Technical Assistance to Strengthen Capabilities (TASC) Project

# Aligning Food System Activities with Healthier Diets for Low-Income Households

## A guidance note

May 2022

SUBMITTED BY DAI IN ASSOCIATION WITH

Nutrition Works
International Public Nutrition Resource Group

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development initiatives

## About TASC

**Technical Assistance to Strengthen Capabilities (TASC)** is part of the broader Technical Assistance for Nutrition (TAN) Programme, funded by UK Aid. TASC is a mechanism to provide technical assistance to Scaling Up Nutrition (SUN) country governments and build capacities towards advancing multisector nutrition agendas, in line with the SUN Movement principles and roadmap.

The objective of the TASC Project is to provide:

1. Technical assistance to Governments in the SUN Movement and to the SUN Movement Secretariat (SMS) to catalyse country efforts to scale up nutrition impact (Component 1) in 60+ SUN Movement countries.
2. Technical assistance to the Foreign, Commonwealth and Development Office (FCDO) to maximise the quality and effectiveness of its nutrition-related policy and programmes, to support evidence generation and lesson learning, and to develop nutrition capacity (Component 2).

## TASC Partners

- DAI
- NutritionWorks
- Development Initiatives

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## About This Publication

This document was produced by the TASC project to support FCDO staff and implementing bodies involved in food system activities (agriculture, private sector development, trade and investment, economic development, food security and nutrition, livelihoods and social protection, climate, and environment programmes). It was subsequently revised to be more accessible to an external audience.

The document was produced through support provided by UK aid and the UK Government; however, the views expressed do not necessarily reflect the UK Government's official policies.

TASC makes all efforts to provide correct information and links to source documents; however, cannot take responsibility if links are changed or removed.

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## Abbreviations

| | |
|---|---|
| **ATNI** | Access to Nutrition Index |
| **CDC** | Center for Disease Control |
| **CSA** | Climate-smart agriculture |
| **DIB** | Development Impact Bond |
| **ESG** | Environmental, social and governance (investments) |
| **FAO** | Food and Agricultural Organisation |
| **FBDG** | Food-based dietary guidelines |
| **FCDO** | Foreign, Commonwealth and Development Office |
| **FCR** | Feed conversion ratio |
| **FFS** | Farmer field schools |
| **FISP** | Farmer Input Support Programme (Zambia) |
| **FISP** | Farmer Input Subsidy Programme (Malawi) |
| **GAIN** | Global Alliance for Improved Nutrition |
| **GHG** | Greenhouse gas |
| **HGSF** | Home-grown school feeding |
| **ICAI** | Independent Commission for Aid Impact |
| **ICT** | Information and communications technology |
| **IFAD** | International Fund for Agricultural Development |
| **IFC** | International Finance Corporation |
| **LANSA** | Leveraging Agriculture for Nutrition in South Asia |
| **LMICs** | Low- and middle-income countries |
| **LSFF** | Large-scale food fortification |
| **M&E** | Monitoring and evaluation |
| **MNC** | Multinational corporation |
| **MQSUN+** | Maximising the Quality of Scaling Up Nutrition Plus |
| **MSME** | Micro, small and medium-sized enterprises |
| **NCDs** | Non-communicable diseases |
| **NGO** | Non-governmental organisation |
| **OECD** | Organisation for Economic Cooperation and Development |
| **PPP** | Public-private partnership |
| **RBF** | Results-based financing |
| **SDG** | Sustainable Development Goal |
| **SME** | Small and medium-sized enterprises |
| **SMS** | Sun Movement Secretariat |
| **SUN** | Scaling Up Nutrition |
| **TAN** | Technical Assistance for Nutrition |
| **TASC** | Technical Assistance to Strengthen Capabilities |
| **TMEA** | Trademark East and Southern Africa |
| **UN** | United Nations |
| **UPF** | Ultra-processed food |
| **US$** | United States dollars |
| **WFP** | World Food Programme |
| **WHO** | World Health Organisation |
| **WUWM** | World Union of Wholesale Markets |

## Key aspects of the guidance

The Core Guidance to enable healthier diets among low-income households in low- and middle-income countries (LMICs), while bringing co-benefits and reducing trade-offs for economic development and climate change, **involves nine activities across the food system**, as follows:

1. Support the adoption of **crop production practices** which improve dietary diversity of producer households and beyond, while also benefiting economic and climate objectives.
2. Maximise the nutrition, economic, and food security benefits of **animal production** for low-income households, whilst adapting to and mitigating climate and other environmental impacts.
3. Test and monitor investments in infrastructure and business models that link producers of **perishable, nutritious foods** to markets serving low-income households.
4. Leverage benefits and manage risks of **cross-border trade** with healthy diets in both exporting and importing countries, while advancing economic objectives.
5. Focus investment into **food processing and manufacturing** towards enhancing convenience, nutrient quality, safety, and marketing of nutritious foods for which there is demand from low-income consumers.
6. Mobilise **demand for nutritious foods** from low-income consumers and reduce demand for ultra-processed foods.
7. Incentivise, support, and monitor **innovative digital solutions** to improve access and affordability of nutritious foods for low-income consumers.
8. Incentivise and support innovative **financing solutions** to support healthy diets for low-income consumers in a commercially sustainable and scalable way.
9. Build capacity for designing and implementing **agricultural and food policy** for healthy diets while managing co-benefits and trade-offs towards the achievement of the Sustainable Development Goals.

## Options within each activity of the core guidance

Specific options within each activity of this core guidance can improve different aspects of healthy diets while also forging co-benefits in relation to economic development and climate change: increasing or decreasing intake of specific nutrients; increasing dietary diversity; and reducing intake of foods high in unhealthy fats, sugars, and/or salt and ultra-processed foods. For dietary diversity, options are available to improve the diets of both producer households and low-income households reliant on markets. These options will often not be the same.

### ➔ *Options to support dietary diversity among producer households*

- Invest in breeding and/or adoption of nutritious crop breeds and biofortification as a win-win-win for improving diets, reducing rural poverty, and climate change adaptation
- Support climate-smart agricultural practices and agroecological pathways which benefit diets of producer households
- Ensure adoption of irrigation technologies and infrastructure that support diet diversity among producer households and climate adaptation
- Manage risks of crop specialisation and generate co-benefits from production diversity for diet and climate
- Leverage agricultural extension to improve productivity, climate adaptation and diets of producer households
- In low-income rural settings, consider supporting household ownership of livestock and poultry with the objective of increasing consumption by women and children in the household in particular, and enhancing women's economic empowerment

- Support effective design and implementation of agricultural subsidies to enhance diets, environment and economy
- Invest in storage technologies effective for nutritious perishables
- Invest in transportation infrastructure that directly links producers of perishable nutritious foods to markets for low-income consumers, and manage risks
- Support the development of new business models to link producers to low-income consumers
- Support farmers in engaging with public procurement to institutions providing healthy diets to low-income children
- Increase access to mobile phones, especially for rural and low-income women

### ➔ *Options to increase dietary diversity of low-income households reliant on markets*

- Leverage breeding and/or adoption of nutritious crop breeds and biofortification as a win-win-win for improving diets, reducing rural poverty and climate change adaptation
- If investing into large-scale animal source food production, ensure products are accessible and affordable to low-income groups, and manage economic and environmental trade-offs
- Invest in storage technologies effective for nutritious perishables
- Invest in transportation infrastructure that directly links producers of perishable nutritious foods to markets for low-income consumers, and manage risks
- Support the development of new business models to link producers to low-income consumers
- Support growth of formal and informal suppliers of nutritious processed foods which enhance convenience, with a close eye on affordability for low-income consumers
- Support improvements in availability and affordability of appropriate packaging technologies that increase safety, affordability, and desirability of nutritious foods for low-income consumers
- Focus regional and intra-regional trade on nutritious foods while managing benefits and risks for diet in both exporting and importing countries
- Support capacity building for the nutrition community to engage in and monitor national trade facilitation and policy activities, and advocate for complementary policies
- For diet and nutritional impact on infants and young children, combine supply-side interventions with well-designed, intensive nutrition education and behaviour change communication
- Increase access to mobile phones, especially for rural and low-income women
- Consider investing in marketing activities that promote nutritious foods to low-income households and make ultra-processed foods less appealing
- Utilise mobile technologies to support delivery of nutrition information through extension
- Research and improve effectiveness and reach of technology for nutrition education and nutrition advisory services, to increase consumer demand for nutritional produce amongst low-income consumers

### ➔ *Options to support targeted improvement in micronutrient intake*

- Leverage breeding and/or adoption of nutritious crop breeds and biofortification as a win-win-win for improving diets, reducing rural poverty and climate change adaptation
- Invest in ensuring large-scale food fortification (LSFF) programmes benefit low-income households
- Support growth of formal and informal suppliers of nutritious processed foods which enhance convenience, with a close eye on affordability for low-income consumers

### ➔ *Options to support lower availability, access, and utilisation of ultra-processed snacks, refined ready-to-eat foods, and food and drinks high in unhealthy (saturated and trans) fats, added sugars and/or salt*

- Only invest in ultra-processed foods if health and nutrition risks can be managed
- Support capacity building for the nutrition community to engage in and monitor national trade facilitation and policy activities, and advocate for complementary policies
- Consider investing in marketing activities that promote nutritious foods to low-income households and make ultra-processed foods less appealing
- Invest in technical capacity and advocacy for the development of healthy food environment policies, their implementation, and evaluation

### ➔ *Options to contribute to a more enabling environment*

- Consider creating performance-based incentives to help de-risk and/or improve the returns for companies and developers
- Consider reconceptualising and re-pricing nutritional risk into investments
- Consider increased weighting for food investments with positive nutritional impacts for low-income consumers
- Consider providing blended finance to incentivise investment in micro, small and medium-sized enterprises (MSMEs) involved in production, marketing, storage and/or transport of healthy and nutritious foods
- Consider providing credit and investment to women to empower them to make better nutrition decisions
- Promote use of technology to capture data and monitor population-level shifts
- Build capacity for a food system approach to implementation of national 'Pathways for Food Systems Transformation'
- Support development of food-based dietary guidelines integrating nutrition and sustainability

The rationale, considerations, co-benefits, trade-offs, and knowledge gaps for each option are summarised in the following tables.

# 1 Crop production practices

| CORE GUIDANCE | | | *Support the adoption of agricultural production practices which improve dietary diversity of producer households and beyond, while also benefiting economic and climate objectives* |
|---|---|---|---|
| **What can be done** | | | ***Invest in breeding and/or adoption of nutritious crop breeds and biofortification as a win-win-win for improving diets, reducing rural poverty and climate change adaptation*** |
| → | **Potential for impact on diets of low-income families** | | There is significant difference in nutrient content between and within different staple crops. Breeding and adoption of more nutrient-rich varieties potentially increases nutrient availability for populations consuming these grains. Their impact on micronutrient sufficiency requires testing and monitoring.<br>Biofortification results in increased micronutrient intake.<br>Some evidence indicates adoption of improved crop varieties (i.e. more productive) leads to higher diet diversity for the producer households, likely owing to higher incomes. |
| → | **Factors to consider** | | • Important to focus on breeding crop varieties which are more nutritious and have potential to support economic and climate objectives.<br>• Also need to consider existing crops which are nutritious but currently neglected and under-commercialised (e.g. specific indigenous varieties). |
| → | **Co-benefits and trade-offs** | Economic | Research and development into improved crop varieties have a strong evidence base for achieving economic development for the poor. |
| | | Climate | Crop varieties can be improved to increase both nutrient density and adaptation to climate change.<br>Most biofortified varieties possess traits that make the crops more tolerant to abiotic stresses that are expected as a result of climate change. |
| → | **Key knowledge gaps** | | • If and how the adoption of improved crops varieties and more nutrient-dense varieties, including neglected (often indigenous) crops, leads to dietary benefits for low-income households reliant on markets to buy food. |

| **What can be done** | | | ***Support climate-smart agricultural practices and agroecological pathways which also benefit diets of producer households*** |
|---|---|---|---|
| → | **Potential for impact on diets of low-income families** | | Several research studies indicate the adoption of agricultural practices that enable adaptation to climate change, including climate-smart agricultural and agroecological practices, can also bring benefits to the diets of producer households. |
| → | **Factors to consider** | | • Need to consider context of implementation – evidence shows impact on the diets of producer households differs with factors such as agroecological zone, gender of household head, crop type and/or wealth of the farmer. |
| → | **Co-benefits and trade-offs** | Economic | Adoption of climate-smart agriculture practices can increase income for producer households. |
| | | Climate | There is a win-win between production practices that enable climate change adaptation and the diets of producer household (see above), although the mechanism which connects them is not clear. |

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| | **Key knowledge gaps** | | • If and how the adoption of climate-smart agriculture and agroecological practices benefits diets for low-income households reliant on markets. |

| **What can be done** | | | ***Ensure adoption of irrigation technologies and infrastructure supports diet diversity among producer households and climate adaptation*** |
|---|---|---|---|
| | **Potential for impact on diets of low-income families** | | A range of studies link the adoption of irrigation technologies and infrastructure focused on the production of nutrient-rich foods to higher dietary diversity among small-scale producer households. |
| | **Factors to consider** | | • Dietary benefits of irrigation appear to come when applied to nutritious foods grown by households.<br>• Irrigation can be a pathway to women's empowerment in agriculture. Need to consider gender dynamics, who has access to irrigation, and what is being irrigated. |
| | **Co-benefits and trade-offs** | Economic | Irrigation can bring benefits to incomes of small-scale producers.<br>Irrigation to boost production of staples may undermine production and consumption of nutritious foods. |
| | | Climate | Better use of agricultural water is a practice that supports climate change adaptation. |
| | **Key knowledge gaps** | | • If and how the adoption of irrigation, the form it takes, and what is being irrigated, influences the diets of low-income households reliant on markets. |

| **What can be done** | | | ***Leverage agricultural extension to improve productivity, climate adaptation, and diets of producer households*** |
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| | **Potential for impact on diets of low-income families** | | Evidence from a range of studies indicates that agricultural extension can lead to improved dietary diversity among women in producer households. |
| | **Factors to consider** | | • To bring benefits for low-income and female-headed households, care needs to be taken to select these households as participants for extension to avoid a bias towards wealthier farmers.<br>• The evidence of the impact of agricultural extension on women's empowerment is mixed; although some evidence indicates it benefits women if both women and men are targeted and transformative learning is integrated in the programme. |
| | **Co-benefits and trade-offs** | Economic | Agricultural extension has been shown to improve agricultural productivity. |
| | | Climate | Examples from assessments of agricultural extension indicate that agricultural extension services can promote sustainable natural resource management, conservation techniques and farmers' resilience to climate change. |
| | **Key knowledge gaps** | | • If, how, and what type of agricultural extension could benefit the diets of low-income households reliant on markets.<br>• The elements of agricultural extension that contribute to improving the diets of producer households, including the diets of all household members. |

| What can be done | | | *Manage risks of crop specialisation and generate co-benefits from production diversity for diet and climate* |
|---|---|---|---|
| → | **Potential for impact on diets of low-income families** | | There is no unambiguous direct relationship between production diversity and healthy diets. However, failing to consider the consequences of increasing specialisation on diversity at the level of farms, landscapes, nations, and globally, increases risks for rural producer households with poor links to markets, compromises the production of micronutrient-rich foods vital in the global diet, reduces the availability of diverse foods for national and global consumption, and favours production for animal feed, edible oils, and ingredients for ultra-processed foods. |
| → | **Factors to consider** | | • Risks of crop specialisation for diet, climate and environment can be managed using any of the options under this core guidance (i.e. adoption of more nutritious crop varieties, agricultural production practices which benefit climate, irrigation of fruits and vegetables, agricultural extension encouraging production diversity). |
| → | **Co-benefits and trade-offs** | Economic | Favouring diversity at the on-farm, landscape, national and/or global level is counter to trends over past decades to prioritise crop productivity from a small number of crops, indicating that under current models of development there may be some trade-offs involved. |
| | | Climate | Commercialisation of agriculture which brings economic development creates risks for climate and environment. Agrobiodiversity benefits biodiversity, which in turn helps benefit climate change and other environmental goals. |
| → | **Key knowledge gaps** | | • Empirical studies on how diversity at the on-farm, landscape and national level influences the diets of the majority of low-income households who rely on markets. |

## 2 Animal production

| CORE GUIDANCE | | | ***Maximise the nutrition, economic, and food security benefits of animal production for low-income households, whilst adapting to and mitigating climate and other environmental impacts*** |
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| **What can be done** | | | ***If investing into large-scale animal source food production, ensure products are accessible and affordable to low-income groups, and manage economic and environmental trade-offs*** |
| → | **Potential for impact on diets of low-income families** | | Animal source foods can be expensive for low-income families. Industrial-scale production can make animal source foods more widely available at lower prices. However, there is no evidence on whether these foods benefit the lowest-income households. |
| → | **Factors to consider** | | • There is no specific evidence that industrial-scale operations bring tangible improvements for the diets and nutrient status of the lowest-income households who would most benefit from lower-priced meat, eggs, and dairy. It needs to be ensured that an such investment brings direct benefits to these households.<br>• Investing in industrial-scale operations which only serve to provide more meat for households who already eat sufficient amounts for health and development should be avoided. Excess meat intake, especially red and processed meat, is a risk to human health.<br>• There are an extensive range of environmental and economic risks of industrial production which would need to be managed (see below). |
| → | **Co-benefits and trade-offs** | Economic | Industrial-scale operations can catalyse markets for inputs and services, potentially bringing benefits to smaller farms in proximity to large-scale farms. They may also generate employment.<br>However economic trade-offs emerge if they displace smallholder livestock and poultry producers. There also may be externalised costs created by environmental impact and disease spread. Industrial-scale production also creates risks for the spread of infectious disease in humans. |
| | | Climate | There are a range of complex trade-offs between livestock and poultry production and climate. Climate adaptation measures and mitigation to climate disruptions and consideration of the broader environmental impact would need to be built into all livestock and poultry investments. Although they tend to emit proportionately less greenhouse gases (GHGs) than smaller operations owing to enhanced efficiencies, industrial-scale operations still release GHGs, and create other environmental risks (e.g. soil and water pollution) and risks to the spread of animal and human disease. |
| → | **Key knowledge gaps** | | • How low-income households historically unable to afford animal source foods are impacted by large-scale industrial operations.<br>• How the complex economic, environmental, health and dietary trade-offs play out in practice. |

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| **What can be done** | | | ***In low-income rural settings, consider supporting household ownership of livestock and poultry with the objective of increasing consumption by women and children in the household and enhancing women's economic empowerment*** |
| → | **Potential for impact on diets of low-income families** | | Studies indicate that, on balance, ownership of cattle and poultry by low-income, rural households is associated with improved dietary diversity. This is a result of increased access to a source of animal source foods, and/or higher |

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| | | | incomes from the sale of animal products then spent on a more diverse diet. Dietary benefits are particularly notable for children (e.g. milk). Benefits can be more pronounced if women own the animals rather than just have responsibility for their care. |
| | **Factors to consider** | | • The gender implications of livestock and poultry ownership are complex; livestock and poultry ownership by women has been associated with higher intake of animal source foods among children, as well as empowering women economically, but household livestock ownership can also create significant burdens on women's time.<br>• Owing livestock and poultry introduces risks of diarrheal disease because of repeated faecal-oral transmission or zoonotic transmission of other animal diseases.<br>• Experience indicates that projects encouraging household production of ruminants and poultry must be well-designed to have impact and can fail if not tailored to context.<br>• No investments in livestock or poultry should be made without considering the trade-offs for climate (see below). |
| | **Co-benefits and trade-offs** | Economic | Livestock/poultry development contributes to poverty reduction both at household and community level. Owning cattle and poultry can increase income of low-income households. There can be trade-offs if economic benefits accrue from selling livestock rather than own consumption. |
| | | Climate | There are a range of complex trade-offs between any livestock/poultry-related project and climate; adaptation measures and mitigation to climate disruptions would need to be built into all livestock investments. |
| | **Key knowledge gaps** | | • If and how household livestock and poultry ownership influences access and affordability in local communities.<br>• How the complex economic, environmental, health and dietary trade-offs play out in practice. |

# 3 Market linkages

| CORE GUIDANCE | *Test and monitor investments in infrastructure and business models that link producers of perishable, nutritious foods to markets serving low-income households* |
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| What can be done | | ***Invest in storage technologies effective for nutritious perishables*** |
|---|---|---|
| **Potential for impact on diets of low-income families** | | Improved storage for nutritious, perishable foods (e.g. fruits, dairy) on farms, and during transportation and distribution, has the potential to increase production incentives, reduce food losses and food safety risks, and enhance the opportunity for transportation to markets. This in turn has potential to reduce costs and increase affordability for households reliant on markets, while also increasing food safety. |
| **Factors to consider** | | • Care must be taken to ensure storage solutions are relevant to linkages with markets that serve low-income households. |
| **Co-benefits and trade-offs** | Economic | Inadequate storage introduces economic costs for producers and creates economic inefficiencies in supply chains. There is therefore a potential for both more accessible, affordable, safer nutritious foods and economic benefits for supply chain actors, including producers and MSMEs. |
| | Climate | Improved storage can reduce food losses, which have significant environmental implications from the wasting of resources (e.g. needless production of carbon emissions), meaning there is a potential synergy with climate change mitigation.<br>For cold storage, trade-offs should be factored in between the energy expended and the energy saved in not producing foods that never reach the consumer. |
| **Key knowledge gaps** | | • How improving storage influences access and affordability of perishable nutritious foods for low-income households reliant on markets and for producer households.<br>• The relationship between storage, food losses, and food access and prices. |

| What can be done | ***Invest in transportation infrastructure that directly links producers of perishable nutritious foods to markets for low-income consumers, and manage risks*** |
|---|---|
| **Potential for impact on diets of low-income families** | As for storage, strong transport linkages have the potential to lower prices of perishable nutritious foods in markets serving low-income households. Modelling evidence suggests this is the case.<br>Public transport and proximity to markets facilitate market participation for producers, which in turn benefits the dietary diversity of low-income producer households. |
| **Factors to consider** | • Transportation costs may make an insignificant contribution to market prices and thus reducing them may have limited impact.<br>• Care must be taken to ensure transportation infrastructure directly links to markets serving low-income households, and investments are made in monitoring for impact on access, affordability, food losses and food safety. |

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| | | | • Improved transport links have been shown to expose previously remote areas to the risk of greater influx of foods high in fats, sugars, and salt and ultra-processed foods. Transport investments should thus always be assessed to manage risks for unhealthy diets. |
| → | **Co-benefits and trade-offs** | Economic | Lower transport costs can benefit producers' incomes and help them participate more competitively in the market. |
| | | Climate | As for storage, improved transport can reduce food losses, creating a synergy with climate change mitigation. Potential trade-offs with environmental impacts of transport should be assessed. |
| → | **Key knowledge gaps** | | • There is no empirical evidence of how improving transportation influences access and affordability for low-income households in markets in practice. |

| **What can be done** | | | ***Support the development of new business models to link producers to low-income consumers*** |
|---|---|---|---|
| → | **Potential for impact on diets of low-income families** | | New business models that aim to reduce post-harvest perishability through efficient aggregation and logistics have potential to reduce costs of perishable nutritious foods. |
| → | **Factors to consider** | | • There are recent innovations available, such as digitally enabled aggregation, that could provide inspiration for potential models. |
| → | **Co-benefits and trade-offs** | Economic | A synergy would be created if new business models benefit incomes of producers and/or supply chain small and medium enterprises (SMEs) and help them to participate more competitively in the market. |
| | | Climate | Reducing food losses benefits climate change mitigation. |
| → | **Key knowledge gaps** | | • There is no empirical evidence of how adopting new business models influences access and affordability of nutritious perishable food for low-income households in markets in practice. |

| **What can be done** | | | ***Increase capacity for public-private investments and management of fresh produce wholesale markets*** |
|---|---|---|---|
| → | **Potential for impact on diets of low-income families** | | Wholesale markets are a critical linkage for perishable foods between producer and low-income consumers. They are frequently the source of nutritious foods affordable to low-income households sold by wet markets and informal traders. Low-income income households in many LMICs tend to still shop from wet markets and vendors rather than modern supermarkets. |
| → | **Factors to consider** | | • Wholesale markets may be a particularly suitable vehicle for public investment, or public-private investment.<br>• Wholesale markets are also used to channel perishable products to export and to higher-income domestic markets. While this can bring economic benefits, it is important to ensure wholesale markets are providing for local markets that serve low-income households. |
| → | **Co-benefits and trade-offs** | Economic | Wholesale markets have the potential to bring economic benefits by channelling more share of the retail price to farmers and market, enhancing market connectivity through greater price transparency, and creating new/improved industrial and export opportunities. |

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| | | Climate | If wholesale markets have the infrastructure to reduce food losses, this has potential to benefit climate change mitigation. |
| | **Key knowledge gaps** | | • There is no empirical evidence of how investing in wholesale markets influences access and affordability of nutritious perishable food for low-income households reliant on markets in practice. |

| **What can be done** | | | ***Support farmers in engaging with public procurement to institutions providing healthy diets to low-income children*** |
|---|---|---|---|
| | **Potential for impact on diets of low-income families** | | School meal programmes exist in around 161 countries, providing a direct benefit to at least 388 million pre-primary, primary and secondary schoolchildren, and a food safety net for low-income households. Evidence indicates that providing meals at school means children are more likely to attend school, which brings particular benefits for adolescent girls and enhances gender equity. They also present an opportunity for the development of market linkages with farmers through "home-grown school feeding" (HGSF) programmes. |
| | **Factors to consider** | | • Producers need support to enable them to effectively link to schools (and other institutional markets) so they can commercialise their products, meet required standards, have price information, access to infrastructure etc.<br>• Guidelines are needed to ensure the food provided in schools meets children's nutrient needs while also limiting unhealthy foods. The zones immediately outside schools also need consideration, given the prevalence of kiosks and vendors selling unhealthy snacks. |
| | **Co-benefits and trade-offs** | Economic | Linking with school food programmes reduces uncertainty and risk for producers engaging with markets. They also have the potential to catalyse investment in commercialisation investments by giving security of offtake, provided attention is given to ensuring a viable plan for supply chain to be competitive selling into private markets in medium-long term to ensure sustainability.<br>An analysis of school feeding programmes in 14 countries estimated they generate a high return on investment. |
| | | Climate | The World Food Programme have proposed that home grown school feeding is beneficial for climate change, on the basis that short food chains reduce lengthy transportation, reduce food waste and can stimulate the adoption of climate-smart agricultural practices. |
| | **Key knowledge gaps** | | • How school feeding impacts the total diet of low-income school children. |

