

Research Article

Prevalence, Regional Disparities and Associated Factors of Vitamin A-rich Food Consumption Among Children 6-24 Months in Somaliland: Evidence from a National Survey

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Abstract

Micronutrient deficiencies, particularly vitamin A deficiency (VAD), pose a significant public health challenge in developing nations by contributing to child morbidity and mortality; however, empirical evidence regarding dietary intake among young children in Somaliland remains limited. This study assessed the prevalence, regional disparities, and factors associated with the consumption of vitamin A-rich foods among children aged 6–24 months in Somaliland. A secondary analysis of 1,086 children was conducted using data from the 2020 Somaliland Demographic and Health Survey (SDHS), a nationally representative community-based cross-sectional survey. The outcome variable was the consumption of vitamin A-rich foods in the 24 hours preceding the interview, and multivariable logistic regression was performed to identify independent predictors using Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI). The overall prevalence of vitamin A-rich food consumption was 56.45% (95% CI: 53.47–59.37%), with fresh milk being the predominant source (48.07%), while fruit and vegetable intake remained markedly low. Substantial regional disparities were observed, ranging from 73.24% in the Sahil region to 49.48% in the Sanaag region. Multivariable analysis revealed that children from middle (AOR = 0.59; 95% CI: 0.38–0.93) and rich (AOR = 0.50; 95% CI: 0.36–0.71) wealth quintiles were significantly less likely to consume vitamin A-rich foods compared to those from poor households. Conversely, maternal exposure to mass media was a strong positive predictor of intake (AOR = 5.04; 95% CI: 1.55–16.43). In conclusion, vitamin A-rich food consumption among young children in Somaliland is suboptimal and geographically uneven. These findings highlight a dietary paradox where higher household wealth correlates with lower intake, underscoring the vital role of maternal media exposure and nutrition education in improving child feeding practices across all socioeconomic strata.

Keywords

Vitamin A-rich Food Consumption, Geographical Variation, Children, Somaliland, Nutrients

1. Introduction

Micronutrients are essential for optimal human health, playing a critical role in numerous physiological processes vital

for child growth and development [1, 2]. These essential vitamins and minerals, though required in small quantities, signif-

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icantly influence cellular and humoral immune responses, cellular signaling and function, and cognitive development [1, 3, 4]. Adequate intake of micronutrients is foundational for children's survival and long-term well-being [5, 6]. Their absence and inadequacy in the diet negatively affect children's survival and development [7, 8]. The World Health Organization (WHO) advocates for diverse complementary feeding practices, including both plant-based foods and animal products such as meat, poultry, fish, or eggs, to ensure children meet their nutrient requirements [1, 9]. The importance of various micronutrients, including vitamin A, vitamin D, iron, and zinc, for child health is widely recognized [6, 10, 11].

Deficiencies in micronutrients among children represent a pervasive global public health challenge, predisposing them to various adverse health outcomes [1, 5, 12]. Even marginal inadequacies in dietary intake can severely impact children's survival and development, leading to conditions such as anemia, stunting, wasting, weakened immunity, and delayed cognitive development [3, 7, 8]. Among these, vitamin A deficiency (VAD) is particularly critical, as it significantly contributes to child mortality from common childhood illnesses like measles, diarrhea, malaria, and other infectious diseases [1, 3, 5, 13, 14].

Globally, VAD imposes a substantial public health burden, affecting millions of preschool-aged children and contributing to a significant number of preventable deaths [2, 5, 12]. It is estimated that approximately 250 million preschool children are vulnerable to VAD, with a quarter of a million children becoming blind annually, and half of these succumbing to death before 23 months of age [1, 15]. The global prevalence of VAD in populations at risk was estimated to be 33.3% among preschool children [5, 16, 17].

Developing regions, notably South Asia and sub-Saharan Africa, bear a disproportionately high burden of childhood malnutrition and micronutrient deficiencies [1, 5, 17, 18]. These regions are home to a significant number of chronically undernourished children, with over 200 million African children suffering from malnutrition and failing to achieve their full cognitive potential [1, 19]. The prevalence of VAD in Africa has been reported to range widely, from 8.5% to 79% [1, 20, 21]. VAD is very common in the African continent, affecting more than 30 million children, most of whom are younger than five years of age [22].

