



Plant-based and vegetarian diets: an overview and definition of these dietary patterns

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Abstract

Purpose This paper aims to present an overview of the definitions of “plant-based and “vegetarian diets” adopted by different organizations worldwide, proposing new standard definitions and discussing the notion of vegetarianism as a restrictive dietary pattern.

Methods An extensive literature review on the different definitions of vegetarian and plant-based diets was conducted. Definitions of different international vegetarian and vegan organizations were also taken into account. Objective definitions for vegetarian and plant-based diets, as well as for their subcategories, were proposed. Other aspects related to how vegetarian diets are viewed and defined were also discussed.

Results We proposed that a vegetarian diet should be defined as “a dietary pattern that excludes meat, meat-derived foods, and, to different extents, other animal products”. This definition would include, among others, ovolactovegetarian and vegan diets. The proposed definition for a plant-based diet was “a dietary pattern in which foods of animal origin are totally or mostly excluded”. Other types of diets, such as flexitarian and pescetarian diets, could be considered plant-based. A vegetarian diet should not be considered restrictive. Instead, terms such as alternative or non-conventional could be used to define it and to distinguish it from the conventional diet adopted by most of the Western population.

Conclusion This paper was able to elaborate objective definitions of vegetarian and plant-based diets. Standardizing nomenclatures may reduce misinterpretation and confusion in this field of study.

Keywords Vegetarianism · Vegetarian diet · Plant-based diet · Definition

Introduction

Adopting a vegetarian diet may bring several health benefits. An umbrella review of health outcomes related to vegetarian diets showed a lower risk of diabetes, cardiac ischemic disease, and cancer [1]. Another recent umbrella review showed that a vegan diet benefits weight reduction. Moreover, for individuals with diabetes or at high cardiovascular risk, vegan diets reduced adiposity, total and LDL cholesterol, and improved glycemic control, potentially contributing to cardiometabolic health [2]. Such benefits are related, among other factors, to a lower total and saturated fat intake [3, 4]. In addition, the higher intake of foods rich in fiber and antioxidants among vegetarians [5] may contribute to a lower risk of developing chronic diseases due to better control of systemic inflammation [6]. Vegetarians also have lower systolic and diastolic blood pressure values [7], which can be attributed to a higher potassium intake [8], as well as to lower blood viscosity and lower body weight [9].

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Positive effects of a high intake of plant foods for gut microbiota health have also been described. A higher intake of fiber, phytochemicals, and carbohydrates, and a lower or zero intake of animal protein may be beneficial for maintaining a balanced microbiota, thus positively contributing to overall health [10–12]. Moreover, the adoption of vegetarian and plant-based diets can contribute to weight loss [13], reduced voluntary caloric intake [14], and better lipid profile [15], important factors contributing to the lower risk of chronic diseases.

Besides health benefits, following a vegetarian diet may have a positive environmental impact. According to Ruini et al. [16], the ecological footprint of an omnivore diet is 2.57 and 2.8 times greater than that of a vegetarian and a vegan diet, respectively. This indicator considers all the cropland, grazing land, forest, and fishing grounds required to produce food, absorb waste, and provide space for infrastructure. In addition, an omnivore diet's water footprint (the total volume of freshwater consumed for production) is over three times greater than for vegetarian and vegan diets [16]. In general, vegetarian and vegan diets have lower carbon footprints than other dietary patterns [17]. However, it is important to highlight that such differences in environmental impacts are related not only to a diet's classification into vegetarian or non-vegetarian, but mainly to its composition. An evaluation of the carbon footprint of different dietary choices showed that, due to differences in diet compositions, some vegetarian dietary patterns showed higher environmental impact than others, and some non-vegetarian dietary patterns had a low impact [17]. These differences were observed, for example, in the Italian vegetarian diet, which included dairy and eggs and had over four times higher greenhouse gas emissions than the Indian diet, which was not vegetarian, but included mainly foods from plant origin and only around 30 g of chicken and lamb per day [17]. It is estimated that switching from a typical Western diet toward a more sustainable dietary pattern (which involved reducing or excluding the intake of foods of animal origin) could reduce the use of water in food production by 50% and reduce land use and greenhouse gas emissions by up to 80% [18].

Despite the increasing interest in studying vegetarian diets due to their health and environmental benefits, the definition of a vegetarian diet remains muddled. A vegetarian diet is usually defined as a dietary pattern in which all types of meats are excluded [19, 20]. However, sometimes it refers to individuals who also eat eggs and dairy products (that is, *ovolactovegetarians*) [21, 22], while, in other cases, it could refer to both *ovolactovegetarians* and *strict vegetarians* or *vegans* (who do not eat any food from animal origin) [23], or even to individuals who exclude red meat and poultry from the diet but consume fish, referred to as *pescovegetarians*, *pescatarians* or *pescetarians* [24]. The term *plant-based diet* is also common in the literature and

could relate to vegetarian and vegan diets [25–28], or to diets that are mostly (but not necessarily exclusively) based on plant foods [29–31]. In this case, subcategories of vegetarian diets—namely, *pescetarian* and *flexitarian* diets—could be included in the definition of plant-based diets, but not in the actual definition of vegetarian diets. The lack of a consensus regarding the most appropriate definition for vegetarian and plant-based diets may lead to confusion when interpreting and comparing results from papers that use this terminology.

