



VEGETARIANISM IN BUDDHIST ETHICS, HEALTH, AND ENVIRONMENTAL SUSTAINABILITY: A COMPARATIVE STUDY OF THERAVADA AND MAHAYANA PERSPECTIVES

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Abstract

Background: Vegetarianism occupies a central position in both historical and contemporary debates on ethical living, particularly within religious traditions that emphasize compassion and non-violence. In Buddhism, vegetarianism is closely linked to the principle of Ahimsa (Non-harming), a moral injunction and central element of spiritual cultivation. Despite its recognition in Buddhist ethics, understanding how these teachings are interpreted and practiced in modern contexts remains limited. Scholarship often treats Buddhist vegetarianism as homogeneous, whereas its application varies across regions, schools, and communities. Questions persist regarding how Buddhists negotiate traditional ethical imperatives alongside contemporary concerns for health, ecological sustainability, and social responsibility. To address this, the study aimed to explore how Ahimsa shaped vegetarian practices in Theravada and Mahayana contexts and their health and ecological implications. A qualitative approach was adopted, combining textual analysis of canonical scriptures and modern literature, enabling exploration of how ethical principles were expressed and aligned with scientific and environmental discourses.

Involvement to Buddhadhamma: Findings revealed that Buddhist vegetarianism could not be understood as a monolithic practice but must be situated within doctrinal, cultural, and historical contexts. In Mahayana traditions of China, Taiwan, Korea, and Vietnam, vegetarianism was strongly emphasized and texts such as the Lankavatara and the Mahaparinirvana Sutras explicitly discouraged meat consumption as incompatible with bodhisattva compassion. Accordingly, many monastic communities and lay practitioners adopted strict vegetarian diets, viewing abstention from meat as an expression of Karuna and the vow to save sentient beings. By contrast, Theravada Buddhism, predominant in South and Southeast Asia, allowed monks to consume meat that was not killed specifically for them, emphasizing intentionality over consumption. Many Theravada practitioners, both monastic and lay, voluntarily adopted vegetarian diets, promoting plant-based foods during religious observances as an expression of merit-making, compassion, and ethical responsibility. Beyond doctrinal interpretation, Buddhist vegetarianism engaged with modern science and sustainability discourse: Plant-based



diets reduced risks of cardiovascular disease, diabetes, certain cancers, and gallstones, while supporting bone health, glycemic control, and mental well-being. Ecologically, vegetarianism reduces greenhouse gas emissions, land and water use, and eases pressure on global food systems. These findings resonated with Buddhist ethical imperatives and illustrated the application of Buddhist principles to contemporary challenges, especially in promoting sustainable development across economic, social, and environmental dimensions, highlighting Dhamma's relevance beyond monastic contexts. The data highlighted that vegetarianism in Buddhism functioned not merely as a religious ideal but as a multidimensional practice integrating ethical, spiritual, health, ecological, and sustainability considerations, demonstrating how Buddhadhamma guided contemporary lifestyle choices and decisions in accordance with the principle of Ahimsa.

Conclusions: The study concluded that Buddhist vegetarianism represented a dynamic interplay between doctrinal teachings, cultural contexts, and ethical debates. While Mahayana often mandated abstention from meat and Theravada emphasized intention, both shared a concern with compassion and non-harming shaping practice in diverse contexts. Buddhist principles were embodied in monastic and lay practices, linking ethical ideals to contemporary health and sustainability concerns. Thus, Ahimsa retained relevance, guiding dietary practices that reflected compassion, promoted health, and supported ecological balance, and addressed social responsibility, thereby clarifying how ancient ethical commitments intersected with modern scientific insights and shaped ethical consumption and sustainable living.

Keywords: Buddhist Vegetarianism, Buddhist Ahimsa, Plant-Based Nutrition, Environmental Sustainability, Theravada and Mahayana Buddhism

Introduction

Food and nutrition are fundamental to human health, growth, and well-being. A well-balanced diet ensures physical development, supports healthy aging, and enhances resistance to disease. Key nutrients, including carbohydrates, proteins, fats, vitamins, minerals, dietary fiber, and water, must be consumed in appropriate proportions to meet physiological needs and maintain energy for daily functioning (Ohlhorst et al., 2013); (Murkovic, 2021). While these considerations are crucial, dietary choices are also shaped by cultural, ethical, and religious values that provide moral guidance and social responsibility.

Vegetarianism has gained popularity as a lifestyle choice influenced by concerns about animal welfare, weight management, religious beliefs, and the ecological footprint of animal agriculture (Leitzmann, 2014). Understanding how ethical frameworks inform dietary decisions is essential to appreciating the broader significance of vegetarian diets. Buddhism, in particular, offers a compelling ethical and philosophical foundation for vegetarianism. Its principles of Ahimsa (Non-harming) and (Compassion) guide practitioners in making mindful dietary choices that extend beyond personal health to encompass ethical conduct, spiritual cultivation, and environmental sustainability (Sevmis & Tengiz, 2020); (Harvey, 2000); (Barstow, 2019).



