

# Measles Among Hospitalized Nigerian Children

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## Abstract

**Background:** Measles is a vaccine preventable infection. The prevalence of the infection in any setting is thus a tool for measuring the effectiveness of the immunization program in the locality.

**Objectives:** To study the rate and effect of immunization in hospitalized children with measles.

**Methods:** A one year prospective study, between October 1st, 2005 and November 31st, 2006, in which consecutive children admitted with measles at the children's emergency unit of Ladoke Akintola University of Technology Teaching Hospital, Osogbo, Osun –State were studied.

**Results:** All the 42 (21 male and 21 female) children admitted with measles in this period were studied and their ages ranged between 5 months to 8 years. These children accounted for 42 (6.6%) of the total 636 admissions at the children emergency unit over the study period. The common modes of presentation were pneumonia, heart failure, croup and gastroenteritis. Of the 42 children 13(31.0%) were immunized and the remaining 29(69.0%) were not immunized against measles. The common reasons stated for failing to receive the vaccine by the parents of the non-immunized children were, the unavailability of vaccines at the health facility by 12(41.4%) and the children being under age for immunization (age below 9 months) by 8(27.6%). The mean number of hospitalization days was 4.3 for the immunized and 5.2 for the non-immunized patients. Of the 42 cases of measles, there were 8 (19.0%) deaths. Six (75.0%) of the 8 fatal cases were non-immunized.

**Conclusion:** To reduce the morbidity and mortality arising from measles, efforts should be made to ensure the availability of potent vaccines at all appropriate health facilities always. Also the National Program on Immunization should be modified to accommodate a first dose of vaccine at 6 and the second at 9 months.

## INTRODUCTION

Measles is a viral infectious vaccine preventable disease. Sadly, however, it continues to be one of the present day scourges of the developing world.<sup>1</sup> Elimination of measles has been achieved in some regions of the world; however this has so far been unattainable in the African continent.<sup>2</sup> Globally more than 30 million people are infected yearly and in the year 2004, measles killed an estimated 454,000 people of which more than 95% were located in the sub-Saharan Africa. A disease with such a high rate of morbidity and mortality requires proper attention in order to achieve control. Presently, the UNNICEF, WHO and other philanthropic bodies are making concerted efforts to eliminate this infection from Nigeria. The present study is another attempt to document the problem that measles constitutes to the well being of children living in a

developing country and proffer solutions to the childhood measles problem in Nigeria.

## METHODOLOGY

This is a prospective study in which information on consecutive children presenting with clinical features of measles at the Ladoke Akintola University of Technology Teaching Hospital Osogbo, between 1<sup>st</sup> October 2005 and 30<sup>th</sup> September 2006 was recorded in a proforma. Two consultant paediatricians [OOA and EPO] recruited all the patients and the diagnosis of measles was clinical in all cases. Patients presenting with fever and a generalized erythematous maculopapular rash, spreading from the head/hair line down to the extremities/feet, preceded by a prodromal cough, rhinorrhea and conjunctivitis and a prior history of contact with person(s) known to have suffered

from measles or similar illness were diagnosed and included in the study as cases of measles. The parents of the subjects were also carefully questioned and examined to rule out other differentials such as morbilliform skin eruptions to drugs and other infectious illnesses such as exanthema subitum. Viral confirmatory studies like culture and serology were not done because of lack of facilities in our hospital laboratory to carry out the test.

Information obtained through the use of the proforma from history taking includes, age, sex, history of immunization against measles and length of hospitalization. Details of the age and immunization status of the patient were recorded in the proforma. The information obtained on the immunization and age was crosschecked from the hand held records (Road to health chart). The weights, heights, hydration status and the presence of complications such as pneumonia, heart failure, dehydration, angular stomatitis, xerophthalmia, malnutrition and any other complication on clinical examination were also noted and recorded in the proforma. Investigations such as complete blood count, chest and neck radiographs, electrolytes and urea were conducted when indicated in order to make the diagnosis and manage the patient as appropriate. The data obtained was analyzed and presented as simple descriptive statistics.

