

# Factors Associated with Vitamin A Supplementation in Children Aged 6-59 Months in Guinea: Secondary Analysis of 2018 Demographic and Health Survey Data

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**Abstract:** *Introduction:* Vitamin A is a nutrient required for normal functioning of the visual system, growth, development, cellular integrity of the epithelium, immune function, and reproduction. Deficiency can be serious for children. Therefore, the WHO has recommended high-dose vitamin A supplementation for infants and children aged between 6 and 59 months in situations where vitamin A deficiency is a public health problem. Assorted studies have demonstrated a strong association between vitamin A deficiency and an increased risk of infections, visual defects, and anemia. Factors linked to mothers and residential environments are thought to be associated with Vit A supplementation. The aim of our study was to identify these factors in children aged 6-59 months in Guinea using data from the DHS 2018. *Methods:* This was a secondary analysis of data from the Demographic and Health Survey conducted in 2018 by a cross-sectional survey in Guinea. We analyzed data from 4240 mothers who responded to questions about Vit A supplementation of their children. A descriptive analysis of the survey data was performed using Stata 14.0 software, and factors associated with Vit A supplementation were then identified using univariate analysis. Multivariate analysis was also performed, considering only factors with a p-value  $\leq 0.050$  in the model. *Results:* Overall coverage of Vit A supplementation was 42%, with variations according to administrative region. The mother's level of education and work/occupation, household wealth quintile and region of residence were associated with Vit A supplementation in children aged 6-59 months. *Conclusion:* Vit A supplementation coverage of children aged 6-59 months is low in Guinea, far from the 80% target that would significantly reduce infant mortality. Interventions on modifiable associated factors and routinization of supplementation could improve Vit A supplementation coverage. We suggest carrying out similar in-depth studies in certain prefectures in order to make a comparison and draw conclusions based on the evidence.

**Keywords:** Associated Factors, Vit A Supplementation, DHS 2018, Guinea

# 1. Introduction

Vitamin A is a nutrient required for normal functioning of the visual system, growth, development, cellular integrity of Vitamin A deficiency has been shown to be linked to stunted growth in children [1]. The epithelium, immune function, and reproduction. It has a significant and clinically important effect since it has been associated with a 12-34% reduction in all-cause mortality and mortality due to diarrhea [2]. However, vitamin A deficiency can be serious. It remains a major public health problem throughout the world, and particularly in low- and middle-income countries. It is, directly or indirectly, a major risk factor for morbidity and mortality in children aged between 6 and 59 months (2).

Many studies have demonstrated a strong association between Vit A deficiency and an increased risk of infection, visual defects, and anemia [3]. Worldwide, the prevalence of vision loss linked to vitamin A deficiency rose from 68.8 per 100,000 people in 1990 to 75.1% in 2017 [2]. The World Health Organization estimates that 500,000 children go blind every year due to vitamin A deficiency. Of these, half die within 12 months, even if there are no clinical signs of eye disease [4]. As vitamin A is intricately linked to the development of the immune system, its deficiency further weakens this system and, as a result, children who suffer from it succumb to the most common diseases [5, 6].

Three complementary approaches are recommended to combat this deficiency: prophylactic vitamin A supplementation, fortification of foods with vitamin A and dietary diversification.

With a view to preventing deficiency, the WHO has recommended high-dose vitamin A supplementation for infants and children aged 6-59 months in settings where vitamin A deficiency is a public health problem [7]. Vitamin A supplements (VAS) should be given to children aged between 6 and 59 months twice a year, at the time of contact with the health system. The administration of this supplement should be integrated with other public health programs aimed at improving child survival, such as national immunization days against polio or measles [7].

Universal vitamin A supplementation for children under five in populations at risk of deficiency is an effective public health approach for improving the health of young children. It boosts the immune system, reduces the incidence of diarrhea and measles, prevents blindness and hearing loss, and helps reduce childhood morbidity and mortality [8, 9]. A study carried out in Ghana showed that VAS in children under the age of 5 reduced admissions to hospitals and clinics [10].

Introduced into child health programs in low-income countries, vitamin A supplementation for children aged between 6 and 59 months has been in place for many years, but its coverage has been limited and coverage is still low and far from the expected target of 80% (3). A study on the coverage of high-dose vitamin A supplementation and associated factors in children aged between 6 and 59 months, conducted in twenty-three sub-Saharan African countries, found that coverage was 59.4% [1].

