



# Assessing The Prevalence Of Vitamin B And D Deficiency: A Survey Study

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## Abstract:

Deficiency in vitamins can lead to diseases like beriberi and rickets, while insufficiency poses risks for chronic illnesses. In Japan, low vitamin D levels increase the likelihood of osteoporotic fractures. B vitamins, essential for metabolism, are found in foods like meat, dairy, and greens. Thiamine deficiency research sheds light on its importance, while low vitamin B12 or folate levels can cause hyperhomocysteinemia, leading to cardiovascular issues, fractures, and cognitive decline. Insufficient vitamin B1 levels raise the risk of heart failure in the elderly. Though improving nutrition through vitamins may not match drug treatments, it's cost-effective for disease prevention. B vitamins, unlike fat-soluble ones, need daily replenishment and play vital roles in energy production and molecule synthesis. Studies focusing on thiamine deficiency highlight its specific effects on health, revealing its crucial role in physiology. Vitamin B12 deficiency can cause reversible anemia or demyelinating disease, with diagnosing challenges addressed by measuring methylmalonic acid levels. High-dose vitamin B12 treatment effectively manages these deficiency-related neurological issues. Understanding vitamin D's hormonal role emphasizes its importance in disease prevention, urging for maintaining optimal levels for overall well-being beyond conventional approaches.

**Keywords:** vitamin D, cholecalciferol, calcifediol, calcitriol, bone, fracture, osteoporosis, beriberi, cardiovascular disease, vitamin B.

## 1. Introduction:

Vitamins are organic substances that are crucial for the body's optimal functioning and overall health. Although required only in small amounts, they have vital roles in different physiological processes, such as metabolism and immune function, and overall health maintenance. Vitamins are divided into two primary categories depending on how they dissolve in the body: water-soluble vitamins (like vitamin C and B-complex vitamins) and fat-soluble vitamins (such as vitamins A, D, E, and K).[1]

Water-soluble vitamins dissolve in water and are not extensively stored in the body, requiring regular consumption through diet or supplements. Examples of water-soluble vitamins include vitamin C (ascorbic acid), thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), pyridoxine (B6), biotin (B7), folate (B9), and cobalamin (B12) [1,2].

In contrast, fat-soluble vitamins are absorbed along with dietary fats and can be stored in the body's adipose tissue and liver for future use. These vitamins play critical roles in vision, bone health, blood clotting, and antioxidant defense [1]. Examples of fat-soluble vitamins include vitamin A (retinol), vitamin D (calciferol), vitamin E (tocopherol), and vitamin K (phylloquinone and menaquinone) [2].

The prevalence of Vitamin B deficiencies, including B12 and folate, varies across different populations and geographic regions. Factors such as dietary habits, socioeconomic status, age, and certain medical conditions contribute to the variability in prevalence rates. Deficiencies in Vitamin B have been associated with an increased risk of anemia, neurological disorders, cardiovascular diseases, and developmental abnormalities, emphasizing the need for timely detection and intervention [3].

Similarly, Vitamin D deficiency is widespread, affecting individuals of all ages and ethnicities, albeit with varying degrees of severity. Factors such as limited sunlight exposure, inadequate dietary intake, obesity, and certain medications contribute to Vitamin D insufficiency [2,3]. The consequences of Vitamin D deficiency extend beyond bone health, encompassing immune dysfunction, cardiovascular diseases, cancer, and mental health disorders.

Research into vitamin D deficiency has garnered significant attention in recent years, leading to extensive investigations into recommendations, guidelines, and treatment strategies. Furthermore, the confirmed role of vitamin D as a hormone has shed light on its involvement in numerous enzymatic, metabolic, physiological, and pathophysiological processes across multiple organs and systems within the human body [3]. What sets this research apart is its interdisciplinary nature, revealing vitamin D's impact beyond traditional considerations of bone health. Studies have linked vitamin D to immune function, cardiovascular health, neurological processes, and even mental well-being. This broad scope underscores the hormone-like actions of vitamin D, influencing gene expression and cellular function in diverse ways [1,3].

Each vitamin has its specific functions and sources in the diet. While a balanced diet typically provides adequate vitamins for most individuals, certain factors such as age, lifestyle, medical conditions, and dietary restrictions may increase the risk of vitamin deficiencies. In such cases, supplementation or dietary modifications may be recommended under the guidance of a healthcare professional [1,3,4].

Vitamins are vital micronutrients that contribute to overall health and well-being, and their importance cannot be overstated in maintaining optimal bodily functions [4].

Vitamins are organic compounds that are necessary for normal growth and nutrition. They are essential in small amounts in the diet since the body cannot produce them on its own. They aid in the formation and maintenance of bones, skin, and tissues; in the production of blood cells; and the support of the body's immune system [3,4]. Although not an energy source, vitamins serve as catalysts that control the rate at which chemical reactions occur within the body. Of the 13 known vitamins, vitamin D is unique in that it is the only vitamin that can be synthesized in the body [2]. In a process that begins when the skin is exposed to the sun. Vitamin D, along with calcium, is necessary for the formation and maintenance of healthy bones. Indicators of vitamin D status reflect levels of intake, endogenous production, and exposure to sunlight [3]. Vitamin D deficiency is not only harmful to one's bones since it is harmful to one's immune system. Low levels of vitamin D have been associated with lower respiratory tract infections such as bronchitis or pneumonia; for this reason, it would be wise for asthmatics to maintain a good vitamin D status [2,4]. Unfortunately, vitamin D deficiency has emerged as a silent epidemic with over a billion people believed to be affected worldwide. Men and women are recommended to limit sun exposure to lower skin cancer risk [4]. This is of particular concern in the elderly, where there is a high prevalence of deficiency. It is complicated by the fact that vitamin D is believed to be a protective factor in several musculoskeletal conditions, which are more common in the elderly, while also being associated with reduced life expectancy [3]. The first step in addressing this issue is, of course, to quantify the problem by measuring the serum levels of the main storage form of vitamin D. Although vitamin D is synthesized from sunlight and found in a small number of food products such as oily fish, egg yolks, and fortified milk, many people will still have a vitamin D deficiency [4,2]. This could be because exposure to the sun depends on the time of day, season, altitude, area of living, the use of sunblock, and skin pigmentation. In regards to diet, vitamin D is not found in many foods and is found mainly in fortified milk, liver, and fish; without a conscious effort to eat these foods, one may have inadequate levels of vitamin D [5,4]. Due to vitamin D's fat-soluble properties, it is stored in the body and can be conserved for a couple of months. This is why it is possible to still be deficient in vitamin D even if you are not exposed to the sun for a long period [3,4,5].

### 1.1 Vitamin B1(Thiamine):

Vitamin B1, also known as thiamine, is crucial for the proper functioning of the body. A deficiency in vitamin B1 can lead to a condition called beriberi, which manifests in two main forms: wet beriberi and dry beriberi [5].

**Wet Beriberi:** This form affects the cardiovascular system, leading to symptoms such as:

Dilated cardiomyopathy: This is a condition where the heart becomes enlarged and weakened, leading to heart failure.

