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## Measles in Ibadan: a continuous scourge

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### Summary

Measles remains one of the leading causes of childhood mortality in the world, despite the availability of a safe, effective, relatively inexpensive vaccine. It is also one of the leading causes of childhood blindness in the developing world. We reviewed the records of cases of measles admitted into Oni Memorial Children's Hospital, Ibadan over a 5-year period, January 2000 to December 2004; to evaluate any changes in the pattern of the disease. A total of 666 cases of measles were admitted comprising of 347 males and 319 females, giving a male to female ratio of 1.1:1. The yearly incidence of measles remained fairly the same from January 2000 to December 2002. There was a marked increase in yearly incidence in the year 2003. The majority of the affected children (74.1%) were 2 years and below. One hundred and thirty-six (20.4%) cases developed measles before the age of 9 months, the recommended age for measles vaccination in Nigeria. The peak incidence occurred in the months February and March. The commonest complication was bronchopneumonia, seen in 45.2% of cases. Other complications include protein-energy malnutrition, tuberculosis, croup, keratopathy, otitis media, heart failure and tension pneumothorax. Fifty-six patients died giving a case fatality rate of 8.4%. Factors associated with increased mortality were young age (<2 years) and malnutrition. Measles remains a major threat to the health of the Nigerian child. A significant number of children developed measles before receiving the required vaccination at the recommended age of 9 months. There is a need to review the current immunisation policy, strengthen immunisation practices and improve the living standards in order to make the eradication of measles a reality.

**Keywords :** *Measles, Ibadan.*

### Résumé

La rougeole reste une des causes de la mortalité infantile dans le monde et de l'aveugleté dans les pays sous-développés bien que avec l'approvisionnement d'un vaccin effectif et non-chér. Nous avons revu les registres des enfants vu pour rougeole de l'Hôpital à la mémoire d'Oni à Ibadan pendant 5 ans (Janvier 2000 à Décembre 2004) en vue d'évaluer la fréquence de cette maladie. Au total 666

cas de rougeoles ont été admis, compris 347 males et 319 femelles. L'incidence annuelle de la rougeole reste la même de Janvier 2000 à Décembre 2002, et une augmentation remarquable en 2003. La majorité des enfants affectés (74.1%) étaient de moins de 2 ans. 136 (20.4%) des cas se développaient avant 9 mois, l'âge recommandé pour la vaccination contre la rougeole au Nigéria avec le sommet de l'incidence au mois de Février et Mars. La complication commune était le bronchopneumonie, vu à 45.2% de cas. Le taux de mortalité était de 8.4%. Les facteurs de risque incluent l'âge moins de 2 ans et la malnutrition. Cette maladie représente un problème majeur pour la santé des enfants Nigériens avant l'âge de la vaccination. Ceci démontre le besoin de revoir la politique d'immunisation, l'efficacité de l'immunisation et améliorer le niveau de vie afin de faire de l'éradication de la rougeole une réalité.

### Introduction

Measles remains one of the leading causes of under-5 morbidity in the developing world, and accounts for more than 7% of all deaths of children under the age of five around the world [1-2]. Deaths from measles represents 50-60% of the estimated 1.6 million deaths that occur from vaccine-preventable diseases [3]. Measles has also been described as one of the leading causes of childhood blindness in Africa [4-6]. Although, active immunisation of children has drastically reduced the incidence of measles in the developed countries [7] the disease remains a major public health concern in the developing countries. The majority of measles deaths occur in the 14 countries where immunization coverage for children was reported to be less than 50% in 1999, namely, Afghanistan, Angola, Central African Republic, Chad, Congo, Democratic People's Republic of Korea, Democratic Republic of the Congo (DRC), Djibouti, Equatorial Guinea, Ethiopia, Niger, Nigeria, Somalia and Togo [8]. The high prevalence of measles in the developing world and the attendant high mortality have been attributed to the poor vaccine coverage, low vaccine efficacy, younger age at infection, poverty, malnutrition, and overcrowding [9,10]. Despite the efforts to improve the services of the National Programme on immunization (NPI) in Nigeria, the current measles vaccine coverage in the country remains about 35% [11].

