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**FRUITS AND VEGETABLES**  
2021

**FAO/WHO International Workshop  
on Fruits and Vegetables 2020 in preparation for  
the International Year of Fruits and Vegetables 2021**

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Workshop report



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on Fruits and Vegetables 2020 in preparation for  
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Workshop report

Food and Agriculture Organization of the United Nations  
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## FOREWORD

Fruits and vegetables are an important part of healthy diets. It is widely recognized that an increase in fruits and vegetables consumption can result in beneficial health and nutrition outcomes. Despite this fact, data show that the global production and consumption of fruits and vegetables are insufficient, and they are often offered at prices unaffordable to many, especially for vulnerable population groups and those living in poverty.

In preparation for the International Year of Fruits and Vegetables (IYFV), which will take place in 2021, and to take stock of progress made since the Joint FAO/WHO Workshop on Fruit and Vegetables for Health (held in Kobe, Japan, in 2004), the Government of Chile and 5-a-Day Chile requested that FAO and WHO hold an international workshop on fruits and vegetables in 2020. The aim was, firstly, to gather scientific evidence on important aspects of the health impacts, production, value chains and consumption of fruits and vegetables, and, secondly, to come up with innovative, practical and feasible recommendations for various stakeholders, specifically decision and policy makers. These objectives were achieved. The outcomes of the workshop will be used not only in the promotion of the IYFV, but also in the development of key messages and recommendations for global, regional and national actions. Our shared objective is for all adults to consume the recommended minimum intake of 400 grams of fruits and vegetables per day as an integral part of a diverse and healthy diet. We must also recognize that the benefits extend beyond human health. Reduced health service expenditure to treat malnutrition and non-communicable diseases (NCD) and increased planetary health are added benefits of replacing a greater share of animal and ultra-processed foods with fruits and vegetables, particularly if they are sustainably and safely produced.

I am looking forward to seeing a better global food and nutrition landscape as new policies, laws, regulations and programmes are put in place to enhance the production, value chains and consumption of fruits and vegetables as part of the transformation of the food system for healthy diets. Key in this endeavour will be ensuring that fruits and vegetables are available everywhere at affordable and fair prices for all, leaving no one behind. This would be a great contribution to putting us on track to achieve the Sustainable Development Goals (SDG), particularly SDG 2.



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## ABBREVIATIONS AND ACRONYMS

<b>CVD</b>	cardiovascular disease
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>IYFV</b>	International Year of Fruits and Vegetables
<b>GDP</b>	gross domestic product
<b>LMIC</b>	low- and middle-income countries
<b>NCDs</b>	non-communicable diseases
<b>NUGAG</b>	Nutrition Guidance Expert Advisory Group
<b>PAHO</b>	Pan American Health Organization
<b>SDGs</b>	Sustainable Development Goals
<b>SME</b>	small-and-medium enterprises
<b>UNGA</b>	United Nations General Assembly
<b>UP</b>	ultra-processed
<b>WHO</b>	World Health Organization
<b>WTO</b>	World Trade Organization

## SUMMARY

Fruits and vegetables are one of the cornerstones of a healthy diet. Reduced fruits and vegetables consumption is linked to poor health and increased risk of non-communicable diseases (NCDs). An estimated 3.9 million deaths worldwide were attributable to inadequate fruits and vegetables consumption in 2017 (WHO, 2017). An adequate and diverse intake of fruits and vegetables as part of a healthy diet was shown to reduce the risk of some NCDs, including cardiovascular diseases (CVDs), certain cancers, obesity and type 2 diabetes. Moreover, fruits and vegetables are sources of vitamins and minerals, dietary fibre and a myriad of beneficial phytochemicals, including plant sterols, flavonoids and other antioxidants. Consuming a variety of fruits and vegetables helps to ensure an adequate intake of many of these micronutrients and compounds (Liu, 2013).

In view of the upcoming International Year of Fruits and Vegetables (IYFV) to be observed in 2021, the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) organized the **FAO/WHO International Workshop on Fruits and Vegetables 2020**. The aim was to review global evidence surrounding the effectiveness of interventions and the policy, programmatic and scientific advances in the decades since the Joint FAO/WHO Workshop on Fruit and Vegetables for Health (Kobe, Japan, 2004). The overall goal of the FAO/WHO International Workshop on Fruits and Vegetables 2020 was to develop evidence-based, actionable recommendations for future policies, laws, regulations and programmes aiming to improve fruits and vegetables consumption, production and value chains. Three background papers served as primary inputs for the discussions during the workshop.

Thirty-nine international experts were selected from academia, governments, civil society, the private sector, international organizations, FAO and WHO to participate in a series of five online sessions held between 24 August and 9 September 2020 (See Annex 1 for participants and Annex 2 for workshop agenda). The participants developed a series of conclusions and recommendations for the implementation of policies, laws, regulations and programmes, which were oriented towards governments, academia, the private sector, civil society and international organizations. These were developed with a vision toward the development of a more holistic perspective that considers healthy diets and food systems approaches.

The main conclusions from the workshop are that fruits and vegetables need special consideration because of their high perishability and susceptibility to waste and loss, high labour demand, yield variations, high consumer prices, and their decreasing competitiveness and desirability compared to ultra-processed foods. Participants recommended that multiple elements of the whole food system would need to change simultaneously to make healthy diets, inclusive of fruits and vegetables, the first choice of consumers. Despite their known

health benefits, past efforts have proven insufficient to implement the recommendations of the Kobe workshop, held in 2004, which are still relevant today. The required changes in fruits and vegetables production, value chains and consumption can only be achieved with the commitment of all stakeholders, adequate funding, evidence-based development and the implementation of policies, laws, regulations and programmes, as well as proper monitoring and evaluation. At the same time, wherever possible, there is a need to move towards greater consumption of fresh or minimally processed fruits and vegetables over highly processed fruits and vegetables or UP foods. Although processing makes fruits and vegetables less healthy, it allows year-round availability and reduces food losses. Governments play a crucial role in providing the legal and regulatory framework at the national and global levels. Their political commitment, and the collaboration among different ministries, is essential to improve the food system. They should primarily aim to protect and promote consumer health while encouraging the private sector, from small producers to multinationals, to enhance fruits and vegetables production, value chains and consumption. This would require countries to incorporate fruits and vegetables issues in their policy agendas, using a food system approach that ensures the participation of all stakeholders in interventions aimed at making fruits and vegetables intake more cost-effective, feasible and equitable, while building and leveraging capacities of producers, distributors, academia and civil society. General and specific conclusions and recommendations for all stakeholders are detailed in Sections 8 and 9.





## 1. SITUATIONAL ANALYSIS OF FRUITS AND VEGETABLES – HUGE IMPORTANCE FOR HEALTH, BUT INSUFFICIENT ATTENTION AND CONSUMPTION

WHO/FAO recommend a daily intake of at least 400 g/adult of raw or minimally processed fruits and vegetables, the equivalent of five servings of 80 g each, in order to promote good health and reduce the risk of a variety of NCDs (WHO, 2003; FAO, 2019a). There is a wide variation in fruits and vegetables consumption across the globe. In general, FAO food supply (food balance sheets) estimates are higher than fruits and vegetables individual intake data. Del Gobbo *et al.* (2015) found that food supply largely exceeds the individual intake estimates from the Global Dietary Database (by 78.4 percent for fruits and 74.5 percent for vegetables). In spite of these difficulties, estimates indicate that consumption

is below the recommended levels. A systematic review of fruits and vegetables intake in 288 countries revealed that the mean fruit intake was 81.3 g/adult/day (ranging from 19.2 g to 325.1 g), and only two countries met the recommendation of 300 g/adult/day or more, while the mean vegetable intake was 208.8 g/adult/day (34.6 g to 493.1 g). The highest intake was observed in Jamaica, Malaysia, Jordan, Greece and New Zealand, while the lowest intake was observed in Ethiopia, Nepal, India, Vanuatu, and Pakistan (Micha *et al.*, 2015). Achieving WHO/FAO recommendations for fruits and vegetables intake is challenging, especially for segments of the population living in poverty, because of availability, accessibility, affordability and food preferences (Kalmpourtzidou, Eilander and Talsma, 2020). The determinants of fruits and vegetables consumption are multifactorial, and include individual, social, political, economic, and environmental factors (Wallace *et al.*, 2019). Food systems significantly shape the fruits and vegetables intake of populations, as they determine which foods are grown, harvested, processed, packed, transported, traded and marketed, under which conditions and

at what prices and therefore, ultimately, which fruits and vegetables are desired and consumed (GloPan, 2016).

