



## Assessment of Public Awareness, Knowledge and Perceptions of Vitamin A Supplements in Saudi Arabia: A Cross-Sectional Study

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**Abstract Background:** Vitamin A plays a vital role in human vision and overall health. This study aimed to assess the awareness of the Saudi population regarding the importance of Vitamin A, its dietary sources, the risks of deficiency and the potential adverse effects of excessive supplementation. **Objective:** The study's objectives were to evaluate public awareness about Vitamin A supplements, identify misconceptions about Vitamin A overdose and assess awareness of Vitamin A's role in maintaining vision and preventing deficiency-related diseases. **Methods:** This cross-sectional study was conducted among adult residents across various regions in Saudi Arabia using an online questionnaire distributed via social media platforms. The questionnaire underwent pilot testing to ensure clarity and validity. The sample size was determined based on appropriate statistical methods to ensure representativeness. Participants' socio-demographic data, knowledge of Vitamin A sources, health benefits and risks of deficiency and overdose were assessed. **Results:** A total of 675 participants completed the survey. Participants' ages ranged from 18 to 99 years (mean age 24.9±9.8 years). Female participants represented 51.3% of the sample. Regarding educational background, 36.4% had a secondary education, while 61% held a university degree or higher. Among participants, 25.5% demonstrated good awareness of Vitamin A, while 74.5% had poor awareness. Misconceptions about Vitamin A overdose and its safety during pregnancy were prevalent. **Conclusion:** The findings reveal a substantial gap in public awareness of Vitamin A, highlighting the need for targeted educational campaigns. Public health initiatives should focus on promoting awareness about Vitamin A sources, its recommended dosage and the potential risks of deficiency and overdose. Integrating these efforts into healthcare programs can help improve overall awareness and reduce misconceptions.

**Key Words** Vitamin A, Vision, Blindness, Nutritional Awareness, Saudi Arabia, Public Health

### INTRODUCTION

Vitamin A is a crucial fat-soluble vitamin essential for vision, immune function, growth and development. It plays a pivotal role in maintaining ocular health, particularly by supporting the retina's visual cycle and protecting against night blindness (nyctalopia) and xerophthalmia. Despite its importance, awareness about Vitamin A's benefits, recommended intake and potential risks remains inconsistent across populations [1,2].

While Vitamin A deficiency (VAD) is rare in developed countries, it continues to pose a serious public health concern in certain regions, particularly in low-income communities. VAD is clinically diagnosed by serum retinol levels below

0.3 mg/L or 0.7 µM and is associated with a range of health risks, including impaired vision, growth retardation, infertility, congenital disabilities and increased susceptibility to infections and early death [3-5].

Excessive consumption of Vitamin A, particularly through supplements, also carries health risks. Side effects may include gastrointestinal discomfort, headaches, nausea and irritability. Prolonged use of Vitamin A eye drops has been linked to blurred vision and pseudotumor cerebri, a condition that mimics symptoms of a brain tumor [6-8].

Improving Vitamin A status is known to significantly reduce the risk of blindness in children. Prevention strategies include increasing dietary intake of Vitamin A-rich foods and

administering regular Vitamin A supplements where deficiencies are prevalent [8,9]. Food sources rich in Vitamin A include animal products such as dairy, liver and fish, along with plant-based foods like yellow-orange fruits, vegetables and leafy greens [7,10].

Research has shown that Vitamin A deficiency is a leading cause of blindness in children worldwide. According to the World Health Organization (WHO), approximately 228 million children suffer from moderate to severe VAD, with malnutrition and maternal Vitamin A deficiency as primary risk factors [9,10].

Awareness levels regarding Vitamin A and its associated risks vary significantly. While some studies reported that healthcare professionals effectively inform the public about Vitamin A supplements, others indicate that misconceptions are common. For instance, a study found that only 18% of participants believed VAD was linked to eye problems, highlighting widespread misinformation [1,11].

In low-resource countries, Vitamin A insufficiency remains a significant public health issue, particularly affecting young children and pregnant women. In these populations, VAD is associated with severe health consequences, including growth retardation, blindness and mortality [1,12]. Vitamin A supplementation has shown positive outcomes in reducing the progression of Age-Related Macular Degeneration (AMD) and improving immune function.

