The Rockefeller Foundation

Building Climate Resilient School Feeding Programs

EXECUTIVE SUMMARY

Introduction

School feeding programs are among the largest and most effective social safety nets in the world. More than 466 million children[1] receive at least one meal at school each day. These meals improve nutrition and help fuel students' learning and educational outcomes. They also strengthen local economies, acting as a powerful policy lever to support local food systems and smallholder farmers. Despite the progress made on school feeding – with 80 million additional students reached since 2020[2] – the unmet need remains vast. Hundreds of millions of children lack access to the nutritious food they need to thrive, compromising their futures before they even begin.

New research from Stanford University, supported by The Rockefeller Foundation, provides the first empirical evidence that the climate crisis is quietly undermining our ability to deliver school meals to children worldwide. Rising temperatures, shifting rainfall patterns, and increasing climate variability are hurting yields and driving up the costs of the food that supplies these critical programs. The research, however, also provides a potential solution to this issue: a switch to regeneratively-produced ingredients.

This Executive Summary previews key findings from the Stanford study, and intends to serve practitioners, advocates, policymakers, researchers and others invested in school feeding programs globally in several key ways:

Assess climate impact on individual programs:

The analyses outlined here can be applied to any school feeding program to understand the current pressures of climate change on the local "school plate".

Inform sourcing decisions:

These findings can support decision-makers in sourcing decisions and policies that could bolster their resilience against likely climate-driven disruptions.

Guide international strategy and coordination:

International agencies and regional partners can use these insights to understand correlated climate impacts across countries and inform region-specific approaches to building resilience.

Catalyze climate-smart local food systems:

Researchers, implementers, and funders can draw on this work to spur investment into the kind of nutritious, year-round, climate-resilient production systems that can sustain school meal programs.

1 WFP. 2025. State of School Feeding Worldwide 2024. Rome
2 ^Ibid

Understanding The Climate Vulnerability of School Meals - Report Methodology

It is well documented that climate change is disrupting food production globally – compromising productivity and reducing yields of major staple food crops (e.g. maize, rice, soybean, and wheat) in every region.

Yet the climate exposure of school feeding programs specifically – despite their tremendous reach – has been poorly understood. This report provides the first estimates of climate impacts on school meal plates. It draws on data from the Global Survey of School Meal Programs, country food basket data from the FAO, and regional weather and agricultural production data.

Estimating the current cost of climate change on school feeding

The report first presents climate-productivity relationships for a broad suite of agricultural products that appear in school meals around the world. Through statistical analysis of past crop yields and weather conditions, the authors are able to project what crop yields would be at present without climate trends.[4]

By comparing actual yields to these "no-climate-change" scenarios, the report measures how shifts in temperature and rainfall over the past forty years have affected production of these crops (positively or negatively) in different regions. The report links these crop-level productivity changes to the foods that make up a typical school meal in each country. This approach gives an estimate of how many additional meals could have been provided if climate change had not altered crop yields.

Projecting the potential impact of regenerative methods

The second part of the methodology involves contrasting 'business-as-usual' agricultural methods with those that seek to preserve soil health (e.g., no till, cover cropping, intercropping). Here, the report draws on global evidence from nearly 3,000 field trials that show how these methods, which are key components of regenerative agriculture, affect yields of the most common crops in today's climate.

Referred to by different names in different contexts, "regenerative agriculture" is guided by principles, measured through outcomes (like increased soil health, water quality and biodiversity) and applied via specific practices that vary by place. Regenerative agriculture is widely understood to deliver ecological, social, and economic returns for producers and the planet.

3 This number could potentially increase if including non-staples such as fruit and vegetables.

4 The study uses an assumption that all production of these crops is domestic and excludes animal-source foods as estimating climate and regenerative impacts on egg, dairy, fish/seafood, and meat production is not straightforward and lacks insufficient standardized data.

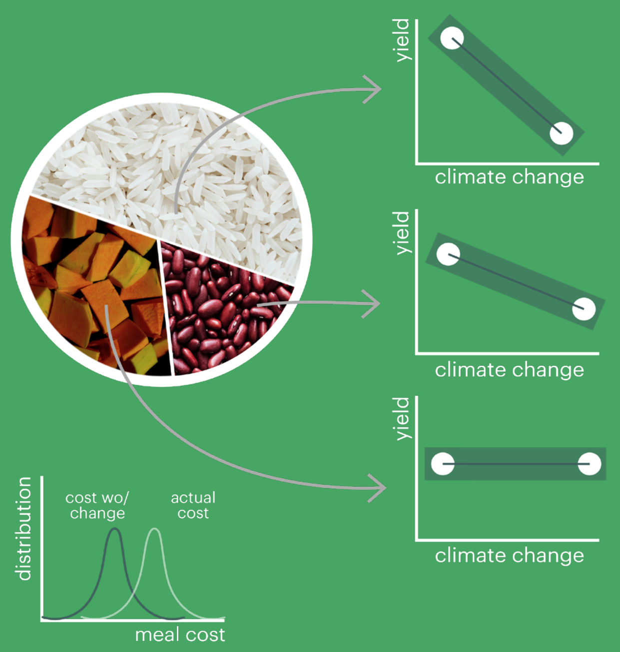
KEY FINDINGS

Climate-driven yield losses increase program costs when schools source from business-as-usual agriculture, translating to an estimated 1.12 million fewer children reached through existing budgets.