The Somalia Micronutrient Survey 2019 showed that good nutrition is still out of reach for large numbers of Somali children under the age of five. The survey revealed that 34% of

children under the age of five suffer from vitamin A deficiency, 43% of anemia and 28.6% of iron deficiency anemia; 47% of pregnant women are also anemic. The national prevalence of VAD denotes a severe public health problem in children (>30%) and a moderate public health problem in women (10%-20%) according to WHO criteria [15].

Given Somaliland's geographical location within the Horn of Africa and its socio-economic parallels with neighboring developing countries, it is highly probable that its child population faces a similar, if not greater, risk of VAD.

In Ethiopia, VAD continues to be a significant public health problem among children, with its prevalence varying considerably across different regions [1, 3]. The estimated prevalence of VAD among Ethiopian children ranges from 20% to 39% [13, 18, 21]. Reports from the Ethiopian Demographic and Health Surveys (DHS) indicate that the intake of vitamin A-rich foods among children aged 6–23 months has been consistently low, with only 38% in 2016 and 39% in 2019 meeting the criteria for intake within a 24-hour period [1, 3, 23, 24].

While extensive research has documented the prevalence and determinants of vitamin A-rich food intake among children in East African nations [1, 3, 4], a notable gap exists in the specific context of Somaliland. Therefore, this study is justified by the critical need to understand the unique prevalence, regional disparities, and associated factors of vitamin A-rich food intake among young children aged 6–24 months in Somaliland, using robust multivariate analytical approaches to guide effective nutritional programming and policy.

2. Methods

2.1. Study Area

Somaliland is a self-declared autonomous region located in the Horn of Africa, geographically positioned along the southern coast of the Gulf of Aden. The region is administratively divided into six major regions: Awdal, Marodijeh, Sahil, Togdheer, Sool, and Sanaag, with Hargeisa serving as the capital and largest city. The area is characterized by a semi-arid climate and faces significant public health challenges, including food insecurity and micronutrient deficiencies, which are often exacerbated by recurrent droughts and limited healthcare infrastructure (Figure 1).



Figure 1. Study area.

2.2. Source of Data and Study Design

This study utilized secondary data derived from the 2020 Somaliland Demographic and Health Survey (SLDHS), which serves as a nationally representative household survey. The survey employed a community-based cross-sectional study design to generate updated health and demographic indicators for the population.

2.3. Population and Sample Size

The source population for this study included all children aged 6 to 24 months residing in the selected households across the six administrative regions of Somaliland during the survey period. The final sample size consisted of 1,086 children for whom complete data regarding dietary intake and relevant maternal and household characteristics were available in the dataset.

2.4. Inclusion Criteria

The analysis included all living children aged 6 to 24 months who were residing with their mothers or primary caregivers at the time of the interview. Children who had missing values for the dietary recall outcome variable or significant missing data for key explanatory socio-demographic variables were excluded to ensure the accuracy of the statistical modeling.

2.5. Study Variables

The outcome variable, consumption of foods rich in Vitamin A, was constructed using eight dietary recall variables that capture whether the child consumed specific vitamin-A-rich food items in the past 24 hours, namely eggs (V414G), fresh milk (V411B), cheese or other milk products (V414P), meat (V414H), pumpkin/carrot/squash (V414I), fish or shellfish (V414N), organ meats such as liver (V414M), and vitamin-A-rich fruits such as mangoes or papayas (V414K). These individual items were combined to classify children into “Good consumption” (if they consumed at least one of these vitamin-A-rich foods) and “No consumption” (if they consumed none of them).

The predictor variables selected for this analysis were identified based on previous literature regarding determinants of child nutrition, data availability and sample size representativeness within the SLDHS. These included the region, residence, household wealth quintile, mother’s age, mother’s educational level, marital status, employment status, pregnancy status, age of child (months), child sex birth order (parity), household’s exposure to mass media.

2.6. Data Management and Data Analysis

All data management steps were conducted using a statistical software of STATA 16.0 to prepare the final dataset for rigorous testing. Descriptive statistics, including frequencies and percentages, were used to summarize the socio-demo-

graphic characteristics of the study participants. Bivariable logistic regression was initially performed to assess the crude association between each predictor variable and the outcome variable, with those having a p-value < 0.25 considered for further analysis. A multivariable logistic regression model was then employed to identify statistically significant predictors while controlling for confounding factors. The strength of association was measured using Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI), and statistical significance was declared at a p-value < 0.05. Multi-collinearity among independent variables was also assessed using variance inflation factor (VIF) and a value of 10 was used as cut off.