Hall *et al.* (2009) reported that 77 percent of men and 78.4 percent of women in 52 low- or middle-income countries (LMIC) consumed less than the five recommended fruits and vegetables servings on a daily basis. Low intake tended to increase with age and decrease with income. The intake is especially low in LMIC where, on average, 3.61 portions of fruits and vegetables are consumed per day (Frank *et al.*, 2019). Low income is a strong predictor of insufficient fruits and vegetables consumption on a country basis in terms of Gross Domestic Product (GDP), as well as at the household (Ruel, Minot and Smith, 2005) and individual levels (Miller *et al.*, 2016). The prevalence of meeting the WHO/FAO recommendation of combined fruits and vegetables intake is only 11.2 percent in the lowest wealth quintile, while it reaches 24.5 percent in the richest quintile in 28 LMIC (Frank *et al.*, 2019). Education level is another important predictor of achieving the recommendation, as those with secondary education or higher are more likely to comply than those with no formal education.

The development of children's dietary habits is highly dependent on the home environment (Wyse *et al.*, 2011). In children aged 6-12 years, the most important factors were availability and accessibility of fruits and vegetables, parental role modelling, and maternal intake (Ong *et al.*, 2017). Hodder *et al.* (2020) highlight the

importance of effective early interventions to increase consumption of fruits and vegetables, including those focused on specific child-feeding strategies and parent nutrition education in early childhood (Wolfenden *et al.*, 2012). Further determinants of fruits and vegetables consumption, as well as the analysis of fruits and vegetables promotion policies and programmes using the NOURISHING framework, are outlined in the workshop's background paper *The effectiveness of policies and programmes promoting fruits and vegetables*.

Regular and adequate consumption of fruits and vegetables benefits human health and nutrition by providing vitamins, micronutrients, dietary fibre, plant proteins and a myriad of bioactive compounds that act synergistically to maintain and optimize bodily functions, thus reducing NCD risk factors when part of an overall healthy diet (WHO/FAO, 2003; WHO, 2009; Mozaffarian, 2016; Afshin *et al.*, 2019). Fruits and vegetables are much more than a sum of nutrients and phytochemicals and cannot be replaced by food fortification or dietary supplements.

There are a variety of difficulties in assessing the direct effects of fruits and vegetables consumption on health outcomes. One of the challenges is the measurement of fruits and vegetables intake, which is mainly affected by methodological errors (questionnaires, records) and variations in portion size, among others (Agudo, 2005). In addition, fruits and vegetables composition



data are lacking, especially considering the huge biodiversity of these foods worldwide. Detailed food consumption and composition data are still limited globally, particularly in LMIC, which makes it difficult to evaluate their impact on health outcomes. For example, there is a lack of information on whether fruits and vegetables have been refrigerated, peeled, cooked, stored or processed in other ways, or which variety was consumed. This is important because nutrient content can vary significantly depending on storage and ripeness, processing, local practices and the varieties in question (Burlingame, Charrondière and Mouille, 2009; Nijhuis and Brower, 2020). Depending on the type and combination of fruits and vegetables, such physical processes can alter their nutrient and phytochemical content, as can the addition of sugars, sweeteners and salts, making the originally fresh and nutritious food less healthy (Gomes and Reynolds, 2021). Moreover, nutrient and bioactive compound profiles are highly variable according to interactions with agro-climatic variables, anthropogenic inputs, and processing along the value chain.

Vegetables scored higher than fruits on the Aggregate Nutrient Density Index and contain fewer calories and more fibre, while fruits score higher in antioxidant content (Offringa *et al.*, 2019). Daily intakes of both fruits and vegetables are lower than recommended, but the discrepancy is larger for vegetables – especially among children – suggesting

a greater imperative to promote vegetables. For these reasons, Offringa *et al.* (2019) recommend putting vegetables first when promoting increased fruits and vegetables consumption and emphasize their important contributions to health.

The global burden of NCDs is rising rapidly and is having a significant impact on society, economy and health (WHO, 2014a; 2014b; Riley *et al.*, 2016). Low fruits and vegetables consumption is an important modifiable risk factor for NCDs. In order to improve public health and nutrition, populations across the globe must consume more fruits and vegetables daily. Establishing a causal relationship between fruits and vegetables intake and health outcomes is difficult, since there are multiple interactions between diet, gut microbiota, the genetic profile of consumers and environmental factors such as production, postharvest practices and processing, or the nutritional composition of the foods. Despite these constraints, there is a huge amount of scientific evidence on the positive impact of fruits and vegetables consumption on various health aspects. The background paper on the effects of fruits and vegetables intake on direct or indirect health outcomes (Gomes and Reynolds, 2021) highlights some of the scientific evidence published by the Diet and Health subgroup of the WHO Nutrition Guidance Expert Advisory Group (NUGAG). Other potential health effects of fruits and vegetables intake not considered within the above background paper were food safety, immunity, gut and mental health, obesity and overweight, micronutrient deficiencies, and ageing,

all of which would provide scientific evidence for the development of policies and programmes. However, the paper did show that juice consumption is associated with higher energy intake, a main driver of weight gain and, as a result, juice intake should be considered to contribute to free sugar intake rather than to fruits and vegetables intake.

An inverse association between the intake of fruits, vegetables, and fruits and vegetables combined, and the risk of coronary heart disease, stroke, CVD, total cancer and all-cause mortality has been described (Aune *et al.*, 2017). Reynolds *et al.* (2019) report that higher intake of vegetable fibre reduces the risk of coronary heart disease mortality and incidence and the incidence of stroke, while higher intake of fruit fibre reduces the risk of CVD mortality and incidence, coronary heart disease mortality, stroke incidence, and type 2 diabetes incidence. Food processing methods such as juicing, pulverizing, mashing, and extrusion can reduce the fibre content of fruits and vegetables or mechanically disrupt it into less complex structures, resulting in the loss of some of the beneficial effects on the gastrointestinal tract.

Bahadur *et al.* (2018) compared dietary fruits and vegetables recommendations versus global agricultural production statistics, concluding that the agricultural system currently overproduces grains, fats and sugars, while production of fruits and vegetables is not sufficient to meet the nutritional needs of the current

population. The background paper on fruits and vegetables value chains (Santacoloma *et al.*, 2021) highlights low productivity, food losses, poor post-harvest management, inadequate logistics and marketing infrastructure and climate change as the main factors that hinder the development of the horticultural sector. Only 5 percent of all vegetables and 9 percent of all fruits produced worldwide are traded internationally. Therefore, domestic production is currently the main source of fruits and vegetables needed to meet dietary recommendations. On the other hand, because of their perishability, fruits and vegetables are the second most lost and wasted food product category after seafood in many countries: combined losses during post-harvest and waste in retail and at the consumer level amount to more than 50 percent of total production (Parfitt, Barthel and Macnaughton, 2010; NRDC, 2017; FAO/WHO, 2018; Chen, Chaudhary and Mathys, 2020).

The regular consumption of fruits and vegetables can result in benefits beyond human health by protecting planetary health (FAO/WHO, 2019b). In many contexts, producing and consuming more fruits and vegetables has the added benefit of contributing to more nutritionally balanced diets, saving land and water, and reducing greenhouse emissions - all of which are actions that would help to meet the Sustainable Development Goals (SDGs). A high quality plant-based diet significantly contribute to sustainability (Tilman and

Clark, 2014; Springman *et al.*, 2020) given its potential to reduce environmental impacts in the form of reduced water use, greenhouse gas emissions, and land use, while reducing risks of diet-related NCDs compared to diets rich in animal-based foods.

Increased fruits and vegetables production and consumption can also promote equity by reshaping food systems. Traditional wholesale and fresh produce markets are important entry points for small-scale farmers to generate income. Available evidence suggests that such short value chains encourage fruits and vegetables consumption (Santacoloma *et al.*, 2021). However, they are increasingly being displaced by large operators, resulting in increased economic and health inequities (Gomes and Reynolds, 2021). Socioeconomic status is inversely associated with health status, and such health inequities are caused by unequal distribution of power, income, goods, and services, both globally and nationally (Marmot *et al.*, 2008).

