

# Vegetarian and other alternative diets

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## Abstract

*There are numerous myths in Pediatrics, and especially referred to Infant Nutrition. In recent years, the number of families attending clinics following a vegetarian, vegan, or alternative eating pattern has increased. It is essential for healthcare professionals to be up-to-date on these topics in order to make the most appropriate recommendations and resolve any questions that may arise, especially in the first months of a baby's life and during adolescence: Is it possible and healthy?, will it lack any nutrients?, should any vitamins be given? what follow-up should be performed? This paper aims to review the literature on feeding with non-traditional diets, especially vegetarian or vegan, and address these questions that concern us as professionals, allowing us to guide families in appropriately implementing them. A detailed analysis of the nutrients to monitor is provided, with recommendations for meeting these needs, as well as a review of the evidence regarding the supplements required in certain cases. Breast milk is the ideal food for babies. From 6 months complementary feeding should be started, and it can be vegetarian or vegan provided it is based on fresh and minimally processed products, includes the necessary nutrients, and is supplemented with at least vitamin D until 12 months and vitamin B12 for life. A vegetarian or vegan diet can be adequately and healthily implemented at any stage of childhood, as long as it is well planned, supplemented, and supervised by an experienced healthcare professional.*

**Key words:** Food; Children; Teenagers; Vegetarian; Vegan.

**Palabras clave:** Alimentación; Niños; Adolescentes; Vegetariana; Vegana.

## Resumen

Existen numerosos mitos en Pediatría y, especialmente, en el ámbito de la Nutrición Infantil. En los últimos años, ha aumentado el número de familias que acuden a las consultas siguiendo un patrón de alimentación vegetariano, vegano o basado en opciones alternativas. Es necesario que los profesionales estén actualizados en estos temas para hacer las recomendaciones más adecuadas, así como resolver las dudas que puedan surgir, sobre todo en los primeros meses de vida del bebé y durante la adolescencia: ¿es posible y saludable?, ¿le faltará algún nutriente?, ¿hay que dar alguna vitamina?, ¿qué controles se deben realizar? Con este trabajo se pretende revisar la literatura escrita sobre la alimentación con dietas no tradicionales, especialmente vegetariana o vegana, y resolver estas cuestiones que nos preocupan a los profesionales, permitiendo guiar a las familias para llevarla a cabo de forma adecuada. Se realiza un análisis detallado de los nutrientes a vigilar, con recomendaciones para cubrir las necesidades de los mismos, así como una revisión de la evidencia en cuanto a los suplementos que se precisan en algunos casos. La leche materna es el alimento idóneo para el bebé. A partir de los 6 meses, se debe comenzar la alimentación complementaria, pudiendo ser vegetariana o vegana, si se basa en productos frescos poco procesados, incluye los nutrientes necesarios y se suplementa con, al menos, vitamina D hasta los 12 meses y vitamina B12 de por vida. Es posible realizar una alimentación vegetariana o vegana de forma adecuada y saludable en cualquier etapa de la infancia, siempre y cuando esté bien planificada, suplementada y supervisada por un profesional con experiencia.

## OBJECTIVES

- To review the expert position on vegetarian and vegan nutrition in childhood.
- To establish recommendations for vegetarian nutrition in childhood that meet the needs at each stage.
- To determine the nutrients to monitor and how to do it.
- To provide food options to advise families with these eating patterns.

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## Introduction

### Nutrition in childhood

**Infant nutrition is the foundation of an individual's present and future health, so it must be ensured that it is adequate and sufficient.**

From before birth, in the stage known as “the first 1,000 days” which covers from conception to 24 months of life, including the months of gestation, the body uses nutrients and lifestyle to program some of the processes that will accompany it forever<sup>(1,2)</sup>. Therefore, guiding parents about healthy habits and, specifically, giving appropriate advice on infant nutrition, respecting traditions as much as possible, constitutes one of the fundamental pillars of public health<sup>(3)</sup>.

In recent decades, there has been an increase in the number of people adopting vegetarian and vegan diets, whether for health, environmental, or other reasons. 2-5% of American adults are vegetarian<sup>(4,5)</sup>. It is estimated that there are over 20 million vegans in the United States<sup>(6)</sup>. In Europe, between 3 and 8% of the population is vegetarian<sup>(6,7)</sup>. In Germany and Sweden, the figure is estimated to be as high as 10%, and while the number of children following these diets is unknown, these families are more likely to adopt similar patterns<sup>(5,7)</sup>. In Italy, France, and Spain, up to 7% of the population follow this diet<sup>(8)</sup>. In Poland, rates are as high as 8% among adults, and in the United Kingdom, 12%<sup>(7)</sup>. In India, the percentage rises to 30%<sup>(2,5,9)</sup>. Sometimes it is the parents who identify with this option, and other times it is the children themselves who express their desire to avoid animal products<sup>(10)</sup>. In older children, especially if their family is omnivorous, concerns about food and, in particular, their body image should be investigated in order to rule out or detect early an eating disorder as the cause of the dietary restrictions<sup>(6,10,11)</sup>.

### What are the basic foods in childhood?

The main diet we should undeniably promote, and one that has widely demonstrated its benefits for infant health, is breastfeeding. In addition to

being available, modifiable, and adapted to each stage of development, it is complete enough to cover nutritional needs up to 6 months of age, as it has the nutrients the baby needs<sup>(1,10)</sup>. Exclusive breastfeeding is promoted as the optimal diet for infants up to 6 months of age. After that, breast milk remains the basis and main component of the diet until 2 years of age, although it is true that supplementation and diversification of foods should begin progressively once the infant turns 6 months old. Breastfeeding is recommended until at least 2 years of age and, thereafter, for as long as both mother and child desire<sup>(1)</sup>.

If breastfeeding is not possible or is insufficient, the infant should be fed formula adapted to their needs during the first year of life. There is a cow's milk adapted for the first 6 months, called starter formula or type 1. If desired, at 6 months it can be switched to type 2 or follow-on formula. From 12 months of age, the infant is ready to tolerate whole cow's milk. For vegan families who do not wish to offer animal milk or its derivatives, the recommended option during the first year of life should be a plant-based formula adapted to the infant. **Other beverages intended for the general population, whether commercial or homemade**, such as almond or oat milk, should not be offered. It is important that the products be specifically prepared to be tolerated and sufficient for the infant's growth and development<sup>(10)</sup>.

Other foods are not essential. It's not “absolutely necessary” for children to eat meat, fish, milk, or any other specific food. What is important is knowing how to ensure they get the necessary nutrients, regardless of their source.

Likewise, all families should be encouraged to limit their consumption of products rich in simple sugars, saturated fats, and salt, known as ultra-processed foods, because they are associated with chronic diseases such as obesity, hypertension, and type 2 diabetes. With the arrival of vegetarian and vegan trends, often linked to the idea of health, well-being, and environmental friendliness, the food industry has increased the supply of prepared products with this label, which does not guarantee that they are healthy, as is the case with many sweets, pastries,

juices, and sugary drinks. Every diet, omnivorous or not, should be based on fresh, minimally processed products<sup>(10,11)</sup>. This is especially important in the early years of life, when food preferences develop. If the supply of processed products is high, a rejection of fresh foods is likely to develop, since the former are highly palatable. Furthermore, it is recommended not to add salt to foods offered to babies until they are 12 months old. Sweeteners (mostly free sugars) should be avoided as much as possible, as should artificial sweeteners. The later they become familiar with these types of flavors, the more readily they will accept the variety of products nature offers<sup>(11)</sup>.

Pediatricians, especially those in primary care, must be up-to-date in order to advise families, regardless of their dietary pattern. Regardless of eating habits, people are increasingly consuming foods rich in saturated fats, sugars, and salt, which is detrimental to the current and future health of the population. Therefore, we have ample room for improvement ahead<sup>(12)</sup>.

### Plant-based eating patterns

There are numerous variations of the vegetarian diet<sup>(10,13,14)</sup>. The main ones are shown in table I. In this article, we will focus on the two main plant-based dietary patterns: vegetarianism and veganism, since the other options are not recommended during childhood.

**Vegetarians:** these are people who do not consume foods derived from animal flesh, including fish and shellfish, but do consume products derived from live animals, such as dairy products, eggs, and honey.

