International Journal of Multidisciplinary Education and Research
www.multieducationjournal.com
ISSN: 2455-4588
Received: 15-12-2025, Accepted: 28-01-2026, Published: 13-02-2026
Volume 11, Issue 1, 2026, Page No. 18-22

Plant-Based diets and their role in sustainable obesity management: An overview

Paramita Dhara[1], Ruma Solanki[2], Srijita Majumder[3], Parna Chatterjee[4], Pallabi Chatterjee[5], Khan Farhana Mehreen[6*]

[1] Assistant Professor, Department of Nutrition, Haldia Institute of Health Sciences, West Bengal, India
[2] Orane International, Jaipur, Rajasthan, India
[3] Swami Vivekananda University, Barrackpore, West Bengal, India
[4] Sarada Ma Girls' College, Barasat, West Bengal, India
[5] All India Institute of Hygiene and Public Health (WBUHS), West Bengal, India
[6] Assistant Professor and Head, Department of Home Science, Indian Institute of Food Science & Technology, Aurangabad, Maharashtra, India

Abstract
Plant-based diets (PBDs) — encompassing vegetarian, vegan, whole-food plant-based and plant-heavy (flexitarian) patterns — are increasingly promoted both for human health and environmental sustainability. Evidence from randomized trials and observational studies shows that PBDs tend to produce modest but clinically meaningful weight loss and improvements in adiposity-related metabolic markers; proposed mechanisms include lower energy density, higher fibre and water content, changes in gut microbiota, and reduced dietary saturated fat. Parallel life-cycle and population-level analyses indicate that large-scale dietary shifts toward plant-based patterns lower greenhouse gas emissions, land use, and biodiversity loss compared with typical animal-product-heavy diets. This review summarizes mechanisms linking PBDs to weight control, critically examines clinical evidence, discusses environmental co-benefits and nutritional considerations, identifies barriers and equity issues, and proposes research and policy priorities for integrating sustainable obesity management into public health practice.

Keywords: Plant based diet, human health, obesity, BMI, high fibre, nutrition

Introduction

Obesity is a worldwide public-health challenge driven by complex interactions of biology, behavior, and food environments (Bagnall *et al*., 2019) [1]. Simultaneously, food systems are major contributors to climate change, biodiversity loss, and land degradation (Smith *et al*., 2020) [2]. Dietary patterns that improve individual health while reducing environmental impact are therefore of high interest (Grosso *et al*., 2020) [3]. Plant-based dietary patterns — defined here as diets that prioritize vegetables, fruits, whole grains, legumes, nuts and seeds and minimize or exclude animal products — are hypothesized to help manage body weight while offering environmental benefits (Petersen *et al*., 2017) [4]. This review synthesizes current understanding of how PBDs affect body weight and obesity-related outcomes and examines their sustainability implications.

Definitions and scope

"Plant-based diet" is an umbrella term describing dietary patterns that emphasize foods derived from plants, though the degree of animal-food exclusion varies (Hargreaves *et al*., 2023) [5]. A vegan diet eliminates all animal products, including meat, fish, dairy, eggs, and often honey, relying entirely on plant sources for nutrients (Kowalska *et al*., 2020) [6]. A lacto-ovo vegetarian pattern excludes meat and fish but includes dairy products and eggs, making it one of the most nutritionally flexible vegetarian approaches (Kwiatkowska *et al*., 2022) [7]. A whole-food plant-based (WFPB) diet goes a step further by prioritizing minimally processed plant foods such as vegetables, fruits, whole grains, legumes, nuts, and seeds, while limiting refined grains, added sugars, and oils (Karlsen *et al*., 2019) [8]. In contrast, a flexitarian or plant-heavy pattern is more adaptable, encouraging a predominantly plant-based intake while allowing occasional or small amounts of animal products (Räty, 2025). In the context of obesity management, the focus is less on strict exclusion and more on dietary quality—specifically increasing intake of fibre-rich, low-energy-density whole plant foods and reducing high-energy animal products and ultraprocessed foods that contribute to excess calorie consumption.

