Awareness, Knowledge, and Attitude of Vitamin D Consumption Among Adult African Immigrants in Finland

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2023 Laurea

Laurea University of Applied Sciences

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Bachelor's of Degree in Nursing

Thesis

June 2023

Laurea University of Applied Sciences

Abstract

Nursing

Bachelor of Health Care

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Year 2023 Number of pages 38

Abstract

This study explores the attitudes, awareness, and knowledge regarding vitamin D consumption among adult African immigrants in Finland. The study aims to examine the status of attitudes towards vitamin D consumption, evaluate the level of awareness concerning its importance, and assess the knowledge regarding vitamin D deficiency among African immigrants in Finland. The theoretical framework revolves around vitamin D, and the research methodology is qualitative, utilising thematic analysis. The data is collected using an open-ended questionnaire and face-to-face interview method from 10 voluntary participants from a church found in Helsinki.

The results indicate that the targeted population holds a positive attitude towards vitamin D and demonstrates awareness of its significance. However, the findings also reveal a limited knowledge regarding dietary sources of vitamin D, and the information acquired by the participants is predominantly informal rather than from healthcare professionals.

The findings have implications for interventions and educational programs. Recommendations include improving knowledge about dietary sources and providing reliable information from healthcare professionals. This study contributes to understanding attitudes, awareness, and knowledge of vitamin D consumption among African immigrants, facilitating the promotion of healthier dietary choices and prevention of deficiencies within this population.

Key Words: Vitamin D, Awareness, Knowledge and Attitude

Contents

1. Introduction

Vitamin D is an essential nutrient that builds and maintains strong bones, teeth, and muscles. It also helps to prevent chronic diseases such as cardiovascular disease (Mayo Clinic 2021). Vitamin D deficiency causes rickets in children and osteomalacia in adults (Eerol 2021). The primary source of vitamin D is exposure to the sun, and it can also be found in foods that are rich in vitamin D and dietary supplements (Paakkari 2022). As the main source of vitamin D is exposure to the sun, living in a country such as Finland, which has a longer winter season, can limit the absorption of vitamin D nutrients from sunlight. ~~R~~esearch shows that having darker skin and being an adult limits vitamin D absorption compared to having lighter skin and being younger (Andrea Hanel, Carsten Carlberg 2020). This shows that adult African immigrants in Finland get less vitamin D from sunlight compared to others who have lighter skin.

It is important for African immigrants living in Nordic countries to be aware of the potential risks of vitamin D deficiency and to take steps to ensure that they are getting enough vitamin D from other sources, such as through their diet or the use of supplements (Lips and Jongh 2018).

Different research indicates that immigrants who live in countries near the polar region such as Finland, Norway, Sweden, Denmark, Russia, parts of Canada, and part of the USA have vitamin D deficiency (Adebayo, Itkonen, Lilja, Jääskeläinen, Lundqvist, Laatikainen, Koponen, Cashman, Erkkola, & Lamberg-Allardt, 2020; Mikstas 2020). Further evidence from a Swedish study on children reinforces this, revealing lower vitamin D levels in immigrant children, especially those from the Indian subcontinent, Middle East, and Africa. The study also reported seasonal fluctuations, underlining the complexity of this public health issue (Trollfors 2022). However, there is currently a lack of research on the knowledge and behaviours of adult African immigrants living in Finland concerning vitamin D intake.

Therefore, the purpose of this research is to explore the knowledge, attitude, and awareness of African immigrants about their vitamin D consumption and the research result might indicate the development of targeted interventions or education programs to address these issues.

Keywords: Vitamin D, African immigrant, Awareness, knowledge and Attitude.

2. Theoretical Background

2.1 Vitamin D

Vitamin D is a fat-soluble vitamin that our body requires in small amounts to maintain healthy bones and teeth (Kubala and Ware, 2022). The main function of Vitamin D is to increase calcium and phosphorus absorption in the small intestine, which is essential for building strong bones and teeth. It also plays a crucial role in the development of the immune, muscle and nervous systems (Mayo Clinic 2021).

There are two forms of vitamin D: Vitamin D3 (cholecalciferol) and Vitamin D2 (ergocalciferol). Vitamin D3 is the most active form of vitamin D that is found from exposure to the sun, while Vitamin D2 is found in food and supplements. Foods rich in Vitamin D include fatty fish, salmon fish, tuna, egg yolk, beef liver, cheese, mushrooms, fortified milk and fortified juices (Kubala & Ware 2022.)

Mayo Clinic recommends a person should get 15 mcg of vitamin D per day, with a safe upper limit of 50 mcg (Torborg 2018) However, the Finnish Food Safety Authority recommends a daily intake of vitamin D ranging from 10 mcg to 20 mcg based on age and overall health. The recommendation for adults aged 19-64 years is 10 mcg per day, but individuals with limited sun exposure, darker skin tones, or who wear clothing that covers most of their skin, are advised to consume 20 mcg per day (Paakkari 2022). A person with darker skin is recommended to take between 25-50 mcg of vitamin D per day, particularly during the winter season (Raman 2017).

The level of Vitamin D in the body can be determined through a blood test, which measures the level of 25-hydroxy-vitamin D (Eerola 2021). In Finland, the level and interpretation of Vitamin D according to Käypä Hoito-recommendations are as follows: less than 25 nmol/l is considered a deficiency, between 25 and 50 nmol/l is considered insufficient, 50-75 nmol/l is considered sufficient, and 75-120 nmol/l is considered the target concentration for osteoporosis patients, and more than 375 nmol/l is considered a toxic concentration (Fimlab 2023).

Vitamin D deficiency, also known as hypovitaminosis D is characterised by low levels of vitamin D in the blood. In the United States and Finland, deficiency is defined as levels below 25 nmol/L (Bordelon, Ghetu & Langan 2009; Paakkari 2022). Vitamin D deficiency can lead to weak bones, bone pain and fractures, muscle weakness, and an increased risk of cardiovascular disease. Some evidence indicates that vitamin D levels and the severity of COVID-19 are positively related (Gibbons, Norton, McCullough, Meltzer, Lavigne, Fieldler and Gibbons 2022).