# 4 Cross-border trade

| CORE GUIDANCE | *Leverage benefits and manage risks of cross-border trade for healthy diets in both exporting and importing countries while advancing economic objectives* |
|---|---|
| **What can be done** | ***Focus inter- and intra-regional trade on nutritious foods while managing benefits and risks for diet in both exporting and importing countries*** |
| **Potential for impact on diets of low-income families** | Regional trade in fruits, vegetables, dairy, wholegrains, legumes and fish could have the result of reducing prices in importing countries and enhancing access when supplies are inadequate. In exporting countries, production of nutritious crops for exports could stimulate investment in infrastructure for domestic production and market linkages for domestic markets and create income-generating opportunities for low-income households. |
| **Factors to consider** | • Potential mechanisms include trade corridors to facilitate exports from lower-priced to higher-priced countries; technical assistance to identify tariffs, cross-border procedures/processes, food trade/handling infrastructure, and non-tariff measures that present barriers to inter-/intra-regional trade of nutritious foods; and upgrading of food testing to help enable enforcement of standards on packaging, labelling, cleanliness, pests and foreign matter, aflatoxin levels and moisture content.<br>• There is no specific evidence on how cross-border trade improves diets of low-income households. Focusing such trade on nutritious foods also brings risks for diet. Imports may displace domestically produced foods and their producers, and/or could fail to benefit low-income households if the foods remain unaffordable. In exporting countries, cross-border trade may lead to nutritious foods that would have been consumed domestically being exported, reducing supply and raising prices. |
| **Co-benefits and trade-offs** – Economic | Regional trade is a tried and tested economic development strategy. Aligning it with increased access and affordability of nutritious foods would create a synergy. |
| **Co-benefits and trade-offs** – Climate | N/A |
| **Key knowledge gaps** | • How regional trade in nutritious foods affects access and affordability and consumption by low-income households in both exporting and importing countries. |

| **What can be done** | ***Support capacity building for the nutrition community to engage in and monitor national trade facilitation and policy activities and advocate for complementary policies*** |
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| **Potential for impact on diets of low-income families** | Consideration of healthy diets is typically missing from discussions on trade. Capacity building for the nutrition community to engage in discussions and negotiations about trade issues could contribute to greater consideration of diets, food prices and access among low-income producer and consumer households in trade discussions. |
| **Factors to consider** | • Capacity building could enable nutrition experts unfamiliar with the language and processes of trade to: engage in relevant discussions and learn how to make nutrition action more coherent with trade policy; flag legitimate concerns about the risks of cross-border trade policy for unhealthy diets (trade in edible oils, sugary drinks, snacks and other ultra- |

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| | | | processed foods etc); monitor the dietary impacts of trade impact; and identify and advocate complementary nutrition policies and interventions to leverage benefits and manage risks. |
| → | **Co-benefits and trade-offs** | Economic | Increasing the engagement of trade advisers with nutrition could help advance co-benefits and manage trade-offs with healthy diets. |
| | | Climate | N/A |
| → | **Key knowledge gaps** | | • The direct impacts of trade and trade policy on food access, food prices, diets and nutrition among different income groups. |

# 5 Food processing

| CORE GUIDANCE | *Focus investment into food processing and manufacturing towards enhancing convenience, nutrient quality, safety and marketing of nutritious foods for which there is demand from low-income consumers* |
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| What can be done | | | ***Invest in ensuring large-scale food fortification programmes benefit low-income households*** |
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| → | **Potential for impact on diets of low-income families** | | Evidence shows that large-scale food fortification can produce positive outcomes for improving micronutrient status, especially among women. It is less effective for children under the age of 5. |
| → | **Factors to consider** | | • Fortification can fail to have impact if the food vehicle is not sufficiently widely consumed by target population and the level of fortification is not sufficiently high in the food product. Monitoring data on coverage and access will be needed to ensure fortified foods are reaching and having impact on low-income households, for quality assurance and compliance with standards, and to ensure it does not lead to over-consumption of foods high in sugar or salt, or ultra-processed foods.<br>• Consider taking steps to increase efficiencies and lower costs so products remain affordable, such as incentivising uptake of improved processing and milling equipment, and systems to improve production efficiencies and increase quality.<br>• Most effective programmes are mandatory. |
| → | **Co-benefits and trade-offs** | Economic | Food fortification is considered a cost-effective intervention with significant returns for relatively low cost. |
| | | Climate | N/A |
| → | **Key knowledge gaps** | | Coverage and access to fortified foods among those in greatest need. |

| What can be done | | ***Support growth of formal and informal suppliers of nutritious processed foods which enhance convenience and affordability to low-income consumers*** |
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| → | **Potential for impact on diets of low-income families** | Low-income households often face major challenges in having time, space, equipment, water, and energy to store and prepare perishable foods. Food manufacturers, particularly small manufacturers, lack resources in developing affordable healthier products. Supporting informal processors (e.g. local bakeries) or manufacturers of branded packaged products to develop nutritious products for the low-income market could help make nutritious foods more convenient while maintaining affordability. Products like quick-cooking bean flours; dairy products; processed forms of vegetables, fruits and fish; and products made with biofortified crops make already nutritious foods more convenient, requiring less time, fuel and water to cook. |
| → | **Factors to consider** | • Businesses providing nutritious products have often struggled with commercial sustainability. Technical assistance, appropriate market development and financing mechanisms could upskill and incentivise the informal and MSME sector active in food processing to improve the nutritional value, affordability and desirability of their produce. |

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| → | **Co-benefits and trade-offs** | Economic | Providing support for innovative food businesses to produce nutritious processed foods has the potential to generate business growth. However, there can be a trade-off for affordability of the products for low-income households and commercial viability. |
| | | Climate | Processing may increase the use of energy in manufacturing, through this could be mitigated by reduced energy use by households. |
| → | **Key knowledge gaps** | | • What business models work for affordability for nutritious foods and commercial sustainability in serving low-income markets. |

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| **What can be done** | | | ***Support improvements in availability and affordability of appropriate packaging technologies that increase safety, affordability, and desirability of nutritious foods for low-income consumers*** |
| → | **Potential for impact on diets of low-income families** | | Appropriate packaging can assist food processors and low-income consumers by increasing the shelf-life and durability of foods, which in turn has potential to increase food availability, affordability, and safety. |
| → | **Factors to consider** | | • There are a range of packaging solutions to consider, including aseptic packaging that enables transport and storage of otherwise perishable foods in ambient conditions, and small portion packaging to increase affordability to low-income households. |
| → | **Co-benefits and trade-offs** | Economic | Packaging assists with availability, affordability, marketing and distribution of nutritious foods. Availability and use of packaging products and services enables increased processing and value-adding in food systems, which can support economic development. But improved packaging and labelling (including the costs of compliance) can increase production costs and therefore reduce profitability or increase prices, which may make them unaffordable for low-income households. |
| | | Climate | Packaging can help reduce food waste but also potentially increases energy costs of food production. The food packaging industry often uses materials with high environmental impact. |
| → | **Key knowledge gaps** | | • How innovations in packaging affect availability and affordability of nutritious foods to low-income households. |

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| **What can be done** | | | ***Only invest in ultra-processed foods if health and nutrition risks can be managed*** |
| → | **Potential for impact on diets of low-income families** | | Ultra-processed foods bring no or minimal nutritional benefits. Very young children in LMICs regularly consume ultra-processed snacks with no nutritional value, potentially displacing more nutritious foods. Ultra-processed foods are associated with a range of negative health outcomes, including obesity and measures of cardiovascular disease. Limiting investments into ultra-processed foods to businesses who agree to improve their products would potentially reduce the nutrition and health risk posed by these foods. |
| → | **Factors to consider** | | • Measures to manage risks include reformulation programmes, nutrition labels, and replacing promotional advertising and marketing for unhealthy foods with healthier products. Businesses themselves are unlikely to be incentivised to take these measures without conditionalities on investment, extra support to undertake them |

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| | | | (especially MSMEs), and/or mandatory regulations (see “agriculture and food policy” below). |
| → | **Co-benefits and trade-offs** | Economic | Ultra-processed food businesses may generate jobs and economic development. Measures that affect profitability of existing products may create economic trade-offs. |
| | | Climate | It has been proposed that ultra-processed foods generate greater greenhouse gas emissions than minimally processed food. Current evidence is limited to one study from Brazil. |
| → | **Key knowledge gaps** | | • The economic impacts of measures to manage health and nutrition risks and if/how they impact on diets among low-income households.<br>• The climate impacts of ultra-processed foods. |

# 6 Low-income households

| CORE GUIDANCE | | | *Mobilise demand for nutritious foods from low-income consumers and reduce demand for ultra-processed foods* |
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| **What can be done** | | | ***For diet and nutritional impact on infants and young children, combine supply-side interventions with intensive nutrition education / behaviour change communication*** |
| → | **Potential for impact on diets of low-income families** | | Nutrition education and behaviour change communication techniques can ensure mothers and caregivers are informed about the diets needed for the healthy growth and development of their children. A meta-analysis of available evidence shows that social behaviour change communication strategies are on balance effective in increasing demand for dietary diversity in LMICs. |
| → | **Factors to consider** | | • Certain strategies are more likely to be effective than others; more intensive multi-faceted approaches are more successful. |
| → | **Co-benefits and trade-offs** | Economic | N/A |
| | | Climate | N/A |
| → | **Key knowledge gaps** | | • The impacts of different types of interventions and how they can most effectively complement supply-side interventions. |

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| **What can be done** | | | ***Consider investing in marketing activities that promote nutritious foods to low-income households and make ultra-processed foods less appealing*** |
| → | **Potential for impact on diets of low-income families** | | Commercial techniques used effectively to market unhealthy food products could be drawn upon to create demand for nutritious food for low-income households and reduce appeal of ultra-processed foods. |
| → | **Factors to consider** | | • Existing evidence of such approaches tends to come from high-income countries. It shows that in-store interventions can have direct impact on purchasing, but evidence for mass media campaigns is limited to knowledge and attitudes. The way campaigns are designed is likely to have an impact on their effectiveness. Marketing activities that aim to address the underlying reasons why people do not buy nutritious food and/or buy ultra-processed food have not been tried and are worthy of greater attention in order to be more motivational for low-income households. |
| → | **Co-benefits and trade-offs** | Economic | N/A |
| | | Climate | Campaigns could integrate considerations of food sustainability. |
| → | **Key knowledge gaps** | | • The type of marketing campaigns which effectively shift consumption towards healthier diets for low-income households. |

# 7 Financing for innovation

| CORE GUIDANCE | *Incentivise and support innovative financing solutions to support healthy diets for low-income consumers in a commercially sustainable and scalable way* |
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| What can be done | | | ***Consider creating performance-based incentives to help de-risk and/or improve the returns for companies and developers*** |
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| → | **Potential for impact on diets of low-income families** | | There is evidence that results-based finance (RBF) has the potential to reach poor target groups and improve healthcare delivery and coverage. |
| → | **Factors to consider** | | • While there are no examples yet of purely nutrition-focused RBF mechanisms, there are many examples of existing facilities in the agriculture and health sector, including one integrating health and nutrition for a Kangaroo Mother Care programme in Cameroon.<br>• For RBFs such as Development Impact Bonds (DIBs) to succeed, projects must have clear and measurable, though ambitious, social (e.g. nutritional) outcomes that can be achieved in a timely manner.<br>• Stimulating consumer demand for products differentiated by their high nutrition value is a significant challenge, especially for non-multinational corporations (non-MNCs). |
| → | **Co-benefits and trade-offs** | Economic | RBF projects can spur the development of new markets for high-impact agricultural technologies and services, increasing innovation, competitiveness, and productivity. |
| | | Climate | Untested as nutrition-specific DIBs are, it is possible that stipulating pure-nutrition outcomes could result in unintended negative trade-offs for climate outcomes. However, monitoring climate impact may increase the complexity (and monitoring cost) of the RBF and be beyond the scope of a lean DIB design. |
| → | **Key knowledge gaps** | | • Nutrition outcomes have not been well measured to date, and this is an opportunity for future RBF programs to set explicit targets and track progress towards nutritional outcomes. |

| What can be done | | | ***Consider reconceptualising and re-pricing nutritional risk into investments*** |
|---|---|---|---|
| → | **Potential for impact on diets of low-income families** | | Factoring in the risk of creating negative dietary outcomes from an investment (e.g. assessing regulatory, legal, and reputational risks as part of the 'social' component of an Environmental, Social and Governance (ESG) assessment) can incentivise more nutritionally responsible investments that have positive impacts on the diets of low-income consumers. |
| → | **Factors to consider** | | • There is no consensus around a proven, relatively simple, and low-cost way of factoring in the complex impacts of poor nutrition outcomes – these would need to be invested in themselves, tested, and adapted. |
| → | **Co-benefits and trade-offs** | Economic | • Many products associated with negative dietary outcomes (e.g. ultra-processed foods) are the most profitable for food processors and small-scale food vendors and kiosks. |

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| | | | • Societally, there are financial costs in ignoring nutrition. The Blended Finance Taskforce estimates there are US$4.5 trillion in hidden nutrition costs (malnutrition and obesity) in the US$10 trillion global food system. |
| | | Climate | • The functional mechanisms for measuring, tracking, and reporting climate risk (including as the 'environmental' part of ESG evaluations) could be adapted to included nutritional risk, with both being tracked alongside each other. |
| | **Key knowledge gaps** | | • There is a lack of consensus on the optimal framework for how to conceptualise the nutrition impacts of investments and activities, at an individual, community, or society level. |

| **What can be done** | | | ***Consider increased weighting for food investments with positive nutritional impacts for low-income consumers*** |
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| | **Potential for impact on diets of low-income families** | | Providing a weighting for positive nutritional impacts for low-income consumers theoretically helps to shifts incentives towards investing in activities most likely to achieve these outcomes. |
| | **Factors to consider** | | • Data needs to be gathered to establish a robust pipeline of opportunities and a credible track record of metrics around attractive social and financial returns. Such a track record could inspire new investors and encourage follow-on or blended financing from return-seeking investors already operating in the space. |
| | **Co-benefits and trade-offs** | Economic | By contributing to improving malnutrition and diet-related health, healthier diets also contribute to economic gains. Good nutrition enables people to be more productive and have greater capacity to engage in their own development. |
| | | Climate | • LMICs can better align dietary patterns with nutritional and environmental objectives, and in doing so avoid the consumption patterns of wealthier countries leading to high emissions, environmental, and biodiversity degradation. This can include adopting more plant-based diets with modest amounts of meat intake.<br>• Off-grid renewable energy is generally more expensive than fossil fuel for agri-driven industrialisation, and this influences affordability of nutritious foods. |
| | **Key knowledge gaps** | | • As characterises the wider practice of ESG evaluation, there are multiple frameworks being used to assess nutritional impacts. More knowledge needs to be acquired on standardised metrics for businesses and investors to ensure the frameworks are sufficiently robust to span across the value chain actors and measure both outputs and longer-term impact. |

| What can be done | | | *Consider providing blended finance to incentivise investment in MSMEs* |
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| → | **Potential for impact on diets of low-income families** | | MSMEs are responsible for most of the production, storage, processing and retailing of foods for low-income consumers. Designing financial products that support these ventures improves the availability of nutritious food to these consumers. |
| → | **Factors to consider** | | • Blended finance for MSMEs can be part of a longer-term goal of scaling to make them investable prospects for another tier of more commercial financing (not subsidised). |
| → | **Co-benefits and trade-offs** | Economic | • As MSMEs are integral to the food system and significant employers, increasing their access to finance for growth should have positive impacts on livelihoods of their stakeholders, and in creating new employment opportunities for the poor. |
| | | Climate | • Financial innovation for MSMEs in nutrition is often linked to climate finance (e.g. creating demand-side market opportunities in climate-friendly technologies such as distributed renewable energy in off-grid agricultural environments for irrigation, cold chain, and post-harvest storage and processing).<br>• Increased productivity and reduced losses in the food chain increase overall climate resilience for communities.<br>• Increased productivity and industrialisation in food systems can create trade-offs with climate goals such as increased emissions from livestock, fossil fuel use, environmental pressure on land and water resources, and agricultural encroachment on forests. |
| → | **Key knowledge gaps** | | • Studies on the impacts of blended finance are few; more specifically, there is currently insufficient evidence linking blended financing instruments to nutritional outcomes. |

| What can be done | | | *Consider providing credit and investment to women to empower them to make better nutrition decisions* |
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| → | **Potential for impact on diets of low-income families** | | Economically empowering women, including access to land and technology, increases their agricultural productivity and ability to feed their families. Providing more agricultural assets and enabling them to have greater control on economic decisions is shown to result in families spending more on children's nutrition. |
| → | **Factors to consider** | | • Access to finance is an enabler for empowering women to participate more in economic activity. A holistic approach also addresses other factors (cultural inhibitors, lack of access to education, childcare, skills and training, etc.). |
| → | **Co-benefits and trade-offs** | Economic | Closing the gender productivity gap will improve the income of poor families. |
| | | Climate | N/A |
| → | **Key knowledge gaps** | | • Most of the data on women in agriculture is collected descriptively or anecdotally and does not quantitively measure the impact of nutrition-sensitive or food system-wide interventions on actual nutrition outcomes. |

# 8 Digitalisation

| CORE GUIDANCE | *Incentivise, support and monitor innovative digital solutions to improve access and affordability of nutritious foods for low-income consumers* |
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| What can be done | | | ***Increase access to mobile phones, especially for rural and low-income women*** |
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| → | **Potential for impact on diets of low-income families** | | Mobile phone use, especially by women, is positively associated with household dietary diversity as it increases the ability of households to coordinate travel to market, reduces transaction costs, and improves information sharing leading to greater access to, and less wastage of, nutritious (but perishable) foods. |
| → | **Factors to consider** | | • The evidence suggests that mobile phone usage must be frequent to accrue the dietary benefits above. This indicates that phones need to be owned (i.e. with open access), not shared (i.e. with limited access), for benefits to be gained. |
| → | **Co-benefits and trade-offs** | Economic | Improved information from mobile phone ownership can give farmers and food producers access to better production inputs and technologies, leading to improved yields. They can also gain better access to output markets and price information leading to improved income. |
| | | Climate | Accessing information at times of food insecurity (e.g. droughts, pest infestations) can allow people to source and distribute food aid more effectively; important during climate events that create food shortages. |
| → | **Key knowledge gaps** | | • Disaggregated gender data is scarce, and effects of mobile phone access for women are not fully understood. |

| What can be done | | | ***Utilise mobile technologies to support delivery of nutrition information through extension*** |
|---|---|---|---|
| → | **Potential for impact on diets of low-income families** | | An estimated 13% of sub-Saharan African smallholder famers are currently registered with a mobile service for market information, weather updates, etc. They offer opportunities to share information that could improve dietary outcomes for low-income producers or consumers. |
| → | **Factors to consider** | | • Increased knowledge does not always translate into behaviour change since contact with extension workers as well as education is required. |
| → | **Co-benefits and trade-offs** | Economic | Improved access to extension services can improve yields and incomes (e.g. via using better inputs, planting and harvesting at the right time, better management of pests and diseases) and there is a strong evidence base for improving incomes for the poor. |
| | | Climate | Accessing information on weather, including climate-related variations of drought or flooding, helps farmers better prepare to mitigate impacts. |
| → | **Key knowledge gaps** | | • There is evidence of intermediary outcomes from mobile technologies delivering advice for better agronomic practices and dietary advice (e.g. adaption of farming practices), but no evidence for resulting nutrition outcomes. There is a corresponding lack of |

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| | | | data on what kind of information delivered via mobile leads to positive dietary outcomes. |

| What can be done | | | *Research and improve effectiveness and reach of technology for nutrition education and nutrition advisory to increase consumer demand for nutritional produce amongst low-income consumers* |
|---|---|---|---|
| | **Potential for impact on diets of low-income families** | | Nutrition education via technology can increase understanding and awareness of nutrition and therefore the appeal of a more diverse diet. |
| | **Factors to consider** | | • Reaching low-income households, and particularly low-income women, remains an immense challenge. Low uptake inhibits not only the effectiveness of the impact, but also the cost-effectiveness of delivery. Behaviour change is possible only if a user is active. Given these challenges, digital education must be complemented by in-person services and tailored content and delivered alongside larger efforts around infrastructure and literacy. |
| | **Co-benefits and trade-offs** | Economic | Behaviour change can be a costly and uncertain intervention, not necessarily providing the best value for money in comparison to other nutrition-pathways. |
| | | Climate | N/A |
| | **Key knowledge gaps** | | • The effectiveness of 'train the trainer' approaches using frontline workers with higher literacy and technology access, in settings where network connectivity, electricity access and illiteracy remain barriers to delivery. |

| What can be done | | | *Promote use of technology to capture data and monitor population-level shifts* |
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| | **Potential for impact on diets of low-income families** | | Lean, data-enabled approaches to collecting nutrition information can enable a real-time view (and even the predicting and forecasting) of nutrition trends in otherwise hard-to-reach populations, like the rural and low income, to allow for early intervention. |
| | **Factors to consider** | | • Whilst an early warning or other real-time monitoring system may indicate that individuals or communities are in or at risk of nutrition stress, this does not give answers to how to combat or mitigate such stresses. |
| | **Co-benefits and trade-offs** | Economic | Gathering of data can be relatively inexpensive, whilst the potential to safeguard loss of income through forewarning of weather events or disease in livestock can protect farmer livelihoods. |
| | | Climate | Low-income consumers are particularly susceptible to climate shocks to food systems that impact the availability or affordability of food – current, accurate data enables a swifter response and even advanced mitigation of these. |
| | **Key knowledge gaps** | | • Data from longitudinal studies using the gathering of large data sets is currently limited. The potential of artificial intelligence and machine learning technologies is yet to be fully understood or realised. |

# 9 Agricultural and food policy

| CORE GUIDANCE | *Build capacity for designing and implementing agricultural and food policy for healthy diets, while managing co-benefits and trade-offs towards achievement of the Sustainable Development Goals* |
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| What can be done | | ***Build capacity for a food system approach to implementation of national 'Pathways for Food Systems Transformation'*** |
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| **Potential for impact on diets of low-income families** | | The UN Food System Summit process in 2021 led to over 100 countries developing National 'Pathways for Food Systems Transformation' which bring together actions to improve different aspects of the food system in those nations. Many do not explicitly address the issue of unhealthy diets, nor provide mechanisms to manage conflicts, challenges, and trade-offs inherent in addressing multiple objectives. Investing in entities and experts able to provide support for implementation could help ensure nations implement actions to support healthy diets among low-income populations as part of their food system pathways, while actively promoting co-benefits and managing trade-offs with economic and environmental outcomes. |
| **Factors to consider** | | • The process of implementing the pathways is not yet clear and will likely depend on country commitment and prioritisation. The pathways do not constitute formal government policy. |
| **Co-benefits and trade-offs** | Economic | A core purpose of the activity would be to promote co-benefits and manage trade-offs between healthy diets and economic outcomes. |
| | Climate | A core purpose of the activity would be to promote co-benefits and manage trade-offs between healthy diets and economic and environmental outcomes. |
| **Key knowledge gaps** | | • The process would necessitate a 'food systems' approach to effecting change, which is as yet little tried and tested at a national policy level. |

| What can be done | | ***Support effective design and implementation of agricultural subsidies to enhance diets, environment, and economy*** |
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| **Potential for impact on diets of low-income families** | | Agricultural producer support has implications for foods available for consumption and their prices. Repurposing agricultural subsidies (typically applied on inputs in LMICs) away from staples and male control to incentivise production of diverse, nutritious crops and benefit gender empowerment could potentially lead to greater availability of diverse nutritious foods at local markets. Evidence already indicates that producer households in receipt of subsidies more often show improved dietary diversity, and that when women receive them, benefits to dietary diversity are greater. |
| **Factors to consider** | | • Agricultural subsidies are a highly political issue and efforts to change them often face political challenges. While the potential is there, the impact of repurposing subsidies on diet would likely be complex. |
| **Co-benefits and trade-offs** | Economic | Agricultural subsidies have major implications for public finances. Although agricultural subsidies are minimal in low-income compared to higher-income countries, they represent a large share of public budgets. Since subsidies are considered to contribute to higher food prices for a healthy diet, there is potentially a synergy between repurposing subsidies |

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| | | | to manage public finances while also reducing the costs of nutritious foods. |
| | | Climate | Modelling evidence indicates agricultural subsidies may affect greenhouse gas emissions. Reducing producer support could reduce greenhouse gas emissions. |
| | **Key knowledge gaps** | | • How the specific design of agricultural subsidies influences food availability and prices to low-income households, and how they could be designed to benefit diets of low-income households while also supporting economic and climate objectives. |

| What can be done | | | ***Invest in technical capacity and advocacy for the development of healthy food environment policies, and their implementation and evaluation*** |
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| | **Potential for impact on diets of low-income families** | | Healthy food environment policies include nutrition labels; warnings and regulation of misleading claims; restricting food advertising and marketing; taxes on sweetened beverages and other snack foods; mandatory reformulation, or targets for reformulation; and school food procurement policies. Evidence indicates they can have positive impacts on diet-related measures (e.g. lower purchasing of sugary drinks, nutrient quality of foods in the market). |
| | **Factors to consider** | | • A major challenge for Ministries of Health in developing these policies is opposition from some food businesses and trade associations, which creates 'regulatory chill'. Many governments have inadequate capacity and support for effective policy development which balances the different demands, nor to undertake monitoring and evaluation. Smaller food businesses will face challenges in adapting to these regulations, so will need support for their implementation. |
| | **Co-benefits and trade-offs** | Economic | Economic development is directly associated with rising intakes of unhealthy fats, sugars, salt, and ultra-processed foods. These foods generate profits for food businesses. Implementing healthy food environment policies could thus be viewed as negative economic trade-offs for food businesses, as indicated by opposition from food businesses on the basis they will lead to job losses. However, healthy food environment policies act to level the playing field for competition between food businesses, potentially incentivising them to compete for healthier foods. Policies could thus create economic/healthy diet synergies if the policies unleash creative innovation towards healthier foods. |
| | | Climate | Emerging evidence suggests that ultra-processed foods have greater GHG emissions than minimally processed foods. Reducing their intake is thus potentially a synergy for climate change mitigation. |
| | **Key knowledge gaps** | | • More evaluations of existing policies are needed to identify how they can be most effectively designed to reduce unhealthy diets among low-income households in LMICs. The evidence on the impact of 'unhealthy' foods on climate change is minimal. |

| What can be done | | *Support development of food-based dietary guidelines integrating nutrition and sustainability* |
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| **Potential for impact on diets of low-income families** | | Food-based dietary guidelines are national-level guidelines that provide population-level guidance on healthy diets. If they are developed based on the best available scientific evidence and promulgated to the public, they could inform low-income households about healthy diets. They can also be used to guide policy development. |
| **Factors to consider** | | • Food-based dietary guidelines are often inadequately disseminated and used to guide policy. Proactive efforts would be needed. |
| **Co-benefits and trade-offs** | Economic | N/A |
| | Climate | Food-based dietary guidelines integrating nutrition and sustainability are explicitly designed to enhance synergies between healthy diets and climate. |
| **Key knowledge gaps** | | • How food-based dietary guidelines actually impact on the diets of low-income households. |

# 1 Introduction

## 1.1 What is the purpose of this guidance?

The purpose of this guidance is to support organisations and practitioners involved in food system activities to design programmes and conduct policy engagement to enable the world's most vulnerable people to eat more diverse, healthier diets, while also meeting climate and/or economic objectives. In so doing, it aims to increase the efficiency and effectiveness of food system activities in achieving development goals. It provides guidance to help answer the question: **how can development activities in food systems be designed to align with healthier diets?** By "align" it refers to doing no harm – ensuring activities are not counter to the objective of healthier diets – and/or actively undertaking activities in support of healthier diets. While there are extensive opportunities for alignment, it recognises that food system activities will only be effective in aligning with the objective of healthier diets among low-income households if they purposefully focus on how to do so. Change can occur step by step, as nutritious food groups are added and, where necessary, less nutritious foods and ingredients reduced.