Oedema (fluid retention): Swelling, particularly in the lower extremities, due to fluid buildup [6].

**Dry Beriberi:** This form primarily affects the nervous system and can result in symptoms such as:

Peripheral neuropathy: Numbness, tingling, or burning sensations in the extremities.

Muscle weakness and wasting.

Difficulty walking.

Mental confusion, irritability, and memory problems.

Chronic alcohol consumption is a common cause of thiamine deficiency, as alcohol interferes with thiamine absorption and utilization in the body. Other causes include malnutrition, certain gastrointestinal disorders that affect nutrient absorption, and conditions that increase thiamine requirements, such as pregnancy and breastfeeding [6,5].

Treatment for thiamine deficiency typically involves thiamine supplementation, either orally or intravenously in severe cases. However, prompt treatment is essential to prevent permanent damage to the nervous system and other organs. If you suspect a thiamine deficiency or experience symptoms suggestive of beriberi, it's crucial to consult a healthcare professional for proper diagnosis and treatment [6,7].

## 1.2 Vitamin B2 (Riboflavin):

Vitamin B2, commonly known as riboflavin, is a water-soluble vitamin vital for various metabolic functions in the body. It plays a crucial role in converting carbohydrates into energy and in the metabolism of fats and proteins [5,7]. Additionally, riboflavin is essential for the synthesis of red blood cells. Beyond its metabolic roles, riboflavin acts as an antioxidant, assisting in shielding cells from oxidative stress and damage. This multifaceted vitamin is integral to overall health and vitality, supporting key biochemical processes and promoting cellular protection [7].

A deficiency in vitamin B2 can lead to various health issues, including:

**Ariboflavinosis:** Ariboflavinosis is a condition resulting from inadequate riboflavin (vitamin B2) intake and is identified by symptoms including a sore throat, redness, and swelling of the mouth and throat lining, cracks or sores on the lips (cheilosis), redness and inflammation of the tongue (magenta tongue), and inflammation at the corners of the mouth (angular stomatitis). This condition highlights the consequences of riboflavin deficiency on oral and mucosal health [8].

**Skin disorders:** Riboflavin deficiency may contribute to skin disorders such as dermatitis, which is characterized by dry, itchy, and inflamed skin.

**Eye problems:** Riboflavin deficiency can also affect the eyes, leading to symptoms such as sensitivity to light (photophobia), itching, burning, and watering of the eyes, and blurred vision.

**Anemia:** Riboflavin deficiency may contribute to the development of anemia, a condition characterized by a reduced number of red blood cells or a deficiency of hemoglobin, which can lead to symptoms such as fatigue, weakness, and shortness of breath [7,8].

### 1.3 Vitamin B3 (Niacin):

Vitamin B3, also known as niacin, is another water-soluble vitamin that is essential for various bodily functions. Niacin plays a crucial role in the metabolism of carbohydrates, fats, and proteins, helping to convert them into usable energy. It also contributes to the synthesis of certain hormones and is involved in DNA repair and cell signaling [8,9].

A deficiency in vitamin B3 can lead to a condition known as pellagra, which is characterized by a combination of symptoms affecting the skin, digestive system, and nervous system. Some of the key symptoms of pellagra include: [9,10].

**Dermatitis:** Pellagra often presents with a characteristic rash, typically occurring in areas of the skin exposed to sunlight. The rash is usually symmetric and may be red, rough, and scaly [9].

**Diarrhea:** Individuals with pellagra often experience diarrhea, which can be severe and persistent. The diarrhea may be accompanied by abdominal pain and cramping [9].

**Dementia:** Pellagra can lead to cognitive impairment and neurological symptoms, including confusion, disorientation, memory loss, and depression. In severe cases, hallucinations and psychosis may occur [9,10].

Pellagra was historically more common in populations whose diets were heavily reliant on maize (corn) as a staple food, as maize contains niacin in a bound form that is not readily absorbed by the body. Traditional processing methods such as nixtamalization, which involves soaking maize in an alkaline solution, help release niacin and prevent pellagra [11].

In developed countries, pellagra is now rare due to improved nutrition and fortified foods. However, certain factors such as alcoholism, malabsorption disorders, certain medications, and conditions that increase niacin requirements (such as pregnancy and breastfeeding) can increase the risk of deficiency. Treatment typically involves niacin supplementation and dietary changes under the guidance of a healthcare professional [9,10,11].

### 1.4 Vitamin B5 (pantothenic acid):

Vitamin B5, or pantothenic acid, is a water-soluble vitamin essential for numerous physiological functions in the body. It plays a crucial role in the synthesis of coenzyme A (CoA), which is involved in numerous biochemical reactions, including the metabolism of carbohydrates, fats, and proteins. Coenzyme A also plays a role in the synthesis of fatty acids, cholesterol, steroid hormones, and neurotransmitters [12].

A deficiency in vitamin B5 is rare because it is widely available in a variety of foods, and the body can also synthesize it from the amino acid, tryptophan. However, severe deficiency can lead to a condition known as pantothenic acid deficiency, although it's uncommon [11,12].

Symptoms of pantothenic acid deficiency may include:

**Fatigue:** Pantothenic acid deficiency can lead to fatigue and weakness due to its role in energy metabolism.

**Irritability:** Some individuals with a deficiency in vitamin B5 may experience irritability or mood changes.

**Gastrointestinal disturbances:** Deficiency may result in digestive issues such as abdominal discomfort, nausea, and vomiting.

**Neurological symptoms:** In severe cases, neurological symptoms such as numbness, tingling, and muscle cramps may occur [12,13].

While pantothenic acid deficiency is uncommon, certain factors such as malnutrition, chronic alcoholism, and certain medical conditions may increase the risk. Additionally, some medications may interfere with the absorption or utilization of pantothenic acid [13].

In cases where deficiency is suspected or diagnosed, supplementation may be recommended under the guidance of a healthcare professional. However, it's essential to consult with a healthcare provider before starting any supplementation regimen [14].

## 1.5 Vitamin B6 (pyridoxine):

Vitamin B6, also known as pyridoxine, is a water-soluble vitamin that plays a vital role in various biochemical reactions in the body. It is involved in over 100 enzymatic reactions, including the metabolism of amino acids, the synthesis of neurotransmitters such as serotonin and dopamine, and the production of hemoglobin, which carries oxygen in red blood cells [12,13].

Vitamin B6 deficiency is uncommon in developed nations due to its presence in a variety of foods like poultry, fish, bananas, potatoes, and fortified cereals. However, factors such as inadequate dietary intake, malabsorption disorders, specific medications, and certain medical conditions can elevate the risk of deficiency [14,12].

Symptoms of vitamin B6 deficiency may include:

**Anemia:** When your body doesn't get enough vitamin B6, it can cause a specific kind of anemia known as sideroblastic anemia. This condition arises when there's not enough hemoglobin produced and your red blood cells form abnormally. Anemia symptoms typically include feeling tired, and weak, having pale skin, and experiencing shortness of breath.