**Vegans:** their diet does not include any products obtained through the use of animals.

### Is a vegetarian diet healthier?

To answer this question, it is important to consider what foods will be included in the family's menu. The presence of ultra-processed foods, rich in saturated fats, sugars, salt, or combinations of these, can occur in any type of dietary pattern. That is, even if they are not of animal origin, these products do not have beneficial properties themselves. This happens, for example,

**Table I. Plant-based eating modalities**

	<i>Vegetable products</i>	<i>Animal products</i>	<i>Comments</i>
<b>Omnivorous</b>	All	All	
<b>Vegetarian</b>	All	Dairy, eggs and honey	
<b>Vegan</b>	All	No	Includes lifestyle
<b>Raw food</b>	All	No	Mostly raw or at low temperature
<b>Frugivorous</b>	Fruits	No	Raw

with certain types of processed pastries, sugary drinks, snacks, and so on. One of their advertising claims is that they are “suitable for vegans”, and they are far from being good for the body. On the contrary, if a diet includes minimally processed animal products (fish, meat, cheese, milk, natural yogurt) but is based on fruits, vegetables, grains, and seeds, it can be more balanced and healthier than a vegetarian diet with an excess of unnecessary ingredients. It all depends on the type of foods included in each dietary pattern. We must approach the topic without prejudice and with rigor, showing genuine interest in checking whether the family has the necessary knowledge and, if not, guiding them toward an optimal dietary pattern for the child.

In general, plant-based diets have some advantages, such as higher fiber content, lower saturated fat content, which contributes to a more favorable lipid profile, and providing antioxidants and other bioactive compounds beneficial to the body. Furthermore, these foods have a much smaller water footprint, making them more sustainable for the planet and having a lower environmental impact on natural resources<sup>(3,11)</sup>.

However, for a vegetarian diet to be adequate, it must be well planned and requires knowledge based on scientific evidence<sup>(10)</sup>.

**Is a vegetarian diet suitable for children?**

Most pediatricians support the vegetarian diet and affirm that optimal growth and development can be achieved in children following this type of diet. Even so, all studies point to the importance of adequate infor-

mation, properly planned menus, and vitamin B12 supplementation, given that the only sources of vitamin B12 are animal products, and dairy products and eggs are insufficient. Studies and organizations that do not support vegetarianism in childhood emphasize the risk of nutritional deficiencies in cases where adequate counseling is not provided, particularly in iron, iodine,

omega-3 fatty acids, vitamin D, calcium, and vitamin B12<sup>(11)</sup>. Hence, the need for health professionals who work with families to be properly trained to provide recommendations and monitor these children. If they lack the necessary knowledge, it is essential to refer families to a dietitian-nutritionist expert in vegetarian diets to ensure that their diet will be balanced and sufficient. The younger the child and the more restrictive the diet, the greater the likelihood that the dietary pattern is unhealthy, so greater attention must be paid to it. Ensuring that all nutrients are supplied in the right proportion and quantity requires specific knowledge, so that optimal growth and function can be achieved at any age<sup>(15)</sup>.

Studies show lower weight in children who follow this eating pattern, with lower rates of overweight and obesity in this group, and adequate growth at any age. It also appears to reduce the risk of developing chronic

**Table II. Expert position regarding vegetarian and vegan diets in children**

	<i>Vegetarian</i>	<i>Vegan</i>
Canada	Yes	Yes, subject to conditions
American Academy of Nutrition and Dietetics	Yes	Yes, subject to conditions
Australia	Yes	Yes, subject to conditions
Argentina	Yes, with conditions	Yes, subject to conditions
United Kingdom	Yes	Yes, subject to conditions
Nordic countries	Yes	Yes, subject to conditions
Spanish Association of Pediatrics	Yes	Yes, subject to conditions
Poland	Yes	Yes, subject to conditions
Portugal	Yes	Yes, subject to conditions
ESPGHAN	Yes	<b>Not for children under 12 months</b>
Germany	Yes	<b>No</b>
Belgium	Yes	<b>No</b>
France	Yes	<b>No</b>
Italy	Yes, with conditions	<b>No</b>

*ESPGHAN: European Society for Pediatric Gastroenterology, Hepatology and Nutrition.*

diseases. Further research is needed, as updated, long-term studies with sufficient and homogeneous samples are lacking<sup>(2,10)</sup>.

There is no consensus among experts regarding vegetarian and vegan diets in children. Table II summarizes the positions of different organizations and countries regarding vegetarianism in childhood. The German Society of Nutrition, the American Academy of Pediatrics, and the Belgian Academy of Medicine do not recommend that children, adolescents, pregnant women, or breastfeeding mothers follow diets free of animal products, especially the vegan pattern. They state that the most appropriate diet in childhood is omnivorous, with a high intake of vegetables and a moderate intake of meat, fish, and dairy products<sup>(5-7,15-17)</sup>. Experts from countries such as France and Italy indicate that veganism in children should be avoided due to the high risk of nutritional deficiencies if they do not receive supplements. They also promote systematic supplementation with vitamins B12 and D, calcium, and docosahexaenoic acid (DHA), in addition to iodized salt<sup>(5,9,12,18)</sup>. The European Society for Pediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) advises against it in children under 12 months of age<sup>(6,9,15)</sup>. The 2020-2025 American Guidelines recommend a vegetarian dietary pattern starting at 12 months of age. However, the American Academy of Nutrition and Dietetics, the Canadian Pediatric Society, and the Argentine Nutrition Society do consider it a healthy dietary pattern at any age, as long as it is well planned and supplemented, with accurate information and adequate monitoring by expert professionals<sup>(3,5-7,15)</sup>. The same opinion is held by the Dietetic Associations of Australia, the United Kingdom, Italy, Portugal, and the Nordic countries<sup>(5,7,12)</sup>. In Poland, they consider supplementation and monitoring by a nutrition expert to be necessary<sup>(12)</sup>. In Spain, the Spanish Association of Pediatrics (AEP) considers an omnivorous diet more appropriate, especially for infants, but states that a well-planned vegetarian and vegan diet supplemented with vitamin B12 can be healthy at any age<sup>(5,10)</sup>. The most skeptical consider that no substitute exactly matches the nutrients found in

meat, which could pose a short- and long-term health risk for children. Some propose reducing red meat consumption by increasing poultry and fish intake in a so-called flexitarian approach, which could reduce cardiovascular risk without increasing the risk of nutritional deficiencies. In general, nutrient deficiencies could be avoided through supplementation, with appropriate clinical and analytical monitoring by well-qualified and experienced professionals<sup>(4,11)</sup>.

**What should a vegetarian or vegan diet be like?**

To provide a child with all the necessary nutrients, the diet must be well planned, regardless of the type of diet adopted. This means a wide variety of

foods, including vegetable fats, sources of omega-3, calcium, and monitoring vitamin D and B12 intake<sup>(8)</sup>. For vegetarian or vegan families, it is recommended that each meal include at least one of the following food groups: legumes and their derivatives, cereals, nuts, seeds, and, if consumed, dairy products and eggs<sup>(11)</sup>.

If the family wishes, advice from a nutrition specialist may be recommended. To avoid nutritional deficiencies, prior training and professional support are sometimes necessary. A balanced and varied menu should avoid improvisation and apply the basic concepts of a vegetarian diet<sup>(4)</sup>.

Figure 1 shows the plant-based food pyramid developed in France. The



**Figure 1.** Vegetarian food pyramid. Source: *Pyramide Alimentaire Végétale - AVF (Association Végétarienne de France)*. Available in: <https://www.vegetarisme.fr/produit/pyramide-alimentaire-vegetale/>.



recommended servings for different foods are shown in a very original way.

## Planning the vegetarian and vegan diet

**For a healthy eating pattern in childhood, meal planning is essential.**

To ensure the intake of necessary nutrients in childhood and avoid the overuse of unhealthy foods, any dietary choice must be organized and planned appropriately. This is especially important when certain food groups are omitted. Generally, if the diet is well planned, nutritional deficiencies are not likely to occur. This helps focus on those key components of food that deserve special attention, avoiding deficiencies that can be dangerous for a growing body, such as that of a child. Parents' knowledge of nutrition and their professional advice determine the quality of the diet of vegetarian and vegan children<sup>(6)</sup>.