This guidance focuses on enabling healthier diets among low-income groups, including low-income households that are dependent on purchasing food in markets and farm/producer households. It includes a specific consideration for women, adolescent girls and children under five. Applying this guidance will enable food system activities, including those designed to commercialise farms and markets, to align more closely with national nutrition plans and regional and national policies on nutrition-sensitive programming. Box 1 sets out why healthier diets are so important for a range of development benefits.

This guidance sets out why taking opportunities in food systems has such potential to support the objective of healthier diets for low-income households. It then provides guidance organised by eight key entry points to facilitate programme advisers and implementing bodies to formulate a portfolio of food system activities designed to support these objectives.

The guidance is based on two types of sources:

1. Evidence from a specifically conducted review of the academic literature on the impact of food system activities on food environments and diets. The review largely identified papers on how food system activities influence the diets of farm households. This reaffirms the findings of an earlier review that there are very few published papers linking interventions in supply chains to food environments, diets, or nutritional outcomes (Allen and de Brauw, 2018).
2. Evidence from existing evidence reviews, guidance documents and reports.

The academic review largely identified papers on how food system activities influence the diets of farm households. This reaffirms the findings of an earlier review that there are very few published papers linking interventions in supply chains to food environments, diets or nutritional outcomes (Allen and de Brauw, 2018). This in turn reflects that the monitoring and evaluation of food system interventions on dietary indicators among farming/food producing and/or consumer households purchasing food in markets has not been systematically integrated into development programmes and policies. This is often due to the distal relationship between nutrition-sensitive food system activities and impacts on nutrition and diets as well as lack of sufficient metrics and tools (Global Panel, 2015). Improving elements of the food supply chain and food environment can serve to improve food access and availability but does not automatically flow to improved nutrition and dietary outcomes without complimentary actions to encourage healthy dietary practices such as social behaviour change. In a 2021 evidence gap map on the effects of food systems interventions on food security and nutrition outcomes in low- and middle-income countries, there was a dearth of impact evaluations and systematic reviews assessing outcomes of food access, food affordability, food availability and supply, and among interventions that assessed impacts on nutrition, diet quality and adequacy, most were generated from nutrition specific interventions (Moore et al., 2021).

This in turn indicates the importance of gathering routine monitoring data to guide the planning, coordination and implementation of food system activities. Guidance on how to monitor and evaluate food systems activities can be found in TASC's Guidance on Monitoring and Evaluation of Nutrition-Relevant Programmes. This guidance document and accompanying indicator tool provides an overview and key points to look for when monitoring for nutrition outcomes. It shows how to support more accurate measurement of programme impacts for all target populations, including the most marginalised women and children. The guidance also explains how to use the data generated through M&E efforts to reflect on

the contribution made by nutrition relevant programmes, and improve them as necessary to increase effectiveness.

## 1.2 Who is this guidance for and what does it include?

The primary audience for this guidance is programme staff and implementing bodies who are engaged in food systems activities. Food system activities are anything involving the food system, which includes "*everything and everybody that influences, and is influenced by, the activities involved in bringing food from farm to fork and beyond*" (Parsons et al., 2019). This includes the many elements, entities, institutions and people involved, and the drivers and outcomes of those activities and the interconnections between them. Relevant programme or policies include those which involve:

1. agricultural production practices and inputs
2. commercialisation of agriculture and agribusiness
3. post-harvest storage and distribution beyond the farm gate, and the entities involved
4. primary food processing and food manufacturing, such as by small and mid-sized enterprises
5. food provision and retail
6. infrastructure that directly affects food value chains (which include agriculture production and related inputs all the way along to waste, disposal and pollution), such as roads, storage or energy
7. nutrition education or behaviour change communication
8. jobs generation which includes food businesses
9. investment facilitation and finance development that affects any of the above

**Box 1. Why healthy diets matter: bringing benefits for nutrition, health, economic development and environmental sustainability**

A healthy diet is sufficient, safe, diverse and proportionate. It is made up of a diversity of safe, nutritious foods (e.g. fruits/vegetables, wholegrain/nutritious staples, legumes, animal source foods, and/or fortified and biofortified foods) in the appropriate amounts for nutrition and health in local contexts and at all stages of the life course. It is also limited in unhealthy fats, sugars and/or salt and ultra-processed foods.

A healthy diet helps to protect against malnutrition in all its forms, as well as non-communicable diseases (NCDs), including those such as diabetes, heart disease, stroke and cancer (WHO, 2020). Healthy diets, especially during pregnancy, can stave off developmental delay and neurocognitive impairment (Groce et al., 2014). Healthy diets do not automatically lead to improved nutritional status, given the role of other contributing factors (e.g. infectious diseases, physical activity) but are nevertheless necessary to achieve it. In contrast, poor quality diets contribute to children being desperately thin and prone to infection (wasting); women and men being too thin (underweight); poor child growth and development (stunting); people being deficient in important vitamins or minerals (micronutrient deficiencies); people carrying more weight than is optimal for health (overweight and obesity); and being at risk of chronic diseases because of excess intake of sugar, salt, and/or fat (e.g. diabetes) (Global Nutrition Report, 2016).

Poor diet quality contributes to high levels of these conditions around the world. Poor diet contributes to 6 of the top 10 risk factors for the global burden of disease, and for 5 of the 10 in nearly all countries (Murray et al., 2020). The problem affects all age groups. Only 21.3% of children aged 6–23 months are estimated to consume diets with adequate dietary diversity in LMICs. 42.8% of adolescents in Africa, the Americas, the Eastern Mediterranean, South and East Asia Western Pacific drink carbonated soft drinks at least once per day, while 20.6% eat vegetables less than once per day (Beal et al., 2019). Mean national intakes among adults only meet recommended targets for fruit in 2 out of 187 countries, 2 countries for vegetables, and 23 for wholegrains (Micha et al., 2015).

Malnutrition is particularly problematic for women, adolescents, children, and people with disabilities. Malnutrition can cause or exacerbate disabilities- those with disabilities are up to three times more likely to be malnourished and twice as likely to die from malnutrition (Hume-Nixon and Kuper, 2018; Kuper and Heydt, 2019). Inadequate nutrition among women has many negative impacts on their health and, if

they have them, the health of their children. Children of women experiencing undernutrition have higher risk of disease and death throughout their lives. Around one-third of women experience anaemia, and women are more likely to be affected by obesity than men (Global Nutrition Report, 2020).

By contributing to improving malnutrition and diet-related health, healthier diets also contribute to economic gains. Good nutrition enables people to be more productive and have greater capacity to engage in their own development. Evidence shows that people who experience malnutrition are less able to drive economic development. For example, stunting disrupts the critical 'grey matter infrastructure' – brain development – that builds futures and economies. Improved nutritional status supports human development throughout life and enhances mental and productive capacity. Reducing undernutrition is estimated to offer a $16 return for every $1 invested. Well-nourished children are 33% more likely to escape poverty as adults, and each added centimetre of adult height can lead to an almost 5% increase in wage rate. Nutritious and healthy diets are associated with improved performance at school. Children who are less affected by stunting early in their life have higher test scores on cognitive assessments and activity levels (Global Nutrition Report, 2017).

Diets are also central to addressing climate change and environmental sustainability more broadly. Food production uses 70% of the world's freshwater withdrawals and 38% of the world's land. Food accounts for 26% of all greenhouse gas emissions (Ritchie & Rosen, 2020). Modelling studies indicate there are a range of options for LMICs to better align dietary patterns with nutritional and environmental objectives, and that in general a climate-friendly pathway is necessary to avoid the consumption patterns adopted in wealthier countries. This can include consuming 'plant-forward' diets with modest amounts of meat intake (Kim et al., 2020).

Food systems activities can influence a range of different objectives including economic development (such as through job creation, commercialisation of agriculture, trade facilitation), climate change mitigation and adaptation (such as through supporting climate smart agriculture), poverty reduction and improved nutrition. This guidance is therefore for staff and organisations concerned with a wide range of activities towards different goals, with the potential for greater alignment in achieving these food system objectives.

# 2 How Food Systems Activities Impact Healthier Diets

## 2.1 Conditions influencing healthier diets among low-income households

Most people want to be healthy, and parents and caregivers (mainly women) everywhere aspire to good nutrition for their children. Yet there are many constraints, especially among people who experience disadvantages that prevent them from eating healthy diets. Evidence shows a number of conditions have to be in place to enable people to eat well. These overlapping factors can be categorised as:

- **Economic factors:** People must have sufficient income to afford a healthy diet as well as the assets (e.g. kitchen equipment, storage) and time needed to prepare one.
- **Food environments:** Nutritious food and healthy diets need to be accessible to people in their everyday lives, affordable, and positioned and promoted in a way that increases their appeal relative to food with little nutritional benefit or that brings potential harm. This amounts to the quality of the foods available to people (product), the places they are available, their prices, how they are (or not) promoted, and the information provided about the foods.
- **Knowledge and skills:** People need to know what a healthy diet is and the nutrient content of the foods on offer; and have the skills and literacy to navigate their food environments, and to prepare and serve a healthy diet and/or support others in their household to do so.
- **Social and cultural factors:** People are more likely to eat healthier diets if they live in cultures that find meaning and value in healthy diets, and if they have the social support (e.g. social network, peer support, gender norms, disability inclusion), and the psychological capacity (e.g. self-esteem, mental health) to motivate them to do so.

Ultimately, these factors influence the development of taste preferences and habits over the life course. Once habits and preferences are established, they can be hard to change – but still very possible with a concerted effort to change the range of factors important in any context. The relative importance of the different factors will vary significantly with context (for example social and cultural factors affecting the appeal of food will be more important in some places than others) and will require different portfolios of actions to change the ability of households to eat healthier diets.

At the moment, as indicated by the data on what people are eating (see Box 1 above), the conditions required to enable people to eat healthy diets are largely not in place. For example, low incomes combined with the cost of a diverse, healthy diet means that an estimated 3 billion people are unable to afford the cost of a healthy diet (FAO et al., 2020). Diets delivering minimum-needed nutrients cost three times more than diets meeting only dietary energy needs through starchy staples, and healthy diets are five times more expensive (FAO et al., 2020). In Africa, it is estimated that food and non-alcoholic beverages account for 23% of nominal expenditures (the highest share of all regions) (Ramachandran, 2021).

Along with the prices of food making affordability a challenge for low-income households, limited access (e.g. due to seasonal factors) to a diversity of safe and nutritious foods, combined with an excessive availability of highly-promoted sugary, fatty foods, means food environments are failing to make healthy diets optimally available, accessible, acceptable and appealing. The development of markets and economic development has facilitated the growth of unhealthy food environments, undermining efforts to address all forms of malnutrition.

Overcoming the constraints that prevent people from acquiring, preparing and eating healthier diets involves making changes to the systems that underlie them. For example, changing education systems so people have more knowledge, or changing social systems to influence gender norms. One of these systems is food systems.

## 2.2 The role of food systems in healthy diets

### 2.2.1 Food system entry points

**Any food system includes**

**The chain of activities from producer to consumer,** including the many elements, entities, institutions, and people directly and indirectly involved. This includes agricultural production, distribution, processing, manufacturing, and retail.

**The interconnections between the chain of activities** and elements, entities, institutions, and people involved, and economic, political, environmental, health and social outcomes that are produced.

*(Parsons et al., 2021)*

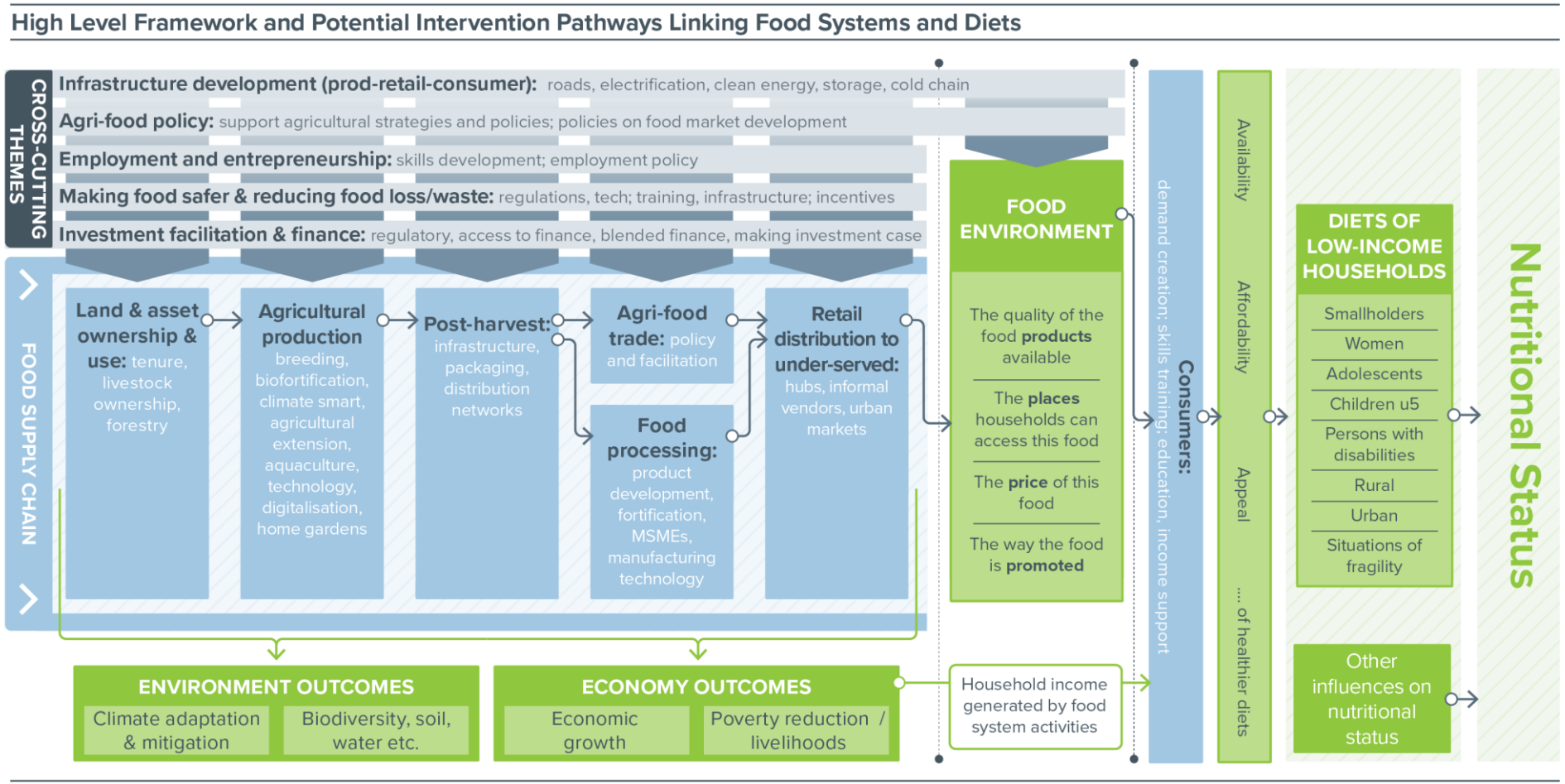
Food systems influence the conditions that enable people to eat healthy diets in several ways, with two being particularly important:

***Shaping food environments.*** The quality of available foods, where they are available, their prices and the way they are (or are not) promoted, are influenced by activities throughout the food chain. This includes production, processing, stored, distribution, trading, marketing and/or losses through the chain. People's food environments include foods available for purchase in informal and formal markets, and food that may be accessible in households through own-production (e.g. as farmers) or available to people in natural habitats (Downs et al., 2020).

***Shaping economic factors in households who work in food systems.*** For the millions of people who generate their livelihoods from food systems – whether it be from farming; working in micro-, small-, and medium-sized enterprises (MSMEs); in factories; as food vendors; in supermarkets, etc. – their employment influences their income, time burdens and the assets they own. In turn, this affects what foods they can afford, conveniently access and find appealing in the context of their lives. Historically, smallholder farming has been the main occupation of concern from a nutrition perspective, given that smallholders tend to experience elevated levels of poverty and malnutrition.

While changes in food systems alone will not be sufficient to enable people to eat healthy diets or achieve other development goals, they have an important contribution to make to shaping people's diets. Figure 1 shows a high-level conceptual framework of the entry points where intervening in food systems could achieve a change towards healthier diets, including for low-income groups, people with disabilities, farm households and women and children under 5. It shows how food system activities along the food supply chain (in blue boxes) affect food environments, which combine with factors in households, such as knowledge and skills, economic factors, gender norms etc, to affect food availability, accessibility, affordability, and appeal. These activities also have the potential to influence economic and climate/environment objectives. The cross-cutting themes represent broad areas where change is possible, with elements in the food supply chain (white writing) being more specific food system activities.

*Figure 1. High Level Framework and Potential Intervention Pathways linking Food System and Diets*



### 2.2.2 Food systems' contributions to healthier diets

Owing to the interconnections in food systems, food systems activities with the objective of enabling healthier diets have the potential to influence other development objectives, negatively or positively. Likewise, food system activities that aim to advance climate change or economic development objectives have the potential to influence food environments and the economics of households who work in food systems, which can then influence people's diets. Thus, emerges the opportunity for food system activities to achieve multiple objectives. That is, there are opportunities to ensure alignment (coherence); create synergies, i.e. when "*making progress on one policy objective makes it easier to make progress on another*" (OECD, 2021); and manage 'trade-offs' that emerge from the risks of unintended consequences, i.e. when making progress in one area leads to worse outcomes in another (OECD, 2021).

A food systems approach includes consideration of how food systems activities (Figure 1) can contribute to improving diets and extends beyond this to consider how they can also support other food systems goals. This approach can be defined as "*a way of thinking and doing that considers the food system in its totality, taking into account all the elements, their relationships and related effects*" (FAO, 2019). It involves the steps outlined in Box 2:

**Box 2. Four dimensions of taking a food systems approach**

1. Looking for **entry points throughout food supply chains**, from inputs all the way through to waste/disposal at the consumer end of the chain. For example, identifying how food processing or agriculture can be leveraged to improve diet-related outcomes. This could involve acting in one entry point to have ripple effects for positive change across the system, or multiple entry points to enable coherent change across the system (see 4).
2. Looking for **entry points across government departments and sectors**. For example, including nutritional elements in programmes primarily aimed at economic development or climate objectives.
3. Considering how activities designed to achieve one goal (such as healthier diets) can **align with (coherence) and benefit (synergies) other activities, and manage trade-offs**, seeking to engage with other sectors and stakeholders to do so.
4. Combining **complementary activities (from 1-3) into mutually reinforcing portfolios** to align the system towards different objectives, while managing trade-offs between objectives. For example, a portfolio of activities designed to change agricultural production, distribution networks, markets and access.

*(Hawkes, 2022)*

This guidance takes this food systems approach by bringing together these four dimensions. Organised by broad entry points, it provides options for what can be done in these entry points for collation into a portfolio of mutually complementary activities aligned with healthier diets. It considers how co-benefits can be created and trade-offs managed with climate and economic objectives.

# 3 Aligning Food System Activities with Healthier Diets

Two key steps are needed in planning food system activities to align them with diet-related objectives: set a diet-related objective; and then select a portfolio of activities to achieve that objective, drawing on the range of options provided in Section 4 and 5.

## 3.1 Set diet-related objectives

Food system activities will only be effective in aligning with the objective of healthier diets among low-income households if they purposefully focus on how to do so. The specific dietary shifts needed to benefit the health and development of low-income households will vary between local contexts and cultures. Therefore, a first step is to set specific diet-related objective(s) for the activity. This could be an explicit diet objective (e.g. consuming more of food x) or a food environment objective (e.g. lowering the price of food y). Setting diet-related objective(s) will require an understanding of the diet-related challenges and opportunities in the specific context and geography. The focus should be on low-income households, especially women and children and people with disabilities. From a practical perspective, it may be necessary to scope what the dietary challenges are in the context, and then finalise the objective once it is clear what food system activities are available to address the challenge. The TASC Guidance on Monitoring and Evaluation of Nutrition-Relevant Programmes and accompanying indicator tool can help identify how these diet related objective(s) can be measured. Not all diet-related objectives will be achievable through food system intervention. Diet-related objectives can include both objectives around dietary intake and measures of food environments:

- **Diet objectives:** Table 1 sets out the basic parameters of diet objectives – what shifting people towards healthier diets looks like. It shows that two elements are particularly important: (a) dietary diversity and (b) reducing intake (or at least, not increasing intake) of foods that contribute to a less healthy diet. Both are important to improve the quality of diets. What the direct objective should be depends on the diet-related problem in the given setting and the local context of that problem. Tools already exist to help set objectives through situation appraisal, notably guidance in the FAO publication *Designing nutrition-sensitive agriculture investments. Checklist and guidance for programme formulation* (FAO, 2015) (pages 4-20). The process involves asking questions such as "What are the most commonly eaten foods in the local diet?" and "What is/are the impact pathway(s) through which the programme is likely to impact?"
- **Food environment objectives:** A range of measurable elements of food environments can be used as objectives, including those related to food prices, the nutrient quality of food available, where and what food is available, and the information and promotion of that food (e.g. Downs et al., 2020). Tried and tested methods are also available to monitor food environments (Swinburn et al., 2013). Special considerations for setting and monitoring objectives are required in lower-income settings (Carducci et al., 2021).