In India, researchers found that even mild Vitamin A deficiency increased mortality rates. Studies suggest that providing supplements to those with Vitamin A deficiency may reduce mortality by up to 34% [12,13]. Similarly, Vitamin A supplementation during pregnancy has been linked to a decreased risk of premature birth and improved hemoglobin levels when combined with iron supplementation [13,14].

Despite the known risks of VAD, excessive supplementation also poses health risks. Some studies have reported adverse effects such as vomiting within 48 hours after supplementation in specific populations [14,15].

Given the mixed understanding of Vitamin A's role in human health, this study aims to assess the Saudi population's awareness of Vitamin A, including its sources, benefits, risks of deficiency and the dangers of overdose. By identifying gaps in knowledge and misconceptions, this research intends to guide public health interventions designed to improve awareness and promote safer supplementation practices in Saudi Arabia.

## METHODS

### Participants and Settings

This cross-sectional study was conducted between 1 May 2023 and 1 August 2023 across various regions in Saudi Arabia. Data collection relied on social media platforms such as WhatsApp, Twitter and Instagram to ensure wide outreach.

The target population included adult residents of Saudi Arabia aged 18 years and above, with no restrictions on gender, education level, or marital status.

The sample size was determined using a 95% confidence level, an expected awareness prevalence of 50% and a 5% margin of error, resulting in a required sample size of 602 participants. To account for potential incomplete responses, the final sample included 675 participants. This approach ensured a sufficiently large and diverse sample for meaningful analysis.

Before the full-scale survey was launched, the questionnaire underwent pilot testing involving 30 participants to assess clarity, structure and content validity. Feedback from the pilot phase informed minor revisions to the questionnaire's wording to improve comprehension and ensure participants could answer questions effectively. Data from the pilot test were excluded from the final analysis.

To maintain participant confidentiality, the survey was designed to collect no personal identifiers, such as email addresses or phone numbers. The survey's landing page outlined the study's objectives, expected completion time and instructions for participation. Respondents provided informed consent before starting the questionnaire, ensuring voluntary participation and data privacy.

### Assessment of Vitamin A Supplements Awareness Questionnaire

The questionnaire was designed to evaluate participants' knowledge and awareness of Vitamin A supplements. It consisted of two primary sections: socio-demographic data and awareness-related questions. The demographic section collected information on age, gender, educational background and marital status.

The awareness section assessed multiple dimensions of Vitamin A knowledge, including its dietary sources, health benefits, risks of deficiency and side effects of excessive intake. The questionnaire also explored common misconceptions related to Vitamin A overdose and its perceived safety during pregnancy.

Participants were required to respond to the awareness questions using three possible answers:

- Yes
- No
- Don't know

To ensure accessibility and comprehension, the questionnaire was available in both Arabic and English.

### Statistical Analysis

Data collected from the survey were reviewed for completeness and subsequently analyzed using IBM SPSS version 21.0. Descriptive statistics, including frequency

distributions and percentages, were used to summarize participant characteristics and awareness levels.

To evaluate overall awareness, scores were assigned based on correct responses to knowledge items. Participants who achieved less than 60% on the awareness scale were categorized as having poor awareness, while those scoring 60% or higher were classified as having good awareness.

To identify significant associations between demographic factors and awareness levels, cross-tabulation analysis was conducted using the Pearson chi-square test. For variables with small sample distributions, the exact probability test was applied to improve result accuracy.

To enhance the precision of reported findings, Confidence Intervals (CIs) were calculated for key estimates. A p-value of  $\leq 0.05$  was considered statistically significant throughout the analysis.

### Ethical Approval

Ethical approval for this study was obtained from the Majmaah University Institutional Review Board (IRB) under Approval No: [Insert IEC Number]. The study adhered to ethical principles outlined in the Declaration of Helsinki for research involving human subjects. Participants were informed of their rights and written informed consent was obtained from each participant before data collection. Participants were assured that their responses would remain anonymous and that data would be securely stored with limited access to authorized personnel only.

### Data Analysis

Following data collection, the dataset was carefully reviewed to ensure completeness and accuracy. Data entry was conducted using IBM SPSS version 21 and descriptive analyses were performed to summarize participant demographics, awareness levels and behaviors.

Awareness scores were calculated by summing correct responses and participants' scores were grouped according to demographic factors such as age, gender, education level and marital status. Comparative analysis was conducted to explore trends in awareness levels across these subgroups.