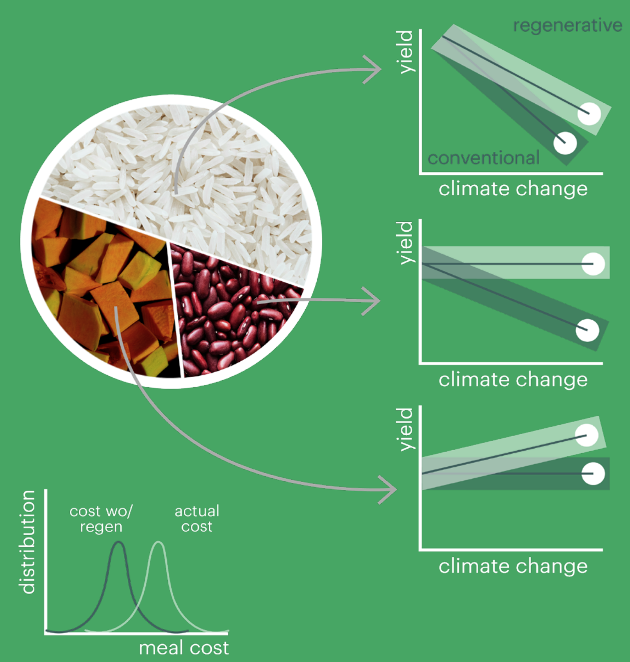
Shifting toward regeneratively-grown staple crops[3] could stretch current budgets to feed up to 8 million more children.

Creating menus with more diverse food on the plate, including incorporating culturally-relevant, locally-sourced crops, can help create climate-resilient and nutritionally-rich meals.

A: Silent Cost of Climate Change



B: Regenerative Agriculture Potential



The Current Cost of Climate Change

The threat of climate change on food production is not a distant risk. Historical climate data from 1983–2023 shows widespread yield losses, driven primarily by rising temperatures, impacting key staple crops – with soybean, maize, and wheat demonstrating particularly high vulnerability. This has negative implications for school meals programs.[5] In practical terms, these climate-induced yield reductions increase costs, leading to fewer school meals purchased for the same budget.

This is the "silent" cost of climate change. These trends are largely invisible to policymakers; in contrast to sudden food crises (e.g., after an extreme weather event), this threat manifests slowly through budgets that no longer stretch as far, and plates that are less nourishing. These impacts are distributed globally and affect countries of all income levels. As the threat climate change poses to school meals comes more clearly into focus, stakeholders must work to build the resilience of school meal programs and the agricultural systems on which they depend.[6]

The research finds that if temperatures were not increasing, current school meal program budgets would have been able to feed an estimated additional 1.12 million students each year.

A Regenerative Imperative

This research articulates the transformative potential of switching to regeneratively-produced major staples. The report examines the impacts of regenerative practices such as reduced tillage, cover cropping, diversified crop rotations and crop residue retention on crop yields.Focusing on the four most widely grown crops – maize, rice, soybean, and wheat – the report finds that regenerative farming practices generally boost yields, often substantially, though results vary by region. By linking these projected yield gains to the foods that make up a typical school meal, the study shows that shifting to regeneratively produced staples could greatly strengthen the productivity and resilience of global school feeding programs.

Over time, these productivity gains would translate into lower procurement prices – enabling programs to feed more children on the same budgets.

The analysis estimates that shifting toward regeneratively-grown staple crops would stretch current program budgets to reach an additional 7.96 million children each year.

5 While the analysis focuses on agricultural impacts, climate change can also disrupt school meal operations directly and in many other ways, which are not accounted for in these results. Extreme heat, flooding, or other climate-related weather events can also hinder food preparation and delivery, including by directly impacting the health and safety of agriculture and food service workers.

6 The report does not account for climatic events in the future which would be generally expected to continue in the same direction, country-by-country.

Spotlight on Plate Composition

This research includes an examination of typical school meal plates in key geographies. While the report found substantial variety between (and even within) countries, there are concerns that emerged across regions:

School meal plates often lack food group diversity, reducing nutrition quality for children. Grains constitute about one-third of the estimated average 'global plate', and are typically paired with a legume and oil. Fortified staples, which are likewise common, can help meet children's micronutrient needs, but cannot replace the benefit of a diverse, healthy plate.

This lack of diversity reduces the nutritional impact of school meals, potentially limiting the boost to children's health, social, and economic development outcomes.

Typical plates reflect an overreliance on a small number of climate-vulnerable crops. The lack of product diversity on most program plates often coincides with a heightened vulnerability to climate shocks. The most commonly served grains have already been negatively impacted by climate change, and concentrated reliance on such crops – whether grown locally or imported – represents its own form of risk.

