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Promoting fruit and vegetable consumption



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Key messages

Global fruit and vegetable (F&V) production and consumption are significantly below the threshold needed to meet the FAO and World Health Organization (WHO) recommended F&V intake of at least 400 grams/day for an adult.^[1]

In 2017, approximately 4 million premature deaths globally were attributable to insufficient F&V consumption. Moreover, global health costs associated with unhealthy diets are projected to reach USD 1.3 trillion/year by 2030.

Globally, very few policy actions specifically promote F&V consumption beyond school-based interventions, especially in low- and middle-income countries (LMICs). Even fewer studies exist on the effectiveness of such interventions.

Communication and behaviour change interventions (i.e. in school, education and media campaigns) are important, but insufficient on their own, to increase F&V consumption to recommended levels.

Interventions to promote healthy diets, inclusive of F&Vs, should start early in life, for example during pregnancy, and should be supported and reinforced thereafter by all health professionals.

International evidence suggests that fiscal policies (e.g. subsidies for F&Vs or tax removal on F&Vs), and policies and programmes that increase access to fresh F&Vs through mobile produce markets (i.e. portable carts/trucks) can be effective in increasing F&V consumption.

The consumption of F&Vs is a key part of healthy diets. However, F&V consumption is very complex and shaped by interwoven factors such as desire, taste, culture, prices, competing foods, advertising and convenience. For this reason, effective interventions require a holistic view and an understanding of all influencing factors. A critical means of increasing F&V consumption is by changing elements of the entire food system, including reducing the availability of competing foods such as highly processed foods and beverages, for example, by increasing their relative price with taxes or decreasing F&V prices with subsidies.

^[1] For the purpose of the International Year of Fruits and Vegetables, F&Vs are defined as “edible parts of plants (e.g. seed-bearing structures, flowers, buds, leaves, stems, shoots and roots), either cultivated or harvested wild, in their raw state or in a minimally processed form.” The definition excludes starchy roots and tubers, dry grain legumes, cereals, medicinal plants, stimulants (e.g. tea, coffee and cacao) and ultra-processed foods (FAO, 2021a).

Scope of the problem

Despite the large number of known health benefits of fruit and vegetable (F&V) consumption, global F&V consumption is low, resulting in a global public health problem. Low F&V consumption is recognized as a leading but preventable risk factor for both morbidity and mortality globally, and contributed in 2017 to **3.9 million deaths worldwide** (GBD 2017 Diet Collaborators, 2019). Poor adherence to a healthy diet, where high F&V consumption is a pillar, is also associated with all forms of malnutrition, including obesity and undernutrition, which affect 2 billion people worldwide.

Insufficient F&V consumption is more prevalent in populations with low income or education, or those living in food deserts, food swamps, or rural areas.^{[2][3]} Globally, the situation has worsened during the COVID-19 pandemic due to higher food insecurity (FAO *et al.*, 2020).

The determinants of F&V consumption are multifactorial and include cultural, socio-economic, political, and environmental factors: age, gender, role modelling, early life taste experiences, price and affordability, fiscal incentives and disincentives, food assistance programmes, procurement, nutrition standards and food industry standards, food marketing and zoning restrictions, etc. The food system also shapes F&V consumption by determining which products are grown and marketed, their prices and, ultimately, their desirability



[2] Food deserts are geographic areas where residents' access to food is restricted or non-existent due to the absence or low density of "food entry points" within a practical travelling distance.

[3] Food swamps are areas that lack affordable nutritious food, but where highly processed foods are prevalent.

and consumption. The COVID-19 pandemic has caused economic disturbances, such as significant loss of family income that affects F&V affordability. It has also exposed weaknesses in existing food systems (for example, food systems not delivering the healthy diets needed for nourishment) and the vulnerability of populations with a high prevalence of non-communicable diseases (NCDs), overweight or obesity (for example, overweight is a highly significant predictor of developing complications from COVID-19). Clearly, the adoption of food system policies that promote physical accessibility and economic affordability of F&V-rich, healthy diets is urgent, particularly because these could generate benefits for human health, environmental health, climate change and food system resilience as well (FAO, 2021b).