Vitamin D deficiency symptoms may not be noticeable until the condition is severe (Bordelon et al. 2009). Risk factors include older age, breastfeeding, dark skin, limited sunlight exposure, use of sunscreen, and being overweight (Mayo Clinic 2021). African immigrants who have darker skin have a higher risk of vitamin D deficiency when they move permanently to a country with a temperate climate, especially as they age. Vitamin deficiency is more common among non-western immigrants, particularly those with darker skin. (Lips & Jongh 2018; Mayo Clinic 2011). The reason is dark skin has more melanin, which reduces the skin's ability to absorb UV radiation, which is necessary for the production of vitamin D (SunSmart 2021). In a country like Australia, African immigrants have been shown to have a higher prevalence of vitamin D deficiency (36% more than Australians) (Horton-French, Dunlop, Lucas, Pereira & Black 2019). Based on recent nationwide research, about 40% of African immigrants residing in Australia could have a deficiency of vitamin D due to restricted access to safe sun exposure and insufficient sources of this vitamin (Noone 2019). Similarly, in Finland, even in the summer months, the traditional clothing worn by many immigrants and having darker skin limits vitamin D absorption. (Paakkari 2022).

The treatment of vitamin D deficiency is aiming to get the normal level of Vitamin D in the blood. The treatments are daily intake of vitamin D supplements if exposure to the sun is limited (Cleveland Clinic 2022).

Consuming foods high in vitamin D or excess exposure to the sun are not the likely causes of excessive vitamin D levels. However, it is possible, though uncommon, to develop this condition as a result of taking an overdose of vitamin D supplements (Cleveland Clinic 2023). The excess Vitamin D (vitamin D toxicity) causes the build-up of calcium in the body (hypercalcemia). The symptoms of excess vitamin D include headache, weakness, frequent urination, metallic taste, pancreatitis, nausea, and vomiting. Hypervitaminosis D is diagnosed through a blood test to measure vitamin D levels. It does not usually require treatment if there are no symptoms of illness (Zeratsky 2022.)

2.2 African Immigrant in Finland

Merriam-Webster dictionary defines immigration as an act of immigrating, travelling into a country for the purpose of permanent residence, and an immigrant is a person who comes to a country to take up permanent residence. The word immigrant is taken from the Latin word migrate which means a move from one place to another (Merriam-webster 2023). Therefore, an African immigrant means an immigrant who comes from Africa to live permanently outside Africa or on another continent.

In this paper, I will consider only adult African immigrants who lived for more than two years in Finland.

Finland is found in northern Europe and has the longest coldest season in the year. The longest winter limits the skin from getting enough sunshine which in turn causes vitamin D deficiency. Therefore, to prevent the risk of vitamin D deficiency, the population who live in a country which has similar climate conduction should get vitamin D from food or from supplements (Paakkari 2022). Having darker skin and living in a place like Finland limits the vitamin D that is found in the sunshine (Mikstas, C. 2020), specifically, this is a risk for African immigrants who live in Finland.

According to the statistics Finland in 2018, there were about 400,000 non-Finnish people living in the country. Among those non-Finnish people, 11% of them had African backgrounds. However, the percentage of individuals of African descent was twice as high in the second generation. It means among the second generation born in Finland, 22% had African background (Statistics Finland 2019.)

Considering all the factors mentioned above, such as the research and studies conducted in this field, including the impact of living in Finland and having dark skin, this study aims to investigate if African adult immigrants have an awareness regarding vitamin D consumption.

2.3 Awareness of Vitamin D Consumption

According to the Cambridge English Dictionary (2023), awareness refers to "knowledge that something exists, or understanding of a situation or subject at the present time based on information or experience". In this research, awareness refers to the knowledge and understanding that African immigrants in Finland have about vitamin D and its importance in maintaining good health.

As mentioned in section 2.2, individuals with darker skin and living in a region like Finland face limitations in vitamin D synthesis from sunlight exposure (Mikstas 2020), consequently, it becomes crucial to examine the level of awareness and knowledge regarding vitamin D consumption among African adult immigrants in Finland. By understanding the extent of this awareness gap, appropriate interventions and educational campaigns can be designed to enhance awareness, improve knowledge, and promote optimal vitamin D status among this specific immigrant population.

2.4 Knowledge of Vitamin D Consumption

Knowledge refers to facts, information and skill acquired through experience or education. It is an understanding of a subject theoretically or practically (Cambridge English Dictionary 2023).

The concept of knowledge plays a central role in understanding the awareness of African immigrants about their vitamin consumption. From a theoretical perspective, knowledge can be defined as a combination of information, experience, and understanding, which individuals use to make decisions (Taylor 2023). The acquisition of knowledge can occur through various means, such as formal education, personal experience, or social networks (Stankovski (n.d.)).

Understanding vitamins and their impact on health is crucial for making informed decisions about consumption patterns. A study in the UK conducted on individuals with a bachelor's degree found that participants have good knowledge of vitamin D. Still, a previous study in England showed people have poor knowledge. The different results may be due to the participants' educational background differences (O'Connor, C., Glatt, D., White, L., & Iniesta, R. 2018; Kotta, Gadhvi, Jakeways, Saeed, Sohanpal, Hull, Famakin, Martineau, & Griffiths 2015). This research aims to uncover the factors influencing the awareness and understanding of vitamin D among African immigrants in Finland by examining their sources of knowledge and attitudes.

2.5 Attitude

A person's attitude is their way of thinking about and judging something or someone. This affects if they like or dislike it and how they act towards it (Jonathan 2009. Similarly, the Cambridge Dictionary (2022) defines attitude as a feeling or belief about something or someone, or a behaviour that results from these feelings or beliefs.

The concept of attitude plays a crucial role in understanding the awareness of African immigrants about their vitamin D consumption. In this study case, attitudes can be defined as an individual's feelings or beliefs towards Vitamin D.

In the context of research, examining the attitudes of African immigrants towards vitamins and their role in health is critical in gaining a deeper understanding of their awareness and understanding of this important aspect of health. By exploring the attitudes of African immigrants towards vitamins, this study aims to identify the factors that influence their beliefs and perceptions about vitamins and their consumption patterns.

In conclusion, the theoretical background of attitudes provides a framework for understanding the awareness and understanding of African immigrants about their vitamin D consumption.

3. Purposes, Aim and Research Questions

3.1 Purposes and Aim

The purpose of the study is to explore the attitude, awareness, and knowledge towards vitamin D consumption among Adult African immigrants in Finland.

The aims of the study:

- To explore the status of attitudes towards the consumption of Vitamin D among African Immigrants in Finland.
- To evaluate the awareness concerning Vitamin D consumption among African Immigrants in Finland.
- To assess the level of knowledge regarding the nutritional deficiency of vitamin D among African Immigrants in Finland.

3.2 The Research Questions

A research question is a type of question that a research project aims to answer (Bouchrika 2022).

Through the conduction of the entire study is intended to answer the designed research questions, which cover the objective of the study and help in generating a precise and complete conclusion.

