A young student in a blue school uniform is working with hydroponic plants. The student is smiling and looking towards the camera while holding a small plant in a white container. In the background, there are several white pipes with small plants growing out of them, set against a blurred green background of trees.

SPECIAL REPORT

A new conceptual and operational framework for school meals and food systems: rethinking the implications for national school meal programmes for climate, environment, biodiversity and food sovereignty

Report contributed by the Research Consortium for School Health and Nutrition

In Kenya, a student learns about hydroponics. WFP/Lisa Murray

This special chapter presents a new conceptual framework for the relationship between school meals and the food systems that supply them. The framework shows how the public procurement of food to supply national school meal programmes has the potential to significantly contribute to global efforts to address some of the world's greatest environmental challenges. This chapter is the result of two years of analysis and represents the joint work of 164 authors from 85 different organizations worldwide, indicating the topic's extraordinary importance and range of influence.


Rethinking food systems has never been more urgent. The world is facing a global nutrition crisis, with malnutrition affecting half of the world's population (FAO, 2021). The need to feed an increasing population, coupled with unsustainable food production and consumption, has caused depletion and pollution of natural resources, biodiversity loss, deforestation, ocean acidification and climate-related extremes (Searchinger et al., 2018; Willett et al., 2019). Food systems contribute to a third of all human-induced greenhouse gas emissions and 70 percent of freshwater use, while a third of all food is wasted along the value chain (Alexander et al., 2017; Crippa et al., 2021; UNEP, 2024).

Food production is the principal driver of biodiversity loss, mainly due to the conversion of natural ecosystems for crop production or pasture (Global Panel on Agriculture and Food Systems for Nutrition, 2023). These environmental changes affect our ability to produce high-quality foods, further compromising food security and nutrition (Fanzo et al., 2021). This is especially damaging for countries in the global south that bear the brunt of the impacts of shocks and stressors more intensely than other parts of the world. These shocks will disproportionately affect children, with approximately 1 billion children at high risk of suffering from food insecurity (UNICEF, 2021), threatening their education, growth and development.

School meals are increasingly recognized as a key investment for governments to tackle these challenges and provide a platform for food system transformation. At the request of School Meals Coalition member states, the Research Consortium for School Health and Nutrition prepared a white paper, *School meals and food systems: rethinking the consequences for climate, environment, biodiversity and food sovereignty* (Pastorino et al., 2023), on how school meals can be made both nutritious and sustainable, and act as a leverage for food system transformation.

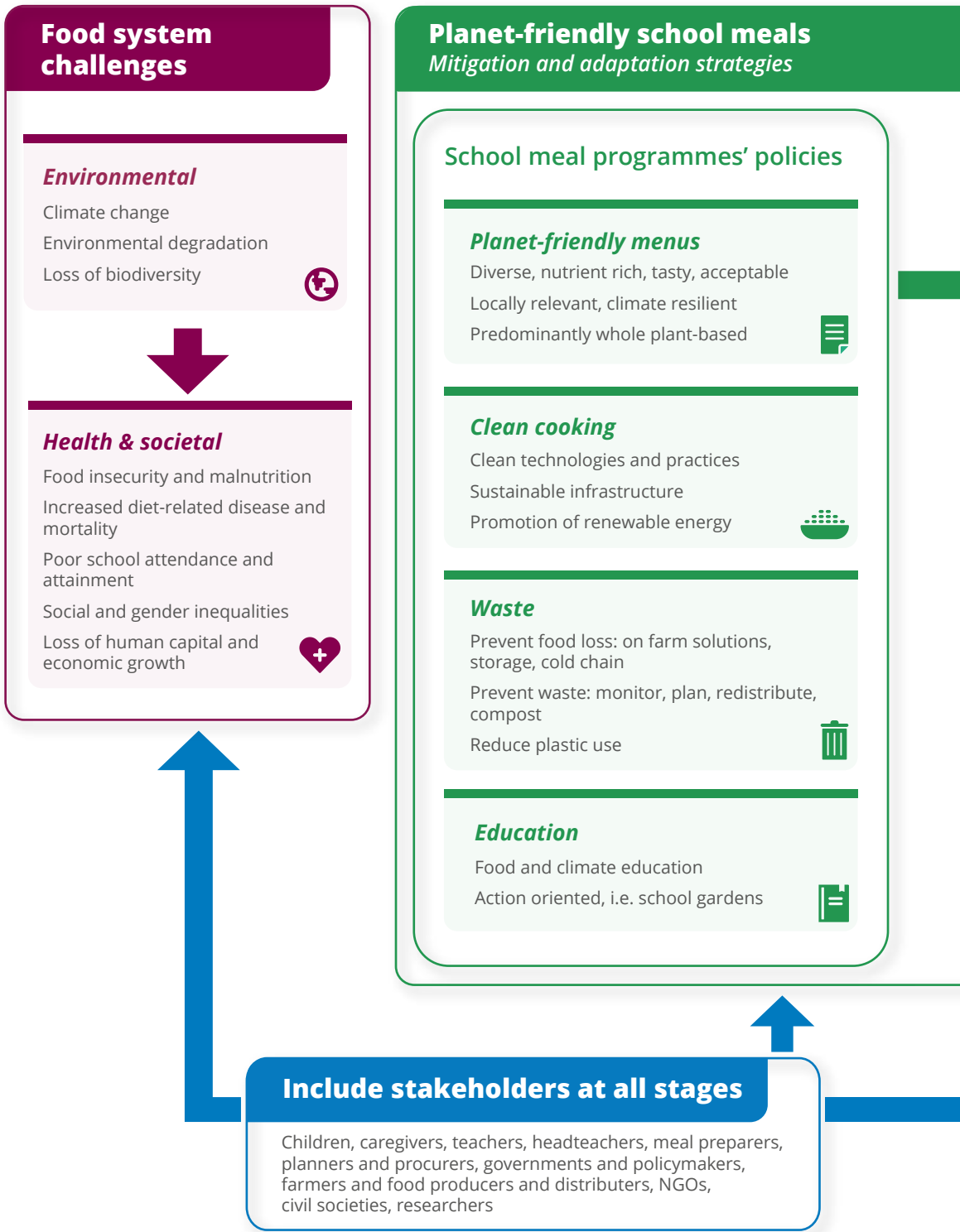
SR.1 A new framework for understanding the role of school meals in the context of food systems