**Neurological symptoms:** Vitamin B6 deficiency can affect the nervous system, leading to symptoms such as irritability, depression, confusion, and cognitive impairment. In severe cases, peripheral neuropathy may occur, characterized by numbness, tingling, and weakness in the hands and feet [13,14].

**Dermatitis:** Some individuals with vitamin B6 deficiency may experience skin changes such as inflammation, scaling, and cracks at the corners of the mouth.

**Weak immune function:** Vitamin B6 plays a role in immune function, and deficiency may impair the body's ability to fight infections [14,12].

While vitamin B6 deficiency is relatively uncommon, individuals who are at risk or experiencing symptoms should consult with a healthcare professional for proper diagnosis and treatment. Treatment typically involves supplementation with vitamin B6, either through dietary changes or supplements, under the guidance of a healthcare provider [14,15].

## 1.6 Vitamin B7 (biotin):

Vitamin B7, also known as biotin, is a water-soluble vitamin that plays a crucial role in various metabolic processes in the body, particularly in the metabolism of carbohydrates, fats, and proteins. Biotin serves as a cofactor for several enzymes involved in these metabolic pathways, helping to convert food into energy and synthesize important cellular components [15].

A biotin deficiency is rare, as it is widely available in many foods, including eggs, nuts, seeds, fish, meat, dairy products, and certain fruits and vegetables. Additionally, biotin is also produced by bacteria in the gastrointestinal tract. However, certain factors such as prolonged antibiotic use, excessive alcohol consumption, and certain medical conditions can increase the risk of deficiency [15,16].

Symptoms of biotin deficiency may include:

**Hair loss:** One of the hallmark symptoms of biotin deficiency is hair loss or thinning, which may affect the scalp and other areas of the body.

**Skin rash or dermatitis:** Biotin deficiency can lead to skin issues such as red, scaly rashes, particularly around the eyes, nose, mouth, and genital area.

**Brittle nails:** Biotin deficiency may cause nails to become brittle and break easily [14].

Biotin deficiency can also occur in individuals who consume raw egg whites regularly, as egg whites contain a protein called avidin that binds to biotin, preventing its absorption in the body.

Treatment for biotin deficiency typically involves supplementation with biotin, either through dietary changes or supplements, under the guidance of a healthcare professional. Biotin supplementation is generally safe and well-tolerated, [15,16].

## 1.7 Vitamin B9(folate):

Vitamin B9, also known as folate or folic acid (the synthetic form of folate used in supplements and fortified foods), is a water-soluble vitamin that plays a crucial role in cell division, DNA synthesis, and the formation of red blood cells. It is particularly important during periods of rapid cell growth and development, such as during pregnancy and infancy [16,17].

A deficiency in vitamin B9 can lead to various health issues, including:

**Megaloblastic anemia:** Folate deficiency can lead to a specific form of anemia known as megaloblastic anemia. This condition is marked by the creation of unusually large and immature red blood cells. Symptoms

commonly associated with megaloblastic anemia include fatigue, weakness, difficulty breathing, and a pallid complexion.

**Neural tube defects:** Sufficient folate intake is essential during pregnancy to reduce the risk of neural tube defects, and serious birth abnormalities that impact the brain and spinal cord and can result in conditions like spina bifida and anencephaly [18].

**Increased risk of heart disease:** Low levels of folate have been associated with an increased risk of heart disease, as folate plays a role in reducing levels of homocysteine, an amino acid linked to cardiovascular disease [18].

Folate is found naturally in a wide variety of foods, including leafy green vegetables (such as spinach and kale), legumes (such as beans and lentils), fruits (such as oranges and avocados), fortified grains and cereals, and liver. Additionally, folic acid is added to many fortified foods such as bread, pasta, and breakfast cereals [17,18].

In addition to its role in preventing deficiency, folate has also been studied for its potential role in preventing other health conditions, including certain types of cancer and cognitive decline. However, more research is needed to fully understand the effects of folate supplementation on these conditions [16,18].

## 1.8 Vitamin B12 (cobalamin):

Vitamin B12, or cobalamin, is a water-soluble vitamin that is essential for numerous physiological processes in the body.

It is involved in the synthesis of DNA, the maintenance of nerve cells, the formation of red blood cells, and the metabolism of carbohydrates, fats, and proteins [19].

A deficiency in vitamin B12 can lead to various health issues, including:

**Pernicious anemia:** Lacking vitamin B12 can lead to pernicious anemia, a condition distinguished by the presence of oversized and immature red blood cells. Common indicators of pernicious anemia encompass feelings of tiredness, weakness, difficulty breathing, paleness, and dizziness.

**Neurological symptoms:** Insufficient levels of vitamin B12 can impact the nervous system, resulting in various symptoms including tingling or numbness in the hands and feet (peripheral neuropathy), challenges with walking, memory issues, confusion, feelings of sadness, and even dementia. In severe instances, a deficiency in vitamin B12 can lead to irreversible nerve damage.

**Gastrointestinal symptoms:** Some people lacking vitamin B12 might experience gastrointestinal problems such as nausea, vomiting, diarrhea, and a decreased desire to eat. Vitamin B12 is found naturally in animal-based foods such as meat, fish, poultry, eggs, and dairy. As a result, those following vegan or vegetarian diets are at a higher risk of vitamin B12 deficiency and may find it helpful to include fortified foods or supplements containing vitamin B12 in their diet [18,19].



Treatment for vitamin B12 deficiency typically involves supplementation with vitamin B12, either through dietary changes or supplements, under the guidance of a healthcare professional. In cases where absorption is impaired, vitamin B12 may be administered through injections or nasal sprays. It's essential to consult with a healthcare provider for proper diagnosis and treatment of vitamin B12 deficiency [19,20].

## 1.9 Vitamin D ((calciferol):

Vitamin D is a fat-soluble vitamin that plays a crucial role in various physiological processes in the body, particularly in maintaining bone health, regulating calcium and phosphorus absorption, supporting immune function, and modulating cell growth and differentiation. There are two primary forms of vitamin D: vitamin D2 (ergocalciferol), which is derived from plant sources, and vitamin D3 (cholecalciferol), which is synthesized in the skin upon exposure to sunlight and found in animal sources

A deficiency in vitamin D can lead to various health issues, including:

**Rickets:** A lack of vitamin D can result in rickets, a condition marked by fragile and feeble bones in children. Rickets may bring about skeletal abnormalities like bowed legs, thickened wrists and ankles, and a delay in growth and maturation.

**Osteomalacia:** In adults, severe vitamin D deficiency can lead to osteomalacia, a condition characterized by softening and weakening of the bones. Symptoms may include bone pain, muscle weakness, and an increased risk of fractures.

**Increased risk of osteoporosis:** Low levels of vitamin D are linked to a higher risk of osteoporosis, a condition marked by decreased bone density and an elevated risk of fractures, especially in postmenopausal women and elderly individuals.

**Increased risk of infectious diseases:** Vitamin D is involved in immune function, and low levels have been linked to a higher susceptibility to infections such as respiratory tract infections and influenza.