The following questions are aimed to be addressed through this study.

1. What is the status of the attitudes of Adult African immigrants towards vitamin D consumption in Finland?
2. What is the extent of awareness of the Adult African immigrants on vitamin D consumption in Finland?
3. What knowledge level do the Adult African immigrants have regarding the nutritional deficiency of vitamin D in Finland?

The level of awareness and the status of knowledge is measured by what participants already know and what they do not know.

4. Methodology

4.1 Research Methodology

According to Indeed, research methodology is a way of explaining how a researcher intends to carry out their research. It is a logical, systematic plan to resolve a research problem and ensure reliable, valid results that address the research aims and objectives (Indeed 2022).

A qualitative research methodology is used to understand individual experiences, viewpoints, and ideas, as well as acquire extensive knowledge of a particular setting or society (McCombes, 2023). Based on the study's aim this research used a qualitative approach in order to explore the African immigrants' knowledge, attitude and awareness about their vitamin D consumption.

4.2 Sampling and Sample Size

The research study focuses on voluntary participants selected from a church and NGO. The target population includes adult African immigrants aged 18 to 64 who have resided in Finland for at least one year. Purposive and snowball sampling is utilised to select the sample from the population, specifically based on the participants' willingness to participate. Participants were exclusively taken from the church. The decision to limit the sample size is based on the saturation of the data. This approach aims to ensure the validity of the research by including a diverse range of participants and collecting sufficient data until the point of saturation.

4.3 Eligibility

4.3.1 Inclusion criteria

All the adult African Immigrants, aged between 18 and 64, who have lived for at least one year in Finland are included in this study.

4.3.2 Exclusion criteria

The exclusion criteria are for those individuals below 18 or over 64 years old, immigrants whose background is not African, and those who have lived in Finland for less than a year. In addition, African immigrants meeting the age and residency criteria but unwilling to participate or seriously ill during the data collection period will also be excluded. These exclusions aim to provide valuable insights into the experiences of a specific group of adult African immigrants in Finland.

4.4 Study setting and study period

As mentioned earlier in section 4.2, the research study was conducted in Helsinki, Finland, during the period from March to May 2023. Data collection took place at the specified location between March 20 and April 15, 2023. Prior to collecting data, permission to interview participants was obtained through email requests sent to both the NGO and the Church. It should be noted that interviews with voluntary participants were conducted after the church service every Sunday, as agreed upon with the church authorities.

A total of 8 participants were identified and recruited from the church, while an additional 2 participants were obtained through snowballing sampling. Due to data saturation being reached, no participants were selected from the NGO for this study.

4.5 Data Collection Method

Qualitative primary data were collected using a face-to-face interview method, employing an open-ended questionnaire or interview guide (McComber 2022). The interview guide, consisting of a set of questions, was prepared as a tool for interviewing informants. It was written in English. The interview guide was designed to explore the attitude, awareness, and knowledge of adult African immigrants regarding vitamin D consumption in Finland. The interviewer utilised both an audio recorder and field notes during the fieldwork.

4.6 Data management and analysis

A data management plan is a vital component of research planning, with main principles and procedures determined before data collection starts. This research study ensures scientific integrity, data safety and accessibility for sharing during and after the research is completed (Finnish social science data archive n.d.). Data management involves transcribing interviews and entering observational data. The collected data of this research has been anonymised and kept confidential, with regularly backed-up implementations to ensure security. Additionally, the data has been kept well organised in order to save time during analysis and increase the study's replicability (Bhandari 2022)

4.7 Data Analysis

After the completion of data collection, the data were analysed using the inductive thematic analysis method, specifically utilising the MAXQDA software. Thematic analysis is a qualitative research approach employed to explore commonly held views, emotions, beliefs, opinions,

knowledge, and experiences related to the research problem (Jyväskylän Yliopisto 2010). This method allows for flexibility in interpreting data and organising it into overarching themes. The thematic analysis process consists of six steps: familiarisation, coding, generating themes, reviewing themes, defining and naming themes, and producing the final report (Caulfield 2022).

The first step, familiarisation, involved thoroughly acquainting oneself with the data before analysing individual items. The researcher dedicated time to becoming well-acquainted with the data. The second step, coding, entailed highlighting sections of the text and assigning shorthand labels or codes to describe their content. Using the MAXQDA software, the researcher identified potential codes. In the third step, generating themes, patterns among the codes were identified, and broader themes were created. As a result of the coding process, four themes emerged. The fourth step, reviewing themes, ensured that the themes were useful and accurate data representations. The fifth step, defining and naming themes, involved writing descriptions for each theme and assigning them appropriate names. A list of the four themes was generated. Finally, the final report was produced in the sixth step, summarising the findings and providing data examples to support each theme (Caulfield 2022).

Therefore, this method was utilised in the present study to gain a deeper understanding of the awareness, knowledge, and attitudes of adult African immigrants in Finland.

5 Result

5.1 Background of the participants and the themes

The background of the participants included in the research are as follows: The research involved 10 voluntary participants who were interviewed in Finland. The majority of them resided in Helsinki, accounting for 70% of the participants. These individuals hailed from various African countries, with the largest representation coming from Ghana, making up 40% of the group. Regarding age, the participants spanned a range of ages, but the majority fell within the age group 46 to 55 years, comprising 40% of the participants. The gender distribution was equal, with an equal number of men and women participating. The participants exhibited diverse educational backgrounds, with the majority having completed vocational or upper secondary school, representing 60% of the group. In terms of occupation, two participants had a nursing background, making up 20% of the group, while the others held different professions. The length of time they had lived in Finland varied, with an average of 12 years and a range of 1 to 22 years. This data underscores the varied attributes of this immigrant group in Finland, including age, origin, education, occupation, and duration of

residence in the country. Due to confidentiality reasons, participant information has been summarised in Tables 1 and 2 as follows.

Age group	Gender	Participants no.
18-24	F	0
	M	1
25-35	F	1
	M	1
36-45	F	1
	M	2
46-55	F	3
	M	1
55-64	F	0
	M	0
Total Participant		10

Table 1: Background Information of Participants' by Age Group and Gender

Country of origin			Municipality of Residence				Years living in Finland		
Ghana	Ethiopia	Other African Countries	Helsinki	Kokola	Espoo	Lappeenranta	1 to 5	6 to 10	10+
4	2	4	7	1	1	1	2	1	7

Table 2: Background Information of Participants' by Country of Origin, Municipality of Residence and years of living in Finland

In general, the data showcases a heterogeneous collection of individuals in terms of age, gender, origin, education, occupation, and residency in Finland.

