

Rethinking food systems and school meals: climate, environment, biodiversity and food sovereignty

Executive Summary

The Research Consortium for School Health and Nutrition¹, an initiative of the School Meals Coalition

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The need for food systems transformation

Rethinking food systems, from production to consumption, has never been more urgent. The world is facing a global nutrition crisis, with malnutrition affecting most of the population, either as hunger, food insecurity, obesity, or diet-related diseases. Many countries experience multiple malnutrition burdens at the same time and very few are on course to meet nutrition related Sustainable Development Goals (SDG).

At the same time, the need to feed an increasing population coupled with prevailing agricultural practices and unsustainable food production and consumption trends has altered the equilibrium of our planet, causing depletion and pollution of natural resources, habitat and biodiversity loss, deforestation, ocean acidification, and climate change. Food systems contribute to a third of all human-induced greenhouse gas (GHG) emissions. A third of all food is wasted along the value chain, accounting for 8%-10% of GHG emissions through its production. Food production accounts for 70% of freshwater use, and is the principal driver of biodiversity loss, mainly due to the conversion of natural ecosystems for crop production or pasture. These environmental changes affect our ability to produce high quality foods, further compromising food security and nutrition. These changes are especially damaging for countries in the global south that will bear the brunt of the climate crisis sooner and more intensely than many other parts of the world.

School meals: a unique opportunity to address multiple food system challenges

The environmental and climate crises disproportionately affect children. Approximately 1 billion children are at high risk of suffering from food insecurity and other impacts of the climate crisis. This threatens the education, growth, and development of children and adolescents worldwide, as well as increasing the risks of morbidity and mortality.

¹ The [Research Consortium for School Health and Nutrition](#) is the evidence-generating arm of the School Meals Coalition. The Research Consortium supports an independent, global network of researchers with a small Secretariat based at the London School of Hygiene and Tropical Medicine.

School meals are increasingly recognized as a key investment for governments, especially in the global south to tackle these challenges for children and provide a platform for food systems transformation. School meals programs are amongst the most established and extensive parts of public food systems worldwide, currently reaching 418 million children every day worldwide. Because the policy levers are in the hands of governments, and because of their reach and scale, national school meals programs provide an exceptional opportunity for the implementation of change to planet-friendly policies which have enormous co-benefits for child health and the wider society.

The message that investment in well-designed and holistic school meals programs yields substantial returns in terms of healthier, educated, and empowered individuals who contribute positively to the overall advancement of society was reinforced at the recent 2023 UN Food System Summit. Governments of member countries of the School Meals Coalition, a network created with the goals of enhancing the reach, quality, and sustainability of school meals, committed to support healthier diets, shorter and more sustainable value chains, and boost equitable smallholder farmers' economy, especially for women. Implementing such sustainable and healthy school meals programs also acts as a catalyst for the creation of more resilient and sustainable food systems that benefit the local economy. This potential can be achieved especially when school food is linked to the local and smallholder agriculture production such as in the home grown school food (HGFS) approach, and when inputs, technical, and financial support are well targeted.

Two key areas where school meals programs can drive systemic change

Schoolchildren and adolescents as agents of change

An emerging body of evidence indicates the importance of nutrition to the health and development of children across the full age spectrum up to adolescence, what is now called the first 8,000 days, building on the crucial early investments during the first 1,000 days. Optimizing the synergistic potential of health and education investment during this sensitive development period helps ensure children achieve their full potential as adults, thus creating a nation's human capital. School meals programs provide the world's most extensive safety net for vulnerable children and, for many children, the food they are served at school represents the most nutritious, and for some the only, meal of the day.