Sustaining a vegetarian lifestyle typically depends on personal conviction, social support, and access to suitable food options (Ruby, 2012). While Mahayana traditions often mandate vegetarianism and Theravada traditions emphasize intention, both share a foundational concern with compassion and non-harming. These principles continue to shape contemporary practices, influencing health behaviors, ecological awareness, and ethical consumption. Exploring this interplay between traditional teachings and modern challenges is particularly relevant today as plant-based diets gain global attention for their benefits to health, society, and the environment.

From the above, this article argues that Buddhist ethical principles, particularly Ahimsa, provide a foundational framework for understanding contemporary vegetarian practices. The paper examines vegetarianism in Buddhist perspectives, compares Theravada and Mahayana approaches, and discusses the types, advantages, disadvantages, and nutritional considerations of vegetarian diets. Dietary guidelines for vegetarian and vegan practices are also presented, highlighting the alignment of ethical, health, and environmental concerns. Finally, the article emphasizes its originality and contribution to the body of knowledge, offering a systematic and detailed academic exploration of the subject.

Vegetarianism in Buddhist Perspectives

Vegetarianism in Buddhism is primarily grounded in the ethical principle of Ahimsa (Non-violence) which underpins the First Precept (Panatipata Veramani), prohibiting the taking of life. This principle, combined with the cultivation of Karuna (Compassion) toward all sentient beings, forms a moral foundation for many Buddhists who choose to abstain from meat (Harvey, 2000). While vegetarianism is not a uniform requirement, it is often regarded as an extension of the commitment to reduce suffering and promote spiritual purity.

In Mahayana Buddhism, especially in East Asian countries such as China, Taiwan, and Vietnam, vegetarianism is both doctrinally supported and widely practiced. Canonical texts like the Lankavatara Sutra and the Mahaparinirvana Sutra denounce meat consumption, associating it with karmic defilement and a lack of compassion (Hiep & Mahatthanadull, 2019). The bodhisattva ideal, central to Mahayana thought, emphasizes the aspiration to alleviate the suffering of all beings, a goal that aligns closely with vegetarian ethics. As such, many Mahayana monastics follow strict vegetarian rules, and the lay community often participates in these practices during religious observances or as a daily commitment.

In contrast, Theravada Buddhism, prevalent in countries such as Sri Lanka, Thailand, Laos, Cambodia and Myanmar, approaches vegetarianism more pragmatically. The Pali Vinaya permits the consumption of meat under specific conditions: If the monk has not seen, heard, or suspected that the animal was killed expressly for them (Mahanarongchai & Marranca, 2015). This guideline shifts the ethical focus to intention rather than action, reflecting a nuanced interpretation of Ahimsa. While Theravada monastics typically rely on alms and may not have control over their meals, many choose to follow a vegetarian diet based on personal ethical reasoning.



The diversity of interpretations across Buddhist traditions underscores the adaptability of Buddhist ethics to cultural and historical contexts. Though Mahayana and Theravada perspectives differ in their application, both recognize the moral implications of dietary choices. In modern times, these traditional values have found renewed relevance amid global conversations on sustainability, animal welfare, and health. As Barstow (2019) notes, contemporary Buddhist communities often promote vegetarianism not only as a spiritual discipline but also as a form of socially engaged ethics.

Ultimately, vegetarianism in Buddhism illustrates a confluence of spiritual practice, ethical reflection, and ecological awareness. It offers a dynamic framework in which ancient teachings respond to modern challenges, reaffirming the role of diet as a vehicle for moral and environmental responsibility. Building on the ethical foundation of Ahimsa and compassion, it is essential to consider how these principles intersect with nutritional science to ensure that a vegetarian diet supports both moral and physical well-being.

Types of Vegetarian Diets

Vegetarianism is broadly defined as a dietary practice that excludes the consumption of meat, poultry, and seafood. However, within this general category, several subtypes exist, differentiated by the inclusion or exclusion of various animal-derived products. Understanding these distinctions is essential in nutritional science, public health, ethics, and cultural studies. The primary types of vegetarians are outlined below (Table 1).