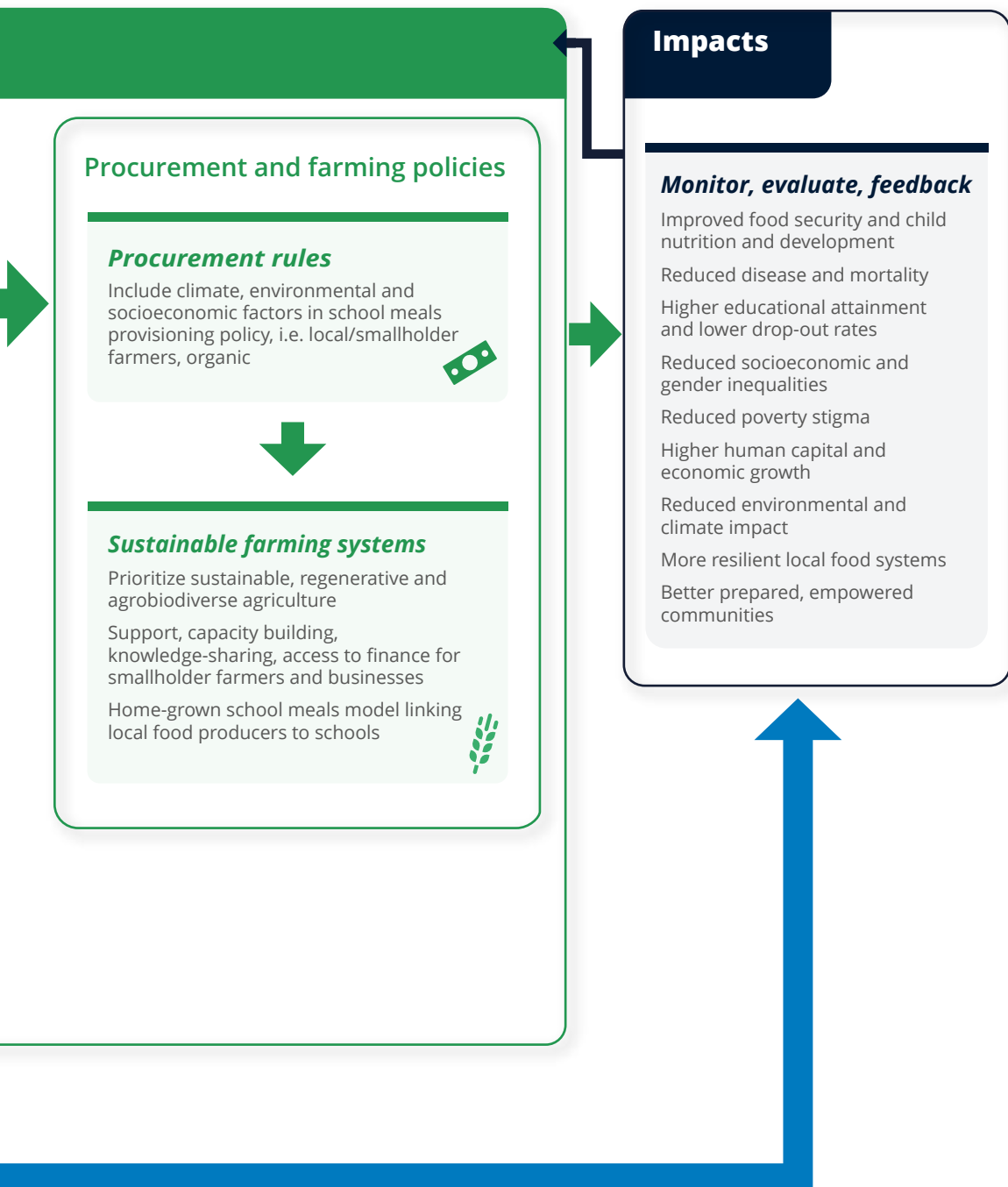
A key challenge for enhancing school meals is how to move towards healthier diets with lower environmental impact, while also enhancing the local and national economy, including farmer incomes. This challenge needs to be addressed by pursuing systemic innovations (Midgley and Lindhult, 2021). It entails changes in two sets of policies: (i) those directed at making immediate changes to school meal programmes in four key areas: menus, energy for cooking, waste and education about food; and (ii) demand-driven, planet-friendly procurement policies that promote agroecological farming practices and develop sustainable food systems (see Figure SR.1).



