

Impact of Expanded Programme on Immunization (EPI) on Rates and Trends in Admission of Neonatal Tetanus and Measles

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Summary

Oruamabo RS, Okoji GO and Igbagiri FP. **Impact of Expanded Programme on Immunization (EPI) on Rates and Trends in Admission of Neonatal Tetanus and Measles.** *Nigerian Journal of Paediatrics* 1994; 21: 52. Impact of the Expanded Programme on Immunization (EPI) on neonatal tetanus (NNT) and measles, two of the target diseases in the programme, was studied retrospectively, using the rates of and trends in admissions of these diseases. Trends in admission were determined, using the technique of analysis of time-series, four-point and eight-point moving averages for NNT and measles, respectively. During the five-year period covered by the study, more cases of NNT were admitted than measles ($P < 0.01$); similarly, mortality from NNT was higher ($P < 0.001$) than that from measles. There was a positive impact of EPI on the rates of admission of both diseases, as evident from the decrease in the rates, as well as by the decreasing trends in the admissions. The decreasing trend for measles started in 1984, about one year before the launching of the EPI in Port Harcourt, but this became more marked about two years after the launching. Regarding NNT, a sustained decreasing trend started about a year after the launching, having been preceded by a period of an increasing trend that appeared to be due to the generally low immunization coverage rates of between nine and 23 percent for measles, DPT and tetanus toxoid among the target population, comprising children from birth to one year and pregnant women.

Introduction

MORTALITY rate and the degree of physical and mental handicaps from vaccine-pre-

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ventable diseases remain high in the developing world.¹ During the period 1986/87 in countries with low under-five mortality rates (U5MR), the median immunization coverage rates of 12-month old children were BCG (90 percent), DPT (90 percent), OPV (90 percent) and measles (84 percent).² By

contrast, in those countries with very high U5MR, during the same period, the corresponding coverage rates were 46 percent, 27 percent, 28 percent and 33 percent of these diseases respectively.² Nigeria which belongs to the latter group of countries had, for the same 1986/87 period, rates for BCG (41 percent), DPT (20 percent), OPV (21 percent) and measles (31 percent), while only 12 percent of pregnant women received two doses of tetanus toxoid.² Expectedly, mortality from these diseases has remained high in the developing world with these low coverage rates. The above data from Nigeria, though derived mostly from hospital-based studies, indicated high morbidity and mortality from neonatal tetanus (NNT) and measles,³⁻⁶ tuberculosis, poliomyelitis and whooping cough.⁷⁻⁸

The aim of the expanded programme on immunization (EPI) is to provide immunization against the above diseases to all children in the world by the year 1990.⁹ In Nigeria, however, this programme aimed at achieving 80 percent coverage rate of immunization by 1990.¹⁰ In Rivers State, the programme was launched in February 1985, with the University of Port Harcourt Teaching Hospital (UPHTH) selected as base, it being a major referral centre for the entire state; the programme did not, however, take off at this centre until later in 1985. The aim of the present study was therefore, to assess the impact of the programme as reflected by the admission rates of NNT and measles into the UPHTH, these conditions being two of the target diseases in the EPI.

Materials and Methods

All the cases of NNT and measles that were admitted over a period of five years (January 1984 to December 1988) into the department of paediatrics, UPHTH, were

included in the study. The case-files of these patients were retrieved and information extracted from the files included age, sex and the outcome of the respective disease. The data were assembled according to the number of cases per quarter of each of the five-year period of the study. Using the technique of analysis of time-series,¹¹ four-point moving averages were obtained for tetanus and eight-point, for measles. These averages were then plotted on a time-scale, so as to determine the admission trends. For the immunization coverage status of the target population in the Rivers State, the coverage rates for the population from the beginning of the revised EPI in 1985, was obtained from the epidemiology unit, Ministry of Health. Where relevant, the results were analysed statistically, using the Chi-square test.

Results

There were 353 (203 males and 150 females) admissions for NNT and 263 (151 males and 112 females) cases of measles, over the five-year period ($X^2 = 9.5871$; $df = 4$, $P < 0.01$). Of these cases (353 for NNT and 263 for measles), 52 patients (39 cases of NNT and 13 of measles) were discharged against medical advice. Excluding these 52 patients, there were thus, 314 cases of NNT and 250 of measles. Mortality from NNT was 187 (59.6 percent) out of the 314 patients and from measles, it was 29 (11.6 percent) of the 250 cases ($X^2 = 135.4466$; $df = 1$, $P < 0.001$). The quarterly and yearly admissions of the 353 cases of NNT and 263 of measles are presented in Table 1.