In the literature, several studies have looked at the determinants of vitamin A supplementation in different contexts. In Pakistan, the age of mothers and their level of education were reported to be determining factors in Vit A supplementation for children under 5 [11]. In Ethiopia, the number of ANC visits and the household wealth index were significantly associated. Children of mothers from families in the middle wealth quintile and those of mothers who had made 4 ANC visits were much more likely to receive VAS than children from families in the lowest wealth quintile and those whose mothers had not received ANC during pregnancy [2].

In Guinea, a routine strategy has been put in place in health centers. Vitamin A distribution campaigns coupled with National Polio Vaccination Days (NVDs) have also been organized since 1999 [12]. These strategies have improved the VAS rate, but it is still low and far from the national target of 78.7% [13]. According to the 2012 DHS report, the percentage of children who had received vit A in the 6 months prior to the survey was 41%. The DHS 2018 report also states that this percentage did not change between 2015 and 2018 [14]. There is also a discrepancy between the administrative data, those reported by UNICEF and those reported by other surveys. It is therefore necessary to determine VAS coverage in Guinea and the associated factors in children aged 0-59 months.

To our knowledge, no study has yet addressed the factors associated with Vit A supplementation in a sample as representative as the DHS. The aim of our study is to identify the factors associated with Vit A supplementation in children aged 6-59 months in the Republic of Guinea. Specifically (i) to determine the overall coverage of Vit A supplementation among these children, (ii) to describe the variability of Vit A supplementation coverage according to place of residence, and finally (iii) to determine the associated factors related to the children's mothers.

# 2. Methodology

## 2.1. Setting

The study was conducted in the Republic of Guinea, with 8 administrative regions, of which Conakry is the capital, and thirty-three prefectures. According to the 2014 RGPH, the projected population of women of childbearing age in 2018 was 2,564,175 and that of children aged 0-5 years 1,763,997.

## 2.2. Type and Duration of Study

This was a secondary analysis of data from demographic and health surveys conducted in Guinea in 2018 through a cross-sectional survey.

## 2.3. Population

Women aged 15-49 years in Section 6 (Nutrition and Child Health) and children aged 0-59 months were the target population. The study population was made up of the same women, particularly those whose data on Vit A supplementation for their children aged 0-59 months were complete.

## 2.4. Selection

Women aged 15 to 49 who had completed the women's questionnaire in section 6 (Nutrition and child health), particularly the one relating to Vit A supplementation for their children aged 0 to 59 months, were included, as were children aged 0 to 59 months at the time of the survey with complete data in the database.

Women aged 15 to 49 in the database who did not know their child's Vit A supplementation status were excluded.

### 2.4.1. Sampling

The DHS 2018 aimed to produce nationally representative results. These results are presented by region and according to whether they are urban or rural.

To this end, the national territory was divided into 8 study areas corresponding to the 7 administrative regions and the special zone of Conakry. In each study area (except for the city of Conakry, which has no rural part), two strata were created: the urban stratum and the rural stratum. In all, fifteen sampling strata were created. The first-stage sample was drawn independently in each stratum, and the second-stage sample was drawn independently in each primary unit drawn in the first stage. The sampling frame chosen for the DHS V 2018 is the database of the General Population and Housing Census that took place in 2014 (RGPH, 2014). The Institut National de la Statistique (INS) has a computer file containing 9679 DZs.

#### (i). First Degree

From the list of DZs, 401 clusters were selected for the 2018 DHS by systematically drawing with probability proportional to their size, the size of the DZ being the number of households.

#### (ii). Second Stage

For the 2018 DHS, 8020 households were selected and, of these, 7979 were identified at the time of the survey. Of these 7979 households, 7912 were able to be surveyed, representing

a response rate of 99.2%. Of the households interviewed, 10,987 eligible women were identified for individual interviews. Of these, 10,874 completed the interview, giving a response rate of 99%. Of the 10874 women who responded to the individual interview, 4240 mothers were surveyed about their children's Vit A supplementation.

### 2.4.2. Data Processing and Analysis

Data were processed and analyzed using Stata software version 14.0.

Quantitative data were recoded and expressed as a proportion. Proportions were compared using Student's t-test. Qualitative data were expressed as numbers and percentages, then the Chi-square test (Pearson's Chi2 for expected values greater than 5) and the Fischer test for expected values less than 5 in at least 20% of cells) were used to compare proportions. Finally, factors associated with Vit A supplementation were identified using logistic regression based on univariate and multivariate analysis (only factors from the univariate analysis with a p-value  $\leq 0.050$  were included in the model).

