Vitamin A supplementation coverage: results from nine states in Nigeria

Background

Vitamin A is a fat-soluble compound that plays a fundamental role in numerous physiological functions including vision, immunity, red blood cell production, and growth.[1] Though the global prevalence of vitamin A deficiency (VAD) in children under the age of 5 years has declined over the past two decades, little progress has been achieved in sub-Saharan Africa, where the deficiency still affects approximately 48% of young children.[2] Since 2000, vitamin A supplementation (VAS) programmes have been scaled up as a public health strategy to protect millions of children from the devastating consequences of VAD.[1,2] The World Health Organization (WHO) recommends that children aged 6 – 59 months should receive VAS every four to six months.[2]

In Nigeria, VAD remains a significant public health burden, affecting over 20% of preschool-aged children.[3] Available evidence indicates that VAS coverage among children aged 6-59 months in Nigeria is below the WHO's recommended target of 90%.[3,4] Data from to the 2018 Nigerian National Nutrition and Health Survey showed that only 41% of children aged 6 – 59 months received VAS in the six months prior to the survey, with notable variations across states.[5] This analysis aims to generate estimates of VAS coverage across nine states in Nigeria, which can support ongoing efforts to track progress and inform further efforts to accelerate progress towards optimising VAS coverage among the eligible population of children across the country.

Methods

Setting

Data for this analysis were collected as part of routine household surveys conducted to assess coverage and quality of seasonal malaria chemoprevention (SMC) programmes implemented across SMC-eligible states in Nigeria. In particular, data were collected in the post-cycle surveys following the August 2023 SMC monthly cycle. The following states are represented in the data: Bauchi, Bornu, Kebbi, Kogi, Nasarawa, Oyo, Plateau, Sokoto and the Federal Capital Territory (FCT).

Survey design

End-of-cycle (EoC) surveys within Malaria Consortium's SMC programme employ the lot quality assurance sampling (LQAS) methodology, described in greater detail elsewhere.[6] In brief, EoC surveys employ a multi-stage sampling process in each SMC-implementing state. SMC areas within each state are divided into local administrative units called lots or supervision areas (SAs) typically based on household clusters

or communities within a health facility catchment area. SAs are selected as primary sampling units and included in the survey sampling frame with probability proportional to population size. That way, samples of each state could be considered representative and self-weighted, on the assumption that health facility catchment areas are of similar population size. Twenty-five households with at least one SMC age-eligible child (aged 3 – 59 months) are sampled in each selected SA. At the household level, survey questionnaires are administered by trained data collectors to primary caregivers of SMC age-eligible children.

Data collection

For the purposes of VAS coverage estimation, additional VAS-specific questions were included in the standard EoC survey questionnaire, and those questions were restricted to caregivers of children aged 6 to 59 months in line with the globally recommended VAS age-eligibility criterion.[2] VAS questions covered aspects of receipt of VAS at any time in the past six months, timing of VAS received and source or place where VAS was received. Questions were framed in line with standard VAS coverage data collection methods.[2] Survey questions were administered electronically using SurveyCTO. To clarify VAS receipt questions and validate responses, each data collector had a photo of a vitamin A capsule, which was shown to survey respondents.

Data analysis

Once data collection was completed, data were exported, processed and analysed using Stata (version 16). VAS coverage and related indicators were calculated using the proportion command, with 95 percent confidence intervals (95% CIs) calculated using a logit transform in Stata. All indicators were expressed as percentages at the state level. As primary sampling units (supervision areas) were selected in each state with probability proportional to population size, state-level estimates are considered self-weighted and representative at that level.

Results

Data from a total of 36,250 caregivers of children aged 6 – 59 months across the nine participating states were included in the analytic sample (Table 1).

Child and caregiver characteristics

Table 1 summarises the distribution of child (age group and sex) and caregiver (age and gender) characteristics. There was balance in terms of the distribution of child sex, whereas caregivers across states were predominantly female and were typically aged between 20 – 39 years.