The thematic analysis of the collected data resulted in the identification of four key themes related to the participants' perspectives on vitamin D consumption among African immigrants in Finland as shown in the figure below. The first theme, "Understanding and Awareness of Vitamin D," explored participants' knowledge and awareness regarding the importance of vitamin D. The second theme, "Vitamin D Intake Strategies and Challenges," delved into the strategies employed by participants to incorporate vitamin D into their daily routines and the obstacles they encountered in doing so. The third theme, "Influence of External Factors on Vitamin D Consumption," examined the external factors, such as cultural practices and environmental conditions, that influenced participants' vitamin D intake. Lastly, the fourth theme, "Information Acquisition and Health Education," focused on participants' sources of information regarding vitamin D and their experiences with health education related to this nutrient. These themes, along with their corresponding codes, are shown in the picture below.

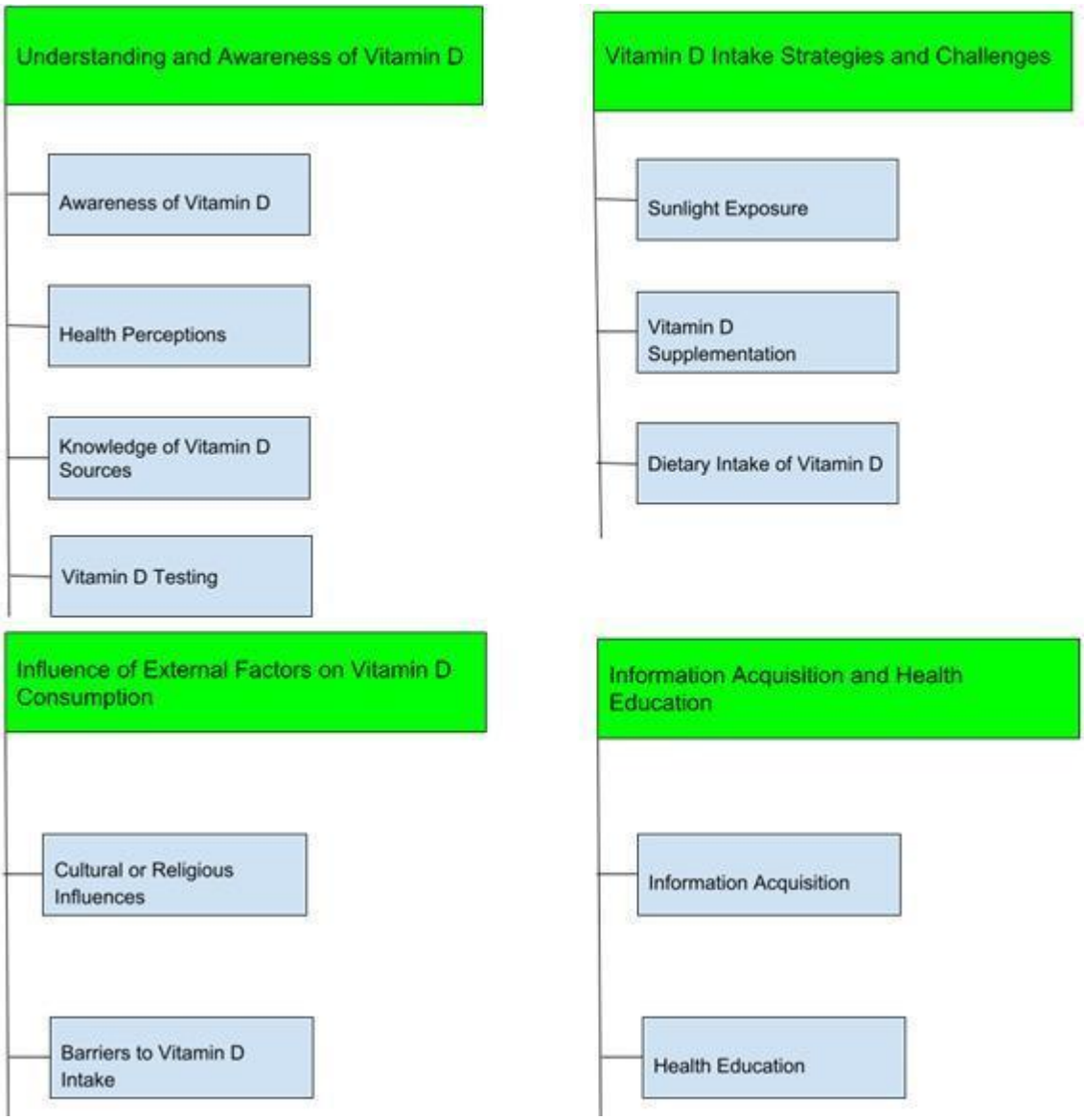

Figure 1: The four themes and the corresponding codes

5.2 Theme 1: Understanding and Awareness of Vitamin D

5.2.1 Awareness of Vitamin D

All participants demonstrated some level of awareness about Vitamin D, with a common understanding focusing on its role in maintaining bone health. For example, participant 7 said, "I know that lack of Vitamin D can lead to diseases like osteoporosis."

5.2.2 Health Perceptions:

80% of the participants expressed concerns about Vitamin D deficiency or recognized its importance to health. For instance, participant 1 stated, "Vitamin D is essential for the body because it helps to absorb calcium, and its deficiency might lead to bones becoming brittle."

Half of the participants could name specific health risks associated with Vitamin D deficiency. For instance, participant 3 expressed the perception that a "lack of Vitamin D could lead to weakened bones."

5.2.3 Knowledge of Vitamin D Sources:

Except one participant, all of the participants were able to identify sunlight as a primary source of Vitamin D. As Participant 2 put it, "*Sunlight is a natural source of Vitamin D.*"
60% of the participants could name at least one dietary source of Vitamin D. For instance, participant 4 recognized, *"fish as a good source of Vitamin D."*
30% mentioned Vitamin D supplements as a source. Interviewee 8 noted, "*In Finland, where sunlight is limited, one may need to take Vitamin D supplements."*

5.2.4 Vitamin D Testing:

Only 3 out of 10 participants reported having been tested for Vitamin D levels in the past. For example, participant 1 shared, *"I have been tested for Vitamin D levels and the results were good."*
However, the majority of participants, 7 out of 10, have not been tested or did not mention being tested for Vitamin D levels. As Participant 7 stated, "*I have not been tested for Vitamin D levels.*"

In conclusion, while there is a basic level of awareness about Vitamin D and its role in health among the participants, knowledge gaps exist about specific health risks associated with Vitamin D deficiency, dietary sources of Vitamin D, and the importance of regular testing. There is a need for increased awareness and education about Vitamin D, especially among those living in countries with limited sunlight.
Fig 2 demonstrates the understanding and awareness of vitamin D based on participants' responses.