*Table 1. What does shifting towards a 'healthier diet' look like?*

| Dietary shift | Evidence base |
|---|---|
| Increasing the **diversity of people's diets** to include a wider variety of safe, nutritious foods (e.g. fruits/vegetables, nutrient-dense staples, legumes, nuts/seeds, animal source foods, and/or fortified and biofortified staple foods) in the appropriate amounts for nutrition and health in local contexts and cultures. | • Diet diversity is an indicator of the quality of people's diets and sufficient intake of micronutrients. There is a direct relationship between higher diet diversity and reduced stunting. Three standard measures of diet diversity are Household Dietary Diversity Scores (HDDS), Women's Dietary Diversity Scores (WDDS) and Minimum Dietary Diversity (MDD) for children.<br>• Fruits, vegetables, wholegrains, legumes, nuts and seeds all reduce risks of diet-related ill-health.<br>• Fortified foods have been found to increase serum micronutrient concentrations.<br>• Biofortified foods address micronutrient deficiencies. |
| Increasing the **amount of animal source foods** (e.g. milk, eggs, meat) in the diets | • Animal source foods are a source of micronutrients and represent an important food group to support the nutrition of |

| | |
|---|---|
| of vulnerable groups where existing intakes are very low (e.g. women and children experiencing poverty). Decreasing the amount of red and processed meat among those who consume high levels of meat (tend to be wealthier populations). | infants and young children (notably milk). Studies show they can support child growth in low-income settings.<br>• Consuming red and processed meats in excess is associated with health risks. |
| Reducing the **amount of ultra-processed snacks, refined ready-to-eat foods,** and food and drinks high in unhealthy (saturated and trans) fats, added sugars and/or salt, including processed meats. | • Unhealthy fats, sugars, sodium and ultra-processed foods (UPF) are associated with poor health outcomes, including obesity and cardiovascular health. When eaten by infants and young children, they may displace more nutritious foods and thus have negative implications for stunting. |
| For infants, increasing **optimal complementary feeding practices and supporting breastfeeding**. | • Good complementary feeding practices are necessary for child growth.<br>• Breastfeeding protects against infant mortality and morbidity; increases intelligence; and is linked to a decreased risk of breast cancer for the woman. There is emerging evidence that it may also protect against obesity and diabetes later in life. |

*Source: Afshin et al. (2019); Dhor and Allen (2011); Elizabeth et al. (2020); Keats et al. (2019); Krasevec et al. (2017); Pagliai et al. (2021); Pries et al. (2019); Ruel et al. (2015); WCRF (2018); and WHO (2020).*

## 3.2 Select a portfolio of activities to align with diet-related objectives

The next step is to select a portfolio of activities able to achieve the diet-related objective(s), which is an important dimension of taking a food systems approach (Box 2). Evidence from efforts to address hunger, food security and nutrition indicate an integrated portfolio of activities will be needed to satisfy diet-related objectives (Barrett et al., 2020; Ceres2030, 2021; FAO et al., 2021). The *Ceres2030* report, which presents the results of an extensive review of the evidence on solutions to hunger, concluded that it is "*much more effective to create integrated portfolios of interventions rather than seek improvements in isolation*" (Ceres2030, 2021). *The State of Food Security and Nutrition in the World 2021* notes that "*interventions along food supply chains are needed to increase the availability of safe and nutritious foods and lower their cost*," and these portfolios "*need to be well targeted and provide incentives for all actors to change behaviour and to engage constructively in innovative and systemic changes that will lead to transformed food systems*" (FAO et al., 2021).

These portfolios also need to be tailored to context and different options selected to align the different entry points in the same direction. Specific options to select from are outlined in Sections 4 and 5. Each option should be selected to work together coherently to ensure alignment towards achieving the diet-related objective, while also considering economic and environmental goals. For example, ensuring that investment into more nutritious crops (**agricultural production**) is accompanied by an option to build **market linkages** (e.g. transportation to markets serving low-income households), a well as **mobilise demand from low-income consumers** through a motivational mass media campaign, all of which would involve some form of **financing** and potentially **agricultural or food policy** designed to create an enabling environment. Ensuring this alignment is particularly key given the target of low-income households, and the women and children within them. These households face greater financial insecurity which reduces their ability to have a full scope of choice of what is available on the market, more limited resources to prepare food, and are potentially more constrained by gender, disability, and cultural norms. This makes alignment with commercial objectives – producing food to generate jobs and profitability – a particular challenge (Henson & Humphrey, 2015; Humphrey & Robinson, 2015).

*Table 2. Summary of supply chain entry points and options for action*

| Supply chains entry points | Core guidance | Options for action to consider |
|---|---|---|
| **1. Crop production practices** | Support the adoption of crop production practices which improve dietary diversity of producer households and beyond while also benefiting economic and climate objectives | • Invest in breeding and/or adoption of nutritious crop breeds and biofortification as a win-win-win for improving diets, reducing rural poverty and climate change adaptation<br>• Support climate smart agricultural production practices and agroecological pathways which benefit diets of producer households<br>• Ensure adoption of irrigation technologies and infrastructure supports diet diversity among producer households and climate adaptation<br>• Leverage agricultural extension to improve productivity, climate adaptation and diets of producer households<br>• Manage risks of crop specialisation and generate co-benefits from production diversity for diet and climate |
| **2. Animal production** | Maximise the nutrition, economic, and food security benefits of animal production for low-income households whilst adapting to and mitigating climate and other environmental impacts | • If investing into large-scale animal source food production, ensure products are accessible and affordable to low-income groups, and manage economic and environmental trade-offs<br>• In low-income rural settings, consider supporting household ownership of livestock and poultry with the objective of increasing household consumption by women and children and enhancing women's economic empowerment |
| **3. Market linkages for perishable nutritious foods** | Test and monitor investments in infrastructure and business models that link producers of perishable, nutritious foods to market serving low-income households | • Invest in storage technologies effective for nutritious perishables<br>• Invest in transportation infrastructure that directly links producers of perishable nutritious foods to markets for low-income consumers and manage risks<br>• Support the development of new business models to link producers to low-income consumers<br>• Increase capacity for public-private investments and management of fresh produce wholesale markets<br>• Support farmers in engaging with public procurement to institutions providing healthy diets to low-income children |
| **4. Food processing** | Focus investment into food processing and manufacturing towards enhancing convenience, nutrient quality, safety and marketing of nutritious foods for which there is demand from low-income consumers | • Invest in ensuring large-scale food fortification programmes benefit low-income households<br>• Support growth of formal and informal suppliers of nutritious processed foods which enhance convenience and affordability for low-income consumers<br>• Support improvements in availability and affordability of appropriate packaging technologies that increase safety, affordability and desirability of nutritious food for low-income consumers<br>• Only invest in ultra-processed foods if risks can be managed |
| **5. Cross-border trade** | Leverage benefits and manage risks of cross-border trade and healthy diets in | • Focus regional and intra-regional trade on nutritious foods while managing benefits and risks for diet in both exporting and importing countries |

| Supply chains entry points | Core guidance | Options for action to consider |
|---|---|---|
| | both exporting and importing countries, while advancing economic objectives | • Support capacity building for the nutrition community to engage in and monitor national trade facilitation and policy activities and advocate for complementary policies |
| **6. Low-income consumers** | Mobilise demand for nutritious foods from low-income consumers and reduce demand for ultra-processed foods | • For diet and nutritional impact on infants and young children, combine supply-side interventions with well-designed, intensive nutrition education and behaviour change communication<br>• Consider investing in marketing activities that promote nutritious foods to low-income households and make ultra-processed foods less appealing |
| **Cross-cutting entry points** | | |
| **7. Digitalisation** | Incentivise, support and monitor innovative digital solutions to improve access and affordability of nutritious foods for low-income consumers | • Increase access to mobile phones, especially for rural and low-income women<br>• Utilise mobile technologies to support delivery of nutrition information through extension<br>• Research and improve effectiveness and reach of technology for nutrition education and nutrition advisory to increase consumer demand for nutritional produce amongst low-income consumers<br>• Promote use of technology to capture data and monitor population-level shifts |
| **8. Financing for innovation** | Incentivise and support innovative financing solutions to support healthy diets for low-income consumers in a commercially sustainable and scalable way | • Consider creating performance-based incentives to help de-risk and/or improve the returns for companies and developers<br>• Consider reconceptualising and re-pricing nutritional risk into investments<br>• Consider increased weighting for food investments with positive nutritional impacts for low-income consumers<br>• Consider providing blended finance to incentivise investment in MSMEs<br>• Consider providing credit and investment to women to empower them to make better nutrition decisions |
| **9. Agricultural and food policy** | Build capacity for designing and implementing agricultural and food policy for healthy diets while managing co-benefits and trade-offs towards the achievement of the Sustainable Development Goals | • Build capacity for a food system approach to implementation of national 'Pathways for Food Systems Transformation'<br>• Support effective design and implementation of agricultural subsidies to enhance diets, environment and economy<br>• Invest in technical capacity and advocacy for the development of healthy food environment policies and their implementation and evaluation<br>• Support development of food-based dietary guidelines integrating nutrition and sustainability |

# 4 Options for Action in Food Systems Chains with Diet-related, Economic and Environment Objectives

This guidance is organised by entry points in food chains, from production to consumers plus further cross-cutting issues (digitalisation, financing, and agriculture and food policy (Table 2). Each contains options and ideas which can be selected and collated into a portfolio of mutually complementary activities. Each activity and portfolio would need to be tailored to local context and diet-related objectives; it is thus not possible to be prescriptive. The guidance starts with the supply chain entry points and then moves onto the cross-cutting issues. A total of 33 options are provided (Table 2). They were identified in the context of current approaches taken to agricultural commercialisation and the need to align and/or manage trade-offs with economic and climate change objectives. All were shaped by the available evidence (or took into account where evidence was limited). Further options are also available elsewhere (e.g. Hawkes et al., 2020).

## 4.1 Crop production practices

**Core guidance: Support the adoption of crop production practices which improve dietary diversity of producer households while also benefiting economic and climate objectives**

**Rationale for core guidance**

The body of evidence on the direct impact of agricultural production practices on diet outcomes is restricted to producer households, typically small-scale producers (Table ). It indicates that relationships do exist between some agricultural practices and diet diversity, although results are dependent on local situations and conditions. The adoption of different production practices can enhance diet diversity either by increasing on-farm production diversity, which is then consumed by the household, or by increasing income through sale of the crops. Agricultural production practices also have important implications for economic/rural poverty and adaptation to climate change, making them a suitable entry point for leveraging synergies between economic, climate and nutrition objectives.

In this context, the following options should be considered:

### 4.1.1 Invest in breeding and/or adoption of nutritious crop breeds and biofortification as a win-win-win for improving diets, reducing rural poverty and climate change adaptation

More productive crop breeds have been a core driver of agricultural productivity, as illustrated by the *Green Revolution* (Pingali, 2019). Amidst concerns that gains are plateauing, there are new opportunities to reorient breeding towards climate adaptation and nutrition. An evidence review by FCDO of climate adaption and mitigation in 2019 indicates research and development into improved crop varieties is beneficial for achieving economic development for the poor as well as being a climate adaptation strategy. It notes that breeding of crops that are high yielding and tolerant to pests and diseases and drought/flood/salinity is strongly linked to climate change resilience outcomes, including increasing resilience to drought, flooding and disease, producing more stable yields and income. Evidence showed the benefits of flood-tolerant rice in South Asia; from Southern Africa during the 2016 El Nino, when drought-tolerant maize varieties with more stable yields outperformed popular commercial maize and thus provided more stable incomes; and from Ethiopia, where higher-yielding, disease-resistant varieties of wheat have been adopted at scale, covering more than 60% of farming areas.

While evidence is limited, several studies indicate that adoption of more productive crop varieties can bring direct benefits to the diets of farming households through higher incomes. For example, studies indicate that:

- In the mid-Zambezi Valley, Zimbabwe, farmers who allocate more land towards improved sorghum varieties increased household dietary diversity by 35% and reduced food insecurity by 29–34% (Musemwa & Musara, 2020)
- In Tanzania, adoption of climate-adaptive improved sorghum varieties increased farm household and women's dietary diversity scores (Kaliba et al., 2021);
- In Northern Ghana, adoption of improved rice varieties improved household diet diversity by 26% (Lu et al., 2021)

- In Malawi, the use of fertilizer on improved wheat varieties increased household diet diversity (Koppmair et al., 2017).

Improving the productivity of crops has, however, not been shown to improve diet diversity of general population and may cause damage if it leads to increasing production of specific staple crops at the expense of others (see section 4.1.5). To maximise the impact of breeding on diets, breeding should also consider crop nutrient density. Evidence is clear that the same crop types can have very differing levels of nutrient content; certain varieties of rice contain 2.5 times more iron than the average variety (World Bank, 2016). A World Bank report thus recommends that "*breeding needs to be expanded to include a focus on nutrient content to improve access to nutrient-rich foods and to a broader set of crops*," giving the example of a sorghum variety that has triple the amount of iron compared to average values while exhibiting high yields and drought resilience.

Choices can also be made about what type of staples and varieties to grow to diversity into more nutrient-dense varieties. Recent research shows that calcium, iron, selenium and zinc vary substantially between and within crop species (Gashu et al., 2021). Overall, the main cereals grown have lower levels of micronutrients than alternative staples (Defries et al., 2015). Among staples, maize typically has the lowest concentration of all four micronutrients. It could thus be expected that people relying on maize-based diets are likely to have the lowest micronutrient intakes. By way of example finger millet has calcium levels almost two orders of magnitude greater than in maize. The International Fund for Agricultural Development (IFAD)'s report *Food-system interventions with climate change and nutrition co-benefits* thus suggests farmers grow a diverse range of nutrient-rich varieties (See also Section 4.1.5). This includes currently neglected, underutilised (often indigenous) plant species which are nutrient-dense, such as quinoa, millet, sorghum or teff. Despite their potential, evidence for the adoption of these more nutrient–rich varieties on consumers' diets is minimal, indicating the need for careful monitoring and evaluation (M&E) on if and how they reach markets serving low-income consumers, their affordability and acceptability, and their impact on the diets of women and children.

Supporting biofortification is another option to consider. A review of evidence by FCDO focusing on social protection and agriculture for improving incomes of the poorest, indicates biofortification is linked to positive outcomes, including mitigating deficiencies in Vitamin A, iron, and zinc; having further impact on reducing diarrhoea in children (improved vitamin A); and improved cognitive performance (improved iron). A systematic review of the efficacy of iron-fortified crops concluded they significantly improved cognitive performance in attention and memory domains, compared with conventional crops (Finkelstein et al., 2019). Biofortification improves nutrition without compromising yields or agronomic traits, which removes these potential barriers to farmer adoption, especially when they cost no more to purchase. It is also cost effective (Dizon et al., 2021)– a 'good buy' relative to a cost/ benefit analysis of impacts on incomes. Biofortified varieties, including iron-fortified beans and orange-flesh sweet potato, are generally acceptable to households, although demand may need to be created by provision of nutrition information (Talsma et al., 2017). Moreover, according to the recent review *Food-system interventions with climate change and nutrition co-benefits* (Bakker et al., 2021) published by IFAD, most biofortified varieties "*possess traits that make the crops more tolerant to abiotic stresses that are expected as a result of climate change, and thus could potentially contribute to farmers' adaptive capacity – depending on the context*."

### 4.1.2 Support climate smart agricultural production practices and agroecological pathways which benefit diets of producer households

Climate-smart agricultural (CSA) practices include sustainable intensification of subsistence farming, water conservation, soil conservation, crop rotation, intercropping, protection against drought and disease, and conservation tillage. The objective of supporting their adoption is threefold: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gases emissions, where possible (FAO, 2013). Evidence shows that their adoption can also bring benefits for the diets of producer households. Several studies from a range of different settings indicate CSA practices are associated with higher dietary diversity in producer households, likely because of a combination of increased access to the foods produced, higher yields, and greater income to purchase food. For example, one study in the Punjab Province of Pakistan found that rural households adopting a higher number of CSA practices consume more diversified food compared to rural households with a lower number of practices at their farm (Ul Haq et al., 2021). Teklewold et al.

(2019) also showed adopting combinations of CSA practices leads to higher dietary diversity among households in Ethiopia.

Agroecological practices, such as crop diversification; intercropping or polycultures; agroforestry; integration of livestock and crops; and riparian buffers, are also associated with climate change adaptation and mitigation (Debray et al., 2018). A systematic review of the adoption of agroecological practices find on balance positive benefits for diets and nutrition among producer families (Kerr et al., 2021). Studies that include a social component (e.g. focus on gender equity) brought positive benefits.

Studies across the evidence base also indicated, however, that the dietary impact of the adoption of agricultural practices with potential to bring benefits for climate change differs with context (e.g. agroecological zone, gender of household head, crop type and/or wealth of the farmer), with no generalisable relationships yet emerging. There are also cases where they bring no positive benefits, further indicating the importance of tailoring to context.

### 4.1.3 Ensure adoption of irrigation technologies and infrastructure supports diet diversity among producer households and climate adaptation

A range of studies link the adoption of irrigation technologies and infrastructure focused on the production of nutrient-rich foods to higher dietary diversity among small-scale producer households. For example, a study conducted as part of the FCDO-funded *Leveraging Agriculture for Nutrition in South Asia* programme (LANSA) in Afghanistan showed that "*possession of irrigated land and garden plots are positively associated with household dietary diversity*" among small-scale producers (Kawsary et al., 2018). Most studies do not specify if this is because of increased income, food availability or other pathways. Kawsary et al. (2018) did establish, however, that it was because of both increased food intake from own production and greater diversity of food purchased at the market, indicating both pathways can be important. A systematic review of the evidence published in 2015 concluded that irrigation can also be an important entry path for women's empowerment (Domenech, 2015).

There is, however, potential for irrigation focused on staple crops to cause harm to the diets of producing households. One study showed that irrigation infrastructure used for high-yielding rice varieties led to increased rice intake and reduced dietary diversity among the poorest households, indicating that the nature of the irrigation and context influences the relationship (Hossain et al., 2015, cited in Domenech, 2015).

Irrigation technologies and infrastructure are also important for climate adaptation. IFAD's report *Food-system interventions with climate change and nutrition co-benefits* notes that better use of agricultural water will address potential climate-induced threat and recommends increasing irrigation systems to protect crops and livestock from loss due to changes in seasonal precipitation and extreme weather events (Bakker et al., 2021).

### 4.1.4 Leverage agricultural extension to improve productivity, climate adaptation and diets of producer households

Various studies indicate agricultural extension can have benefits for productivity, environment and diet of producer households, as illustrated below. To successfully reach low-income households it is critical to ensure selection of participants is not biased towards farmers with more land and resources (Larsen, 2014). Agricultural extension programmes have the potential to improve women's empowerment if both women and men are targeted and transformative learning is integrated in the programme (Najjar, 2013).

1. **Productivity:** A systematic review of the evidence of farmer field schools (FFS) concluded that FFS improved agricultural outcomes among participants, as measured by a 13% increase in yields on average and a 19% increase in profits or net revenues (Waddington, 2014). Studies from Bangladesh, Tanzania, Rwanda and Uganda have also reported increased production diversity as a result of participating in farmer field school interventions promoting agricultural diversification, kitchen gardens and vegetable production, or introducing new crop varieties (MoFA DK, 2011; Berg, 2020).
2. **Environment:** Agricultural extension services have been shown to improve environmental sustainability by promoting sustainable natural resource management and conservation techniques. Studies also indicate that agricultural extension increased farmers' resilience to climate change, drought and other shocks through reducing pesticide use, promoting sustainable natural resource management or conservation techniques (Berg, 2020). A study on FFS in the Philippines found that FFS-trained onion farmers had lower insecticide expenditures and increased profits compared to non-

trained farmers. The main objective of the FFS training was to encourage producers to lower their reliance on chemical insecticides as the main method for controlling pests in their farms (Yorobe, 2011).

3. **Diet:** There is evidence that agricultural extension leads to improved dietary diversity among farming households from different countries (Berg, 2020). A study in Tanzania measured the impact of mentor farmers providing legume seeds to encourage agroecological experimentation on children's dietary diversity and household food security. The study found significantly reduced household food insecurity and a modest but positive increase in diet diversity in the post-harvest season. Analyses by food group revealed an increased proportion of children consuming eggs, meat, dairy and legumes (Santoso, 2021). In Democratic Republic of Congo, an increase in household diet diversity security indicators was attributed to the FFS (Doocy, 2017).

### 4.1.5 Manage risks of crop specialisation and generate co-benefits from production diversity for diet and climate

Commercialisation of agriculture through cash cropping, increasing use of inputs, high levels of market participation etc. has historically been associated with specialisation and intensification of production. This approach prioritises crop yield over crop diversity and reduces biodiversity (Jackson et al., 2012; Bakker et al., 2021). Crop yield has grown very significantly over past decades whereas supply diversity has grown only minimally (Remans et al., 2014). At the global level, national food supplies globally have become increasingly similar in composition, based upon a small number of global crop plants, such as wheat, rice, maize and soybeans and other oil crops with relatively lower levels of micronutrients (Khoury et al., 2021; (Defries et al., 2015).

Numerous scientific reports stress the importance of producing multiple food products from a single parcel of land to support nature and climate (Bossio et al., 2021). Agricultural biodiversity or agrobiodiversity (the diversity of crops and their wild relatives, trees, livestock, fish, microbes and other species that contribute to agricultural production) brings benefits for biodiversity and adapting to and mitigating the impacts of climate change (Portner et al., 2021). For example, agricultural diversity is needed to maintain pollinators vital for global food security (Aizen et al., 2019).

With regard to impacts on diet, available evidence on the relationship between production diversity and diet is inadequate to provide the full picture. What is available suggests (a) the relationship is complex and varies between different scales and contexts; and (b) on balance, maintaining some level of diversity of production brings benefits for diets and environment and overreliance on a small number of species should be avoided. There are important distinctions between the on-farm, landscape, national and global levels.

- **On-farm level:** Evidence indicates that, on average, increasing production diversity at the farm-level brings relatively insignificant benefits to small-scale farm households compared to improved market linkages (section 4.3, Box 3). However, own-production diversity remains important for households who lack access to markets and/or where local markets provide inadequate supply or unaffordable nutritious foods and can be an important complement to improved market participation (Box 3).
- **Landscape level:** On balance, landscapes with a diversity of nutritious foods emerge as bringing benefits for diet diversity, including through production for local markets. Evidence from LMICs show more diverse landscapes yield more food and more nutrients (Herrero et al., 2017). The majority of fruits, vegetables, and pulses are produced in more diverse agricultural landscapes. Farm size is an important consideration. Smaller and mid-sized farms tend to be associated with greater diversity. It has been estimated that 53–81% of key micronutrients are produced by small and medium farms, which make up 84% of all farms and 33% of the land areas globally (Herrero et al., 2017). Landscape diversity can also bolster dietary diversity in rural landscapes in which market access is low. For example, a study in southern Ethiopia found that diet diversity is higher in forested landscapes because of the benefits proximity to forests bough to farming systems (Baudron et al., 2017).
- **National level:** Analysis indicates that for low-income countries, producing greater diversity nationally benefits diversity in the national food supply. However, as national income increases and countries access international trade, production and supply diversity are decoupled, with imports through trade provide an important source of diversity (Remans et al., 2014) (see also section 4.4). Trade openness has been linked to high levels of diversity of national food supplies (Dithmer & Abdulai, 2017; Krivonos

& Kuhn, 2019) but also increases availability of ultra-processed snacks, refined ready-to-eat foods, and food and drinks high in unhealthy (saturated and trans) fats, added sugars and/or salt.

- **Global level**: Reliance on a small number of crops at the global level reduces total production of micronutrient-rich varieties and reflects trends associated with less healthy diets: crop grown to feed animals; increasing amounts of edible oils and fats; and providing a source of low-cost ingredients into ultra-processed foods (Hawkes et al., 2012).

Mechanisms to maintain or increase production diversity and manage risks include options 4.1.1 - 4.1.5. Breeding more nutritious crop varieties and adopting more nutritious staples, including currently neglected species, increases production diversity by reducing reliance on a narrow number of nutrient-poor staple. Climate smart agricultural practices like intercropping support diversity and agroecological practices explicit incorporate crop diversity. Irrigation can support greater diversity by enabling fruits and vegetables to be supported. Agricultural extension services have also been shown to be a mechanism for encouraging production diversity.

## 4.2 Animal production

**Core guidance: Maximise the nutrition, economic, and food security benefits of animal production for low-income households whilst adapting to and mitigating climate and other environmental impacts**

**Rationale for core guidance**

Animal source foods bring important dietary benefits in small quantities as they are rich in micronutrients and protein, which are especially important for infants, young children, and women (Table 1. What does shifting towards a 'healthier diet' look like?). At the same time, high levels of intake of red meat is associated with diet-related disease. Intake in high- and some middle-income nations is already significantly in excess of recommended levels, though beginning to decline. In lower-income countries, consumer demand for meat is growing in a “livestock revolution” (Thornton, 2010; Wright et al., 2012). In Africa, for example, demand for animal source foods is projected to increase by 80% from 2010 to 2030 due to population growth, with similar growth in Asia driven by rising incomes and increased per-capita consumption (WEF, 2019). While this has potential to improve nutrition among the poorest households with children who would benefit from higher intake, increasing intake is largely driven by rising levels of income, suggesting the lowest-income families for whom incomes are not rising will not benefit (WEF, 2019; Milford et al., 2019).

With this high and/or rising demand, there are increasing concerns about the impact of animal production on the environment. Livestock contributes 14.5% of global greenhouse gas (GHG) emissions (Downing et al., 2017; Gerber et al., 2013), and contributes to land degradation, air and water pollution, and declines in biodiversity (Bellarby et al., 2013; Reynolds et al., 2010; Steinfeld et al., 2006; Thornton & Gerber, 2010). In turn, climate change will affect livestock production through increased competition for natural resources, reduced quantity and quality of feeds, livestock diseases, heat stress and biodiversity loss (Garnett, 2009). This has negative implications for rural livelihoods, employment, poverty reduction and economic development; it is estimated that one billion people are involved in livestock value chains globally (WEF, 2019). Intensive poultry production has also been linked with avian influenza viruses (e.g. Gilbert et al., 2017).

A key question is how to balance these complex economic, environmental, and dietary trade-offs to ensure low-income households benefit economically and nutritionally.

In this context, the following options should be considered where relevant:

### 4.2.1 If investing into large-scale animal source food production, ensure products are accessible and affordable to low-income groups, and manage economic and environmental trade-offs

Evidence shows animal source foods can be expensive for low-income families, especially given the costs of production in smallholder settings. Industrial-scale production of animal source foods – where large numbers of animals are confined in “concentrated animal feeding operations” (USDA) – tends to reduce the retail prices of animal source foods through efficiencies created by economies of scale and technologies. These farms are growing further in emerging and developing economies (Faunalytics, 2017). In some countries and subsectors – for example, dairying in Vietnam – they are the most rapidly

growing type of farm (Ngo, 2018). Technological breakthroughs, such as making cooling systems more affordable in hot tropical countries, are driving their growth, as are the spread of livestock expertise, equipment, genetics and vaccines, and the trade in animal feed. Established multinational companies, keen to expand into the world's growing economies, are behind much of this effort.

The pros and cons of these farms for economy and environment are well established. Economically, pros include the ability of industrial-scale farms to catalyse markets for inputs and services that benefit smaller farms in proximity. For example, in Mozambique large industrial chicken farms provided small and medium-sized farmers with chicks and vaccines (WEF, 2019). Livestock and poultry production facilities may also generate employment opportunities. However, cons include potential displacement of smallholder livestock producers and the costs of the environmental impact (WEF, 2019).