Mechanisms linking plant-based diets to weight regulation

Multiple, partly overlapping mechanisms are proposed:

1. Reduced energy density and increased satiety. Whole plant foods typically have more water and fibre and lower fat content than animal-based foods, lowering calories per gram and increasing meal volume and satiety per calorie consumed. This tends to reduce total energy intake without deliberate caloric restriction (Päivärinta *et al*., 2020).
2. Increased dietary fibre and effects on the gut microbiota. Fermentable fibres increase production of short-chain fatty acids (SCFAs) that can modulate appetite, energy harvest, and inflammation; plant-rich diets are associated with shifts toward putatively beneficial microbiota that may support energy balance and metabolic health (Sleeth *et al*., 2010) [11].
3. Lower saturated fat and improved insulin sensitivity. Less saturated fat and cholesterol combined with higher polyunsaturated fats and plant phytochemicals can improve insulin action and reduce visceral adiposity, facilitating weight loss and improvements in cardiometabolic risk (Islam *et al*., 2021) [12].

4. Behavioral and food-environment effects. Adoption of a plant-based pattern often triggers broader lifestyle changes (cooking practices, food choices) that reduce ultraprocessed-food consumption and support weight control (Ohlau *et al*., 2022) [13].

Clinical evidence: randomized trials and observational studies

1. Randomized controlled trials (RCTs).

RCTs comparing vegetarian/vegan or WFPB interventions with conventional or dietary-advice controls have generally shown greater weight loss in the plant-based arms over short to moderate follow-up (weeks to 24 months) (Austin *et al*., 2021) [14]. Effects are variable but commonly in the range of modest weight loss (several kg) and greater reductions in BMI and waist circumference; benefits are seen in general overweight/obese adults and in people with type 2 diabetes. Trials that emphasize whole, minimally processed plant foods and lower added fat tend to show larger effects (Wing *et al*., 2011) [15].

2. Observational and cohort evidence.

Observational and prospective cohort studies consistently report that individuals who habitually follow vegetarian or vegan dietary patterns tend to have lower average body mass index (BMI) and a reduced prevalence of obesity compared with omnivores (Jarvis *et al*., 2022) [16]. Large population studies across diverse regions have shown that diets richer in whole plant foods—such as legumes, whole grains, fruits, and vegetables—are associated with more favorable body weight profiles and lower central adiposity (Esquivel, 2022) [17]. However, causal interpretation must be cautious because plant-based eaters often differ from non-vegetarians in other health-related behaviors, including higher physical activity levels, lower smoking rates, and greater health awareness, as well as differences in education and income. These factors can partially explain observed weight differences. Despite these limitations, longitudinal cohort data provide stronger support, indicating that people who maintain plant-rich eating patterns over time generally experience less gradual weight gain during adulthood, suggesting a protective role of high-quality plant-based diets in long-term weight regulation (Cavelaars *et al*., 2000) [18].

3. Meta-analyses and systematic reviews.

Meta-analyses and systematic reviews pooling data from randomized controlled trials and observational studies generally conclude that plant-based dietary patterns support short- to medium-term weight reduction and lead to improvements in key cardiometabolic risk markers (Luong *et al*., 2022) [19], including blood lipids, glycemic control, and blood pressure. These benefits are often attributed to higher dietary fibre intake, lower energy density, and improved overall diet quality associated with plant-focused eating patterns (Woodside *et al*., 2022) [20]. However, interpretation of pooled results requires caution. Considerable heterogeneity exists across studies in how "plant-based" diets are defined (vegan vs. vegetarian vs. plant-forward), the degree of dietary support provided, duration of interventions, and the types of comparison diets used (e.g., standard care, Mediterranean, or low-fat omnivorous diets). Such variability reduces the precision of effect estimates and makes it difficult to determine which specific plant-based approach is most effective. Nonetheless, the overall direction of evidence supports plant-centered diets as a viable component of obesity and cardiometabolic risk management strategies (Bravata and Olkin, 2010).