Table 1 Types of Vegetarian Diets (Orzel et al., 2024)

Classification of Vegetarian Diet	Description of Dietary Pattern
Lacto-ovo-vegetarianism	All forms of animal flesh are excluded from the diet. Dairy and egg products are included in the diet.
Lacto-vegetarianism	Excludes all items containing flesh meat, eggs, or ingredients derived from eggs. Dairy products are included in the diet.
Ovo-vegetarianism	Excludes all items containing flesh meat and dairy-derived ingredients. Eggs are included in the diet.
Fruitarianism	All animal-derived foods are excluded from the diet. The diet consists primarily of fresh and dried fruits, with the possible inclusion of nuts, seeds, and select vegetables.
Pescatarian or Pesco-vegetarianism	Excludes all forms of meat, including wild game and poultry. Includes fish and potentially other types of seafood, along with optional inclusion of dairy products and eggs.
Veganism	All animal-derived foods are excluded from the diet.
Flexitarian	The diet emphasizes plant-based foods, with occasional inclusion of meat or other animal-derived products.

The spectrum of vegetarian diets reflects a diverse and evolving set of dietary choices motivated by ethical, health-related, and environmental concerns. Understanding these typologies is



essential for nutrition professionals, researchers, and policymakers seeking to engage with plant-based dietary patterns and their implications for health and sustainability.

Buddhist ethical principles, particularly the concept of Ahimsa (Non-harming) and the cultivation of karuna (Compassion), play a central role in shaping dietary choices among both monastic and lay communities. While Mahayana Buddhism generally emphasizes strict vegetarianism as a spiritual discipline, Theravada Buddhism allows for conditional meat consumption, highlighting the importance of intention in ethical decision-making. Despite these doctrinal differences, both traditions recognize that reducing harm to sentient beings is a fundamental moral aim.

These ethical considerations intersect closely with nutritional science and public health. For instance, the avoidance of meat not only aligns with Buddhist compassion but also affects macronutrient and micronutrient intake, requiring careful attention to protein quality, essential fatty acids, iron, zinc, vitamin B12, and vitamin D. By examining the dietary implications of these ethical choices, we can better understand how traditional Buddhist teachings are applied in contemporary dietary practices and how they correspond with health outcomes. Thus, dietary typologies grounded in Buddhist ethics must also be examined in terms of nutritional adequacy, ensuring that ethical intentions translate into sustainable health outcomes.

To illustrate the relationship between Buddhist ethical perspectives and nutritional considerations, Table 2 provides a comparative overview of Mahayana and Theravada approaches alongside their implications for diet planning, nutrient intake, and potential health benefits. This comparison highlights how ethical motivations and doctrinal interpretations influence practical dietary behaviors and informs strategies for maintaining balanced and sustainable vegetarian or vegan diets.

Table 2 Comparison of Buddhist Ethical Perspectives and Nutritional Implications of Vegetarian Diets

Dimension	Mahayana	Theravada	Nutritional Consideration
Ethical Focus	Strict Vegetarian, Bodhisattva Ideal	Intention-based, Optional Vegetarian	Protein, B12, Iron Adequacy
	Monastics & Devout Lay	Monastics Mostly, Some Lay	Complementary Plant Sources, Supplements
Environmental Impact	Promotes Plant-based Diet	Some Flexibility	Lower Ecological Footprint Aligned with Ethics

Advantages of Vegetarian Diets

A substantial body of research supports the association between vegetarian and vegan diets and improved health outcomes. These dietary patterns are typically higher in complex carbohydrates, fiber, and unsaturated fats, and lower in protein and saturated fat, contributing to



a reduced risk of noncommunicable diseases and enhanced physical health and quality of life (Wang et al., 2023).

An optimal diet, characteristic of populations with low rates of chronic disease, shares these nutritional features. It emphasizes plant-based foods rich in complex carbohydrates, fiber, and water, while limiting fats, cholesterol, salt, and sugars. Protein needs are met through varied consumption of legumes, grains, vegetables, nuts, and seeds. Vegetarian diets, closely aligned with the optimal diet, are consistently associated with better cardiovascular outcomes and overall health compared to omnivorous diets, which include both plant and animal products. Cardiovascular diseases, the leading cause of global mortality, are strongly associated with obesity and type 2 diabetes (Orzel et al., 2024). This trend has raised interest in the potential long-term cardiometabolic benefits of plant-based diets. The documented cardioprotective effects of vegetarian diets, including reductions in cholesterol levels and atherosclerosis risk, are largely attributed to two primary factors: The exclusion of high-fat red meat, which can burden the digestive system, and the increased consumption of dietary fiber and complex carbohydrates (Feher et al., 2020); (Sindhu, 2022). Hazelnuts, peanuts, and walnuts are found to reduce the risk of developing these diseases (Sevmis & Tengiz, 2020). Additionally, individuals who follow vegetarian diets exhibit a lower prevalence of hypertension and tend to have lower average blood pressure (Sindhu, 2022). Although sodium intake may be similar across dietary groups, vegetarian diets typically support optimal cardiovascular function and circulatory health.