Vegetarian diets are often referred to as restrictive dietary patterns [32–34], because selected food groups are not included. However, this might imply that such diet is somehow incomplete, which contributes to a negative image of vegetarianism. Furthermore, describing a diet as restrictive in comparison with non-vegetarian diets (followed by most of the population) might increase the perception that a standard omnivorous diet is the appropriate one. Actually, balanced vegetarian diets are considered healthy for all life stages [20] and are associated with better health outcomes [1]. On the other hand, a typical Western diet may play a role in the development of several chronic diseases [35, 36]. Therefore, a nutritionally adequate diet that could bring more benefits than a standard one should not be considered restrictive, and its adoption should be encouraged.

Considering the increasing number of recent studies published on vegetarian and plant-based diets, a standardized definition of both terminologies is needed. Moreover, referring to a vegetarian diet as a restrictive dietary pattern seems to cast it in an unfavorable light, and researchers should reconsider this practice. Therefore, this paper has two main objectives: (1) to review the definitions of vegetarian and plant-based diets adopted by different organizations worldwide; and (2) to propose a standard definition of vegetarian and plant-based diets.

Current definitions of vegetarian and plant-based diets

According to the Cambridge Dictionary [37], vegetarianism is defined as “the practice of not eating meat, for health or religious reasons, or because you want to avoid being cruel to animals.” Definitions of vegetarianism provided by different vegetarian/vegan societies around the world are in line with this concept. According to the International Vegetarian Union, vegetarianism is “a diet of foods derived from plants, with or without dairy products, eggs and/or honey” [19].

The Vegetarian Society from the United Kingdom defines a vegetarian as a person who does not eat fish, meat, or chicken [38]. For the Brazilian Vegetarian Society, a vegetarian is a person who excludes from their diet all types of meats, poultry, and fish and their byproducts, whether or not they use dairy products or eggs. Vegetarianism includes

veganism, which is the practice of not using products from the animal kingdom for any purpose (food, hygiene, clothing, etc.) [39].

In a 2018 position paper, the European Vegetarian Union advocates the need for a definition of *vegetarian* and *vegan* in the context of food labeling. In this case, foods suitable for vegans are “foods that are not products of animal origin and in which, at no stage of production and processing, use has been made of, or the food has been supplemented with: ingredients (including additives, carriers, flavorings, and enzymes); or processing aids; or substances which are not food additives but are used in the same way and with the same purpose as processing aids, that are of animal origin.” Foods suitable for vegetarians are “foods which meet the requirements [for vegans] with the difference that in their production and processing milk and dairy products, colostrum, eggs, honey, beeswax, propolis, or wool grease including lanolin derived from the wool of living sheep or their components or derivatives may be added or used” [40]. Several definitions of vegetarianism and veganism, provided by vegetarian and vegan organizations around the world, are described in Table 1.

Currently, vegetarianism is often classified into subcategories based on the types of foods that are not part of the diet: flexitarian, pescetarian, ovolactovegetarian, lactovegetarian, ovovegetarian, and vegan [4, 21, 41]. The flexitarian diet allows meat consumption sporadically or even multiple times per week; the pescetarian (or pescovegetarian) diet excludes all meats, except fish and seafood. The ovolactovegetarian diet, in turn, excludes all meat from the diet, but allows the consumption of products of animal origin, such as eggs and dairy products. Two subcategories of the ovolactovegetarian diet are described: the lactovegetarian diet, which excludes meat and eggs but includes dairy products, and the ovovegetarian diet, which excludes meat and dairy products, but includes eggs. The strict vegetarian (i.e., vegan) diet excludes all foods of animal origin [21, 42, 43]. Veganism is a concept that involves not only diets but also other consumer items derived from animals, such as cosmetics and clothing items. According to the Vegan Society (UK), “Veganism is a philosophy and way of living which seeks to exclude—as far as possible and practicable—all forms of exploitation of, and cruelty to, animals for food, clothing or any other purpose; and by extension, promotes the development and use of animal-free alternatives for the benefit of animals, humans and the environment. In dietary terms, it denotes the practice of dispensing with all products derived wholly or partly from animals” [44].

As it is possible to notice, the primary definition of vegetarianism differs from the classification of the different types of vegetarian diets, since the flexitarian and pescetarian categories do not fit the definition. Moreover, the wider term *vegetarian* has been used to refer to people who follow an

ovolactovegetarian diet [21, 22, 45], a strict vegetarian diet [23], and even a pescetarian diet [46]. The term *vegetarianism* is used as a synonym for *vegetarian diet*, as there seems to be no distinction between both terms among different definitions. Therefore, they can be used interchangeably when referring to this dietary pattern.