The benefits of school meals go beyond nutrition: they improve school enrolment, attendance, attainment and cognitive development and lower dropout rate, especially for girls. School meals programs help bridge socioeconomic disparities, ensuring that all children, regardless of their background, have equal access to quality nutrition and education. Importantly, planet-friendly school meals coupled with consistent and action-oriented food education can empower future generations by fostering healthier and more sustainable food habits at a critical age when life-long dietary preferences and social attitudes are formed and tracked into adulthood. By taking these messages home, children can also influence the dietary preferences of their family, and coupled with a whole school approach, which actively involves communities, the broader food culture and values can also be positively influenced.

The power of procurement

Alongside the direct benefits for children, changes to the world's national school meals programs can also create demand-driven planet-friendly actions in local agriculture. They can also stimulate crop diversity and broaden the local food basket especially as some forgotten foods are valued, thereby supporting food security. The link between school meals provision and local agricultural change is already established in many countries, and the mechanisms for policy change already exist. In Africa, for example, school meals provision is a specified demand in the African Union 2014 Malabo Declaration, and 42% of national school feeding programs currently have agriculture policy objectives, which include ecological elements such as agrobiodiversity and climate-smart foods. Government and community-led changes to the national school meals programs can catalyze regenerative agricultural practices which, if appropriately designed, can promote biodiversity and climate change resilience. Procurement practices have also been shown to enable food sovereignty.

Economic and financial implications of the policy changes

Policies that are environmentally sustainable are almost always economically sound, providing long-run returns especially to human capital and agriculture. Studies suggest that the returns from school meals programs are substantial, of the order of \$9 for every \$1 spent, because of the additive costs across multiple sectors, including returns to education, health, human capital, social protection, and agriculture. The additive long-run returns will be even greater if the investments are sustainable from the perspectives of agroecology, biodiversity, food sovereignty and climate, and especially if they contribute to regenerative agriculture.

Financial affordability may be of more immediate concern to policy makers, especially in resource limited settings, and here too the analyses suggest positive outcomes. Careful choices of sustainable dietary change can be largely cost-neutral, as shown for fortification in low-resource settings, and for a switch to more sustainable programs in Finland and Sweden. In some cases, changes can reduce costs, for example: the move to flexitarian diets from those based on some current food standards; the switch from open fires to more fuel-efficient cooking stoves; and waste reduction procedures to make savings that effectively reduce the per-capita cost of food.

All change implies some costs, especially capital costs for start-up and transition, and here too there are positive options. The Sustainable Financing Initiative of the School Meals Coalition has supported the move by external donors to specifically target their support for school meals at low-income countries which seek to strengthen and launch national school meals programs, and at countries with established national programs which need marginal and temporary support to transition to sustainability. Other potentially important sources of support for implementing planet-friendly policy change in national school meals programs are Debt Swaps that specifically target human capital creation and the growing number of Green Financing resources that are increasingly available to countries with limited fiscal space.

A focus on two areas of policy change can create nutritious and sustainable planet-friendly school meals sourced from ecologically sustainable agriculture

Systemic changes and collaboration between multiple actors across the school food system are required to move towards healthier school meals with lower environmental impact. By starting with the meal and working backwards through the supply chain to the farmer, innovation can be driven across the entire food system using a 'fork-to-farm' approach.

This entails changes in two sets of policies:

The first group of policy changes are those that are directly controlled by national governments. Governments hold the policy levers of national school meals programs and can bring about changes that can have direct effects on critical areas that influence all their young people. Depending on the local demography, these changes will affect the lives of between 38% and 15% of the population, in low and high resource settings respectively. Analysis suggests that the biggest effects are made by policy changes in the following four priority areas:

- 1) Menu changes which encourage dietary shifts which promote planetary and population health;**
- 2) Clean and energy efficient cooking methods;**
- 3) Prevention of food loss and waste, and reduction of plastic use;**
- 4) Action oriented and holistic food education to help establish life-long healthier and more sustainable food practices**

Annexes 1 and 2 provide examples of how countries are using policy change to make their national school meals programs more planet friendly, in high and low resources settings, respectively.

