

OUTCOME OF A MULTI-STATE MEASLES CAMPAIGN COVERAGE IN SOUTH-EAST, NIGERIA

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ABSTRACT

BACKGROUND: Nigeria, a signatory to the Global Vaccine Action Plan 2012–2020 has been conducting measles campaigns biannually as a key strategy for reaching measles elimination goal by the year 2020.

OBJECTIVE: This 2017/18 post measles campaign coverage survey was carried out in South-Eastern Nigeria to determine the coverage of measles vaccination in the region.

METHODS: Data was obtained from the 2018 post measles campaign coverage survey report involving households and children aged between 9-59 months in 30 enumeration areas in each of the 5 states in South-Eastern Nigeria. A WHO EPI survey instrument was used for data collection. Data was analysed using Stata version 14.

RESULTS: A total of 1,161 (81.6%) of children in the region had received measles vaccine before the campaign. State-level coverage before the campaign ranged between 71.9% - 90.4%. During the campaign, only Anambra state (95.7%) had coverage above 95% target. Abia state (11.3%) had the highest proportion of respondents uninformed about the campaign. Majority of the respondents obtained information about the campaign from community health workers (33.6%), none from the internet.

CONCLUSION: Survey results highlight measles vaccine coverage gaps in South-East Nigeria. In order to achieve the 95% proposed measles vaccination coverage in this region, routine immunization and supplementary immunization activities should be intensified.

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INTRODUCTION

Vaccination remains one of the most cost-effective healthcare interventions in health globally resulting in remarkable improvements in health and life expectancy. This health intervention reduces morbidity and mortality associated with infectious diseases not just in low-income countries, but also in high-income countries and is regarded as one of the greatest public health achievements of the 20th century.¹ Globally, over two million deaths are averted annually through vaccination.²

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Measles, a ribonucleic acid (RNA) viral disease, is one of the highly infectious diseases known to man. It is endemic throughout the world and epidemics occur in seasons. Despite being a vaccine preventable disease, measles still pose as a major public health challenge in many developing countries being a major cause of childhood morbidity and mortality due to underlying malnutrition and overcrowding.³ Case fatality rates from measles, commoner in children below 5 years of age, vary from 0.1% in the developed world to 15% in the less developed world.⁴ Lifelong disabilities including blindness, brain damage and deafness, have been reported following measles infection.³ Death results following pneumonia, diarrhea, encephalitis, otitis

media, corneal ulceration and myocarditis.⁵

Prevention of measles by vaccination is still the most important measles control and elimination strategy. WHO recommends 2 doses of measles vaccine, either alone or with other measles-containing vaccine, as the standard for all national immunization programmes.⁶ Supplementary immunization activities (SIA) aimed at reaching children missed by routine immunization activities regardless of prior vaccination status are conducted on a regular basis, to achieve and maintain high population immunity. In Nigeria, the Expanded Programme on Immunization (EPI) was launched in 1978 with the aim of providing routine immunization (RI) against childhood killer diseases in children less than 1 year.⁷ By year 1997, National Programme on Immunization Agency was established as a parastatal of the Federal Ministry of Health.⁷ In addition to routine immunization, SIAs are conducted biennially and during outbreaks in the country as a key strategy to reach measles elimination goal of 1 case per 1,000,000 populations by 2020.⁸

Though population immunity of 92% – 95% is considered necessary to stop measles transmission in younger infants through herd immunity, global measles coverage still remains at about 85%.^{6,9} Nigeria accounts for the highest burden of measles globally with 3.3 million unimmunized children despite availability of safe and effective vaccines.¹⁰ According to the latest **Immunization Coverage Survey report of the Nigeria Demographic Health Survey (NDHS), only 42% of children aged 12 to 23 months received measles vaccination based on vaccination cards and mothers report.**¹¹

In order to achieve the health-related

Sustainable Development Goals and targets, programmes to eliminate measles remain an important contributor.¹² In order to ensure that gains in measles control are sustained, a post-measles coverage survey is carried out across each geo-political zone 2 weeks after the measles campaign. The focus of this survey is to reach populations unreached by vaccination programmes and, in addition, regions that require further strengthening. This will provide a guide for decision-makers in making programmatic and strategic decisions.