Malnutrition affects every country on the planet and is a major impediment to achieving global food security, positive health outcomes, and sustainable development. According to *The State of Food Security and Nutrition in the World 2020*, almost 690 million people went hungry in 2019. The report argues that food systems need to be transformed to reduce the cost of nutritious foods and increase the affordability of healthy diets, including fruits and vegetables. While

the specific solutions differ from country to country, the overall answers lie in interventions along the entire food value chain, in the food environment, and in the political economy that shapes trade, public expenditure and investment (FAO, IFAD, UNICEF, WFP and WHO, 2020). Policies aimed at reshaping value chains should improve efficiency while ensuring the inclusion of vulnerable actors (including consumers) in the chain, as well as the environmental sustainability of production (Santacoloma *et al.*, 2021).

There is consensus on the importance of addressing the challenges associated with fruits and vegetables production and consumption, from a food systems perspective. The High Level Panel of Experts for Food Security and Nutrition (HLPE, 2017) considers how food systems are shaping diets and nutrition and emphasizes the role of diets as the basic link between food systems and their impact on health and nutrition, as well as the central role of the food environment in enabling healthy choices by consumers and food produced sustainably. It also takes into account the effects of agriculture and agricultural systems on the three dimensions of sustainability, namely economic, social and environmental. A complementary system perspective integrates the pandemics of obesity, undernutrition, and climate change into the concept of the Global Syndemic (Swinburn *et al.*, 2019).

As previously mentioned, current food systems are not providing everyone with foods at prices they can afford to live a healthy and productive life. A holistic approach is necessary, towards achieving a radical transformation of agriculture and food systems, to tackle the multiple burdens of malnutrition and contribute to the achievement of the 2030 Agenda (HLPE, 2016; IPES-Food, 2016; GloPan, 2016; Haddad *et al.*, 2016, Willett *et al.*, 2019; SOFI, 2020).

The first joint FAO/WHO workshop *Fruits and Vegetables for Health* was held in Kobe, Japan, in 2004 (WHO/FAO, 2005). The workshop proposed several actions and a common framework to guide the development of cost-efficient and effective interventions to promote adequate fruits and vegetables production, value chains

and consumption in Member Nations. Its recommendations on production, food supply systems and the promotion of fruits and vegetables consumption are still valid today. However, despite solid scientific evidence on the benefits of fruits and vegetables, they were not fully implemented globally, possibly due to limited dissemination of the recommendations and a lack of political commitment, legal actions, funding and accountability. Recent trends in food environments further hinder fruits and vegetables consumption. As food deserts and swamps expand, junk food has become widely available, affordable and appealing, while fruits and vegetables remain expensive, especially for vulnerable populations and those living in poverty.



## 2. FAO/WHO INTERNATIONAL WORKSHOP ON FRUITS AND VEGETABLES 2020

The 74<sup>th</sup> Session of the United Nations General Assembly (UNGA), held in December 2019, declared 2021 as the International Year of Fruits and Vegetables. The initiative aims at raising awareness of and directing policy attention to the nutritional and health benefits of fruits and vegetables consumption, the contribution of fruits and vegetables to the promotion of diversified, balanced and healthy diets and lifestyles, reducing loss and waste of fruits and vegetables and sharing best practices in these and other topics (FAO, 2019c).

For the purpose of the IYFV, fruits and vegetables were 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 (UP) food.

In view of the IYFV, and at the request of 5-a-Day Chile and the Government of Chile, FAO and WHO decided to update the policy, programmatic and scientific advances since the Kobe workshop and organized the FAO/WHO International Workshop on Fruits and Vegetables 2020. It aimed to develop recommendations for future policies, laws, regulations and programmes to improve fruits and vegetables consumption, production and value chains. The specific objectives were to:

- Analyse the trends and underlying drivers of fruits and vegetables consumption, value chains and production.
- Analyse the scientific evidence on the health effects associated with fruits and vegetables consumption.



- Collect global experiences on the promotion of fruits and vegetables consumption through policies, laws, regulations and programmes from different stakeholders and analyse their efficiency, challenges and opportunities.
- Analyse efficiency gains, pricing, opportunities and challenges in production and along the value chains of fruits and vegetables, in order to increase fruits and vegetables demand, as well as physical and economic access.

Thirty-nine selected international experts from different continents participated, including nutritionists, food scientists, economists and experts in public policies, health, agriculture and value chains from governments, international agencies, academia, the private sector and civil society, in addition to FAO and WHO staff (see Annex 1 for the full list of participants).

The 2020 workshop was structured into three topics: 1) Policies and programmes promoting fruits and vegetables consumption; 2) Policies and programmes promoting sustainable fruits and vegetables value chains; and, 3) Effects of fruits and vegetables consumption on health outcomes. For each of the themes, a background paper was prepared (Santacoloma *et al.*, 2021; Gomes and Reynolds, 2021; Gerritsen,

Barquera and Wolfenden, 2021). The workshop used the IYFV definition of fruits and vegetables as detailed above.

Due to the COVID-19 pandemic, the workshop was held virtually. Five facilitated sessions of three hours each were held between 24 August and 9 September 2020 (see Annex 2 for the Agenda). In addition, a virtual *Knowledge Market* was created to facilitate the exchange of videos, relevant literature and other material among the participants. This was used extensively.

To focus the efforts during the sessions, participants received the three background papers, as well as pre-recorded video presentations containing summaries of the three background papers for review before the workshop, along with a list of predefined questions. Two expert facilitators assisted in the preparation and implementation of the workshop, which was structured to provide an overview on Day 1 by setting the scene on the state of the art of fruits and vegetables issues from a food systems perspective. On Days 2-4, the three main topics were discussed and, on Day 5, the focus was on reaching consensus on the conclusions and recommendations.

## Day 1: Opening and setting the scene

The session was opened and chaired by the FAO Deputy Regional Representative for Latin America and the Caribbean and FAO Representative in Chile, Dr Eve

Crowley. She emphasized the importance of taking stock of progress made since the 2004 Kobe workshop, and providing realistic, cost-effective evidence-based interventions with the potential for large-scale impact. She also presented the expected outputs of the workshop.

Dr Francesco Branca, Director of the Department of Nutrition for Health and Development in WHO, emphasized the importance of fruits and vegetables for the health of people and the planet, and the need to find solutions that are technologically, ecologically and economically viable. He also mentioned measures that can improve availability and access, as well as incentives to increase production, distribution and consumption.

Dr Anna Larrey, Director of the Food and Nutrition Division at FAO, highlighted several concerning statistics on affordability, consumption patterns and supply side issues impacting fruits and vegetables. She also encouraged participants to focus on the available evidence from policies and programmes, as well as to think of innovative strategies for engaging public and private partnerships.

Finally, Dr Crowley presented the conceptual framework of the food system and the system perspective from the Obesity Lancet Commission (see Section 2). She highlighted that fruits and vegetables are a critical component of the right to food and emphasized the mutual benefits of addressing human

and planetary health together. She also urged participants to ensure that recommendations from the workshop are viable and relevant in a resource constrained COVID-19 environment that has also impacted food supply and acquisition, as well as fruits and vegetables consumption behaviours.

A series of ice-breaking activities allowed participants to get to know each other, share personal experiences and challenges, and express their expectations for the workshop, as well as their ideal vision concerning fruits and vegetables.

## **The ideal world – a collective visioning exercise**

In a perfect world, high fruits and vegetables consumption and a healthy diet would be the norm. Everyone would have physical and economic access to a variety of fruits and vegetables in adequate amounts, which are safe and tasty. Producers would be empowered to grow fruits and vegetables in a sustainable and safe manner, have good market opportunities, and receive adequate incomes from fruits and vegetables production, allowing a decent livelihood and access to healthy diets through consumption of some of their own produce, and/or by buying safe fruits and vegetables at affordable prices. Infrastructure, inputs and knowledge would minimize food loss and waste (FLW), and consumers would be able to buy the amount and varieties of fruits and vegetables they desire, at affordable

prices. Exposure to fruits and vegetables would start early in life (pregnancy, infants), when taste preferences are being established, and infant tastes would not be distorted by exposure to sweet, fatty, and/or salty UP foods. The private sector would play an important role in production, food supply, processing, marketing and retail. Governments, by means of task forces involving all key ministries, would be accountable for ensuring adequate, accessible and safe fruits and vegetables consumption. They would develop food environments with coherent policies, laws, regulations and programmes to enhance sustainable fruits and vegetables production, with special attention to small-scale farmers and domestic markets, and efficient and inclusive fruits and vegetables value chains, along with policies that ensure that the relative prices of fruits and vegetables are lower than those of UP foods. Policy-makers would understand that fruits and vegetables are not simply a sum of nutrients that can be replaced by fortification or supplementation, but rather a natural matrix suitable for processing by the human digestive system from which a variety of healthy components can be extracted for health and well-being, beyond specific isolated nutrients.