Vitamin D stands out among vitamins because the body can produce it when exposed to sunlight. However, factors like geographic location, season, time of day, skin pigmentation, sunscreen use, and age influence the body's ability to synthesize vitamin D from sunlight. Dietary sources of vitamin D include fatty fish (like salmon and mackerel), fish liver oils, egg yolks, and fortified foods such as milk, orange juice, and breakfast cereals.

In cases where vitamin D deficiency is suspected or diagnosed, supplementation may be recommended under the guidance of a healthcare professional. It's essential to consult with a healthcare provider for proper diagnosis and treatment of vitamin D deficiency, as excessive vitamin D supplementation can lead to toxicity.

## 2. Background:

Deficiency in micronutrients such as vitamin D and B has been a topic of interest worldwide, from east to west. Vitamin B and D have various physiological roles in the body, so their deficiency is expected to have adverse effects. Estimates from the National Diet and Nutrition Survey suggest that a substantial proportion of the UK population has vitamin levels below what is required for optimal health. Its strength lies in its coverage of the entire UK population and people of all age groups. Vitamin intake from food is generally lower in older people and teenagers than in other adults, which is likely a reflection of dietary habits. The lower vitamin D status seen in South Asian and black and minority ethnic groups is likely a result of dietary and behavioral factors in specific population groups. Vitamin D conversion to the active form in the dihydroxy form occurs in the kidney. When the activation of the activated hydroxyl form occurs, it reaches tissues [1]. Because bacteria and fungus can also activate vitamin D, consumption of cod liver oil, which has high vitamin D levels, can result in toxicity. This study involves a survey distributed in one city to assess the prevalence of vitamin D and B deficiency. The reason this survey was carried out is because vitamin D is obtained by exposure to the sun. Very few foods contain vitamin D. The major biologically active form of vitamin D demonstrated on the skin is produced when an ultraviolet light reaction occurs. As a result, skin pigmentation affects the synthesis of vitamin D. Darker skin requires a lot longer exposure to sunlight to produce the same amount of vitamin D as light skin [2]. Vitamin D deficiency can lead to several problems, including lack of bone density and pain in the bones. In the elderly, it can cause osteomalacia and eventually osteoporosis. With the growing number of immigrants from countries with hotter climates to Canada, this study will be a good way to assess if darker-skinned people are at an increased risk of vitamin D deficiency compared to light-skinned people. This topic, relative to skin colour, would have a high face validity for most people and a significant portion of the immigrant population in the city. Currently, the best way to assess if someone has vitamin D deficiency is by analyzing the 25-hydroxy vitamin D level in the blood. This vitamin, it turns out, is a very potent form of steroid hormone that regulates gene transcription. This makes certain genes carry out specific functions. A problem related to obtaining the blood test is that it is very expensive. Also, there is an alternate way of determining if someone has a vitamin D deficiency by simulating a bone with calcium isotopes and measuring the effects of PTH. These criteria are not met, which was one of the reasons why we chose a clear, simple-to-administer blood test for 25-hydroxy vitamin D. Measures of sun exposure on the skin and collecting data on diets that contain significant amounts of vitamin D can also be used to determine its deficiency. However, there are no reliable tests for these methods. An efficient way of taking data on diet and comparing each subject would be the use of the food frequency questionnaire Introduction.

Vitamin	Deficiency	Disease
1. Vitamin B1 (Thiamine)	Deficiency can lead to beriberi, a condition characterized by weakness, fatigue, nerve damage, and eventually heart problems.	Beriberi
2. Vitamin B2 (Riboflavin)	Deficiency can result in skin disorders, sore throat, swelling of mucous membranes, and anemia.	Ariboflavinosis
3. Vitamin B3 (Niacin)	Deficiency leads to pellagra, which involves symptoms like dermatitis, diarrhea, dementia, and eventually death if untreated.	Pellagra
4. Vitamin B5 (Pantothenic Acid)	Deficiency is rare but may result in fatigue, irritability, neurological disturbances, and gastrointestinal issues.	fatigue, neurological symptoms
5. Vitamin B6 (Pyridoxine)	Deficiency can cause anemia, dermatitis, depression, confusion, and weakened immune function.	Anemia, dermatitis, neurological symptoms
6. Vitamin B7 (Biotin)	Deficiency is rare but may lead to hair loss, skin rash, neurological symptoms, and metabolic disturbances.	Dermatitis, neurological symptoms
7. Vitamin B9 (Folate)	Deficiency during pregnancy can lead to neural tube defects in the fetus. In adults, it can result in megaloblastic anemia and other neurological complications.	Neural tube defects, megaloblastic anemia
8. Vitamin B12 (Cobalamin)	Deficiency can cause pernicious anemia, neurological problems, fatigue, weakness, and tingling sensations in the hands and feet.	Pernicious anemia, neurological symptoms
9. Vitamin D	Deficiency leads to rickets in children, characterized by weak bones, skeletal deformities, and stunted growth. In adults, it can result in osteomalacia, causing bone pain and muscle weakness.	Rickets, osteomalacia

**Table :1. Vitamins B Complex and D Deficiencies and diseases caused by its deficiencies**

### 3. AIM AND OBJECTIVES:

Assessing the prevalence of vitamin B and D deficiency: A survey study

#### 3.1 Study Objective:

The primary objective of this survey-based study is to assess the prevalence of vitamin B and D deficiency.

#### 3.2 Study design:

The study was conducted with the help of a survey form developed by Google Forms. The whole study was on a randomized basis.

#### 3.3 Study Population:

The target population for this study consisted of individuals aged 16-30 years, irrespective of gender, to assess the deficiency of vitamins B and D. A convenience sampling technique was employed to recruit participants from various geographical locations, including community and educational institutions.

#### 3.4 Sample Size:

A sample size of 232 participants was deemed appropriate to achieve a balance between statistical power and feasibility.

#### 3.5 Survey Instrument:

A comprehensive vitamin deficiency questionnaire was developed, comprising structured questions focused on participant demographics, self-medication practices, and experienced deficiencies. The questionnaire was designed to ensure simplicity, clarity, and relevance to the research objectives.

#### 3.6 Ethical Considerations:

The study was conducted in adherence to ethical guidelines and regulations. Informed consent was obtained from all participants before their participation, ensuring confidentiality, voluntary participation, and the right to withdraw from the study without any consequences.

#### 3.7 Data Collection:

Data collection was carried out using an online survey. The participants were provided with clear instructions regarding the completion and submission of the questionnaire.

### 4. Result and discussion:

The objective of this research project was to investigate the deficiency of vitamin B and D among a sample of 100 men and 30 women, primarily within the age range of 20-23 years.

### 4.1 Demographics:

The study included a total of 232 participants, comprising 100 men and 130 women. -Most of the participants fell within the age range of 15-25 years, indicating a young adult population.