Materials and Methods

Nigeria made up of 36 states with its federal capital in Abuja is divided into six geo-political zones. The South-East zone with a population of **16,381,729 people based on the 2006 national population census,¹³ lies within a total area of 28,987 kilometer square.**¹⁴ States in the South-East geo-political zone include; Abia, Anambra, Ebonyi, Enugu and Imo. **The inhabitants are mostly of Igbo ethnic nationality and are predominantly Christians.**

Though centrally managed by the National Primary Health Care Development Agency (NPHCDA) of the Federal Ministry of Health, vaccination services are organized and implemented at sub national levels, including states and Local Government Areas (LGAs). Parents and caregivers of all children aged between 9 month and 59 months in the selected households were eligible to participate in the survey.

Data was collected from the South-East 2017/18 Post Measles Campaign Coverage Survey (PMCCS) report. The survey was performed using a stratified two stage – cluster sampling design. The list of enumeration areas (EAs) prepared for the 2006 Population Census of the Federal Republic of Nigeria, as provided by the National Population Commission was used

as the sampling frame.¹³ A total of 30 enumeration areas were selected from the master sampling frame for each state. Following first stage sampling, a complete listing of households and a mapping exercise were carried out for each selected EAs to identify households with children aged between 9 and 59 months eligible for second stage selection. In the second stage, selection of households to be interviewed was conducted by the National Bureau of Statistics using simple random sampling technique. Seven (7) households with eligible children were randomly selected from each of the 30 enumeration areas in every state making a total of 210 households per state. All households selected were occupied, hence participated in the study. Design weights were computed as the product of inverse probabilities of selection in the first and second stage followed by adjustment for household non-response and child non-response to get the sampling weights for households and for children, respectively. This is done to ensure that all subpopulations are equally represented.

Data collection for states in South East zone was conducted from 14th – 26th April 2018. Data collection was conducted by 5 teams in each state with each team comprising of a supervisor and two trained enumerators. Training focused on the survey guidelines, identification of sampled EAs and eligible households, determination of whether an eligible child had been vaccinated, ethics and informed consent, electronic data capture and transmission, and conducting quality control checks. AWHO EPI survey instrument was used to collect data for this study. Information on vaccination coverage was collected in three ways; from vaccination cards shown to the interviewer, from mothers' verbal report/recall and from finger marks on children. Additionally, reasons for non-vaccination through RI services and sources of

information were also collected. Questions were in English language but interviewers were trained to verbally translate the questions to the respondents in *Igbo* Language (the local dialect) when necessary.

Data entering was done using Census and Survey Program (CSPRO) software. Data cleaning and analysis was conducted using the SIA module of Vaccination Coverage Quality Indicators (VCQI) software running on Stata version 14 (StataCorp. 2015. *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.).

RESULTS

This presentation of measles vaccination coverage information focuses on the age group 9 to 59 months who were the target age group for the measles campaign. Additionally, the source of information on vaccination and reasons for non-vaccination has been presented. A total of 821 households and 1161 children aged 9 to 56 months participated in the survey. Table 1 shows the household response rate of selected and interviewed households. The overall response rate in South East was 91.1%. Notably, the household response rates Abia and Ebonyi were below 90%.

Table 1: Households, number of interviews, and response rates, according to their residence

State	Household response rate (%)	Households selected	Households interviewed
Abia	89.8	186	167
Anambra	95.0	179	170
Ebonyi	85.6	202	173
Enugu	94.5	163	154
Imo	91.8	171	157
South East	91.1	901	821

Household response rate = sum of weighted households interviewed / sum of weighted selected households

table 2 presents the number of children interviewed. Measles vaccination was administered to all children aged 9 months to 59 months who were present during the period of the measles campaign. The percentage of eligible children present during the campaign range from 85.6% in Ebonyi to 95.0% in Anambra.

Table 2: Eligible children 9 to 59 months interviewed.