Vegetarian diets may also contribute to improved glycemic control, facilitating more stable blood glucose levels and enhanced insulin sensitivity (Wang et al., 2023); (Sindhu, 2022). Furthermore, epidemiological evidence suggests that individuals who adhere to plant-based diets exhibit a reduced risk of developing various cancers, including stomach, hematological, colorectal, prostate, and colon cancers (Baroni et al., 2024).

Vegetarian diets are associated with a reduced incidence of gallstone formation. Plant-based proteins, including soy, may help inhibit gallstone development. Additionally, plant-based diets emphasize fruits, vegetables, whole grains, legumes, and healthy fats (Mono and Polyunsaturated Oils), all of which are rich in fiber and have been shown to lower the risk of cholesterol gallstones. In contrast, diets high in animal protein, particularly from meat, poultry, and fish, have been linked to an increased risk, likely due to components such as heme iron, saturated fat, and dietary cholesterol, which contribute to elevated cholesterol levels in gallstone disease patients (Rose & Strombom, 2020).

Although vegetarian diets can be restrictive and may lead to deficiencies in nutrients such as calcium and vitamin D, potentially increasing the risk of bone loss, osteoporosis, and fractures, many plant-based foods provide bioavailable calcium. These include broccoli, bok choy, tofu, kale, and fortified products such as fruit juices, energy bars, and plant-based milks (Falchetti et al., 2022). Research indicates that individuals following vegetarian or vegan diets may have a reduced risk of developing osteoporosis. While bone mineral density is generally comparable between vegetarians and omnivores in early adulthood, differences tend to emerge in later life. This suggests that the protective effect in vegetarians may stem not from higher peak bone mass, but from a slower



rate of bone loss with aging. Contributing factors may include lower intake of dietary protein and phosphorus, which are associated with increased urinary calcium excretion and tissue acidification (Sindhu, 2022).

Adopting a vegan diet, which excludes all animal products, may alleviate asthma symptoms. This effect is potentially linked to the absence of polyunsaturated fats prevalent in animal-derived foods, which can promote leukotriene synthesis, pro-inflammatory mediators known to induce bronchoconstriction (Sindhu, 2022). Moreover, plant-based diets are associated with reduced inflammation, partly due to their high antioxidant content. Unprocessed plant foods are rich in antioxidants such as vitamins C and E, which neutralize free radicals and modulate immune responses (Orzel et al., 2024). These compounds also stimulate the production of endogenous antioxidant enzymes, contributing to decreased inflammatory activity (Hargreaves et al., 2021).

Adherence to a vegetarian diet may enhance psychological well-being by fostering feelings of purpose, contentment, and benevolence. The pursuit of guilt-free, peaceful eating often motivates this choice, while shared dietary values can strengthen social bonds and promote a sense of connectedness (Feher et al., 2020). Vegetarianism may also reduce social dysfunction and is associated with lower healthcare spending and improved overall quality of life. In addition to individual and social well-being, dietary choices have broader ecological consequences. Choosing a vegetarian diet may bring positive effects, including improved physical well-being, positive emotions associated with embracing a morally upright mindset, a heightened sense of affiliation (With a Vegetarian Group), and a reduced ecological footprint.

Environmental sustainability is a key motivator for adopting and maintaining a vegetarian diet. Extensive research demonstrates that meat production, particularly through factory farming, imposes a substantial environmental burden, while plant-based diets have a significantly lower ecological impact. For example, producing 1 kg of beans requires 3.8 m² of land, 2.5 m³ of water, 39 g of fertilizer, and 2.2 g of pesticide, whereas the same amount of beef requires 52 m² of land, 20.2 m³ of water, 360 g of fertilizer, and 17.2 g of pesticide. These disparities are even more pronounced when comparing the environmental costs per kilogram of protein, with beef protein requiring 10 to 18 times more land, water, fertilizers, and pesticides than protein from beans (Fresan & Sabate, 2019). Overall, vegetarianism has the potential to impact various aspects of quality of life. Beyond ecological considerations, these benefits resonate strongly with Buddhist ethics, particularly the principle of Ahimsa (Non-harming). Choosing plant-based foods not only reduces harm to sentient beings but also supports personal well-being.

Beyond ecological sustainability, the moral dimension becomes central when viewed through Buddhist philosophy. Building on the ethical foundation of Ahimsa and compassion, it is essential to consider how these principles intersect with nutritional science to ensure that a vegetarian diet supports both moral and physical well-being. While Theravada traditions often emphasize individual discipline and compassion expressed through dietary restraint, Mahayana perspectives extend the principle of Ahimsa to a broader cosmological and universal framework, reinforcing vegetarianism as both an ethical duty and an ecological imperative.