The term *vegetarian* is often used to refer only to ovolactovegetarians when a comparison is made with other diets. Chai et al. (2019), for example, compare the environmental impact of vegan, vegetarian, and omnivorous diets [45]. It is possible to infer that, in this case, vegans are not included in the definition of vegetarians, as they are put into a separate group. Even though the meaning is usually described under the methodology adopted for each study, a global definition and use of these terms could avoid confusion and misinterpretation.

There is no consensus about the definition of flexitarian diets either. It is often mixed with the definition of semi-vegetarian diet—which sometimes is considered as a subcategory of a flexitarian diet, and includes semivegetarian and pescetarian diets, as well as pollovegetarian diets (a less common subdivision of vegetarianism which incorporates the consumption of chicken) [1]. On other occasions, the terms *flexitarian* and *semivegetarian* are also used as synonyms. In this case, a semivegetarian diet would include all foods, but limit the frequency of meat intake to a certain amount of times per week [21, 47].

A literature review on the benefits of flexitarian diets found at least 19 different definitions of flexitarian/semi-vegetarian diets, which vary in terms of types of restricted food groups (either only red meat or all meats) and allowed frequency of consumption [48]. In some cases, a flexitarian diet seems to be mostly plant-based, as in this example of a diet’s composition [49]: “Miso (fermented bean paste) soup, vegetables, fruits, legumes, potatoes, pickled vegetables, and plain yogurt were served daily. Fish was served once a week, and meat once every 2 weeks, both at about half the average amount consumed.” In other cases, the definition gets closer to an omnivore diet [50]: “Excluded red meat but ate poultry and fish.” A semivegetarian diet has also been defined as a diet in which some but not all types of meat are excluded [32, 50–53].

In addition to the lack of clarity regarding the definitions of vegetarian and flexitarian diets, the term plant-based is also widely used to refer to diets composed mainly of foods derived from plants. However, there is no consensus about the definition of a plant-based diet. It could describe diets that are mostly plant-based but include animal products [54], such as the Mediterranean diet [55–57], the DASH (Dietary Approaches to Stop Hypertension) diet [58], the “Blue Zones” diet [59], and some traditional diets which are mostly based on plant foods [60]. On the other hand, plant-based is many times used as a synonym for *vegetarian* or *vegan*

Table 1 Definitions of vegetarianism and veganism by different vegetarian and vegan organizations worldwide

American Vegan Society (103)	Becoming vegan is a simultaneous three-part process in embracing this lifestyle. One part is learning about the gastronomical pleasures available in the plant kingdom, so they can be integrated into daily meals, and finding new sources of clothing, toiletries, and household items. The second part is discontinuing the use of all animal products. The third part is utilizing ahimsa, not just non-harming but creating positive action for a better world
Association Végétarienne de France* (43)	Vegetarianism (vegetarian): consists of a diet based on plants and animal products (dairy products, eggs, honey) Note: fish are animals Pesco-vegetarianism (pesco-vegetarian): consists of a vegetarian diet and fish Flexitarianism (flexitarian): consists of an essentially vegetarian or vegan diet but with some exceptions Vegetalism (vegan): consists of a diet-based exclusively on plants (including mushrooms) Veganism (vegan in French, vegan in English): consists of a vegan diet and avoidance of products that have required the exploitation of animals (leather, silk, wool, products tested on animals, etc.) Veggie: generic term grouping together different vegetarianisms
Bulgarian Veg Society (104)	Vegetarianism: [Vegetarianism is] mainly expressed in a specific diet that excludes animal meat and fish Veganism: [Veganism] also excludes all animal products and byproducts, such as food, as well as their use in the cosmetics or fashion industry (especially leather). It does not accept circuses with the exploitation of animals, the testing of anything on them, their confinement in zoos, etc
Dutch Society for Veganism (105)	Veganism is a way of living that seeks to exclude, as far as is possible and practicable, all forms of exploitation of, and cruelty to, animals for food, clothing or any other purpose Veganism is thus a way of living that aims to exclude the exploitation of animals and cruelty against animals Vegans do not eat anything which is derived from animals, but veganism is more than that. A vegan also does not consume plant products that have been produced using animals. For example, products that have been tested on animals, or have been produced with animal-derived additives, like wines clarified with gelatine or fish-glue. Vegans, of course, also do not eat meat, fish, dairy, eggs, honey, gelatine, animal E-numbers and other products containing ingredients from animals
European Vegetarian Union (40)	Foods suitable for vegans are “foods that are not products of animal origin and in which, at no stage of production and processing, use has been made of, or the food has been supplemented with: ingredients (including additives, carriers, flavorings, and enzymes); or processing aids; or substances which are not food additives but are used in the same way and with the same purpose as processing aids, that are of animal origin.” And foods suitable for vegetarians are “foods which meet the requirements [for vegans] with the difference that in their production and processing milk and dairy products, colostrum, eggs, honey, beeswax, propolis, or wool grease including lanolin derived from the wool of living sheep or their components or derivatives may be added or used”
Fédération vegane* (106)	A vegan is someone who tries to live without exploiting animals. Concretely, a vegan excludes all products of animal origin from his diet (meat, fish, shellfish, milk, eggs, or honey, among others), from his clothing (fur, leather, wool, silk, feathers) and from any other field whatsoever (cosmetics, leisure, etc.). Veganism is, therefore, a moral concept, which differs from the simple diet called vegetarianism Vegetarianism: abstinence from the flesh of animals for food
International Vegetarian Union (19)	IVU defines vegetarianism as a diet of foods derived from plants, with or without dairy products, eggs and/or honey
Associazione vegetariana italiana* (107)	Vegetarians are people determined to safeguard life in all its manifestations who, therefore, consistently, do not eat either meat or fish or foods containing products that derive from the killing of animals (for example, we do not eat cheeses made with rennet of animal origin or products made with lard, because both come from the killing of the animal)