State	Eligible children response rate (%)*	Number of eligible children aged 9 to 59 months	Number of children aged 9 to 59 months interviewed (weighted)
Abia	89.8	222	367,055
Anambra	95.0	259	1,156,308
Ebonyi	85.6	244	648,529
Enugu	94.5	221	533,474
Imo	91.8	215	1,109,637

*Eligible children response rate=Respondents interviewed/eligible respondents

Table 3 shows proportion of children who received measles vaccination before the 2017-2018 measles campaign. Approximately 82% of all respondents had received measles vaccine before the campaign from either recall or evidence from vaccination cards. Abia state had the least proportion of children who had been vaccinated against measles before the campaign at 71.9% while Anambra state at 90.4% had the highest proportion. Majority of the respondents (61.0%) reported that they had received measles vaccine before the campaign from recall.

Table 3: Proportion of children aged 9 to 59 months who had received measles vaccine before the campaign.

State	Measles vaccination status before the campaign				Received measles vaccine before campaign ¹			
	Yes, date on card (%)	Yes, Recall/History (%)	N	Weighted	Yes, by card or recall (%)	95% CI* (%)	N	Weighted
Abia	16.1	55.7	22.3	5.9	71.9	(57.3, 83.0)	222	367,055
Anambra	18.0	72.4	7.5	2.1	90.4	(77.7, 96.2)	259	1,156,308
Ebonyi	22.1	51.7	22.4	3.7	73.8	(61.0, 83.6)	244	648,529
Enugu	19.7	68.0	9.6	2.7	87.7	(80.6, 92.4)	221	533,474
Imo	26.8	57.0	12.2	4.0	83.8	(75.4, 89.7)	215	1,109,637
South-East	20.6	61.0	14.8	3.6	81.6	(76.9, 85.5)	1,161	3,815,003

¹=Proportion of children who had received measles vaccine before the campaign from other sources such as routine immunization *CI=Confidence Interval

Table 4 shows the proportion of children aged 9 months to 59 months who received measles vaccine during the measles campaign. Of all respondents' 48.3% had card to show they had received measles vaccine before the campaign while only 21.2% had evidence (finger mark). Among the states, Anambra state had the highest proportion of children aged between 9 and 59 months who received measles vaccine during the campaign at 95.7% while Abia state had the lowest proportion at 85.7%. Only Anambra state achieved more than the target 95% coverage during the campaign while Ebonyi and Enugu were between 90 – 95%.

Table 4: Proportion of children aged 9 months to 59 months who received measles vaccine during the measles campaign.

	Vaccinated during SIA, by card (%)	Vaccinated during SIA, by recall (%)	Vaccinated during SIA, by finger mark (%)	Vaccinated during SIA (card or recall or finger mark)		N	Weighted N
	(%)	(%)	(%)	(%)	95% CI		
Abia	34.5	51.3	14.4	85.7	(77.6, 91.2)	222	367,055
Anambra	48.4	47.3	29.4	95.7	(90.6, 98.1)	259	1,156,308
Ebonyi	57.2	35.1	22.1	92.3	(85.2, 96.2)	244	648,529
Enugu	44.1	46.5	36.7	90.5	(81.4, 95.4)	221	533,474
Imo	57.5	30.4	3.3	87.9	(74.8, 94.7)	215	1,109,637
South East	48.3	42.1	21.2	90.4	(87.1, 93.2)	1,161	3,815,003

Abbreviations: CI=Confidence Interval

The results in this table are from weighted analysis and the CI calculation considers the sampling design & weights

Table 5 presents the primary sources of information about the measles campaign. Majority of the respondents obtained information about the campaign from community health workers (26.9%), town criers (19.1%) and religious leaders (16.8%). None of the respondents reported having received information about the campaign from the internet. While none of the respondents in Enugu was uninformed about the campaign, 11.3% of respondents in Abia state were uninformed about the campaign.