Disadvantages and Nutritional Considerations of Vegetarian Diets

Vegetarian dietary patterns, while aligned with ethical and environmental values, often present nutritional challenges, particularly regarding protein adequacy. Although plant-based foods such as legumes, soy products, and whole grains provide valuable sources of protein, they generally lack one or more essential amino acids, thereby reducing their biological value compared to animal proteins (Orzel et al., 2024). To ensure optimal protein intake, vegetarians are advised to adopt strategies such as complementary protein pairing for instance, rice with lentils or hummus with whole grain bread (Wang et al., 2023). In cases of persistent low energy or suspected protein insufficiency, dietary supplementation with amino acid blends may be warranted (Sindhu, 2022). Beyond protein adequacy, other essential nutrients may also be insufficient in vegetarian diets, notably omega-3 fatty acids.

Omega-3 fatty acids, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are predominantly found in marine sources such as fish, which are absent in vegetarian diets. As a result, vegetarians often exhibit lower blood concentrations of these long-chain fatty acids, which play critical roles in cardiovascular, neurological, and ocular health. While alpha-linolenic acid (ALA), a plant-derived omega-3 precursor found in flaxseeds, chia seeds, and walnuts, can be converted to EPA and DHA, the conversion efficiency is typically less than 10% (Lane et al., 2022). Thus, vegetarian populations may benefit from algal oil supplements, which offer a sustainable and bioavailable source of EPA and DHA (Craig, 2009).

Iron deficiency anemia is another concern among vegetarians, as plant-based diets provide non-heme iron, which is less efficiently absorbed compared to the heme iron present in animal products. Factors such as phytates, tannins, and polyphenols in plant foods can further inhibit iron absorption (Sindhu, 2022). Strategies to enhance non-heme iron absorption include consuming vitamin C-rich foods alongside iron-rich meals or employing food preparation techniques such as soaking, fermenting, or sprouting to reduce antinutritional factors (Craig, 2009). Left unaddressed, iron deficiency may result in fatigue, impaired cognitive performance, and reduced work productivity.

Similarly, zinc intake tends to be lower in vegetarian diets, and its bioavailability is hindered by phytates in legumes and whole grains. Zinc deficiency is associated with growth retardation, impaired immune function, and delayed wound healing (Orzel et al., 2024). Thus, vegetarians are encouraged to include zinc-rich foods such as pumpkin seeds, lentils, and fortified cereals, or consider supplementation if necessary.

Vitamin B12 deficiency represents one of the most significant risks in vegetarian populations, as reliable plant-based sources are virtually absent. Vitamin B12 plays an essential role in neurological function and red blood cell formation; Its deficiency can cause megaloblastic anemia, fatigue, and neurological impairments (Craig, 2009). Clinical manifestations may include neuropathy, paresthesia, cognitive decline, and mood disturbances. Given that fortified foods alone are often insufficient, supplementation is generally recommended for vegetarians, particularly strict vegans (Wang et al., 2023).



Vitamin D insufficiency is also prevalent among vegetarians, especially in regions with limited sunlight exposure. Although ergocalciferol (Vitamin D2) can be obtained from mushrooms and fortified foods, its bio-efficacy is generally lower than that of cholecalciferol (Vitamin D3). Vitamin D is essential for calcium metabolism, bone health, and immune regulation (Falchetti et al., 2022). Supplementation with vitamin D2 or plant-derived D3 may therefore be necessary to maintain adequate serum levels and prevent conditions such as osteoporosis.

Although vegetarian diets present certain nutritional challenges, careful planning, monitoring of key biomarkers, and judicious supplementation can effectively mitigate risks. Framed within Buddhist ethics, such mindfulness reflects Ahimsa not only toward other beings but also toward oneself, making vegetarianism a balanced integration of moral discipline and nutritional responsibility.

Dietary Guidelines for Vegetarian and Vegan Diets

Vegetarian and vegan dietary patterns are associated with a wide range of health benefits, including a reduced risk of chronic diseases. However, these diets may also pose nutritional challenges if not carefully planned. The following evidence-based guidelines are intended to ensure nutritional adequacy and support long-term health among individuals adhering to plant-based diets.

1. Protein Quality and Amino Acid Sufficiency

Adequate intake of high-quality protein is essential for the maintenance of muscle mass, immune function, and metabolic health. Since many plant proteins are incomplete, lacking one or more essential amino acids, it is important for individuals to combine complementary protein sources, such as legumes and whole grains, to achieve a complete amino acid profile. The food industry has contributed significantly in this regard by developing a range of alternative protein products, including soy protein isolates (e.g., Textured Vegetable Protein), mycoprotein, lupin flour, and substitutes for egg whites. Additionally, laboratory-produced products such as synthetic meats, plant-based egg whites, and dairy analogues have gained popularity. These alternatives are widely available in supermarkets and are used in various applications, including savory dishes, baked goods, protein bars, imitation meats, and pasta.