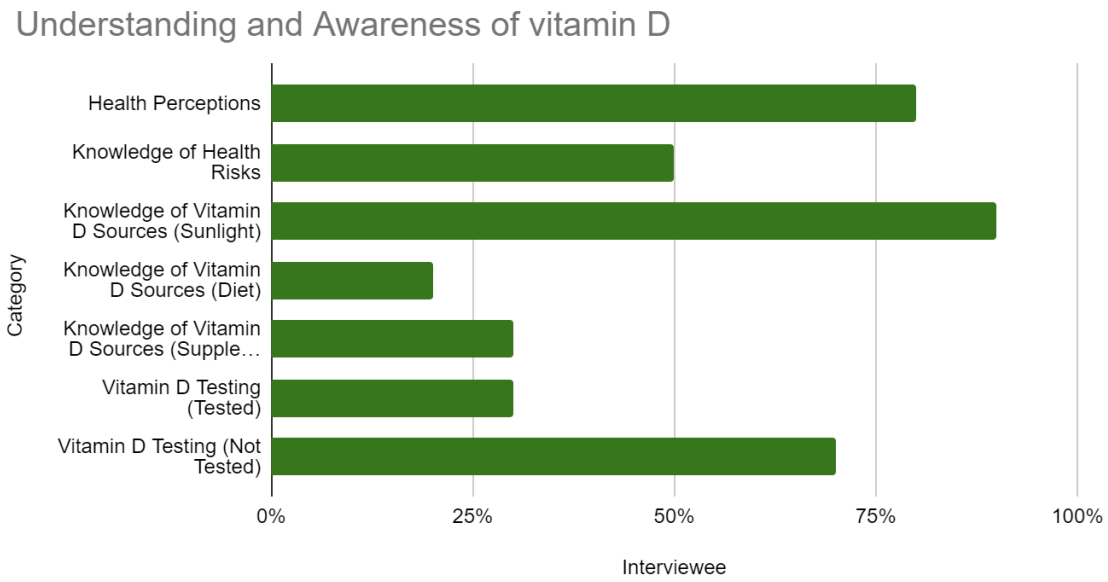

Figure 2: Understanding and Awareness of Vitamin D

5.3 Theme 2: Vitamin D Intake Strategies and Challenges

5.3.1 Sunlight Exposure:

100% of the participants acknowledged the challenge of limited sunlight exposure due to Finland's long winters and short summers.
60% specifically mentioned making efforts to get sun exposure during the summer, with activities ranging from spending time outdoors to sitting in the sun at home.
20% indicated that their work schedule or lifestyle significantly limits their sun exposure, particularly in the winter.

5.3.2 Vitamin D Supplementation:

Ninety percent of the participants reported taking vitamin D supplements, although the regularity and dosage varied among them. Thirty percent of the participants admitted to occasionally forgetting to take their supplements. For example, participant 5 said, "*I take them... uh, most of the time I do remember, sometimes I do not remember. It's vital if I finish my vitamin D. I forgot to buy it...*" Additionally, 10% of the participants did not mention using any vitamin D supplements.

5.3.3 Dietary Intake of Vitamin D:

Only 20% (2 out of 10) mentioned specific dietary habits related to vitamin D intake, such as drinking milk or having meals prepared by a knowledgeable family member. participant 7 stated, " I was told one milk".
80% (8 out of 10) did not mention their dietary habits related to vitamin D, and among them, two participants expressed uncertainty about what foods contain this vitamin.

5.4 Theme 3: Influence of External Factors on Vitamin D Consumption

5.4.1 Cultural or Religious Influences:

Across all interviews, no interviewee identified cultural or religious factors impacting their vitamin D consumption. This means that 0% of the interviewees found cultural or religious influences to be a significant factor. For example, Interviewee 7 noted that as a Christian, there were no religious restrictions on vitamin D consumption.

5.4.2 Barriers to Vitamin D Intake:

The intake of vitamin D among African immigrants in Finland faces several challenges. A significant barrier identified by 70% of the participants (7 out of 10) is the limited sunlight exposure due to Finland's long winters, inhibiting natural vitamin D production.
Work schedules also pose a challenge. As the participant explained, working night shifts can lead to forgetting to take vitamin D supplements.
Participant 9 *"Uh, barriers? Sometimes if I have a night shift, I come home in the morning, at work, then I don't remember I just want to sleep taking supplements, I just want to sleep, and then I wake up, and go to work there, and so on. But if I wake up in the morning, I got to drink my coffee at the same time I see my vitamins and I take them. There are things the way I work and I sometimes don't take my vitamins"*
This issue accounted for 10% of responses.
Even though most of the participants said that there are no cultural barriers to vitamin D consumption, participant 7 pointed out a prevalent cultural aversion to supplements among African immigrants. This participant highlighted the common belief among Africans that vitamin D supplements are merely chemicals, further illustrating this aversion.
" Because I have heard so many Africans saying that No, it's chemical, No, I don't take chemicals And there is no sun for us. So even amongst ourselves also, a lot of people believe that the supplement is chemicals."

Finally, participant 3 highlighted economic difficulties as a barrier to regular vitamin D consumption, representing another 10% of responses. This response emphasises the financial constraints affecting vitamin D intake. However, another participant mentioned that vitamin D consumption as an African immigrant is not expensive. *"I believe that it is a positive thing and it's not expensive, so vitamin D, why not!"*
The graph in Fig. 3 shows the barriers to vitamin D intake based on the participants' responses.