4.What is Age  
232 responses

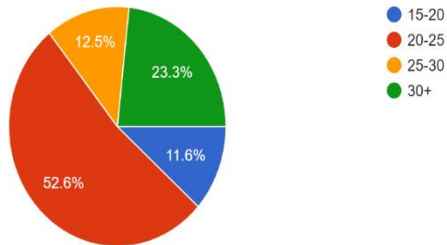


FIG. 4.1.1 – AGE

5.Gender  
232 responses

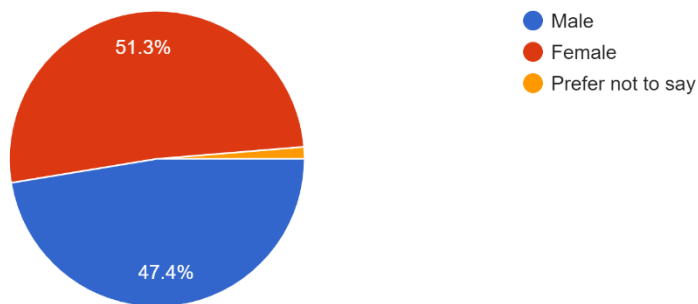


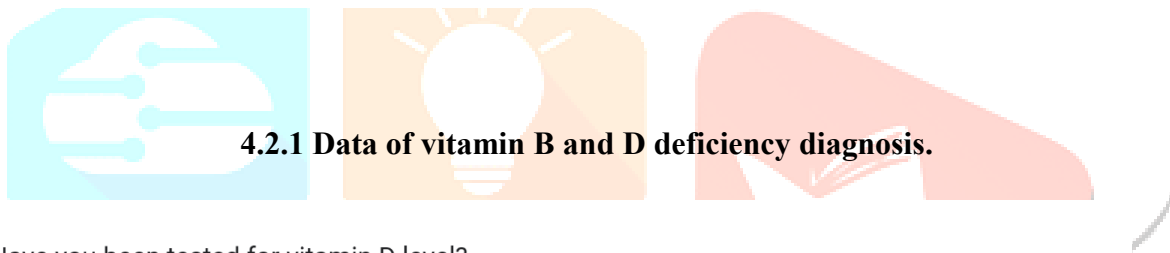
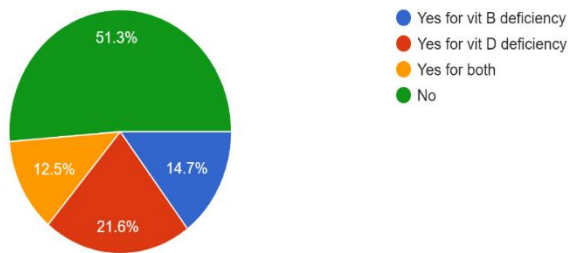
FIG 4.1.2- GENDER

### 4.2 Data of diagnosed with vitamin B or vitamin D:

A significant proportion of the participants (21.6%) reported as diagnosed with vitamin D deficiency. And (14.7%) were diagnosed with vitamin B deficiency.

The deficiency was diagnosed by blood tests and also by symptoms such as skin color change, muscle pain, weakness, etc.

6. Do you remember if you have been diagnosed with vitamin B or vitamin D deficiency?  
232 responses



#### 4.2.1 Data of vitamin B and D deficiency diagnosis.

7. Have you been tested for vitamin D level?  
232 responses

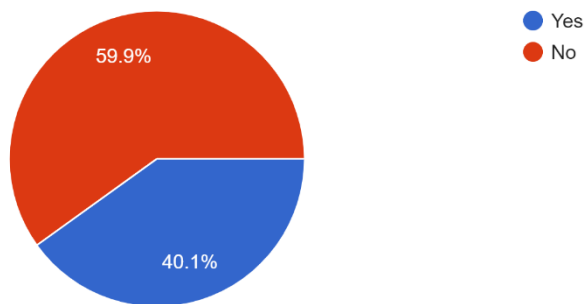
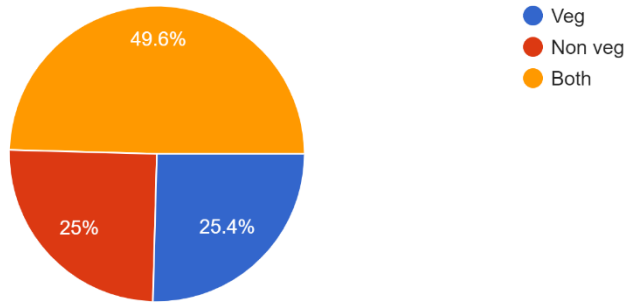


FIG 4.2.2-Data of vitamin D level done.

8. Which of the following diet you take?

232 responses



4.2.3- Data on the diet of participants.

9. Do you have any of the following symptoms related to vitamin B complex deficiency?

232 responses

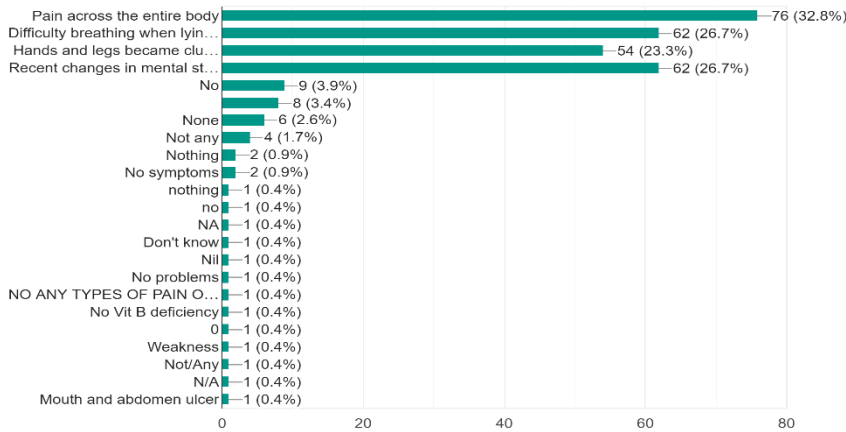
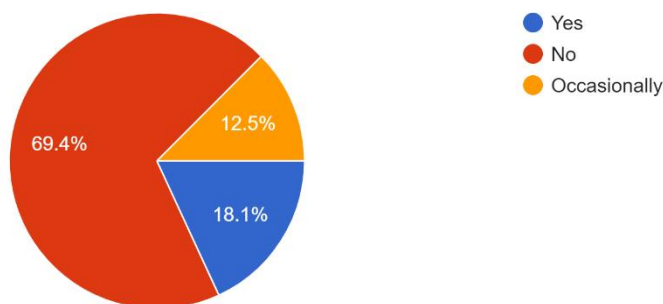