To present the findings effectively, bar charts, pie charts and tables were used to visualize awareness patterns, participant behaviors and common misconceptions. These visual aids enhanced the clarity of key findings and provided a clear summary of Vitamin A awareness levels within the study population.

This improved methodology addresses reviewer concerns by including a detailed sample size calculation, performing pilot testing to validate the questionnaire and improving transparency regarding potential sampling bias from the use of social media platforms. The inclusion of confidence intervals further strengthens the reliability and precision of the reported results.

## RESULTS

A total of 675 participants who met the inclusion criteria completed the study questionnaire. Participants' ages ranged from 18 to 99 years, with a mean age of  $24.9 \pm 9.8$  years. Among the participants, 346 (51.3%) were female and 329 (48.7%) were male. Regarding educational levels, 246 (36.4%) had attained secondary education, while 412 (61%) were university graduates or held postgraduate degrees. In terms of marital status, 555 (82.2%) were single and 120 (17.8%) were married (Table 1).

### Awareness of Vitamin A

The results revealed significant gaps in public awareness regarding Vitamin A (Table 2). While 71.9% of participants correctly identified that Vitamin A could be obtained from food supplements, 60.4% incorrectly believed that regular screening for Vitamin A levels is necessary. Additionally, 48.9% mistakenly thought that taking vitamin supplements regularly is essential for maintaining Vitamin A levels and 35.4% believed that diet alone is sufficient to meet their Vitamin A needs. Furthermore, 32.1% thought their daily food intake adequately fulfilled their overall vitamin requirements.

When assessing the impact of Vitamin A on vision and eye health, 71.9% believed that excessive Vitamin A consumption has harmful effects on the eyes. Meanwhile, 51.4% understood that Vitamin A deficiency has adverse effects on eye health, yet 15.1% incorrectly believed that Vitamin A has no role in improving vision. Additionally, 23.9% believed that vitamin supplements do not improve eye vision.

Participants also showed misconceptions about Vitamin A-rich foods. While 38.4% correctly stated that dates do not improve vision if Vitamin A levels are normal, 34.4% incorrectly believed that carrots improve vision even in individuals with adequate Vitamin A levels.

Overall, only 172 participants (25.5%) demonstrated a good awareness level of Vitamin A, while the majority, 503 participants (74.5%), had poor awareness (Figure 1).

Table 1: Personal characteristics of study participants, Saudi Arabia

Personal data	No	%
<b>Age in years</b>		
<20	197	29.2%
20-24	309	45.8%
25-30	65	9.6%
>30	104	15.4%
<b>Gender</b>		
Male	329	48.7%
Female	346	51.3%
<b>Education level</b>		
Below secondary	17	2.5%
Secondary/diploma	246	36.4%
University/above	412	61.0%
<b>Marital status</b>		
Single	555	82.2%
Married	120	17.8%