A girl in Uganda prepares herself for class after her school lunch.
WFP/Daisy Masembe

Figure SR.1
Conceptual and operational framework for school meals and food systems





Source: Pastorino, S., Backlund, U., Bellanca, R., Hunter, D., Kaljonen, M., Singh, S., Vargas, M., & Bundy, D. (2024). Planet-friendly school meals: opportunities to improve children's health and leverage change in food systems. *The Lancet Planetary Health*. [https://doi.org/10.1016/S2542-5196\(24\)00302-4](https://doi.org/10.1016/S2542-5196(24)00302-4)

SR.2 Planet-friendly school meals – demand-driven policies for healthy and sustainable consumption

Menu changes that promote environmental and population health

A planet-friendly diet means access to healthy foods for all, produced and consumed in ways that do not pollute or overexploit natural resources, such as land and water, and that protect biodiversity (Pastorino et al., 2023). To achieve this goal, populations should consume a variety of nutrient-rich fruits, vegetables, wholegrains, legumes and nuts alongside small portions of low-impact, animal-based foods (Willett et al., 2019). A nutritious, wholefood diet produced in resilient and sustainable systems presents major opportunities for adaptation and mitigation of climate-related consequences, while generating significant health co-benefits (IPCC, 2020). This requires strengthening the quality, type and diverse range of food included in school meal menus and simultaneously addressing inequalities within global food systems.

Adoption of traditional and indigenous foods in school meals increases agrobiodiversity, nutritional value and resilience to shocks

In contexts facing greater climate risks, planet-friendly school meals should aim to shift menus to include foods that are drought-resistant, or flood-tolerant (as local conditions require), which add nutrients to the soil and interact positively with local growing conditions. This is best accomplished by diversifying the types and sources of foods served at school; incorporating principles of agrobiodiversity; and acknowledging the importance of Indigenous Peoples and their traditional knowledge as custodians of biodiversity (FAO, 2022a; IPCC, 2019).

Incorporating traditional and indigenous diets into school meals provides an opportunity to improve child health, promote agrobiodiversity, foster a sense of connection to heritage and enhance the livelihoods of communities. Traditional and indigenous diets emphasize the use of locally sourced, seasonal ingredients, aligning with sustainable food practices. This entails the adoption of neglected and underutilized plant species and varieties, also known as “lost”, “native”, “orphan” and “indigenous” plants (IFPRI, 2023).

Many neglected food species and varieties are significantly more nutrient dense than the few dominant varieties consumed today, with higher levels of micronutrients (Akinola et al., 2020; Avallone et al., 2007; Hunter et al., 2019; IFPRI, 2023; Randrianatoandro et al., 2010). Endemic crops are also more resilient due to their natural adaptation to the local environment, i.e. they can withstand droughts and infertile soils and require little or no chemical input (IFPRI, 2023). Examples of countries incorporating neglected local species into their school meal menus include Brazil (Ministry of Health of Brazil, 2015) and India (Government of India, 2013).