Table 1 (continued)

North American Vegetarian Society (108)	Vegetarians are people who abstain from eating all animal flesh, including meat, poultry, fish and other sea animals. An ovo-vegetarian includes eggs, a lacto-vegetarian includes dairy products, and an ovo-lacto vegetarian includes both eggs and dairy products. A total vegetarian (vegan) consumes no animal products at all
Physicians Committee for Responsible Medicine (109)	A plant-based diet consists of exclusively plant foods, including fruit, vegetables, grains, and legumes, and avoids meat, dairy, and eggs
ProVeg International (110)	Vegans eat exclusively plant-based food. In other words, they do not eat animals or animal-based products
Sociedade Vegetariana Brasileira* (39)	Vegetarianism is a diet that excludes animal products. The Brazilian Vegetarian Society recognizes variations in the interpretation of the term because of the dynamism of the language. The main types of vegetarianism are: (a) Ovolactovegetarianism: uses eggs, milk and dairy products in its diet (b) Lactovegetarianism: uses milk and dairy products in its diet (c) Ovovegetarianism: uses eggs in its food (d) Strict vegetarianism: does not use any animal products in its diet
The Vegan Society (44)	Veganism is a philosophy and way of living which seeks to exclude—as far as is possible and practicable—all forms of exploitation of, and cruelty to, animals for food, clothing or any other purpose; and, by extension, promotes the development and use of animal-free alternatives for the benefit of animals, humans and the environment. In dietary terms, it denotes the practice of dispensing with all products derived wholly or partly from animals
Toronto Vegetarian Association (111)	Vegetarians do not eat the flesh of any animals, be they mammals, birds, or fish. In addition, vegans do not eat any animal products, such as milk, cheese and eggs. Lacto-ovo-vegetarians include dairy products and eggs as part of their diet
Vegan Ireland: The Vegan Society of Ireland (112)	A vegan diet and lifestyle exclude the following: Meat, fish, dairy, eggs and honey Leather, wool, silk, or any clothing that comes from an animal Products that have been tested on animals or which contain animal-derived substances
Vegane Gesellschaft Österreich* (113)	Veganism is a way of life that seeks—as far as practicable—to avoid all forms of exploitation and cruelty against suffering animals for food, clothing and other purposes; and subsequently promotes the development and use of animal-free alternatives for the benefit of humans, animals and the environment. In terms of nutrition, this means avoiding all products that are wholly or partly obtained from animals
Vegetarian Society (UK) (44)	A vegetarian diet can include... Vegetables and fruits Grains and pulses Nuts and seeds Eggs Dairy products Honey A vegetarian diet does not include... Meat or poultry Fish or seafood Insects Gelatine or animal rennet Stock or fat from animals In addition, a vegan diet does not include eggs, dairy or honey Vegetarians and vegans do not eat products or byproducts of slaughter. They do not eat any foods which have been made using processing aids from slaughter
Academy of Nutrition and Dietetics (20)	Vegetarian diets are devoid of flesh foods (such as meat, poultry, wild game, seafood, and their products)
British Dietetics Association (60)	A plant-based diet is based on foods derived from plants, including vegetables, whole-grains, legumes, nuts, seeds and fruits, with few or no animal products
Dietitians Australia (114)	A vegetarian diet is based on plant foods. There are different types of vegetarian diets, including: Vegan—only plant foods are included Lacto—dairy foods are included Ovo-lacto—dairy foods and eggs are included

Table 1 (continued)