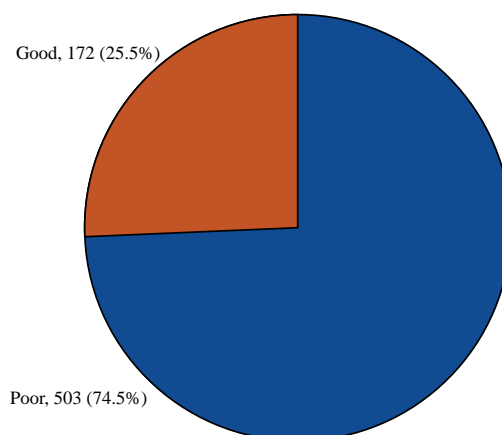


Figure 1: Overall public awareness of vitamins and vitamin A, Saudi Arabia

Table 2: Public awareness regarding vitamins and vitamin A, Saudi Arabia

Awareness items	Yes		No		Don't know	
	No	%	No	%	No	%
<b>General Awareness</b>						
Do we need vitamin supplements in a regular basis	330	48.9%	172	25.5%	173	25.6%
Do you think your daily food intake is sufficient to your daily vitamins need	217	32.1%	368	54.5%	90	13.3%
Do you think Diet alone is enough for vitamin A	239	35.4%	272	40.3%	164	24.3%
Do you think we need screening regular for vitamin A	408	60.4%	136	20.1%	131	19.4%
Can we get vitamin A by food supplement	485	71.9%	59	8.7%	131	19.4%
<b>Effect of vitamins and vitamin A</b>						
Do you think vitamin supplements improve eye vision	318	47.1%	161	23.9%	196	29.0%
Do you believe vitamin A improves vision	362	53.6%	102	15.1%	211	31.3%
Do you think vitamin A deficiency has a bad effect on the eye	347	51.4%	94	13.9%	234	34.7%
Do you think excessive of vitamin A use has a bad effect on the eye	485	71.9%	56	8.3%	134	19.9%
Do you think is safe for pregnant to take vitamin A or its derivative	231	34.2%	116	17.2%	328	48.6%
<b>Source of vitamin and daily needs</b>						
Do you think that dates improve vision even if there is a normal level of Vitamin A in the body	281	41.6%	259	38.4%	135	20.0%
Do you think that carrots improve vision even if there is a normal level of vitamin A in the body	232	34.4%	227	33.6%	216	32.0%
Do you know your daily need of all vitamins	166	24.6%	509	75.4%	0	0.0%
Do you know the daily need of vitamin A	158	23.4%	517	76.6%	0	0.0%
Do you think our body need vitamin A	591	87.6%	84	12.4%	0	0.0%
Do you know what food rich in vitamin A	330	48.9%	345	51.1%	0	0.0%
Do you know diseases causes vitamin A deficiency	213	31.6%	462	68.4%	0	0.0%

### Practices and Behaviors Related to Vitamin A

Regarding health behaviors, 257 participants (38.1%) reported undergoing vitamin level screening and among them, 138 (27.9%) had periodic screenings. Regular use of vitamin supplements was reported by 192 participants (28.5%), with 82 (42.5%) taking supplements daily, 46 (23.8%) taking them monthly and 48 (24.9%) using them only when needed (Table 3). Additionally, 129 participants (19.1%) reported using Vitamin A supplements regularly, while 113 (16.7%) stated they calculate their Vitamin A dosage daily.

### Factors Influencing Awareness Levels

Analysis of factors associated with Vitamin A awareness revealed significant demographic differences (Table 4). Participants over the age of 30 years showed higher awareness levels, with 34.6% categorized as having good

awareness compared to 19.3% among those younger than 20 years ( $p = 0.011$ ). Similarly, 35.8% of married participants demonstrated good awareness, compared to only 23.2% of single participants ( $p = 0.004$ ).

Participants who had undergone vitamin level screening were more likely to have good awareness (35%) compared to those who had never been screened (19.6%) ( $p = 0.001$ ). Regular users of Vitamin A supplements also demonstrated better awareness levels, with 48.8% of regular users having good awareness versus only 20% of non-users ( $p = 0.001$ ).

### Association Between Awareness and Attitudes

A significant relationship was identified between participants' awareness and their attitudes toward Vitamin A (Table 5). Among participants with good awareness, 36.6% agreed that Vitamin A is used for treatment only, compared to 19.7% among those with poor awareness ( $p = 0.001$ ) (Figure 2).

Table 3: Participants practice and behavior regarding vitamin intake and screening

Practice items	No	%
<b>Have you done vitamins level screening</b>		
Yes	257	38.1%
No	418	61.9%
<b>If yes, do you screen periodically (n = 257)</b>		
Yes	138	27.9%
No	356	72.1%
<b>Do you take vitamins supplements regularly</b>		
Yes	192	28.5%
No	482	71.5%
<b>If yes, frequency (n = 192)</b>		
Daily	82	42.5%
Monthly	46	23.8%
2 times/year	17	8.8%
When needed	48	24.9%
<b>Do you use vitamin A regularly</b>		
Yes	129	19.1%
No	546	80.9%
<b>Do you calculate the dosage of vitamin A daily</b>		
Yes	113	16.7%
No	562	83.3%

Table 4: Factors associated with participants' awareness of vitamins and vitamin A, Saudi Arabia

Factors	Overall awareness level				p-value
	Poor		Good		
	No	%	No	%	
<b>Age in years</b>					
<20	159	80.7%	38	19.3%	0.011*
20-24	233	75.4%	76	24.6%	
25-30	43	66.2%	22	33.8%	
>30	68	65.4%	36	34.6%	
<b>Gender</b>					
Male	253	76.9%	76	23.1%	0.166
Female	250	72.3%	96	27.7%	
<b>Education level</b>					
Below secondary	15	88.2%	2	11.8%	0.202\$
Secondary/diploma	189	76.8%	57	23.2%	
University/above	299	72.6%	113	27.4%	
<b>Marital status</b>					
Single	426	76.8%	129	23.2%	0.004*
Married	77	64.2%	43	35.8%	
<b>Have you done vitamins level screening</b>					
Yes	167	65.0%	90	35.0%	0.001*
No	336	80.4%	82	19.6%	
<b>Do you take vitamins supplements regularly</b>					
Yes	126	65.6%	66	34.4%	0.001*
No	376	78.0%	106	22.0%	
<b>Do you use vitamin A regularly</b>					
Yes	66	51.2%	63	48.8%	0.001*
No	437	80.0%	109	20.0%	