Several studies comparing vegetarian and vegan children with omnivorous children found that the amount of energy consumed was similar<sup>(19,20)</sup>. Others showed lower energy consumption in vegan children<sup>(21)</sup>. In general, the macronutrients ingested by vegetarian and vegan children are those necessary for optimal growth<sup>(22)</sup>. Omnivorous children consume more protein, fats (especially saturated fats) and free sugars, while vegans consume a higher proportion of carbohydrates and fiber<sup>(19,21)</sup>. They also show higher intakes of cholesterol, calcium, iodine, zinc, DHA and vitamins B12, B2 and D than omnivores. Vegetarian children show lower intakes of all amino acids, but they are sufficient to cover their requirements. They have a higher intake of folates, carotenoids, magnesium, iron, vitamins E, A, B1, B6, K and C, potassium, monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA)<sup>(11,17,20-23)</sup>. If they are not supplemented, they present vitamin deficiencies, mainly B12 and D<sup>(19)</sup>. Lower levels of serum albumin have been observed in vegetarian children compared to omnivores, but they were within normal limits, as were the values of amino acids in the blood. Recent studies show that

	<i>Risk of deficit</i>	<i>Suitable</i>
<b>Vegetarians</b>	Fiber, SAFA, PUFA, calcium, iron, zinc, vitamin B12 and selenium	Folate and vitamin E
<b>Vegans</b>	Calcium, iron, zinc, vitamin B12 and selenium	Fiber, PUFA, folate, vitamin C and vitamin E
<b>Omnivores</b>	SAFA, PUFA, folate, calcium, fiber and vitamin E	Zinc and vitamin B12
<b>Any dietary pattern</b>	EPA and DHA, vitamin D. Possibly iodine	

*DHA: docosahexaenoic acid; EPA: eicosapentaenoic acid; PUFA: polyunsaturated fatty acids; SAFA: saturated fatty acids.*

vegan children ingest higher quantities of some vitamins and minerals, although calcium is below requirements. Omnivores exceed iodine, calcium and riboflavin. Vitamins B2 and B12 and iron were also shown to be lower in children with vegan diets, although no serum deficiencies were observed.

All children, regardless of diet, had low vitamin D intakes<sup>(12,19)</sup>. Selenium may be a deficiency nutrient in vegetarians and vegans living in areas with selenium-poor soils. Table III summarizes the nutrients at risk by dietary pattern<sup>(12)</sup>.

## Nutrients in plant-based diets

**In the vegetarian eating pattern, the contribution of different nutrients must be taken into account.**

Nutrients that should be monitored in people on vegetarian or vegan diets include protein, iron, zinc, iodine, selenium, omega-3 fatty acids, vitamin D, calcium, and vitamin B12. Special attention should be paid when a child exhibits aversions to food groups, which are very common at certain ages, as this increases the risk of malnutrition or deficiency. Studies on children following meat-free diets have yielded variable results, but most are old and heterogeneous. The most recent studies show that, thanks to fortified foods and supplements and a better understanding of children's nutritional needs, vegetarian dietary patterns are conducive to growth.

Vegetarian children have been shown to have lower serum levels of total cholesterol, high-density lipoproteins (HDL), vitamins B12 and D (without supplementation), with higher glucose and triglycerides. In contrast, vegans have lower values of low-density lipoproteins (LDL), HDL, iron, C-reactive protein, vitamins B12 and D (without external input), with higher levels of homocysteine and mean corpuscular volume<sup>(20,21)</sup>. Vegans also have lower levels of fat-soluble vitamins, especially A and D<sup>(21)</sup>. A lower index of oxidative stress is observed in vegetarians. If the diet is properly planned, a more favorable inflammatory profile is observed, with a protective effect of the plant-based diet on the inflammatory state of the body.

## Calories

We must ensure the necessary intake for the child's growth. Since, in general, plant-based products are lower in calories than foods of animal origin, it is established that the calorie intake in a vegetarian diet can be 10-15% higher. This is achieved by increasing the amount, if tolerated and accepted, or by choosing foods with greater calorie density, such as avocado, legume or nut creams, or eggs if they consume them.

## Proteins

The belief that vegetarian diets lack protein is not true in most cases. If energy intake is sufficient, protein needs are adequately met<sup>(3,5)</sup>. So-called children's menus, in fact, often contain excess protein. Protein intake in a vegetarian eating pattern is ensured with a

varied and balanced diet that includes one of these food groups at each meal: legumes (including soy and its derivatives), cereals (wheat, oats, quinoa), seeds, nuts, and milk or eggs if desired. Thus, with 2-3 daily servings of these foods, preferably combined, protein intake is assured<sup>(5,10,12,15)</sup>. Figure 2 shows protein-rich plant foods.

To achieve the necessary intake of essential amino acids, foods (e.g., legumes and cereals) should be combined throughout the day, not necessarily in the same meal, as was previously thought<sup>(3,5)</sup>. In children under 2 years of age, it does seem advantageous to combine complementary proteins in 6-hour intervals<sup>(8)</sup>. This is because cereals are deficient in lysine, and some legumes are deficient in methionine. Chickpeas, soybeans, and other vegetables, such as beetroot and pistachios, have a nutritional profile that includes all the essential amino acids, so it is recommended to include them in the daily diet. Seitan, a wheat-derived product, is also a good source

of plant-based protein<sup>(11)</sup>. We should recommend the intake of different foods, alternating them. It is also true that the digestibility of plant-based proteins is lower than that of animal proteins, which contributes to the need to ensure the necessary intake to cover requirements<sup>(23)</sup>. For these reasons, it is recommended to increase protein intake by 10% to 30% daily to ensure adequate amounts during childhood and adolescence<sup>(5,8,13,15,19)</sup>. More specifically, by age, children under 2 years of age require the greatest increase in protein intake, around 30-35% more than omnivores, 20-30% up to 6 years of age, and 15% thereafter<sup>(3,14)</sup>.

### Iron

Some studies show lower ferritin levels in vegetarian children compared to omnivores, but this did not indicate a deficiency, as they were within normal ranges and did not present higher rates of anemia<sup>(3,4,11,14,17)</sup>. In addition to lower ferritin, lower hepcidin levels and increased serum transferrin recep-

tor concentrations have also been observed<sup>(22)</sup>. Due to their tannin, polyphenol, phytate, and fiber content, the bioavailability of iron from vegetables is lower<sup>(6,16)</sup>. In vegetarians, iron absorption is physiologically increased<sup>(2,3)</sup>. In fact, some studies show a higher iron intake in vegetarian children and adolescents<sup>(17)</sup>.

Foods high in iron, which should be part of a child's regular diet to ensure a good supply of this mineral, include legumes, spinach (from 12 months of age), eggs, seeds, nuts, and whole grains. Iron utilization can be enhanced by accompanying foods rich in vitamin C, such as kiwi, tangerines, tomatoes, or oranges, which counteracts its lower bioavailability<sup>(3,5,10,11,13)</sup>. Figure 3 shows some examples of plant foods rich in vitamin C. Iron absorption is improved by fermenting, sprouting, and soaking legumes and seeds, which reduces the chelating effect of the phytates they contain. Conversely, their combination with foods rich in phytates, oxalic acid, and calcium should be avoided<sup>(6)</sup>. It is therefore important to increase the intake of iron-rich foods in this population. Even more attention should be paid in adolescence, since the risk of iron deficiency is higher<sup>(12)</sup>.

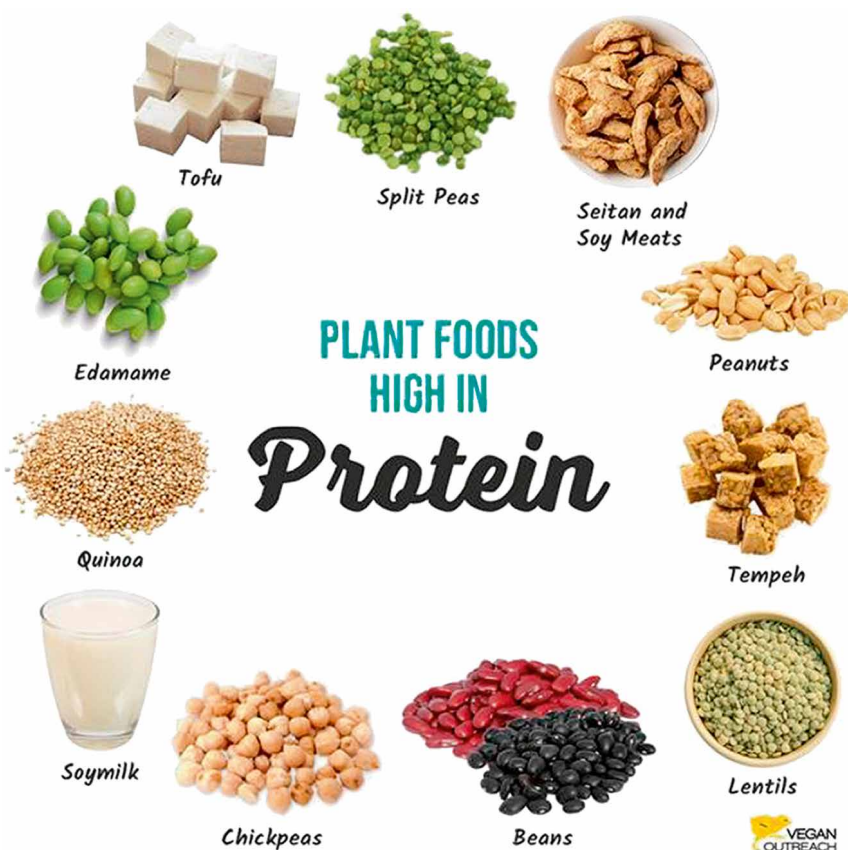
### Iodine

It is recommended to ensure iodine intake through food or milk until iodized salt can be introduced at 12 months of age<sup>(8)</sup>. From that age on, in Spain, the entire population is recommended to cook with iodized salt, which is supplemented with this mineral. This practice, along with a varied and balanced diet, ensures the necessary intake. Seaweed, a food that contains high amounts of iodine, is not recommended in children's diets due to the risk of excess and toxicity<sup>(6,10)</sup>.