The second group of policy changes build on the power of procurement to create demand from the agricultural sector for school foods from ecologically sustainable local farm systems, with the goals of stimulating local approaches to agriculture which are regenerative, and which promote biodiversity, resilience, and food sovereignty. The policy influence here is less direct, and the power of procurement plays the major role if governments make the active and deliberate policy shifts in where they source school food, as explained in **Annex 3**.

Turning policy into action

There are two areas for action:

1) Policy changes to national school meals programs

- Nutrient rich diverse menus:
 - Establish context-specific, evidence-informed national nutrition and food standards for school meals that adequately integrate sustainability considerations.

- Shift to nutrient rich, climate resilient, and culturally relevant foods, ensuring a diverse school diet including whole grains, legumes, fruits, and vegetables: there is a particular role here for menu planning tools which address crops which are indigenous, local, planet- and climate-friendly.
- Reduce meat, especially ruminant, where this is overconsumed, with the goal of shifting to predominantly plant-based diets. Our analyses show, for the first time for school-age children and adolescents, that relatively modest changes to standard school menus (a flexitarian diet) can reduce environmental impacts by 26% (and by 43% with a vegetarian diet).
- Where possible, prioritize local foods produced ecologically by small farmers by including sourcing requirements in procurement guidelines and practices, such as the Brazil model of accessing 30% of school food from family farms.
- Adopt nutrient sensitive planet-smart school meals national guidelines.
- Use planning and monitoring tools to ensure nutrition and environmental targets are planned for and met.
- Integrate sustainability aspects to the vocational training of chefs and kitchen personnel and invest in teaching planet-friendly recipes and cooking. Secure resources for further training and capacity building of chefs and kitchen staff responsible for school meal provisioning.
- Clean efficient energy for cooking:
 - Ensure access to energy efficient, clean cooking methods, with the goal of moving to modern energy cooking (MEC) technologies; in low-income settings, a switch from open fires to electric cookers can significantly reduce pollution with additional benefits for the health of the cooks and reduced deforestation.
- Minimal waste:
 - Prevent food loss by using methods such as better storage and preserving methods, and ecological pest control.
 - Reduce food waste at all stages, using monitoring and planning tools to control orders and portion size: halving food waste could reduce environmental impacts by 13%.
 - Adopt climate-friendly methods of disposing of food waste, such as composting.
- Food system education:
 - Ensure that holistic food education is institutionalized in national school systems, designed with an action-oriented focus and implemented with regularity and available to all grades. Prioritize real-life and practical activities such as farm visits, cooking produce from school gardens, taste sessions, and waste awareness.
 - Adopt whole school food approaches to help children and young people develop a new understanding of the role of food in their development.

- Make the interconnectedness of food systems, climate change and environmental impacts part of the national curriculum to ensure a future generation is better prepared to make planet-friendly decisions.

2) Policy changes to promote regenerative agriculture.

- Recommended food system improvements:
 - Actively promote and formally give preference to a regenerative agriculture approach (defined within the local context) to source school meals ingredients.
 - Include climate targets in policies, recommendations, procurement rules and contracts guiding school meal provisioning at national, regional, and local levels.
 - Explore options to tap into innovative financing that can accelerate innovation, support local entrepreneurs including women and youth and other small and medium enterprises (SMEs) involved in value chain development that enables them to target more climate-resilient and nutrient-rich crops.
 - Capacity building of SMEs, farmer organizations and cooperatives on adopting climate-smart practices across supply chains.
 - Link HGSF farmer organizations and cooperatives to the growing range of climate-smart technologies and practices, climate services and knowledge products, tailored agro-advisory services, innovative insurance etc.