2. Essential Fatty Acids

Vegetarian and especially vegan diets tend to result in lower plasma concentrations of the long-chain omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), primarily due to the exclusion of marine-derived foods. Although alpha-linolenic acid (ALA), which is found in flaxseed, walnuts, canola oil, soy products, and hemp-based beverages, can be consumed regularly, its conversion to EPA and DHA in the human body is limited. As such, the inclusion of DHA-fortified foods, such as specific brands of soy milk and cereal bars, is advisable. Supplementation with algae-derived EPA and DHA is particularly beneficial for individuals with increased physiological needs, such as pregnant and lactating women (Craig, 2009).



3. Iron and Zinc

The bioavailability of iron and zinc from plant-based sources is generally lower compared to that from animal-based sources, largely due to the presence of phytates, which interfere with mineral absorption. To enhance iron absorption, individuals are encouraged to consume iron-rich plant foods, such as legumes, whole grains, and fortified cereals, in combination with foods high in vitamin C. To improve zinc intake, emphasis should be placed on consuming legumes, seeds, whole grains, and soy products, which are relatively rich in zinc despite the inhibitory effect of phytates. In certain cases, supplementation or the use of fortified products, such as ready-to-eat breakfast cereals, may be necessary (Craig, 2009). Moreover, the use of specific preparation techniques, such as soaking legumes and discarding the soaking water prior to cooking, can significantly reduce phytate content. Additional processing methods, including sprouting, fermenting, and cooking in the presence of vitamin C-rich ingredients, have also been shown to enhance the bioavailability of both iron and zinc (Wang et al., 2023).

4. Vitamins D and B12

Vitamin D and vitamin B12 are two nutrients of particular concern for vegetarians and vegans due to the scarcity of reliable plant-based sources. To maintain adequate vitamin D status, particularly during the winter months or in populations with limited sunlight exposure, individuals should consume fortified foods such as soy milk, rice milk, orange juice, breakfast cereals, and margarine. In situations where fortified foods are not regularly consumed, a daily supplement providing 5-10 micrograms of vitamin D is recommended, especially for elderly individuals (Craig, 2009). In the case of vitamin B12, regular consumption of fortified foods, such as plant-based beverages, breakfast cereals, meat analogs, and nutritional yeast, is essential, as unfortified plant foods, including fermented soy products, leafy greens, and seaweed, do not provide reliable or sufficient quantities of bioactive B12. Supplementation with bioavailable forms of vitamin B12, such as methylcobalamin or hydroxocobalamin, is strongly recommended. The current recommended dietary allowance for vitamin B12 is 2.4 micrograms per day for adults, increasing to 2.6 micrograms during pregnancy and lactation (Watanabe et al., 2014).

5. Micronutrient-Rich Plant Foods

Nuts and seeds serve as excellent sources of essential fatty acids and B vitamins, and should be incorporated into the daily diet. A varied intake of fresh fruits and vegetables is also necessary to ensure adequate consumption of vitamins, minerals, antioxidants, and phytochemicals. Particular attention should be given to above-ground vegetables, which generally exhibit higher nutrient densities. Certain techniques are recommended to preserve the nutritional quality of plant foods during preparation. Steaming is preferable to boiling or frying, as it helps retain water-soluble vitamins and phytonutrients. Tearing vegetables by hand, rather than cutting with metal blades, may help preserve enzymatic activity and nutritional integrity. Soaking, boiling, and steaming are also effective methods for reducing phytates and other anti-nutritional factors (Sindhu, 2022).



6. Phytonutrient Diversity

A diet that includes a broad spectrum of colorful fruits and vegetables, often referred to as the "Eat the Rainbow" approach, ensures a wide range of phytonutrients, vitamins, minerals, and amino acids. Such dietary diversity is associated with improved immune function, enhanced cellular health, and a reduced risk of chronic diseases. This principle serves as a foundation for general dietary recommendations in plant-based nutrition, as outlined in Table 3.