Table 5: Primary sources of information about the measles campaign

Sources of information (%)	States					Zone
	Abia	Anambra	Ebonyi	Enugu	Imo	South East
	N=222	N=259	N=244	N=221	N=215	
Radio	5.9	7.7	9.8	5.0	4.7	6.6
Television	0.5	0.0	0.0	1.8	0.0	0.5
Internet	0.0	0.0	0.0	0.0	0.0	0.0
Town criers	13.5	28.2	17.2	12.7	23.7	19.1
Community health workers	25.2	33.6	21.7	33.0	20.9	26.9
School	14.4	15.8	5.7	3.6	16.3	11.2
Family	0.0	1.9	1.2	1.4	2.8	1.5
Neighbour or friend	3.2	3.5	1.2	5.4	1.9	3.0
Village Chief	0.0	0.0	0.0	0.0	4.7	0.9
Religious leader	16.2	5.8	23.8	32.6	5.6	16.8
Community mobilizer	9.5	1.2	18.0	4.5	15.3	9.7
Not informed	11.3	2.3	1.2	0.0	4.2	3.8
Others	0.5	0.0	0.0	0.0	0.0	0.1

Note: This measure is an unweighted summary of proportions from the survey sample. Denominator (N) is the total number of respondents per state.

parents or primary caregivers of children who were not vaccinated were asked to provide the main (single) reason why the

child who had not been vaccinated did not receive measles vaccination during the 2017-2018 measles campaign.

Table 6: Main reasons for non-vaccination

Reasons for Non-vaccination (%)	State					Zone
	Abia	Anambra	Ebonyi	Enugu	Imo	South East
	N=30	N=13	N=18	N=22	N=22	N = 105
Did not Know about the campaign	20.0	30.8	11.1	0.0	13.6	15.1
Confused with other vaccines (believes that the child has already been vaccinated)	3.3	0.0	0.0	13.6	9.1	5.2

Subject or parent or guardian were missing	3.3	0.0	5.6	0.0	4.5	2.7
Fear of injection	3.3	0.0	0.0	0.0	13.6	3.4
Lack of confidence in vaccine	10.0	15.4	22.2	27.3	4.5	15.9
Fear of side effects	0.0	0.0	0.0	9.1	4.5	2.7
The site of vaccination not known	3.3	0.0	0.0	9.1	0.0	2.5
The site of vaccination too far	6.7	0.0	0.0	0.0	0.0	1.3
Time of vaccination unsuitable	6.7	0.0	0.0	4.5	9.1	4.1
Waited too long at vaccination centres	0.0	0.0	0.0	0.0	0.0	0.0
Missing vaccinator at the site	0.0	0.0	11.1	9.1	18.2	7.7
Not authorized by the head of the household	3.3	0.0	11.1	0.0	0.0	2.9
Religious beliefs	0.0	0.0	0.0	0.0	4.5	0.9
Sick at time of vaccination	10.0	7.7	0.0	9.1	9.1	7.2
Absent during time of the campaign	10.0	23.1	16.7	18.2	4.5	14.5
Too busy to take the child	3.3	0.0	0.0	0.0	0.0	0.7
Child ill	3.3	0.0	5.6	0.0	0.0	1.8
Mother ill	6.7	0.0	0.0	0.0	4.5	2.2
The child already received measles vaccine	0.0	23.1	5.6	0.0	0.0	5.7
Others	6.7	0.0	11.1	0.0	0.0	4.7

Note: This measure is an unweighted summary of proportions from the survey sample.
Denominator (N) is the number of unvaccinated children per state

Tables 6 provide reasons for non-vaccination. Majority of parents or primary caregivers of children who were not vaccinated reported that either they have no confidence in the vaccine (15.2%) or that they were not aware of the measles campaign (14.3%). Anambra and Abia states had the highest proportion of respondents reporting that they were not aware of the campaign at 30.8% and 20.0% respectively while Imo state (4.5%) was the only state to cite religious belief as a reason for non-vaccination. None of the respondents reported not to have received vaccination due to long waiting time at vaccination centres.