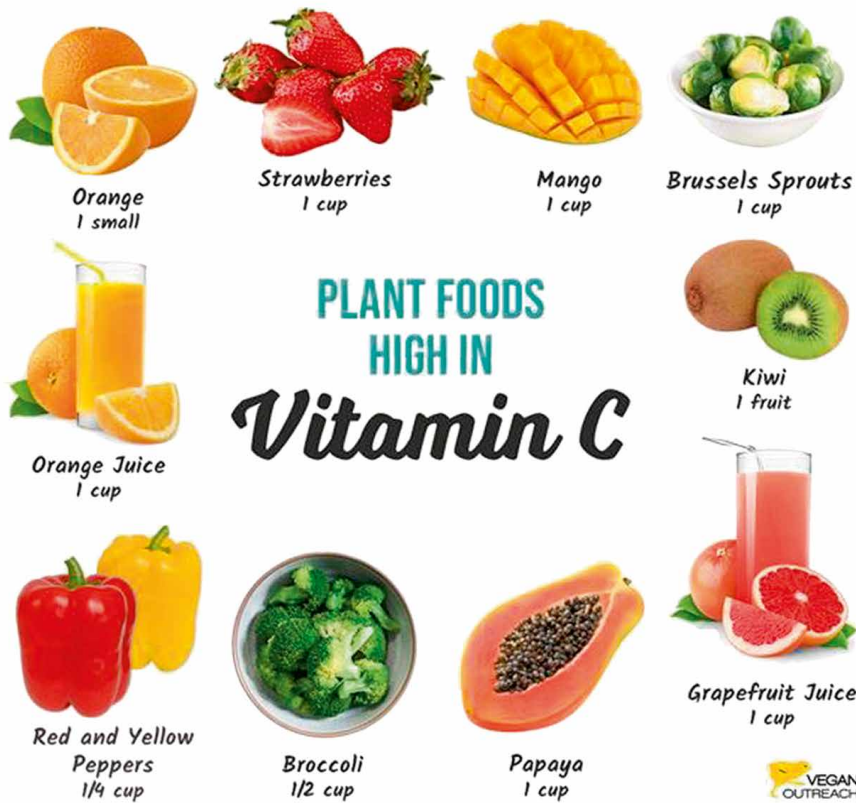
Up to 6 years of age, the recommended daily intake of this mineral is 90 micrograms, 120 between 6 and 12 years of age and 150 from adolescence onwards<sup>(15)</sup>.

### Zinc

Although zinc intake is lower in vegetarians and vegans than in omnivores, it is usually sufficient to maintain normal levels<sup>(41)</sup>. Zinc is found in a mul-



**Figure 2.** Protein-rich plant foods. Source: *Vegan Health – Evidence-Based Nutrient Recommendations*. Available in: <https://veganhealth.org/>.



**Figure 3.** Plant foods rich in ascorbic acid or vitamin C. Source: *Vegan Health – Evidence-Based Nutrient Recommendations*. Available in: <https://veganhealth.org/>.

titude of foods, such as dairy products, eggs, legumes, nuts, seeds, and grains like oats and quinoa, but some antinutrients hinder its absorption. Therefore, cooking techniques such as fermenting or soaking legumes are recommended. Zinc intake is beneficial alongside organic acids from fruits and vegetables<sup>(2,6)</sup>.

### Selenium

Selenium may be deficient in vegetarian diets of children living in areas with selenium-poor soils, so the intake of cereals, nuts, and legumes should be recommended for these groups as part of a varied and balanced diet. Long-term excessive consumption of Brazil nuts in young children is not recommended due to the risk of selenium excess.

### Polyunsaturated fatty acids (omega 3)

The fat intake profile is healthier in vegetarian diets, with a better antioxidant status, although the intake of omega 3, mainly from fatty fish, must be ensured in omnivorous diets<sup>(11)</sup>.

Due to the food sources included in their diet, children with vegetarian diets consume lower amounts of eicosapen-

taenoic acid (EPA) and DHA, although the effects of this intake have not yet been determined<sup>(6,10)</sup>. In the case of vegans, their percentage of dietary fat is even lower, and sometimes omega 6 displaces omega 3, which is unhealthy in the long term, so the intake of both lipid groups should be monitored<sup>(6)</sup>. To achieve adequate levels of omega 3 fatty acids, which are also balanced with respect to omega 6 fatty acids, the consumption of ultra-processed products should be avoided. The use of olive oil or high-oleic sunflower oil should be promoted, including, in the regular diet, foods with a healthy lipid profile, such as nuts, which can be ground or in cream form, during the first 5 years of life, especially walnuts, seeds such as flax or chia, and soy<sup>(10,15)</sup>. As a recommendation, regular consumption of foods rich in alpha-linolenic acid (ALA), a precursor of omega 3 and present in foods such as nuts, soy, flax and chia seeds and green leafy vegetables should be encouraged<sup>(11)</sup>.

DHA supplementation could be interesting and beneficial for infants whose breastfeeding does not reach half of their daily intake, and there is even

the possibility of giving algal oil to all vegetarian and vegan infants when they begin solid food.

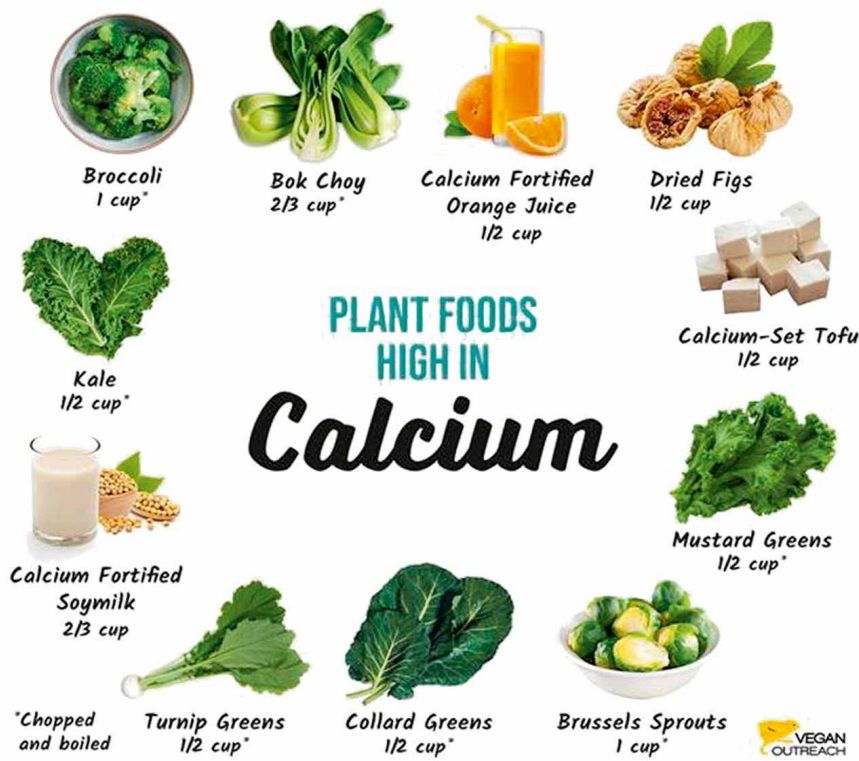
In some countries such as Italy, it is recommended that children between 6 months and 3 years consume 100 mg of DHA per day, regardless of the type of diet<sup>(5,8)</sup>.