Price is a major determinant of F&V consumption and F&Vs are two of the most expensive food groups globally (FAO *et al.*, 2020). Their prices depend on

the season, varieties and places of production, sales and consumption. For example, F&Vs sold in formal markets, such as supermarkets, are often more expensive than those sold in fresh food markets. Unfortunately, during the COVID-19 pandemic many fresh food markets were temporarily closed (FAO *et al.*, 2020). High F&V prices tend to make them unaffordable for poor households globally, particularly in LMICs. Individuals in the lowest wealth quintile in LMICs consumed **13.3 percent** less F&Vs compared to those in the wealthiest quintiles, reflecting the direct relationship between income elasticities and F&V consumption (FAO *et al.*, 2020).

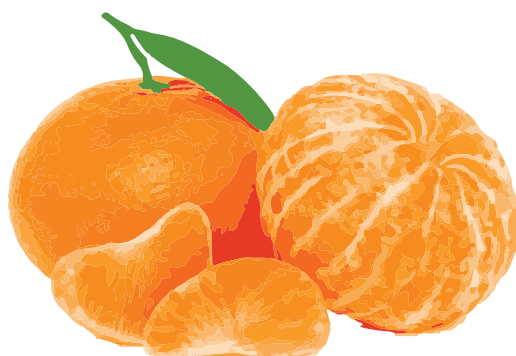
In one study, a saturated fat tax and salt tax resulted in an increase in F&V purchases, suggesting that a combination of different tax and subsidy policies might be a highly effective way to improve diets and decrease diet-related chronic diseases (Waterlander *et al.*, 2019).

Individuals in the lowest income quintile in low and middle income countries consume

13,3%

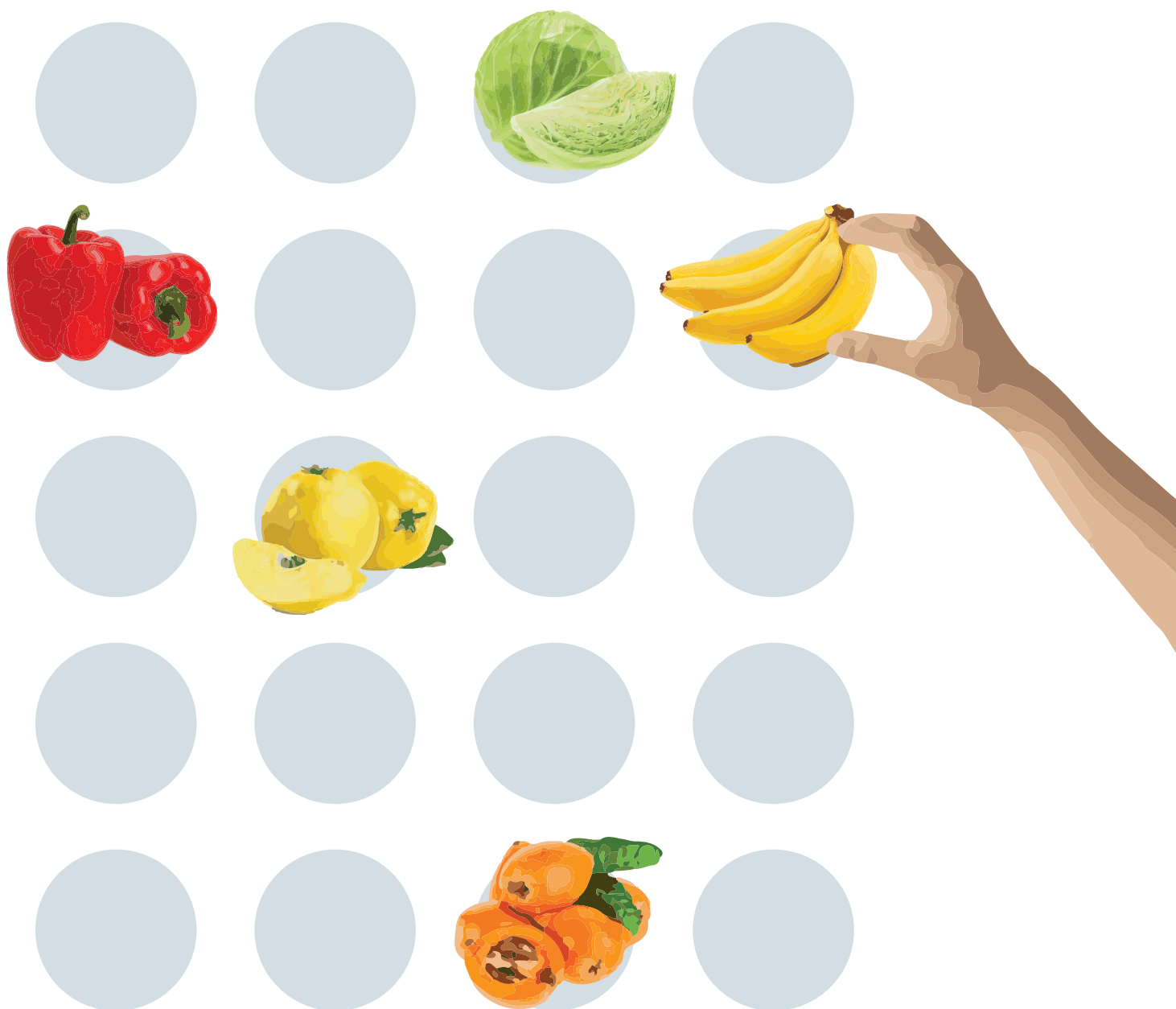
less fruits and vegetables in comparison to those in higher income quintiles.