Environmental pros include fewer GHG emissions and requiring less land per unit of production than small-scale producers (WEF, 2019). Cons include negative environmental impacts, such as the requirement for significant energy inputs (e.g. cooling densely reared animals in warm climates); increased disease among the animals in close-contact populations; and increased production of biowaste that is not readily incorporated back into the supply chain. Evidence also indicates intensive poultry production brings risk for human disease, notably avian influenza viruses (e.g. Gilbert et al., 2017).

With regard to the diets of low-income households, while mass production has resulted in lower prices and more widespread consumption, these products may remain unaffordable for the lowest-income households. There is no evidence on the impact of establishing industrial-scale operations on the diets of children who stand most to benefit from greater intake of the micronutrients and proteins from animal source foods. The role of income in driving consumption and the still relatively high price of animal source foods suggests it may not affect the poorest of the poor (Milford et al., 2019). At a broader scale, industrial-scale livestock farms may also have negative impacts on the food supply given they rely on high-quality cereal grains and plant-based proteins (especially soybeans, or fishmeal derived from capture fisheries) (Wilde et al., 2002) grown on land that could be used for crops for human consumption.

Ultimately, investments into commercialising animal production need to be evaluated in their specific contexts for their ability to meet nutritional needs of the lowest-income households and their pros and cons for economy and environment. In any livestock or poultry investment, complex trade-offs between livestock-related project and climate will need to be considered. Some measures that potentially balance these trade-offs are listed in Table 3. Research is needed on assessments for implementing these adaptation measures, tailoring them based on location and animal production system, and assessing impacts on the diets of producer households and low-income populations whose nutritional status stands to benefit from greater consumption. Any approach to managing these trade-offs should consider the importance of ensuring sufficient access by low-income households while not incentivising excessive intake among wealthier groups.

*Table 3. Potential strategies to manage trade-offs between climate risk and animal production*

| Strategy | Potential options |
|---|---|
| **Encourage adaptations in areas of increasing water scarcity** | A recent review of the evidence *Food-system interventions with climate change and nutrition co-benefits*, published by IFAD, recommends:<br>• **Focusing on climate-resilient livestock breeds**, such as improved breeds of small ruminants<br>• Investing in **improving sustainable livestock productivity** (e.g. cost-effective approaches to fodder production, manure and pasture management), to reduce emissions and improve water retention/reduce soil erosion (Bakker et al., 2021). |
| | **Diversify farming to more drought-resistant food production** (smaller ruminants, drought-tolerant crops, etc.) in areas where water scarcity and desertification will intensify. Diversifying livestock and crop varieties can increase tolerance to droughts and heat waves and defend against climate change related diseases and pest outbreaks (Batima et al., 2005; IFAD, 2010; Kurukulasuriya & Rosenthal, 2003).<br>For low-income producer families, diversified production is also an insurance policy against extreme food insecurity in the event of a climate-related shock |

| Strategy | Potential options |
|---|---|
| | decimating a food or income source (as in the case of unprecedented locust infestations that have been blighting East Africa since 2019). |
| | **Support food grassland management practices to enhance forage production**. For 200 million pastoralists living in drylands, livestock are their primary productive asset. Moving their herds to find new water and fodder resources allows these herders to cope with a variable climate.<br>Improving grassland forage production, for example through grazing plans and participatory rangeland management, also restores soil health and increases livestock productivity (WEF, 2019). |
| **Make better use of resources, for example land, manure, water that are given over to livestock production** | Factor in efficiencies in feed, for example using **alternative technologies for livestock feeding** that mitigate the 'food-vs-feed' competition. For instance, the use of feeds from sources that i) cannot feed people and ii) do not compete with food crops for land. New technologies include the use of insect or microbe-based alternative feed, and circular systems using food surpluses and wastes (leave, stalks) biomass for conversion into high-quality livestock and fish feed. |
| | **Move from red to white protein** to reduce the feed conversion ratio (FCR) of livestock production. The feed conversion ratios of different livestock types make a compelling case for moving animal production away from beef and pork towards chicken, fish, and even insects. For producing 1 kg of live weight, feed requirement for chickens, pigs, and beef cattle are 2.5, 5, and 10 kg respectively (Collavo et al., 2005). For fish it is circa 1.2 kg (dependent on species and farm location) and insects circa 1.7 kg. A shift in production will necessitate supporting infrastructure of appropriate feed production, transport, and storage.<br>Looking at FCRs incentivises **the use of insects** not just as animal feeds. The higher feed conversion ratios also contribute to water use efficiency (Gardner et al., 1985) since a lower feed requirement means less water is used to grow that feed. Lower water usage also reduces the energy needed to pump or recycle more clean water for crops and livestock, adding to the benefits of farming insects and smaller livestock rather than larger animals (Gahukar, 2019). |
| | Breeding for more productive animals helps mitigate GHG emissions through requiring less nutrients to be provided to an animal to result in the same level of production (Van de Haar & St Pierre, 2006; Wall et al., 2010; Bell et al., 2011). However, **selective breeding for higher productivity** can harm animal health and welfare unless these effects are measured, controlled, and balanced by selection pressure placed on functional traits (Rauw et al., 1998; Lawrence et al., 2004). Whilst the GHG mitigation potential of breeding for increased efficiency and productivity may be significant, experience highlights the need for broader breeding goals to offset negative welfare consequences that in turn have economic and environmental costs (Lawrence et al., 2004). |
| **Mitigation through improved animal nutrition, health, and genetics** | Research is needed on **assessments for implementing these adaptation measures**, tailoring them based on location and livestock system, and assessing impacts on the diets of producer households and low-income populations whose nutritional status stands to benefit from greater consumption. |

### 4.2.2 In low-income rural settings, consider supporting household ownership of livestock and poultry with the objective of increasing household consumption by women and children and enhancing women's economic empowerment.

An evidence review for poverty reduction by FCDO found evidence that livestock development contributes to poverty reduction both at household and community level. There is also evidence that owning cattle and poultry can increase the dietary diversity of their owners through providing both access to a food source, and higher incomes from the sale of animal source food products (Koppmair et al., 2017; Lopez-Ridaura et al., 2018; Aweke et al., 2020). This is the case if livestock and poultry are raised primarily for sale or for household consumption.

Dietary benefits are particularly notable for children. Evidence indicates children in low-income (typically rural) households who own ruminants tend to benefit from greater availability and convenient accessibility of milk (the perishability of milk makes own consumption a common feature) (e.g. Leroy & Frongillo, 2007; Jin & Ianotti, 2014; Hetherington et al., 2017). In many cases, owners of poultry eat more meat and/or eggs (e.g. Lambrecht et al., 2021; Broaddus-Shea et al., 2020) and/or more diverse diets because of higher incomes (Romeo et al., 2016; Dizon et al., 2021). In some cases, poultry ownership may be more likely to be used for food than for sale (de Bruyn et al., 2018). Overall, owners of food animals, including poultry, tend to have higher household dietary diversity. This is due to livestock ownership being associated with higher incomes making animal source foods more accessible, as well providing a food source for children (Hossainn et al., 2021; Kabunga et al., 2017). In some cases, the relationship may be because households who own livestock are wealthier overall (e.g. Pradyumnya et al., 2021).

It is important to consider the complex gender impacts of livestock ownership. Around two-thirds of the world's poor livestock keepers are women and animals are often the only asset that women can own. (WEF, 2019). Livestock and poultry ownership by women has been associated with higher intake of animal source foods among children, as well as empowering women economically. However, household ownership can also create significant burdens on women's time (Katiuki et al., 2013; Gitungwa et al., 2021).

Other risks also need to be balanced. In terms of food safety, livestock ownership may be associated with diarrheal disease because of repeated faecal-oral transmission or zoonotic transmission of other animal diseases (Cliffer et al., 2019). Experience indicates projects encouraging household production of ruminants and poultry must be well-designed to have impact. For example, they should integrate a range of different complementary activities, consider women's empowerment (e.g. Nordhagen & Klemm, 2018), and purposefully focus on dietary benefits not just income generation (e.g. Haileselassie et al., 2020).

Whilst commercialising smallholder poultry production has not proved viable, mechanisms could be also considered to increased productivity. For example, interventions to make vaccines and wormers more accessible could have a significant positive impact on the health and productive life of birds (Wellspring, 2019) which could translate into their production of more eggs and healthier chicks, and increased consumption of these foods.

## 4.3 Market linkages for perishable nutritious foods

**Core guidance: Test and monitor investments in infrastructure and business models that link producers of perishable, nutritious foods serving low-income households**

**Rationale for the core guidance**

The emphasis of agricultural policies and programmes over past decades has been on supporting the availability and affordability of starchy staples (FAO et al., 2020). In contrast, nutritious foods in LMICs have received little attention, and face low levels of productivity, high production risks, and high transaction costs related to their storage, preservation, and transportation (FAO et al., 2020; Allen & De Brauw, 2018). This is important from a diet perspective because it has the effect of raising costs for consumers and producers. Most perishable, nutritious foods consumed in LMICs are produced domestically and regionally, including livestock, dairy, fruit, poultry, eggs, fish (wild capture and aquaculture) and vegetables, so it is critical to create market linkages at this scale.

In particular, stronger market linkages could address problems associated with storage and transport, which could also bring benefits to costs for producers, food loss and food safety. High food losses during production, handling, and storage reduce the economic efficiency of the value chain and have significant

environmental implications from the wasting of resources (i.e. land, production inputs and water to produce food which is never eaten, and needless production of carbon emissions). The harvest of some fruit and vegetable crops can be extremely time sensitive. Lack of adequate storage facilities limit the ability to store produce until times when prices are favourable and that enable extension through the seasons. Most fruit and vegetable crops and animal source foods cannot travel long distances to their next step on the value chain unless they are preserved in some way (e.g. through cold storage, drying, processing), which increases costs and presents risks for food safety and loss.

Investments into building market linkages for nutritious foods have the potential to reduce consumer prices due to decreased perishability and greater abundance of produce for sale, while increasing or keeping producer prices level – thus bringing economic benefits for producer households as well as the SMEs which dominate supply chains (AGRA, 2019; Allen & De Brauw, 2018). Building stronger market linkages for perishable, nutritious foods is thus widely recommended as priority for investment (FAO et al., 2021; Ceres, 2030, 2021; AGRA, 2019). However, evidence is limited on how building stronger market linkages influences retail prices and dietary benefits in practice. As set out in Box 3, there is good evidence that improved market participation by smallholders is associated with improved incomes and dietary benefits in these households, including among women and children. But this evidence does not extend to the majority of people who buy foods in markets. It is thus vital to take the approach of 'learning by doing,' and establish ways to monitor the impact of any activity on food prices, food loss, safety and access, expenditure and consumption among low-income consumers and producer households. While the impacts could be expected to beneficial, there also may be no impact if low-income consumers are not reached, or negative impact if improved linkages also increase the availability and affordability of unhealthy diet. When improving market linkages for perishable nutritious foods, it is also vital to consider gender and disability and to monitor potentially different impacts on women and men.

Experience suggests the following are worth testing and monitoring to bring co-benefits for diets, food loss, food safety and lower costs for producers and SMEs in supply chains:

**Box 3. Evidence on the association between smallholder participation in domestic and international markets, household diets and gender**

Studies of participation in cash cropping in Kenya (Ogutu et al., 2020); organised marketing systems in Kenya (Kihiu & Amuakwa-Mensah, 2021); degree of market participation in Zimbabwe (Murendo et al., 2018), Zambia (Mulenga et al., 2021) and Central Africa (Ochieng et al., 2019); access to public transport to markets in Northern Nigeria (Manda et al., 2020); proximity to markets in Zambia (Mulenga et al., 2021); and engagement in certified commercial organic farming in South Africa (Hendriks & Msaki, 2009) all show that **market participation brings positive benefits for household diet diversity**. One study from Ethiopia also found that diet diversity is higher in farm households who adopt storage technologies for grain (which also facilitate market participation) (Tesfaye et al., 2018). These findings appear to be the result of higher incomes enabling greater purchasing power for acquiring more diverse diets in markets. In some cases, own production was replaced by increase purchasing from markets (e.g. Murendo et al., 2018); while in others increased levels of purchasing from markets complemented own consumption (Ogutu et al., 2020).

Where producers are able to link to markets, market participation has a relatively more significant benefit for household diet diversity than **increasing on-farm diversity**, though both can be important (e.g. Snapp & Fisher, 2015; Sibhatu et al., 2015; Hirvonen & Hoddinott, 2017). A meta-analysis of the association between production diversity, diets, and nutrition in smallholder farm households published in 2018 showed that on-farm production diversity can lead to higher diet diversity, but the mean marginal effect is very small (an increase in production diversity by one crop/livestock tends to increase household dietary diversity scores by 0.06 food groups (Sibhatu & Qaim, 2018). These findings have led to recommendations to strengthen producer households' market integration as a means of increasing their ability to purchase non-staples (Gupta et al., 2020). However, on-farm production diversity is likely to remain important where farms are very isolated from markets (Luckett et al, 2015). In addition, studies show that cash-cropping can reduce dietary diversity for producers who do not directly benefit from market access, and where local markets do not provide sufficient nutritious goods (see Anderman et al, 2014). Other studies show that maintaining on-farm diversity benefits both household consumption and cash income for buying-in greater diversity (Bellon et al, 2020).

Evidence indicates that **gender is an important mediator between improved market linkages and household diets**. Women are less likely to participate in market activities or commercialized production, but when they do participate, they tend to sell larger shares of the production under their control compared to male farmers (Carletto, 2017). A study from Kenya found that household dietary diversity improves by 5.3 points on average when female farmers have access to agricultural markets. For men with access to markets, household dietary diversity improves by only 1.9 points (Kihiu & Amuakwa-Mensah, 2021). However, an even larger effect on household dietary diversity was found when both the woman and man in the same household had access to organised agricultural markets. Thus, commercialisation may potentially have different effects on household nutrition depending on the decision maker (Kilimani, 2020).

Studies of **engagement in production for export** are more limited and mixed. A study on an irrigated zone developed for commercial vegetable production in northern Ethiopia (for domestic and regional trade) found that farmers who participate in the vegetable business have substantially higher incomes and household food availability than those who do not (Gebru et al, 2019). Yet household diet diversity score declined, and child nutritional status did not improve; the reason is unknown, but the authors suggested it could be because of increased family labour in intensive vegetable production reducing time to access markets selling diverse food and/or preparing food; higher operational costs; reduction of diverse production for own consumption; or poor nutritional knowledge. The study concluded that multiple development interventions would be needed to also bring nutrition benefits.

In Kenya, a study of small-scale producers growing vegetables for export found that food intake among farmers in a semi-arid area less suited to growing the crops experienced no benefits, while in a well-suited area, farmers consumed more food (Chege et al, 2015). Another study of public-private partnerships established to engage Kenyan smallholders in export production for French beans and mangos showed that even where income increased, diets were not affected, which was attributed to income being spent on non-food items, the unavailability of diverse food items in the local markets, and limited nutrition knowledge (Wangu, 2020, 2021; Wangu et al, 2021). Relationships can be complex. A study from Ghana found that producers who dedicated more than 75% of their land to cacao had lower measures of food availability and access, but diet diversity was similar (Anderman et al., 2014). These households reported eating relatively more white tubers suggesting the quality of diets may have declined as a result of inadequate diversity of foods being available in local markets.

### 4.3.1 Invest in storage technologies effective for nutritious perishables

Evidence shows a range of storage technologies can be effective for fruits and vegetables, such as storage in hermetic containers and the use of improved packaging and cold storage (Stathers et al, 2020). Cold chain storage is considered particularly effective in reducing food losses but remains a challenge where refrigeration is limited (FAO et al, 2020). Trade-offs should be factored in between the energy expended on cold storage (unless renewables such as solar is used), and the energy saved in not producing foods that never reach the consumer. Storage infrastructure needs to be affordable and relevant for small businesses serving lower-income groups, as well as the types of foods being consumed by low-income groups. A pathway to serving poorer customers' needs to be developed and incentivised if a new technology needs to gain initial traction by targeting higher-income customers.

Improved storage can also enhance food safety via the reduction of food-borne diseases since storage and transport can reduce rotting and infestation. Training traders and truckers at wholesale markets can also reduce post-harvest losses and address food safety problems, such as aflatoxin in maize (Liverpool-Tasie, Reardon, Sanou et al, 2017).

### 4.3.2 Invest in transportation infrastructure that directly links producers of perishable nutritious foods to markets for low-income consumers, and manage risks

The *State of Food Security and Nutrition in the World 2020* recommends investing in road infrastructure as one means of increasing the affordability of healthy diets. The *Ceres2030* report on solutions to hunger also recommends investments in roads and storage ('food on the move'), noting they increase efficiency of production factors for small-scale producers and increase total factor productivity of agriculture

(LaBorde et al., 2020). Studies indicate public transport and proximity to markets facilitates market participation for producers (Manda et al., 2020; Mulenga et al., 2021) and that effective transportation can lower food prices. A modelling simulation reported in *The State of Food Security and Nutrition in the World 2020* estimated that investments in the road networks of 14 African countries could help raise the affordability of nutrient adequate diets through reducing transport costs by up to US$50 per household on an annual basis (FAO et al., 2020). Analysis suggests affordability of nutritious diets is negatively associated with rural travel times and access to electivity (Bai et al., 2021).

Still, it is not the de facto case that improvements to transport infrastructure will benefit the diets of low-income households. Transport infrastructure must be built so that the poor benefit, e.g. markets are geographically accessible for poor consumers. In some contexts, transportation costs may make up a minimal proportion of the retail price of perishable foods, and thus reducing them would make an insignificant difference (Hirvonen et al., 2021). Other factors such as degree of market competition and balance between supply and demand may be more important in influencing price. Cost savings for producers may also not be transmitted to consumers.

Transport can also bring unintended consequences for diets if it opens up previously remote areas to foods which contribute to unhealthy diets. Evidence from studies in north-western Nepal and the Brazilian Amazon show that increased access to markets increased the availability and consumption of foods such as noodles, chocolate, sweets and soda (Grocke et al., 2018; Oestreicher et al., 2020). A higher percentage of children are now reported to be overweight in these regions. Monitoring the impact of these investments is thus vital.

### 4.3.3 Support the development of new business models to link producers to low-income consumers

Along with physical infrastructure, stronger linkages will require business models that facilitate efficient distribution. New business models have emerged that aim to reduce post-harvest perishability between producer and consumer, using smart aggregation networks. For example, aggregators that collect perishable products and transport them directly to a network of chilling centres (Dodla Dairy, India). Other examples are digitally enabled aggregation of fruit and vegetables into warehousing and distribution depots (TWIGA, Kenya), and digitally enabled aggregation of horticulture produce into warehousing and wholesaler distribution (Tulaa, Kenya) (Tam, 2020). Rapidly growing new digital-enabled logistics services such as LORI and KOBO360 coordination platforms also offer potential to increase the efficiency of logistics (David Pilling, FT.com, 2019).

### 4.3.4 Increase capacity for public-private investments and management of fresh produce wholesale markets

Wholesale markets are a critical linkage for perishable foods between producer and low-income consumers, frequently being the source of nutritious foods sold by wet markets and informal traders utilised by low-income households. Low-income households in most LMICs still tend to shop at wet markets and vendors rather than modern supermarkets. According to The World Union of Wholesale Markets (WUWM), wholesale markets distribute 200 million tons of fresh produce per day, provide food to 90% of street markets, and eventually reach 3 billion consumers daily (WUWM, 2021). Improvements in logistics, hygiene, information technology, and simple value-added services could all generate positive knock-on effects for low-income consumers and producer households. For example, the World Bank's Future Drivers for Growth report (2020) makes a case for investing in wholesale markets on the basis that they have potential to reduce consumer prices and meet demand for improved quality of perishable produce by encouraging product differentiation by quality. They can also improve the ability of farmers, traders, transporters and wholesalers to achieve standards and certifications, while also bringing economic benefits. World Bank states that wholesale markets can:

- **Help channel more of the retail price to farmers and market players** that add value beyond aggregation and transportation, while serving as a key source of market data and pricing.
- **Reduce post-harvest losses** by improving transportation and storage of perishables and providing new value addition services that increase product life.
- **Enhance market connectivity** through greater price transparency and helping connect smallholder farmers to markets.

- **Create new/improved industrial and export opportunities** by shortening the supply chain for companies that source horticultural raw material for processing, reducing input costs, and making products more competitive on the international market.

An AGRA report on transport and logistics opportunities in Africa stressed that investment into many areas of logistics and aggregation should be left to an increasingly dynamic and vibrant marketplace of SMEs for assets such as “trucks, warehouses and trading stalls, mobile phones, and tarps, boxes, and packing sheds” (AGRA, 2019). However, the report also identifies a role for public (or public-private) sector investment in ‘big priority needs’, including “wholesale markets, roads, and electrification.” The report states that “investing in wholesale market infrastructure should be the number one priority, especially in secondary/tertiary cities and rural towns close to farms. This was the strategy taken by China in the 1990s and is reported to have been fundamental to their food system success (Huang et al., 2007).”

### 4.3.5 Support farmers in engaging with public procurement to institutions providing healthy diets to low-income children

Global estimates suggest there are at least 388 million pre-primary, primary and secondary schoolchildren receiving food at school in 161 countries (WFP, 2021). Given low, variable, and unpredictable incomes among low-income households, and lack of capacity and assets to prepare food, the provision of food at schools and early child centres provides a safety net for low-income families. While many children do not attend schools (e.g. many children with disabilities), evidence indicates that providing meals at school means children are more likely to attend school, which brings benefits for adolescent girls and enhances gender equity (WFP, 2021).

School food programmes also present an opportunity for the development of market linkages with farmers through ‘home-grown school feeding’ (HGSF) programmes, which exist in a range of countries. School food programmes can be accompanied by complementary services and programmes to support nutritional status, such as handwashing and deworming (GCNF, 2019). With these opportunities, school feeding is considered a multiple win for nutrition, economic, education, gender, and environmental benefits. An analysis of school feeding programmes in 14 countries estimated the cost of programmes serving 190 million schoolchildren was US$11 billion per year – but estimated annual human capital returns were US$180 billion: US$24 billion from health and nutrition gains, and US$156 billion from education. In addition, school feeding programmes offer annual social protection benefits of US$7 billion and gains to local agricultural economies worth US$23 billion (Verguet et al., 2020). The World Food Programme (WFP) also argue that HGSF is beneficial for climate change, on the basis that short food chains reduce lengthy transportation, reduce food waste and can stimulate the adoption of climate-smart agricultural practices (WFP, 2021).

Linking with school food programmes and similar institutional markets can support agricultural commercialisation and overcome constraints to developing market linkages by providing structured demand, reducing uncertainty and risk for farmers engaging with markets (Sumberg & Sabates-Wheeler, 2011). They also have the potential to catalyse investment in commercialisation investments by giving security of offtake, provided attention is given to ensuring a viable plan for the supply chain to be competitive selling into private markets in the medium to long term, to ensure sustainability.

To ensure producers can effectively link to these institutional markets, commercialise their products and meet required standards, investments in credit, extension, price information and infrastructure are needed, along with the provision of complementary services (e.g. training, credit, access to inputs and technology) (Sumberg & Sabates-Wheeler, 2011).

Guidelines are also needed to ensure the food provided meets children’s nutrient needs, and ensure unhealthy foods are limited. Evidence gathered by FAO from 33 LMICs with school feeding programmes revealed that only 13 (mostly from Latin America) reported official national guidelines and standards for food served in schools (eight were in the process of developing them at the time of the survey) (FAO, 2019). The majority were energy-based standards, with only three providing upper limits for saturated fat, sugar and sodium in their standards. The zones immediately outside schools also need consideration, given the prevalence of kiosks and vendors selling unhealthy snacks (Hawkes et al., 2019).

## 4.4 Cross-border trade

**Core guidance: Leverage benefits and manage risks of cross-border trade and healthy diets in both exporting and importing countries, while advancing economic objectives**

**Rationale for core guidance**

Trade policy and facilitation is a widely used strategy to advance economic development, job creation, poverty reduction, investment, and food security. High-value exports can bring significant income benefits to small-scale farmers, as well as empower women economically (Van den Broeck & Maertens, 2016; Maertens & Verhofstadt, 2015). With regard to diets, cross-border trade can bring both benefits and harms (Table 5; Zimmermann & Rapsomanikis, 2021).

**Benefits include:**

- Region and intra-regional trade in food can help balance out food surpluses and deficits.
- Trade facilitation (e.g. reducing documentation requirements) is associated with higher dietary energy supply and lower food deficits in African countries (Bonuedi et al., 2020).
- As low-income countries transition to specialised production of fewer crops, the ability to import boosts the availability of nutrients (Remans et al., 2014) (also see Section 4.1.5).
- Trade openness has been linked to high levels of diversity of national food supplies (Dithmer & Abdulai, 2017; Krivonos & Kuhn, 2019).
- Trade also has important implications for food safety.

**Harms include:**

- In countries with a high proportion of low-income farm households, imports have been shown to affect rural livelihoods and ability to access sufficient food (Mary, 2019).
- Exporting nutritious crops may deflect from domestic efforts to boost consumption (Wangu, 2021; Schneider & Gugerty, 2010; Chege et al., 2015). Evidence from horticulture indicates that higher exports are not associated with lower food availability in the exporting country (Van den Broeck & Maertens, 2016; Maertens & Verhofstadt, 2015). However, more evidence is needed to understand impact on consumption. Studies on the dietary quality of farm households engaged in export-led production of nutritious foods are minimal and mixed (Box 6).
- Evidence from a range of countries (e.g. South Africa, Central America, Vietnam, Thailand) indicates that openness to trade increases the availability of ultra-processed snacks, refined ready-to-eat foods, and food and drinks high in unhealthy (saturated and trans) fats, added sugars and/or salt, (Thow et al., 2015; Thow & Hawkes, 2009; Schram et al., 2015; Jensen et al., 2019; Werner et al., 2019).