A shift to more plant-based foods would bring the greatest health and environmental benefits in contexts where meat is overconsumed

Overconsumption of meat, especially ruminant meat, has the highest negative impact on environmental and human health (Godfray et al., 2018). Reducing red meat and eliminating processed meat intake would offer significant co-benefits for human health. It is important to substitute a reduction in animal-based foods with whole, unprocessed plant foods, such as fruit, vegetables, legumes, nuts, seeds and wholegrains, which are all currently under-consumed in most parts of the world. In particular, legumes such as beans and lentils offer an opportunity to shift the protein and vegetable component of diets towards healthier and sustainable plates: legume crops also improve soil fertility and have lower CO₂ and nitrogen emissions (Stagnari et al., 2017).

Evidence from school settings shows that minimizing animal products in school menus can lead to a 22 percent reduction in global warming potential (Petruzzelli et al., 2023), without any compromise in nutritional quality. Low-carbon school menus, defined as more plant-based, have the potential not only to halve carbon emissions but also to positively impact land use, water use and energy demand (Batlle-Bayer et al., 2021). Modelling work estimates that providing meals in line with recommendations for healthy and sustainable dietary patterns could reduce environmental impacts on average by 26 percent (12–42 percent across the environmental indicators) for flexitarian meals; 43 percent (18–62 percent) for vegetarian meals; and 52 percent (23–81 percent) for vegan meals. The greatest reductions would be for land use, followed by greenhouse gas emissions, reducing the likelihood of creating polluting landfill (eutrophication potential) and demand on freshwater use.

These reductions would be larger in high-income countries. In many countries, including in Europe, active work is under way to increase the proportion of plant-based food used in school meal programmes, with many municipalities reducing meat in school menus.

Aquatic foods: an opportunity to incorporate small amounts of animal foods with high nutritional value and lower environmental impact

Aquatic foods are rich in essential fatty acids, micronutrients and protein and therefore can promote healthy nutrition in school (Bianchi et al., 2022; Hallström et al., 2019). Analyses of aquatic foods based on nutrient density and greenhouse gas emissions reveal certain species, such as small pelagic fish (for example, anchovies and sardines, which are often consumed whole) and molluscs, are particularly nutrient rich. They also have relatively lower greenhouse gas emissions compared to farmed species, such as catfish and prawns, which have high environmental impacts and can lead to ecosystem destruction (Bianchi et al., 2022; Hallström et al., 2019).

Through a successful pilot study, FAO has demonstrated the opportunity for integration of fish into school meals, leveraging public procurement strategies (FAO, 2022b). The collaborative experiences from countries such as Angola, Honduras and Peru underline the importance of multisectoral committees, uniting governmental and non-governmental entities to effectively integrate fish into school meal programmes. This collaborative approach generates affordable, locally accepted fish products while enhancing awareness of their nutritional benefits (Toppe et al., 2021).

Switching to clean cooking solutions for school meal preparation

Around the world, mostly in low-income countries, 2.3 billion people cannot access clean, efficient, convenient, safe, reliable and affordable cooking energy (UN, 2023) and mainly rely on traditional cooking systems, using high emission fuels such as firewood, charcoal and kerosene, burned inefficiently on open fires or simple stoves. This causes large environmental, economic, social, gender and health impacts (WFP, 2021). Traditional cooking systems contribute to the increase of greenhouse gases and cause more than 2 million deaths each year globally from illness and respiratory diseases, including lung cancer and pneumonia, with women and children being the most affected (WHO, 2022). Open cooking and charcoal or wood stoves are utilized in more than 85 percent of schools in low-income countries, while access to electric stoves in schools is minimal in low-income countries and less than 20 percent in lower-middle-income countries (GCNF, 2022b).

Evidence shows that modern energy cooking technologies, consisting of biogas, liquefied petroleum gas, electricity, ethanol, natural gas and direct solar cooking can reduce carbon emissions and contribute to achieving multiple SDGs (including SDG 3, SDG 5, SDG 7 and SDG 13) (Mazorra et al., 2020; Rosenthal et al., 2018).