## RESULTS

### AGE AND SEX DISTRIBUTION OF CHILDREN STUDIED

All the 42 children admitted with measles into the children emergency ward over the 1 year period were studied. These 42 children accounted for 6.6% of the total 636 emergency paediatric admissions and consisted of 21 boys and 21 girls - M:F ratio of 1:1. Their ages ranged from 5 months to 8 years. The age distribution of the children is shown in Table 1

### PATTERN OF PRESENTATION OF THE PATIENTS WITH MEASLES

Of the 42 patients, 30 (71.4%) presented with pneumonia, of whom 21 (70.0%) were uncomplicated and 9(30.0%) developed congestive cardiac failure complications. Three of the patients with pneumonia and congestive cardiac failure, also had complications of xerophthalmia. Of the remaining 12 (28.6%) children, croup, gastroenteritis with severe dehydration, encephalitis, complex febrile convulsion, marasmus and diarrhoea with severe dehydration were found in 3 (7.1%), 3 (7.1%), 2(4.8%), 1(2.4%) 1(2.4%), 1(2.4%) and 1(2.4%) cases respectively.

### TIME OF OCCURRENCE OF MEASLES INFECTION

Most of the infections – 32(76.2%) were recorded in the dry/harmattan season [October to March], while the remaining 10(23.8%) occurred in the wet/rainy seasons May to September. The seasonal variation is shown as a bar chart in Figure 1.

### IMMUNIZATION STATUS OF THE PATIENT

Of the total 42 patients studied 13(31.0%) received vaccination against measles infection while the remaining 29(69.0%) were not immunized. The reasons stated by the parents of the affected children for not receiving the vaccination were, the unavailability of vaccines at the health facility by 12(41.4%), the children being under age for vaccination (age below 9 months stipulated in the national program for immunization) by 8 (27.6%), ignorance concerning the need for vaccination by 4(13.8%) and a lack of belief in the efficacy of vaccines by 2(6.9%). Furthermore 2(6.9%) parents gave no reasons, while the remaining one (3.4%) said that her failure was due to the demise of the father.

### DURATION OF ADMISSION OF PATIENTS STUDIED

The duration of admission of the hospitalized patients ranged from 1 to 11days. The mean lengths of hospitalization among the immunized and non-immunized patients were 4.3 and 5.2 days respectively. Of the 13 immunized children 9(69.2%) were hospitalized for less than 4 days, while 4 (30.8%) spent more than 4days; compared with the 29 non-immunized children of whom 10(34.5%) were admitted for less than 4 days and 19 (65.5%) for more than 4 days. A greater proportion of non-immunized children spent more than 4 days on admission.  $\chi^2 = 3.085$ ,  $p = 0.079$  (with Yate's correction applied). The duration of hospitalization is shown in Table 2.

### COMPLICATIONS AND DEATHS

Eight (19.0%) deaths occurred among the 42 subjects constituting 20.0% of the total 40 children who died at the children's emergency ward over the 1 year period of study. Five (62.5%) of these patients had pneumonia complicated by heart failure, one (12.5%) had diarrhoea with severe dehydration and one each with encephalitis and uncontrollable convulsions [Of the 5 deaths due to pneumonia complicated by heart failure, 3 had xerophthalmia]. Six (75.0%) of the children who died were not immunized against measles while the remaining two

(25.0%) were. Of the surviving 34 children 23(67.6%) were non-immunized, compared to the 11 (32.4%) who were. Most of the children who died were between 12 and 24 months old. The ages' of the children who survived the illness and those who died are shown in Table 3.

**Figure 1**

Table 1: Age distribution of the studied children

Ages in months	number of cases in each age category	Percentage of total 42
5 – 6	3	7.1%
>6 – 8	5	11.9%
>8 – 10	6	14.3%
> 10 – 12	2	4.8%
> 12 – 24	19	45.2%
> 24 – 36	4	9.5%
> 36 – 48	1	2.4%
> 48	2	4.8%
<b>Total</b>	<b>42</b>	<b>100.0%</b>

**Figure 2**

Table 2: Duration of hospitalization among immunized and non immunized children

Number of days Hospitalized	Days										
	1	2	3	4	5	6	7	8	9	10	11
Number of Immunized children	1	2	3	3	1	0	2	0	0	0	1
Number of un-immunized children	4	0	3	3	3	7	4	4	0	1	0

