Prevalence of Vitamin A Deficiency And Associated Factors Among Children Aged 6-59 Months In Dera District, Northwest Ethiopia: A Cross-Sectional Study

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Abstract

Background: Vitamin A is a fat-soluble vitamin essential for the proper functioning of the immune system. It fondes both animal and plant sources in the form of retinol from animal sources or beta-carotene from plant source foods. Due to increased nutrient need and the severity of the potential health consequences are associated with vitamin A deficiency (VAD), preschool children and pregnant women are considered as the most at risk segments of the community. Hence, this study aimed to assess the prevalence of VAD and associated factors among children aged 6-59 months in Dera woreda, Northwest Ethiopia.

Methods: Community based quantitative cross-sectional study was conducted among children aged 6-59 months in Dera woreda from December 1/2018 to January 1/2019. Multistage random sampling was used to select the required samples (267). Data were coded and entered into Epi-data version 3.1 and exported to SPSS (Statistical Package for Social Sciences) version 20 for analysis. Binary logistic regression was fitted. Both bivariable and multivariable analyses were used to identify factors associated with VAD. Those variables that were showed significant association in multivariable association at P value less than 0.05 declared as statistically significant factors of VAD among children age 6-59 months.

Results: Two hundred sixty seven mother-children Pairs were included in the study making a response rate of 94.7%. The overall prevalence of Vitamin A deficiency among children age 6-59 months was 7.8% (95% CI (4.7, 11.3). Antenatal care follow up (AOR: 0.446,95 % CI (0.155, 0.980)); birth interval within 2 year (AOR: 0.392, 95 % CI (0.107, 0.839)), and age group of24-35 months (AOR; 1.206, 95 % CI (1.037, 6.129)) were significantly associated with vitamin-A deficiency.

Conclusion: The overall prevalence of vitamin A deficiency in this study was found to be lower than the national and regional prevalence. According to this study, VAD is a mild public health problem. Age of children, birth interval, ANC follow up, remain the most important associated factors for vitamin A deficiency. Therefore to decrease the prevalence of VAD, ANC service should be strengthened and we should focus on older children birth interval and age- based food needs.

Background

Vitamin A Deficiency (VAD) is among the top 10 risk factors contributing to the global burden of disease among preschool- age children in resource limited countries[1, 2]. (Globally, around 33.3% of preschool-age children (One third (190 million) of the world's preschool children) were Vitamin A deficient, and 15.3% of pregnant women in populations at risk of VAD. An estimated 44.4% of preschool children in Africa (56.4 million children) are vitamin A deficient[3] and are supposed to contribute to over 1 million childhood deaths a year [4]. Recent reviews showed that the sub-Saharan Africa region has the highest rate of VAD (48%) prevalence in children < 5 years [3].

Vitamin A deficiency alone are responsible for almost 6% of child deaths under the age of 5 years in Africa and 8% in South-East Asia [3]. Vitamin A supplementation in children 6–59 months of age living in developing countries is associated with a reduced risk of all-cause mortality and a reduced incidence of diarrhea [5].

The consequences of VAD is magnified by poverty and the higher prevalence of the infectious disease[6] and it is an underlying cause for nearly one-fourth of global child mortality from measles, diarrhea and malaria [7]. This mortality risk worsens among children born in sub Saharan African countries, which face 16.5 and 1.8 times higher probability of dying before the age of 5 years compared to children born in developed regions and Southern Asia respectively[8]

In Ethiopia national prevalence of vitamin A deficiency estimated based on retinol adjusted for inflammation among preschool children was found 13.9%. And the lowest prevalence was observed in Addis Ababa; almost all preschool children in this city administration were not at risk of vitamin A deficiency. Among the region's the prevalence of vitamin A deficiency of preschool children who live in Harari was the highest as compared to other regions at a prevalence of 21.0% and moderate prevalence of vitamin A deficiency was observed among preschool children who live in the Amhara region (10.3%)[9]. Hence based on WHO classification, this prevalence can be categorized as a moderate public health problem in Ethiopia. Likewise, the prevalence of Vitamin A deficiency can be considered as a moderate public health problem in all regions, except Harari and Addis Ababa. Vitamin A deficiency is a severe public health problem among the Harar preschool children at a prevalence of 21%. On the other hand vitamin A deficiency is not a public health problem among the Addis Ababa preschool children [9]. In Ethiopia Mortality in children who are blind from Keratomalacia or who have the corneal disease is reported to be from 50–90% [10] and measles mortality associated with VAD is increased up to 50% [11]