## **Days 2, 3 and 4: Expert discussions on the main topics of the workshop**

Each session started with an introduction on the topic before breaking out into four parallel subgroups with 7-8 participants

to ensure a thorough and inclusive discussion on the daily themes. The discussion focused on key aspects covered by the background paper related to the daily theme, identifying potential missing information, success factors, bottlenecks, challenges and opportunities. Each group was requested to reach at least five key conclusions, as well as to identify at least three actionable recommendations and three challenges and opportunities for success, intended to be addressed by different stakeholders. The chairs from each breakout group then presented their outputs in plenary, which were discussed in detail. Conclusions and recommendations were consolidated into tables summarized for each stakeholder. These tables were shared with the participants for review, prior to the final discussion on Day 5.

## **Day 5 – Final Discussion**

This session was led by Dr Crowley (FAO) and Dr Branca (WHO), who presented the summary tables with the conclusions and recommendations. These were discussed and agreed upon by all the participants. The session ended with messages by Dr Lartey and Dr Branca on the way forward and with closing words from the FAO and WHO chairs, and the Government of Chile.





### 3. ANALYSIS OF ADVANCES AND CHALLENGES IN FRUITS AND VEGETABLES AS DESCRIBED IN THE THREE BACKGROUND PAPERS

To achieve the objectives and outcomes of the workshop, three technical background papers were prepared by experts using the food systems approach. The executive summaries are presented below, and the full versions are available online.

#### **Paper: “Effects of fruits and vegetables intakes on direct and indirect health outcomes”**

**Authors:** Fabio S. Gomes and Andrew N. Reynolds

The regular consumption of fruits and vegetables is of considerable benefit to human health (Gomes and Reynolds, 2021). Expert consultations and

workshops convened by the WHO and FAO in the early 2000s resulted in global recommendations for a minimum daily intake of 400 g of fruits and vegetables, excluding starchy tubers. Emerging evidence has accumulated since the 2004 WHO/FAO recommendations, providing greater confidence in the direction and considerable health effects from fruits and vegetables intake, as well as in the mechanisms behind their action. WHO, through the work of the Diet and Health subgroup of the WHO Nutrition Guidance Expert Advisory Group (NUGAG), is currently updating the recommendations for carbohydrate intake, including some on fruits and vegetables consumption. The evidence assessed by NUGAG includes two existing low-risk-of-bias systematic reviews, which identified broad and significant benefits from fruits and vegetables intake on premature mortality, and on the incidence of coronary heart disease, type 2 diabetes and colorectal, breast, endometrial, esophageal, and prostate cancers. The direct health effects observed from fruits and vegetables consumption are considerable, and may be due to

their constituents, such as dietary fibre, micronutrients and other compounds, and their low energy density and high satiety levels, relative to other foods that may also contain added sugars, sodium, and saturated fats. An inverse dose response gradient was observed between fruits and vegetables intake and all outcomes assessed, with death and disease occurrence declining with increasing fruit and vegetable intake. While benefits were observed with increasing consumption, results indicated that risk reduction was steepest up to 400 g/adult/day, suggesting a target of at least 400 g/adult/day to maximise health gains. The regular consumption of fruits and vegetables may also benefit human health in a generational context when it contributes to the protection of planetary health. Considerable co-benefits to health and the environment were observed by increasing the production and intake of fruits and vegetables when compared with sugar, other monocrop commodities, or processed and unprocessed red meat. Modelling and observational work has reported benefits to sustainability outcomes and a reduction of inequities in food systems with the production of fruits and vegetables grown within agroecological systems and distributed through short supply chains. Industrial agricultural systems focused on large-scale production of a few high yielding plant foods often coupled with intensive use of synthetic fertilizers and pesticides are major drivers of agrobiodiversity erosion and extensive use of monocultures. Such production methods

are systemically and repeatedly linked to environmental damage, which impacts health, nutrition and future agriculture. Conversely, agricultural diversification and biodiversity conservation can contribute to ecological intensification and balance in agricultural systems, as well as to more nutritious foods and diets, increasing the potential of fruits and vegetables to exert their beneficial effects on human health. The way fruits and vegetables are processed before purchase, from being frozen to UP, may also alter how their intake interacts with human health. Fruits and vegetables preserved in sugars and/or sodium-based preservatives can contribute to excessive intake of free sugars and sodium, increasing the risk of diseases that fresh and minimally processed fruits and vegetables intakes are able to reduce, thus achieving opposite effects. Juicing mechanically shears cell walls within fruits and vegetables, reducing their fibre content, and industrial juicing adds additional processes that may further deplete the nutrient content of the fruits and vegetables included in juices. UP food, such as juice drinks, including those juices with none or residual components of fruits and vegetables products, are consistently associated with lower dietary quality and increased risk for several critical health outcomes. In summary, improvements to production, supply and consumption of fruits and vegetables have the potential to impact health in its multiple dimensions and in a systemic, sustainable and equitable way.

**Key messages:** Higher intake of fruits and vegetables reduces the risk of premature mortality and incidence of prevalent NCDs when compared with lower intake. The consumption of at least 400 g a day of fresh or minimally processed fruits and vegetables should be encouraged in light of their health benefits. Beneficial effects were observed for intake up to 800 g/adult/day with no detrimental effect observed with higher intakes. The benefits of the consumption of fruits and vegetables may extend beyond personal health and into planetary health and reducing inequities. Factors that may improve such a systemic impact on health include: agroecological production systems; short and recurrent production-supply-consumption circuits; equitable production and supply systems, led by indigenous people, women and small-scale farmers and operators; seasonal consumption of fruits and vegetables in the form of fresh, minimally processed, diversified culinary preparations; and diversified families, genera and species of fruits and vegetables produced, supplied and consumed. Agricultural diversification and biodiversity conservation can contribute to more nutritious foods and diets, increasing the potential of fruits and vegetables to benefit human health. The consumption of UP products containing remnants of fruits and vegetables products can result in higher intake of sodium, free sugars, trans fats and saturated fats that undermine and can reverse health benefits observed with fruits and vegetables intake. In addition, they displace fruits and vegetables intake.

Marketing and labelling regulations should prevent the use of images of fruits and vegetables that misrepresent the true proportion and nature of fruits and vegetables ingredients included in products, misleading consumer perceptions and understanding about the identity, quality and healthfulness of the product.

### **Paper: “Promoting sustainable and inclusive value chains for fruits and vegetable – Policy review”**

**Authors:** Pilar Santacoloma, Bruno Telemans, Dalia Mattioni, Cristina Scarpocchi, Makiko Taguchi and Florence Tartanac

The persistence of undernutrition and increasing levels of overweight and obesity worldwide call for transformative change in food systems towards healthier diets (Santacoloma *et al.*, 2021). Fruits and vegetables consumption is considerably lower than the minimum 400 g/adult/day recommended by WHO and FAO, in particular in LMIC countries, and among low-income socio-economic groups in all countries. Moving towards healthy diets with increased sustainable production and consumption of fruits and vegetables will also have positive impacts on poverty reduction by generating income and employment opportunities for small-scale producers and small-and-medium enterprises (SMEs) involved in primary processing.

fruits and vegetables production is of special interest for small-scale farmers as it is labour intensive and generates high productivity per unit of land, while SMEs may take advantage of the post-harvest added-value opportunities of the sector. The fruits and vegetables sector generates comparatively low environmental impacts and, under landscape approaches, contributes to biodiversity and sustainable production. This paper uses the value chain approach to analyse the underpinning factors affecting availability and affordability of fruits and vegetables, examines the main challenges across the supply chain and identifies policy opportunities for improvement, applying a nutrition-sensitive lens. Globally, only 5 percent of vegetables and 9 percent of fruits produced are exported, which means domestic production will be mainly responsible for ensuring recommended levels of fruits and vegetables consumption. Trends in net availability of produce in the last 50 years per region clearly show that current production levels are insufficient to meet recommendations for daily consumption, except in a very few countries. Low productivity, high labour costs, food losses, poor post-harvest management, inadequate infrastructure, logistics and markets, and climate change impacts are the main factors hindering adequate availability. Added to this, fruits and vegetables are unaffordable for many low-income consumers globally as shown in The State of Food Security and Nutrition in the World Report

2020. Fruits and vegetables prices are comparatively higher than staples and food environments are usually not conducive for poor consumers to access fruits and vegetables. On the other hand, rapid urbanization and income growth of the middle class in emerging and LMIC countries stimulates the demand for healthy food and offers an opportunity for sustainable fruits and vegetables development. Successful cases of export-oriented fruits and vegetables value chains, such as in Chile and Kenya, provide interesting lessons to support the development of fruits and vegetables in domestic markets. Firstly, governments prioritize fruits and vegetables export as an economic sector and actively support it. They provide an institutional framework for public-private collaboration, investments (infrastructure such as ports, highways or laboratories), linkages with research to generate innovations in post-harvest operations (packaging, cold chains), financing and extensive capacity building for workers, producers and managers. In Chile, this support has helped the fruits and vegetables sector to establish upgrading strategies based on three main issues: understanding the market needs in a buyer-driven value chain; investing in technologies to increase the shelf life of the produce; and enabling support services such as technology supply. By 2010, the fruits and vegetables sector in Chile employed more than 450 000 people in production, packaging and processing equivalent to 5 percent of the country's labour force.