2.7. Ethics Approvals

As this study involved a secondary analysis of the 2020 SLDHS, its publicly available secondary data. Informed consent was obtained from all participants during primary data collection. Formal permission to access and analyze this dataset was granted by the DHS Program.

3. Results

3.1. Socio-demographic and Economic Characteristics

A total of 1,086 children aged 6–24 months participated in the study. The majority of mothers (74.40%) were between the ages of 20 and 34 years. Educational attainment among mothers was notably low, with 85.17% having no formal education. In terms of economic status, the majority of households (66.21%) were classified as poor, and 99.82% of mothers reported not working. The study participants were fairly evenly distributed between rural (52.30%) and urban (47.70%) settings (Table 1).

Table 1. Descriptive Statistics of children aged 6–24 months in Somaliland, $n = 1086$.

Variable	Category	Frequency	Percent
Mother's Age	<20 years	84	7.73%
	20-34 years	808	74.40%
	35-49 years	194	17.86%
Mother's Education	No Education	925	85.17%
	Primary	133	12.25%
	Secondary	23	2.12%
	Higher	5	0.46%
Wealth Quintile	Poor	719	66.21%

Variable	Category	Frequency	Percent
Work Status	Middle	95	8.75%
	Rich	272	25.05%
	Yes	2	0.18%
	No	1,084	99.82%
Parity	<3 births	296	27.26%
	3-4 births	344	31.68%
	5+ births	446	41.07%
Marital Status	Married	1,029	94.75%
	Divorced	35	3.22%
	Widowed	22	2.03%
Pregnant Status	Yes	208	19.15%
	No	878	80.85%
Child Age	6-8 months	193	17.77%
	9-11 months	144	13.26%
	12-17 months	419	38.58%
	18-24 months	330	30.39%
Child Sex	Female	495	45.58%
	Male	591	54.42%
Media Exposure	No exposure	1,067	98.25%
	Have exposure	19	1.75%
Region	Awdal	46	4.24%
	Marodijeh	48	4.42%
	Sahil	71	6.54%
	Togdheer	130	11.97%
	Sool	403	37.11%
	Sanaag	388	35.73%
Residence	Rural	568	52.30%
	Urban	518	47.70%

3.2. Prevalence and Sources of Vitamin A-rich Food Consumption

The overall prevalence of adequate Vitamin A-rich food consumption was found to be 56.45% ($n = 613$), while 43.55% ($n = 473$) of children had inadequate consumption (Figure 2).

Regarding specific food sources, fresh milk was by far the most consumed Vitamin A source, consumed by 48.07% of children. Consumption of other Vitamin A-rich foods was significantly lower. Only 7.73% consumed dairy products like cheese or yogurt, 7.09% consumed meat, and 7% consumed organs. Plant-based sources were also low, with only 6.63% consuming pumpkins/carrots and 6.17% consuming Vitamin

A-rich fruits (Table 2).

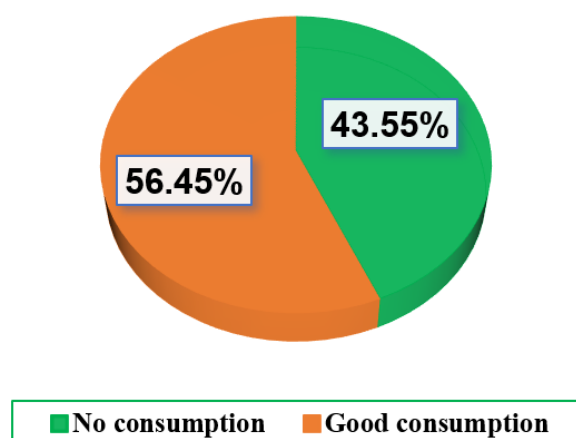


Figure 2. Vitamin A-rich food consumption.

Table 2. Sources of Vitamin A-rich food consumption among children aged 6–24 months in Somaliland, $n = 1086$.