The problem of vitamin A deficiency in developing countries is inextricably linked to poverty. Low incomes constrain families' abilities to purchase the diverse foods they need for a nutritious and balanced diet with adequate amounts of vitamin A[12]. Maternal vitamin A deficiency results in low concentrations of vitamin A in breast milk, predisposing infants to deficiency. This is exacerbated by an inadequate dietary intake of vitamin A during the complementary feeding period. Finally, illness can worsen vitamin A status because of a reduced food intake from anorexia, mal-absorption, and increased excretion in urine [13].

To redress vitamin A deficiency, megadose vitamin A capsules are administered twice yearly to preschool children in many developing countries, often in conjunction with the Expanded Program of Immunization (EPI). Children can receive micronutrients from foods, fortified food, and direct supplementation. But inadequate intake of this micronutrient and the presence of infections such as measles and diarrheal diseases in children are the cause of Vitamin A deficiency (VAD) [14].

VAD can occur in individuals of any age. However, vitamin A deficvencey is a disabling and potentially fatal public health problem for children under 5 years of age. VAD- related blindness is most prevalent in children under 3 years of age[10]. This period is very sensitive and critical characterized by high requirements for vitamin A to support early rapid growth, the transition from breastfeeding to dependence on other dietary sources of the vitamin and increased frequency of respiratory and gastrointestinal infections. The increased mortality risk from concurrent infections extends at least to 6 years of age and is associated with both clinical and subclinical VAD [15].

Children's have protein-energy malnutrition and anemia affected by VAD, VAD causes night blindness and Bitot's spot during childhood period this indicator of increased morbidity and mortality in preschool children. So children are more vulnerable to illness, both infectious and non-infectious [16].

Seven national regional states of Ethiopia showed that the prevalence rate of Bitot's spots was highest in Amhara (3.2%), followed by Afar (2.1%), Oromiya (1.5%), Addis Ababa (1.4%), Harari (1.2%), and Dire Dawa (1.1%) regions and it was significantly associated with male sex, rural residence and greater age[17].In Ethiopia and other African countries, poverty, sub-optimal nutrition, unsanitary living conditions and poor health care access exacerbate the risk of developing multiple micronutrient deficiencies[18]. 26% of the young children consume vitamin A rich foods, while only 4% receive food from at least four food groups [19]. Therefore, the purpose of this study is to provide information regarding the prevalence and factors associated with Vitamin A Deficiency among 6–59 months children.

Methods

Study design and setting

A community based cross-sectional study was conducted in Dera Woreda, South Gonder Zone from December 1/2018 to January 1/2019.Dera Woreda is located 600 km from Addis Ababa in Northwest and 40 km from Bahir Dar in Northeast. The estimated population of the *Woreda* in 2017/18 is about 154,886. The estimated number of the under-five year children is22, 567. The total number of estimated children aged 6–59 months were19282. Quantitative data were collected from mothers who have a child age 6–59 months.

All participants were allowed to ask questions throughout data collection and could refuse to answer questions or stop the interview at any moment.

Sample size determination and sampling procedure

The sample size was determined using a single population proportion formula.

$$\boldsymbol{N} = \frac{\left(Z\frac{\alpha}{2}\right)^2 p(1-p)}{d^2}$$

[28], where, **p** represents the proportion of children who took the Vitamin A Deficiency, which was 8.6% taken from the study done in Dembia [20].. To get the optimum sample size, 5% margin of error (d) was considered with 95% confidence interval.

$$\boldsymbol{N} = \frac{(1.96)^2 0.086(1-0.086)}{0.05^2} = 120.7 = 121$$

We added 10% for the non-response rate and multiplied by 2 because of design effect. Then the final sample size was 267.