Large electric pressure cookers have been found to be durable and safe and therefore appropriate in school settings (Batchelor, 2021). The findings of pilot projects in Lesotho and Kenya indicate that electric pressure cookers can improve the work environment and well-being for women, and address gender inequalities given that school staff members are predominantly female. Cooking with electric pressure cookers saves time; reduces the burden and health risks of traditional cooking systems; and requires less supervision, which enables staff members to conduct other productive activities, including teaching.

The introduction of electric cooking solutions and technologies for schools requires supporting enabling environments, reliability and the accessibility of the grid or off-grid electricity infrastructure, value chains and business models (Bisaga & Campbell, 2022). There is potential to attract more funding for school meal programmes by switching from traditional cooking fuels to modern energy cooking technologies and monetizing carbon emission savings, emphasizing the gender and health co-benefits of modern energy cooking technologies (WFP, 2021).

Economic, environmental and health impacts of switching to clean cooking in schools

Pilot studies conducted in Kenya, Rwanda and Lesotho, and evaluated by the Modern Energy Cooking Services organization have demonstrated that cooking with electricity, both grid and off-grid, can be cost competitive with current practice, saving 60–90 percent costs compared to cooking with firewood (Leary et al., 2023; Nsengiyaremye & Yesmeen Khalifa (MECS programme), 2023). Cooking with electricity, also called e-cooking, is faster, taking about half the time compared to traditional methods.

Transitions in the fuel and stoves used for cooking will lead to additional environmental benefits. However, the opportunities for, and impacts of, transition to modern energy cooking are highly context dependent. For example, transitioning from firewood to electric cooking will reduce burdens on forestry, but the significance of that change will depend on the ecological sensitivity of the forests exploited, and net greenhouse gas emissions will depend on whether the wood harvested is classified as non-renewable. This is another priority area for further work; for example, carbon finance could be useful in helping to overcome the first-cost barrier to the purchase of electric pressure cookers, but it relies on the traditional biomass coming from largely non-renewable sources.

A Nepalese farmer harvests vegetables to supply a nearby school. WFP/Samantha Reinders



Preventing food loss and waste

About a third of food is wasted: around 14 percent of the world's food (valued at US\$400 billion per year) is lost after it is harvested and before it reaches retailers (FAO, 2019b). A further 19 percent is wasted in retail and by consumers, particularly households (UNEP, 2024). This lost and wasted food could feed 1.26 billion people every year. Food loss and waste also account for 8–10 percent of global greenhouse gases. SDG target 12.3 aims to “By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chain”.

In low-income countries, food loss mostly occurs on-farm or post-harvest because of contamination by insects and foreign matter, bacteria, aflatoxin or other fungi and moulds. School meal programmes can implement multiple strategies to reduce food losses, such as improved pest control, harvesting, gleaning, salvaging, drying, storage, preservation, preparation, reuse and disposal methods. For example, drying technologies, such as the solar drying of fruit and vegetables, is an effective method to help prevent school food loss through the value chain (Bradford et al., 2020). Lack of sustainable cold chains, including freezers and refrigeration, directly results in 526 million tons of food production loss every year – approximately 13 percent of all food produced (IIR, 2021). Challenges become more acute in communities with limited access to electricity. Refrigeration capacity could allow schools to store perishable, highly nutritious food products such as fruits, vegetables, eggs and dairy for longer periods, supporting a more vitamin-rich, balanced diet.

In high-income settings, food waste occurs mainly at consumption level. For example, schools in the UK waste around 80,000 tons of food, most of which is avoidable waste (WRAP, 2011). A study in Italian schools estimated food waste to be 20–29 percent of prepared foods (García-Herrero et al., 2019). Food waste in schools is also associated with waste of resources, both natural and economic, and compromises the nutritional needs of schoolchildren.

Food waste quantification is an essential first step to identify existing waste issues and for evaluating interventions (Eriksson et al., 2019). In school kitchens, food waste can be divided into kitchen waste (storage, preparation and cooking); serving waste (food that is served but does not reach the plate); and plate waste (everything thrown away from diners' plates). To help reduce waste in schools and catering, the Swedish Food Agency has developed a


handbook with strategies to combat each type of waste (Swedish Food Agency, 2020). Menu planning, serving-size calculation, forecasting and use of leftovers are effective measures to reduce serving waste. Plate waste can be reduced by improving the dining environment, for example by allowing sufficient lunch time, and raising awareness of food waste with students (Malefors et al., 2022; Swedish Food Agency, 2020).