While empirical evidence on the impact of trade on these outcomes for low-income households is relatively scant, the potential for both benefits and risks suggest activities to promote food trade should proactively consider how to align with the objective of healthier diets for lower-income groups, and purposefully consider and balance the trade-offs between the pros and cons of trade on nutrition as outlined above and in Table 5.

In this context, the following options for actions are recommended to be considered:

### 4.4.1 Focus regional and intra-regional trade on nutritious foods while managing benefits and risks for diet in both exporting and importing countries

Regional trade facilitation has historically focused more on staple grains. A starting point to align regional trade with healthier diets would be to focus on nutritious foods such as fruits, vegetables, dairy, wholegrains, legumes and fish. As summarised in Table 4, this could reduce prices and enhance access in importing countries when supplies are inadequate. In exporting countries, regional trade opportunities could stimulate investment in infrastructure for production and market linkages in domestic markets and create income-generating opportunities for low-income households. However, as a strategy, focusing regional trade on nutritious foods also brings risks for diet. In importing countries, imports could fail to benefit low-income households if the foods remain unaffordable. Imports may also simply displace domestically produced foods. In exporting countries, it may lead to foods that would have been consumed domestically being exported, thus reducing supply and raising prices.

*Table 4. How facilitation in cross-border trade of nutritious foods could support efforts to enable low-income households to access and afford healthier diets*

| Opportunity to benefit | | Risks to watch for |
|---|---|---|
| **Importing country** | • Greater availability of nutritious foods when there are inadequate supplies<br>• Greater availability of perishable foods during seasonal shortages<br>• Reduced prices of a greater diversity of nutritious foods, owing to lower production costs and better ability to access markets in exporting country<br>• Greater ability to manufacture fortified foods (if fortificants are easier to trade) | • Focus on high-value products benefits wealthier groups but are unaffordable for lower-income households<br>• Focus on foods already relatively affordable in domestic markets (e.g. vegetables) has null benefits<br>• More nutritious domestically produced foods are displaced<br>• More affordable domestically produced nutritious foods are displaced<br>• Ability of low-income farm households to generate income in importing country is undermined by imports |
| **Exporting country** | • Production of nutritious crops for exports creates extra supply for domestic markets, especially if international prices are low<br>• Production of nutritious crops for exports leads to greater investment in domestic infrastructure to build market linkages (roads etc.), thus enhancing access and affordability for domestic markets as well<br>• Income generated from producing for export enables households to afford more diverse diets<br>• Increased employment opportunities for women and subsequent higher control of income<br>• Good practices gained from producing safe food for export has spill-over impacts on safety of production for domestic markets | • Producing nutritious crops for exports reduces capacity to produce them for domestic markets<br>• Domestic prices of nutritious food rise<br>• Producers involved in export production reduce own-production and intake of nutritious foods, e.g. if female farmers have less access to land to cultivate foods for household consumption<br>• Greater proportion of income in hands of male farmers reduces women's control over purchase of nutritious foods<br>• Export opportunities primarily benefit farmers who already possess greater assets rather than bringing nutritional benefits to the lowest income households<br>• Foods failing to meet export safety standards are redirected to the domestic markets |

*Source: Adapted from Hawkes, 2015; Van de Broek & Martens, 2016*

Given the potential for both benefits and risks, regional food trade facilitation and investments in LMIC countries should proactively take into account how they can advance access to and affordability of safe, nutritious foods in the countries both importing and exporting the foods. Mechanisms which could be used to advance opportunities for benefit and manage risks are:

- Support countries to establish trade corridors between lower-priced to higher-priced countries for nutritious foods for which price is a barrier to access by low-income households in the importing country (Allen, 2017).
- Provide technical assistance to enable exporting and importing countries to identify tariffs, non-tariff measures, and cross-border procedures/processes and food trade/handling infrastructure that present barriers to regional trade in nutritious foods. The focus should be on nutritious foods for which supply is short in the importing country and/or where there would be a tangible impact on affordability for low-income households.
- Support upgrading of food testing to help enable enforcement of standards on packaging, labelling, cleanliness, pests and foreign matter, aflatoxin levels and moisture content.

Existing efforts to support regional trade with primarily economic goals should also be monitored to assess impact on diets. For example, Trademark East and Southern Africa, described in Box 6, has potential to bring co-benefits for the economy and diets of low-income households.

**Box 4. TMEA: facilitating improvements in nutritious food trade from Uganda to Kenya**

Uganda produces a net surplus of food produce that can benefit Kenya's net food deficit. Trademark East and Southern Africa (TMEA) research indicates that in 2018 over 300,000 metric tonnes (MT) of legumes, fresh fruit and vegetables were traded through Busia from Uganda to Kenya.

Busia traders procure tomatoes, mangoes, pineapples, oranges, watermelons, and bananas from various parts of Uganda, consolidate items at Busia, and then export to Kenya through various intermediaries. Key actors in the supply chain include Ugandan trucking companies/transporters of goods from collection centres to the Busia border; women traders at the Busia border who sort, grade and clean produce; traders (mainly men), brokers and politically connected trading/certification companies; wholesalers; and end buyers in Kenya.

Key constraints from practices that limit the potential volume, availability, affordability and quality of fresh fruits and vegetables traded include:

- Lack of cold storage infrastructure at the border, meaning the volumes traded are lower than they could potentially be.
- Lack of cold storage infrastructure leads to spoilage and quality reduction. Traders store surplus at Busia in wooden shacks, and then of the 73,000 MT of fresh fruits and vegetables ex-ported through Busia, TMEA estimate 22,000 MT (30% of the total) is exported informally. Moreover, it is estimated that Uganda loses US$2.4 million to US$5.16 million of export value due to spoilage of fruits and vegetables in Busia market (i.e. 10-50% of the total produce).
- Lack of enforcement of standards, and testing equipment for moisture or aflatoxins, means that grains, fresh fruits and vegetables exported are not inspected by the Kenyan authorities. As a result, the prescribed East African Community (EAC) standards of fresh fruits and vegetable trade are not practiced by Busia traders and other intermediaries.

TMEA are supporting development of improved border food handling and storage infrastructure, and trade practices to increase volumes, value and quality of food traded.

### 4.4.2 Support capacity building for the nutrition community to engage in and monitor national trade facilitation and policy activities, and advocate for complementary policies

It is well established that capacity development and technical assistance are needed to ensure governments of lower-income countries benefit from regional and international trade. Technical assistance is also needed to build capacity for agencies and bodies concerned with nutrition, so they are able to engage in discussions about trade facilitation and policy. The challenge of engaging in such discussions from beyond the trade sector is typically underestimated (Walls et al., 2015). In a rare case reported from Thailand where the trade and health communities have engaged successfully in conversations about trade, this kind of capacity building proved essential to the process (Thaiprayoon & Smith, 2014).

Capacity building is needed to:

- **Enable participation by the nutrition community in conversations about trade**, so they can raise issues relevant to diets among low-income households. This would also serve to educate the nutrition community about some of the complexities involved in trade. Experience from nutrition labelling indicates that if the nutrition community had a greater understanding of trade sector concerns, they would be more able to design approaches more coherent with trade and trade policy (Thow et al., 2018).
- **Enable the nutrition community to flag legitimate concerns about the risks of cross-border trade policy for unhealthy diets**. As noted above, evidence from a range of countries (e.g. South Africa, Central America, Vietnam, Thailand) indicates that openness to trade increases the availability of ultra-processed snacks, refined ready-to-eat foods, and food and drinks high in unhealthy (saturated and trans) fats, added sugars and/or salt to national populations (Thow et al., 2015; Thow & Hawkes, 2009; Schram et al., 2015; Jensen et al., 2019; Werner et al., 2019). There are scores of cases where vested interests have pushed back against nutrition policies designed to regulate the

marketing and labelling of these foods based on spurious concerns (Thow et al., 2018; Barlow et al., 2018). Having the nutrition community involved can help manage some of these risks and reduce the threat of 'regulatory freeze' among governments (see also Section 5.3.3.).

- **Build capacity for monitoring the impacts of trade by the nutrition community**. Far more knowledge and evidence is needed about the impact of trade and trade policy on food prices, access, diets and nutrition. Monitoring the impacts of trade could help provide some evidence from real-life cases, such as the impacts of exporting nutritious foods on local food prices and consumption. Generating this knowledge can inform how to manage risks and advance potential solutions for diets and nutrition, rather than assuming that tackling trade barriers will necessarily bring benefits (Torres et al., 2017).
- **Identify and advocate complementary nutrition policies and interventions to leverage benefits and manage risks**. This may be necessary to ensure trade measures bring benefits for low-income households and manage risks. For example, if imports increase the availability of fruits and vegetables but their prices remain high, social protection mechanisms could be implemented specific to fruits and vegetables. In another example, trade facilitation may create incentives for investment in the production and distribution of nutritious foods for export; this could be complemented by efforts to ensure investment in market linkages from the same production facilities to domestic markets. As already indicated, if trade increases availability of ultra-processed foods, complementary healthy food environment policies are needed (Hawkes, 2015) (see section 5.3.3).

Mechanisms that can be used to build capacity include political and financial support for trade-nutrition/health programmes in the relevant multilateral, regional and national institutions; technical assistance; training programmes; development of guidelines; trade-nutrition monitoring systems; and legal expertise.

## 4.5 Food processing

**Core guidance: Focus investment into food processing and manufacturing towards enhancing convenience, nutrient quality, safety and marketing of nutritious foods for which there is demand from low-income consumers**

**Rationale for core guidance**

The proportion of consumption of processed foods is increasing in LMICs. This is the case for the urban middle classes and the urban and rural poor. As exemplified in Box 5, trends differ between foods which have been minimally processed (e.g. milled or dried), those which are high processed but unpackaged (e.g. fried bread eaten as snacks), and those which are termed 'ultra-processed' i.e. manufactured into packaged ready-to-eat convenience foods, drinks and snacks with added sugars, salt and/or fats.

Evidence indicates processing can bring both benefits and harms for diets. On the beneficial side, all food processing increases the convenience of food, and thus typically saves women's labour and time. Drying can aid preservation through seasons, packaging can enhance the safety of food, and fortificants (e.g. vitamins) can be introduced into low-processed, widely used cooking ingredients (e.g. maize meal, flour,) (Augustin et al., 2016). On the harmful side, food eaten away from home is often high in unhealthy fats, salt and sugar, and 'ultra-processed foods' typically offer no nutritional benefits to populations at risk of both undernutrition and/or overweight and obesity. This is a concern for stunting, given that very young children in LMICs regularly consume ultra-processed snacks with no nutritional value, potentially displacing more nutritious foods (Pries et al., 2019). For example, a study in Egypt showed that 20.9% of total energy intake came from unhealthy snacks, biscuits, and cakes among 6- to 8-month-olds, 18.8% among 9- to 11-month-olds, and 9.0% among 12- to 23-month-olds. As indicated in Table , ultra-processed foods are also associated with negative outcomes for non-communicable diseases among adults. A recent study in Tanzania provided particularly penetrating insights into the dynamics of processed foods consumption, showing differences between various levels of processing with different groups, and the role of women's time in influencing purchasing (Box 4).

There is also emerging interest in assessing if the greenhouse gas emissions from ultra-processed foods are disproportionately high (Seferidi et al., 2020), with some considering that ultra-processed foods threaten all "dimensions of food system sustainability due to the combination of low-cost ingredients at purchase and increased consumption worldwide" (Fardet and Rock, 2020). One recent study using data from Brazil concluded that "low UPF diets seem to have lower GHG, water and ecological footprints" (Silva et al., 2020).

**Box 5. Processed food purchases in Tanzania**

In **rural areas,** processed food accounts for 76% of all food purchased. The majority is 'low processed' (58%), such as flours, edible oils, packaged milk. One percent is unpackaged 'high processed' food (e.g. fried snacks), 9% is ultra-processed (e.g. sweets, sugary and salty snacks, sugary drinks) and 8% is meals away from home. The rates are similar between the lowest income tertile (75%) and highest (77%), but with the lowest tertile consuming a higher proportion of low processed (60% vs 53%) and significantly less food eaten away from home (5% vs 12%).

In **urban areas**, the share of purchased food which is processed is similar to rural (79%), with 47% being low processed, 2% being high processed, 9% being ultra-processed and 20% being meals away from home.

The proportion of processed food, including ultra-processed foods, is thus similar between urban and rural regions. However, purchase share of ultra-processed food is significantly higher in **primary cities**, where consumption of low processed foods is also significantly lower.

Women at home with children purchase more unprocessed and lower processed, indicating they have time to prepare food but also buy low processed to avoid laborious chores (e.g. hand pounding of grain). Having kitchen assets (e.g. refrigerator, cooking stove) is associated with a lower proportion of eating away from home.

*(Sauer et al. 2021)*

In this context, the following options should be considered:

### 4.5.1 Invest in ensuring large-scale food fortification programmes benefit low-income households

Evidence (Table ) shows that large-scale food fortification can produce positive outcomes for improving micronutrient status, especially among women (it is less effective for children under the age of five) (Keats et al., 2019). According to The Global Alliance for Improved Nutrition (GAIN), fortification represents the most cost-effective and scalable solution to address micronutrient deficiencies (GAIN, 2018). Fortification is suitable for a broad range of products undergoing processing. This includes rice (where extruded processed rice is added to the basic grain), flour, porridges, vegetable oils, as well as more highly processed food like condiments (bouillon cubes, soy sauce, fish sauce, salt), dairy products, grain-based noodles and biscuits, and beverages (IFC, 2021). Food fortification is also estimated to be considered a cost-effective intervention with significant returns for relatively low cost (Olsen et al., 2020).

Extensive experience and written evidence suggest, however, that the effectiveness of fortification programmes in addressing nutritional needs of low-income households and women can be compromised through inadequate design. They provide insights into what is needed to ensure programmes benefit low-income households (Box 6). There are also options to improve efficiencies in the supply of fortified foods to ensure affordability by lower-income groups. These include:

- **Incentivising or supporting uptake of improved processing and milling equipment and systems** to improve production efficiencies and increase quality. The International Finance Corporation (IFC), for example, is exploring incentives for fortification equipment purchases within its investees, providing advisory to firms to help increase percentage of flour extraction, reduce grain spoilage and increase energy efficiency (IFC, 2021).
- Continue to **support investment in storage and supply chain logistics at post-harvest, aggregator and processor levels**, including drying facilities for grains, hermetically sealed storage bags, silos and cold chain facilities, to reduce post-harvest losses and contamination. The resulting increased volumes and quality of inputs could help improve capacity utilisation of the mills/processors, to reduce costs and improve output quality for consumers.
- In situations where there are deficits and/or high prices of raw material inputs, consider **advocating or supporting food trade policies that enable an increased supply and lower costs** (especially due to import tariffs, duties and rates) from wider regional or global markets.
- **Develop public-private partnership (PPP) models that are designed to stimulate supply chains for LSFF foods by giving reliable offtake commitments**, such as via government school feeding

programme procurement or humanitarian relief agencies (e.g. WFP). For example, CDC's investment into Africa Improved Foods (AIF) (CDC, 2021). Where this approach is used, carefully consider the extent to which these businesses will be sustainable at scale beyond the term of the public procurement stimulus/subsidy, if this is not envisaged to be permanent. It is especially important to consider how the businesses will create production efficiencies through the chain to improve the affordability and availability of LSFF for low-income households.

**Box 6. Factors enhancing effectiveness of food fortification programmes**

A systematic review of 41 reports and 76 research papers concluded that in LMICs there is strong evidence of health impact where food fortification achieved both high coverage and compliance (Osendarp et al., 2018). However, many countries do not have large-scale fortification programmes, and, where they do exist, mass fortification may not always reach the most vulnerable populations. This is because of inadequate coverage and compliance, and/or because the fortified foods are not affordable, accessible or widely consumed by the most vulnerable populations (Osendarp et al., 2018). A review of programmes in eight countries in 2017 showed that coverage of large-scale food fortification of edible oil, wheat flour, and maize flour varies greatly by vehicle and country, but is consistently lower among the most vulnerable (Aaron et al., 2017). One review of external quality assurance activities of staple food fortification programmes from 25 countries found that the percentage of foods meeting national standards averaged between 45 and 50% (Luthringer et al., 2015).

Experience of fortification suggests there are several ways to maximise the potential of investing in fortification and ensuring it addresses the nutritional needs of low-income groups, especially women (Aaron et al., 2017; Osendarp et al., 2018):

- Make programmes mandatory and integrate them into broader national nutrition strategies to address a significant public health need or risk.
- Select a food vehicle taking into account how many people are malnourished and where they live, as well as what food they eat. The food vehicle should regularly be consumed by a large proportion of the population, particularly the most vulnerable people.
- Monitor quality assurance and compliance with standards to ensure adequate fortification. This should be integrated into routine food control systems.
- National governments need to commit the requisite capacity, resources and sustained commitment for this effective quality control.
- Conduct periodic reviews to check assumptions about dietary patterns, including to avoid overconsumption of nutrients such as fats and trans fats.
- Evaluate impact of fortification on biological (e.g. on iron deficiency anaemia) and functional outcomes.

In addition, fortification programmes for specific nutrients tend to be treated as vertical interventions with limited alignment or harmonisation. Although many of the same actors and stakeholders are involved with the fortification of different food vehicles, programmes are often not linked. Work is needed to identify potential synergies and opportunities for greater efficiency in design, implementation, and monitoring.

*Adapted from Garrett et al. (2018)*

### 4.5.2 Support growth of formal and informal suppliers of nutritious processed foods which enhance convenience and affordability to low-income consumers

Low-income households often face major challenges in having the time, space, equipment, water, and energy to store and prepare perishable foods. Food manufacturers, particularly small manufacturers, lack resources to develop affordable, healthier products. Supporting informal processors (e.g. local bakeries) or manufacturers of branded packaged products to develop nutritious products to reach the low-income market can help make nutritious foods more convenient while maintaining affordability. Products like quick-cooking bean flours, dairy products, processed forms of vegetables, fruits and fish, and products made with biofortified crops makes already nutritious foods more convenient, requiring less time, fuel and water to cook. Table 5. provides examples of **formal** branded packaged products which are designed to benefit nutrition.

*Table 5. Examples of packaged processed foods design to improve diet quality produced by formal companies*

| Firm | Business Model |
|---|---|
| **KeBAL food karts** (Indonesia) – producing nutritious street food for children in Jakarta. From 2008-2011, Mercy Corps conducted the Kedai Balitaku (KeBAL or My Child's Cafe) programme to test the market for healthy street food alternatives. Four prototype food carts were created, and local entrepreneurs were recruited to run them. A nutritionist created a menu of inexpensive but nutritious food suitable for morning meals and snacks; Saatchi & Saatchi developed the KeBAL visual brand and a child-focused marketing appeal; DSM partnered with nutrition advice and provision of fortificants. | • Commercial consumer market<br>• Non-governmental organisation (NGO)-funded<br>• Did not sustain commercially after programme closure in 2013 |
| **Protein Kissee-La (Côte d'Ivoire) – fortified infant cereals targeting low-income consumer market. The company also purchases inputs from smallholder farmers in Côte d'Ivoire and the West African sub-region to provide a reliable outlet for their produce.** | • Mix of public/humanitarian, NGO and commercial low-income consumer customers<br>• Public and private funding<br>• Sustainable with significant sales into humanitarian market |
| **Nutriset – manufacturer of PlumpyNut and other treatments for chronic malnutrition, but also active in the commercial consumer markets with products such as QBMix and Growell products aimed at women and children. Nutriset also administrate the PlumpyField** network of producers who manufacture ready-to-use nutritional solutions such as PlumpyNut in countries where they are needed. | • European HQ<br>• Primarily sells into the humanitarian sector |
| **Dala Foods (Nigeria) – fortified instant cereal meals made from millet, sorghum, and maize, based on traditional foods that were time consuming to prepare. Income is diversified and increased via tea packing business and beverage brands.** | • Commercially sustainable SME<br>• Resilient indigenous food company founded in 1980<br>• Market-led product development and innovative niche marketing strategies (Gambo and Safiyanu, 2014)<br>• Also process and pack flours for humanitarian market |
| **KokoPlus (Ghana) – protein/micronutrient powder to be added to foods, targeted at parents preparing infant meals (6-24 months)** | • NGO<br>• Funded by multiple donors and born out of the Ghana Nutrition Improvement Program (GNIP)<br>• Not commercially sustainable |

A major challenge to producing nutritious processed branded foods via structured market distribution channels is that they may not be affordable or acceptable to low-income consumers. For example, a case study of a fortified yoghurt manufactured by Grameen Danone Foods Limited (GDFL) in Bangladesh found that the main reason for lack of purchasing was affordability (Agnew & Henson, 2018).

A second major challenge is business sustainability. It is notable that the majority of examples in Table 4 benefit in part or entirely from ongoing support from humanitarian, NGO, company CSR or public sources. In reviewing businesses developing nutritional products, Agnew and Henson (2018) noted that significant questions remain about "the sustainability of these businesses and under what circumstances, and the extent to which they can bring about improvements in the nutrient intake of poor populations at scale". By way of example, a public-private partnership project in Ghana supported by the Ajinomoto Foundation, designed to produce and sell an "affordable complementary feeding nutrition supplement via an inclusive social business model" (Ghosh et al., 2014), is still running at a deficit on a local company business base

(NutritionConnect, 2021), even though the product demonstrated acceptability among target households (Tano-Debrah et al., 2019).

One option is to focus on small **informal** processors (for example, village millers or bakers). These are highly prevalent within food supply chains in LMICs and are particularly important for low-income consumers (Robinson et al., 2016). They are better able to keep overall costs to a minimum by sourcing, processing and selling locally, in small quantities, and close to low-income consumers. They may, however, also have very low levels of profitability. A study of 'atta' production (milling cowpea) from artisanal food processing microenterprises in Cotonou (Benin) found that artisanal atta production creates jobs for low-income female youths but is a low-profitability business with a return rate of only 11.7% (Kpossilande et al., 2020).

Investment in more basic processed foods such as pre-cooked beans can offer more promising sustainable financial returns and reach larger groups of low-income consumers. Bean consumption is limited by the high energy and water requirements for cooking beans, as well as the long cooking time of two-three hours. Rapid urbanisation and the high cost of energy have fuelled the demand for fast-cooking processed foods. For example, in Kenya (the world's seventh largest bean producer, and second largest in East Africa (KenyaInvest, 2016)), 60% of beans are consumed on-farm, and of those marketed, 20% are processed (10.8% of the total) (IDRC, 2017). These products are primarily sold to individual consumers in urban markets, and by informal eateries and roadside vendors in industrial areas. While canned and frozen beans are available, they are often out of reach for most low-income households due to their high cost and/or the requirement for refrigeration (DDRC, 2019).

Technical assistance, appropriate market development and financing mechanisms could upskill and incentivise the informal and MSME sectors active in food processing to improve the nutritional value, affordability and desirability of their produce. For example, large-scale fortification is generally not accessible or practiced yet by small village mills, but equipment innovations and concessional financing mechanisms and innovations (such as equipment lease finance, discussed in section 5.2) make this an increasingly viable pathway to explore. Programmes and investments targeting processed nutritious food provision for low-income consumers should carry out detailed feasibility analyses and due diligence prior to programme implementation or investment disbursement. Teams should incorporate suitably qualified and experienced staff or consultants to conduct the assessments to a high quality, including experts able to assess the financial and commercial sustainability of businesses alongside experts in nutrition, food safety and public nutrition.

To deepen the evidence base and improve programme design and implementation in the future, research is needed into how to make business models more commercially sustainable. Commissioning ex-post M&E and learning activities to examine the effectiveness of support to the food processing sector to produce nutritious processed foods for low-income households, and qualitative research to explore success factors and reasons for failure where firms fail to sustain or scale sales into the low-income market, could provide useful insights.

### 4.5.3 Support improvements in availability and affordability of appropriate packaging technologies that increase safety, affordability, and desirability of nutritious foods for low-income consumers

Packaging separates food from the external environment and allows for food protection, food safety, reduction of food waste, consumer convenience, and communication (Yam et al., 2005). Appropriate packaging can assist food processors and low-income consumers by increasing the shelf-life and durability of foods. Aseptic packaging solutions enable transport and storage of otherwise perishable foods in ambient conditions (for example, UHT milk), particularly benefiting LMICs with sub-optimal cold chain infrastructure and high energy costs (TetraPak & SYSTEMIQ, 2021). This has potential to increase food availability and affordability. At the same time, improved packaging, and labelling (including the costs of compliance) can increase production costs, potentially reducing profitability or increasing prices, which may make nutritious packaged foods unaffordable for low-income households.

Optimised packaging solutions (e.g. in small portions) is one way to reduce cash outlays and increase food availability to the poor at the 'bottom of the pyramid' (Prahalad, 2019). Packaging also provides a vehicle to communicate the health benefits and costs of food to every consumer, through national food labels and other messaging.

Despite these potential benefits, the food packaging industry needs to further improve use of materials through more environmentally friendly packaging components and circular approaches. This is one of the greatest challenges for the sector to enable healthy diets and environmental sustainability (TetraPak, 2021).

### 4.5.4 Only invest in ultra-processed foods if risks can be managed

See also Section 5.3 on agricultural and food policy.

Investment in packaged, ultra-processed foods may help drive economic growth, supply chain opportunities or job creation. However, as noted above and in Table 1, these foods bring no nutritional benefits for populations at risk of undernutrition and/or obesity and diet-related disease. Analysis by The George Institute for Global Health shows that proportionally, more packaged foods are unhealthy in LMICs compared to high income countries (Dunford et al., 2019). Overall, around 70% of these packaged products are high in saturated fats, salt and added sugars, and low in fruits, vegetables, legumes, nuts and micronutrients (Dunford et al., 2019). Given their negative implications for diets and nutrition, where possible, investments in unhealthy UPFs should be avoided (even if fortified), unless the risks can be managed, and the investment brings significant benefits for jobs and income creation. USAID recommends that its programmes should "avoid processing that results in contaminated food and foods that are high in sugar, salt, or fat, which contribute to non-communicable diseases" (USAID, 2021).

