attributable to good infection control practices in the hospital.

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