### Vitamin D and calcium

For all children under 12 months of age, whether vegetarian or not, daily supplementation with 400 IU of vitamin D is recommended, preferably in the form of D3, which is already available from plant sources<sup>(3,8,11)</sup>. From that age onwards, it is not usually necessary if the diet is varied, sufficient, balanced and not very restrictive, although it must be assessed individually, especially in vegans. The most recent studies, conducted in children, show levels within the normal range with a bone turnover rate similar to that of omnivores. Lower bone mineral content is observed in vegans, which corresponds to the lower levels of calcium consumption in this type of diet<sup>(20)</sup>.

We must emphasize the need for daily sun exposure with protection. The main source of vitamin D is sunlight. Just 15 minutes a day on the face, neck, and forearms is enough to receive the necessary intake. It is found in small and variable quantities in food, so it may be worth including fortified foods<sup>(6)</sup>. It is essential to instill the habit of physical exercise from a young age. Throughout childhood, it is recommended to do 60 minutes of moderate to intense activity daily. In addition to many other benefits, this practice promotes proper bone development<sup>(10)</sup>.

Dietary recommendations should be individualized. Plant-based foods that provide calcium are primarily legumes (especially white beans, soybeans, and their derivatives), cereals, nuts (almonds, tahini), figs, cabbage, kale, collard greens, watercress, broccoli, arugula, dairy products, and eggs<sup>(3,13,14)</sup>. Figure 4 shows plant-based foods rich in calcium. Consumption of leafy vegetables with low oxalate content, such as broccoli, kale, and collard greens, should be encouraged to prevent a decrease in oxalate bioavailability<sup>(5,10,11)</sup>. Green leafy vegetables, such as spinach and chard, are not



**Figure 4.** Calcium-rich plant foods. Source: *Vegan Health – Evidence-Based Nutrient Recommendations*. Available in: <https://veganhealth.org/>.

good sources of calcium due to their low absorption in the presence of oxalates. They should also be avoided until the age of 12 months due to the risk of methemoglobinemia. Phytic acid in legumes, nuts, and seeds also reduces calcium bioavailability.

For all these reasons, people following a plant-based diet should increase their intake of this mineral by 20%<sup>(6,15)</sup>. Table IV shows the calcium intake of some foods. In comparison, 100 ml of cow’s milk contains 120 mg of calcium.

Occasionally, it is recommended to offer children enriched or fortified foods, depending on the individual needs and the nutrient intake they receive from their regular diet. This should be done on an individual basis. The advice of a dietitian with expertise in vegetarian nutrition will ensure the appropriate administration of supplements if necessary. This is especially important for children on a vegan diet, as they do not consume milk or dairy products, and it may be more difficult for them to meet their calcium requirements<sup>(10)</sup>. Therefore, for vegan children, calcium-fortified foods, including mineral water, may be recommended to

ensure calcium intake, or supplements may be recommended if necessary<sup>(15)</sup>. Breast milk should not be overlooked as a source of calcium. Its bioavailability is almost 60%, while that of formula milk is 38%.

**Vitamin B12**

Supplementation is essential for all vegetarian children from 6 months of age, even if they consume eggs and

dairy products<sup>(15,23)</sup>. To achieve adequate intake levels, the amount of these foods required would unbalance the diet<sup>(10)</sup>. In the first 6 months of life, if the mother is vegetarian, she should take a supplement, which would be sufficient to cover the baby’s requirements. After that age, cyanocobalamin must be supplied externally throughout life<sup>(5,15)</sup>.

Dosage may be weekly or administered several times a week, varying according to the child’s age and characteristics. Various recommendations can be found with different doses depending on the regimen chosen, although the most important thing is to facilitate long-term compliance. Some studies indicate that it is preferable to take the dose in fractions during childhood, that is, daily or several times a week, to promote intestinal absorption of the vitamin and achieve its optimal use<sup>(8)</sup>. High doses in a single weekly dose can saturate intestinal vitamin receptors, resulting in the loss of a large part due to non-absorption<sup>(6,11)</sup>. It is estimated that doses greater than 2.5 micrograms saturate the intrinsic factor and prevent the absorption of the remainder, so it seems more beneficial to administer the vitamin in fractions or in single daily doses<sup>(5)</sup>.

Figure 5 shows the main vegetarian food sources of some key nutrients in this group<sup>(14,23)</sup>.

Supplementation with multivitamin complexes is not recommended, as there is a risk of interaction between compounds and even poisoning<sup>(5)</sup>.

**Culinary techniques**

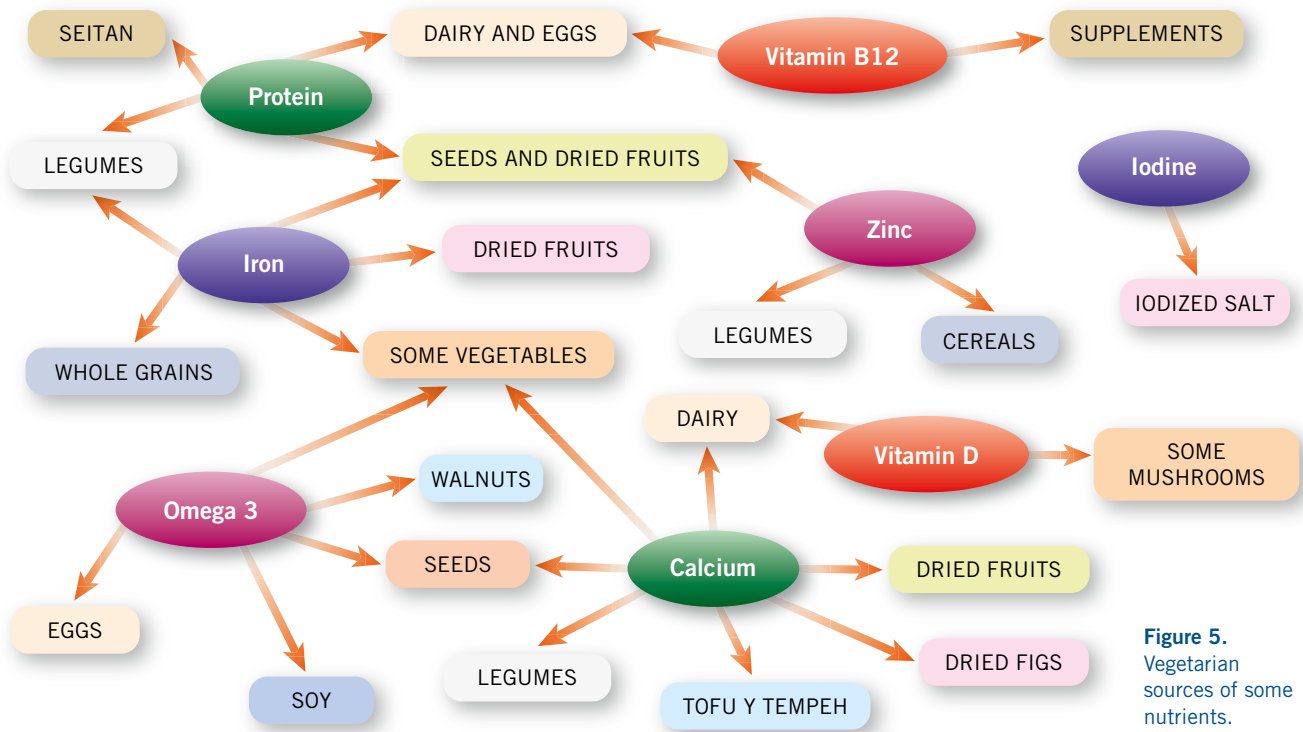
Some plant-based foods contain antinutrients, such as enzyme inhibitors, polyphenols, dietary fiber, tannins, or phytates, among others, which interfere with the ability to utilize amino acids and minerals. Furthermore, certain foods can sometimes be difficult to digest, especially for young children.

There are a number of food hygiene tips, such as washing fruits and vegetables thoroughly before eating them and some cooking techniques that improve digestibility or food utilization, such as soaking legumes or not discarding the broth from cooking vegetables, that should be known in order to advise

Table IV. Calcium content per 100 grams of plant-based foods	
Dried figs	165 mg
Tofu	87 mg
Almonds	252 mg
Broccoli	58 mg
White beans	113 mg
Kale	40 mg
Cabbage	52 mg

*Modified from: <https://www.dietas.net/tablas-y-calculadoras/tabla-de-compuesto-nutricional-de-los-alimentos/>.*





**Figure 5.** Vegetarian sources of some nutrients.

families. The preparation and cooking of certain products influence their absorption<sup>(5)</sup>.