Of the 39 administrative Kebeles in Dera Woreda, nine were selected randomly by lottery method. Among those kebele 20–30% of the population proportional allocation was done to select the desired samples from each selected Kebele. The sampling frame, based on a community-based health information system of the family folder in health posts, was constructed. Lists of all mothers having children age 6–59 months with Community Health Information System (CHIS) number in selected kebeles were used to select the respondents. Finally, we used a computer-generated random sampling to select the desired sample from the sampled frame of each selected kebele. other-child pair having a child aged 6 to 59 months who has a mental problem, critically ill were excluded.

Data collection procedure and measurements

Questionnaires were first prepared in English and translated into Amharic Version, which later back-translated into English. Amharic version questionnaires were used to collect data. A structured questionnaire was used to collect data on socio-demographic characteristics, maternal and child characteristics, and a Pre-test was done on 5% of the samples, two weeks before the actual data collection at Fegera *Woreda*. Data on Vitamin A deficiency were collected through face to face interviewing and with direct observation of children eyes of children age 6–59 months.

Assessment of dietary diversity and Quasi-food frequency

Food consumption studies can provide important information at an earlier stage before the clinical manifestation has appeared. To determine the food consumption of the children twenty-four-hour recall method was used. One single twenty–hour-hour recall was collected for every participant and dietary diversity was calculated. Determination of dietary diversity score (DDS) was done by asking the mother/caregiver to list all foods consumed by the child in the previous 24 hours preceding the survey. In the case of a mixed dish, mothers were asked to list the ingredients of the food items. Then reported food items were classified into seven food groups like grains, legumes, vitamin A-rich fruits and vegetables, other fruits and vegetables, egg, dairy products (milk, yogurt, and cheese), and meat. Considering four food groups as the minimum acceptable dietary diversity, a child with a dietary diversity score (DDS) of less than four was classified as having poor dietary diversity; otherwise, they were considered to have good dietary diversity [21].

Assessment of vitamin A deficiency

A detailed ophthalmic examination was carried out by clinical optometrists was used to assess the clinical signs of vitamin-A deficiency, such as Bitot’s spot, Conjunctival xerosis, corneal xerosis, corneal ulceration, and corneal scar. However, during data collection time the history of night blindness was confirmed by asking mothers about her childs using the local word for night blindness “*dafint” or* *"chicken eye"*. Information on whether a child faced any difficulty while playing or in identifying objects in dim light, especially at sunset, was gathered.

Six data collectors (2 clinical optometrists & 4 clinical nurses) and two supervisors (public health officers) were participating in the data collection process. One day training was provided to data collectors and supervisors about how to collect the data and how to ask the investigators.

The Dependent variable of this study is Vitamin A deficiency and Independent variables are Socio-demographic and economic characteristics, Health utilization and Child factors

Operational definition

Optimal dietary diversity: Dietary diversity was defined as optimal if children (aged 6–59 months) received foods from at least four of seven food groups(1) Grains, roots, and tubers, (2) Legumes and nuts, (3) Dairy products, (4) Flesh foods, (5) Eggs, (6) Vitamin-A rich fruits and vegetables, (7) Other fruits and vegetables, within the preceding 24 hours of the interview.

Sub-optimal dietary diversity: Suboptimal dietary diversity:-If a child aged 6–59 months receives foods from three or below three food groups from seven food groups [22]

VAD: - if a child has a history of night blindness and during the physical examination if the child has one signs of vitamin A deficiency, such as Bitot's spot, Conjunctival xerosis, corneal xerosis, corneal ulceration, and corneal scar.

The terms **'Women and mothers'** are used interchangeably in this study.

Statistical analysis

Data were entered into EpiData version 3.1 with double entry for verification. The analysis was performed using SPSS version 20.0. Descriptive data presented by using Frequency and cross-tabulation. Both the bivariate and multivariable logistic regression analyses were used to assess the association between dependent and independent variables. Independent variables that showed $P < 0.2$ at 95% CI in the bivariate logistic regression analysis were included in the multivariable logistic regression model. $P < 0.05$, with 95% CI, was considered to declare the variables significantly associated with the dependent variable.

Results

Of the total 267 sampled mother-children Pairs takers who had children 6–59 months, 267of them participated in the study with a response rate of 94.7%.