During the first and second quarters of each of the five-year period, the number of NNT admissions was 39 (52.0 percent) of the 75 total admissions, 29 (44.0 percent) of 66 admissions, 41 (52.6 percent) of 78 admissions, 42 (67.7 percent) of 62 ad-

TABLE I

Quarterly and Yearly Admissions of 353 Cases of Neonatal Tetanus and 263 Cases of Measles.

Quarter	Year and Number of Cases									
	1984		1985		1986		1987		1988	
	NNT	Mea	NNT	Mea	NNT	Mea	NNT	Mea	NNT	Mea
1	22	21	15	18	21	36	18	10	20	3
2	17	35	14	20	20	9	24	19	22	17
3	20	5	26	8	22	4	8	18	21	9
4	16	11	11	6	15	7	12	5	99	2
Total	75	72	66	52	78	56	62	52	72	31

NNT = Neonatal Tetanus
Mea = Measles

missions and 42(58.3 percent) of the 72 total admissions, while that of measles admissions was 56(77.8 percent) out of the 72 total admissions, 38(73.1 percent) of the 52 admissions, 45(80.4 percent) of the 56 admissions, 29(55.8 percent) of 52 admissions and 20(64.5 percent) of 31 total admissions. The admission rates for NNT were thus, consistently lower than those for measles per year. It is evident that uniformly high admission rates for measles were in the first and second quarters per year. It should be noted that these quarters correspond to the peak of the dry season and the beginning of the rainy season in Port Harcourt.

Figures 1 and 2 illustrate the quarterly totals, moving averages and trends in admissions plotted on a time-scale for the two diseases, respectively. There was an unexplained decreasing trend (Fig 1) in the admission rate of NNT, throughout

TABLE II

Yearly, Total Numbers of All Admissions and those of NNT and Measles

Year	Total Number of Admissions	Number of NNT and Measles Admissions	
		NNT	Measles
1984	1548	75(4.8)	72(4.7)
1985	1323	66(5.0)	52(3.9)
1986	1291	78(6.0)	56(4.3)
1987	1340	62(4.6)	52(3.9)
1988	1387	72(5.2)	31(2.2)

NNT = Neonatal tetanus

Figures in parentheses represent percent of total admissions per year.

1984, as well as an increasing trend beginning from the first quarter of 1985 and ending about the second quarter of 1986. Thereafter, the trend was a decrease in the admission of NNT till the end of 1988. The trend for measles (Fig 2) shows a gradual decrease beginning from the last quarter of 1984. There were also two epidemics of the disease in 1984 and 1986, respectively, corresponding to the biennial outbreak pattern of measles. Unexpectedly, there was no epidemic in 1988. The annual total number of admissions and those of NNT and measles are presented in Table II. The total number of all admissions ranged between 1291 in 1986 and 1548 in 1984, while the number of admission for NNT ranged between 62(4.6 percent) of 1340 admissions in 1987 and 78(6.0 percent) of the 1291 admissions in 1986 and that of measles with a conspicuous decreasing trend, ranged between

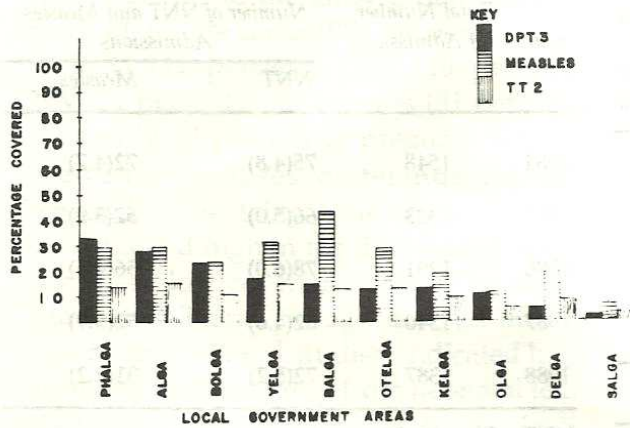


Fig 1: Quarterly totals, moving averages and trend in admission of neonatal Tetanus.