Cooking recommendations include soaking legumes for at least 8 hours before cooking, removing the cooking water. To facilitate digestion and reduce the amount of gas that bothers children, it is recommended to cook them for longer periods of time. To optimize the assimilation of plant foods, priority cooking methods should be boiling, stewing, sprouting, or fermenting. Heat inactivates many antinutrients, so cooking or boiling some plant products is beneficial.

### Ultra-processed foods

Ultra-processed products are those produced by the food industry using techniques or the addition of substances that make them very different from the original ingredients. That is, they have been modified to increase their palatability or improve their organoleptic characteristics. They are usually products rich in saturated fats, salt, simple sugars, or a combination of these. The emergence of these foods has revolutionized the way people eat. Since they are mostly ready-to-eat products, which reduce the time spent in the kitchen,

families, who often have to find ways to balance work and parenting hours, have increased their use to the point of using them daily. Whether for convenience or food preference, consumption rates of these types of products have skyrocketed in recent years. These data are very worrying, due to the association between this type of diet and the development of chronic diseases, such as cardiovascular disease, obesity, and diabetes.

Healthy eating, at any age, is based on the consumption of fresh, minimally or unprocessed foods. We must emphasize that no matter how “plant-based” a highly processed product may be, it is not beneficial to the body. These are advertising claims that exploit public misinformation and lead to confusion. It has been shown that unhealthy vegetarian diets, rich in free sugars, salt, and saturated fats, are associated with an unfavorable metabolic profile, such as elevated LDL cholesterol, high blood pressure, or altered glucose metabolism. Therefore, the intake of these types of products should be limited<sup>(9)</sup>. The food industry can implement measures to improve the products it offers, contributing to the public health of the population, and especially children<sup>(12)</sup>.

## General recommendations by age

### Infants under 6 months

Breastfeeding on demand should be recommended and promoted in all families. The infant’s only food should be milk, preferably breast milk or, failing that, an adapted infant formula (animal or plant-based) that complies with the regulations.

Vitamin B12 should be given to the mother if she is breastfeeding. It is usually added to the formula used for formula feeding. Furthermore, in Spain, vitamin D supplementation is recommended for all infants up to 12 months of age.

### Children from 6 months to 2 years

Their main diet should still be milk, preferably breast milk or, if this is not possible, an adapted follow-on formula (animal or plant-based). From this age on, it is advisable to use legumes instead of meat, and to offer iron-rich and nutritious foods using the baby-led weaning (BLW) method or the baby-led introduction to solids (BLISS) method, if desired. For vegans, it may be worth introducing calcium-enriched soy yogurts. Foods such as eggs, hummus or chickpea pâté, tofu, avocado,

peas, lentils with rice, chickpeas with couscous, or peanut butter are very well tolerated. If possible, it is preferable to use whole grains, including lesser-known varieties such as quinoa or amaranth. Regular consumption of vegetables rich in vitamin A, such as carrots, pumpkin, and sweet potatoes, should be encouraged<sup>(10,13)</sup>. In reality, an infant's menu should be similar to that of the rest of the family, tailored to their age, as long as it is balanced, well-planned, and based on fresh, minimally processed products. After introducing different foods, it is recommended that vegetarian and vegan children frequently eat legumes (including soy and soy products), fruits, vegetables, nuts, seeds (flax, chia, sesame), and eggs and dairy products, if used<sup>(8,11)</sup>. Legumes are a wonderful food for infants from 6 months of age. They provide a multitude of nutrients, including protein, iron, zinc, calcium, magnesium, fiber, carbohydrates, and antioxidants. They are very easy to chew and come in a wide variety of forms and derivatives, such as tofu and tempeh<sup>(11)</sup>. Nuts and seeds are another fantastic food group to consider for complementary feeding. They are a source of protein, mono- and polyunsaturated fats, fiber, antioxidants, calcium, iron, selenium, zinc, and vitamins B and E. They can be offered from 6 months of age, distributed throughout the day, always ground or in cream form until 5 years of age. During the first year, spinach, chard, borage, arugula,

honey, and seaweed should be avoided. Foods with laxative effects, such as flax and chia seeds, should be offered occasionally and preferably ground<sup>(11)</sup>. In younger children, especially at the beginning of complementary feeding, fiber intake should be limited so as not to interfere with the absorption of nutrients, mainly calcium, iron, and fats, or cause early satiety<sup>(5,8)</sup>. Iron intake must be ensured. The foods offered should be of high nutritional density, providing energy, protein, iron, zinc, and other nutrients, even in small quantities. Examples of this are: legumes, avocado, eggs, tofu or nuts in cream or ground form<sup>(3)</sup>. Varying foods, in addition to making the diet less monotonous and more fun, contributes to increasing satiety and ensuring the supply of nutrients, especially important in the vegan community<sup>(17)</sup>.

Some tools have been developed that can help plan meals for vegetarian or vegan infants, such as the wheel shown in figure 6. It shows the different food groups to be offered, without forgetting vitamin D and B12 supplements, the first up to 12 months (in Spain) and the second throughout life, if the infant does not eat meat or fish<sup>(8)</sup>.

### School-age children

From the age of 2, children should eat the same food as the rest of the family, with a focus on fresh produce.

Each main meal (2-3 servings per day) should include at least one of the

following foods, trying to vary them throughout the week: legumes, grains, nuts, seeds, and, for vegetarians, dairy products and eggs. Legumes should be eaten at least once a day.

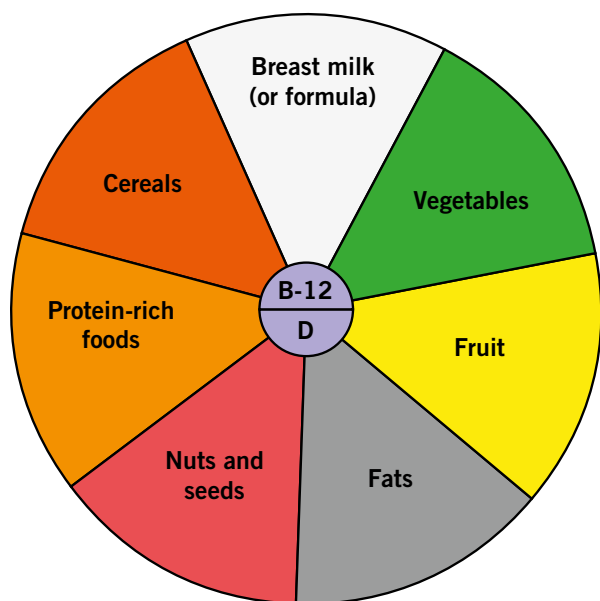
Examples of a protein serving: one egg or a glass of milk; for legumes: one glass of soy milk, a bowl of cooked lentils, a handful of textured soy, and a chickpea burger.

A serving of nuts: one tablespoon of peanut butter, one tablespoon of ground almonds, a handful of crushed walnuts (whole nuts, for children 5 and older).

Some foods widely used in plant-based diets are:

- **Tempeh:** prepared by fermenting soybeans. It can be eaten fried or grilled, or it can be used to add texture to dishes.
- **Textured soya:** it is a soy preparation that can be hydrated and used as a substitute for minced meat to prepare dishes such as lasagna or stuffed peppers.
- **Seitan:** a food made from wheat gluten. It has a firm texture, so it can be eaten alone or added as an ingredient to many dishes (salads, stews, etc.).
- **Tofu:** is a preparation of curdled soybeans, with an appearance similar to cheese and a texture that varies depending on the type. It can be consumed chopped or used to make sauces or creams.
- **Natto:** this is a product made from fermented soybeans, but in this case, its texture is sticky. It is usually mixed with rice and seasonings.
- **Couscous:** durum wheat semolina. It needs to be hydrated for consumption.
- **Miso:** it is a condiment in paste form made from fermented soybeans. It is most commonly used to make soup.
- **Tahini:** this is a paste made from sesame seeds. It is used to make hummus.

They do not necessarily need to be included in menus, but they can provide nutrients and expand culinary possibilities, making them good resources to consider<sup>(14)</sup>. If they are processed, it is preferable to choose those that do not exceed the salt content and do not have added sugars or saturated fats, especially if they are used frequently.



**Figure 6.** Nutritional needs in infants. Modified from: Baroni L, Goggi S, Battino MA. Planning well-balanced vegetarian diets in infants, children and adolescents: the vegplate junior. *J Acad Nutr Diet.* 2019; 119: 1067-74.