Socio-demographic characteristics of mothers

More than half of participants 165 (65.2%) were living in the urban kebele of Dera Woreda. Of the respondents of the study, 237 (93.7%) orthodox religious followers and 100% were Amhara in the ethnic group. Almost 105 (41.5%) of the study participants live in a household that shas seven and above household members. The majority of 209 (82.6%) of the respondents were housewives; married 215 (85%) and illiterate 186 (73.5%). About half 173 (52.2%) of the fathers were unable to read and write and the majority 211 (83.7%) of them were farmers in their occupation (Table 1).

Table 1
Sociodemographic and economic characteristics of mothers having child aged 6–59 months in Dera Woreda, Northwest Ethiopia, 2019/20(N = 267)

Variables		Frequency	
		N	%
Maternal age	15–35 year	213	84.2
	36–49 year	40	15.8
Maternal religion	Orthodox	237	97.3
	Muslim	16	6.3
	Others	-	-
Maternal ethnicity	Amhara	253	100
	Others	-	-
Maternal marital status	Single	11	4.3
	Married	215	85
	Divorced	25	9.9
	Windowed	2	0.8
Place of residence	Urban	165	65.2
	Rural	88	34.8
Maternal education level	Unable to read and write	186	73.5
	Read and write only	19	7.5
	Primary school (1–8 grade)	27	10.7
	Secondary school (9–12 grade)	15	5.9
	Higher education	6	2.4
Father’s education	Unable to read and write	132	52.2
	Read and write only	73	28.9
	Primary school (1–8 grade)	23	9.1
	Secondary school(9-12grade)	20	7.9
	Higher education	4	1.6
Maternal Occupation	Housewife	209	82.6
	Government employed	9	3.6

Variables		Frequency	
		N	%
	Merchant	23	9.6
	Farmer	9	3.6
	Student	3	1.2
Fathers' occupation	Farmer	211	83.7
	Government employed	15	6
	Private employed	1	0.4
	Merchant	23	9.1
	Student	1	0.4
Household family size	<=4	66	26.1
	5–6	82	32.4
	>=7	105	41.5
Availability of Media sources* at the households	Yes	62	24.5
Exposure to available media sources	Yes	44	17.4
Available farmland	Yes	211	83.3
Cultivating vegetables	Yes	176	69.5
Mother involved in decision-making	Yes	110	43.4

*Includes Radio and Television (TV)

Characteristics of the children aged 6-59 months

About more than half 160 (63.2%) of children were male and 68 (26.9%) were found in the age group of 36–47 months. The majority of 189 (74.7%) of them was a second and above child for the interviewed mothers. About 108 (42.6%) of them had received a growth-monitoring service and 208 (82.2%) of them received a measles vaccine (Table 2).

Table 2
Selected health-related characteristics of children aged 6–59 months in Dera *Woreda*, Northwest Ethiopia, 2019/20(N = 267)

Variables		Frequency	
		N	%
Child sex Child's age in months	Meal	160	63.2
	Female	93	36.8
Child age in month	6–23	58	22.9
	24–35	60	23.7
	36–47	68	26.9
	48–59	67	26.5
Child live at home	< 2	64	25.3
	>=2	189	74.7
Growth monitoring service	Yes	108	42.6
Birth interval	< 2 years	24	9.5
	>=2 years	229	90.5
Morbidity for the last two weeks	Yes	15	5.9
Type of morbidity	Diarrhea	24	37.5
	Fever	15	5.9
	Cough	24	37.5
	Others	9	14
BCG Vaccinated	Yes	232	91.6
Pentavalent1 vaccinated	Yes	232	91.6
Pentavalent3 vaccinated	Yes	215	84.9
Measles vaccinated	Yes	208	82
Growth monitoring practice follow up	Yes	108	42.6

BCG: Bacillus Calmette-Guérin, Pentavalent: A vaccine against Diphtheria, Pertussis, Tetanus, Hepatitis B, and Haemophilus influenza type B

Health utilization and dietary related characteristics of mothers

The majority of 143 (56.52%) of mothers had no antenatal care (ANC) visits for the current children. The majority of 225 (88.9%) of children took vitamin A supplementation in the last 6 months. The majority of 225 (88.9%) of children's had dietary diversity scores blew and equal to 4 and also 176 (69.5%) three forth of mothers delivered at the clinic (Table 3).