SOURCE: FAO *et al.*, 2020



No country has explored using the revenue from taxes on unhealthy highly processed foods to subsidize purchases of healthy foods, such as legumes and F&Vs (Popkin, 2020). Indirect measures to increase F&V consumption are even more effective when coupled with limiting or banning sales points and advertising for unhealthy foods, especially to children, as proposed by the World Health Organization (WHO) in the *Set of recommendations on the marketing of foods and non-alcoholic beverages to children* (WHO, 2010).

Promoting policy actions to increase F&V production and consumption during the International Year of Fruits and Vegetables (IYFV) and the United Nations Decade of Action on Nutrition (2016–2025) could assist governments in achieving the Sustainable Development Goals (SDGs) by 2030. Such actions will also shape the food system in a way that ensures that increased F&V consumption within a healthy diet becomes the norm rather than the exception.



Evidence of impact of policy action

Ensure that fruits and vegetables are more affordable through fiscal policies and social protection programmes

Among children and adults in high-income countries (HICs) and South Africa (an upper-middle income country), F&V subsidies that resulted in a 10 percent decrease in price were statistically significantly associated with a 14 percent increase in F&V consumption (Afshin *et al.*, 2017).

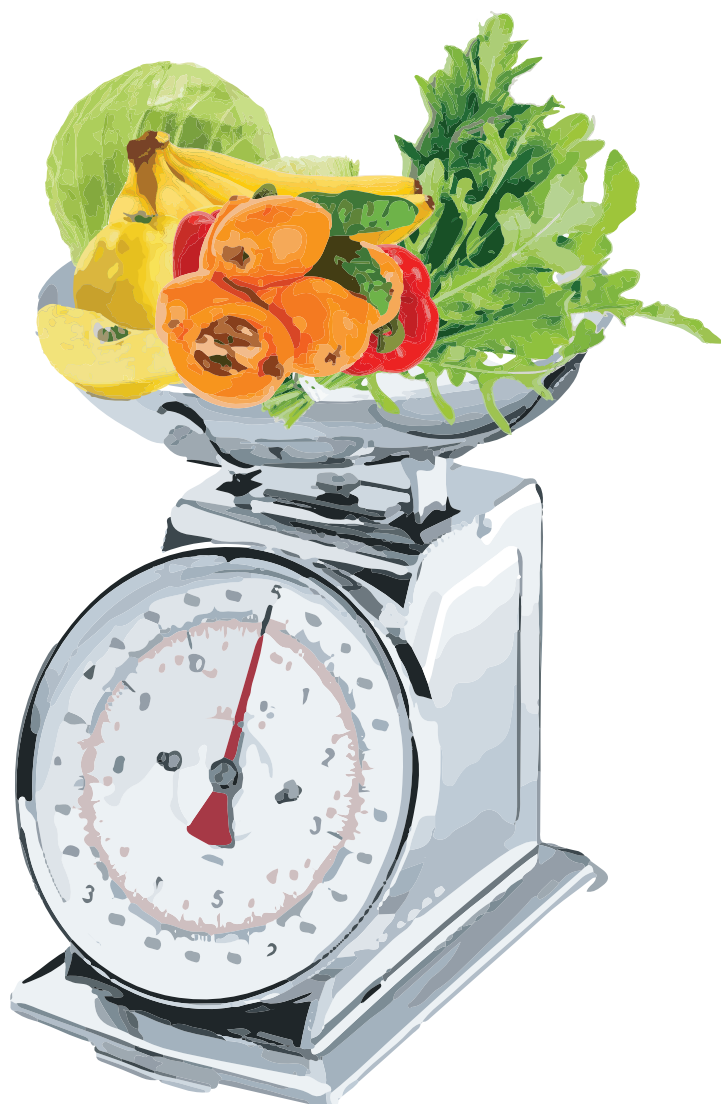
A recent modelling simulation has shown that fiscal policies that combine more than one strategy (i.e. taxes and subsidies) have the largest effect on increasing household F&V purchases (Caro *et al.*, 2020). Specifically, it showed that increased taxes on highly processed foods (i.e. an 18 percent tax on sweet and salty foods and a 23 percent tax on sugar-sweetened beverages), combined with **excluding F&Vs from a 19 percent value-added tax**, can increase monthly household F&V purchases by 5.29 kilograms per month (Caro *et al.*, 2020).