DISCUSSION

This survey highlights close range of measles vaccination coverage both before (71.9% - 90.4%) and after the measles campaign (85.7% - 95.7%) in the South-East zone. During the campaign, only Anambra state (95.7%) had measles vaccination coverage above the 95% target coverage. Conversely, Abia state, the state with the least coverage, is of particular concern as there has not been steady progression in measles vaccination coverage unlike in other states in the South-East zone. According to the NPC report,¹¹ a decline in measles vaccination was reported in Abia state over the years; 81.6% in 2007 to 52.2% in 2011, with increase to 73.1% in 2013, while

findings from another report revealed a slight decline to 71.9%.¹⁵ This instability in measles coverage invariably denotes low vaccination coverage and probably weak health system in this state as measles vaccination program is considered the 'canary in the coal mine' or an indicator for the quality of the overall immunization program and their vaccination coverage considered as primary indicators of immunization program performance.⁸ The weak environmental infrastructure such as poor water supply, food scarcity, poor housing and sanitary conditions reported in Abia state indicates a direct correlation between health service delivery and socio-economic factors.¹⁵

Major progress in measles vaccine coverage has been made in the last decade in the country. Based on 2013 NDHS report, there has been a sustained increase in measles coverage among children aged 12-23 months in 2003 (35.9%) through 2008 (41.4%) to 2013 (42.1%).¹¹ However, there remains wide variation among the geopolitical zones; South-East had the second best measles coverage of 72.2% after South-South at 74.0%.¹¹ This is considerably lower than 81.6% measles vaccine coverage recorded before the vaccination campaign and 90.4% recorded during the campaign in this survey. This difference could be attributed to the difference in the age range of children who participated in both surveys; NDHS having occurred among children aged 12 – 23 months against 9 – 59 months in the present PMCCS. If this progress in measles coverage is sustained in this zone, the Global Vaccine Action Plan adopted at the 2012 World Health Assembly with the mission of immensely plummeting vaccine-preventable deaths and increasing vaccination coverage to 95% by 2020 and its elimination in at least five WHO regions by 2020 appears attainable.^{8,16}

Social mobilization activities are an

important component of any campaign as they serve to inform the community of an upcoming measles campaign and also gain acceptance to the campaign. During the 2017-2018 measles campaign, various communication media were used to inform and mobilize the community prior to the campaign. Use of community health workers were identified as the main source of information in this survey. However, additional efforts should be made by community health workers to reach the caregivers in their homes as studies in Borno, Northern Nigeria and Kenya reported better outcome when community health workers embark on house-to-house social mobilization instead of merely educating the caregivers at the health facilities.^{9,17} Contrary finding was made in Northern Nigeria where the main source of information about RI services (43%) was through the town crier or announcer.¹⁸ However, findings Northern Nigeria exercise reveals that area of residence determines the sensitization program recommended.¹⁷ The house-to-house vaccination campaign and traditional sensitization program should target the rural areas characterized by high level of illiteracy, uneven spread of health facilities, poor electronic and print media coverage while electronic and print media are recommended for urban dwellers due to their high level of literacy.¹⁷

The commonest reasons given for non-vaccination in this zone were lack of confidence in the vaccine and lack of knowledge about the campaign. Similar reports were made in Northern Nigeria where the commonest reported reasons for non-vaccination included lack of knowledge about vaccines and vaccination services (50%) and factors related to access to RI services (15%).¹⁸ In the South-South region of Nigeria, harmful rumours about childhood immunization resulted in

caregivers losing confidence in the vaccine thereby deterring them from vaccinating their wards.¹⁹ These rumours were spread through the mass media and affected urban respondents more than their rural counterparts. Similarly, findings from a policy simulation study of two measles immunization programs for children aged 9-23 months in Borno state, Northern Nigeria, reveals that provision of free immunization against measles complemented with media awareness campaign is more effective and beneficial than free immunization complemented with house to house visitation.¹⁷ Other possibilities for this reported lack of confidence could be adverse effects seldom observed by caregivers after vaccination, poor information dissemination technique by the health workers or socio-cultural factors. These points to the need for targeted social mobilization strategies aimed at improving caregivers' literacy and knowledge about the benefits of vaccination. Caregivers need to understand the risk of contracting measles, benefits of receiving the vaccination and potential risks of vaccine failure. Knowledge about the safety and significance of vaccines have been identified as the most important types of information needed to help mothers/caregivers decide to vaccinate their children.¹⁸