Variable (Food Item)	Category	n	%
Eggs	Yes	40	3.68
	No	1,046	96.32
Fresh milk	Yes	522	48.07
	No	564	51.93
Cheese, yogurt, milk products	Yes	84	7.73
	No	1,002	92.27

Variable (Food Item)	Category	n	%
Meat	Yes	77	7.09
	No	1,009	92.91
Pumpkin, carrots, squash	Yes	72	6.63
	No	1,014	93.37
Fish or shellfish	Yes	29	2.67
	No	1,057	97.33
Organs	Yes	76	7
	No	1,010	93
Vitamin A fruits	Yes	67	6.17
	No	1,019	93.83

3.3. Regional Distribution of Vitamin A Consumption

Figure 3 illustrates the spatial distribution of Vitamin A consumption prevalence across the regions of Somaliland. There is notable regional heterogeneity in dietary habits. The Sahil region exhibited the highest prevalence of Vitamin A-rich food consumption at 73.24%, followed closely by Togdheer (69.23%) and Maroodi Jeex (64.58%). Conversely, the eastern regions showed lower consumption rates, with Sanaag recording the lowest prevalence at 49.48%, followed by Sool (55.33%) and Awdal (54.35%). This geographic variation implies that factors such as regional climate, access to markets, or local pastoral practices specifically regarding milk availability may influence consumption levels.

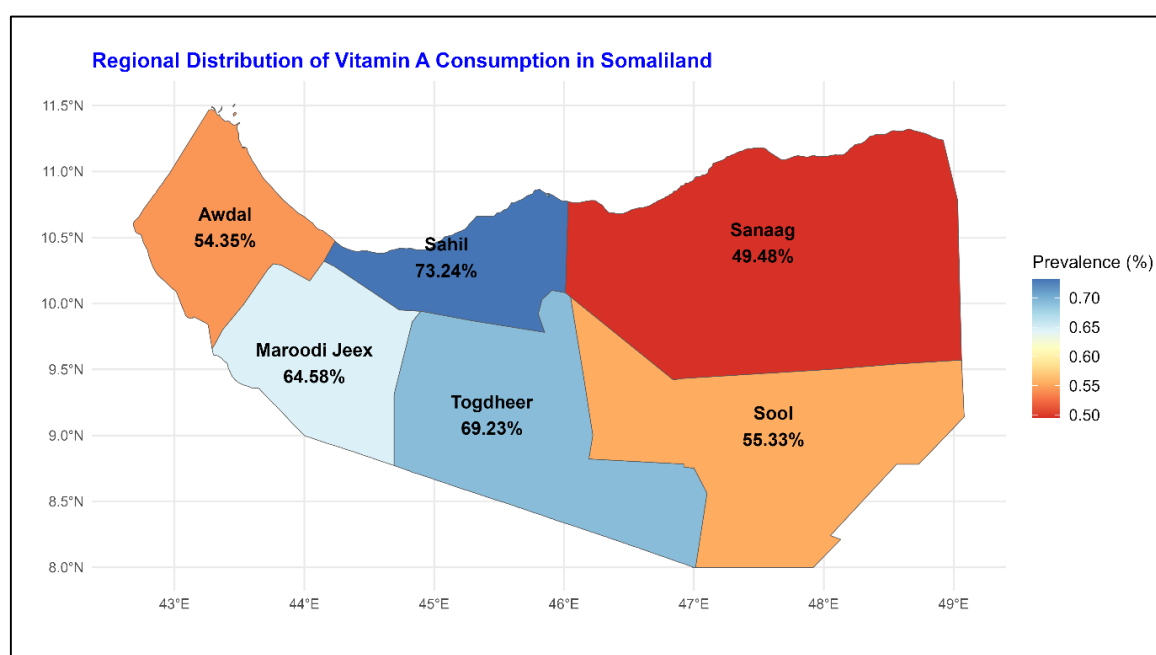


Figure 3. Spatial distribution of Vitamin A consumption in Somaliland.