Similarly, in New Zealand, 212 health-adjusted life years (HALYs) – a measure of public health – could be gained by a 20 percent F&V subsidy, while an 8 percent tax on unhealthy foods could result in 127 to 518 HALYs, depending on the tax type, equivalent to per capita healthcare savings between USD 492 and USD 2 164 (Blakely *et al.*, 2020).

5,29

kilograms per month

SOURCE: Caro *et al.*, 2020



Ensure that fruits and vegetables are available and physically accessible

Government incentives in the United States of America have also proven effective at facilitating physical access to F&Vs through weekly farmers' markets and by regulating local supermarkets to stock fresh F&Vs, especially in food swamps (FAO *et al.*, 2020).

Workplace cafeteria interventions, in HICs and Brazil, have also led to increases in F&V consumption through multiple strategies implemented simultaneously, such as adding F&V options, increasing F&V portion sizes and removing unhealthy options.

Bangladesh and Nepal offer good examples of how public investments in infrastructure can have positive impacts on both food security and nutrition outcomes, for instance, road improvements to increase consumer access to F&V markets, and storage facilities that improve **distribution of F&Vs through better linkages between farmers and vendors** (FAO *et al.*, 2020; Kafle, Krah and Songsermsawas, 2018).

Promote fruit and vegetable consumption through school meal programmes

Policies supporting direct provisioning of healthy foods to schools resulted in an overall increase in F&V intake of 0.28 servings/day among children (ages 2 to 18), while school meal standards, focused on the nutritional quality of school lunches, can increase fruit intake by 0.76 servings/day (Micha *et al.*, 2018).