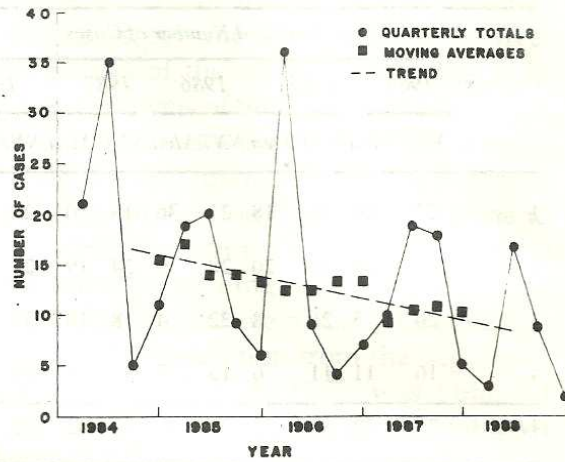


Fig 2: Quarterly totals, moving averages and trend in admission of Measles.

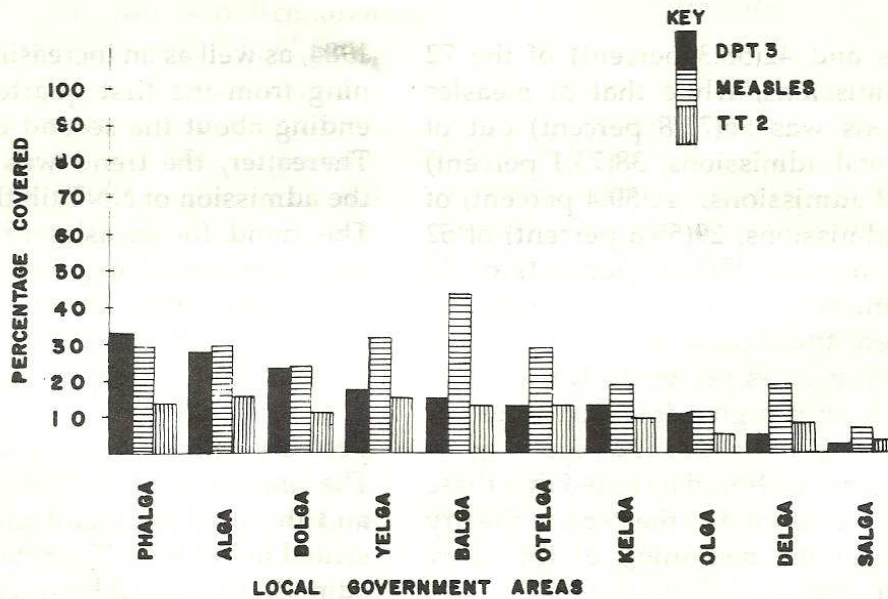


Fig 3: Immunization coverage among target population for each of 10 local government areas in Rivers State. PHALGA = Port Harcourt local government area; ALGA = Ahoda local government area; BOLGA = Bori local government area; YELGA = Yenoga local government area; BALGA = Brass local government area; OTELGA = Okrika Tai Eleme local government area; KELGA = Ikwerre Etche local government area; OLGA = Bonny local government area; DELGA = Degema local government area; SALGA = Sagbama local government area; DPT3 = Three doses of triple vaccine; TT₂ = Two doses of tetanus toxoid.

TABLE III

*Yearly Percent of the total Target Population⁺
Covered by DPT₃, Measles and TT₂ Vaccines

Vaccine	Year and Percent of Coverage				
	1985	1986	1987	1988	1989
DPT ₃	20	19	16	16	18
Measles	18	22	15	23	21
TT ₂	15	18	9	14	10

* Information (1985-89) supplied by the epidemiology unit, Ministry of Health, Rivers State.

+ Birth to 12 months and pregnant women
DPT₃ = Three doses of triple vaccine
TT₂ = Two doses of tetanus toxoid

31(2.2 percent) of 1387 total admissions in 1988 and 72(4.7 per cent) of 1548 total admissions in 1984.

The percent of the total target population, including children, aged between birth and 12 months and pregnant women, covered by three doses of the triple vaccine (DPT₃), measles and two doses of tetanus toxoid, is shown in Table III. The percent of the population covered remained at between 15 and 23 percent throughout the five-year period, except for tetanus toxoid given to pregnant women, which was low at nine, 14 and 10 percent for the years 1987 through 1989, respectively. Examination of the coverage for each of the 10 local government areas (Fig 3), showed that the predominantly riverine local government areas, namely: Sagbama Local Government Area (SALGA), Degema Local Government Area (DELGA), Bonny Local Government Area (OLGA) and Okrika Tai Eleme Local Government Area (OTELGA), had the lowest coverage rates

TABLE IV

Age Distribution of 263 Cases of Measles admitted in 1984, 1985 and January 1986 - December, 1988.