Spanish Paediatric Association (115)	Vegetarian diets are those that are free of meat and meat products (including poultry) and fish (including shellfish and its derivatives) According to the type vegetarian diet, it can include eggs or dairy products (ovo/lacto-vegetarian) or exclude any products of animal origin, including honey (vegan diet)
German Society for Pediatric and Adolescent Medicine (102)	A lacto-ovo-vegetarian diet, which comprises milk and eggs supplying key nutrients but not meat or fish, is the most common type of vegetarianism. Strict vegetarianism (veganism) excludes all foods sourced from animals
American Dietetic Association and Dietitians of Canada (116)	A vegetarian is a person who does not eat meat, fish, or fowl or products containing these foods.(...) The lacto-ovo-vegetarian eating pattern is based on grains, vegetables, fruits, legumes, seeds, nuts, dairy products, and eggs but excludes meat, fish, and fowl. The lacto-vegetarian excludes eggs as well as meat, fish, and fowl. The vegan, or total vegetarian, eating pattern is similar to the lacto-vegetarian pattern, with the additional exclusion of dairy and other animal products

*Free translation from the website's original language

[25–28, 61], which could again refer to either ovo-lacto-vegetarian or strict vegetarian diets. Although it is sometimes used inaccurately to refer to vegetarian diets, a plant-based diet contains smaller amounts of animal products (including meats) and larger amounts of plant-based products, such as vegetables, fruits, whole grains, legumes, nuts, and seeds [62, 63]. In this sense, a diet containing 100% of plant foods should be considered a *total plant food diet* and not (only) a plant-based diet.

ProVeg International, an organization that encourages the adoption of a vegetarian diet, uses the terminology plant-based to refer to diets exclusively based on plant foods. On the other hand, according to the British Dietetic Association, “a plant-based diet is based on foods derived from plants, including vegetables, whole grains, legumes, nuts, seeds, and fruits, with few or no animal products,” which means it may include animal products (as long as only in limited amounts). In fact, in addition to strict vegetarians and ovo-lacto-vegetarians, the BDA's definition of a plant-based diet also includes pescetarians and flexitarians [64].

Subcategories are also found in the literature, such as *plant-based vegan diet* [65], or *whole-foods plant-based diet* [66, 67]. These stand for healthy vegan diets based mainly on whole foods (such as fresh fruits, vegetables, nuts, seeds, and grains) rather than processed foods. Again, the absence of a single definition may result in some information being misinterpreted. The term *whole-foods plant-based diet* could also be understood as a diet mostly based on whole foods, but not necessarily completely vegan [68].

Proposed definitions of vegetarian and plant-based diets

Based on the analysis of several definitions to encompass the key concepts around vegetarianism, a vegetarian diet could be defined as “A dietary pattern that excludes meat,

meat-derived foods, and, to different extents, other animal products”. This definition would apply to ovo-lacto-vegetarians, lacto-vegetarians, ovo-vegetarians and vegans. As previously suggested [32], there should be a distinction between flexitarian and semi-vegetarian diets. In this case, in a flexitarian diet, meat intake is still accepted (within limits); and in a semi-vegetarian diet, certain—but not all—types of meat are excluded (that is, pescopollivegetarian, pescovegetarian, or pollivegetarian diets). We believe these diets should not be classified as vegetarian diets as they do not fulfill the criteria for this dietary pattern. They could be, however, classified as plant-based diets, when composed mainly of plant-derived foods.

We believe an appropriate definition of a plant-based diet should be: “a dietary pattern in which foods of animal origin are totally or mostly excluded.” Although pescetarian, semi-vegetarian and flexitarian diets might not be strictly seen as vegetarian diets, they are often classified as plant-based diets. Vegetarian diets could be considered plant-based diets, except if they are heavily based on animal-derived foods (dairy and eggs). Other diets that do not have any specific classification could also be considered plant-based, such as the Mediterranean and DASH diets. The relationship between the definitions of vegetarian and plant-based diets is illustrated in Fig. 1, and the definitions of vegetarian and plant-based diets are described in Table 2.

The current definitions do not consider the different motivations that drive people to adopt a vegetarian diet. Regardless of whether an individual is vegetarian for ethical reasons (reducing animal suffering), or for any other reason (health, sustainability, or taste preference, for example), they would still be considered a vegetarian. Yet, many of the definitions reviewed (see Table 1) conceive vegetarianism as inherently a value system that ethically opposes harming animals. These definitions contrast with more classic definitions that view vegetarianism as simply a diet that may be driven by any motivation, and all that matters is the food one eats.