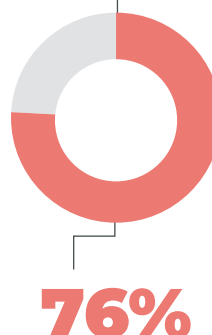
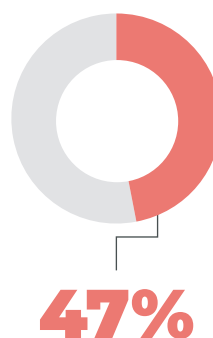
Develop and implement holistic educational programmes on healthy diets, which include fruits and vegetables

Nutrition-friendly school canteen interventions tend to have much wider impacts when they are aimed at the entire school community (Gerritsen, Barquera and Wolfenden, 2021).

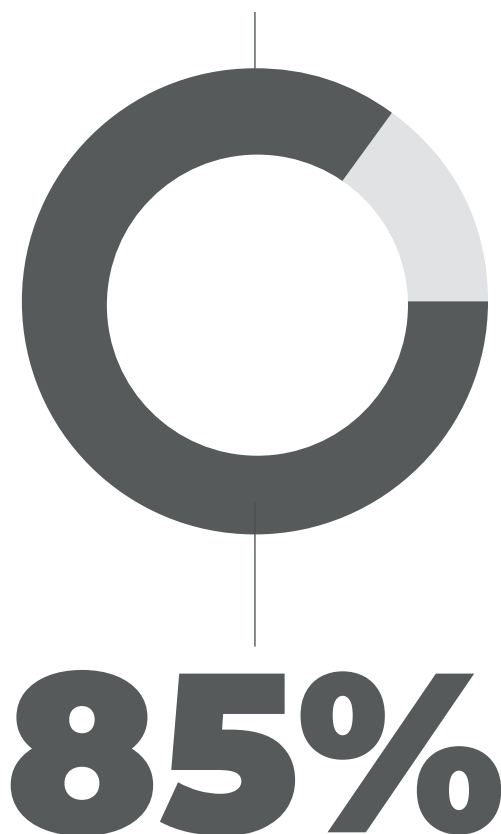
A “5 a Day” school intervention in New Zealand increased F&V consumption in **47 percent of children** and promoted healthier food at home, according to **76 percent of parents** surveyed (Gerritsen, Barquera and Wolfenden, 2021).

In Guatemala, fruit consumption significantly increased – though only in boys – by more than 1 serving/day (92 grams), thanks to a Farm to School Programme.

In both of the cases mentioned above, total consumption of F&Vs reached **85 percent** of the FAO/WHO recommendation of 400 grams/day (Gerritsen, Barquera and Wolfenden, 2021).



SOURCE: Gerritsen, Barquera and Wolfenden, 2021



SOURCE: Gerritsen, Barquera and Wolfenden, 2021



Strengthen the reach of territorially diverse diets comprised of local foods to promote healthy, minimally processed, diverse diets, rather than individual foods, nutrients or food supplements

Adherence to plant-dominant diets with little to moderate amounts of animal-sourced foods, including plenty of F&Vs, has positive impacts on both human and planetary health and, as such, diets are often territorially and culturally supportive.^[4] Evidence suggests that changes in the consumption of red meat, fruits and vegetables, and in total energy

intake could result in reductions of 6-10 percent in total mortality from some diet-related NCDs, and a 29-70 percent reduction in food-related greenhouse gas emissions.^{[5][6]} Subsequently, these may result in an economic savings of between USD 1 trillion and USD 31 trillion in diet-associated human and planetary health costs, when modelled against alternative scenarios for 2050. The greatest benefits of dietary change occurred in developed countries, due to the relatively larger per capita reductions in red meat consumption and total energy intake (Springmann *et al.*, 2016).



^[4] For example, the Mediterranean Diet and the New Nordic Diet are plant-based diets (FAO and WHO, 2019).

^[5] Including six or seven portions of F&V and one portion of pulses, with no red meat, poultry, or fish, and no dairy or eggs. The health consequences of adopting these diets have not been explicitly modeled or quantitatively analyzed.

^[6] Noncommunicable diseases (NCDs) such as coronary heart disease, stroke, cancer and type-2 diabetes mellitus.