Table 3
Health service utilization and dietary practice of mothers in Dera-*Woreda*, Northwest Ethiopia, 2019/20(n = 267)

Variables		Frequency	
		N	%
ANC follow up for the index child	Yes	110	43.8
Place of delivery	Home	70	27.2
	Clinic	176	69.5
	Hospital	5	1.9
Mode of delivery	Spontaneous vaginal delivery	228	90
	Assisted deliveries	25	9.8
PNC follow up for the index child	Yes	108	42.7
Vitamin A supplementation	Yes	225	88.9
Dietary diversity score	<=4	225	88.9
	> 4	28	11.1

Prevalence of vitamin A deficiency

The prevalence of Vitamin A deficiency among children age from 6–59 months was 7.8% with 95% CI (4.7, 11.3).(Fig. 1)

Factors associated with Vitamin A deficiency among children aged 6–59 months

In the bivariable analyses age of children, Sex, place of residence, ANC visit, PNC follow up, Cultivate dummy vegetable and the birth interval was significantly associated with Vitamin A deficiency. Those variables that were significant in bivariable analysis, including multivariable analysis. In multivariable analysis age of children, sex of children, birth interval, ANC and PNC follow-up was significantly associated with Vitamin A deficiency. The birth interval of greater than two years asaswas 60.8% times less likely to suffer from VAD compared to counterparts (AOR = 0.392,95% CI:0.107,0.839). On the other hand, age groups 36–47 months were1.91 times more like to have VAD compared to the age group 24–35 months (AOR 1.911,95%CI: 1.305,11.969). Likewise, mothers who had ANC visits had 55.4% times less likely to develop VAD compared to mothers who did have ANC visits (AOR = 0.446, 95%CI: 0.155,0.980).

Similarly, children from mothers who had PNC visits had 63.3% times less likely to develop VAD compared to children from mothers who did not attend PNC (AOR = 0.337, 95%CI: 0.111, 0.924)(Table 4).

Table 4
The bivariate and multivariable logistic regression analysis showing factors associated with VAD among children aged 6–59 months in Dera *Woreda*, Northwest Ethiopia

Variables		**VAD**		**Crude Odds Ratio (COR) (95% CI)**	**AOR (95% CI)**
		No	**Yes**		
Sex	Male	143	17	0.280(0.080,0.984) ***	0.296(0.077,1.141)
	Female	90	3	1	1
Age of children in month	6–23	47	11	0.271(0.081,0.905) ***	0.381(0.099,0.774) *
	24–35	57	3	1.206(0.259,5.623)**	1.206(1.037,6.129)**
	36–47	66	2	2.095(0.371,11.844)	1.911(1.305,11.969)
	48–59	63	4	1	1
Place of residence	Urban	146	19	0.088(0.012,0.671)*	
	Rural	87	1	1	
ANC	Yes	97	13	0.384(0.148,0.998)*	0.446(0.155,0.980)*
	No	136	7	1	1
PNC follow up	Yes	94	14	0.290(0.108,0.781)**	0.337(0.111,0.924)**
	No	139	6	1	1
Cultivate dummy vegetable	Yes	157	19	0.109(0.014,0.827)*	
	No	76	1	1	
Birth interval	Within > 2 years	19	5	0.266(0.087,0.813)*	0.392(0.107,0.839)*
	Within 2 years	214	15	1	1

Significant at *p-value < 0.05, **p-value < 0.01, and ***p-value < 0.001

Discussion

This study tried to assess the prevalence of vitamin A deficiency and associated factors among children age 6–59 months.The overall prevalence of VAD was 7.8%. The finding of this study in line with the study done in Demba,8.6% [20]. But the current study finding was higher than the study done in Mali 5.4%[23] and the reports of WHO cut off point,1.56%[24] The discrepancy might be due to the existence of differences in socio-economic status of the study area, living condition, lack of adequate dietary diversity (11.1%)[25]and lack of maternal literacy in the study area (18.6%). Adequate diets and maternal literacy are of greater value for children to resist vitamin A deficiency[25].

In this study, Conjunctival xerosis (1.6%), Bitot's spots (2.4%), Corneal Ketosis (0.4%), corneal ulceration (1.6%) and Corneal scar (1.6%) were the sign of VAD reported.