Environmental co-benefits and trade-offs

Life-cycle analyses and scenario modeling consistently show that diets lower in animal products — especially ruminant meat — yield substantially lower greenhouse gas emissions (GHGEs), lower land use, and often lower biodiversity impacts per unit of dietary energy or nutrient. However, the environmental footprint of plant foods varies: some nuts or fruits may require more water or be sourced from ecologically sensitive areas; highly processed plant-based alternatives can have non-trivial footprints. Therefore, the optimal sustainability profile combines increased healthy, minimally processed plant foods and reductions in high-impact animal products. At population scale, shifts toward plant-heavy or planetary health diets could substantially lower diet-related emissions and help meet climate goals (Detzel *et al*., 2022) [22].

Nutritional adequacy and practical considerations

PBDs can meet macro- and micronutrient needs when well-planned, but attention is required for certain nutrients commonly lower in strict plant patterns: vitamin B12, vitamin D (depending on sun exposure), iodine, long-chain omega-3 fatty acids (EPA/DHA), iron bioavailability, and in some cases calcium and zinc (Alcalá-Santiago *et al*., 2025) [23]. Practical recommendations include B12 supplementation or fortified foods for vegans, use of iodized salt or seaweeds for iodine (with caution), and inclusion of ALA sources (flaxseed, chia, walnuts) and/or algae-based EPA/DHA supplements when needed (De Stefano *et al*., 2026) [24]. Fortified foods and thoughtful meal planning mitigate most risks; nutrition counseling is helpful during the transition. (See Section 8 for implementation guidance.) (Spahn *et al*., 2010) [25]

Barriers, equity, and cultural dimensions

Adopting plant-based patterns is mediated by food availability, affordability, cultural preferences, cooking skills, and industrial food systems (Venter de Villiers *et al*., 2024) [26]. In many low-income settings, animal products are important affordable sources of bioavailable micronutrients (Gibson *et al*., 2010) [27]. Equity-sensitive strategies should therefore focus on increasing access to affordable, nutrient-dense plant foods (legumes, whole grains, local fruits and vegetables), supporting smallholder production, and avoiding one-size-fits-all messaging that could worsen nutritional risk among vulnerable groups (Maindi *et al*., 2024) [28].

Translating evidence into practice: clinical and policy strategies

1. Clinical counseling.

In clinical practice, translating plant-based nutrition evidence into sustainable obesity management requires a supportive, individualized approach that focuses on adding quality plant foods rather than simply removing meat (Mambrini *et al*., 2025) [29]. Patients should be guided toward whole, minimally processed options—such as vegetables, fruits, whole grains, legumes, nuts, and seeds—because these foods naturally improve satiety, reduce

energy density, and support metabolic health (Locke *et al*., 2018) [30]. Setting realistic, incremental goals improves adherence; for example, encouraging patients to replace red or processed meats with legumes or other plant proteins a few times per week, or to include at least one serving of pulses daily, makes dietary change feel achievable rather than restrictive (Koenigsberg *et al*., 2004) [31]. Clinicians must also proactively address potential nutrient gaps, particularly vitamin B12 (through fortified foods or supplements) and iron bioavailability, which can be enhanced by pairing plant iron sources with vitamin C–rich foods (Wright and Zelman, 2018) [32]. Finally, dietary counseling should be integrated with broader lifestyle strategies—regular physical activity, adequate sleep, and behavioral support techniques such as self-monitoring and goal setting—since long-term weight management depends on reinforcing multiple, mutually supportive health behaviors rather than di*et al*one (Kumanyika *et al*., 2008) [33].

2. Public-health and policy levers.

Effective public-health and policy strategies are essential to make plant-based eating patterns accessible, affordable, and sustainable at the population level (Lonnie and Johnstone, 2020) [34]. Nutrition-sensitive agricultural policies can shift production toward pulses, fruits, vegetables, and whole grains, improving both dietary diversity and environmental resilience while lowering the relative cost of nutrient-dense plant foods (McDermott and Wyatt, 2017) [35]. Public institutions—including schools, hospitals, and workplaces—can lead by example through procurement standards that prioritize plant-forward meals, thereby shaping norms and increasing exposure to healthy options early in life (Zavala *et al*., 2016) [36]. Fiscal measures also play a powerful role: subsidies for minimally processed plant foods can encourage healthier purchasing, while reassessing financial support for high-emission animal commodities may help align food systems with climate and health goals. Finally, food-environment interventions—such as reformulating processed foods to improve nutritional quality, implementing clear front-of-pack labeling, and restricting marketing of ultraprocessed, energy-dense products—can nudge consumers toward healthier, plant-rich choices without relying solely on individual willpower (Comini *et al*., 2025) [37].