Table 1: Distribution of child and caregiver characteristics by state

State	Bauchi	Borno	FCT	Kebbi	Kogi	Nasarawa	Oyo	Plateau	Sokoto
Demographic characteristics of children									
Gender									
Female	3,396(50%)	1,927(50%)	637(48%)	2,603(52%)	2,423(48%)	1,573(49%)	691(52%)	2,332(50%)	2,590(51%)
Male	3,423(50%)	1,893(50%)	704(52%)	2,366(48%)	2,600(52%)	1,640(51%)	650(48%)	2,293(50%)	2,509(49%)
Age									
6-11 months	637(9%)	366(10%)	132(10%)	488(10%)	477(9%)	277(9%)	130(10%)	499(11%)	448(9%)
12-23 months	976(14%)	603(16%)	239(18%)	876(18%)	883(18%)	549(17%)	215(16%)	800(17%)	799(16%)
24-35 months	1,596(23%)	919(24%)	284(21%)	1,163(23%)	1,190(24%)	765(24%)	267(20%)	1,039(22%)	1,266(25%)
36-47 months	1,735(25%)	953(25%)	327(24%)	1,224(25%)	1,196(24%)	779(24%)	317(24%)	1,071(23%)	1,333(26%)
48-59 months	1,875(27%)	979(26%)	359(27%)	1,218(25%)	1,277(25%)	843(26%)	412(31%)	1,216(26%)	1,253(25%)
Demographic characteristics of caregivers									
Gender									
Female	6,516(96%)	2,915(76%)	1,149(86%)	4,340(87%)	4,347(87%)	2,688(84%)	1,235(92%)	3,941(85%)	4,272(84%)
Male	303(4%)	905(24%)	192(14%)	629(13%)	676(13%)	525(16%)	106(8%)	684(15%)	827(16%)
Age									
Under 20 years	539(8%)	303(8%)	101(8%)	303(6%)	185(4%)	106(3%)	6(0%)	249(5%)	625(12%)
20–29 years	2,979(44%)	1,475(39%)	544(41%)	2,248(45%)	1,979(39%)	1,360(42%)	481(36%)	1,887(41%)	2,172(43%)
30–39 years	2,456(36%)	1,430(37%)	546(41%)	2,082(42%)	2,061(41%)	1,358(42%)	596(44%)	1,691(37%)	1,804(35%)
40–49 years	666(10%)	483(13%)	124(9%)	302(6%)	575(11%)	301(9%)	190(14%)	592(13%)	419(8%)
50–59 years	145(2%)	109(3%)	15(1%)	28(1%)	159(3%)	66(2%)	60(4%)	133(3%)	64(1%)
60 or more years	34(0%)	20(1%)	11(1%)	6(0%)	64(1%)	22(1%)	8(1%)	73(2%)	15(0%)
Total	6,819	3,820	1,341	4,969	5,023	3,213	1,341	4,625	5,099

Percentage of children who received VAS in the six months preceding the survey

Percentages of eligible children aged 6 – 59 months who received a dose of vitamin A in the six months prior to the survey varied across states, ranging from 43.5% (95%CI:42.2-44.9) in Sokoto to 63.2% (95%CI: 61.6-64.9) in Nasarawa (**Table 2**).

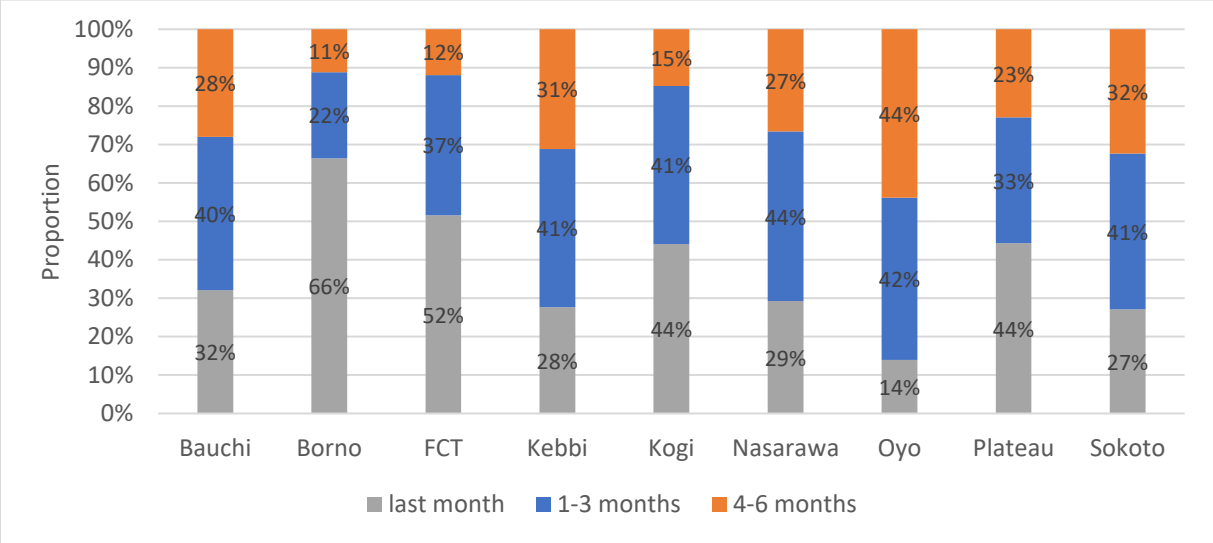
Table 2. Proportion of children who received VAS during the six months preceding the survey by state.