Although previous reports have documented low levels of protective maternal antibodies to measles by age of six months in Nigerian children [12], the current national programme in the country still stipulates the routine administration of measles vaccine at the age of nine months. Human immunodeficiency virus (HIV) infection and ma-



laria in pregnant mothers have also been shown to impair transplacental antibody transfer to the foetus [13]. The resultant effects are low levels of measles antibodies at birth which render children susceptible to measles infection at an early age [13]. One of the specific targets of the fourth millennium development goal is the reduction of annual global measles mortality by half relative to 1999 estimates [14]. Four years after these goals were set, measles still remains a major threat to child health in many developing countries. This study was therefore undertaken to evaluate the current pattern of morbidity and mortality from measles infection amongst children admitted into the Oni Memorial Children's Hospital, Ibadan.

### Materials and methods

All records of children admitted with a diagnosis of measles from January 2000 through to December 2004 were reviewed. Cases of measles which satisfied the standard WHO case definition of measles, that is, presence of a generalised maculopapular rash lasting for 3 days or more, fever (temperature of 38.3°C or greater) and one of the following: cough, coryza, conjunctivitis [15,16] were recruited into the study. Information on the date of admission, age in months, gender, measles vaccination status (based on mothers' recall), weight in kg, complications from the disease, outcome and sequelae were extracted and entered into a structured questionnaire. Individual Z-scores for weight for age (WAZ) was compared with the National Centre for Health Statistics (NCHS) percentiles standard using the Anthro software [17-19].

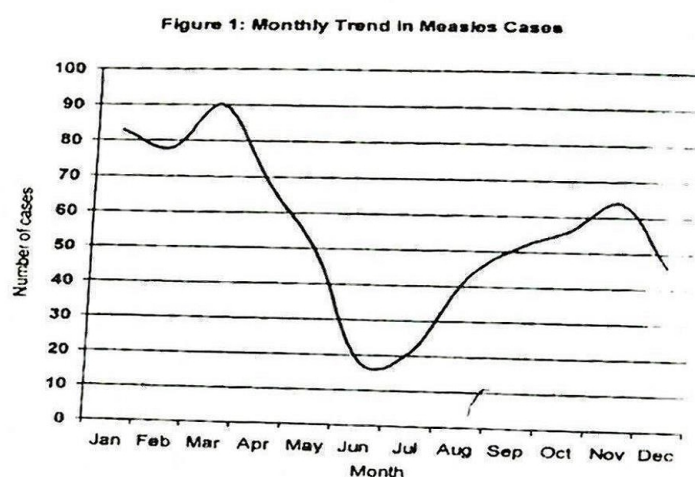
Data were entered into a micro computer and analysis was done using SPSS 11 for Windows software. Categorical and continuous data were compared using Chi-square and Student *t* test between groups respectively. Level of significance was set at < 0.05.

### Results

Of the 666 cases of measles admitted during the period of study, there were 347 (52.1%) males and 319 (47.9%) females, giving a male to female ratio of 1.1:1. The cases represented 9.3% of the 6,194 post-neonatal admissions into the hospital during the study period. The ages of the children ranged from 4 months to 10 years. The peak age incidence was between 12 and 18 months. One hundred and thirty-six (20.4%) cases developed measles before the age of 9 months. Only 25.9% of the 666 patients were above two years and 3.5% were above 5 years. Gender and the vaccination status are shown in Table 1. Of the 317 patients whose mothers gave a reliable history of immunisation, only one hundred and seven (33.8%) of the patients had received measles immunisation while 210 (66.2%) never had measles vaccination.