Box 1. The current membership of the global team working on the White Paper: Agriculture, Nutrition & Health Academy (ANH)*CGIAR*CIAT: Alliance Bioversity International*Comune de Milano *Council Fire*Data & Monitoring Initiative of the School Meals Coalition (SMC)*Dordogne Perigord Le Département*Dubai Cares*Eating City International Platform*Environmental Defense Fund*Food and Agriculture Organization of the United Nations (FAO)*Gamos East Africa*Global Child Nutrition Foundation*Government of Iceland*Government of Luxembourg*Government of Brazil*ICLEI – Local Governments for Sustainability*Imperial College London, School of Public Health*Intake - Center for Dietary Assessment *International Development Research Centre Canada*International Food Policy Research Institute (IFPRI)*International Institute of Rural Reconstruction (IIRR)*London School of Hygiene & Tropical Medicine*Loughborough University*Malmö City*McKinsey & Company* Modern Energy Cooking Services *Organisation for Economic Co-operation and Development (OECD)* Planetary Health Centre at the London School of Hygiene & Tropical Medicine*ProVeg International*Relivs network*Research Consortium for School Health and Nutrition (of the SMC)*Research Institutes of Sweden (RI.SE)*SE4All* Sight and Life*Stanford university* Sustainable Financing Initiative for School Health and Nutrition (of the SMC)*Swedish National Food Agency (Livsmedelsverket)*SYKE: Finnish Environment Institute*TastEd*The Blue Food Assessment (BFA)*The Partnership for Child Development*The Power of Nutrition*The Rockefeller Foundation*The Soil Association.*UCL University College Denmark*Unicamp Brazil*University of Cambridge*University of Edinburgh *University of Gastronomic Sciences*University of Oxford*World Food Programme WFP*World Resources Institute (WRI)*World Wildlife Fund (WWF)*

Annex 1: High income and upper middle income contexts experiences and perspective

1) Shift to healthier plant-based meals to bring the greatest co-benefits for planet and human health

Overconsumption of meat, especially ruminant meat, has the highest negative impact on environmental and human health and is the primary driver of school meals programs environmental footprint. Providing nutritionally balanced predominantly plant-based meals can cut resource use and pollution by more than 50%, with greatest reductions for land use, followed by GHG emissions, eutrophication potential, and freshwater use. If these patterns continue into adulthood, 2.2-3.0 million deaths could also be avoided. Many municipalities in Europe, including Sweden, Finland, Italy, France and Denmark have successfully reduced meat and increased whole plant foods in school menus, with significant impacts on carbon emissions and children's diets at no extra cost.

2) Promote energy conservation behavior and switch to more energy efficient kitchens

Adopting energy saving behaviors while using school kitchen appliances and implementing energy efficient technologies for cooking, dish-washing, cooling and freezing lead to reduced energy use and better working environments.

3) Reduce food and package waste and move to sustainable waste management

Reducing food waste can cut environmental resource use and pollution, reduce costs, improve nutrition, and educate children and staff about their impact on the environment. The basis for reducing food waste in schools is to start measuring it, to help order precise amounts and increase awareness. In cities in Denmark, Sweden and Finland, waste measurement and involvement of the whole school have dramatically reduced waste and costs.

The method for waste disposal will also significantly impact emissions. A 100% landfill disposal can account for up to a third of all school meal emissions, while 100% use of composting or anaerobic digestion can significantly reduce this impact.

Packaging accounts for 40% of global plastic waste, most of which relates to food and drink. School meals contribute to plastic waste through packaged processed foods and single-use service ware. Children are also exposed to plasticizers and plastic chemical additives in food and drink, with potential long term detrimental effects. Using the Zero Waste Hierarchy, "refuse, rethink, redesign" is the best way to reduce resource use and waste. In line with this recommendation, France has announced that by 2025 plastic containers in school canteens will be banned in an ambitious effort to eliminate plastic pollution.

4) Integrated food systems education: an underestimated tool to empower tomorrow generation

Bringing food education into schools and making meal time an integrated part of the schools' pedagogic mission has so far been non-existent, but more support is gathering. The FAO recommends an action-oriented school-based approach fostering direct whole-person practices related to food consumption, nutrition, cooking and agriculture in real-life settings such as school gardens, farmers, and markets visits. Whole School Approaches involve all people interacting in the school setting, including children, families, teachers, school staff, local farmers, foodservice staff, and government staff. The 12-countries Whole School Food Approach (WSFA) project integrating school food and food education is being rolled out across Europe and will offer best practices and impact insights.