Table 3 General Recommendations for a Plant-Based Diet (Feher et al., 2020)

Groups of Ingredients	Recommended Daily Allowance
Vegetables (With the Exception of Starchy Vegetables)	As Desired, with An Emphasis on Diversity
Fruit	2-4 Portions (1 portion = 1 Medium-Sized Piece or 1/2 Cup)
Whole Grain Cereals (e.g., Oat, Brown Rice, Quinoa)	6-11 Portions (1 portion = 1/2 Cup of Cooked Cereals or One Slice of Whole Wheat Bread)
Legumes (lentils, Peas, Beans, Soybean)	2-3 Portions (1 portion = 1/2 Cup of Cooked Legumes)
Leaf Vegetables (e.g., Broccoli, Lettuce, Kale)	At least 2-3 Portions (1 portion = 1 Cup Raw or 1/2 Cup of Cooked Leaf Vegetables)
Oilseeds (e.g., Pistachio, Almond, Walnut)	30-55 g
Seeds (e.g., Chia, Linseed, Hempseed)	1-3 Tablespoons
Vegetable Milk (e.g., Cashew, Soy, Almond)	2-3 Cups
Fresh Herbs	As Desired, with An Emphasis on Diversity

Contemporary dietary guidelines provide a systematic foundation for implementing vegetarian and vegan diets that are both nutritionally adequate and environmentally sustainable. When supported by informed food selection, appropriate supplementation, and sound preparation practices, plant-based diets are capable of meeting essential nutrient requirements while minimizing the risk of deficiencies. A growing body of evidence supports the health benefits of diets characterized by high intakes of fruits, vegetables, and whole grains, and limited consumption of processed foods, particularly in the prevention of chronic diseases.

Holistic Framework of Buddhist-Informed Vegetarianism

Recent interdisciplinary scholarship underscored a convergence between Buddhist ethical principles and modern scientific understandings of plant-based nutrition, advancing a multifaceted model of vegetarianism that embraced both spiritual values and empirical health knowledge. What sets this work apart is its explicit focus on integrating these domains into a dialogical framework, where ethical reflection and nutritional science mutually inform each other, rather than merely being compared. Central to this emerging framework is the alignment of Ahimsa (Non-violence) with public health and ecological sustainability. Within Buddhist thought, dietary abstention from animal products reflected a moral stance on compassion and mindfulness; Increasingly, this ethical commitment was mirrored in scientific literature linking vegetarian diets to reduced risks of non-communicable diseases, including cardiovascular conditions, type 2 diabetes, and various cancers. By linking these scientific findings to Buddhist



principles such as mindfulness, moderation, and intentionality, this framework illustrated how ethical values could directly inform the practical design and implementation of healthful plant-based diets.

A critical dimension of the new evidence lies in its detailed guidance on nutritional adequacy. Recent guidelines elaborated on protein quality, emphasizing the need for amino acid complementation through combinations of legumes and grains. They also introduced technological advancements such as textured soy protein, mycoprotein, and synthetic meats, which broadened the availability and functional value of plant-based diets. Furthermore, enhanced strategies to support micronutrient bioavailability, including soaking, fermenting, and co-consuming iron and zinc-rich foods with vitamin C, addressed long-standing challenges related to mineral absorption in phytate-rich diets. This integration of practical dietary strategies demonstrated how ethical values derived from Buddhist principles, such as intentionality and thoughtful consumption, could inform the design of healthful plant-based diets.

The integration of supplementation protocols, particularly for nutrients with limited presence in plant-based sources (e.g., Vitamin B12, Vitamin D, EPA/DHA), reflected a pragmatic shift toward ensuring long-term nutritional sufficiency. For instance, algae-based omega-3 supplements and fortified food products were presented as essential tools in both clinical and public health contexts. Culinary practices aimed at preserving phytonutrients, such as manual vegetable tearing or steaming rather than boiling, underscore the importance of mindful preparation. These insights had practical applications for policymakers, educators, and health promoters, including culturally sensitive dietary guidelines, educational programs combining spiritual and nutritional instruction, and community initiatives that facilitated nutrient-rich, intentional eating.

Importantly, the reviewed literature positioned vegetarianism as a model of sustainable nutrition, demonstrating the markedly lower environmental costs of plant-based protein production compared to animal-based systems. This ecological dimension resonated with Buddhist teachings on interdependence and the minimization of harm to sentient beings and the natural world. Moreover, the integration of mindful eating practices, rooted in *sati* (Mindfulness) and *karuna* (Compassion), complements contemporary psychological insights into eating behavior, emotional regulation, and mental well-being.

Collectively, this emerging knowledge redefined vegetarianism as an integrative practice that united ethical, nutritional, ecological, and psychological domains. It affirms that a well-planned plant-based diet, when informed by both ancient wisdom and modern science, not only supports personal health and spiritual cultivation but also advances broader societal goals of sustainability, ethical responsibility, and collective flourishing as in Figure 1.