FIG 4.2.4- The bar graph details about symptoms of vitamin B complex deficiency

10. Do you consume alcohol excessively?

232 responses



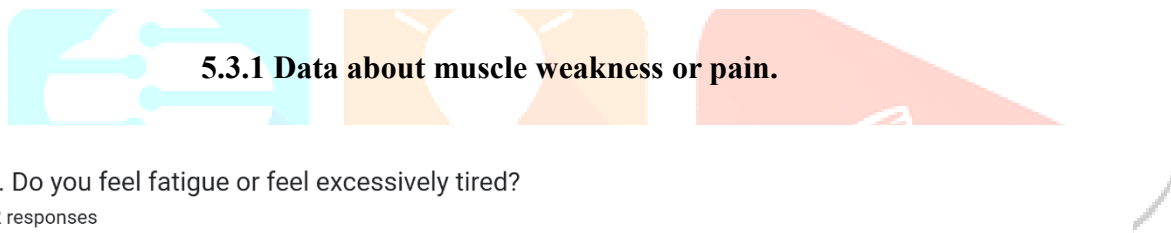
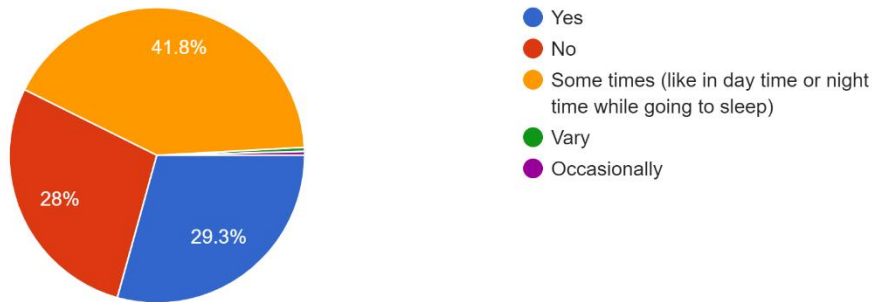
### 4.3- SYMPTOMS OF DEFICIENCIES:

A deficiency of vitamins shows various symptoms of muscle pain, weakness, and tiredness, changes in skin color are observed.

Muscle weakness or pain is the major symptom of vitamin deficiencies it may occur frequently or at night in the morning during work or at rest time.

11. Do you experience muscle weakness or pain?

232 responses



#### 5.3.1 Data about muscle weakness or pain.

12. Do you feel fatigue or feel excessively tired?

232 responses

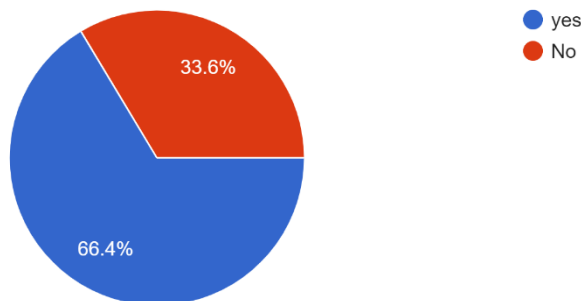
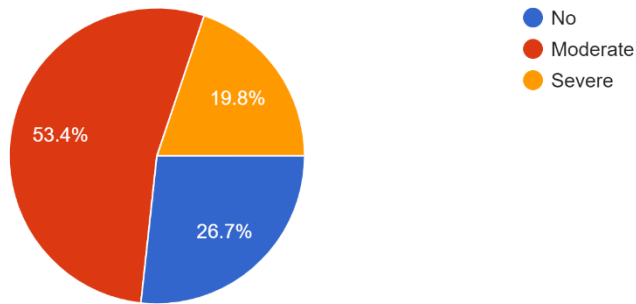


Fig 4.3.2- Data about fatigue or tiredness.



13. Have you noticed muscle pain?

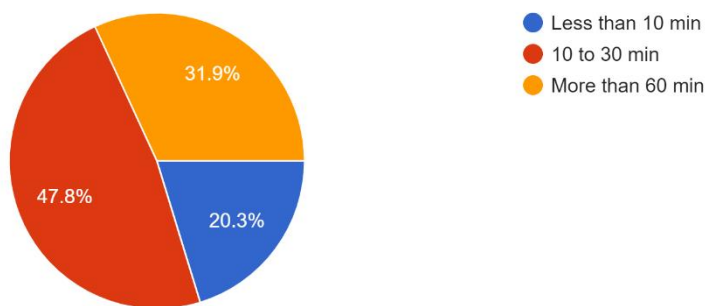
232 responses



### 4.3.3- data about muscle pain

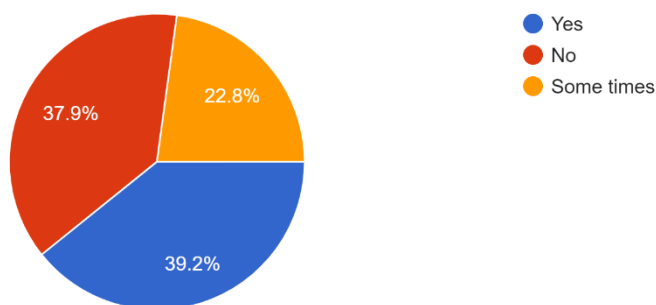
14. How much time do you spend in outdoors, especially in sunlight?

232 responses



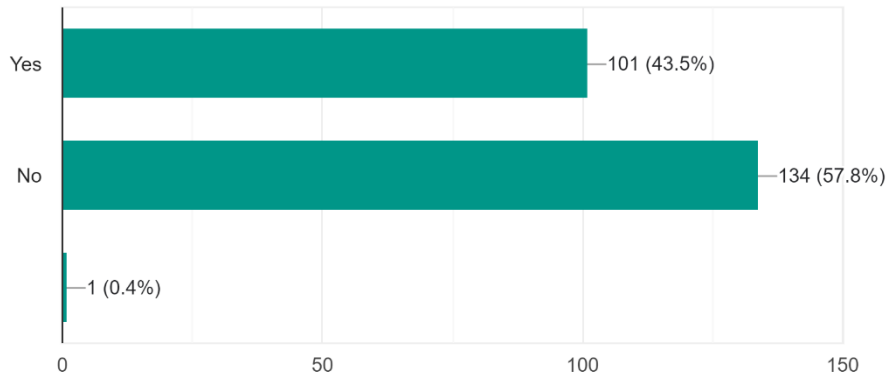
15. Do you experience weakness, fatigue, or numbness in your extremities (hands and feet)?

232 responses



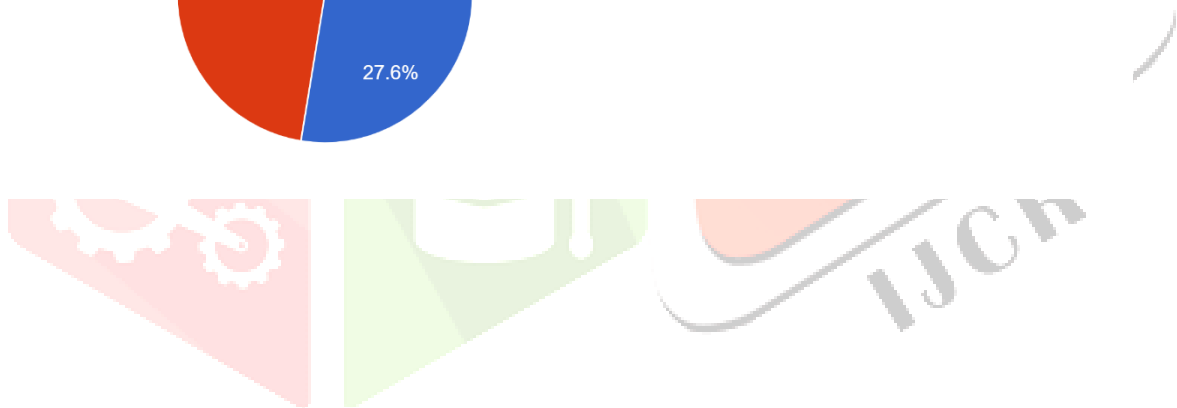
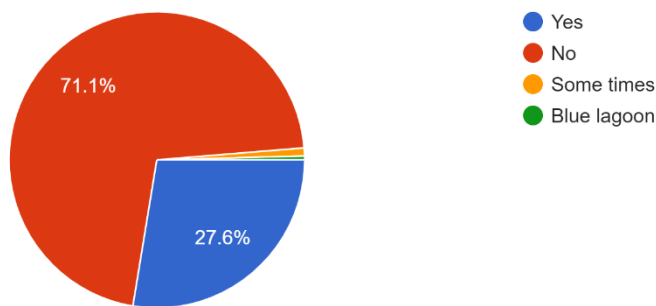
16. Have you noticed change in your skin (e.g., pale, dried, or inflamed)?