The prevalence of Bitot's spots was higher than the study done in different parts of India [26]and Mali(2%)[23], but lower than the study done in Amhara, Ethiopia (3.2%) and higher than the study done in different parts of Ethiopia (2.1%,1,5%,1.2%,1.4%, and 1.1%)[17]. This difference might be due to socio-demographic factors, place of residence, maternal health care, the purchasing power of the community, food price, child health care, low intake of beta carotene-rich and vitamin A containing foods [27].

This study also identified that the age of children, birth interval, antenatal care and postnatal care were factors significantly associated with vitamin A deficiency.

In this study age of the child was statistically significant factor for vitamin A deficiency. Those children whose age group 24–35 months was 1.21 times more likely affected by vitamin A deficiency than 48–59 months age in Dera District. This finding in line with a study done in Indian [26], different parts of Ethiopia [17] and North West Ethiopia [20]. This occurs might be in Ethiopia most children stop breastfeeding and continue family food after the age of 24 months. This leads to an inadequate intake of vitamin A reach foods from their diet that leads to a deficiency of vitamin A. Additionally, undernutrition is common during the periods of complementary feeding practices in Ethiopia. On the other hand, it might be due to physiological changes to support growth and development during this period needs additional micronutrients.

The presence of antenatal care follows up was significantly associated with vitamin A deficiency in Dera district, North West Ethiopia. Those mothers who had ANC follow up care during pregnant of the index child were 55% decreases in the presence of vitamin A deficiency in their children. This finding is supported by the study done in North West Ethiopia [20]. This occurs due to during ANC follow up each pregnant woman is consoled about diversified feeding practice for both them and their children. Therefore pregnant women who had ANC follow up have better understanding and knowledge about child feeding practices[28, 29] and also gain adequate knowledge about vitamin A reach foods during ANC follow up periods [30].

Additionally, Vitamin A deficiency was associated with the presence of postnatal care during postnatal periods. Mothers who had PNC visits during postnatal periods were 64% times less likely to develop vitamin A deficiency among children age 6–59 months. This result was supported by the study done in Indian[26] and North West Ethiopia [20]. The reason might be due to during the postnatal periods there are counseling sessions about infant and child feeding practice that results in the increased awareness about adequate dietary diversity feeding practices and increase knowledge towards vitamin A reach foods.

The birth interval was also factored significantly associated with vitamin A deficiency. The children delivered within equal and greater than two years of birth interval were 60% times less likely to develop vitamin A deficiency than delivered within two years of birth interval. This in line with the study findings done in Bahir Dar [28]. The reason might be due to this interval the children's had freely breastfeeding in addition to family food and a good mother to child interaction.

Conclusion

The overall prevalence of vitamin A deficiency in this study was lower than the national and regional prevalence. According to this study, vitamin A deficiency is a mild public health problem in the study area. Age of child, birth interval, ANC follow up and PNC follow up were factors associated with Vitamin A deficiency in Dera District, North West Ethiopia. Therefore, special focus on children ages greater than 24 months. Additionally, maternal health services especially ANC, PNC, and family planning service to decrease the prevalence of vitamin A deficiency of children age 6–59 months in Dera District, North West Ethiopia.

Abbreviations

ANC Ante-Natal Care, ANRS Amhara National Regional State, CHIS Community Health Information System, DDS Dietary Diversity Score, EDHS Ethiopia Demographic Health Surveys, FAO Food and Agriculture Organizations, MUAC Mid Upper Arm Circumference, PNC Post Natal Care, SPSS Statistical Package for Social Science, VAD Vitamin A Deficiency, VAS Vitamin A Supplementation, WHO World Health Organization.

Declarations

Ethics approval and consent to participate

We obtained ethical clearance from the Ethical review committee of Faculty of chemical and food engineering of Bahir Dar University. Verbal informed consent, which was prepared in written form and dictated to the respondents during data collection, was obtained from the study participants after explaining the purpose of the study and the benefits. In case of minors (participants below 16 years old), verbal assent was obtained from their parents or guardians. Participation was on a voluntary basis and the data were kept anonymous. We used verbal consent as the majority of the respondents were unable to read and write. Ethical review committee has approved this consent. Respondents were interviewed voluntarily, anonymously and confidentiality also was assured.