## 3. Ethical Considerations

The 2018 Demographic and Health Surveys received approval from the Guinea Health Research Ethics Committee prior to its implementation. The database was obtained after a request to the DHS database management programme.

## 4. Results

### Description

Overall, Vit A supplementation coverage was 42% in 2018 on a sample of 4240 resident and visiting women aged 15 to 49. It varied by administrative region, with extremes of 4.51% in Nzerekore and 20.28% in Mamou. Graph 1 shows coverage by administrative region.

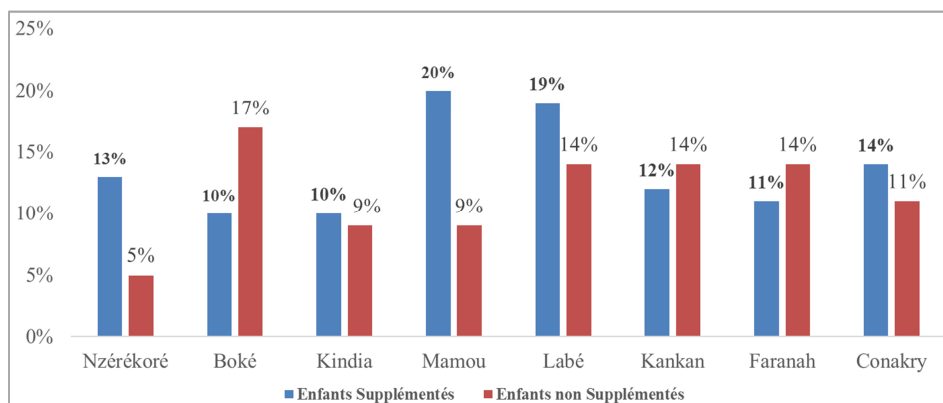


Figure 1. Distribution of Vit A supplementation in children aged 6-59 months by administrative region.

Table 1 shows the distribution of the sample of women according to their socio-demographic characteristics. The 25-34 age group was the most represented with 46.16%. 74.06% of the women in our sample had no education. The majority were

married (93.99%) and lived in rural areas (70.14%). Of these, 23.77% lived in poor households. The Labe and Boké regions had the highest numbers of respondents in our sample, with 15.87% and 13.70% respectively.

**Table 1.** Caractéristiques sociodémographiques de l'échantillon des femmes de l'enquête.

Variables	Effective (N= 4240)	Percentage
Age de la mere		
15-24	1 355	32
25-34	1 957	46
35 et plus	928	22
Niveau d'Education de la mère		
Non solarize	3 140	74
Primaries	503	12
Secondaries/supérieur	597	14
Religion		
Chrétien	360	8
Musulman	3 840	91
Animist	4	1
Ethnize		
Peulh	1677	40
Malinka	1327	31
SOSSOU	784	18
Autres	452	11
Quintile de richesse du ménage		
Très pauvre	1008	24
Pauvre	909	21
Moyen	797	19
Riche	850	20
Très riche	676	16
Parité de la mère		
Primipare	807	19
Paucipare	2392	56
Multipare	1001	24
Grand mutipare	40	1
Statut Marital		
Célibataire	174	4
Marié	3985	94
Divorcé	50	1
Veuve	31	1
Travail/Occupation		
Non	1535	36
Oui	2707	64
Exposition		
Non Exposé	2176	51
Exposé	2064	49
Milieu de résidence		
Rural	2974	70
Urbain	1266	30
Region administrative		
Boké	581	14
Kindia	401	9
Mamou	575	14
Labé	673	16
Kankan	558	13
Faranah	541	13
Nzérékoré	401	9
Conakry	510	12

Table 2 presents the factors associated with Vit A supplementation in children aged 6 to 59 months over the last 6 months in the univariate analysis. The variables that were significantly associated with Vit A supplementation were women's level of education. Children of women with secondary or higher education had a 1.67-fold increased chance of being supplemented with Vit A (OR=1.67 IC95%= [1.40 -2.00] p-value< 0.005). The household wealth quintile showed that children from rich and rich households had a 1.46-fold (OR=1.46 IC95%= [1.21-1.76] p-value< 0.005) and 1.81-fold (OR=1.81 IC95%= [1.49-2.21] p-value< 0.005) of