Annex 2: Low income and lower middle income contexts experiences and perspectives

1) Increase agrobiodiversity with local culturally relevant nutrient-rich, climate resilient foods, preferably applying the HGSF model

In contexts where resources are limited, malnutrition is high and the impact of climate change will cause greater food insecurity, planet-friendly school meals programs should aim to diversify menus by including a range of nutrient-rich foods that are drought- or flood-tolerant 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 bioagrodiversity and integrating traditional and indigenous diets. These would promote health and biodiversity and foster a sense of connection to heritage. One example of this approach is the adoption of "orphan foods" or "traditional African vegetables" in Africa, which are highly nutritious, but often underutilized. These foods can play a vital role in enhancing the nutritional quality of school meals while also promoting local agriculture and food security. Incorporating local aquatic foods into school meals could also have potential to offer numerous benefits for the nutritional status of children.

In the short term, fortification and biofortification of staple foods remains an important strategy to reduce micronutrient deficiency where access and affordability of diverse nutrient rich diets is limited. An example of a low cost action with large nutritional benefits is shifting from refined unfortified flour-based consumption and supply, towards fortified whole grain foods using existing mills.

2) Provide access to energy efficient clean cooking technologies

Four billion people around the world still lack access to clean, safe, reliable, and affordable cooking energy. Cooking using fossil fuels such as firewood, charcoal, and kerosene, on open fires or simple stoves, causes massive environmental, economic, social, gender and health impacts. Clean cooking could save more than 3 million deaths a year, due to respiratory and cardiovascular diseases, mostly among women and children.

Schools are high contributors to inefficient cooking, due to the large quantities of food cooked and prepared for school meals. Modern energy cooking (MEC) technologies (biogas, LPG, electricity, ethanol, natural gas and direct solar cooking) can reduce carbon emissions and contribute to multiple SDGs. Case studies of electric pressure cooking (EPC) in Lesotho and Kenya indicate that EPCs reduce carbon emissions with enormous gender and health co-benefits.

3) Prevent food loss

On-farm and post-harvest food losses to pests, contamination by foreign matter, bacteria, aflatoxin or other fungi and molds, are a significant challenge in low and middle income countries. Food loss can be reduced through improved non-toxic pest control, gleaning, low-cost solar drying, hermetic storage, preservation, and preparation methods. Policy makers can work with agricultural officials, community members, and private sector entities to ensure that safe and effective methods and products are routinely used.

4) Education: embed learning about the interconnectedness between food systems, health and the environment

In low and middle income countries, school food gardens have been successfully used as a learning platform and to improve nutrition in the Philippines, Indonesia, Nepal and Rwanda among others. In and out of classroom learning about the interconnectedness between food systems, health, and the environment is crucial if the next generation is to adopt the strategies needed to successfully respond to climate change.

Annex 3: The power of procurement: local procurement and home grown school feeding

By changing the emphasis to menus that demand planet-friendly foods with high nutritional value, the government can help influence food systems and agricultural practices. School meals typically represent 70% of a nation's food that is under public control. These changes will promote a shift towards sourcing school meals from ecologically sustainable production systems, using HGSF approaches or embedding local procurement in school guidelines, for example following the Brazilian practice of procuring 30% of all school food locally. Local procurement from smallholder farmers can boost agricultural development, strengthen local food systems, stimulate crop diversity, and move people out of poverty. Home grown school feeding provides an important framework to empower farmer organizations and food producers to take climate action, improve biodiversity, reduce supply chain length and support local and regional food systems. There are also additional positive multiplier effects for other groups of people along the HGSF value chain such as local catering businesses, many led by women, traders and transporters, as well as SMEs, many in rural areas, who can achieve higher incomes and improved livelihoods.