Age(months)	Year and Number of Patients		
	1984	1985	1986-88
≤ 6	3(4.2)	2(3.8)	4(2.9)
7 - 12	22(30.6)	24(46.2)	54(38.8)
13 - 18	22(30.6)	9(17.3)	21(15.1)
19 - 24	10(13.9)	6(11.5)	18(12.9)
≥ 25	15(20.8)	11(21.2)	42(30.2)
Total	72(100.0)	52(100.0)	139(100.0)

Figures in parentheses represent percent of total per year.

than the mainland areas comprising Port Harcourt Local Government Area (PHALGA), Ahoada Local Government Area (ALGA) and Bori Local Government Area (BOLGA).

The age distribution of the 263 children with measles for the years 1984, 1985 and January 1986 to December 1988, is shown in Table IV. Children, aged between seven and 24 months numbered 54(75.0 percent) out of the 72 measles patients in 1984, 39(75.0 percent) of the 52 cases in 1985, and 93 (66.9 percent) of the 139 patients in 1986-88. The reduction in the number of patients with measles, aged between seven months and two years over the period 1984 and January 1986 to December 1988 was evident. By contrast, there was an increase in the number of patients, aged above two years over the same period ($X^2 = 2.1177$; $df 1$, $P > 0.10$).

Discussion

Rates of admission for the two diseases were higher in the first quarters of each of the five-year period, than the next two quarters though this difference was more marked with measles than NNT. Furthermore, the rates for NNT were consistently lower than those for measles for each of the five-year period. This pattern of admission for the two diseases was highlighted in two previous reports from this hospital,^{4 6} and is due partly to the seasonal variations existing in the area; the first two quarters of each year corresponded to the peak of the dry season and the beginning of the rainy season in Port Harcourt. The magnitude of the problem as reflected by the number of cases of the two diseases admitted and mortality from, particularly NNT, during the five-year period covered by the study, underscores the seriousness of the two diseases and the need for implementing intervention measures.

There was a positive impact of EPI on the rates of admission of both diseases as evident from the decrease in the rates, as well as by the decreasing trends in the admissions. The admission rate for NNT started declining from January 1984 followed by an increasing trend from the first quarter of 1985 which was sustained to the third quarter of 1986 and followed by a second decreasing trend. The initial increase in the admission rate of NNT could be explained by the awareness of the seriousness of this disease following the wide publicity given to the launching of the EPI. However, the rather slow decline in the admission rates of neonatal tetanus probably points to the fact that few pregnant women received the two doses of tetanus toxoid. According to information that was obtained from the Epide-

miology Unit of the Rivers State Ministry of Health, the proportion of pregnant women covered by two doses of tetanus was rather low, ranging from nine to 18 percent.¹² However, the lowest figure of nine percent was recorded in 1987, two years into the launching of the revised EPI and in 1989 the figure was 10 percent. Furthermore, the lowest coverage rates were in the predominantly riverine Local Government Areas of Sagbama, Degema and Bonny. The reasons for these findings are not clear, but possibly were due to the particularly difficult geographical terrain of the state in general and the riverine local government areas in particular, rendering some sections of the state inaccessible.

There was a sustained decline in the admission rate of measles during the period of the study. The sustained reduction in admission rates of measles was indeed a positive impact of the EPI on the population. In support of this observation on the impact, a coverage of 50 percent was recorded in one of the local government areas. It is worth noting that the age distribution of the children with measles for the years 1984, 1985 and January 1986 to December 1988 showed an increase in the number of admission of children aged above two years, while showing a decrease in the number of those between seven and 24 months. The trend reveals a gradual increase in the age of measles cases admitted into this hospital. The immunization coverage rates of children, aged between nine months and three years attending the out-patient clinic at the UPHTH increased from 4.8 percent in 1984 to 42.9 percent in 1986.¹³ Coverage rate of 80 percent aimed at by the Federal Government by 1990¹⁰ will be achieved before an appreciable drop in the proportion of very young children suffering from measles occurs. For instance, the reported coverage

rates in 1987 for USSR, Sweden, Netherlands and the United States of America where measles is rare under the age of five years, were 95, 94, 96 and 82 percent respectively.

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