benefiting from Vit A supplementation. Regarding place of residence, children from households residing in urban areas had a 1.57-fold increased chance (OR=1.57) of benefiting from Vit A supplementation. For place of residence, children living in the Mamou region had a 6.71-fold increased chance of being supplemented with Vit A (OR=6.71 IC95%= [4.98 -9.04] p-value< 0.005). Compared with children living in the Nzerekore region, children in the Labe region had a 4.1-fold increased chance (OR=4.1 IC95%= [3.01-5.36] p-value< 0.005). Work/occupation showed that the children of women who had a job/occupation had a 1.35-fold increased chance (OR=1.35 IC95%= [1.19-1.53] p-value< 0.005) of being supplemented with vitamin A compared with the children of women who did not have a job/occupation. For media exposure, children of women exposed to the media had a 0.87-fold reduced chance of receiving Vit A supplementation (OR=0.87 IC95%= [0.77 -0.99] p-value< 0.005).

**Table 2.** Facteurs associés à la supplémentation en Vit A des enfants de 6 à 59 mois.

Variables	OR	IC	P value	
Age				
15-24	1			
25-34	0.95	0.83	1.10	0.534
35 et plus	0.93	0.78	1.10	0.426
Education de la mère				
Aucune	1			
Primaire	0.1.02	0.82	1.26	0.862
Secondaries	1.35***	1.10	1.67	0.004
Religion de la mère				
Chrétien	1			
Musulman	0.87	0.54	1.42	0.62
Animist	1.88	0.95	3.73	0.071
Ethnize				
SOSSOU	1			
Peulh	0.90	0.72	1.13	0.35
Malinka	1.06	0.81	1.37	0.674
Autres	1.05	0.65	1.71	0.818
Indice de Richesse				
Très pauvre	1			
Pauvre	1.04	0.85	1.27	0.708
Moyen	1.35***	1.10	1.67	0.004
Riche	1.56***	1.22	1.99	0.000
Très riche	2.22***	1.61	3.06	°0.000
Travail/occupation				
Non	1			
Oui	1.26***	1.09	1.45	0.001
Exposition aux media				
Non expose	1			
Expose	0.90	0.79	1.03	0.159
Milieu de résidence				
Rural	1			
Urbain	0.15	0.91	1.44	0.231
Region d'habitation				
N'Zérékoré	1			
Boké	1.47*	1.05	2.05	0.022
Kindia	1.58*	1.09	2.29	0.014
Mamou	6.69***	4.78	9.32	0.000
Labé	3.19***	2.22	4.58	0.000
Kankan	1.93***	1.39	2.69	0.000
Faranah	2.49***	1.83	3.39	0.000
Conakry	2.93***	1.98	4.32	0.000

In the multivariate analysis, women's level of education was

associated. Compared with the children of women with no education, the children of women with secondary or higher education had a 1.35-fold increased chance of being supplemented with vitamin A (OR=1.35 IC95%=[1.10-1.67] p-value< 0.005). The household wealth quintile showed that, compared with children from poor households, children from rich and rich households had a 1.56-fold (OR=1.56 IC95%=[1.22-1.99] p-value< 0.005) and 2.22-fold (OR=2.22 IC95%=[1.61-3.06] p-value< 0.005) increased chance of receiving Vit A supplementation. Regarding the mothers' occupation, the children of women who had a job/occupation had a 1.26-fold increased chance (OR=1.26 IC95%=[1.09-1.45] p-value< 0.005) of being supplemented with Vit A compared with the children of women who did not have a job/occupation. Children living in the Nzerekore region and children living in the Mamou region had a 6.69-fold increased chance of being supplemented with vitamin A (OR=6.69 IC95%=[4.78-9.32] p-value< 0.005). Also compared with children living in the Nzerekore region, children living in the Labe region had a 3.19-fold increased chance (OR=3.19 IC95%=[2.22-4.58] p-value< 0.005).

**Table 3.** Facteurs associés à la supplémentation en Vit A chez les enfants de 6 à 59 mois dans l'analyse multi variée.

Variables	OR	IC	P value
Education de la mère			
Aucune	1		
Primaire	01.02	0.82	1.26
Secondaires/supérieur	1.35***	1.10	1.67
Religion de la mère			
Chrétien	1		
Musulman	0.87	0.54	1.42
Animist	1.88	0.95	3.73
Ethnize			
SOSSOU	1		
Peulh	0.90	0.72	1.13
Malinka	1.06	0.81	1.37
Autres	1.05	0.65	1.71
Indice de Richesse			
Très pauvre	1		
Pauvre	1.04	0.85	1.27
Moyen	1.35***	1.10	1.67
Riche	1.56***	1.22	1.99
Très riche	2.22***	1.61	3.06
Travail/occupation			
Non	1		
OUI	1.26***	1.09	1.45
Exposition aux media			
Non expose	1		
Expose	0.90	0.79	1.03
Milieu de résidence			
Rural	1		
Urbain	0.15	0.91	1.44
Région d'habitation			
N'Zérékoré	1		
Boké	1.47*	1.05	2.05
Kindia	1.58*	1.09	2.29
Mamou	6.69***	4.78	9.32
Labé	3.19***	2.22	4.58
Kankan	1.93***	1.39	2.69
Faranah	2.49***	1.83	3.39
Conakry	2.93***	1.98	4.32