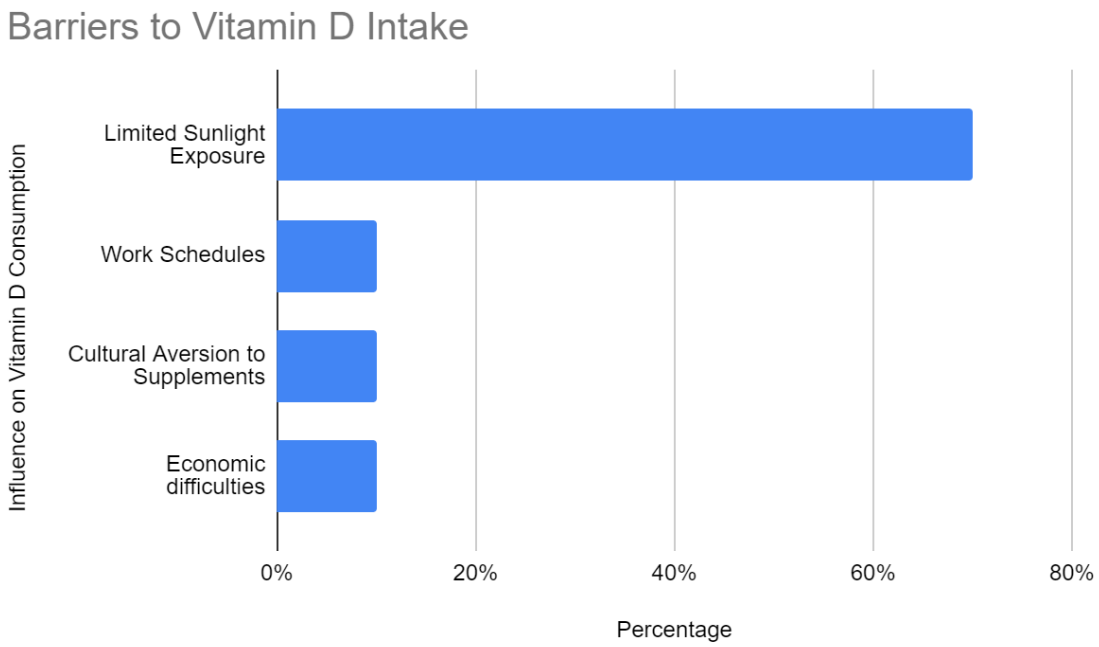

Figure 3: Barriers to vitamin D intake

5.5 Theme 4: Information Acquisition and Health Education

5.5.1 Information Acquisition:

50% of the participants (Participants 1, 3, 5, 6, 7) received information about Vitamin D from interpersonal relationships such as family members or friends.For example participant 6: "My wife telling many stuff about vitamin D".

20% of the participants (Participants 2, 4) received information from healthcare professionals. 20% of the participants (Participants 1, 8) acquired their information about Vitamin D from the internet. 30% of the participants (Participants 2, 5, 9) relied on written materials as their primary source of information. 10% of the participants (Participant 10) relied on their background or experiences as their primary source of information. The graph in Fig 4 below demonstrates the number of participants and their source of information.

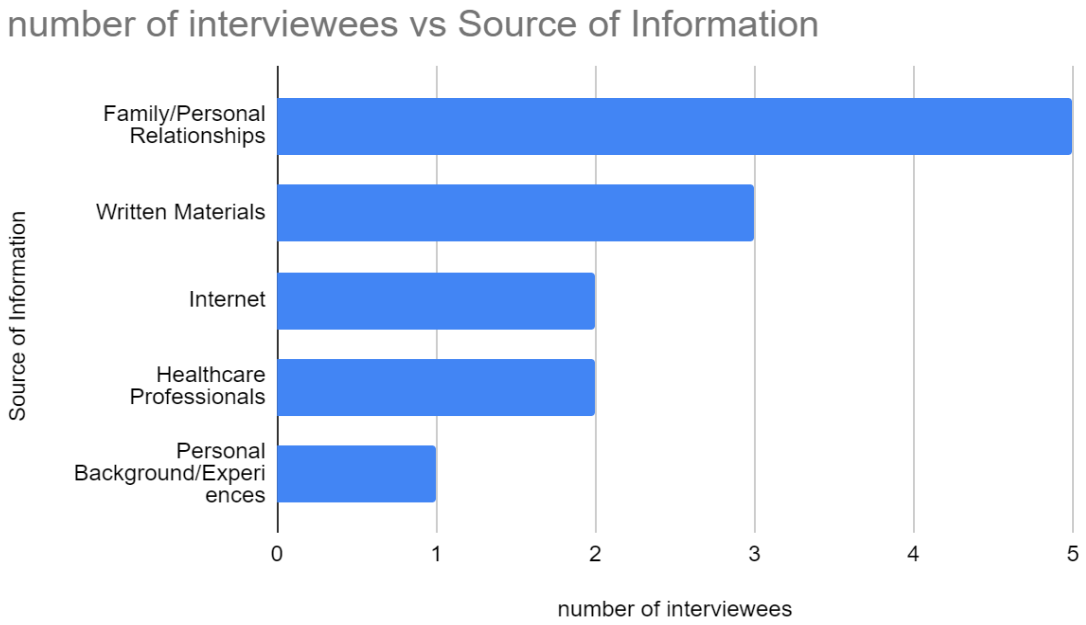

Figure 4: Number of participants Vs Source of information

5.5.2 Health Education:

All interviewees expressed a need for more information and education about Vitamin D for African immigrants in Finland. For example, Interviewee 6 said, "There should be more information and education about vitamin D for African immigrants in Finland" and Interviewee 10 agreed with this point of view.

4 out of 10 (Participants 6, 7, 8, 10) not only mentioned the need for more information but also suggested specific ways or entities to improve health education. Participant 6 mentioned the need for more outreach, participant 7 suggested more diverse sources of information, participant 8 highlighted the potential role of embassies, and Participant 10 emphasised the need to address the climate change challenges African immigrants might face when moving to Finland.
Participant 9 stressed the need for information to be simple and understandable, especially for children. When asked about what kind of information would be helpful, the participant responded:

"Knowledge about the use of vitamin D would be helpful, along with an explanation in a less complicated and simple way that people can easily understand, especially for kids. It is

important for everyone, particularly those in Africa and those who need it the most. Having this kind of information would greatly contribute to understanding the use of vitamin D."

80% of the participants (Participants 1, 3, 5, 6, 7, 8, 9,10) indicated that they received no information from healthcare professionals, suggesting a potential gap in the health education system.

While 20% of the participants (Participants 6, 10) shared their personal experience with Vitamin D consumption, emphasising the importance of personal experiences in shaping attitudes towards health education.

This summary analysis reflects the diverse sources of information on Vitamin D utilised by the interviewees, as well as their collective call for increased, more accessible and understandable health education for African immigrants in Finland.
Discussion.

6. Ethical considerations

In the field of research, adherence to ethical principles and guidelines is crucial to ensure the fair, respectful, and unbiased conduct of studies, particularly when involving human participants. Protecting their well-being, privacy, and dignity is of utmost importance (Finnish National Board on Research Integrity TEMK publications 2019).

To ensure ethical conduct in this study, several measures have been taken. Participants were fully informed about the study's purpose, benefits, consequences, rights, and available options prior to their voluntary participation. Those who chose to participate provided their signature on the consent form. Confidentiality was strictly maintained, with participant information used solely for research purposes and their identities protected through anonymity. All participants were recruited, selected, and treated fairly, without any bias or discrimination. Efforts were made to minimise harm and discomfort throughout the study (Finnish National Board on Research Integrity TEMK publications 2019.)