## Teenagers

At this stage, it is important to ensure adequate calorie and protein intake, as the need for these increases due to the pubertal growth spurt. Although calcium absorption improves at these ages, it is a mineral that cannot be deficient during adolescence. If it is not possible to ensure adequate intake, especially in vegan families, it is necessary to resort to fortified foods or supplements. For girls, we should increase iron intake, coinciding with menarche and menstrual bleeding.

The healthcare professional should always be alert to possible restrictive behaviors that indicate a hidden eating disorder<sup>(3)</sup>.

Daily consumption of legumes or their derivatives, as well as dairy products and eggs, if desired, should be recommended. From the age of 10, a serving of eggs is 2 units, and a serving of dairy products is 2 yogurts<sup>(14)</sup>.

## Monitoring and check-ups

### Monitoring of children on vegetarian diets should be individualized.

Children on a vegetarian diet should be monitored for optimal growth and development, as would be the case with any other child. However, we must also pay attention to detecting possible nutritional deficiencies in these children<sup>(5,9,19)</sup>. At each visit, patients should be asked about symptoms such as fatigue, pallor, irritability, hair loss, or paresthesia, which may be caused by micronutrient deficiencies. The manifestations of deficiency states in some nutrients are summarized in table V<sup>(17)</sup>.

Long-term follow-up should be conducted individually by a qualified professional with experience in the field. Additional laboratory tests or analyses are not justified in all cases. Age and other individual circumstances must be assessed, since the follow-up required by a child following a lacto-ovo vegetarian diet is not the same as that required by a vegan child, or by a family with years of experience as that required by an adolescent starting this type of diet. Dietary habits vary greatly between families, so an adequate history should be taken to provide the neces-

Table V. Manifestations of deficiency states

Vitamin B12	Megaloblastic anemia, paresthesia, neuropathy, psychiatric manifestations, growth retardation, movement and developmental disorders
Vitamin D	Rickets, infections and irritability
Calcium	Bone fractures, tetany and seizures
Iron	Asthenia and microcytic anemia
Zinc	Growth retardation, hypogonadism, taste and smell disorders, and alopecia
Selenium	Heart disease and arthritis
Iodine	Cretinism (growth and development delay, impaired mental function). Hypothyroidism
Docosahexaenoic acid	Lower visual and cognitive development

sary information on the characteristics of the diet in each case. Age and other individual circumstances, such as the degree of food group restriction, must be assessed<sup>(3)</sup>. In general, some expert groups suggest performing a blood test that includes a complete blood count with reticulocyte count, iron profile, vitamin B12, and homocysteine levels at the start of a dietary change. Similarly, they propose periodic monitoring with laboratory tests every 6 months during the first two years of life and during adolescence, and once a year for the rest of childhood. Other tests can be added depending on the clinical presentation or if suggested by the physical examination, the child's dietary intake, or the type of supplementation they receive. If vitamin B12 deficiency is suspected, early markers include homocysteine, transcobalamin, and methylmalonic acid, so these levels should be requested<sup>(5,6,15)</sup>. The most appropriate markers for assessing iron status appear to be hepcidin and the transferrin receptor, as they are less variable in inflammatory states common in childhood and allow for early detection of subclinical iron deficiencies<sup>(22,15)</sup>.

It's essential to ensure that the child's diet is balanced and that he or she is growing within the appropriate guidelines, is active, and is happy. If so, he or she will undergo the same health checks as other healthy children.

Vegetarian children have been observed to have a lower body mass index

(BMI) compared to omnivores, but their growth and development are normal<sup>(4,11)</sup>. One study showed that vegetarian children have lower gluteal-femoral adiposity, but a similar proportion of total fat and lean mass to omnivores, while vegans have lower body fat indices with lean mass similar to the rest<sup>(20)</sup>. Other results conclude that vegetarians have a lower fat mass index. In some studies, no differences were found in the parameters of weight, height and BMI<sup>(22)</sup>.

Compared with standard weight and height scales, vegetarian and vegan children under 5 years of age often show lower values, although within normal limits. This is not always negative, as current BMIs tend toward overweight and obesity. In many cases, children with vegetarian and vegan dietary patterns have been or are receiving a greater proportion of breastfeeding than omnivores, who are often formula-fed, showing more accelerated growth patterns<sup>(4)</sup>.

In children older than 12 months, monitoring vitamin D intake is recommended, including monitoring levels. However, universal supplementation is not indicated due to the risk of toxicity in the case of overdose. During adolescence, some studies recommend annual lumbosacral bone densitometry<sup>(6,15)</sup>. In contrast, studies conducted in 2001 showed adequate bone density in vegetarian children, given that this population's calcium absorption capacity is more effective<sup>(15,24)</sup>.

We must not forget that nutrition is more than just eating. It involves traditions, beliefs, habits, routines, and all of this is part of the daily reality of family life. As professionals, we must respect these choices and be able to make recommendations aimed at achieving the highest level of child health.

### The future of the vegetarian and vegan children's community

This is already being considered in some countries with longer trajectories of these dietary patterns. Studies with larger samples and similar characteristics, using markers and parameters that allow for analysis of the overall health of children with these dietary patterns and conducting long-term follow-ups, are still needed<sup>(12,17,18)</sup>. Research is needed to address the concerns and doubts that some experts still have and to demonstrate the safety of this type of well-planned dietary pattern.

### Role of the Primary Care pediatrician

**The pediatrician must be able to listen, empathize, understand, and respect the family's and individual's dietary choices, identifying possible deficiencies that need to be corrected.**

As healthcare professionals, child health promoters, and those responsible for monitoring children throughout childhood, primary care pediatricians are key players in families. Within this, a fundamental aspect is nutrition. A child's symptoms are not always due to nutritional problems, something that should also be taken into account in vegetarian and vegan families. A series of questions can help determine the quality of a child's diet and provide guidance on where to focus<sup>(23)</sup>. This questionnaire, aimed at families with a plant-based eating pattern, brings together key points to reinforce them and ensure optimal nutrition. It is based on the following aspects, according to age:

- *Children under 2 years old:* the mother is supported with breastfeeding, takes vitamins B12, DHA, and iodine, and eats a healthy diet; the baby takes vitamin D3; if formula is

Supplement	Age	Dose	Comments
Vitamin B12	<3 years	5 mcg daily or 250 mcg, 2 times a week	In all cases, from 6 months of age
	4-10 years	25 mcg daily or 500 mcg, 2 times a week	In all cases
	>10 years	50 mcg daily or 1,000 mcg, 2 times a week	In all cases
Vitamin D	Up to 12 months	400 IU per day	After 12 months of age, individualize
Calcium	Any	Individualize	Individualize
Iron	Any	Individualize	Individualize
Iodine	>12 months	Cook with iodized salt	Individualize
Omega 3	Any	100 mg of docosahexaenoic acid per day	Individualize

given, it is with an adapted formula during the first year of life; if the appropriate milk is used (breast milk for as long as desired, adapted formula up to 12 months, and thereafter, whole cow's milk or calcium-enriched soy milk); the infant eats legumes, nuts, and seeds, has sufficient calories, and receives milk on demand; they regularly include avocado, nut butters, legumes or their derivatives, and tubers; they know which foods to avoid (salt and sugars, honey, seaweed, green leafy vegetables such as spinach, chard, and borage up to 12 months, whole nuts, uncut round foods, hard foods, or foods that pose a choking risk until school age); the infant takes B12 supplements from 6 months onwards and vitamin D3 up to 12 months.

- *Over 2 years old:* he/she eats a variety of fruits and vegetables at every meal, including those rich in vitamins A and C (sweet potato, carrot, pepper, spinach, broccoli, apricot, kiwi, orange, etc.); includes a protein-rich food at every meal; focuses on whole grains over refined grains; regularly uses high-oleic olive or sunflower oil; consumes two daily servings of dairy products with calcium (or, for vegans, ensure the equivalent); uses iodized salt; minimizes consumption of simple sugars and ultra-processed foods; and takes an adequate vitamin B12 supplement.

Finally, each case must be individualized to recommend the necessary supplements. Table VI summarizes the most important ones.

### Conclusions

A well-planned vegetarian and vegan diet, supplemented with nutrients (vitamin B12 and others, depending on age and circumstances), allows for proper growth and development. The primary care pediatrician is a key figure in supporting these families.

### Conflict of interest

There is no conflict of interest in the preparation of this manuscript nor source of funding.

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The asterisks indicate the authors' opinion of the article's interest.

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This article reviews the vegetarian and vegan diet in childhood, with special emphasis on culinary recommendations. It is very practical, with key points outlined by stage and under specific conditions.