Policy recommendations to increase fruit and vegetable consumption

Ensure that fruits and vegetables are more affordable through fiscal policies and social protection programmes

Fiscal interventions are among the policy initiatives that have been shown to impact F&V consumption. Fiscal interventions aim at narrowing the gap between F&V prices and those of their competitors (highly processed foods). However, there is some evidence that such taxation on unhealthy foods may have only short- and medium-term effects. To achieve a longer-term impact, tax revenues acquired through such initiatives could, in turn, be invested in healthcare and health equity initiatives.

Additional fiscal interventions to improve F&V consumption should focus on making fresh F&Vs tax exempt (e.g. tomatoes, mangos and bananas are among the top ten most taxed fresh- or animal-sourced products globally) (FAO *et al.*, 2020). Measures to lower the price of F&Vs could be on the production or

consumption side: subsidies for poor households to purchase F&Vs, reduced taxes on F&Vs for consumers, or fiscal advantages for sellers when selling F&Vs at lower prices, for example, to reduce food loss and waste.

Complementary measures that can also help to reduce F&V prices include the following: programmes and policies promoting short value chains, such as local public procurement, e-commerce or direct sales coupled with low-rate credit for small farmers; the creation of cooperatives to increase market access and power; and policies, programmes and investments to reduce food loss and waste.

Ensure that fruits and vegetables are available and physically accessible

Even though the world average of daily F&V availability has increased from 306 grams per capita in 2000 to 390 grams per capita in 2017, only Asia and some upper-middle



income countries have a sufficient supply of F&Vs (excluding F&V juices and drinks) to meet the FAO/WHO recommendation for daily F&V intake (FAO *et al.*, 2020). However, food consumption surveys indicate much lower F&V consumption levels than that indicated by FAOSTAT F&V supply data. In addition, physical access – through both formal and fresh food markets – can be a challenge for some people, especially those in rural areas or poorer urban neighbourhoods. Physical and e-commerce F&V markets are rarely available in rural or poor neighbourhoods and may require long distance travel (FAO *et al.*, 2020). One programmatic strategy that could be effective in improving physical access to F&Vs is through mobile produce markets (MPM) or portable carts/trucks with vendors that sell F&Vs. Government incentives to increase F&V outlets coupled with infrastructure improvements to facilitate consumer access to such outlets could help increase F&V consumption, especially in remote, non-food producing areas and in food swamps (Gerritsen, Barquera and Wolfenden, 2021).

Promote fruit and vegetable consumption through school meal programmes

Social protection programmes can enhance both economic and physical access to F&Vs. For example, state-subsidized school feeding programmes are available to low-income children in schools in most countries. Public procurement of food for school feeding programmes can also be a very effective means for small farmers to increase incomes; for example, when regulations enable them to supply up to 30 percent of the produce used in school meal programmes nationally, as in Brazil (Law No. 11947, 2009).

Develop, update, and disseminate food-based dietary guidelines and use them as a basis for policies to increase fruit and vegetable consumption

Food-based dietary guidelines (FBDGs) establish a basis for public food and nutrition, health and agricultural policies and nutrition education programmes to foster healthy



eating habits and lifestyles. They issue advice to the general public on foods, food groups and dietary patterns that provide the required nutrients to promote overall health and prevent chronic diseases. When properly designed and disseminated across sectors, FBDGs can also generate environmental benefits. For instance, in 2014, the Brazilian Dietary Guidelines were reoriented around five explicit principles, one of which states that healthy diets are derived from socially and environmentally sustainable food systems (Monteiro *et al.*, 2015).^[7] Key elements of comprehensive FBDGs include the following: a country's food availability (e.g. seasonal F&V availability), the nutrition epidemiological situation (e.g. indicators of nutritional status and nutrition-related chronic diseases), and traditional culinary or food cultures, as well as consumption patterns (e.g. number and types of meals commonly consumed per capita per day).

Policymakers should either develop new FBDGs or revise existing ones to incorporate elements related to both human and environmental health, as well as concrete F&V

recommendations for children. Adequate financing is needed to design, disseminate, implement and monitor policies, laws, regulations and programmes based on the content of the FBDGs. Such guidelines can be used in workplaces, government programmes (e.g. school feeding programmes), health services or as part of food service guidelines in private or public sector food outlets. Additional technical guidance often needs to be provided to facilitate their thorough implementation and monitoring.