3.4. Factors Associated with Consumption of Vitamin A-rich Food

Bivariable and multivariable logistic regression analyses were performed to identify predictors of Vitamin A consumption (Table 3). In the multivariable analysis, wealth quintile and media exposure were found to be statistically significant predictors ($p < 0.05$). Children from households in the middle wealth quintile (AOR = 0.59; 95% CI: 0.38–0.93) and rich wealth quintile (AOR = 0.50; 95% CI: 0.36–0.71) were less

likely to consume Vitamin A-rich foods compared to those in the poor wealth quintile. Media exposure showed a strong positive association. Children of mothers who had exposure to media were 5.04 times more likely (AOR = 5.04; 95% CI: 1.55–16.43) to have good Vitamin A consumption compared to those with no exposure. Other factors, including maternal age, education level, parity, and marital status, did not show statistically significant associations with Vitamin A consumption in the multivariable model ($p > 0.05$).

Table 4. Bivariate and multivariate Analysis of Factors Associated with Vitamin A-Rich Food Consumption among children aged 6–24 months in Somaliland, $n = 1086$.

Variable	Category	Vitamin A Consumption		COR (95% CI)	AOR (95% CI)	P-value
		No (%)	Yes (%)			
Mother's Age	<20 years	38.10%	61.90%	1		
	20-34 years	43.69%	56.31%	0.79 (0.49-1.29)	0.65 (0.39-1.10)	0.108
	35-49 years	45.36%	54.64%	0.74 (0.44-1.25)	0.56 (0.30-1.04)	0.067
Mother's Education	No Education	42.59%	57.41%	1		
	Primary	48.87%	51.13%	0.78 (0.54-1.12)	0.96 (0.64-1.45)	0.843
	Secondary	47.83%	52.17%	0.81 (0.35-1.85)	1.20 (0.49-2.92)	0.690
	Higher	60.00%	40.00%	0.49 (0.08-3.02)	0.70 (0.11-4.53)	0.704
Wealth Quintile	Poor	37.41%	62.59%	1		
	Middle	53.68%	46.32%	0.52 (0.34-0.79)**	0.59 (0.38-0.93)	0.023
	Rich	56.25%	43.75%	0.47 (0.35-0.62)**	0.50 (0.36-0.71)**	0.000
Work Status	Yes	100.00%	0.00%	1		
	No	43.45%	56.55%	-†	-†	-
Parity	<3 births	45.27%	54.73%	1		
	3-4 births	43.60%	56.40%	1.07 (0.78-1.46)	1.20 (0.86-1.69)	0.288
	5+ births	42.38%	57.62%	1.12 (0.83-1.52)	1.37 (0.96-1.94)	0.080
Marital Status	Married	42.66%	57.34%	1		
	Divorced	60.00%	40.00%	0.50 (0.25-0.99)	0.64 (0.31-1.32)	0.223
	Widowed	59.09%	40.91%	0.52 (0.22-1.22)	0.46 (0.19-1.12)	0.087
Pregnant Status	Yes	40.87%	59.13%	1		
	No	44.19%	55.81%	0.87 (0.64-1.19)	0.89 (0.64-1.24)	0.488
Child Age (months)	6-8	47.15%	52.85%	1		
	9-11	38.89%	61.11%	1.40 (0.91-2.17)	1.48 (0.93-2.35)	0.098
	12-17	42.48%	57.52%	1.21 (0.87-1.68)	1.24 (0.86-1.79)	0.254
	18-24	44.85%	55.15%	1.10 (0.76-1.58)	1.07 (0.73-1.57)	0.742
Child Sex	Female	42.83%	57.17%	1		
	Male	44.16%	55.84%	0.95 (0.74-1.21)	0.99 (0.77-1.28)	0.938

Variable	Category	Vitamin A Consumption		COR (95% CI)	AOR (95% CI)	P-value
		No (%)	Yes (%)			
Media Exposure	No exposure	43.96%	56.04%	1		
	Exposure	21.05%	78.95%	2.94 (0.97-8.91)	5.04 (1.55-16.43)**	0.007
Region	Awdal	45.65%	54.35%	1		
	Marodijeh	35.42%	64.58%	1.53 (0.68-3.46)	1.42 (0.61-3.30)	0.411
	Sahil	26.76%	73.24%	2.30 (1.05-5.03)	2.03 (0.92-4.49)	0.080
	Togdheer	30.77%	69.23%	1.89 (0.95-3.77)	1.90 (0.94-3.84)	0.074
	Sool	44.67%	55.33%	1.04 (0.56-1.93)	1.20 (0.63-2.26)	0.584
	Sanaag	50.52%	49.48%	0.82 (0.43-1.58)	1.00 (0.53-1.91)	0.990
Residence	Rural	41.37%	58.63%	1		
	Urban	45.95%	54.05%	0.83 (0.65-1.06)	0.85 (0.66-1.09)	0.190

**Significant at $p < 0.05$

†Could not be estimated due to sparse data (only 2 observations in "Yes" category for work status)

4. Discussion

According to the World Health Organization (WHO), people should receive vitamin A supplements two times per year [9].