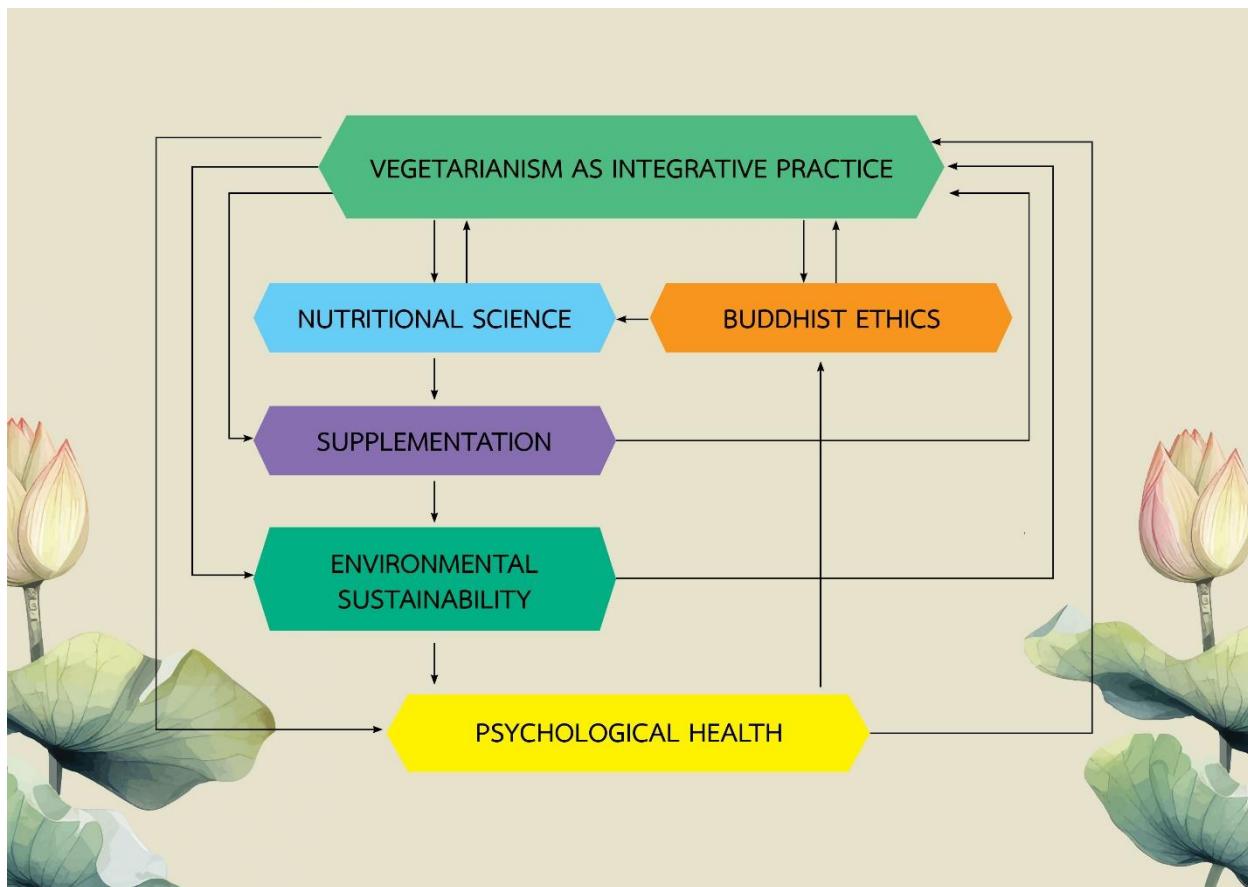


Figure 1 Holistic Framework of Buddhist-Informed Vegetarianism

Conclusions

Vegetarianism, viewed through the lens of Buddhist ethics, embodied compassion (Karuna) and the principle of Ahimsa, or non-harming. In Mahayana traditions, abstaining from meat was an expression of universal compassion, while Theravada emphasized mindful consumption and ethical intention. These frameworks illustrated Buddhism's capacity to adapt to cultural contexts while maintaining its core commitment to reducing suffering. Moreover, in contemporary society, vegetarianism increasingly reflects a synthesis of ethical reasoning and evidence-based knowledge, illustrating how modernity encourages the integration of moral principles with scientific and environmental awareness. Modern research confirmed that well-planned plant-based diets support cardiovascular, metabolic, and psychological health, while also reducing the ecological footprint through lower greenhouse gas emissions, land and water use, and biodiversity impact. Successfully adopting a vegetarian diet requires careful nutritional planning to ensure adequate intake of vitamin B12, iron, zinc, calcium, and omega-3 fatty acids. Accessible education, community support, and fortified food options are essential to sustain healthful plant-based practices. Beyond personal or religious motivations, vegetarianism offers a framework for ethical living, public health promotion, and environmental sustainability. When approached with mindfulness, knowledge, and community support, vegetarianism can foster individual wellness, contribute to global health equity, and promote harmony with all forms of life.



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