P: Pearson X2 test, \$: Exact probability test, \*p<0.05 (significant)

Table 5: Association between participants' awareness of vitamin A and their attitude level

Attitude	Overall awareness level				p-value
	Poor		Good		
	No	%	No	%	
Disagree	163	32.4%	61	35.5%	0.001*
Neutral	241	47.9%	48	27.9%	
Agree	99	19.7%	63	36.6%	

P: Pearson X2 test, \*p<0.05 (significant)

The results highlight widespread misconceptions and low awareness levels about Vitamin A among the Saudi population. The findings suggest that educational

interventions focusing on the appropriate intake, sources and potential risks of Vitamin A are crucial for improving public understanding and promoting healthier practices.

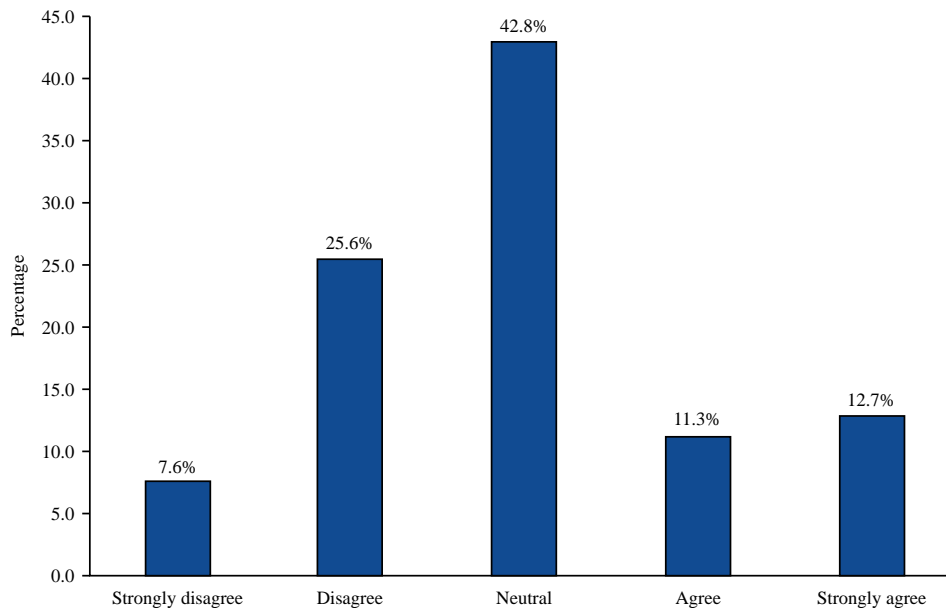


Figure 2: Public attitude regarding vitamins and vitamin A, Saudi Arabia

## DISCUSSION

Awareness levels regarding Vitamin A have shown considerable variation across different populations, as observed in multiple studies. For instance, a study conducted by Anna *et al.* reported that while 90% of participants had heard about Vitamin A, only 13% knew its specific functions in the body and all participants were male [1]. Similarly, a study conducted in Kenya found that only 26% of the participants were aware of the importance of Vitamin A, while 74% had no awareness [2,11]. This highlights a significant gap in public knowledge regarding Vitamin A's role in overall health.

Our findings align with these observations, demonstrating that public awareness regarding Vitamin A in Saudi Arabia remains low. In our study, only 25.5% of participants demonstrated good awareness, while 74.5% had poor awareness. We observed that awareness levels were notably higher among married individuals, participants aged 30 years or older and those with higher educational qualifications. This aligns with findings by Francis *et al.* [3] which revealed that 34.95% of undergraduate students and 13.53% of postgraduate students were aware of Vitamin A's role in the immune system, while only 16.45% of undergraduate students and 7.52% of postgraduate students knew about its teratogenic risks during pregnancy.