This study confirmed that 56.45% (95% CI: 53.47–59.37) of children aged 6–24 months had vitamin A rich foods intake within, or in the last 24 h in Somaliland. This finding is higher than study done in rural Burundi (16%) and Rwanda (23%) [25], Ghana (52%) [18], and Ethiopia (13.3%–24%) [26]. The possible reason for this variation may be due to socio-demographic variation, recent advancements in health care delivery, and accessibility of health care services. However, this finding is lower when we compared with studies done in different areas such as India (58.1%) [27], Malawi (79.1%) [28], and Uganda (66.5%) [29]. The possible justification for variation may be due to differences in socio-demographic and economic characteristics, study setting, and maternal healthcare characteristics.

In multivariable logistic regression analysis, household wealth status, and Media exposure were statistically significant factors for vitamin A rich foods intake among children aged from 6–24 months in Somaliland.

Mothers in the middle wealth category (AOR = 0.59; 95% CI: 0.38–0.93) and those in the rich wealth category (AOR = 0.50; 95% CI: 0.36–0.71) were 41% and 50% less likely, respectively, to consume adequate vitamin A-rich foods compared with mothers in the poor wealth category.

Unexpectedly, this study found that adequate vitamin A consumption was higher among women in the poor wealth

category compared to those in the middle and rich categories. This finding is inconsistent with previous research [5, 15, 30–32]. A possible explanation is that women from wealthier households, despite having economic access, may prioritize Vitamin A-rich foods less than their counterparts.

In the present study, media significantly affects the intake of vitamin A rich foods among children aged from 6 to 24 months in Somaliland. Those children whose mothers had exposure to media were 5.04 times more likely (AOR = 5.04; 95% CI: 1.55–16.43) to intake vitamin A rich foods than children whose mother had no exposure.

This finding is in line with studies done in different parts of Ethiopia [26, 33–37], Bangladesh [38], and Indonesia [39]. This might be the impact of media for promoting child feeding practice and mothers' exposure to media able to feed different foods groups to their children.

5. Strengths and Limitation

Since the study is done through using SLDHS national datasets which the finding may have good generalizability. Conducting multivariate logistic regression model and the larger sample size proved important in maintaining the internal validity of the study by helping provide precise descriptive and analytic findings are considered as the strength of this study.

As a limitation, since the data was collected retrospectively it may prone recall bias. As long as the 2020 SLDHS dataset has no observation for some variables, important variables which determine vitamin A rich foods intake among children may not be included under this study.

6. Conclusion and Recommendation

The magnitude of Vitamin A rich foods intake among children aged 6–24 months across the regions of Somaliland is insufficient at national level. Independent variables such as wealth status of mother, and Media exposure were significantly associated with vitamin A rich foods intake among children aged 6–24 months. Therefore, policymakers should give due attention to the poor wealth status, and media non-exposed mothers, to improve good consumption of foods rich in vitamin A among children aged 6–24 months in Somaliland.

Abbreviations

AOR	Adjusted Odds Ratio
CI	Confidence Interval
SLDHS	Somaliland Demographic and Health Survey
VAD	Vitamin A Deficiency
VIF	Variance Inflation Factor
WHO	World Health Organization

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Author Contributions

Abdifatah Ibrahim Mouse: Conceptualization, Data curation, Formal Analysis, Methodology, Project administration, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing

Ridwan Abdi Ibrahim: Conceptualization, Data curation, Formal Analysis, Investigation, Software, Validation, Visualization, Writing – original draft, Writing – review & editing

Ibrahim Omar Abdi: Conceptualization, Investigation, Methodology, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing

Data Availability Statement

The data presented in this study are available upon reasonable request from the corresponding author.

Conflicts of Interest

The authors declare no conflicts of interest.

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