3. Systems approach.

A systems approach recognizes that obesity prevention and sustainable diets are shaped not just by individual choice but by the structure of the entire food system (Lee *et al*., 2017) [38]. Integrating climate, agricultural, health, and social policies helps ensure that dietary guidance promoting plant-rich eating is supported by food production, distribution, and affordability. For example, agricultural policies that incentivize diverse crop production can increase the availability of pulses, fruits, and vegetables, while public health frameworks can align dietary guidelines with environmental sustainability targets. Social protection programs, school feeding schemes, and urban food policies can further improve equitable access to healthy plant foods, particularly for low-income populations. By coordinating efforts across sectors—from farm production and supply chains to retail environments and consumer education—governments can create supportive environments where healthier, plant-forward dietary choices become the easy, affordable, and culturally acceptable option, thereby linking obesity prevention with long-term environmental and social resilience (Woodside *et al*., 2022) [20].

Table 1: Plant-Based Diets and Their Role in Sustainable Obesity Management — Evidence Overview

Aspect	Key Findings from Previous Studies	Relevance to Obesity Management	Sustainability Implications
Dietary Composition	Emphasis on vegetables, fruits, whole grains, legumes, nuts, and seeds; reduced intake of red/processed meat and high-fat animal foods	Lower energy density and higher fibre promote satiety and reduced calorie intake	Plant foods generally require fewer natural resources and generate lower greenhouse gas emissions (Xu *et al*., 2021)
Energy Density	Whole plant foods contain more water and fibre with fewer calories per gram	Helps spontaneous calorie reduction without strict portion control	Encourages diets based on minimally processed crops rather than resource-intensive livestock (Hicks *et al*., 2018) [41].
Dietary Fibre	Higher intake of soluble and insoluble fibres in PBDs	Improves fullness, glycemic control, and gut hormone regulation	Fibre-rich crops (legumes, whole grains) support soil health and crop diversity (Ruxton and Derbyshire, 2014) [42].
Gut Microbiota	PBDs linked to greater microbial diversity and higher SCFA production	SCFAs influence appetite regulation, fat storage, and inflammation	Promotes agricultural biodiversity through varied plant intake (Frison *et al*., 2011) [43].
Fat Quality	Lower saturated fat, higher unsaturated fats from nuts and seeds	Improves insulin sensitivity and reduces visceral fat accumulation	Reduced reliance on ruminant livestock lowers methane emissions (Waghorn and Hegarty, 2011) [44].
Weight Outcomes (RCTs)	Clinical trials show modest but significant reductions in body weight, BMI, and waist circumference	Supports short- to medium-term weight loss and cardiometabolic improvement	Demonstrates health benefits without reliance on high-impact animal foods (Dixon *et al*., 2023) [45].
Long-Term Weight Trends	Cohort studies associate plant-rich diets with less gradual weight gain over time	Supports sustainable, maintainable dietary pattern	Long-term dietary shifts can cumulatively reduce food system emissions (Li *et al*., 2024).
Cardiometabolic Markers	Improvements in blood lipids, blood pressure, and glycemic control	Reduces obesity-related disease risk (T2DM, CVD)	Lower burden of chronic disease reduces healthcare resource demand (McPhail, 2016).
Food Processing Level	Whole-food plant-based diets show stronger benefits than highly processed vegan diets	Minimally processed foods better for appetite control and metabolic health	Less processing means lower industrial energy use and packaging waste
Nutritional	Potential gaps in vitamin B12, iron	Requires dietary planning or	Fortification and diversification can be

Considerations	bioavailability, omega-3 (EPA/DHA), vitamin D	fortification to ensure safe long-term adherence	integrated into sustainable food policies (Augustin *et al*., 2016) [48].
Behavioral Factors	PBD adoption often linked with overall healthier lifestyle behaviors	Supports holistic weight management (diet + activity patterns)	Encourages food literacy and reduced dependence on industrial animal agriculture (Bellotti, 2010) [49].
Policy & Systems Impact	Research supports integration of dietary guidelines with environmental goals (e.g., EAT-Lancet Commission, World Health Organization)	Population-wide shifts could reduce obesity prevalence	Major reductions in greenhouse gas emissions, land use, and biodiversity loss (Miles and Kapos, 2008) [50].