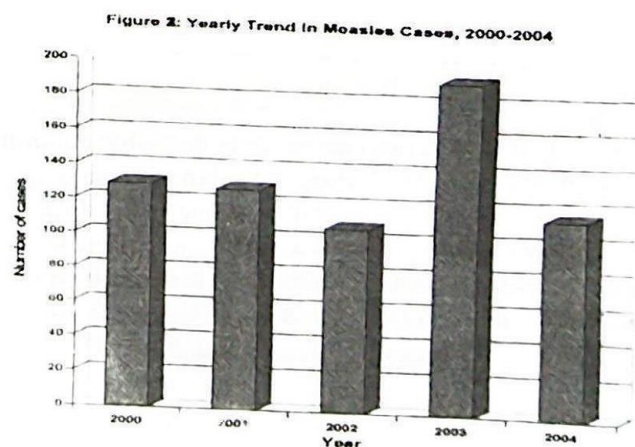
**Table 1:** Distribution of patients by gender and measles vaccination status

Characteristics	Number of Cases	
	N = 666	%
Gender		
•Male	347	52.1
•Female	319	47.9
Vaccinated		
•Yes	107	33.8
•No	210	66.2



**Fig. 1:** Monthly trend in measles cases

The monthly admissions of cases of measles are as shown in figure 1. Measles cases were admitted throughout the year, but admissions were higher in the months of February and March and lowest between June and July. The yearly incidence of measles was comparable in all the years but a marked increase was observed in 2003 (Figure 2).



**Fig. 2:** Yearly trend in measles cases, 2000-2004



Four hundred and two (60.4%) of the 666 cases had various complications (Table 2). The most common complication was pneumonia seen in 301 (45.2%) of the patients. Other associated complications include croup (1.4%), encephalitis (1.4%), otitis media (1.2%), keratopathy (1.2%), febrile convulsion (0.5%), pneumothorax (0.6%) and heart failure (0.3%). Forty-four (14.6%) of the patients had more than one complication.

**Table 2:** Complications of measles in the cases studied

Complications	Number of cases	% of all cases
Pneumonia	301	45.2
Encephalitis	9	1.4
Croup	9	1.4
Otitis media	8	1.2
Keratopathy	8	1.2
Febrile convulsion	3	0.5
Heath failure	2	0.3
Pneumothorax	4	0.6

**Table 3:** Comparisons of outcome by gender, measles vaccination and weight-for-age

	Outcome		$X^2$	Odds ratio (95% CI)	<i>P</i>
	Survived n (%)	Died n (%)			
Gender					
• Male	320 (92.2)	27 (7.8)	0.354	1.181 (0.682, 2.044)	0.552
• Female	290 (90.9)	29 (9.1)			
Total	610 (91.6)	56 (8.4)			
Age (years)					
• <2	442 (74.9)	48 (25.1)	7.876	0.546 (0.234, 0.912)	0.006
• ≥ 2	168 (95.5)	8 (4.5)			
Vaccination					
• Yes	99 (92.5)	8 (7.8)	0.543	1.375 (0.588, 3.228)	0.461
• No	189 (90.0)	21 (10.0)			
Weight-for-age (Z-score)					
• <2.0 SD	254 (89.4)	30 (10.6)	6.287	0.422 (0.211, 0.842)	0.012
• ≥2.0 SD	241 (95.3)	12 (4.7)			

Level of significance,  $P < 0.05$

Three percent of the patients were discharged against medical advice; it was not clear from the records what happened to these children after discharge. The overall case fatality rate was 8.4%. Mortality was significantly higher among patients whose weight for age was lower than (-2SD) of the population (NCHS);  $X^2=6.287$ , OR (95% CI) = 0.422 (0.211-0.842);  $P=0.012$  and patients less than 2 years of age ( $P=0.006$ ). There was no statistically significant association between gender and the outcome of measles admission [ $X^2=0.354$ , OR (95% CI) = 1.181 (0.682-

2.044);  $P=0.552$ ]. Similarly the risk of death was not related to the patients' immunisation status [ $X^2=0.548$ , OR (95% CI) = 1.378 (0.588-3.228);  $P=0.459$ ].