Develop and implement holistic educational programmes on healthy diets, which include fruits and vegetables

Interventions to increase F&V consumption should start early in life and continue throughout the life cycle, and can include developing cooking skills, food gardening, market visits, etc. Countries could define and widely implement nutrition-friendly school canteens and office cafeterias, coupled with relevant educational materials. Policymakers are also encouraged to design and implement



^[7] The five explicit principles of the Brazilian Dietary Guidelines are summarized as follows: 1) diets are more than nutrient intake; 2) dietary recommendations need to be updated with changes over time; 3) healthy diets should come from socially and environmentally sustainable food systems; 4) dietary advice should come from different knowledge sources; and 5) dietary guidelines should increase human autonomy with respect to food choices (Monteiro *et al.*, 2015).

laws to include nutrition education in the curricula of schools and health professions in order to improve F&V desirability, increase consumption and raise public awareness about the benefits of consuming seasonal, locally produced and biodiverse F&Vs.

However, education programmes and nutrition education initiatives are insufficient on their own to achieve a lasting change in F&V consumption. It is important to include these as part of a comprehensive set of policies and programmes to improve health, nutrition, and food environments, combined with broader strategies to ensure that F&Vs are more accessible and affordable.

Strengthen the reach of territorially diverse diets comprised of local foods to promote healthy, minimally processed, diverse diets, rather than individual foods, nutrients or food supplements

Traditional culinary preparations often include a greater concentration of locally sourced, fresh, whole plant-based ingredients than non-traditional or ready-to-eat culinary

preparations (Kuhnlein *et al.*, 2013). However, enhancing indigenous food yields and overcoming challenges in their cultivation, processing and marketing has received scarce attention. Investing in these crops can help address this gap and presents a strategic opportunity to unlock multiple livelihood benefits, especially for marginalized groups in both rural and urban settings. Indigenous women are often the custodians and main knowledge holders of neglected and underutilized species (NUS) given the relevance of these crops to household nutrition and other livelihood needs (IFAD Nutrition Team and Bioversity International, 2021).

Adherence to plant-dominant diets with little to moderate amounts of animal-sourced foods may also be more economically and physically accessible to vulnerable populations than a plant-based diet of non-locally sourced ingredients (e.g. packaged veggie burgers). Support for such diets could significantly improve F&V consumption.



Conclusions

All policymakers have an active role to play in incorporating F&V consumption in their policy agendas (Kanter *et al.*, 2015). To learn more about how to implement these policy recommendations, policymakers are encouraged to consult the references highlighted in this brief. The International Year of Fruits and Vegetables is an opportunity for policymakers and other stakeholders to work

on developing fiscal and setting-based policies to make F&Vs more affordable, accessible and desirable, particularly for vulnerable consumers; to promote greater infrastructure and market planning to enhance F&V production and access; and to revise and use FBDGs to increase the production and consumption of healthy diets within sustainable food systems.





Furthermore, policymakers would benefit from incorporating F&V consumption in social protection programmes and promoting plant-dominant diets based on local, territorial and cultural diversity. Support for these efforts can significantly increase the consumption of healthy foods, including F&Vs, while decreasing the consumption of highly processed foods and beverages. In order to achieve all of these recommendations, adequate funding for implementation, monitoring and evaluation of policies and programmes is necessary.

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Global fruit and vegetable (F&V) production and consumption are significantly below the threshold needed to meet the FAO and World Health Organization (WHO) recommended F&V intake. In 2017, approximately 4 million premature deaths globally were attributable to insufficient F&V consumption. Globally, very few policy actions specifically promote F&V consumption beyond school-based interventions. Communication and behavior change interventions are insufficient on their own. International evidence suggests that fiscal policies, and policies and programmes that increase access to fresh F&Vs through mobile produce markets can be effective in increasing F&V consumption.