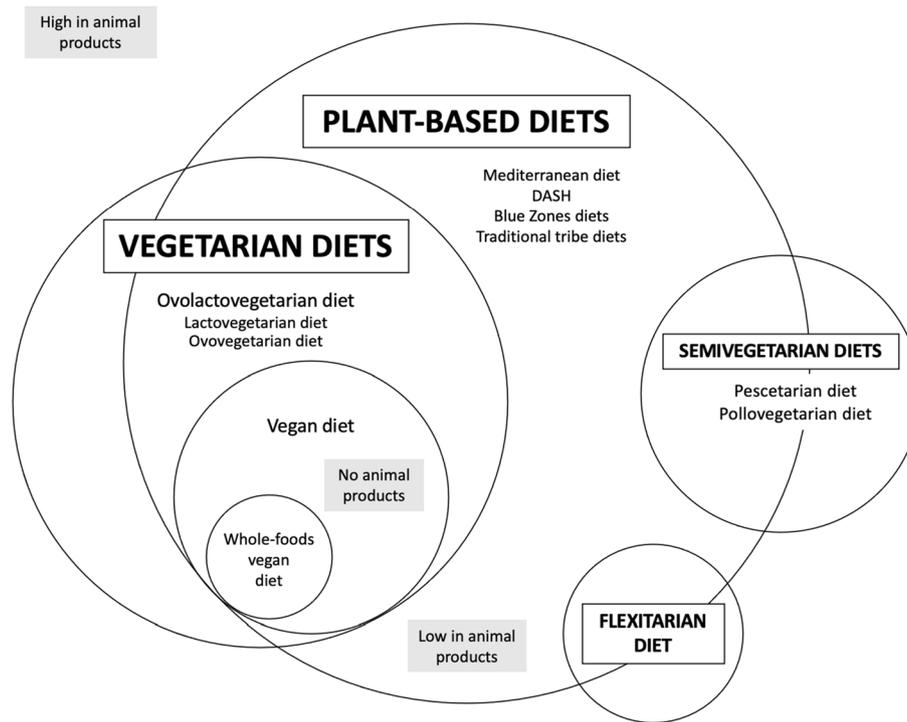


Fig. 1 Relationship between the different types of vegetarian and plant-based diets. Plant-based diets include all diets that are mostly composed of plant foods, with a lower intake of animal products. This definition includes vegetarian and non-vegetarian diets (such as the Mediterranean diet and DASH, among others), as long as the intake of animal products is low. Vegetarian diets include all diets in which meats are excluded. Vegetarian diets might not be considered plant-based if there is a high intake of eggs or dairy. A vegan diet is a type of vegetarian diet in which no animal products are consumed.

Another terminology for this type of diet is “strict vegetarian diet”. If the vegan diet excludes ultra-processed foods and focuses on whole foods, it is considered a whole-foods vegan diet, commonly referred to as a “whole-foods plant-based diet”, despite being fully vegan and not only plant-based. Flexitarian and semivegetarian diets may or may not be considered plant-based, depending on the proportion of plant and animal foods consumed in the diet. The caloric proportion of animal versus plant foods is considered to classify the diets as “high” or “low” in animal products

Table 2 Definitions proposed by the authors of plant-based and vegetarian diets, and the respective subcategories

Diet	Definition
Plant-based	A dietary pattern in which foods of animal origin are totally or mostly excluded
Flexitarian	Allows meat consumption in reduced amounts
Semivegetarian	A dietary pattern in which certain, but not all types of meats are excluded
Pescovegetarian	Excludes all meats, except fish and seafood
Pollovegetarian	Excludes red meats
Vegetarian	A dietary pattern that excludes meat, meat-derived foods, and, to different extents, other animal products
Ovolactovegetarian	Excludes all meats from the diet but allows the consumption of other products of animal origin, such as eggs and dairy products
Lactovegetarian	Excludes all meats and egg products from the diet
Ovovegetarian	Excludes all meats and dairy products from the diet
Vegan	Excludes all foods of animal origin. Also known as “strict vegetarian”
Whole-foods vegan	A diet comprised mainly or totally of whole plant foods (such as fresh fruits, vegetables, nuts, seeds and grains), with limited or no processed foods or products of animal origin. Also known as “Whole-foods plant-based diet”

It may seem paradoxical to say that someone is not a true vegetarian, because they exclude meat solely for health reasons—even though they meet the dietary criteria of

vegetarianism. This disagreement about definitions may stem from underlying epistemic disagreements about whether vegetarianism is a diet or a lifestyle [69, 70]. As

a lifestyle, vegetarianism extends to refraining from using animal products outside of the food domain, such as eschewing wearing animal-based clothing. In this case, whether or not an individual would be classified as a vegetarian would depend solely on a personal judgment of how they fit into this lifestyle, based on the motivations that took them to adopt it, and if they consider themselves as part of this value system [71]. Regardless of how individuals might perceive themselves, a more objective definition of plant-based and vegetarian diets seems more suitable for analytical purposes. Grouping individuals into different dietary patterns requires a clear definition of how these patterns are constituted.

Challenges related to studies with vegetarian and plant-based diets

The misuse of the term plant-based diet may lead to misunderstanding and impair a clear interpretation of data in the field. Some studies include a low-meat diet (plant-based diet) as a different category from vegetarian and omnivore diets [72, 73]. However, in other cases, no distinction between plant-based and vegetarian diets is made when these dietary patterns are analyzed [74, 75]. The term plant-based is also used in a broader sense, including vegan, vegetarian, pescetarian and semivegetarian diets [47]. This diverging terminology could lead to data misinterpretation, and make it more difficult to compare results across different studies.