232 responses



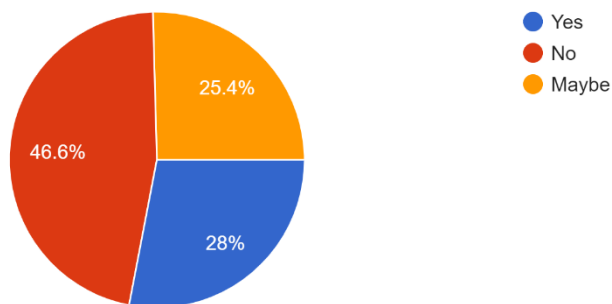
17. Do you have a sore or red tongue (glossitis)?

232 responses



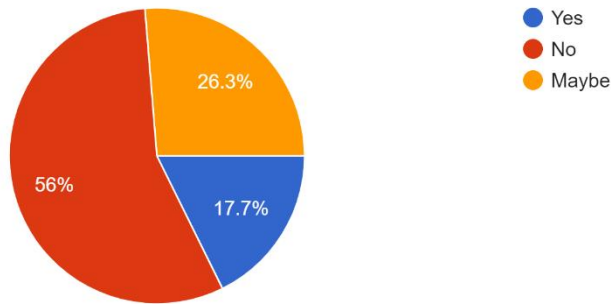
18. Have you lost your appetite or experienced unexplained weight loss?

232 responses



19. Do you take medication that interfere with vitamin B absorption ( e.g., Antacids)

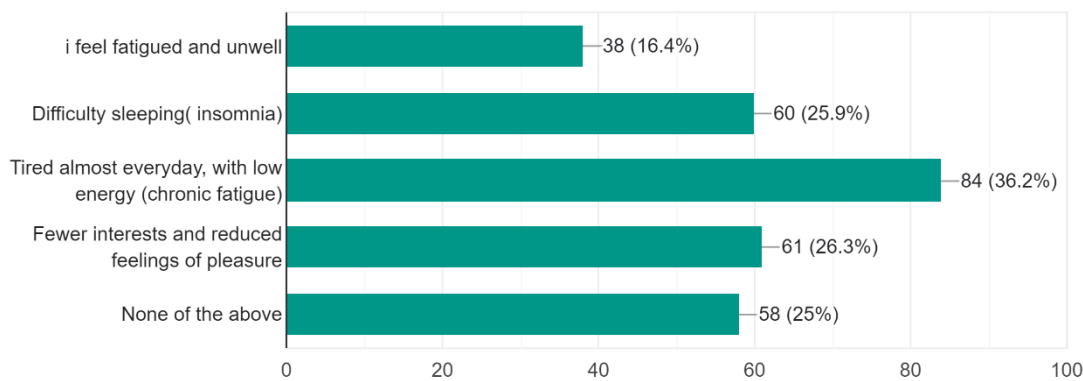
232 responses



#### 4.4: Difficulties occur during deficiency of vitamins B and D:

20. Please select any of the following that apply to you.

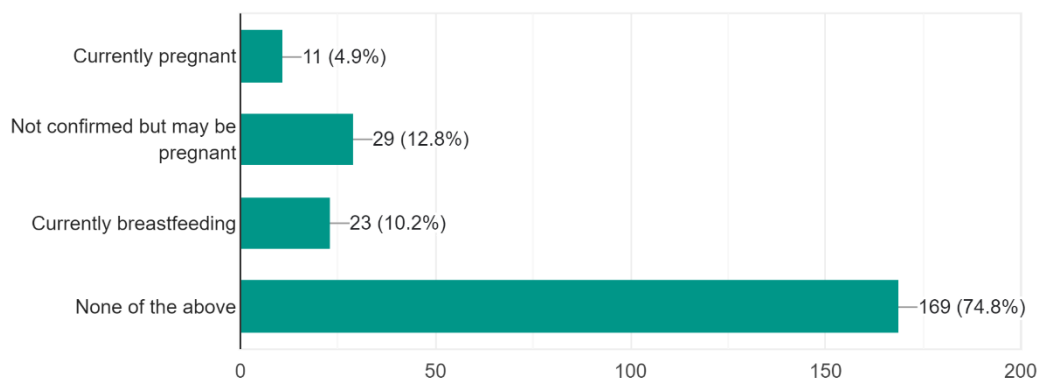
232 responses



#### 4.4.1: Data about the conditions

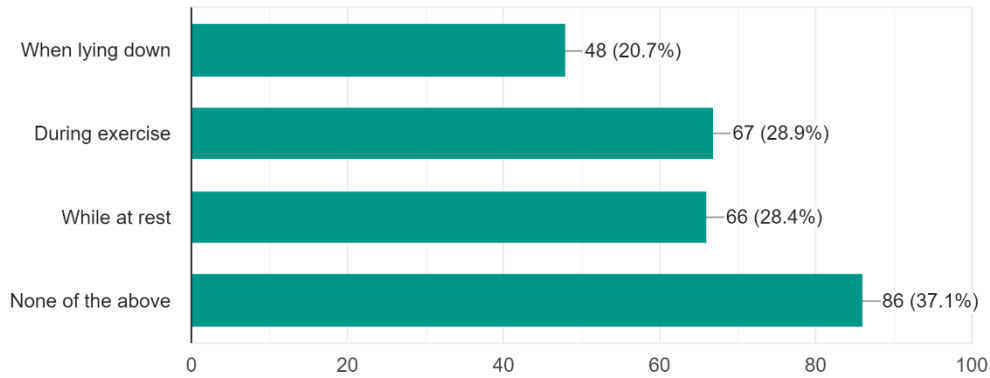
21. Please select any that apply to your current or previous pregnancy, childbirth, etc.