Food that cannot be recovered should be disposed of in sustainable ways. Food waste disposed of in landfill sites or incinerated generates methane and other emissions causing environmental pollution and potentially posing public health risks (HPA, 2011). The method of food waste disposal used has a significant impact on the overall impact of school meals. Waste emissions can be as much as one third of total emissions of a school meal if food disposal is 100 percent landfill. In schools using composting or anaerobic digestion, emissions from waste disposal are much smaller (Tregear et al., 2022). Additionally, plastic waste reduction, for example by using the prioritized framework Zero Waste Hierarchy (Zero Waste International Alliance, 2022) should be a priority.

Action oriented and holistic food education to help establish life-long, healthier and sustainable food consumption

To contain the negative environmental and disaster-related impact of human development, it is essential that children are prepared in schools by addressing environmental, social and economic issues in a holistic way, as emphasized by UNESCO's Education for Sustainable Development programme. As part of this vision, the global Greening Education Partnership supports countries' education programmes in addressing disaster-related issues using a whole-system approach which involves all stakeholders.

Learning about the interconnectedness of food systems, health, well-being and the environment, and developing the capacity to act upon this learning, is a fundamental aspect of sustainable development (dos Santos et al., 2022; FAO, 2020). Institutionalizing this kind of education is not an easy task, as there are important challenges that can hinder its integration, including policy, training, time and system challenges. It is also important to identify the best entry points and assess the readiness of the system before designing a sustainable food and nutrition education initiative.

A young girl with dark skin and braided hair is smiling broadly at the camera. She is wearing a dark blue school uniform with a bright orange collar and a small orange pocket. She is holding a large, bright red bowl filled with food. In the background, other children in similar uniforms are visible, though they are out of focus. The scene appears to be outdoors, possibly at a school event.

School meals in Malawi keep children healthy and ready to learn.
World Vision/Fyson Masina

FAO has developed a model to integrate effective food and nutrition education into school systems, which is informed by evidence and programmatic best practices from countries around the world. It defines an iterative, non-rigid process that should be co-created with students themselves (FAO, 2020). FAO advocates for school-based food and nutrition education (FAO, 2020): it is an action-oriented approach that foresees opportunities for direct experience and practices related to food consumption, nutrition, cooking and agriculture in real-life settings, such as school gardens, farmer visits to schools or vice versa, and food markets, etc. FAO also promotes a “whole-school approach” to food and nutrition education, actively involving all people that interact in the school setting, including children, their families, teachers, school staff, local farmers, foodservice staff, food vendors and government staff.

The EU-funded project SchoolFood4Change¹ built upon these practices by launching an action-oriented framework known as the Whole School Food Approach. This approach positions schools as pivotal change agents, with the aim of not only transforming the school food system but, through food education, fostering the health and well-being of children. School canteens serve as pivotal places where food and education can wield a cascading impact on planetary health diets.

An example of this action-oriented approach to fostering healthy and sustainable dietary habits among children is garden-based learning (Oro et al., 2018). School gardens offer various benefits, including a deeper comprehension of the agriculture and nutrition sectors; positive shifts in attitudes towards food; increased awareness of healthy eating; preservation of agrobiodiversity; and enhanced understanding of the impacts of long and short-term shocks on agriculture and food production (Hunter et al., 2020). For example, in the Philippines, school garden initiatives have promoted diversified garden systems; conserved cultivars of traditional and locally adapted vegetables; and enhanced dietary diversity and consumption of nutrient-dense fruit and vegetables (IIRR, 2023).

¹ More on the project can be found using this link: <https://schoolfood4change.eu/>

SR.3 The power of procurement: leveraging school meals as a tool to improve local agriculture, social and economic sustainable development and foster biodiversity

By requiring school meals to be planet friendly, governments can create demand for more sustainably produced foods and act as catalysts for food system transformation (Swensson et al., 2021). School food procurement has the power to promote farming practices that regenerate soil and ecosystem health, and promote biodiversity and resilience. When accompanied by supporting measures, local procurement from smallholder farmers can also contribute to boosting local agricultural development, strengthen local food systems, stimulate crop diversity and move people out of poverty.

Public food procurement is expressly recognized by the SDGs (Target 12.7) as a key instrument to promote more sustainable consumption and production patterns. As such, it is recognized by national and regional policies globally, including the European Farm to Fork and Green Deal strategies, the African Union Malabo Declaration and the Climate Change and Resilient Development Strategy and Action Plan.

School food procurement can be used to achieve different (social/economic/environmental) goals according to government priorities. This makes it a unique policy instrument that can, and is being adapted to very different contexts and objectives, in both high, medium and low-income countries (FAO, 2021; FAO et al., 2021; Swensson et al., 2021). By creating a demand for planet-friendly food, governments have the power to set a positive trend; signal their ambitions for the future direction of food systems; and incentivize those involved in the supply chain to align their values accordingly, accelerating a transition towards more sustainable food consumption and production patterns (Foodlinks, 2013; Tartanac et al., 2021).