It is important to note that the current definitions proposed here for the different types of vegetarian diets only consider whether a specific food group is present, absent, or limited, but does not *quantify the consumption* of animal-based products that are allowed (for example, eggs and dairy in an ovolactovegetarian diet). Some vegetarians (ovolactovegetarians) may consume a high proportion of calories from eggs and dairy products, while some omnivores might follow a mainly plant-based diet (for example, a Mediterranean or a DASH diet), occasionally consuming meat [56, 73]. Here, we observe a divergence between someone's status as a vegetarian and whether or not they eat a plant-based diet. It is, therefore, relevant to verify the frequency and consumption of animal-based foods, such as dairy and/or eggs, to confirm whether a vegetarian diet is also plant-based.

The definitions of vegetarian and plant-based diets also do not consider the intake of healthy versus unhealthy foods. Despite many health benefits associated with the adoption of vegetarian and plant-based diets, not all plant-derived foods are equally healthy. Vegetarians tend to have better diet quality markers and a higher intake of plant-derived foods when compared to omnivores [5, 72], which is in line with the positive health outcomes frequently observed. However, with the increase in the market of unhealthy ultra-processed plant-based foods over the last decade [76], it is now possible to find lower-quality vegetarian dietary patterns. In this

case, no health benefits (or even a negative health impact) could be expected [30]. Previous studies have addressed this topic [4, 76, 77], and a healthful plant-based diet index (hPDI) has already been created [31]. Nonetheless, whether a vegetarian diet is healthy or unhealthy does not change its definition, as the focus here is on the proportion of animal-based and plant-based foods that a person consumes, regardless of their nutritional value or health impact.

Finally, individuals who adopt a vegetarian diet for a short period may provide inaccurate data to cross-sectional studies that evaluate the association between vegetarian diets and health outcomes, since the time adopting the diet is a relevant factor when evaluating the risk of developing chronic diseases [78, 79]. Studies with long-term vegetarians showed positive results for health parameters, such as oxidative stress, body fat, cholesterol levels [79], risk of diabetes [80], inflammatory and immune markers [81], and life expectancy [82]. Therefore, besides considering healthy index scores and plant-to-animal caloric ratio, we propose that any studies on the effect of vegetarian diets on people's health should—whenever possible—take into account how long participants have been following the diet.

Vegetarianism as a restrictive dietary pattern

Vegetarian diets are often called “restrictive diets”, because specific food groups are excluded [32–34]. In fact, the term *restrictive* is commonly used to describe a variety of diets in which certain foods are excluded. In the case of some diseases, treatment or control essentially consist of adopting a specific dietary pattern, which, although necessary, is mostly quite restrictive, requiring much effort from patients [83–86]. In addition, as they are not flexible and need to be followed for life, such dietary patterns affect social relationships and limit adherence, negatively impacting patients' quality of life [87]. Examples of these so-called restrictive diets include gluten-free diets, or diets to treat phenylketonuria [85, 88]. Patients often feel restricted when they are forced to adopt a diet due to their clinical condition.

On the other hand, most individuals who adopt a vegetarian diet do it voluntarily, mainly due to ethical, spiritual, environmental, or health reasons [32]. Vegetarian diets may also be adopted due to necessities, such as economic issues or limited access to animal foods. However, most vegetarians from Western industrialized countries adopt this dietary pattern by choice [41]. In fact, adopting this type of diet may have a positive impact on a person's quality of life, with higher scores in vegans compared to other vegetarians, suggesting that people who decide to be a vegetarian are less likely to feel negatively affected by it [89]. Referring to a vegetarian diet as a restrictive diet suggests that it somehow has an inherently negative effect. According to Oxford Languages, the adjective *restrictive* means

“imposing restrictions or limitations on someone's activities or freedom” [90], which does not seem appropriate to define a vegetarian diet.

Moreover, a higher intake of plant-based foods is associated with better health outcomes, such as lower body mass index (BMI) and lower risks of cardiovascular disease, cancer, and type 2 diabetes [91]. On the other hand, a high intake of animal products is linked to a higher incidence of non-communicable chronic diseases and mortality [92–96]. Considering a healthy dietary pattern as restrictive contributes to the false idea that a standard Western diet (knowingly less healthy) should be the preferred or more adequate, liberating choice, as it would not be restricting anything. However, both processed food and animal food increase the risk of developing chronic diseases and contribute to poor health outcomes [92, 97–99]. Therefore, a dietary pattern that contributes to better health outcomes should be encouraged and not negatively labeled.