Conclusions

Plant-based dietary patterns are promising tools for sustainable obesity management. Mechanistic plausibility (lower energy density, higher fibre, improved insulin sensitivity and microbiota changes) aligns with clinical trial and observational data showing greater short-to-medium term weight loss and improved metabolic markers compared with many conventional diets. Importantly, at population scale, dietary shifts toward plants can yield meaningful environmental co-benefits. Realizing this potential requires careful attention to nutrient adequacy, cultural and socioeconomic realities, and coordinated policy action across food systems. Future work should prioritize long-term trials, comparative effectiveness studies across PBD subtypes, and policies that ensure equitable access to healthy plant foods.

References

1. Bagnall AM, Radley D, Jones R, Gately P, Nobles J, Van Dijk M, *et al*. Whole systems approaches to obesity and other complex public health challenges: a systematic review. BMC public health,2019:19(1):8.
2. Smith P, Calvin K, Nkem J, Campbell D, Cherubini F, Grassi G, *et al*. Which practices co-deliver food security, climate change mitigation and adaptation, and combat land degradation and desertification?. Global Change Biology,2020:26(3):1532-1575.
3. Grosso G, Fresán U, Bes-Rastrollo M, Marventano S, Galvano F. Environmental impact of dietary choices: role of the Mediterranean and other dietary patterns in an Italian cohort. International journal of environmental research and public health,2020:17(5):1468.
4. Petersen KS, Flock MR, Richter CK, Mukherjea R, Slavin JL, Kris-Etherton PM. Healthy dietary patterns for preventing cardiometabolic disease: the role of plant-based foods and animal products. Current developments in nutrition, 2017, 1(12).
5. Hargreaves SM, Rosenfeld DL, Moreira AVB, Zandonadi RP. Plant-based and vegetarian diets: an overview and definition of these dietary patterns. European journal of nutrition,2023:62(3):1109-1121.
6. Kowalska K, Brodowski J, Pokorska-Niewiada K, Szczuko M. The change in the content of nutrients in diets eliminating products of animal origin in comparison to a regular diet from the area of Middle-Eastern Europe. Nutrients,2020:12(10):2986.
7. Kwiatkowska I, Olszak J, Formanowicz P, Formanowicz D. Nutritional status and habits among people on vegan, lacto/ovo-vegetarian, pescatarian and traditional diets. Nutrients,2022:14(21):4591.
8. Karlsen MC, Rogers G, Miki A, Lichtenstein AH, Folta SC, Economos CD, *et al*. Theoretical food and nutrient composition of whole-food plant-based and vegan diets compared to current dietary recommendations. Nutrients,2019:11(3):625.
9. Räty A. Beyond the chicken and rice paradigm: Finnish competitive athletes' perceptions. Food Science and Nutrition,2025:60(14):2405-2421.
10. Päivärinta E, Itkonen ST, Pellinen T, Lehtovirta M, Erkkola M, Pajari AM. *et al*. Replacing animal-based proteins with plant-based proteins changes the composition of a whole Nordic diet—a randomised clinical trial in healthy Finnish adults. Nutrients,2020:12(4):943.
11. Sleeth ML, Thompson EL, Ford HE, Zac-Varghese SE, Frost G. Free fatty acid receptor 2 and nutrient sensing: a proposed role for fibre, fermentable carbohydrates and short-chain fatty acids in appetite regulation. Nutrition research reviews,2010:23(1):135-145.
12. Islam SU, Ahmed MB, Ahsan H, Lee YS. Recent molecular mechanisms and beneficial effects of phytochemicals and plant-based whole foods in reducing LDL-C and preventing cardiovascular disease. Antioxidants,2021:10(5):784.
13. Ohlau M, Spiller A, Risius A. Plant-based diets are not enough? Understanding the consumption of plant-based meat alternatives along ultra-processed foods in different dietary patterns in Germany. Frontiers in nutrition,2022:9:852936.
14. Austin G, Ferguson JJ, Garg ML. Effects of plant-based diets on weight status in type 2 diabetes: a systematic review and meta-analysis of randomised controlled trials. Nutrients,2021:13(11):4099.
15. Wing RR, Lang W, Wadden TA, Safford M, Knowler WC, Bertoni AG, *et al*. Benefits of modest weight loss in improving cardiovascular risk factors in overweight and obese individuals with type 2 diabetes. Diabetes care,2011:34(7):1481-1486.
16. Jarvis SE, Nguyen M, Malik VS. Association between adherence to plant-based dietary patterns and obesity risk: a systematic review of prospective cohort studies. Applied Physiology, Nutrition, and Metabolism,2022:47(12):1115-1133.
17. Esquivel MK. Nutrition benefits and considerations for whole foods plant-based eating patterns. American journal of lifestyle medicine,2022:16(3):284-290.
18. Cavelaars AE, Kunst AE, Geurts JJ, Crialesi R, Grötvedt L, Helmert U, *et al*. Educational differences in smoking: international comparison. Bmj,2000:320(7242):1102-1107.
19. Luong R, Ribeiro RV, Cunningham J, Chen S, Hirani V. The short-and long-term effects of dietary patterns on cardiometabolic health in adults aged 65 years or older: a systematic review. Nutrition Reviews,2022:80(3):329-350.
20. Woodside JV, Sun Q, de Roos B, Rimm EB, Hu FB, Heinen MM, *et al*. Meeting report: plant-rich dietary patterns and health. Proceedings of the Nutrition Society,2022:81(4):288-305.