As per the Finnish National Board on Research Integrity TENK (2019), a research permit is required if the research may cause physical or mental harm to the subjects or involves participants below 15 years of age. However, for a study on awareness, knowledge, and attitude of Vitamin D consumption among adult African immigrants in Finland that is safe and does not significantly affect participants' lives, and where participants are over 15 years old, no permit

is needed. Therefore, permission from the FUAS Advisory Board on Ethics was not necessary. However, permission was obtained from the church to conduct the study at their premises.

7. Trustworthiness (reliability/validity)

To ensure the trustworthiness and reliability of the research, the data has been collected and analysed using appropriate research methods and techniques that are aligned with the research question. The study has maintained precision and validity by employing sound measures and methods. To enhance transparency, detailed descriptions of the research methods and procedures have been provided, and the data, along with any relevant materials, are available for review (The Farnsworth Group 2023).

The research adheres to four important rules that are integral to qualitative research, ensuring its trustworthiness. First, it emphasises the accuracy and truthfulness of the research findings (Credibility). Second, the findings can be applied to similar situations and replicated by other researchers (Transferability). Third, the research remains unbiased, basing its findings solely on the responses of the participants and not influenced by the researcher's own opinions (Confirmability). Lastly, efforts have been made to ensure that the study can be replicated by other researchers, resulting in consistent results (Dependability) (Statistics Solution n.d).

Furthermore, ethical guidelines and regulations have been strictly followed throughout the research process to ensure its ethical conduct.

8. Discussion

The study provides crucial insights into the awareness, attitude, and knowledge towards Vitamin D among African immigrants in Finland. The result indicates that most of the participants have a general awareness of Vitamin D and its importance to health. However, there is a significant gap in understanding dietary sources of Vitamin D, regular monitoring of Vitamin D levels, and the potential health risks associated with Vitamin D deficiency.

The data suggests that despite the general awareness of Vitamin D's importance, there is a need for more comprehensive knowledge about Vitamin D sources and the consequences of its deficiency. It appears that while the participants understand the role of Vitamin D in maintaining bone health, their knowledge is less concrete when it comes to identifying dietary sources and specific health risks associated with Vitamin D deficiency.

The research unveils a significant knowledge gap among participants, particularly regarding the dietary sources of Vitamin D and the importance of regular Vitamin D level checks. This gap holds considerable implications, especially for minority groups such as African immigrants in Finland.

The relevance of these findings is not confined to our study alone. Prior research has underscored the prevalence of Vitamin D deficiency in minority populations, particularly among Blacks and Hispanics.A Swedish study further highlighted this issue, revealing significantly lower levels of vitamin D in immigrant children, particularly from the Indian subcontinent, Middle East, and Africa. Seasonal influences were also noted, which could be especially relevant in high-latitude countries (Trollfors 2022). Considering that Vitamin D deficiency is linked to several risk factors for leading causes of death in the United States, the imperative for health professionals to recognize this connection cannot be overstated. Strategies to rectify Vitamin D deficiency, especially in minority groups, including dietary interventions, are of vital importance(Forrest & Stuhldreher 2011.)

The necessity to bolster awareness and health education about Vitamin D, its dietary sources, importance, and the requirement for regular checks is thus paramount, particularly for at-risk populations. Compounding the issue, this study indicates that participants largely depend on informal sources for health information, with healthcare professionals not being the principal source of Vitamin D information. This reliance may well be contributing to the observed knowledge deficiencies. Research by Julián, Mouratidou, Vicente-Rodriguez, Gracia-Marco, Valtueña, González-Gross, Ferrari, Gottrand, Manios, de la O, Widhalm, Molnár, Kafatos, Sjöström, Kersting, Gunter, MJ, Henauw, Moreno, and Huybrechts (2017), supports the importance of health education, as they found that maternal education played a significant role in promoting dietary habits, including vitamin D intake, among adolescents. Therefore, redirecting efforts towards providing proper education, particularly through healthcare professionals, can bridge the knowledge gap and empower individuals with accurate information about Vitamin D. By improving access to reliable sources of information and engaging healthcare professionals in health education initiatives, we can address the knowledge deficiencies identified in our study and enhance awareness and understanding of Vitamin D consumption among at-risk populations (Julián et al. 2017.)

Based on the findings of the study among university students in Pakistan, it is evident that there is an unmistakable need for healthcare professionals to play a more active role in Vitamin D education. The study revealed significant knowledge gaps regarding vitamin D, including limited awareness of its food sources, health benefits, and factors affecting production. Additionally, low levels of concern and testing for vitamin D deficiency were observed among the participants

(Tariq, Khan & Basharat 2020). Therefore, by enhancing the involvement of health experts in providing accurate and accessible information on Vitamin D, its dietary sources, and the significance of regular testing, we can effectively address these knowledge gaps and promote better health outcomes among university students.

The result has significant implications for health education and policy, especially given the potential health risks associated with Vitamin D deficiency. For African immigrants in Finland, who are at a higher risk of deficiency due to limited sunlight exposure, this knowledge gap could have serious health implications. This study highlights the need for increased health education efforts, particularly from healthcare professionals, to ensure this population is informed about Vitamin D's role, sources, and the importance of regular testing.

8.1 Limitations

The study has certain limitations that need to be acknowledged. Firstly, the sample size was relatively small and restricted to African immigrants in Helsinki, which might limit the generalizability of the findings to the broader African immigrant population in Finland. Secondly, the reliance on self-reported data introduces the potential for bias. Additionally, it is important to consider that cultural, language, or literacy barriers could have influenced participants' understanding of the questions or the information provided about Vitamin D. Furthermore, it is worth noting that the researcher's lack of prior experience in conducting face-to-face interviews may have impacted the quality of data obtained from these in-depth interviews.

8.2 Recommendations for Future Research

Given the potential health implications of Vitamin D deficiency, further research is needed to explore the knowledge and attitudes towards Vitamin D among African immigrants in different regions of Finland. Larger, more diverse studies could help validate and expand upon our findings.

It would also be valuable to investigate the effectiveness of different health education strategies, such as workshops, information leaflets, or digital resources, in improving knowledge and attitudes towards Vitamin D. Furthermore, research should explore the role of healthcare professionals in Vitamin D education and identify any potential barriers to their involvement.

In conclusion, this study provides a valuable understanding of the knowledge and attitudes towards Vitamin D among African immigrants in Finland. However, it also highlights the need for further research and targeted health education initiatives to address knowledge gaps and improve health outcomes in this population.