226 responses



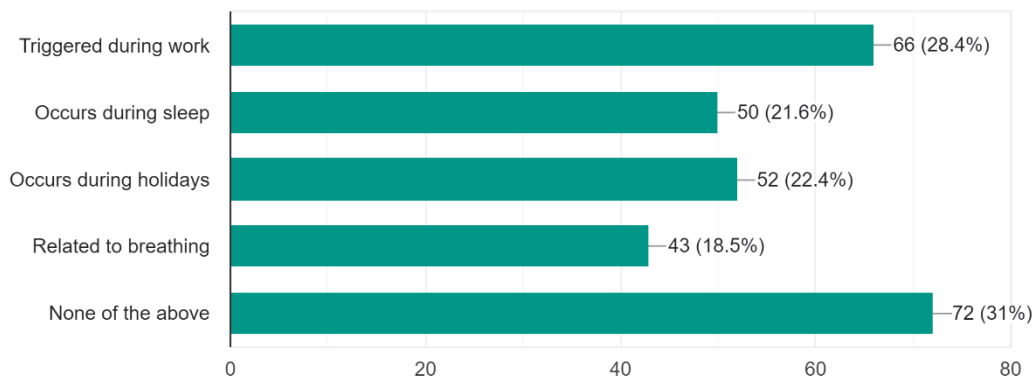
22. what activity effects your symptoms? \*please mark all that apply

232 responses



23. When your symptoms get triggered? \*please mark all that apply

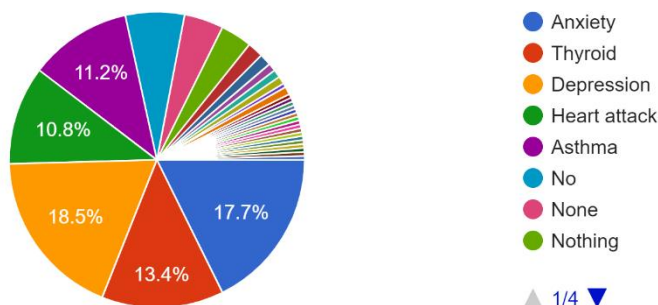
232 responses



### 4. 5: Disease if has been diagnosed in the past:

24.Is there any disease that you have been diagnosed with in the past?

232 responses

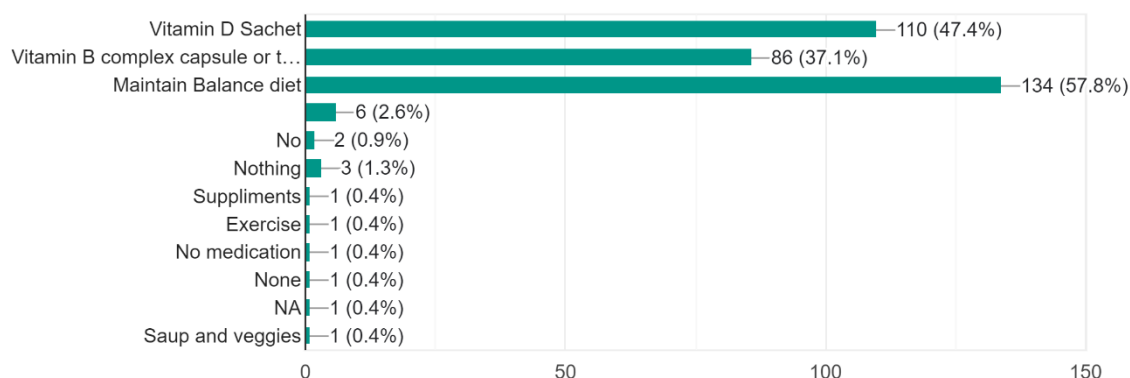


### 4.6 How does the manage their symptoms:

People manage their symptoms in different ways as some of them prefer to maintain a balanced diet some use a D3 sachet and some take vitamin B capsules.

25.How do you manage your symptoms?

232 responses

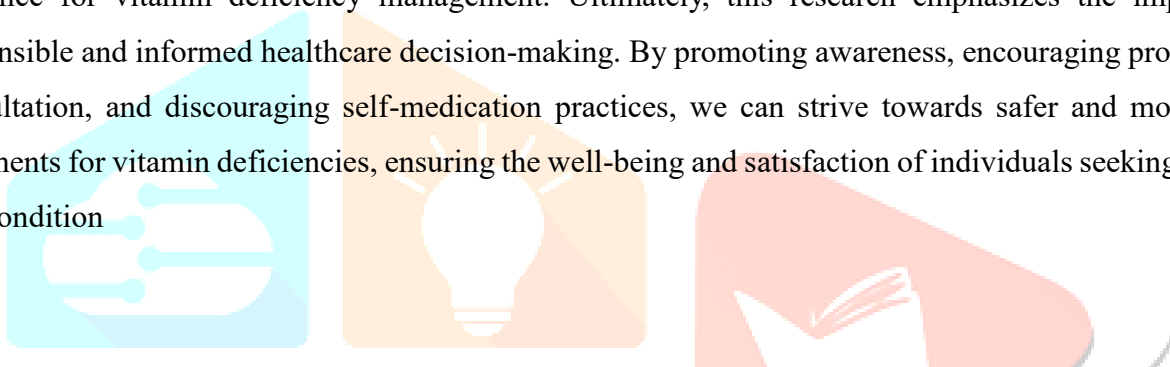


### 4.6 Bar graph details about management of symptoms

## 5. CONCLUSION:

In conclusion, this research article sheds light on the alarming prevalence of vitamin B and D deficiency. Our findings indicate that a significant proportion of the population lacks awareness about the potential risks and consequences of deficiency of vitamin B and D, with a staggering 79% of participants falling into this category. Furthermore, a considerable 64% of the population engages in deficiency of vitamin D and B, indicating a widespread reliance on non-prescribed treatments. The data also reveals that vitamin deficiency is not without its drawbacks. A concerning 21.6% of respondents reported being diagnosed with vitamin D deficiency and 14.7% were diagnosed with vitamin B deficiency by their test reports while only 40.1% of participants had been tested for vitamin D level. Majorly 32.8% had pain across the entire body as vitamin B complex deficiency also 29.3% of participants experienced muscle weakness, and 66.4% experienced fatigue

or excessive tiredness during the vitamin B and D deficiency. Additionally, nearly half of the participants (43.5%) noticed changes in their skin as pale, dried, or inflamed. Vitamin B and D deficiency can be diagnosed by their symptoms which were included in the survey form as 16.4% of participants reported that they feel fatigued or unwell all the time and 10.8% of participants were diagnosed with heart attack disease in the past, 18.5% was reported as depression patient, 0.4% with the neurological disorder. Participants, found vitamin B and D deficiency were managing their symptoms by medication as 47.4% of participants managed vitamin D deficiency by a vitamin D sachet and 37.1% of participants diagnosed as vitamin B deficient managed their symptoms by vitamin B complex capsules or tablets. These findings underscore the urgent need for enhanced awareness campaigns and educational initiatives to address the lack of knowledge surrounding vitamin B and D deficiencies. Individuals must understand the risks associated with deficiency of vitamins and self-medication and the importance of seeking professional medical advice. Healthcare providers should play a key role in educating the public about the potential dangers and providing appropriate guidance for vitamin deficiency management. Ultimately, this research emphasizes the importance of responsible and informed healthcare decision-making. By promoting awareness, encouraging proper medical consultation, and discouraging self-medication practices, we can strive towards safer and more effective treatments for vitamin deficiencies, ensuring the well-being and satisfaction of individuals seeking relief from this condition



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