State	No. of children sampled	Received VAS	Proportion	95%CI
Bauchi	6,819	2,988	43.8	42.6-45.0
Borno	3,820	2,110	55.2	53.7-56.8
FCT	1,341	789	58.8	56.2-61.5
Kebbi	4,969	2,206	44.4	43.0-45.8
Kogi	5,023	3,026	60.2	58.9-61.6
Nasarawa	3,213	2,032	63.2	61.6-64.9
Oyo	1,341	816	60.9	58.2-63.5
Plateau	4,625	2,569	55.5	54.1-57.0
Sokoto	5,099	2,220	43.5	42.2-44.9

Timing of receipt of VAS in the past six months

Caregivers of children who reported receipt of VAS during the six months preceding the survey were asked to select one of three categories that best described how recently children received VAS (last month, 1-3 months and 4-6 months). Responses varied widely across states, probably reflecting differences in timing of VAS campaigns (**Figure 1**). Overall, the majority of reported receipt of VAS occurred within the last 1-3 months, with Borno state having the highest proportion (66.4%, 95%CI: 64.4-68.4) of more recent (1-3 months) receipt of VAS, while Oyo had the highest proportion (43.9%, 95%CI: 40.5-47.3) of receipt of VAS in the 4-6 months preceding the survey.

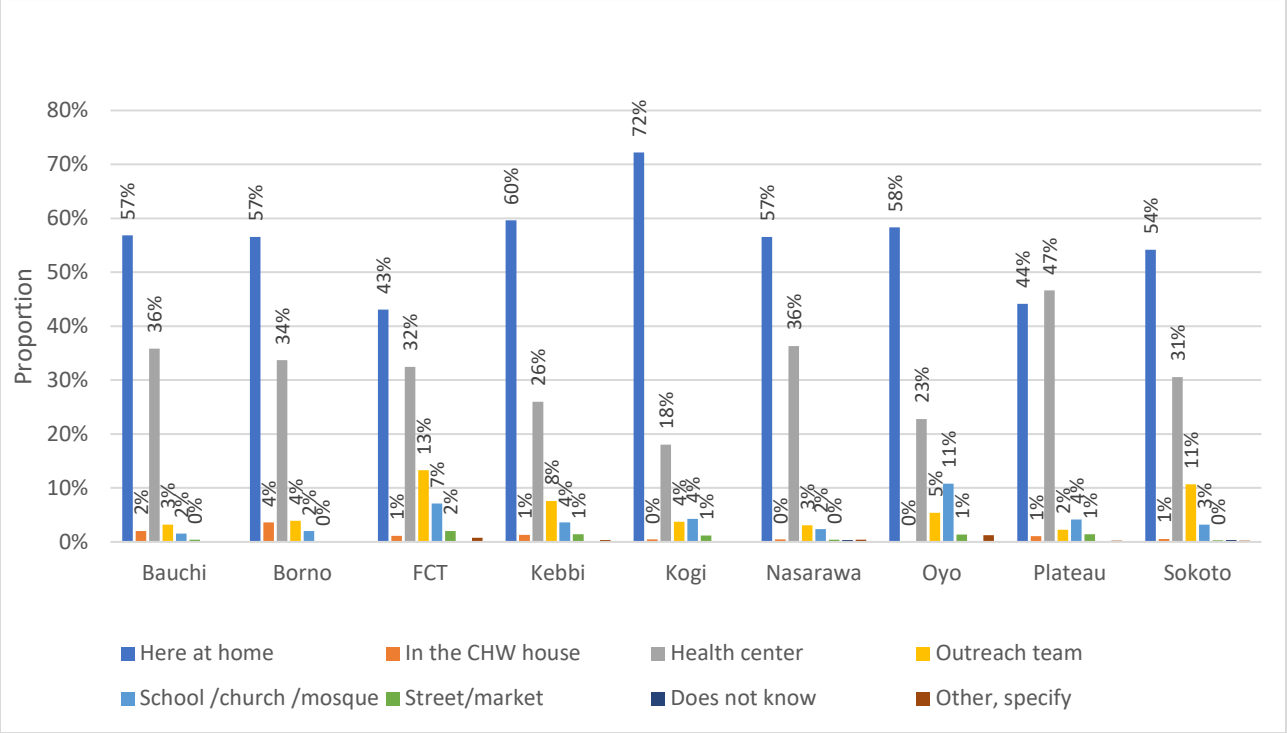
Figure 1. Proportion of children by recency of receipt of VAS and state.