One way to manage risks is to only invest in UPF processors on the condition they agree to measures to reduce the harms of consumption, such as through reformulation of high fat, sugar and/or salt processed foods; applying labels that clearly warn consumers of high levels of negative nutrients; allocating their marketing spend to healthier products; and/or enforcing healthy food environment policies implemented by governments (see section 5.3.3):

- **Reformulation programmes:** Processed foods can be formulated to reduce levels of sodium, unhealthy fats and sugar, and increase the amount of fibre and wholegrain. Reformulation can be 'by stealth,' where the intention is that consumers do not notice or promoted on the package and used to attract health-conscious consumers. Substantial evidence from both modelling (Federici et al., 2019) and real-world studies (Gressier et al., 2021) shows that reducing sodium and trans-fat content of processed foods leads to lower intake of these nutrients. There is less evidence about sugar and other fats. Many large transnational companies have reformulation programmes, but not all and monitoring by the Access to Nutrition Index indicates not enough progress has been made to date (ATNI, 2021). Some governments also require mandatory reformulation (e.g. South Africa) or set voluntary targets for companies to follow (e.g. UK). From a food manufacturer's perspective, reformulation can be expensive and creates risks if sales do not increase to allow for higher costs (Gressier et al., 2020). There is little information available about capacity for reformulation in smaller food manufacturers. Investing through public-private partnerships to support reformulation could help reduce the risks of reformulation for food manufacturers.
- **Nutrition labels**: Following Codex Alimentarius, many countries require packaged foods to carry nutrient lists. A meta-analysis of 60 studies found that nutrient labels decrease consumer intakes of unhealthy nutrients, increase vegetable consumption, and stimulate food businesses to reformulate their products, notably of sodium and trans fats (Shangguan et al., 2019). An increasing number of countries require so-called 'front-of-package' labels which warn consumers about high levels of unhealthy nutrients. Warning labels such as those required in Chile are recommended as being particularly effective, though the type of label most likely to work is likely to vary with context (Roberto et al., 2021). While they tend to have less impact on low-income consumers, their effect on reformulation can bring benefits to all populations, provided it also applies to companies serving these populations. Regulation is also needed to prevent misleading nutrition and health claims (e.g. claiming a food which offers no nutritional benefit is healthy) and thus unfair competition. However, complying with labelling regulations can be challenging, especially for MSMEs, suggesting they need clear institutional frameworks and infrastructure, and support for implementation (Purwaningsih & Hardiyati, 2021; Farida & Ayuningtyas, 2019).
- **Replacing promotional advertising and marketing for unhealthy foods with healthier products**: Another condition could be for companies to restrict marketing and advertising of less healthy products, and place proportionally more marketing spending behind healthier products compared to less healthy products to drive their sales. Again, this could be supported directly through financing. Marketing messages, including those on packaging, could be used more effectively to encourage

frequent consumption of healthy products targeting women and children. A challenge to this approach is the lack of a universally-agreed robust, nutrient profiling system to define 'healthy products' for marketing purposes. Evidence shows that the specific definition has important implications for what can be promoted and what cannot (Labonte et al., 2017). A range of nutrient profiling models exist, including those developed by large food companies, the Pan-American Health Organization and the WHO Regional Office for Europe, as does guidance on how to develop them (Drewnowski et al., 2021).

Smaller companies will need support to enable them to adopt these measures. Limiting consumption of these foods can also be advanced through national regulations to incentivise reformulation, provide mandatory guidance for nutrition labels, limit promotional advertising and marketing, and limit unhealthy foods in schools, as discussed in sections 4.3.5 and 5.3.3 Some evidence indicates that these mandatory measures are needed to fully incentivise businesses to change, but this proposed approach of conditionalities on investment also has strong potential to influence business practices.

## 4.6 Low-income consumers

**Core guidance: *Mobilise demand for nutritious foods from low-income consumers and reduce demand for ultra-processed foods***

**Rationale for core guidance**

One of the challenges across all the above entry points is ensuring that low-income consumers purchase the foods produced, processed, traded and financed. Without this, there will be an inevitable tension between economic and nutritional goals. The MQSUN+ report *Where Business and Nutrition Meet – Review of approaches and evidence on private sector engagement in nutrition* (2018) notes that "*what has not yet worked well across all pathways was creating demand for nutritious foods with poor consumers. Businesses could justify investing in the promotion of their branded nutritious products, since this created demand for nutritious foods. However, focusing on motivating consumers to generally value benefits derived from better nutrition was beyond the means of most companies. Additionally, it was a major barrier to building a viable business in this area. Whilst some of the largest MNCs [multinational corporations] have invested in promoting nutrition and health messages, micro-, small-, medium- and large-sized national companies that served most of the market did not have the means nor the credibility to do so*" (MQSUN+, 2018).

The advice is thus to consider the following options for action:

### 4.6.1 For diet and nutritional impact on infants and young children, combine supply-side interventions with well-designed, intensive nutrition education and behaviour change communication

It is well established that caregivers need to be informed about healthy feeding practice for babies and young children. This information can be provided through counselling and advice in a health care setting, nutrition education and social behaviour change communication (i.e. when communication strategies are based on behavioural science). A meta-analysis of available evidence shows that social behaviour change communication strategies are on balance effective in increasing dietary diversity of infants in LMICs, i.e. they have the effect of increasing minimum dietary diversity, and minimum meal frequency and nutritional status among infants (Mahumud et al., 2021). Nutrition education for caregivers has also been shown to benefit child nutritional status (Zahid et al., 2013).

Certain strategies are more likely to be effective than others (USAID, 2011), with more intensive multi-faceted approaches shown to be more successful. For example, a large-scale social and behaviour change communication intervention to improve the diets and feeding practices of infants and young children in Bangladesh revealed that an intensive, multi-faceted approach (including nutrition-focused frontline workers with performance-based cash incentives, as well as mass media) has a far more sustained, significant impact compared to only standard nutrition counselling and community mobilisation efforts (Kim et al., 2018).

For low-income, food-insecure populations, education and behaviour change communication tend to have a more significant effect on increasing demand if accompanied by other interventions that enhance food access (Zahid et al., 2013). A study in rural Ethiopia, for example, found that better nutrition knowledge among caregivers leads to considerable improvements in children's dietary diversity, but only in areas with

relatively good market access (Hirvonen et al., 2017). In rural Zimbabwe, a multi-faceted nutrition education campaign improved household, women's and children's diet diversity (a significantly greater increase in children under the age of two, relative to adults), with a greater impact when households also had access to markets (Murendo et al., 2018). Further studies are needed to explore behaviour change and communication approaches to reach people with disabilities in targeted communities where they are low-income and food insecure.

### 4.6.2 Consider investing in marketing activities that promote nutritious foods to low-income households and make ultra-processed foods less appealing

Commercial techniques could also be used to generate demand for nutritious foods, such as packaging with child-appeal on nutritious foods. The evidence for these approaches comes almost exclusively from high-income countries. For example, evidence indicates that point-of-sale interventions identifying healthy/unhealthy options can lead to healthier customer purchasing behaviour, particularly those delivered using shelf-labels or technology (Chan et al., 2021). Studies from the US indicate that manipulations in food environments in stores to promote healthier food purchasing and consumption generally have positive impacts (Karpyn et al., 2020). A study from Australia also found restricting the merchandising of sugary drinks reduced purchasing (Brimblecombe et al., 2020).

Mass media campaigns tend to focus on the healthiness (or lack of) of specific products. While they often have impact on knowledge and attitudes, their impact on longer-term dietary shifts is not clear (Kite et al., 2018). The design of these campaigns can make a significant difference. For example, one systematic review concluded that healthy eating campaigns which included both "stop doing X and start doing Y" tended to be more successful (Abril and Dempsey, 2018).

A rare example of an evaluation of a mass media campaign in an LMIC is of the "Are You Drinking Yourself Sick?" campaign, on sugary drinks in South Africa (Murukutla et al., 2020). The campaign aired in South Africa from October 2016 to June 2017. The evaluation found that it increased knowledge that sugary drink consumption can lead to obesity and related health problems and about the harms of sugary drinks in general. However, its impact on consumption is not known.

A major gap is for marketing activities which try to appeal to the underlying reasons why people buy ultra-processed foods and do not buy more nutritious foods. Such motivational approaches could be considered in order to counter the emotional and social appeal of marketing of unhealthy food brands.

# 5 Cross-cutting Entry Points

Three areas cut across all the entry points in supply chains:

- digitalisation,
- financing,
- agriculture and food policy.

## 5.1 Digitalisation

**Core guidance: Incentivise, support, and monitor innovative digital solutions to improve access and affordability of nutritious foods for low-income consumers**

**Rationale for core guidance**

Digitalisation is a tool to enable greater efficiency as well as provide greater access to information and markets. This has the potential to contribute to improving access, affordability, and appeal of nutritious foods for low-income populations. There are some universal best practices in using digital in a development context, that are equally applicable in a nutritious foods context (USAID Advancing Nutrition, 2020):

1. Design with the user
2. Understand the existing
3. Design for scale
4. Build for sustainability
5. Be data driven
6. Use open standards, open data, open source, open innovation
7. Reuse and improve
8. Address privacy and security
9. Be collaborative

A gender lens is also vital as well as a disability inclusive approach, working with Organisations of Persons with Disabilities to ensure they are not lost within the digitisation process and to ensure universal access of products. An evidence review by the FCDO into improving incomes for the poorest, focusing on social protection and agriculture (April 2021) concluded that targeting: ICT [information and communications technology]-based services can benefit some groups and/or exacerbate exclusion of others (e.g. people with disabilities). ICT services may reach young, male farmers that are slightly better off, digitally literate, or those who are more engaged/committed to agriculture. It found mixed evidence on targeting women.

Care is also needed since digitalisation is not inherently good at reducing inequities. While it is still relatively new and untested in use cases for nutritious food, the Growing Better report serves as an important reminder:

> *"Historic evidence – and trends from other parts of the digital economy – suggest a more complex, disturbing outcome is possible. In the food sector, consolidation has already concentrated market power among a small number of players with entrenched interests. Value chains are optimised for massive economies of scale but often neglect basic standards of care for nature and people. Unequal, asymmetric access to information across long, linear supply chains has exacerbated existing inequalities in market power, allowing the many iniquities they harbour to go unaccounted for. These range from unhealthy products being marketed as a natural choice, to implication in environmental crime and slave labour. It is not unreasonable to assume there is a risk of big data being deliberately used to reinforce these unfortunate tendencies."* (The Food and Land Use Coalition, 2019)

Overall, digitalisation has potential, but as showcased below, significant evidence gaps remain. New, innovative and experimental activities are required to test the reach, inclusivity/access and cost-effectiveness of digital interventions in improving the diets of low-income households.

The recommendation is, as for market linkages, to ensure that digitalisation aligns with the objective of improving diets and monitors the impact. Evidence suggests the following options hold most promise:

### 5.1.1 Increase access to mobile phones, especially for rural and low-income women

Mobile phone use, especially by women, is positively associated with household dietary diversity. It increases the ability of households to coordinate travel to market; reduces transaction costs; and improves information leading to greater access to, and less wastage of, nutritious (but perishable) foods (such as white roots and tubers, vegetables, meat, eggs and fish).

Especially in the pastoral context, mobile phones can improve nutrition through reducing transaction costs for daily activities. Sife, Kiondo & Lyimo-Macha (2010) found that mobile phone use increases efficiencies, especially between people who have geographic distance between them. The impact of female phone ownership in Africa is estimated to improve agricultural production by 4% and decrease the number of people who are hungry by 17% (Keino, 2021).

Mobile phones and mobile payment platforms can also enable collective action amongst rural and pastoral communities for purchasing food. This is of especial significance in enabling more frequent market transactions without increasing the cost for the individual of travelling to the market, which enables the purchase of more perishable foods that are important for micronutrients in diets.

Through improved information from mobile phone ownership, farmers and food producers can access better production inputs and technologies, leading to improved yields. They can also gain better access to output markets and price information, leading to improved income. Both of these income generators can (in theory) lead to greater expenditure on diverse and nutritious foods.

In addition, during times of crisis and drought, mobile phone ownership improves food security by providing access to information regarding food (aid) distribution, and in enabling remittances to be sent by family members via mobile money, thus sharing risks and reducing the need for reduced consumption during shocks.

The evidence suggests that mobile phone usage must be frequent to accrue the dietary benefits above. This correlates with mobile phone ownership, as opposed to shared access to a mobile phone that may be intermittent (Parlasca et al., 2020).

There is further limited evidence using gender-disaggregated data from Uganda that suggests that female mobile phone use has stronger positive associations with social welfare than if males alone use mobile phones:

> "*Women seem to benefit over-proportionally from mobile phone technologies, which is plausible given that women are often particularly constrained in their access to markets and information. Hence, a new technology that helps reduce transaction costs and allows new forms of communication can be particularly advantageous for women. Higher incomes and better access to information for women positively influence their bargaining position within the household, thus also improving gender equality and nutrition*" (Cole & Fernando, 2016). One study cautiously concludes that "*equal access to mobile phones cannot only foster economic development, but can also contribute to gender equality, food security, and broader social development*." (Sekabira & Qaim, 2017).

Nevertheless, some evidence points to this practice being less impactful than other factors (such as level of education, household income, market access, and availability of improved storage technologies).

### 5.1.2 Utilise mobile technologies to support delivery of nutrition information through extension

Today, most smallholder farmers make agriculture decisions based on (a) experience, and (b) guidance from government or private organisations. However, digitalisation can unlock more accurate and customised information for farmers (Dury et al., 2019).

There is emerging evidence that ICT-based extension services can be used to deliver better quality and more timely information at scale and increase farmers' self-reported adoption of recommended agricultural inputs and practices, thus overcoming many of the weaknesses of conventional extension services.

FCDO's review of evidence into improving incomes for the poorest, focusing on social protection and agriculture refer to benefits of ICT-based extension services as opposed to traditional government extension services (FCDO, 2021). For instance, a randomised evaluation of an interactive voice response system with timely information on weather, inputs and answering farmers' questions, found that farmers switched to more effective inputs, dedicated more land to cash crops, and saw increased yields. Yet, increased knowledge does not always translate into behaviour change (Aseres, 2019), since contact with extension workers as well as education is required.

An estimated 13% of sub-Saharan African smallholder famers are currently registered with a mobile service for market information, weather updates etc (Karimuribo et al., 2019) These services include programmes like the 80-28 hotline in Ethiopia, Farmerline in Ghana and the Kenya Agricultural Observatory Platform. They offer opportunities to share information that could improve dietary outcomes for low-income producers or consumers.

### 5.1.3 Research and improve effectiveness and reach of technology for nutrition education and nutrition advisory to increase demand for nutritional produce amongst low-income consumers

Technology platforms can also be used to deliver nutrition education and behaviour change communication. For example, the study from Zimbabwe cited in Section 4.6 used technology platforms (podcasts, videos, WhatsApp) alongside traditional extension channels. It concludes that nutrition education produced positive results in increasing understanding and awareness of nutrition, and therefore the appeal of a more diverse diet (Murshed-E-Jahan, 2011).

However, reaching low-income households, and particularly low-income women, and farmers with disabilities remains an immense challenge (Barnett et al., 2021; GSMA Assistive Tech, 2021). Low uptake inhibits not only the effectiveness of the impact, but also the cost-effectiveness of delivery. If a user is active then behaviour change is possible, but the challenge is in reaching and engaging low-income households. To increase uptake amongst women and low-income consumers, it is important that services are available on simple phones via text message or voice-activated services (Barnett et al., 2021). Even then, limitations in network connectivity, electricity access and illiteracy remain barriers to delivery (Barnett et al., 2021), implying that digital education cannot exist in a vacuum and must be accompanied by larger efforts around infrastructure and literacy. Complementing digital education with in-person services and tailoring content has also been found to increase uptake.

There are 3.8 billion people globally, predominantly the poor and rural, who remain offline (GSMA, 2018). Given these challenges, an alternate approach is to use digital tools as 'train the trainers' tools. Frontline health and nutrition workers have higher rates of phone access and literacy, compared to low-income households. A recent study looked at an e-learning platform for nutrition workers in India, focused on rural populations with poor nutritional outcomes (e.g. ~40% of children under five were reported as stunted in the province). Through an interactive e-learning platform, frontline workers were trained on nutrition. Those trained had higher knowledge and awareness of all aspects of their roles, compared to the control group (Sarkar et al., 2021). The eNutrition Academy founded by the Nutrition Society and Cambridge University aspires to roll out similar online training to frontline workers globally.

Among people with disabilities, inclusive digital technology for agriculture can make extension services more accessible (such as by making information and training materials available in accessible formats) and can also help to address barriers to market access and financial inclusion (GSMA Assistive Tech, 2021).

### 5.1.4 Promote use of technology to capture data and monitor population-level shifts

Low-income consumers are particularly susceptible to shocks to food systems that impact the availability or affordability of food (e.g. disasters, pests, supply chain gaps, food trade policy shocks). However, most nutrition reporting mechanisms are infrequent, slow and expensive, for example USAID's Demographic and Health Surveys (DHS) and UNICEF's Multiple Indicator Cluster Surveys.

Lean, data-enabled approaches to collecting nutrition information can provide multiple benefits – providing governments and donors with necessary data and allowing reporting households to receive personalised nutrition advice. One such programme in Samburu County, Kenya, ran a low-cost, high-frequency data

collection initiative that provided a small incentive to respondents for completing the survey. While the study is still ongoing, so longitudinal data is unavailable, researchers were able to cover 3,300 households within the first month and identified that almost 85% of participants were receiving inadequate nutrition (Jensen et al., 2021).

Similar tools can also be used to provide early monitoring and reporting on disease surveillance tools in animals and humans. With rapid information, farmers can save their animals from threat and preserve their livestock (FAO, 2019).

Over time, tools like artificial intelligence and machine learning could be employed to analyse these growing data sets and become even better at predicting and forecasting nutrition trends in otherwise hard-to reach populations, such as rural and low-income households.

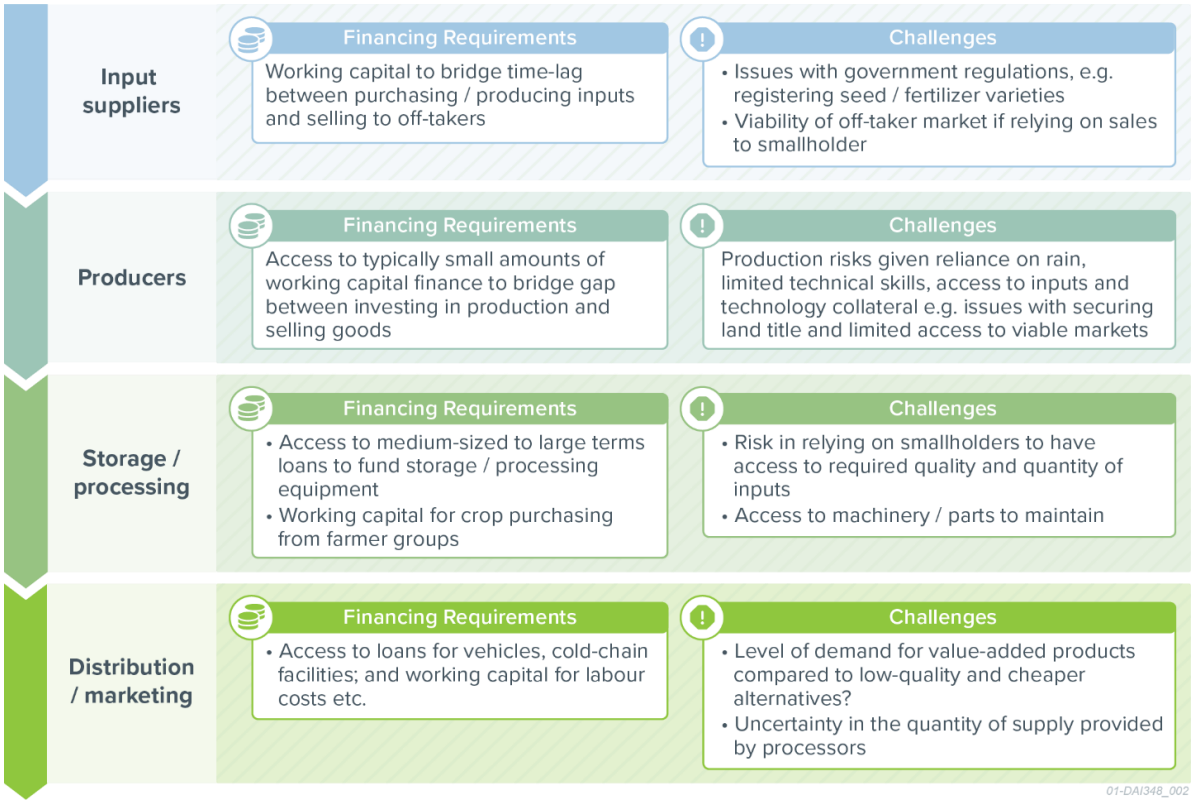
## 5.2 Financing for innovation

**Core guidance: Incentivise and support innovative financing solutions to support healthy diets for low-income consumers in a commercially sustainable and scalable way**

**Rationale for core guidance**

There is an immense need and demand for finance in the food systems sector. An iGravity report carried out by GAIN (Elmer & West, 2018), calculates that the total financing needed to support enterprises working within or alongside food value chains to make healthier food choices more affordable and accessible in Kenya alone is US$4 billion, with a potential pipeline of 'investable' projects estimated at US$94 million. Whilst this is only an example for Kenya, this gap between investment required and investment committed in nutritious food categories is significant. The Blended Finance Taskforce estimates that US$30 billion is required annually to enable the transition to better and more nutritious food systems. But the payoff is significant since "the estimated returns to society are more than 15:1" (Blended Finance Taskforce, 2020). The Food and Land Use Coalition also estimates that investing in nutrition and healthy diets could represent a US$2 trillion business opportunity by 2030 (The Food and Land Use Coalition, 2019), arguing that there is immense economic potential for investors, business and society in investing in nutrition.

*Figure 2. High-level summary of finance challenges in the food value chain*




Billions of dollars are already raised each year to finance many large-scale, profitable supply chains. For example, Africa is a major global supplier of export commodities such as cocoa, coffee, tea, cashews,

cotton, flowers, fresh fruit and vegetables. Several countries have supply chains that deliver surpluses of vegetable oils and sugar for regional export (e.g. Uganda and Zambia). Some major African agribusinesses have already achieved listings on local and international stock markets (e.g. Zambeef PLC on the Lusaka and London exchanges, which is also playing an important role in supplying nutritious foods to low-income consumers in Zambia) (CDC, 2018).

There are specific challenges inherent in food system financing (Box 7), and this is especially so when financing firms producing nutritious foods for the low-income consumer markets given the necessity of charging low prices. As such, this market is generally not able to support the type of risk-adjusted returns that private investors are seeking, and so very little investment at scale is happening without some form of subsidy.

These challenges should be accounted for, and lessons learned from past successes and failures to ensure financing is aligned with, not counter to, access to affordable healthy diets by low-income consumers. Figure 2 provides a simplified and generic agricultural value-chain, which illustrates the typical financing requirements and financing (and other) challenges that they face. In practice, there is significant nuance to this depending on the crop under consideration.

Some financial innovations will only make sense in terms of serving the wider economy rather than focusing them solely on food systems actors. Examples include access to solar panel finance, access to equipment or vehicle finance, access to cold chain finance. These services are needed by a range of rural and low-income consumers as well as by MSMEs. Agricultural and food systems finance is not always best delivered by specialist, sector-specific institutions. Economies of scale and diversification of risk often require that food systems finance be one segment of a larger business model. For example, it may be viable to develop a stand-alone network of village savings and loans clubs, but commercial banking services are probably best provided by retail banks that serve an entire country. An insurance company may develop a weather insurance product for farmers, but it would be far too risky to just have one type of asset on its books. This guidance will therefore embrace both: food systems financial products and services provided by diversified institutions; and dedicated, agriculture/rural/food system sector-focussed financial institutions and facilities.

To mobilise investment and address this complex problem, investment tools already tried and tested can be utilised to create market-led innovation to more sustainably reach the low-income market segment at scale, and to help overcome these complex challenges and improve both nutrition and economic growth. Five tools particularly worthy of consideration are set out below.

**Box 7. Special considerations for food systems financing for healthy diets**

Food systems are one, important, part of the economy, functioning alongside other key economic sectors such as mining, manufacturing, utilities, distribution and services. Commercial (i.e. market-oriented) agribusiness and food retail is a business, and many of its financing needs are common to all commercial activity – from short-term working capital through medium-term finance for durable machinery and equipment, through to long-term fixed assets for buildings and land. There are, however, a number of important sector-specific characteristics that need to be understood and which, in combination, justify approaching food systems finance as a ‘special case’, especially when targeting low-income consumer segments.

- There is still a substantial amount of **subsistence agriculture** in LMICs: production of basic needs for household consumption and barter. As no farm product is sold, there is no scope for selling financial products to subsistence farmers – unless they have off-farm sources of cash, (e.g. casual employment and/or remittances from employed relatives). One common mistake in the past has been for rural development organisations to ‘push’ debt onto subsistence farmers who have little interest or ability to commercialise their farming.
- A related issue is **land tenure**. Where subsistence farming remains common, governments have been reluctant to modernise and privatise land tenure, partly to avoid disturbing the status quo (customary rights and obligations controlled by traditional authorities) and partly because it creates the risk that subsistence farmers will sell their land to meet short-term needs and thereafter become destitute. Many smallholder and emerging, commercial farmers (even some large estates/plantations) do not have a transferable or mortgageable title to the land they occupy, which severely reduces their scope for asset-backed borrowing.