Procurement to drive regenerative agriculture

School food procurement can use its purchasing power to support and promote agricultural production that ensures environmental sustainability and agrobiodiversity. This includes, for instance, the purchase of food from organic, regenerative and agroecological production.

From an environmental perspective, evidence shows how the strategic use of public food procurement can contribute to mitigation of climate impact (Cerutti et al., 2018; SF4C, 2021), biodiversity conservation (Borelli et al., 2021), deforestation (Falvo & Muscaritoli, 2024) and the adoption of production practices with no use of synthetic fertilizers and pesticides, e.g. organic and agroecological practices (FAO, 2021; Lindström et al., 2020).

There is increasing recognition among governments of the importance of school food procurement to contribute to environmental outcomes globally, regardless of income level. One example is the African Union's Climate Change and Resilient Development Strategy and Action Plan (2022–2032) that identifies “enhancing the role and influence of public procurement in food purchasing to support diverse and nutritious diets for example home-grown school feeding” as a priority intervention and action area (African Union, 2022). In Europe, many municipalities have adopted sustainable school food procurement strategies – Nordic cities are leading the way, with high shares of organic and seasonal foods, and sustainably sourced aquatic foods procured for their school meal programmes (FAO, 2021). Strategies such as subdividing tenders; collaborating with regional organic networks; and implementing dynamic purchasing systems have been adopted to amplify the integration of locally sourced and organically produced food in schools.

Food system transformation through home-grown school meals

School meals can enable wider food system transformation through different pathways and processes by engaging with issues concerning food security, public health and conservation at various levels of governance, both formal and informal. The main pathways of transformation include small/family farms, women farmers and traders/food processors. The wider transformative outcomes catalysed by school meals include: (i) women's empowerment and social equity; (ii) adoption of regenerative and climate-smart food production; (iii) agrobiodiversity and natural resource management; and (iv) food sovereignty.

The key principles of school meals–food system engagement build on the now widely recognized concept of home-grown school meals, which is defined as school meal programmes designed to provide children in schools with safe, diverse and nutritious food sourced locally from smallholders (WFP et al., 2018). The main components of home-grown school meals include local food procurement, smallholder engagement, nutritious food, dietary diversity and regularity in meal provision.

WFP's support to home-grown school meal programmes has expanded significantly over the last decade: the number of initiatives where WFP supports the design and implementation of national home-grown school meal programmes had increased to 59 by 2023. Globally, WFP has increased its local purchases for school meals to 57 percent of total purchases, from 42 percent in 2022.

Home-grown school meal programmes are complex, multisectoral initiatives that can be designed and implemented in a large variety of ways depending on the local context. As well as local sourcing, home-grown school meal programmes supported by WFP typically include the following components:

- **Nutrition focus:** Meals are designed to meet the nutritional needs of students, emphasizing diet diversification and nutritionally rich meals, by the inclusion of fruits, vegetables, some animal products or fortified food for example.
- **Educational integration:** Many home-grown school meal programmes incorporate educational elements that teach students about nutrition, food systems and sustainable practices. This can include gardening programmes, nutrition education, cooking classes and training on the adoption of clean cooking technologies.
- **Community engagement:** Home-grown school meal programmes often engage parents, local organizations and governments to foster community support and involvement, creating a network that enhances programme sustainability.

- **Women's empowerment:** Recognizing the integral role that women play in the food value chain and in food production and preparation, home-grown school meal projects can promote gender equality and women's empowerment by creating employment opportunities and increased participation in decision making processes at different points along the value chain.

Public institutions' regular and predictable demand for smallholder farmers' products can facilitate investments by farmers to increase and diversify their agriculture production, contributing to agrobiodiversity and biodiversity gains, as well as to increased incomes (Drake et al., 2016; Kelly & Swensson, 2017; Singh, 2021; Valencia et al., 2019; WFP et al., 2018). Linking school food procurement to local and smallholder agriculture production can also contribute to strengthening local and regional food systems, and to the valorization of traditional, seasonal and resilient food systems.