21. Bravata DM, Olkin I. Simple pooling versus combining in meta-analysis. Evaluation the health professions,2001:24(2):218-230.
22. Detzel A, Krüger M, Busch M, Blanco-Gutiérrez I, Varela C, Manners R, *et al*. Life cycle assessment of animal-based foods and plant-based protein-rich alternatives: an environmental perspective. Journal of the Science of Food and Agriculture,2022:102(12):5098-5110.
23. Alcalá-Santiago Á, Rodríguez-Martín NM, Casas-Albertos E, Gálvez-Navas JM, Castelló-Pastor A, García-Villanova B, *et al*. Nutrient adequacy and environmental foot-print of Mediterranean, pesco-, ovo-lacto-, and vegan menus: a modelling study. Frontiers in Nutrition,2025:12:1681512.
24. De Stefano MI, Monda A, Di Maio G, Casillo M, Messina A, Monda V, *et al*. Exploring vegetarian diets: health benefits, nutritional considerations, and implications for athletic performance. Sport Sciences for Health,2026:22(1):20.
25. Spahn JM, Reeves RS, Keim KS, Laquatra I, Kellogg M, Jortberg B, *et al*. State of the evidence regarding behavior change theories and strategies in nutrition counseling to facilitate health and food behavior change. Journal of the American Dietetic Association,2010:110(6):879-891.
26. Venter de Villiers M, Cheng J, Truter L. The shift towards plant-based lifestyles: Factors driving young consumers' decisions to choose plant-based food products. Sustainability,2024:16(20):9022.
27. Gibson RS, Bailey KB, Gibbs M, Ferguson EL. A review of phytate, iron, zinc, and calcium concentrations in plant-based complementary foods used in low-income countries and implications for bioavailability. Food and nutrition bulletin,2010:31(2):S134-S146.
28. Maindi CN, Nyarindo WN, Ndirangu SN, Isaboke HN. Debunking the one-size-fits-all approach: Synergistic and trade-off effects of collective action on household food security among the smallholder farmers in central Kenya. Journal of Global Innovations in Agricultural Sciences,2024:12(3):815-830.
29. Mambrini SP, Penzavecchia C, Menichetti F, Foppiani A, Leone A, Pellizzari M, *et al*. Plant-based and sustainable diet: A systematic review of its impact on obesity. Obesity Reviews,2025:26(6):13901.
30. Locke A, Schneiderhan J, Zick SM. Diets for health: goals and guidelines. American family physician,2018:97(11):721-728.
31. Koenigsberg MR, Bartlett D, Cramer JS. Facilitating treatment adherence with lifestyle changes in diabetes. American family physician,2004:69(2):309-316.
32. Wright WL, Zelman KM. Maximizing your "nutrition minute": Bridging nutritional gaps across the life span. Journal of the American Association of Nurse Practitioners,2018:30(3):160-177.
33. Kumanyika SK, Obarzanek E, Stettler N, Bell R, Field AE, Fortmann SP, *et al*. Population-based prevention of obesity: the need for comprehensive promotion of healthful eating, physical activity, and energy balance: a scientific statement from American Heart Association Council on Epidemiology and Prevention, Interdisciplinary Committee for Prevention (formerly the expert panel on population and prevention science). Circulation,2008:118(4):428-464.