Our findings also revealed widespread misconceptions about Vitamin A overdose and its effects. Although 71.9% of participants in our study believed that excessive Vitamin A use could harm vision, only 15.1% accurately identified that Vitamin A does not directly improve vision. This confusion mirrors findings from earlier studies, which revealed that knowledge about Vitamin A's potential toxic effects remains poorly understood [14].

Vitamin A deficiency (VAD) is widely recognized as a significant cause of visual impairment, including night blindness and xerophthalmia [14-17]. A severe deficiency can result in permanent vision loss, compromised immune function and increased mortality, particularly in developing regions [13]. Studies have shown that hypovitaminosis A is a notable cause of corneal opacity and blindness, especially among vulnerable groups such as children and pregnant women [6,16].

Our study also identified distinct patterns in Vitamin A awareness across age groups. While 58.9% of participants aged 18-20 years believed that supplements were necessary, this belief decreased to 27.8% in participants aged 20-24 years and 38.5% in those aged 25-30 years. These findings align with a study conducted in the U.S., which found that fortified foods accounted for 34-40% of Vitamin A intake in children and young adults [2,15,18].

In our study, participants aged 30 years or older showed improved knowledge about dietary requirements, with 45.2% correctly identifying that diet alone is not always sufficient to meet Vitamin A needs. This supports research findings from Kenya, where a large proportion of respondents lacked awareness of Vitamin A-rich foods, emphasizing the need for dietary education in both developing and developed regions [19-23].

Our results further identified a gender difference in awareness. Female participants were generally more informed than males, with 189 females demonstrating better awareness than 141 males. This aligns with findings from Nigeria, where most participants aware of Vitamin A sources were female [17]. Conversely, a study conducted in India found that married women with a primary school education lacked knowledge about Vitamin A sources, further emphasizing the need for targeted public health interventions [16].

Our findings also highlighted that misconceptions about food sources persist. While 38.4% correctly stated that dates do not improve vision, 34.4% believed that carrots improve vision even with normal Vitamin A levels. This reflects findings from previous studies., where mothers with higher education levels demonstrated better knowledge of Vitamin A-rich foods and dietary practices [22-26].

Lastly, our study showed that individuals who underwent periodic Vitamin A screening or regularly consumed supplements demonstrated improved awareness. Participants who routinely used Vitamin A supplements had significantly higher awareness than non-users ( $p = 0.001$ ), supporting earlier research that emphasized the educational role of healthcare providers in improving awareness [24-28].

## CONCLUSION

The findings of this study highlight a significant gap in public awareness regarding Vitamin A in Saudi Arabia. While some participants demonstrated an understanding of Vitamin A's benefits, misconceptions regarding its sources, overdose risks and role in vision remain prevalent. Improved awareness was observed among older participants, married individuals and those with higher education levels.

To address these gaps, targeted educational campaigns are essential to enhance public understanding of Vitamin A's dietary sources, recommended intake and associated risks. Healthcare providers should prioritize providing clear guidance on Vitamin A supplementation, particularly for vulnerable groups such as children, pregnant women and individuals with limited health literacy.

Promoting periodic screening, encouraging balanced dietary practices and emphasizing the risks of excessive supplementation are crucial steps to improving public knowledge. By incorporating these strategies into national public health programs, Saudi Arabia can improve Vitamin A awareness, ultimately reducing the burden of Vitamin A deficiency and its associated health risks.

## Limitations

This study has several limitations that should be acknowledged. First, the use of convenience sampling through social media may have introduced sampling bias, limiting the generalizability of the findings to the broader Saudi population. The reliance on self-reported data may also have resulted in recall bias, affecting the accuracy of responses related to Vitamin A intake, awareness and dietary behaviors. Additionally, the absence of direct clinical assessments or biochemical markers to confirm Vitamin A deficiency limits the study's ability to correlate awareness levels with actual Vitamin A status.

The questionnaire was distributed only in digital form, which may have excluded participants with limited internet access or digital literacy. Furthermore, while the study captured socio-demographic characteristics, cultural and regional factors influencing dietary practices and supplement

use were not explored in detail. Future research should adopt longitudinal designs, incorporate clinical assessments and explore additional factors such as occupational stress, income levels and access to healthcare to provide deeper insights into Vitamin A awareness trends.

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The authors declare no funds were received for this study.

## Conflicts of Interest

The authors declare no conflict of interest.

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