Developing countries face tremendous challenges in meeting the competitive preconditions to economically upgrade fruits and vegetables value chains, such as inadequate roads and cold chain infrastructure for the efficient marketing of perishable produce, lack of food safety and quality regulatory and certification systems, and/or lack of consistent training and vocational programmes to upgrade labour skills and competencies. Wholesale markets, as key players, could become a vehicle of transformation provided that organizational, service provision and governance issues can be tackled. They can support post-harvest logistic platforms, become a hub of market information, and provide a dedicated space to promote organic or sustainable produce. Promoting short value chains, such as traditional farmers' markets and open-air fairs is also key, as they have been shown to help promote Fruits and vegetables consumption. Those channels, together with innovative market channels (like e-commerce or e-finance), may facilitate stronger producer-consumer relationships for more sustainable market linkages and healthier diets. Capacity development is required at all stages: seed quality, good agriculture practices and investments to sustainably manage resources at the production stage; post-harvest management, packaging and primary processing; business and managerial skills at all levels; and food safety and quality management for private and public actors. Investments in research on underutilized/neglected species and higher levels of literacy facilitate further

training and development. In short, there are multiple pathways for leveraging fruits and vegetables for greater social and environmental inclusion and healthier diets for all, where various combinations of market, public and public-private partnerships will be required, with likely trade-offs. Based on the findings, this paper introduces key entry points where specific interventions would make the greatest difference. However, none of these are silver bullet solutions. Combinations of multiple interventions are needed to create the enabling environment in which market actors invest and innovate and well-integrated supply chains provide healthy food, including fruits and vegetables. The paper argues that strategic policy approaches are needed for fruits and vegetables, including technical support combined with access to (subsidized) quality inputs, infrastructure and technologies. In addition, these approaches benefit from developing multilateral partnerships whereby the private and public sectors take the lead in different but complementary functions to yield greater results. The private sector should be the driving force in increasing value creation (meeting demand for food products, creating decent jobs, increasing shareholder value and minimizing the environmental footprint of the value chain). For its part, the public sector, including donors and civil society, should be the facilitator, enabler and regulator in the arena of the business-enabling environment (supporting laws and regulations, public infrastructure, policy, research and development). The paper makes the case for recovering

native, underutilized and neglected fruits and vegetables species for improved nutrition, climate resilience and retention of agrobiodiversity, as well as for promoting short value chains for local markets as a resilience strategy for small-scale producers and low-income consumers against climate and economic shocks. In brief, it calls for reshaping value chains and creating policies to suit greater efficiency, inclusion of poor and vulnerable actors across the chain – including consumers – and ensuring environmentally sustainable production. Finally, the paper identifies areas requiring further research, including statistics, nutritional values and best practices in underutilized/neglected species, gender dimensions of horticulture production for export and domestic markets (e.g. land rights, access to finance and capacity development, labour conditions) and impacts on the nutrition of their children, gap analysis of regulation and enforcement of food safety and quality standards, policy options to increase demand of fruits and vegetables through digital solutions and social and technological innovations, and employment generation along the value chain.

### **Paper: “The effectiveness of policies and programmes promoting fruits and vegetables”**

Authors: Sarah Gerritsen, Simón Barquera and Luke Wolfenden

International surveys suggest that fruits and vegetables consumption is well below the WHO and FAO recommendation of

400 g per adult daily (Gerritsen, Barquera and Wolfenden, 2021). Implementation of policies and programmes is required as part of global and national strategies to improve both public and planetary health. A range of multi-level strategies will be required to improve consumption given that the determinants of fruits and vegetables consumption are complex, including individual, social, political, economic and environmental factors. This background paper provides an overview of the evidence on the effectiveness of policies, laws, regulations and programmes that specifically promote fruits and vegetables consumption, and details the ongoing and past policies and programmes around the world. An umbrella review of the literature in systematic reviews was conducted to summarise what is known about the most effective ways to improve fruits and vegetables consumption. Most interventions assessed in the systematic reviews had a positive impact on fruits and vegetables intake. Broadly, there was evidence to support the effectiveness of interventions undertaken in a range of settings (home, childcare, school, workplaces, primary care), as well as eHealth interventions, and mass media campaigns. The review provided evidence of a beneficial effect of fiscal interventions as well, with subsidies on fruits and vegetables and taxes on unhealthy foods showing some impact on increasing fruits and vegetables intake. Information was captured on 210 policies and programmes (detailed in the Appendix of the paper) and mapped against the NOURISHING Policy Framework to characterise the

areas in which action to improve fruits and vegetables intake is occurring. Policies and programmes were largely related to offering healthy food and setting standards in public institutions (e.g. offering healthy food in schools) or informing people about food and nutrition through public awareness (e.g. 5-a-Day and similar initiatives). Actions directed at changing the food system were less common than those directed toward the food environment or behavioural change, with only 9 percent of policies and programmes attempting to harness food supply chains and actions across sectors to ensure coherence with health (e.g. nutrition standards and short/ local food chains for public procurement). Two entries had global reach: food-based dietary guidelines (government recommendations for fruits and vegetables consumption) and the Global Alliance for the Future of Food, which is an alliance of mostly private foundations advocating for sustainable food systems. Case studies of seven promising interventions from the inventory were detailed in the background paper together with their strengths and challenges: Peas Please (corporate pledges to include more vegetables in manufactured food); World Fruits and Vegetables Day; Free Fruits and Vegetables in Schools; Farm to School Programme; LA County Food Service Contracts; Healthy Start Vouchers (for pregnant, breastfeeding women and children under four years old); and the Eat Them To Defeat Them media campaign. Given the limited evidence on the effects of implementation strategies, maximizing the impact of approaches to improve the implementation of policies

and programmes requires a thorough understanding of barriers, and the careful selection of strategies to address these. Furthermore, it was suggested that more policy and programme evaluations need to be funded and published in order to evaluate their effectiveness. Globally, actions to improve fruits and vegetables consumption are largely directed toward increasing access through provision (particularly in schools) and behaviour change interventions focused on nutrition education, including community-based nutrition education, cooking skills, and initiatives such as community and school gardens. However, evidence from systematic reviews for nutrition education interventions is equivocal. The effects of such interventions are typically small, less durable, and can be difficult and costly to scale-up to a level that may meaningfully contribute to changes at the population level. Nutrition education initiatives should therefore be included only as part of a broader strategy to improve public health and nutrition. Often, macro-system influences such as transport systems, land use and urban design are not investigated even if they may interact with the food system or other determinants of population's fruits and vegetables consumption. A limitation of the background paper is that it only included policies or programmes explicitly directed towards increasing fruits and vegetables consumption. It is plausible that other policy actions could have an important impact on transforming the food environment that may be critical to improving fruits and vegetables consumption. Examples

of these wider actions are fiscal policies to increase the price of sweetened sugary drinks and junk food, front of package warning labels on foods high in sugar and salt, or regulatory measurements to curb junk-food marketing. Another limitation is the geographical coverage of the examined interventions, which were commonly implemented in high-income countries. The global applicability of the findings of some interventions therefore may be limited and underscores both the need for primary studies and reviews specific to interventions undertaken in low- and middle-income countries. The findings of this review of the literature and global implementation of policies and programmes suggests that while there remains considerable scope for further action globally, governments have a range of evidence-based policy options to choose from to improve fruits and vegetables intake. The background paper provides the following broad suggestions to facilitate population level improvements in fruits and vegetables consumption:

1. Employ a comprehensive range of policy actions targeting multi-level determinants of fruits and vegetables intake and incorporate strategies across the food environment, food system and behaviour change communication domains of the NOURISHING Framework.