- Agriculture is at heart based on **biological processes** in environments (often open fields) where there is limited scope for control. And these biological assets are also more volatile post-harvest. As a result, it is often characterised by high production risk and uncertainty from:
  - Weather
  - Climate change
  - Pests and diseases
  - Theft
  - Post-harvest food loss and contamination
- Most agricultural production is **seasonal**, with a long time-gap between inputs, output and sales. This increases working capital requirements relative to most manufacturing and service industries and adds to risk and uncertainty. Primary processing, based on domestic raw materials, is often required to buy enough raw materials for a whole year's production during a brief harvesting season – with consequent costs of storage and price risk, i.e. by the time the processed product is sold, will there still be a profit margin over the cost of the raw material bought nine months earlier? This risk and financial costs reduce the affordability of nutritious food, which impacts low-income households the most.
- Most primary agricultural products are **undifferentiated and unbranded** and are sold in commodity markets, with price determined by prevailing supply and demand – again generating price risk and uncertainty for producer and buyer alike.
- A substantial share of agricultural production in LMICs is of **food staples**: e.g. maize, rice, wheat, which form a vital part of the diet and expenditures of the population. Governments cannot ignore concerns over food security and the cost of living, and so it is common to find governments establishing food reserve agencies and interfering in the markets for food staples – generating more uncertainty for producers, traders and primary processors.
- Almost by definition, farming and the rural economy is spread over a large **geographical area**, which makes it expensive to serve these markets compared with concentrated urban populations.
- Food systems in LMICs are largely characterised by **MSMEs** – be they smallholder farmers or input and output traders, processors and retailers. Traditional approaches to providing services such as commercial banking or collateral management can be prohibitively expensive for these institutions.

These sector-specific characteristics need to be assessed and addressed when designing appropriate financial products and services, and not all problems will find solutions.

### 5.2.1 Consider creating performance-based incentives to help de-risk and/or improve returns for companies and developers

**Results-based financing (RBF)** facilities provide a powerful tool for incentivising behaviour and only paying for positive results. The World Bank defines RBF as "*any program that rewards the delivery of one or more outputs or outcomes by one or more incentives, financial or otherwise*" (Musgrove, 2010).

While there are no examples of purely nutrition-focused RBF mechanisms, there are many examples of existing facilities in the agriculture and health sectors, many of which tangentially finance or support health programmes and outcomes. Looking at successes and failures in other facilities can provide some clear lessons for implementation in a nutrition context. A 2013 study from the German Development Institute that analysed the results of 13 health-focused RBF programmes, a subset of which included nutrition, found that RBF "*has the potential to reach poor target groups and improve healthcare delivery and coverage, particularly for the poor*" (Grittner, 2013). Further, a 2021 analysis of AgResults, a US$152 million initiative to provide results-based financing to agriculture projects, concluded that "*projects can, indeed, spur the development of new markets for high-impact agricultural technologies that benefit poor farmers*" (Mainville et al., 2021).

While the AgResults study also references selecting projects that have a potential for improved nutrition, nutrition outcomes were not particularly measured, and this is an opportunity for future RBF programmes to set explicit targets and track progress towards nutritional outcomes.

**Development Impact Bonds (DIBs)** are a relatively new results-based financing tool with high potential applications in nutrition programming. A DIB is a results-based tripartite collaboration between a (typically) private investor who provides upfront finance, service providers who manage and deliver on a programme, and a donor who provides funding if programme goals are independently verified to have been met.

DIBs have several demonstrated benefits. They incentivise a focus on social outcomes as well as financial returns, they incentivise collaboration and learning amongst stakeholders, and they build a culture of data collection and M&E that can provide valuable learnings (World Bank, 2017).

While the mechanisms take a long time to develop and are relatively new, there are some promising results. For example, a UK impact bond reduced reoffending rates amongst former inmates wherein the impact bond enabled the provision of continuously adapted post-release services. In another instance, low-income children were identified and supported early, thus reducing the long-term cost of special education services (World Bank, 2017).

DIBs have started to be utilised for nutritional outcomes; an example is of Nutrition International acting as an outcome funder for a DIB in Cameroon. DIB design, performance management and sustainability support were provided by Social Finance, who also provide an end of programme report (Social Finance, 2021). Whilst broader, market-driven DIBs for nutrition remain untested, the mechanism provides an interesting use-case given the challenge in traditional financing to both make commercial returns and incentivise food systems actors to reach low-income consumers with nutritious foods.

Importantly, for a DIB to succeed, projects must have clear and measurable, though ambitious, social (e.g. nutritional) outcomes that can be achieved in a timely manner (Dalberg, 2019).

### 5.2.2 Consider reconceptualising and re-pricing nutritional risk into investments

There is a perception amongst financiers that extending investment to agriculture and related sectors is risky for the reasons outlined above. The risk and expense of lending to agribusiness are also empirically documented. For example, Aceli reported that for African banks lending to agri-SMEs, the reported risk is twice as high as the risk in lending to other sectors. Further, agribusinesses typically have higher operational costs, resulting in combined returns that are "*4-5% lower for banks in their agri-SME lending portfolios relative to other sectors*" (CSAF, 2021). In fact, at a portfolio level, lending to agriculture SMEs tends to be loss making, as highlighted by a USAID study that looked at over 3,600 SME agri-business loans (USAID, 2018). These trends are further exacerbated in more nutritious food groups, which "tend to have high costs of production, transport and storage" (USAID, 2019).

However, while investors and donors analyse the risk of investing in nutritious food systems, their risk assessment methodologies often fail to analyse and capture the risks and costs of ignoring nutrition, both at a micro (individual) and macro (societal) level.

There are many potential risks to ignoring nutrition in investments. These include regulatory risks (e.g. new taxes on unhealthy inputs, redaction of agriculture subsidies on unhealthy inputs), legal risks (e.g. class action litigation), and consumer risks (e.g. boycotting consumption of produce due to health scares, such as with meat and then cereals in Kenya (BBC, 2019)). In recent years, investors have increasingly included environmental, social and governance (ESG) analysis in their investment processes, and there are now clear mechanisms for measuring, tracking and reporting areas like climate risk. These same systems can be adapted to quantify and analyse nutritional risk and impact.

Societally, there are also financial costs in ignoring nutrition. A study by the Blended Finance Taskforce estimates that there are US$4.5 trillion in hidden nutrition costs (malnutrition, disability, and obesity) in the US$10 trillion global food system (Blended Finance Taskforce, 2020). The scale of this risk is beyond that of an individual LMIC government, bank, donor or impact investor, and so consortiums of public bodies, development finance institutions and development organisations will increasingly need to cooperate to measure, value and price the social impact generated by investing in nutritional interventions, and/or compensate investors for the costs and risks incurred in these investments. Compensating investors to re-balance the perceived risk of investing will increase investment flows to the sector and the corresponding impact.

### 5.2.3 Consider increased weighting for food investments with positive nutritional impacts for low-income consumers

As noted above, in recent years, ESG strategies have also become increasingly popular for all institutional and impact investors. ESG funds have set record levels of new investment flows over each of the last five years, with an estimated US$51 billion in new money flowing into these funds in 2020 alone (Morningstar, 2021). And increasingly, these funds are including nutritional goals. For example, the Access to Nutrition Index (ATNI) has 71 signatories with over US$13 trillion in collective assets under management (ATNI, 2021). The collective has also published their expectations for food and beverage companies, which are directly and explicitly tied to delivery of the Sustainable Development Goals (SDGs) and the WHO's global nutrition targets.

A 2019 GAIN conference highlighted that a key first step to incentivising more businesses and investors to make nutrition commitments was to publish and broadly publicise 'collective action plans' that include "*joint and mutually reinforcing plans for delivery and assessment*" (GAIN, 2019). The summit also highlighted the need for increased coordination and increased guidance on measuring the nutritional value of foods, and that impact is occurring. There are several mechanisms to measure nutrition already: a recent study highlighted 13 different existing systems for tracking and accountability (GAIN, 2019). However, this is part of the problem, as the various systems each have shortcomings and can be overwhelming or confusing to new users. More work can be done to standardise metrics for businesses and investors and ensure that the frameworks are sufficiently robust to span across the value chain actors, and to measure both outputs and longer-term impact. It is worth noting this is a problem in the wider ESG/impact investing world, and not specific to nutrition.

Regardless, too few companies today are tracking or focusing on nutrition-focused metrics. A recent benchmarking by World Benchmarking Alliance highlighted that only 20% of companies, in a 350-company sample, were actively "*addressing accessibility and affordability of nutritious foods*" (World Benchmarking Alliance, 2021).

Given the nascency of nutrition-focused impact investing and measuring, one option is to build a more robust surrogate track record by assessing the investments of agriculture, health and related sectors for deals that are relevant for nutrition. The goal would be to both highlight attractive investment opportunities in the nutrition space and draw some collective patterns and metrics around social and financial return. Such track records could inspire new investors and protract the impact of donors working in the nutrition space with follow-on or blended financing from return-seeking investors.

The rise of 'climate smart' or 'gender lens' investing in recent years can serve as a useful template to frame how to bring nutrition to the forefront of impact investing and ESG funds, to ensure that more investors are actively considering and measuring nutrition management or mismanagement in their investments, as well as disaggregating ESG results by who is being reached (such as by age, gender, disability).

One example of an investor prioritising and implementing a nutrition focus is with the IFC. In their position paper, *Promoting Positive Nutritional Impacts in IFC's Agribusiness Projects,* they highlight that the fund is now assessing the nutritional impact of projects it finances, by placing greater value on investments in foods which constitute a part of a balanced diet per WHO guidelines. To do this, they are utilising existing data, from the annual *Global Hunger Index* complemented by the recent World Bank's report on obesity, for insights regarding micronutrient deficiencies or limited diet diversity, evaluating individual countries against regional and global averages (IFC, 2021). Particular attention is also given to prices and access for the poor. IFC teams "*assess the clients' price positioning and distributional strategies, namely their plans to move down-market, introduce smaller packages, and/or expand rural distribution. These are subsequently monitored*" (IFC, 2021).

### 5.2.4 Consider providing blended finance to incentivise investment in MSMEs

In emerging markets, an estimated 70-90% of food is produced, stored, processed, transported and traded by MSMEs, so support for these organisations is essential to improving availability of nutritious food to low-income consumers (The Food and Land Use Coalition, 2019).

While some of the above mechanisms may incentivise additional private capital investment into nutritious food value chains, today, finance remains an enormous challenge. Lack of access to finance is reported to

be the number one barrier faced by micro, small and medium-sized enterprises involved in the food vale chain (FAO and IFPRI, 2021). A survey of MSMEs in Africa indicated the underlying causes are high interest rates, short payback periods, and banks that are unwilling to lend owing to poor repayment performance (AFI, 2020). The estimated financing gap is US$11 billion annually for the expansion of agriculture output (IFC, 2016).

Blended or subsidised financing mechanisms are suitable to support MSMEs producing nutritious processed foods because they are extended on terms and/or conditions that are more favourable than those available from the market. This is necessary due to the higher risks associated with MSMEs targeting low-income consumers with nutritional products (e.g. via lower risk-adjusted return expectations; terms and conditions that would not be accepted/extended by a commercial financial institution; providing financing to a borrower/recipient not otherwise served by commercial financing; risk mitigation tools, guarantees and first-loss products when provided on concessional terms).

Blended finance approaches can enable investments that are 'small' or 'unattractive' in returns today to reach the scale that later becomes enticing enough for investors without concessional support from donors. "*Low-income consumers present a substantial commercial opportunity (43% of the market potential) if businesses can reach them at scale*" (Southern Africa Institute for Policy and Research, 2018).

While studies on the impacts of blended finance are still in the early days, there is emerging evidence about the benefits towards the agriculture sector. A recent rapid evidence review of 38 studies linking concessional finance and development outcomes concluded there was a causal link in the "*provision of concessional finance to increases in farmer yields and incomes*" (Wellspring, 2020). Today, there is insufficient evidence linking blended financing instruments to nutritional outcomes, and this will be an important next step in any nutrition-focused blended investments.

Experience of some blended finance mechanisms with a focus on nutrition include Africa Improved Foods (funded by CDC Group, GAFSP, IFC, FMO and others), GAIN Premix Facility and California FreshWorks.

### 5.2.5 Consider providing credit and investment to women to empower them to make better nutrition decisions

Women, particularly rural women and those with disabilities, suffer from inequalities in access to land, technology and finance. This lack of access to resources results in lower income and lower agriculture productivity, with women producing 25% to 66% less per hectare than their male counterparts (World Bank, 2014). Closing this gender productivity gap will not only improve the income of poor families but also "*disproportionally improve child nutrition*" (Duflo & Udry, 2004). Further, economically empowering women, providing them with more agricultural assets and enabling them to have greater control on economic decisions is shown to drive families to spend more on children's nutrition (Cliffer et al., 2019).

While the outcomes are clear, the mechanisms to enable such economic empowerment and enhanced nutrition amongst women are less transparent. Development programmes have a demonstrated difficulty in reducing gender inequity via agriculture programmes. A recent study examining eight agricultural development projects in Africa and South Asia showed that "*all projects were associated with increases in assets and other benefits at the household level, but only one contributed to reducing the gender asset gap*" (FAO, 2019).

The required interventions must be more holistic in order to succeed. Women-headed households are, on average, poorer. A Malawi-based study concluded that finance alone was not enough but rather a more holistic approach to sustained income improvement is needed, arguing that: "*to support gains in dietary diversity, there is evidence of the need for complementary investments in education, particularly of female heads of households, and improvement in opportunities for women to earn income*" (Snapp & Fisher, 2015).

Further, while existing research measures and collects data on women and agriculture, most of the information is collected descriptively or anecdotally, and does not quantitively measure the impact of "*nutrition-sensitive or food system-wide interventions on… nutrition*" (Cliffer et al., 2019).

**Box 8. Development Finance and the Nutrition Policy Marker**

When developing, designing and/or adapting nutrition-related programming, it is important to consider how to embed the Organization for Economic Cooperation and Development- Development Assistance Committee (OECD-DAC) Nutrition Policy Marker.

The Nutrition Policy Marker is a mechanism that enables development partners to identify and estimate the amount of development finance going towards programme activities that are intended to address the immediate or underlying determinants of malnutrition. It is the most effective available approach to identify and classify nutrition-related activities, enabling reporting and recognition in the OECD-DAC Creditor Reporting System - the Official Development Assistance database. It also facilitates improved quality data by enhancing consistency and standardisation with other donors and bringing greater transparency to investments for tracking progress and assessing impact.

Ideally, the Nutrition Policy Marker should be applied at the point of programme design in the programme results framework, ensuring nutrition activities are routinely and systematically counted at an organisational level, and monitored and reviewed at programme level. For more information on how to use and apply the Nutrition Policy Marker, see the OECD Nutrition Policy Marker Handbook.

## 5.3 Agricultural and food policy

**Core guidance: Build capacity for designing and implementing agricultural and food policy for healthy diets while managing co-benefits and trade-offs towards the achievement of the Sustainable Development Goals**

**Rationale for core guidance**

Agricultural and food policies will be vital for managing co-benefits and trade-offs between economic, environmental and nutrition objectives. The importance of policy has already been implied in previous aspects of the guidance, such as trade policy or government policies on agricultural extension. While there are numerous aspects of policy needing attention, four specific areas require capacity building for development and implementation towards the goal of healthy diets and managing trade-offs between different development objectives in support of the SDGs.

### 5.3.1 Build capacity for a food systems approach to implementation of national 'Pathways for Food Systems Transformation'

The UN Food Systems Summit held in September 2021 recognised "*the complex relationships between the environmental, economic, and social pillars of sustainable development" and the "need to move boldly*" (United Nations, 2021). A key outcome for countries engaged in the UN Food Systems Summit preparation process during 2021 was the development of "Pathways for Food Systems Transformation" (Food Systems Summit, 2021). These pathways bring together a range of different strategies identified by countries as needed to improve different aspects of their food systems. They are intended to be "*points of reference across government and for all stakeholders in coming years*" and are "*living documents that will continue to be shaped in the lead up to and beyond the Summit*" (Food Systems Summit, 2021). However, many do not explicitly address the issue of unhealthy diets, nor the mechanisms required to identify synergies and manage conflicts, challenges, and trade-offs inherent in addressing multiple objectives. Investing in entities and experts able to support the implementation could help ensure nations take action to support healthy diets among low-income populations, while actively identifying co-benefits and managing trade-offs with economic and environmental outcomes. This would necessitate taking a food systems approach to effecting change, which is as yet little tried and tested at a national policy level.

### 5.3.2 Support effective design and implementation of agricultural subsidies to enhance diets, environment, and economy

Although agricultural subsidies are minimal in low-income countries compared to higher-income countries, estimates suggest they represent "*on average the largest share of public budgets allocated to agriculture in sub-Saharan Africa*" (Pernechele et al., 2021, cited in FAO et al., 2021). Support is concentrated on fertilisers and seeds for staple foods (mainly maize and rice). The provision of subsidies to incentivise the

use of fertilisers and modern crop varieties is widely credited with boosting food availability. A limited amount of evidence suggests they also have the potential to influence the diet diversity of participating households, but this is mediated by gender. For example:

- **Farmer Input Support Programme (FISP), Zambia**. This programme was initiated in 2009 to replace the previous Fertilizer Support Programme. Its goal is to increase adoption of inputs, boost crop productivity and reduce poverty. The subsidy supports maize production and is reported to lead to a modest increase in diet diversity among participating households. It typically goes to a male head of household; where it goes to a female decision maker, it leads to a marginally higher household dietary diversity than male-headed households, suggesting that *"reducing FISP gender gap would increase household dietary diversification*" (Kiwanuka-Lubinda, 2021). This could be related to women's primary role as farmers of non-staple foods and decision makers about food served inside the home. Analysts of the programme recommend repurposing the subsidy to foods beyond maize as a means of further improving household diet diversity and providing greater food diversity nationally (Mwanamwenge & Harris, 2017). Research has found a strong positive association between production diversity and dietary diversity among children in Zambia (Kumar et al., 2015).
- **Fertilizer subsidy, Mali**. The fertilizer subsidy in Mali supports maize, irrigated rice cotton, sorghum and millet. Evidence indicates that the subsidy incentivises households to allocate more of their land to target crops, thereby having a negative effect on crop diversification (Theriault and Smale, 2021). In the minority of cases that the subsidy is controlled by women (i.e. women-headed households), it significantly contributes to the chances that female plot managers will consume an adequate diet including iron-rich foods. It does so by freeing up cash to be spent on more diverse diets (that would otherwise have been spent on staples). It also has the effect of increasing purchasing of small amounts of soda and food eaten out of home (Smale et al., 2020). In male-headed households (98%) receiving the fertilizer subsidy, diet diversity among women did not improve – likely because it leads to greater farm orientation toward targeted cereals and cotton, and women are not in control of the income. The authors conclude that requiring the subsidy to be spent on nutritious foods would enable it to have broader nutritional benefits.
- **Farm Input Subsidy Programme (FISP), Malawi**. The Malawian FISP provides fertilizers and seed subsidies for maize, targeting poor smallholder farmers through vouchers. The FISP has had positive effects on maize productivity owing to increased fertilizer use (FAO et al., 2021). Evidence from data from 2010/11 showed a net positive effect of agricultural input subsidies on households' dietary diversity score, attributed to greater productivity of maize which may have freed up farmers to grow more mixed crops and/or provided more income to access more diverse foods at local markets (Snapp & Fisher, 2015). Access to roads and storage also had positive outcomes for household diet diversity, as did control of income by women.

The report *Repurposing agricultural support to transform food systems* (FAO et al., 2021) calls for a 'repurposing' of such agricultural subsidies on the basis that "*current agricultural support policies are steering us away from achieving the SDGs and the goals of the Paris Agreement, given their negative implications for climate change, nutrition, and public finances*." It provides evidence of the impact of agricultural subsidies on food consumption, revealing some complex relationships but concluding on balance that "*the results of the model suggest that removal of agricultural producer support has a modest positive effect on the affordability of healthy diet*." FAO et al. likewise assess impact on climate change, finding that removal of all border measures and fiscal subsidies would reduce GHG emissions in 2030 by 78.4 million tonnes of $CO^2$. They thus state that:

> *"Given the complex trade-offs with other policy areas and the interactions between policy objectives and impacts, any strategy for repurposing agricultural producer support needs to be systematically assessed both to ensure policy coherence across all stages of the food supply chain and in the intersection with other systems, and to leverage potential synergies. Such policy coherence cannot be stressed enough and requires systems thinking at multiple levels (local to global) and efforts to reform all parts of the integrated food system with integrated assessments of agricultural support policies."*

They recommend that "*to achieve policy coherence at the national level, it is crucial to develop an understanding of possible co-benefits and trade-offs in other policy areas." The report proposes a six-step approach to repurposing subsidies, noting that "deciding where agricultural support needs to be*

*repurposed is quite context specific, but it will generally be needed in all countries where agricultural support is currently reinforcing unsustainable practices, inequalities, and unhealthy consumption patterns*." Another key consideration is the trade-off with the environmental impacts of fertilizer subsidies. It is well-established that the use of chemical fertilizers is associated with the deterioration of soil and water, thus increasing vulnerability to climate change. Hence it may lead to a reduction in productivity in the medium and longer term (FAO et al., 2021).

### 5.3.3 Invest in technical capacity and advocacy for the development of healthy food environment policies and their implementation and evaluation

Economic development brings direct risks for unhealthy diets. The 'nutrition transition' to diets associated with obesity and diet-related non-communicable diseases has been driven by trade liberalisation, increasing market orientation of agriculture, privatisation, investment in infrastructure, the growth of food manufacturing, modern retail and fast food, *income* growth, and changes in employment patterns (Reardon et al., 2021). Evidence indicates intake of energy-dense, nutrient-poor and ultra-processed foods is rising rapidly in LMICs, including throughout the continent of Africa (Box 4). This presents an immediate trade-off between economic and nutrition objectives. A key means of managing this trade-off is through development of healthy food environment policies which limit activities by food businesses to make unhealthy products more affordable, available and appealing, thus levelling the playing field for healthy competition. While this could be viewed as a trade-off (negative economic implications for food businesses), it could create synergies if the policies unleash creative innovation towards healthier foods. See Section 4.4.4 for several approaches of incentivising companies directly to limit unhealthy activity.

Key policies to limit this activity include:

- **Mandatory nutrition labels, warnings and regulation of misleading claims**. Listing nutrients on food packages and highlighting the presence of nutrients of public health concern can influence consumer decisions and create incentives for food businesses to reformulate their foods. Labels can also be used to stimulate demand for healthier foods, but care is needed to ensure claims are not misleading.
- **Restricting food advertising and marketing**: Evidence shows that advertising and marketing influences consumption (Russell et al., 2018). A range of countries have implemented restrictions on unhealthy food marketing, and evidence from experiences to date indicates that comprehensive approaches to restrictions will be needed to have an impact (Taille et al., 2019). Reducing exposure to unhealthy food marketing provides a more enabling environment for nutrition education and demand creation.
- **Taxes on sugary drinks and other snack foods**. Evidence indicates sugary drinks taxes influence purchases of drinks in a healthier direction (Wright et al., 2017; Redondo et al., 2018; Krieger et al., 2021). Despite concerns that sugary drinks taxes damage economic activity, a recent report from the World Bank concluded that "*emerging evidence from independent evaluation and modelling studies consistently identifies net positive economic impacts from sugar-sweetened beverages taxes, including overall employment and productivity gains, and increased government spending*" (Hattersley et al., 2020).
- **Mandatory reformulation, or targets for reformulation**: Evidence from both modelling (Federici et al., 2019) and real-world studies (Gressier et al., 2021) shows that reducing sodium and trans fat content of processed foods leads to lower intake of these nutrients. There are precedents for governments to require mandatory reformulation (or set voluntary targets for companies to follow).
- **School food procurement policies:** There are 161 countries with school feeding programmes, but a relatively small number have adequate standards and guidelines for the food served in schools and available around them (see Section 4.3.5). Echoing the precedent set by high-income countries, support is needed to ensure children have a healthy food environment in schools to develop healthy habits and preferences.

A major challenge for Ministries of Health in developing these policies is opposition from some food businesses and trade associations, which creates 'regulatory chill'. Many governments have inadequate capacity and support for effective policy development which balances the different demands, or for undertaking monitoring and evaluation. Investing in civil society advocacy, technical support, managing private sector relationships, and evaluations that assess both economic and health outcomes would help

governments advance these policies. In addition, as noted in Section 4.4.4, smaller food businesses would need support to adapt to these policies and thus their implementation.

### 5.3.4 Support development of food-based dietary guidelines integrating nutrition and sustainability

Over 100 countries have developed food-based dietary guidelines (FBDGs), largely with the purpose of defining population guidance for consumers (FAO, 2021; Herforth et al., 2019). FBDGs can also be used to guide policymaking. An increasing number of countries are developing FBDGs which also integrate sustainability (Gonzalez-Fischer & Garnett, 2016). The purpose is to enable people and policies to enhance co-benefits and manage trade-offs between nutrition and sustainability goals (particularly climate change, owing to the emphasis on guidance on meat intake). An analysis in France showed that adherence to existing FBDGs is already likely to lead to more plant-based diets, lower health costs, energy intake and environmental impact scores (Kesse-Guyot et al., 2020).

The Eat-Lancet Commission report published in 2019 provided a global approach to defining a healthy diet within planetary boundaries (Willet et al., 2019). Developing FBDGs that reflect the latest in nutritional science as well as sustainability requires capacity building to ensure an effective and science-based development process. A range of methods exist to help support their development (e.g. Mazac et al., 2021) and the FAO already has a structure in place to provide technical support to countries on the development of these guidelines.

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