In Cuba, farmers gain access to tools for farming. WFP/Irshad Khan





A girl runs through the shade house that supplies crops for school meals in Cambodia.
World Vision/Dara Chhim, Ben Adams, Elissa Webster

There is growing recognition that local and smallholder (or family) farmers could play an important role in the transition to just and sustainable food systems (Santacoloma & Zárate, 2021). Many Latin American and Caribbean countries have adopted public food procurement strategies encouraging the purchasing of food from family farms as powerful policy instruments to enable food system transformation. Examples of this approach are the public school meal programmes in Colombia, Guatemala, Honduras, Paraguay and Peru; the procurement system in Uruguay; and the Brazilian National School Feeding Programme (FAO, 2017, 2021; Soares et al., 2021; WFP & IDB, 2023).

In Brazil, at least 30 percent of the food purchased with federal funds through the national programme must be bought directly from family farmers, prioritizing purchases from settlers of the agrarian reform, quilombolas and indigenous communities. These programmes also give priority and provide a price premium for foods produced through organic or agroecological production practices.

From evidence to policy-led action

Planet-friendly approaches to school meal programmes must be supported by adequate and integrated policies, objectives and instruments for implementation (Swensson & Tartanac, 2020); include capacity building for those implementing the programmes (e.g. procurement officers) so they are fully aware and able to translate policy objectives into practice through the procurement process; and support to farmers and small-medium enterprises to allow them to upgrade and respond to the demands of new planet-friendly school meal programmes. This may include measures to support smallholder producers to increase, adapt and diversify their production based on environmentally friendly production practices; organize themselves collectively; and participate in public food procurement processes.

While the multiplicity of benefits that home-grown school meal programmes have the potential to achieve, and the number of beneficiaries they can reach is increasingly recognized by national and local governments, the lack of impact evaluations and longitudinal studies remains a gap. Preliminary studies undertaken by FAO showed that impacts on food security for smallholder farmers could even be negative if support is not provided to increase their productivity and maintain food diversity on farms (Giunti et al., 2022; Prifti & Grinspun, 2021). Nevertheless, it is important to acknowledge that this situation is linked to the (multifaceted and complex) nature of these programmes and of food systems; and the consequent difficulties in examining a wide range of potential impacts simultaneously and capturing them in a quantitative and comparative way (Brunori & Galli, 2016).

In addition to addressing evidence gaps relating to impact, there is a need for focused, scientifically rigorous programmatic evidence to help understand the key drivers, constraints, risks and trade-offs of the different interactions between school meals and food systems. This will help develop appropriate, robust policy and operational mechanisms that can realize the potential of school meals in terms of changes to food systems and public health. While there is some emerging evidence in this area (through multi-disciplinary action research projects) there is a need for greater engagement across different countries and contexts. Such projects would help capture evidence on processes and transition, which is critical but often understudied.

SR.4 Two important policy issues in addressing food systems and public health

New guidelines on school food standards are a fundamental initial step in enabling policymakers, caterers and schools to serve healthy and sustainable school meals

There is an urgent need to incorporate environmental sustainability objectives in school food policies (dos Santos et al., 2022; Oostindjer et al., 2017). A pivotal juncture for incorporating environmental objectives is during the development or revision of school meals nutrition guidelines and standards and food-based dietary guidelines. A recent Initiative on Climate Action and Nutrition report (I-CAN & GAIN, 2023) revealed that of the 70 food-based dietary guidelines reviewed, only 8 percent included a commitment to mobilizing resources and plans to take action to connect climate and nutrition. However, some pioneer countries, such as the Nordic countries (Blomhoff et al., 2023) have already embarked on this process. In planning such an endeavour, it is important to consider potential challenges, including lack of an enabling environment; lack of context-specific, good quality dietary intake data for schoolchildren, food composition and environmental footprint data of locally available foods; and limited capacity, infrastructure and logistics. FAO and WFP are currently devising a global methodology that countries can adapt to formulate nutrition guidelines and standards for their school meal programmes, incorporating environmental objectives (FAO & WFP, forthcoming).

Many policies that are environmentally sustainable are often more economically viable in the medium to long term

In some cases, changes can even reduce costs: for example, the move to more plant-based diets; the switch to more fuel-efficient cooking; portion size adaptation or waste reduction; and shorter supply chains.

Financial affordability may be of more immediate concern to policymakers, especially in resource-limited settings. Sources of support for planet-friendly school meals include debt swaps that specifically target human capital creation and climate financing resources. For example, climate finance could support farmers, micro, small-medium enterprises, entrepreneurs, innovators and start-ups to deliver climate-resilient foods for schools. However, thus far, only 1.7 percent of total climate finance targets small-scale agriculture, which represents a third of all food produced globally (Climate Policy Initiative, 2020).

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