## Discussion

Measles remains an important cause of childhood morbidity and mortality, especially in the developing countries [1-3]. The study showed a high prevalence of measles amongst the children admitted into the Oni Memorial Children's Hospital, Ibadan between January 2000 and December 2004. Measles accounted for 9.3% of all post-neonatal admissions into the hospital, thus nearly one out of every 10 post-neonatal admissions during the study period were due to measles. The World Health Organisation (WHO) and the United Nations Children's Fund (UNICEF) in the joint strategic plan for measles mortality reduction; 2001-2005, targeted 45 priority countries with high measles burden for implementation of a comprehensive strategy for accelerated and sustained measles mortality reduction [14]. It is doubtful if this strategy has had any significant positive influence on the pattern of measles morbidity and mortality in Nigeria as the yearly measles incidence as recorded in the study remained fairly constant from the year 2000 to 2002, even, with a marked surge in the year 2003.

The majority of the measles cases (74.1%) in this study were aged two years and below. This finding is consistent with previous reports from various parts of the country [12,20-22]. The early age at measles infection has been attributed to low levels of maternally acquired antibodies. It is also worthy of note that, one-fifth of the children developed measles before the recommended age for routine measles immunisation in the country. These children must have lost the protective effects of the maternally-acquired antibodies, rendering them vulnerable to the infection at a relatively early age. HIV infection and malaria in pregnant mothers have been shown to impair transplacental antibody transfer in utero [13]. These two diseases are endemic in the developing countries and therefore pose a major challenge to the efficacy of the maternally-acquired antibody protection which most infants are known to enjoy in the first six months of life.

The study showed a marked seasonal variation in the monthly incidence of measles. The disease occurs throughout the year, with peaks in the months of February and March and the lowest incidence in June and July. The seasonal variation in measles incidence is consistent with reports from other parts of the world [23]. The seasonality of the disease may be of value while considering the timing of supplemental immunisation activities (SIA) in the country as SIAs have been shown to improve herd immunity as well as interrupt indigenous transmission of measles virus in other countries [23,24]. Measles vaccination campaigns should be routinely carried out during the low transmission seasons to improve herd immunity as children who had missed the routine childhood immunisation as stipulated in the NPI schedule could be given another opportunity to receive the vaccine.

Complications of the disease occurred in 60.4% of the cases, pointing to the severity of the infection in the



children. The case fatality rate was 8.4% and the risk of mortality was increased with young age, less than 2 years and poor nutritional status. Surprisingly however, the immunisation status of the children had no influence on the outcome of the disease. This finding raises a question on the potency of the vaccines administered to these children. It is therefore necessary to ensure adequate preservation of vaccine potency such that parents and care givers do not lose confidence in the efficacy and value of routine childhood immunisations. Such a situation would further compromise the efforts that are currently geared towards the elimination/control of the vaccine-preventable diseases.

The incidence of measles in the European region has shown a marked decline between 1990 and 2003, although 17 major outbreaks were reported in this region between 1999 and 2004 [24]. The decline in reported measles cases occurred despite enhancements in surveillance and has been attributed to improvements in routine measles vaccination- introduction of routine two-dose schedules throughout the region and supplemental immunisation activities (SIA) to reduce susceptibility among older children, adults and adolescents. According to the WHO and UNICEF [14], the major components of the comprehensive strategy for accelerated and sustained measles mortality reduction include: achievement of high routine vaccination coverage of at least 90% in every district and ensuring that all children receive a second opportunity for measles vaccination.

There is a need to review the current measles immunisation policy in the country. Routine vaccination at an earlier age, that is, before the age of 9 months should be considered. All children should also be given a second opportunity for measles vaccination to improve vaccine coverage and herd immunity against measles. Measles surveillance should be enhanced and preservation of vaccine potency should be made a priority.

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