Consent for publication

Not applicable

Availability of data and material

The data sets used and/or analyzed during the current study are available from the corresponding author. The data will not be shared in order to preserve participant anonymity.

Competing interests

The authors have declared that no competing interests exist.

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Author Contributions

Conceptualization: **YH**. Formal analysis: **YH HAANHTHM**. Development or design of methodology: **YH HA**. Entering data into software: **YH HAANHTTYHM**. Supervision: **YH HAANHTHMTY**. Validation: **HAANHTHMTYHM** writing original draft: **YH HA**. Writing review and editing: **YH HAANHTHMTYHM**. All authors read and approved the final manuscript.

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Figures

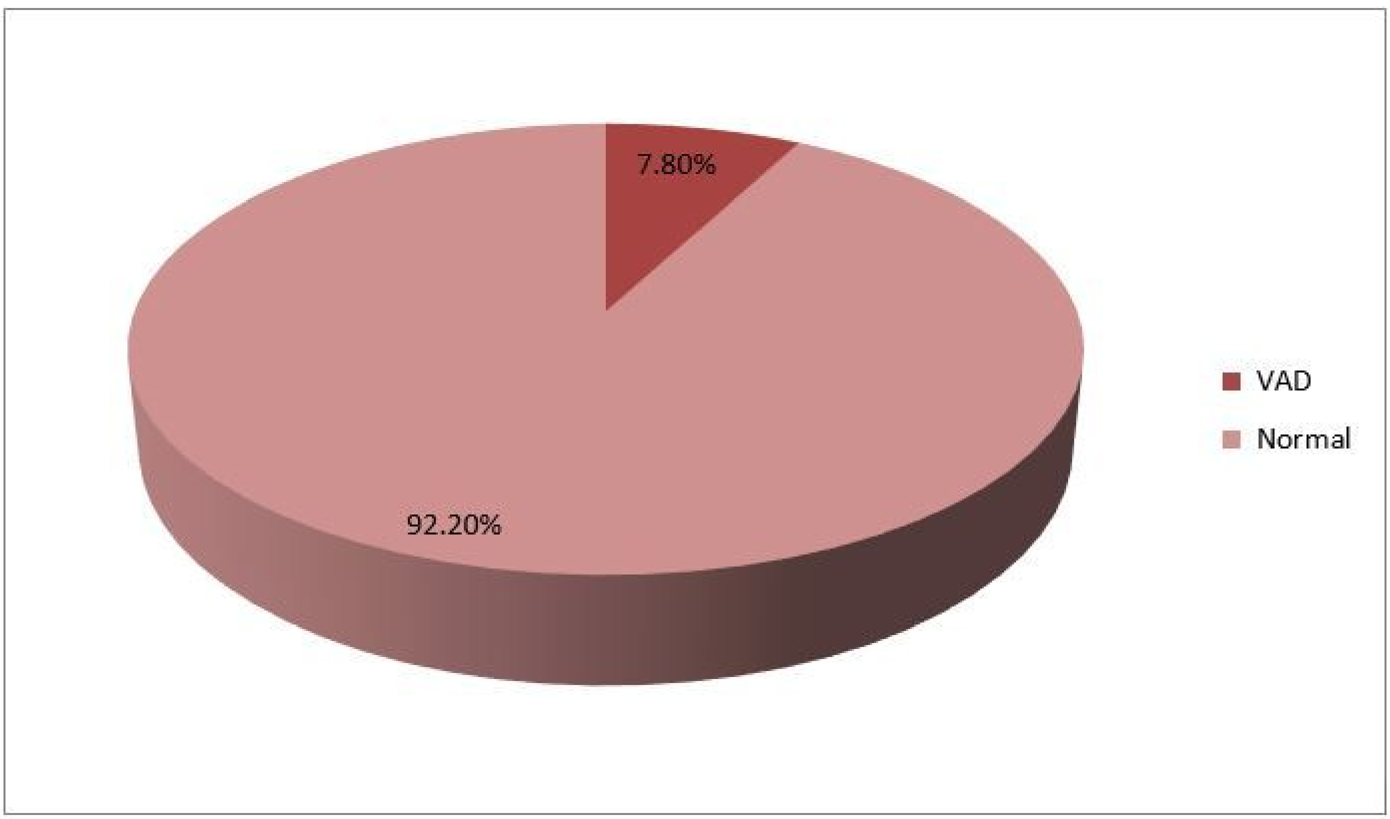

Figure 1

The prevalence of vitamin A deficiency in Dera district, North West Ethiopia, 2020.