- a) Move beyond actions focused on education, media campaigns and schools to also include strategies that

ensure fruits and vegetables are more accessible to the entire population at affordable prices.

- b) Prioritize interventions with the greatest potential for beneficial impact, that is, those that are cost-effective, contextually relevant, with population level reach, and where impacts do not exacerbate inequities and are likely to be enduring.

- c) Counter other macro policies, processes and systems that adversely impact fruits and vegetables intake – for example, marketing, low price or easy accessibility of highly processed-foods and beverages, which displace or limit fruits and vegetables consumption.

- d) Look for cross-sectoral opportunities to promote healthy diets and fruits and vegetables intake, for example as part of environmental or climate change policies.

2. Employ comprehensive, multi-level strategies to support the implementation of government policy initiatives.

- a) Develop and implement fully funded programmes to address specific barriers for their implementation in the local context.

- b) Evaluate and share experiences of implementation efforts to facilitate learning and improvement.





## 4. CONCLUSIONS

The workshop generated a series of conclusions at both the general and specific levels of the food system framework.

### General conclusions

1. Fruits and vegetables are particular food products and, therefore, need special consideration because of their high degree of labour and input intensity, high variations in yield, perishability, losses and waste, seasonality, and dependency on climatic conditions and rapid consumption. This results in a high economic risk for producers and distributors, as well as high food loss and waste.
2. Fruits and vegetables are more than a sum of nutrients and phytochemicals and cannot be replaced by food fortification or dietary supplements.

3. Achieving WHO/FAO recommendations for fruits and vegetables intakes is challenging in many countries, especially for the most vulnerable populations, because of limited availability, accessibility, affordability and food preferences. However, regardless of income level, the vast majority of people do not achieve the recommended levels of fruits and vegetables intake.

4. How fruits and vegetables are produced, processed, distributed and prepared have direct and indirect impacts on human and planetary health and equities. At the same time, greater consumer demand for a wider variety of fresh, biodiverse, and minimally processed fruits and vegetables can contribute to reshaping the food system.

5. A significant change in fruits and vegetables production, value chains and consumption can only be achieved with the commitment of all stakeholders (government with all relevant ministries,

producers, distributors, consumers, academia, civil society, international organizations, etc.), adequate funding and investments across the chain, enhanced human resources, a stronger evidence base and better monitoring of programme implementation, and political will to implement appropriate policies, laws and regulations.

**6.** Member Nations should look for cross-sectoral opportunities to promote healthy diets and fruits and vegetables intake, for example as part of environmental or climate change policies.

**7.** Increased fruits and vegetables consumption, and healthy diets as a whole, can only be achieved by limiting the consumption of competing unhealthy food (high in sugar, salt and fat) through macro policies, laws and regulations (e.g. limiting their access and marketing, increasing their price).

**8.** Most data and studies originate in developed countries and are focused on NCDs. Properly designed studies are required to understand the burden/prevalence of diseases and the comparative effectiveness of interventions, among others. This would allow expanding the focus on issues encountered in developing countries and to evaluate and share experiences of implementation efforts to facilitate learning and improvements.

**9.** Basic statistics are lacking on fruits and vegetables production, consumption and composition (nutrients and phytochemicals, especially on variety level). National statistics need to take into account domestic production and consumption.

**10.** The NOURISHING Framework can assist in developing a holistic action plan covering all parts of the food system. Interventions should be prioritized with the greatest potential for impact, that is, those that are contextually relevant, with population level reach, evidence of beneficial effects, and where impacts are more likely to be enduring and do not exacerbate inequities.

**11.** Current fiscal policies, unclear regulations, subsidies and funding often do not favour the improvement of fruits and vegetables production, value chains, and consumption. For example, unlike cereals and other staple foods, fruits and vegetables are rarely subsidised.

**12.** Linking food policies, including on fruits and vegetables, with climate change policies and other SDG activities could help to mutually reinforce these policies.

**13.** Social determinants of health, historical background, and differences in cultural and social factors need to be considered in policies because of their influence on behaviour change.

## Specific conclusions by sub-topic

### Health impacts

- A high fruits and vegetables intake reduces risk of premature mortality and incidence of certain NCDs when compared with lower or average intakes. Such benefits might accrue due to the nutrients present in fruits and vegetables, influencing physiological processes in the body and the microbiota, as well as to higher intake of fruits and vegetables, leaving less room in the diet for energy dense or nutrient-poor food products.
- The FAO/WHO recommended intake of at least 400 g/d targets the health benefits for adults. It is necessary to explore recommended fruits and vegetables intakes for young children, adolescents, and for other than NCD endpoints.
- The consumption of ultra-processed products that may contain remnants of fruits and vegetables products can result in higher intake of sodium, free sugars, trans fats and saturated fats that undermine and can reverse the health benefits observed with fruits and vegetables consumption. In addition, they also displace whole fruits and vegetables intake.
- Processing (e.g. juicing, frying, adding salt, sugar and/or fat) can significantly reduce the beneficial

impacts of fruits and vegetables consumption and should therefore be avoided or carefully balanced with potential benefits (e.g. reduced loss of fruits and vegetables; improved food safety especially for microbiological contamination).

### Production and value chains

- Agricultural diversification and biodiversity conservation with a particular focus on neglected and underutilized species are key to contributing to more nutritious diets, increasing the potential of fruits and vegetables to benefit human health and resilience to climate change.
- More evidence and data at all stages of the value chain are needed, especially from developing economies (Africa, South Asia and Latin America).
- Ensure equity within the value chain by identifying and taking corrective action on nodes where there is greater concentration of power (middlemen, retailers, etc.).
- More investments are needed in fruits and vegetables research, production and post-harvest technologies.
- Many fruits and vegetables value chains would benefit from investments and shortening as well as consideration

of gender issues to achieve better prices, lower risk and higher quality, especially for smaller producers.

- Public procurement has been shown to be an effective instrument to increase small producer access to markets on the one hand, and the access of vulnerable consumers to fruits and vegetables on the other. To achieve this, it is necessary to support small producers in overcoming certain constraints to be competitive, e.g. support them in building cooperatives and farmer associations, meeting food safety standards, etc.
- Increase sustainable fruits and vegetables production to try to meet fruits and vegetables recommendations.
- Markets often favour foods with longer shelf life, easy transportability, and conformity in size, colour, taste and appearance. More perishable but nutrient rich fruits and vegetables varieties may have difficulties to compete in this context.

## Consumption

- Communication and behaviour change interventions (i.e. in school, education and media campaigns) are important but insufficient on their own to increase fruits and vegetables consumption to recommended levels. They need to be complemented by

a comprehensive range of policies and programmes to ensure that fruits and vegetables are more accessible, affordable and desirable to the population, from across the food system targeting multi-level determinants of fruits and vegetables intake, production and the value chain.

- Interventions for increased fruits and vegetables consumption and preference should start early in life, e.g. in pregnancy, and be supported by all health professionals.
- Marketing techniques using images of fruits and vegetables that misrepresent the true proportion and nature of fruits and vegetables ingredients included in processed products mislead consumers' perception and understanding about the identity, quality and healthfulness of the product. These should be regulated.
- In addition to the lack of funding, there are methodological difficulties in isolating the impacts of specific policies and programmes to increase fruits and vegetables consumption, making it difficult in some cases to provide scientific evidence of the efficiency of programmes and policies.
- Positively phrased health-based fruits and vegetables messages could be more effective and could be used as an opportunity to raise health and food literacy.





## 5. RECOMMENDED ACTIONS

The workshop aimed to generate a series of feasible, cost-effective recommended actions both at the global and country levels, and addressed to different stakeholders.

### Global level

- If feasible, include a target for fruits and vegetables consumption in SDG 2 (e.g. 400 g/adult/day or less as most countries will not be able to afford this amount) to clarify the importance of fruits and vegetables intake as a marker of healthy diets, obtain greater engagement from countries and monitor progress.
- Increase political commitment through the development of a legally binding international framework convention for healthy and sustainable food systems, which aim to deliver a healthy diet for all, including adequate fruits and vegetables consumption.