CONCLUSION

Survey results highlighted measles vaccine coverage gaps in South-East Nigeria. In order to achieve the WHO measles elimination agenda for 2020, importance of the ongoing immunization services should be intensified. Programmatically-oriented operations research should be used to determine how best to interrupt measles transmission. Such operations research should include the heightening of surveillance systems and the development of social mobilization strategies using the

most effective means of communication to achieve optimal uptake of vaccination in targeted populations. In addition, technologically-oriented research *innovations like the micro needle patch can be considered for patients who have phobia for hypodermic needles.*

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REFERENCES

1. Bärnighausen T, Bloom DE, Cafiero-Fonseca ET, O'Brien JC. Valuing vaccination. *PNAS*. 2014; 111(34):12313-12319.
2. Ophori EA, Tula MY, Azih AV, Okojie R, Ikpo PE. Current Trends of Immunization in Nigeria: Prospect and Challenges. *Tropical Medicine and Health*. 2014; 42(2): 67-75.
3. Rabia M, Naemullah S, Shabbir A, Kamran S. Measles - Immunization Status and Outcome. *Journal of Rawalpindi Medical College*. 2014; 18(2):205-208.
4. Strebel PM, Papania MJ, Fiebelkorn AP, Halsey NA. Measles vaccine. In *Vaccines: Sixth Edition*. Elsevier

- Inc.2012;. 352-387.
5. World Health Organization. African Region. African Regional guidelines for measles and rubella surveillance- Draft version April 2015.
 6. World Health Organization (WHO) Department of Immunization, Vaccines and Biologicals. **Vaccines and Diseases: Measles**. Geneva, Switzerland 2018.
 7. Obionu CN. 2016. *Primary Health Care for developing countries*. 3rd edn, Ezu Books Limited, Enugu, pp. 45-47.
 8. Measles and Rubella Global Strategic Plan 2012-2020 Midterm Review. Measles Rubella Midterm Review Report. 2017.
 9. Manakongtreecheep K, Davis R. A review of measles control in Kenya, with focus on recent innovations. *The Pan African Medical Journal*, 2017; 27(supp.3):15.
 10. World Health Organisation. African Region. WHO News: As Nigerian government Flags-off 2017/2018 Measles Vaccination Campaign, Kaduna state Governor's children get vaccinated against measles disease. Assessed on: 9/17/2018. Available at: <https://afro.who.int/news/nigeria-n-government-flags-20172018-measles-vaccination-campaign-kaduna-state-governors>
 11. National Population Commission (NPC) [Nigeria] and ICF International. 2014. Nigeria Demographic and Health Survey 2013. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.
 12. United Nations. Sustainable development knowledge goals - Transforming our world- the 2030 agenda for sustainable development. SDG Report 2018.
 13. Federal Republic of Nigeria. Official Gazette. Lagos, Nigeria: National Population Commission; 2007.
 14. National Bureau of Statistics. Federal Republic of Nigeria. Annual Abstract of Statistics 2012.
 15. **Umeh CA, Ahaneku HP. *The impact of declining vaccination coverage on measles control: a case study of Abia state Nigeria*. *The Pan African Medical Journal*. 2013; 15:105. doi:10.11604/pamj.2013.15.105.2515.**
 16. World Health Assembly. **Global Vaccine Action Plan 2011-2020**. Geneva, Switzerland: World Health Organization, 2012.
 17. Uneze EF, Akongwale S, Tajudeen I. "Policy Simulation of Measles Immunization Programs for Children in Borno State, Nigeria", a research report prepared for the Global Development Network (GDN) under the Strengthening Institutions to Improve Public Expenditure Accountability Project. 2012
 18. *Gunnala R, Ogbuanu IU, Adegoke OJ, Scobie HM, Uba BV, Wannemuehler KA, et al. Routine Vaccination Coverage in Northern Nigeria: Results from 40 District-Level Cluster Surveys, 2014-2015. PLoS One. 2016; 11(12): e0167835.*
 19. *Itimi K, Dienye PO, Ordinioha B. Community participation and childhood immunization coverage: A comparative study of rural and urban communities of Bayelsa State, south-south Nigeria. Nigeria Medical Journal. 2012; 53(1): 21-25.*