34. Lonnie M, Johnstone AM. The public health rationale for promoting plant protein as an important part of a sustainable and healthy diet. Nutrition bulletin,2020:45(3):281-293.
35. McDermott J, Wyatt AJ. The role of pulses in sustainable and healthy food systems. Annals of the New York Academy of Sciences,2017:1392(1):30-42.
36. Zavala MOQ, Klinj TP, Carrillo KLS. Quality of life in the workplace for nursing staff at public healthcare institutions. Revista latino-americana de enfermagem,2016:24:2713.
37. Comini LDO, Lopes SO, Rocha DMUP, Silva MMDC, Hermsdorff HHM. The effects of subsidies for healthy foods on food purchasing behaviors, consumption patterns, and obesity/overweight: a systematic review. Nutrition Reviews,2025:83(7):1722-1739.
38. Lee BY, Bartsch SM, Mui Y, Haidari LA, Spiker ML, Gittelsohn J. A systems approach to obesity. Nutrition reviews,2017:75(1):94-106.
39. Woodside JV, Sun Q, de Roos B, Rimm EB, Hu FB, Heinen MM, *et al*. Meeting report: plant-rich dietary patterns and health. Proceedings of the Nutrition Society,2022:81(4):288-305.
40. Xu X, Sharma P, Shu S, Lin TS, Ciais P, Tubiello FN, *et al*. Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods. Nature food,2021:2(9):724-732.
41. Hicks TM, Knowles SO, Farouk MM. Global provisioning of red meat for flexitarian diets. Frontiers in nutrition,2018:5:50.
42. Ruxton C, Derbyshire E. The health benefits of whole grains and fibre. Nutrition Food Science,2014:44(6):492-519.
43. Frison EA, Cherfas J, Hodgkin T. Agricultural biodiversity is essential for a sustainable improvement in food and nutrition security. Sustainability,2011:3(1):238-253.
44. Waghorn GC, Hegarty RS. Lowering ruminant methane emissions through improved feed conversion efficiency. Animal Feed Science and Technology,2011:166:291-301.
45. Dixon KA, Michelsen MK, Carpenter CL. Modern diets and the health of our planet: An investigation into the environmental impacts of food choices. Nutrients,2023:15(3):692.
46. Li Y, He P, Shan Y, Li Y, Hang Y, Shao S, *et al*. Reducing climate change impacts from the global food system through diet shifts. Nature Climate Change,2024:14(9):943-953.
47. McPhail SM. Multimorbidity in chronic disease: impact on health care resources and costs. Risk management and healthcare policy, 2016, 143-156.
48. Augustin MA, Riley M, Stockmann R, Bennett L, Kahl A, Lockett T, *et al*. Role of food processing in food and nutrition security. Trends in Food Science Technology,2016:56:115-125.
49. Bellotti B. Food literacy: Reconnecting the city with the country. Agricultural Science,2010:22(3):29-34.
50. Miles L, Kapos V. Reducing greenhouse gas emissions from deforestation and forest degradation: global land-use implications. science,2008:320(5882):1454-1455.