9. Conclusion

This study reveals a substantial awareness and positive attitude towards Vitamin D among the African immigrants in Finland, with most participants recognizing its importance to health. However, there is a significant gap in their understanding of dietary sources of Vitamin D and a lack of regular monitoring of Vitamin D levels.

While the majority of participants acquire information about Vitamin D through friends, family, and the internet, none reported receiving this crucial information from healthcare professionals in Finland. This finding underscores the need for more comprehensive health education initiatives targeting this demographic group, given the established prevalence of Vitamin D deficiency among African immigrants in many countries, including Finland.

Therefore, this study recommends that healthcare centres and other relevant authorities in Finland should prioritise the education of immigrants, particularly from Africa, about Vitamin D. This would entail providing comprehensive information about dietary sources rich in Vitamin D, the importance of Vitamin D testing, and strategies to maintain optimal Vitamin D levels, especially during the long winter months.

It is also recommended that further research be conducted to develop effective strategies for implementing these educational initiatives. As the saying goes, prevention is better than treatment. Ensuring that African immigrants in Finland are well-informed about Vitamin D could significantly enhance their health outcomes and overall well-being.

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Figures

Tables

Appendices

Appendix 1: Interview Questions

1. Introduction and background information:
    a. Age Interval: 18-24▫ 25-35▫ 36-45▫ 46-55▫ 56-64▫
    b. Gender: Male ▫ Female ▫
    c. Country of Origin_____
    d. Educational level: _____
    e. Occupation: _____
    f. Municipality of residence: _____
    g. Year/s of living in Finland:_____
2. Awareness of vitamin D
    a. What is your understanding of vitamin D
    b. Explain what you know about the benefit of this vitamin to your health.
    c. What are your thoughts on the risks associated with vitamin D deficiency or shortage of vitamin D to your health?
    d. Are you aware of the risks?
3. Knowledge about sources of vitamin D
    a. Could you tell me any foods that you know that are a good source of vitamin D?
    b. What do you think about another source of vitamin D, apart from foods?
    c. Are you aware that vitamin D can be obtained from sunlight?
    d. If yes, can you describe how you get sunlight exposure in Finland?
    e. Have you ever used vitamin D supplements?
    f. If yes, can you describe how you use them?
4. Attitude towards vitamin D consumption
    a. How important do you think vitamin D is for your health?
    b. Can you explain your reasoning?
    c. Can you share your thoughts on whether you believe you are getting enough vitamin D from your food and sunlight in Finland?
    d. If not, can you describe your concerns?

   e. Can you tell me your attitude towards using vitamin D supplements?
5. Vitamin D consumption habits
   a. Can you describe how often you consume foods that contain vitamin D?
   b. Can you describe how often you spend time outdoors, and if you do so during the winter months in Finland?
   c. Have you ever been tested for vitamin D deficiency?
   d. If so, can you describe the circumstances and the result of the test?
   e. Are there any cultural practices or beliefs that impact your vitamin D consumption?
   f. If so, can you describe them?
6. Barriers to vitamin D consumption
   a. Are there any challenges or barriers that prevent you from consuming enough vitamin D?
   b. Are there any challenges or concerns you have about getting enough sunlight exposure in Finland?
   c. Are there any cultural or religious beliefs that may affect the consumption of vitamin D among African immigrants in Finland?
   d. If yes, can you explain this?

7. Information and education about vitamin D
   a. Have you received any information or education about vitamin D from healthcare professionals or other sources?
   b. If so, can you describe the information you received and whether it was helpful?
   c. In your opinion, should there be more information and education about vitamin D for African immigrants in Finland?
   d. If so, what kind of information would be helpful?
8. Conclusion
   a. Is there anything else you would like to share about your experiences with vitamin D consumption as an African immigrant living in Finland?

Appendix 2: Email Sample

An email sample prepared to request permission from Church

Nigisti Araya

Registered Nurse Student at Laurea Applied Science University

Dear (Church)

I hope this email finds you well. My name is Nigisti Araya, and I am a nursing student at Laurea University of Applied Science. As part of my research for my thesis, I am conducting a study on the awareness of vitamin D consumption among African immigrants in Finland who have lived here for at least one year and are between the ages of 18 to 64.

I am reaching out to you because I believe that your church community would be a valuable resource in identifying potential participants for my study. I am specifically looking for African immigrants who have been living in Finland for at least a year and are between the ages of 18 to 64. The purpose of my study is to understand the level of awareness of vitamin D consumption among this population and to explore ways to improve their access to information about vitamin D.

If it is possible, I would be grateful if you could refer me to any potential participants who may be interested in taking part in this study. I am looking for individuals who are willing to participate in a 30 to 45-minute interview in person. It can be conducted at a time and location that is convenient for the participant between the time period of March and mid of April 2023 to discuss their experiences and perceptions related to vitamin D consumption.

I assure you that all information gathered during the study will be kept confidential and participants will remain anonymous. Participation in this study is voluntary, and participants can withdraw at any time without any consequences.

Thank you for your time and consideration, and I hope to hear back from you soon.

With best regards!

Nigisti Araya
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Nursing Student

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Appendix 3: Consent Form

Dear_____

The study is to investigate the awareness of vitamin D consumption among African immigrants in Finland who have lived here for at least one year and are between the ages of 18 to 64. I would like to invite you to participate in this study.

The study involves a face-to-face interview that will take approximately 30 to 45 minutes. We will be collecting qualitative data using open-ended questions, and the interview will be audio-recorded for analysis. Your responses will be kept confidential and anonymous, and will only be used for the purposes of this study.

There are no known risks associated with participating in this study, and there are no direct benefits to you. However, your participation will help contribute to a better understanding of the health implications of vitamin D consumption among African immigrants in Finland, which may inform future policies and interventions aimed at improving the health outcomes of this population.

Your participation in this study is entirely voluntary, and you have the right to withdraw at any time without consequence. If you choose to participate, I will ask you to provide your signature below to indicate your consent.

Thank you for your consideration.

Sincerely,

Nigisti Araya
phone num. 0442759669
Nursing Student
Laurea University of Applied Science, Tikkurila.

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I have read the information provided and understand the purpose, procedures, risks, and benefits of participating in this study. I have had the opportunity to ask questions and all my concerns have been addressed. I voluntarily agree to participate in this study.

Participant's Name: _____

Participant's Signature: _____

Date: _____

Signature of researcher

I believe the participant is giving informed consent to participate in this study

Researcher's Name_____

Researcher's Signature_____

Date_____