- Redecilla Ferreiro S, Moráis López A, Moreno Villares JM. Recommendations of the Nutrition and Breastfeeding Committee of the Spanish Association of Pediatrics on vegetarian diets. *Recomendaciones del Comité de Nutrición y Lactancia Materna de la Asociación Española de Pediatría sobre las dietas vegetarianas*. *An Pediatr (Barc)*. 2020; 92: 306.e1-e6.

This is an easy-to-read, up-to-date article that reviews the key nutrients to consider in a plant-based eating pattern. It outlines recommended supplementation and emphasizes key points based on the child's age.

- Martínez-Biarge M. Feasibility of vegetarian and vegan diets in childhood and adolescence. How should it be prescribed correctly? *Factibilidad de la dieta vegetariana y vegana en la infancia y la adolescencia. ¿Cómo prescribirla correctamente?* *FMC*. 2022; 29: 110-8.

A very up-to-date, comprehensive, and practical article. Specifically aimed at primary care professionals, it offers very useful recommendations for consultations.

- Web: <https://veganhealth.org/>  
This website discusses nutrients, including tables and examples. It's very practical and visual, and easily accessible to the general public.

- Web: <https://www.vegweb.com/>  
It contains recipes. Possible substitutes for other animal-based foods (egg, milk) are discussed. Very useful for providing ideas.

- Web: <https://www.unionvegetariana.org/>  
It includes recipes. It also has a blog and various services.

- Book: Basulto J, Blanquer M, Manera M, Serrano P. *Vegetarian diet in childhood. Alimentación vegetariana en la infancia*. DeBolsillo.
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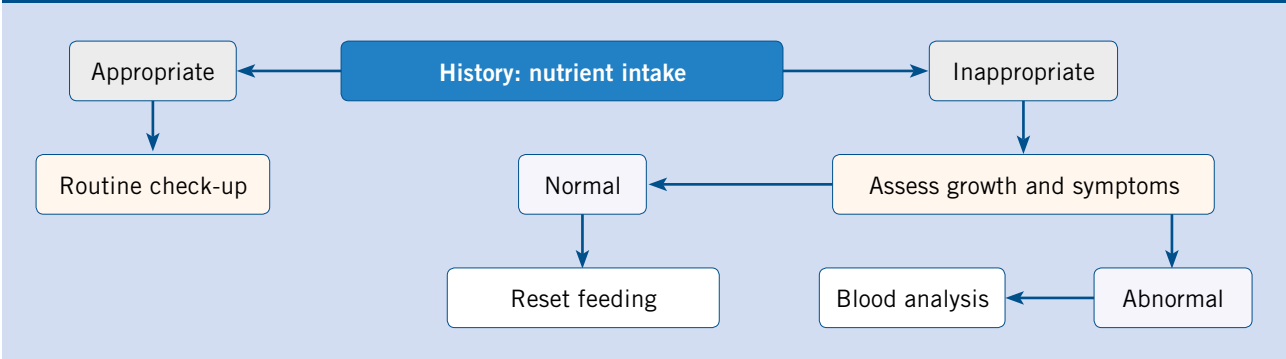
## Clinical case

A family attends the clinic for a 6-month checkup of their firstborn. His growth is harmonious, and from birth he has remained in the 25th-50th percentile for weight, height, and head circumference. His psychomotor development is adequate. He shows interest in food, sits up, and brings his hands to his mouth, although he is currently only being offered breastfeeding on demand.

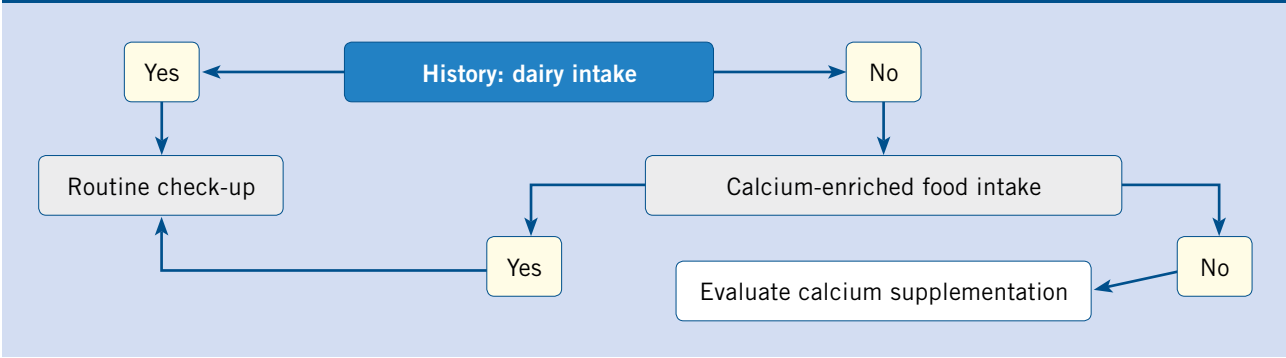
After explaining complementary feeding to them, they comment with some hesitation that, although they know pediatricians do not like it, they have not eaten meat or fish at home for years, for deeply rooted ethical and ecological reasons. They have sought information from various associations, and the mother has even completed an official certification related to nutrition.

The family consumes fruits, vegetables, legumes, grains, and nuts daily. They have not ruled out offering the child animal-derived products that do not involve slaughter, such as dairy products, eggs, or honey. However, they would like to hear the opinion of their primary care pediatrician.

### Algorithm 1. Monitoring of a child with a vegetarian/vegan diet



### Algorithm 2. Calcium in vegetarian and vegan children



## Accreditation quiz

The Accreditation Questionnaires for FC topics can be done at "On line" through the web: [www.sepeap.org](http://www.sepeap.org) and [www.pediatrintegral.es](http://www.pediatrintegral.es).

To obtain the single continuous training accreditation from the accreditation system for health professionals for the entire national health system, 70% of the questions must be answered correctly. The accreditation questionnaires on the different issues in the journal may be carried out during the period stated in the online questionnaire.



# Accreditation quiz

Subsequently, the following accreditation quiz of *Pediatría Integral* collects questions on this topic, which must be answered online through the website: [www.sepeap.org](http://www.sepeap.org).

In order to obtain certification by the Spanish "formación continuada" national health system for health professionals, 70% of the questions must be answered correctly. The accreditation quizzes of the different numbers of the journal may be submitted during the period indicated in the "on-line" quiz.

## Vegetarian and other alternative diets

25. The REASONS for choosing a vegetarian diet in childhood may be:
- Ecological.
  - Religious.
  - Derived from an eating disorder.
  - Ethical.
  - All of the above.
26. Which of the following statements is INCORRECT?
- During the first 12 months of life, breastfeeding should be provided, or if this is not possible, an adapted formula should be given.
  - All vegetarian foods are healthy.
  - Raw diet is not suitable for children.
  - Plant-based diets tend to contain more fiber.
  - The lipid profile of plant foods is more favorable.
27. Indicate the CORRECT answer:
- Vegetarian children are less overweight than omnivorous children.
  - Omnivorous children consume more saturated fats than vegetarians and vegans.
  - Vegetarian children are more likely to have iron deficiency anemia.
  - Options a and b are correct.
  - They are all true.
28. The nutrients that may be deficient in plant-based eating are the following, EXCEPT:
- Folates.
  - Calcium.
  - Iron.
  - Vitamin B12.
  - Selenium.
29. Indicate the INCORRECT answer in relation to nutrients:
- Vegetable proteins have lower bioavailability.
  - Iron absorption from vegetables is improved with cooking techniques such as soaking and fermentation.
  - One of the optimal foods for providing calcium is spinach or chard.
  - In Spain the intake of iodized salt from 12 months of age is recommended.
  - In vegetarian and vegan children, regular consumption of foods such as nuts, soy, olive oil, and flax and chia seeds is recommended, adapting their preparation to age.
30. Of the following statements, which is CORRECT regarding the attitude of the Primary Care pediatrician?
- He will not make any recommendations. They already know everything.
  - He should call them every week to check the growth of the child.
  - It is mandatory to perform an analysis on the infant as soon as possible.
  - He will show them empathy and understanding, giving general advice and more specific advice to clarify possible queries.
  - c and d are true.
31. Regarding the clinical case, it is IMPORTANT to ask the following:
- If the mother is taking vitamin B12 supplement.
  - If the infant is being given adequate vitamin D3 supplementation.
  - If they wish to continue breastfeeding on demand and have support to do so.
  - If they know what foods to avoid at this stage.
  - They are all true.
32. Regarding the clinical case, what food should NOT be offered before the age of one?
- Honey.
  - Cow's milk.
  - Ground or creamed nuts.
  - Options a and b are correct.
  - They are all true.



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