## 5. Discussion

The aim of this study was to identify the factors associated with Vit A supplementation in children aged 6-59 months in the Republic of Guinea. The results show low coverage of Vit A supplementation in children aged 6-59 months, particularly in the administrative region of Nzerekore. The results also showed that Vit A supplementation for children aged 6 to 59 months was influenced by certain factors such as the mothers' level of education, the household wealth quintile, the mothers' work/occupation, and the administrative region of residence of the children's mothers.

One of our specific objectives was to determine the overall coverage of vitamin A supplementation in children aged 6-59 months in the Republic of Guinea and to describe the variability between regions.

Our results show low coverage of Vit A supplementation in the Republic of Guinea. Only 42% of children aged 6-59 months had received vitamin A supplementation in the 6 months preceding the survey. This is far from the expected target of 80%, which could significantly reduce infant mortality [15], and the national target of 78.7% (13). Our results are well below the data reported by UNICEF, which announced coverage of 81% for Guinea during the same period [16].

Our results also show regional disparities in Vit A supplementation coverage. Previous studies in Pakistan and Bangladesh have reported regional disparities in Vit A supplementation among children aged 6-59 months (3).

Our results may be explained by the low routinization of Vit A supplementation in health facilities, the lack of regularity of Vit A distribution campaigns, particularly during the Ebola epidemic, the reluctance of the population to take part in health interventions such as vaccination and supplementation campaigns, the lack of knowledge about the importance of Vit A supplementation and the consequences of Vit A deficiency, and the inadequacy of inputs during campaigns.

There are factors associated with Vit A supplementation coverage among children aged 6-59 months in Guinea. Analysis of the data enabled us to identify four factors associated with Vit A supplementation in the multivariate analysis: Mothers' level of education. An analysis of DHS data from 23 African countries between 2011 and 2015 showed equivalent results. This study revealed that Vit A supplementation was much higher in the children of mothers with primary or secondary education than in the children of mothers with no formal education [11]. Studies have shown that women with a higher level of education are better informed about the importance of Vit A and are more receptive to Vit A supplementation for their children [3].

The wealth quintile of the households in which children aged 6-59 months lived was associated with Vit A supplementation. Children from rich and rich households were more exposed to Vit A supplementation. Equivalent results have been reported in studies conducted in Bangladesh, Ethiopia, and Nigeria [17]. Our results could be explained by the fact that rich and rich families had better financial

accessibility to health services, had more access to health information and consequently became less resistant to health interventions such as vaccination and supplementation. Studies have shown that Vit A deficiency is much higher in poor families than in rich families, even though food is the main source of Vit A [18].

Work/occupation was associated with Vit A supplementation. The children of women with a job/occupation had an increased chance of being supplemented with Vit A. This result could be because most working mothers had a higher or lower level of education and were better informed about the importance of Vit A supplementation.

In our study, region of residence was significantly associated with Vit A supplementation. Regional disparities in Vit A supplementation coverage have been reported by other authors, notably in Pakistan and Bangladesh [3].

Limitations of the Study: The main limitation of this study is that the women interviewed may have been subject to recall bias and may not have known the supplementation status of their children, particularly in the case of working women who may have left their children in the care of older sons/daughters, neighbors or in the hands of This coverage is necessary to help reduce infant and child mortality. In a context of low availability of resources in relation to needs, routinization of Vit A supplementation could be envisaged to reduce the costs associated with campaigns and improve the use of health centers.

## 6. Conclusion

Vit A supplementation coverage of children aged 6-59 months is low in Guinea, far from the 80% target that would significantly reduce infant mortality. Interventions on modifiable associated factors and routinization of supplementation could improve Vit A supplementation coverage. We suggest carrying out similar in-depth studies in certain prefectures in order to make a comparison and draw conclusions based on the evidence.

## Conflicts of Interest

There is no conflicts of interest.

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