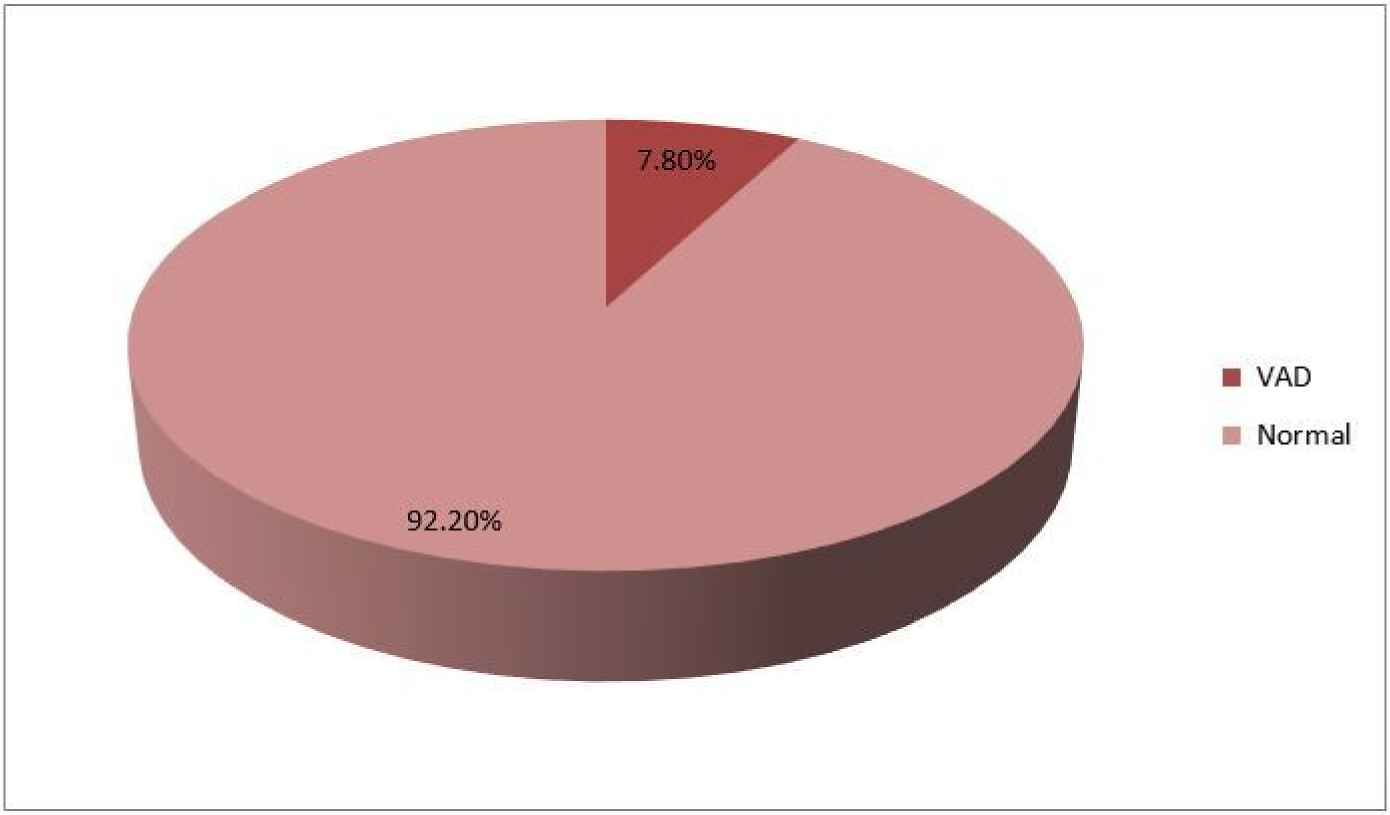

Figure 1

The prevalence of vitamin A deficiency in Dera district, North West Ethiopia, 2020.