- Reinterpret relevant WTO rules to recognize market failures in the provision of healthy and nutritious diets around the world, and thereby avoid impediments to public action to encourage increased domestic availability of nutritious foods.

- Link fruits and vegetables consumption to international celebrations, important policy debates, and the work of high-level bodies, e.g. International Day of Awareness of Food Loss and Waste, climate change, SDGs, Committee on World Food Security, World Food Summit.

- Promote policies and programmes with a systemic approach or system-focused interventions (including production value chains, small-scale farmers, investment in infrastructure, research and processing of fruits and vegetables, public procurement from local farmers, taxation, food advertising and UP food regulation), which consider

the participation of all stakeholders to make these interventions more cost-effective and equitable.

- FAO, WHO and other UN organizations should support the generation of country data, global evidence, technical guidance, instruments and a forum for knowledge exchange, to assist them in their efforts to enhance the production, value chain and consumption of fruits and vegetables within a framework of healthy diets through a healthy and sustainable food system.
- Strengthen the value chains of local, neglected and underutilized species to enable them to reach more consumers.

## Country level

One of the goals of the workshop was to use the food systems approach to develop coherent, feasible recommendations for different actors (governments, food producers, processors and distributors, civil society, consumers and academia) to implement policies, regulations and programmes that would help ensure that healthy diets, including Fruits and vegetables, become the norm and are accessible and affordable for the entire population.

## Recommendations for governments

### Evidence basis and monitoring

- Fund research and monitoring/evaluation of policies and programmes that could impact fruits and vegetables consumption, even as secondary outcomes (e.g. secondary effects of sugar-sweetened beverage taxations).
- Monitor compliance of laws and regulations by concerned stakeholders.

### Technical support, e.g. capacity development, guidelines

- Promote adequate seed system development, including for neglected and underutilized species and biodiversity, favouring those with high nutritional quality.
- Strengthen capacities of government agencies to implement pesticide policies, regulations and compliance with international standards (such as Codex Alimentarius) and codes of conduct.
- Foster the creation of cooperatives and support existing ones to facilitate access to markets, including to public procurement, in order to offer sufficient volume according to quality and food safety standards.

- Incentivise private sector actors to invest in infrastructure and technology to preserve fruits and vegetables, promote biodiversity and enhance their nutritional value (also food processors and distributors).
- Promote inclusive innovations along value chains, like remote sensing, block chain technologies, e-commerce, nutrient conserving minimal-processing technologies, and remove barriers for small-scale producers and low-income consumers (also food processors and distributors).
- Support social innovations for consumer-producer linkages, short value chains and short food circuits (also food processors and distributors).
- Design and implement innovative strategies and technologies to reduce loss and waste of fruits and vegetables while maintaining freshness and nutrient quality.
- Develop educational material for health professionals with nutrition advice on fruits and vegetables to encourage fruits and vegetables consumption and healthy diets for their patients and families.
- Take environmental, economic, and sociocultural sustainability into account in National Food-Based Dietary Guidelines.

## **Policies, laws and regulations**

- Policies, laws and regulations should be inclusive of small-scale farmers, as well as support agricultural practices to be more environmentally sustainable.
- Ensure, when possible, that fruits and vegetables production guarantees sufficient local supply at reasonable prices making them affordable for consumers.
- Design long-term national policies, laws and regulations with funding allocations to ensure adequate infrastructure and human resources aimed at promoting sustainable production and consumption of fruits and vegetables, including national budget allocations specifically for multisectoral collaboration.
- Adapt policies and regulations for public food procurement to allow and facilitate access by small producers and cooperatives.
- Include environmental performance standards for providers and operators in public food procurement policies.
- Reorient subsidies from monoculture of grains, sugar and oil seeds to fruits and vegetables.

- Design policies and regulations to facilitate and promote increased consumption of fruits and vegetables in restaurants, street food and other take-away food services.
- Design and implement laws to incorporate nutrition education, including fruits and vegetables, in school curricula.
- Implement comprehensive sets of regulatory policies that can effectively reduce the demand for and supply of processed and UP products that displace fruits and vegetables, such as marketing restrictions, labelling regulations or taxation.
- Strengthen pesticide regulations and provide incentives for farmers to adopt environmentally sustainable agricultural systems.
- Ensure that regulations (mainly logistical) are in place to prevent disruption of food supplies, including fruits and vegetables, from production areas to markets and consumers, especially during a crisis.

### **Programme implementation**

- Promote fruits and vegetables production, including of neglected and underutilized species, through governmental extension programmes.

- Promote the exchange of seeds and knowledge among indigenous and small-scale farmers and increase capacity for quality seed production.
- Prioritize and promote the consumption of local, seasonal and diverse fruits and vegetables.
- Assist and fund civil society organizations to demand action favouring healthy dietary choices at fair prices, considering specific support for female producers, processors and marketers of fruits and vegetables.
- Implement public policies to promote and strengthen farmers markets and other open-air markets, facilitating market opportunities for small-scale farmers and better access for consumers, as well as to promote and strengthen short supply chains and short circuits for fruits and vegetables.
- Promote an increased presence of fruits and vegetables in public food procurement programmes and with facilitated procedures for small-scale farmers.
- Strengthen social protection programmes to improve the affordability of fruits and vegetables for beneficiaries while guaranteeing a fair price for farmers.



## Recommendations for fruit and vegetable producers

### Evidence basis and monitoring

- Major producers should share more of their data and knowledge and incorporate them into databases (e.g. on production, stocks, trends, food composition) at the national and/or global level.
- Comply with international and national regulations to protect environmental health and the health of consumers.
- Incorporate research and development along the value chain from production through minimal processing, transport, and distribution, especially for indigenous species.

### Technical support, e.g. capacity development, guidelines

- Develop and strengthen inclusive and participatory systems for the certification of organic and agroecological production.

### Programme implementation

- Promote agricultural diversification and biodiversity programmes through diversified agricultural systems.

- Promote associations of small-scale farmers as a strategy to raise their voices, facilitate access to markets, and reduce transaction costs for both consumers and producers.

- Use short value chains/direct sales to increase earnings and improve the livelihoods of small-scale farmers.

- Develop and implement programmes to increase consumer demand for fruits and vegetables.

- Protect rural workers and rural communities from exposure to direct contact with pesticides including contamination of air, water and soil that exert known carcinogenic, teratogenic, mutagenic and/or endocrine disruption effects.

## Recommendations for food processors and distributors

### Evidence basis and monitoring

- Major food producers and distributors should share more of their data and knowledge and incorporate them into databases (e.g. on sales, technology transfer, trends, food composition) at the national and/or global level.

### **Technical support, e.g. capacity development, guidelines**

- Favour minimal processing methods that retain the physical characteristics of fruits and vegetables in the marketing chain, until it reaches the consumer.
- Avoid addition of ingredients and additives that detract from the health benefits of fruits and vegetables, in all forms of processing to “repurpose” highly perishable fruits and vegetables (canning, drying, freezing, juices, other).
- Support research and development on minimal processing, packaging and storage technologies and skills to optimize the physical integrity, preserve freshness and nutritional contents, maintain food safety, and reduce food losses, while prolonging shelf life and reducing waste.

### **Programme implementation**

- Include fruits and vegetables in vending machines to promote their consumption/availability/physical access, as part of healthy vending machine programmes.
- Develop and establish direct sales and co-producing systems and tools (e.g. Community Supported Agriculture or e-commerce).

- Promote value chains that focus on whole fruits and vegetables, taking advantage of local production and consumption to shorten value chains.
- Increase the presence of fruits and vegetables in restaurant menus and food e-commerce and provide incentives for consumers to select more fruits and vegetables based options.

### **Recommendations for civil society and consumers**

#### **Evidence basis and monitoring**

- Monitor compliance of regulations by government and the private sector.

#### **Programme implementation**

- Demand sustainably produced healthy food at fair prices for small farmers and consumers, which preserves planetary health.
- Make use of information and communication technologies that support fruits and vegetables farmers and link them directly to local markets and consumers.
- Create and promote consumer initiatives and cooperatives.









- Use social marketing and other tools to increase consumer demand for fruits and vegetables.
- Support and engage in advocacy campaigns.
- Build alliances and coalitions between consumers and producers to increase mutual benefits and to advocate for food systems that are healthier, friendlier to fruits and vegetables and more sustainable.

## Recommendations for academia

### Evidence basis and monitoring

- Apply for funding and conduct research on areas identified under data and knowledge gaps (see Section 10 below).

- Advocate for additional research needs on fruits and vegetables and funding from potential donors and governments.