Labeling diets as restrictive also suggests that individuals who follow them will somehow suffer, which is not necessarily the case when healthier diets are adopted. A study conducted by Snel et al. [100] with 27 obese type 2 diabetic patients to evaluate the effect of a low-calorie diet plus exercise program on participants' quality of life showed that, after 16 months, individuals improved their quality of life. Similarly, a cross-sectional study on type 2 diabetic patients positively correlated quality of life to diet adherence, suggesting that the diet used as treatment may have had a positive effect on participants' subjective perception of quality of life [101]. Like the diets used in treating type 2 diabetes, vegetarian diets may offer health benefits capable of improving people's quality of life [102].

Despite the increasing number of people adhering to vegetarian diets, many barriers to its have also been identified, such as the fear that a vegetarian diet is nutritionally inadequate, monotonous and does not favor satiety; the belief that preparing vegetarian meals is difficult; difficulties in finding options when eating in restaurants; living with people who eat meat; and the limited knowledge about meat-free eating [103]. Combating these barriers is critical for promoting positive dietary changes, and labeling vegetarian diets as restrictive could reinforce beliefs in these barriers.

Furthermore, those who already follow a vegetarian diet are often stigmatized and experience social rejection [104]. *Vegaphobia* is a term used to describe negative attitudes against vegetarians and vegans, which could be a consequence of omnivores' cognitive dissonance experience. In this case, eating meat (which involves animal suffering) and, at the same time, feeling compassion for them and loving other animals (such as pets) might result in contradictory feelings. Many justifications could be used to rationalize the meat consumption, such as the idea that we need meat to be healthy, or that we are evolutionarily programmed to

eat animals. When omnivores are faced with vegetarians, they may feel repulsed—not due to disliking the idea, but because vegetarians are a constant reminder that eating meat is unnecessary [104].

Moreover, when the term *strict vegetarian diet* is used interchangeably with *vegan diet*, the word *strict* could be interpreted as rigid or inflexible. According to its definition [39, 105], a strict vegetarian diet is a dietary pattern in which all foods sourced from animals are excluded. The term *strict vegetarianism* is used to contrast the idea of a *broad vegetarianism* indicating that, in this case, the term *vegetarianism* would be used in its more specific narrow sense—in other words, vegetarianism *strictu sensu*.

Referring to a vegetarian diet as restrictive could highlight the false idea that it is an inadequate diet, and reinforce this discriminatory behavior using the premise of diet inadequacy as an excuse to continue eating meat or other animal products, and to stigmatize people who do not. When all these aspects are considered, it becomes clearer that vegetarian diets should not be described as restrictive, but simply as alternative or non-conventional dietary patterns, as opposed to the conventional diet adopted by the majority of the Western population.

Final considerations

A global definition of vegetarianism is vital, as the current lack of standardization could lead to a misinterpretation of studies in this field. We propose that a vegetarian diet be defined as “A dietary pattern that excludes meat, meat-derived foods, and, to different extents, other animal products”. Both ovo-lacto-vegetarian and vegan diets are included in the definition. On the other hand, the term plant-based diet would be defined as “a dietary pattern in which foods of animal origin are totally or mostly excluded.” Diets which are not vegetarian but are mostly based on plant-foods, with most of the calories coming from plants, are included in this definition. Flexitarian, pescetarian, and ovo-lacto-vegetarian diets are considered plant-based only if they do not rely heavily on animal foods (either meat, eggs, or dairy products). Despite the assumption that vegetarians naturally eat more plant-based foods, a vegetarian diet might still obtain a considerable proportion of its calories from animal products (dairy and eggs). Differences regarding the quantity of products from animal and plant origin should be considered when studies are designed.

It is important to point out that the proposed definitions of vegetarian and plant-based diets do not consider parameters related to diet quality. Studies in this area should evaluate, whenever possible, whether dietary patterns are healthy or unhealthy. Moreover, the time that has passed since adopting a dietary pattern may influence the health

effects associated with it. Especially when considering its effects on chronic diseases, it is relevant to consider how long a patient has been following their diet. Clear information related to (a) the proportion of animal and plant-derived foods; (b) the diet quality; (c) the time since adopting the diet; and (d) and whether they continue to adhere to the diet during follow-up, as well as using the correct nomenclature for each dietary pattern, would enrich studies in this field and generate more robust and reliable data.

We believe that vegetarian diets should not be considered restrictive diets. Referring to a diet as *restrictive* leads to the idea that it is somehow deficient in nutrients or inadequate for health maintenance, which is not consistent with vegetarianism. Moreover, it can enhance negative feelings toward it and discourage people from adopting this type of diet. Individuals who adopt a vegetarian diet often do it voluntarily, in contrast with other diets considered restrictive, which are used as a treatment for specific diseases or conditions, for example. Therefore, vegetarianism should be considered an alternative or non-conventional diet, instead of a restrictive diet. This proposal reflects the common perspective that vegetarianism is a lifestyle—and one that many people choose to embrace and maintain in the long run.

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Declarations

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