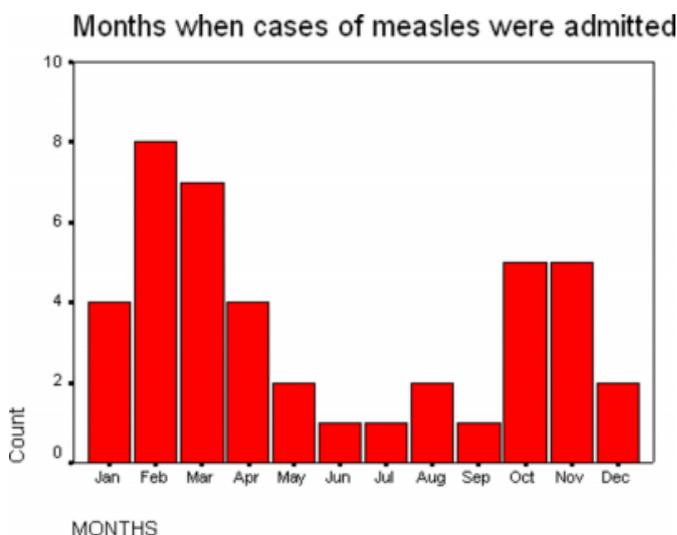
**Figure 3**

Table 3: Morbidity and mortality among measles patient in the different age groups

Ages in months	Number of survivors	Number of deaths
5 – 6	2	1
>6 – 8	4	1
>8 – 10	6	-
> 10 – 12	1	1
> 12 – 24	15	4
> 24 – 36	3	1
> 36 – 48	1	-
> 48	2	-
<b>Total</b>	<b>34</b>	<b>8</b>

**Figure 4**

Figure 1



Key: Count on the y-axis represents the number of cases admitted. Months on the x-axis shows the different months (January to December).

**DISCUSSION**

The present study shows that measles still accounts for a considerable proportion of paediatric emergencies in Nigeria. The cases admitted in the present study are similar to those of previous studies conducted in Nigeria. <sup>1,3,4</sup> Pneumonia, heart failure, croup and gastroenteritis and dehydration were the most common associated conditions seen at presentation. The case fatalities in the present study were linked to non-immunization which may be associated with severe disease manifestations.

A vaccine preventable disease causing alarmingly high rates of morbidity and mortality is unfortunate, since it is known that the efficacy of measles vaccine is between 93-99 %. <sup>5</sup> The National Program on Immunization (NPI) in Nigeria stipulates that children be vaccinated against measles by a single dose of injection at 9 months. It is sad to note that most of the children did not receive measles vaccination. Eight (19.0%) of the 42 infections occurred before the age of 9 months. This early presentation of measles has been attributed to the loss of the passively transferred maternal antibodies from the infant circulation. A previous study has shown that 58% of infants lose these protective antibodies by 4 months and 97% between 6 and 9 months. <sup>6</sup>

Diversification in measles strains has also being reported to account for the early presentation of measles and occurrence of measles in vaccinated children. <sup>7,8</sup> It has been associated

with the potential risk of an epidemic., Furthermore the occurrence of measles infection in children vaccinated against measles may be due to vaccine inefficacy. Storage, transportation and maintenance of cold chain system problems can easily affect the potency of vaccines in developing nations. <sup>10,11,12,13</sup> The unavailability of vaccines at the government hospitals shows a lack of commitment to the control of the disease by the ministries of health and other concerned authorities. The far reaching implications are that the elimination of measles is not in sight.

In conclusion, the battle against measles should be well mounted. Short-term control measures aimed at a medium to long-term goal of eliminating the infection should be vigorously implemented. The provision of effective and potent vaccines, accessible to all the vulnerable citizenry should be ensured. In the present study, a fifth of the infections occurred before the age of 9 months. Other previous studies have reported the proportion of children afflicted by measles below the age of 9 months to be at least 20%. <sup>12,13</sup> Changes in timing of the NPI immunization schedule for measles is therefore suggested such that infants can be vaccinated against measles at 6 and 9 months. Early immunization however carries the risk of failed seroconversion. This risk may be worth taking considering the fact that 97% of infants may have lost the passively acquired protection between 6-9 months. <sup>6</sup> It is known that seroconversion to measles vaccine is between 70-90% for a single dose vaccine administered below the age of 9 months and 97% with 2 doses given after the age of 9 months. Vaccinating children with a single dose of measles vaccine at 9 months, thus erodes the potential protection that might have been accorded by early immunization. A study in Guinea Bissau has already shown that children vaccinated with measles vaccine at 6 and 9 months had better outcome compared to their cohorts on single dose of vaccine administration at 9 months. <sup>14</sup> Administration of the Edmonston Zagreb strain of measles vaccine between 4-6 months in previous studies has been found effective for immunization against measles. <sup>15, 16</sup> The vaccine may be worth trying. Nigerian laboratories should also continue to monitor the strains of the virus prevalent in our environment.

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