### Technical support, e.g. capacity development, guidelines

- Design innovative technologies for reducing food loss and waste.
- Design innovative technologies to increase resource use efficiency in production (protected cultivation, irrigation, etc.).

## 6. EXISTING DATA AND KNOWLEDGE GAPS

Based on the background papers that analyse the state of the art of global policy, programmatic and scientific advances in recent decades, the workshop aimed to identify knowledge and data gaps that should be considered for the elaboration of future interventions.

- Cost-benefit analyses and evaluations of different policies and programmes that promote fruits and vegetables (production, value chain and consumption).
- Research using systems science to improve understanding about the complex and adaptive nature of food systems, which is needed to inform policy development.
- Reliable and timely statistics on fruits and vegetables production and consumption, including for biodiversity and neglected and underutilized species.
- Research on how to achieve decent producer and retail prices simultaneously.

- Research on the impact of food environments (including food deserts and swamps) on fruits and vegetables consumption.
- Research on the relationship between climate change and fruits and vegetables cultivation and nutrient content.
- Research on indigenous fruits and vegetables and neglected or under-utilized species to maintain biodiversity, as well as on the nutrient composition of these foods.
- Gender dimensions of horticulture production for export and domestic value chains and the impacts on family nutrition.
- Policy options to increase demand through digital solutions, social innovations and alternative subsidies.
- Research on rates of fruits and vegetables post-harvest loss and how to reduce them.
- Cost-effective technologies to improve the shelf life of fruits and vegetables and reduce losses and waste.
- Research on different subsidies for poor households to increase fruits and vegetables consumption.





- Research and innovation to increase fruits and vegetables consumption in the restaurant industry, as well as in children's menus.
- Knowledge on fruits and vegetables consumption determinants in different settings and their underlying factors.
- Nutrient and phytochemical contents of fruits and vegetables species and their varieties. Instead, funding is oriented towards the profitable extraction of some components.
- Research on changes of nutrient composition due to different processing techniques and their impact on health effects.
- Independent research on fruits and vegetables benefits for different health and nutrition outcomes beyond NCDs (e.g. immune system, growth, mental health, gut health and other health endpoints), as well as their evaluation through systematic reviews.



## 7. WAY FORWARD

To ensure sustainable and adequate production, value chains and consumption of fruits and vegetables for all people at all stages of life, it is important to:

1. Adopt a nutrition-sensitive food system perspective that recognizes that fruits and vegetables production has particular challenges in terms of high production variability, high demand for labour and inputs, high susceptibility to weather conditions and climatic change, high levels of food loss and waste, and high perishability; and that food safety standards need to be met and demonstrated.
2. Promote and protect the adequate consumption of natural fruits and vegetables as an integral part of a diversified, healthy diet to reap their health benefits.
3. Develop and fund comprehensive, multi-level and multi-sectorial actions and governance to favour the production, processing, transportation, trade, marketing and consumption of fruits and vegetables, which result in convergent and holistic sets of policies, laws, regulations, programmes and strategies (such as those outlined in the NOURISHING framework) in order

to deliver on desired nutrition and health impacts while taking economic constraints into account.

4. Recognize that food system transformation is imperative in order to address inequities in support and incentives for small producers, local producers and consumers. Political will and commitments from all stakeholders are required, including adequate funding and investments in human resources, infrastructure, technical tools, evidence basis and monitoring, programme implementation, policies, laws and regulations. To generate this commitment and political will, it is necessary to assist and fund civil society organizations to demand action favouring healthy dietary choices at fair prices.
5. Address the major constraints on fruit and vegetable consumption (limited affordability and access), together with risks of taste distortion associated with the marketing of competing unhealthy and cheap UP foods and beverages.
6. Collect, analyse, disseminate and monitor evidence and data on fruits and vegetables consumption, value chain and production, including on consumption determinants, impact on a variety of health outcomes especially from developing countries, good practices, and quantitative evaluations

of interventions of policies, laws, regulation, programmes, projects and standards on the increased consumption, production and availability of fruits and vegetables.

**7.** Generate political commitment through the development of a legally binding international framework convention for a healthy and sustainable food system, which aims to deliver a healthy diet for all, including adequate fruits and vegetables consumption. Additionally, include a target on fruits and vegetables in SDG 2.

**8.** Link healthy diets and fruits and vegetables with other agendas, such as climate change, the environment, IYFV and the International Day of Awareness of Food Loss and Waste.

**9.** Favour regulatory over voluntary actions, including fiscal incentives for the production, processing, distribution and trade of fruits and vegetables for healthy diets, minimum legal producer prices, abolishing subsidies on ingredients for UP foods or animal-based foods, and regulating minimum fruits and vegetables portions in educational, health and other institutions.

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# ANNEX

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#### **WHO/PAHO Secretariat**

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2) Fabio Gomes, Advisor on Nutrition and Physical Activity, PAHO/WHO

3) Leendert Nederveen, Advisor, PAHO/WHO

## Workshop Agenda

DAY 1. MONDAY, 24 AUGUST 2020	
Opening Session. Chair: Eve Crowley	
10:00-10:05	Opening and presenting the Chair
10:05-10:25	Welcome words and introduction to the topics and goals of the workshop
	Eve Crowley, FAO
	Francesco Branca, WHO
	Anna Lartey, FAO
10:25-10:35	Housekeeping rules
10:35-11:45	Ice breaker: getting to know the participants
10:45-11:00	Plenary "Setting the scene and bringing in the global perspective"
	Eve Crowley
11:00-11:15	Plenary "Unpacking the framework and aligning the background papers"
	Pilar Santacoloma "Promoting sustainable Fruits and vegetables value chains"
	Sarah Gerritsen "Promoting increased Fruits and vegetables consumption"
	Fabio Gomes "Fruits and vegetables consumption on health outcomes"
11:15-11:30	Discussion -Q&A
11:30-11:45	Coffee break
11:45-12:10	Exercise 1: Sharing experiences
12:10-12:45	Exercise 2: Shaping the ideal future
12:45-12:55	Exercise 3: Sharing your expectations
12:55-13:00	Closing remarks
Day 2. Wednesday, 26 August 2020	
Expert Discussion: Effects of Fruits and vegetables consumption on health outcomes. Chair: Fabio Gomes	
10:00-10:05	Opening and presenting the Chair
10:05-10:15	Welcome words and introduction to the topic
	Fabio Gomes, PAHO/WHO
10:15-11:30	Breakout in parallel working groups
11:30-11:45	Coffee break
11:45-13:00	Plenary Discussion
	Presentation of conclusions and recommendations from working groups
13:00-13:15	Consensus
13:15-13:20	Closing remarks
Day 3. Monday, 30 August 2020	

Expert Discussion: Policies and programmes promoting sustainable Fruits and vegetables value chains. Chair: Pilar Santacoloma	
10:00-10:05	Opening and presenting the Chair
10:05-10:15	Welcome words and introduction to the topic
	Pilar Santacoloma, FAO
10:15-11:30	Breakout in parallel working groups
11:30-11:45	Coffee break
11:45-13:00	Plenary Discussion
	Presentation of conclusions and recommendations from working groups
13:00-13:15	Consensus
13:15-13:20	Closing remarks
Day 4. Wednesday, 2 September 2020	
Expert Discussion: Effectiveness of policies and programmes promoting increased Fruits and vegetables consumption. Chair: Ruth Charrondière	
10:00-10:05	Opening and presenting the Chair
10:05-10:15	Welcome words and introduction to the topic
	Ruth Charrondière, FAO
10:15-11:30	Breakout in parallel working groups
11:30-11:45	Coffee break
11:45-13:00	Plenary Discussion
	Presentation of conclusions and recommendations from working groups
13:00-13:15	Consensus
13:15-13:20	Closing remarks
Day 5. Wednesday, 9 September 2020	
Final Session. Chairs: Anna Lartey and Francesco Branca	
10:00-10:05	Opening
10:05-10:50	Plenary discussion on recommendations for Governments
	Eve Crowley, FAO
10:50-11:35	Plenary discussion on recommendations for other sectors: Production, Processing, Civil Society and Academia
	Francesco Branca, WHO
11:35-11:45	Coffee break
11:45-12:00	Knowledge gaps
12:00-12:30	Way forward and next steps
	Daniela Godoy, Ministry of Social Development and Family, Chile
	Francesco Branca, WHO
	Anna Lartey, FAO
	Eve Crowley, FAO







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