Sources or places where VAS was received during the last six months.

Figure 2 shows the distribution of caregiver responses in terms of the sources or places where VAS was received by their children. The most frequently reported place of VAS receipt was respondents' home across all states, with the >50% of caregivers reporting this in seven states. The second most frequently reported source were health facilities with proportions ranging from 18.0% in Kogi to 46.6% in Plateau. A small minority of caregivers reported outreach teams, schools, churches or mosques as VAS sources. An even smaller minority cited the home of the community health worker, street or market as sources. Other sources reported through open-ended responses are highlighted in **Table 3**.

Figure 2. Proportion of children who received VAS during the last six months by source and state



Proportions for categories 'Does not know' and 'other, specify' not displayed on graph.

Table 3. Other VAS sources or places of receipt

Bauchi		FCT		Kebbi		kogi		Nasarawa		Oyo		Plateau		Sokoto	
Alkaleri	1	Chief palace	2	Fixed post	1	Asko clinic	1	Community square	1	Kwara state	1	At a relatives residence	1	Brought it at medicine	2
At the community pri	1	During Antenatal	1	Hakimi house	1			In abuja	1	Oyo	1	Grand mother's house i	1	Hakimi's house	1
Primary school compo	1	From sister who is a he	1	Sitting under a tree	1			Karshi general hospital	1	PHC	4	In wase	1	Islamic school	2
		Sister brought it home	1	Town center	4			Maidiguri before they came	1	Shop	3	Jos	1		
		Village heads house	1	When giving birth to	1			Under tree village square	1	Thier previous base	1	King's house	1		
								Village square	2			Kings palace	1		
								Went to abuia kuchin goro a	1						
Total	3	Total	6	Total	8	Total	1	Total	8	Total	10	Total	6	Total	5

Conclusions

VAS coverage among children aged 6 – 59 months varied considerably across states, ranging from 43.5% in Sokoto to 63.2% in Nasarawa, with the majority of reported receipt of VAS occurring within the last 1-3 months. Overall, estimates are below the WHO's recommended target of 90% and are fairly consistent with those observed in previous assessments of VAS coverage in Nigeria.[3,5,7] Reports of receipt of VAS at home by the majority of the caregivers in most of the states may reflect challenges in the country's current health facility-based VAS campaign approach, and recent attempts to strengthen coverage via door-to-door campaigns.[4,8]

References

1. Stevens GA, Bennett JE, Hennocq Q, Lu Y, De-Regil LM, Rogers L, et al. Trends and mortality effects of vitamin A deficiency in children in 138 low-income and middle-income countries between 1991 and 2013: A pooled analysis of population-based surveys. Lancet Global Health. 2015; 3(9): 528–536.

2. United Nations Children's Fund. Estimates of vitamin A supplementation coverage in preschool-age children: Methods and processes for the UNICEF global database. UNICEF: New York; 2020.

3. Aghaji AE, Duke R, Aghaji UCW. Inequitable coverage of vitamin A supplementation in Nigeria and implications for childhood blindness. BMC Public Health. 2019; 19(1): 282.

4. Oresanya O, Phillips A, Okereke E, Ahmadu A, Ibinaiye T, Marasciulo M, et al. Co-implementing vitamin A supplementation with seasonal malaria chemoprevention in Sokoto State, Nigeria: A feasibility and acceptability study. BMC Health Services Research. 2022; 22(1): 871.

5. National Bureau of Statistics of Nigeria. National Nutrition and Health Survey 2018: Report on the nutrition and health situation of Nigeria. UNICEF: New York; 2018.

6. Malaria Consortium. Coverage and quality of seasonal malaria chemoprevention supported by Malaria Consortium in 2022: Results from Burkina Faso, Chad, Mozambique, Nigeria, South Sudan, Togo and Uganda. London: Malaria Consortium; 2023.

7. World Bank. Vitamin A supplementation coverage rate (% of children ages 6-59 months) – Nigeria. Available from: https://data.worldbank.org/indicator/SN.ITK.VITA.ZS?locations=NG.

8. Borno State Primary Health Care Development Agency. Report on vitamin A supplementation and deworming campaigns in 2020. Available from: https://reliefweb.int/report/nigeria/vitamin-supplementation-and-deworming-campaign-2020-borno-state-primary-health-care.