There is enormous potential for school meal procurement to serve as a catalyst to diversify plate composition, incentivizing investment in a wider variety of climate-resilient, nutritionally-diverse, culturally relevant, and underutilized crops.

When these programs deliberately solve for increased resilience to extreme weather, changing rainfull and drought patterns, and the wellbeing of producers themselves, regeneratively produced plates become solutions for climate, nature, consumer and producer.

Resilient, Nutritious Indigenous Crops:

These crops show high potential as resilient, nutritious substitutes to diversify school meal plates:

Millets

Bambara Beans

Sorghum

Cowpeas

Yams

Cassava

Moringa

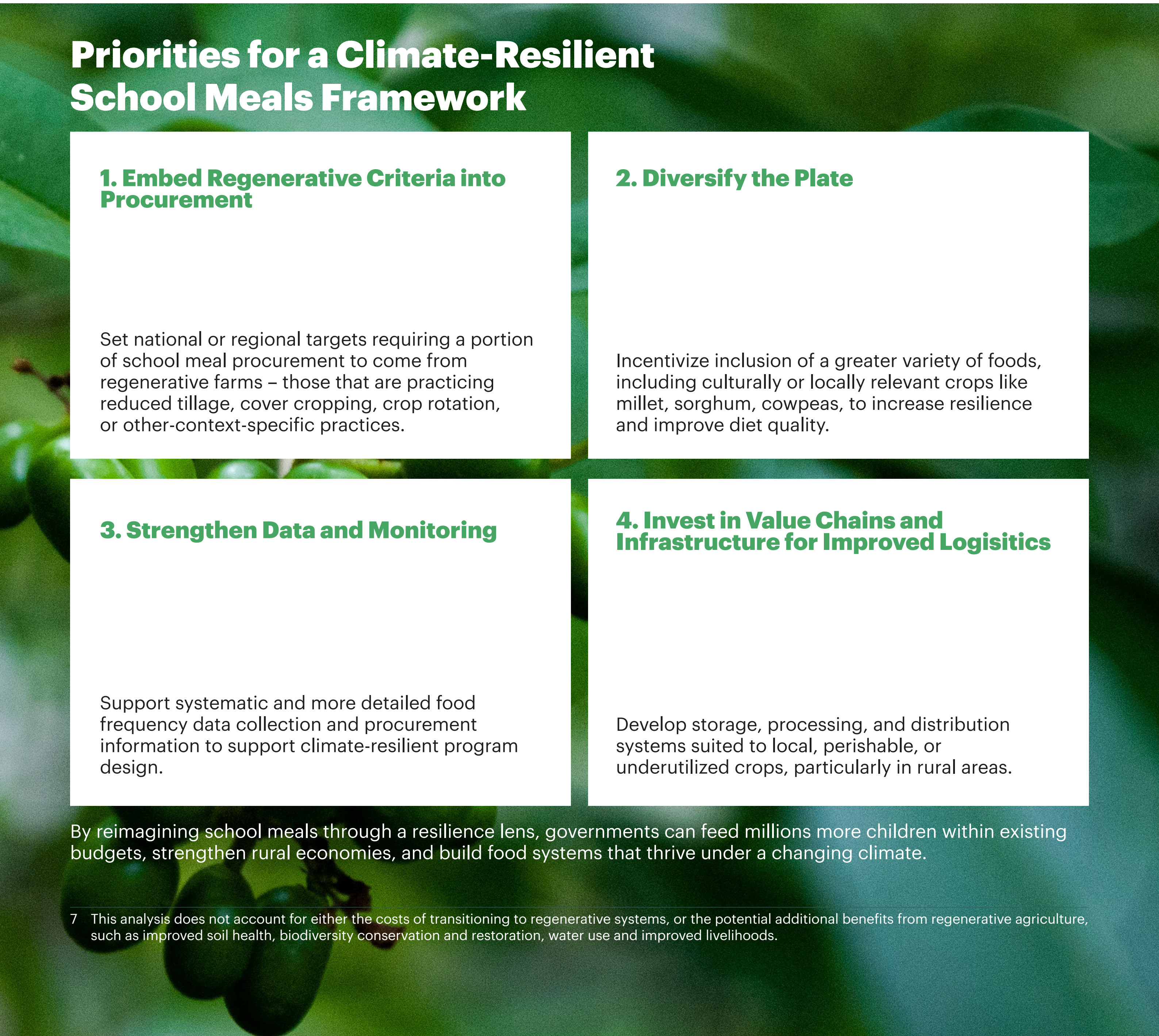
Baobab

Regenerative School Meals as a Strategic Policy Lever

The report lays bare the stark reality of one path by which climate change has impacted the millions of children who receive school meals each day across the globe. Moreover, it paints a clear picture of the potential benefits of switching to regenerative sourcing for school meal programs – which, when measured against the cost of transition, can over time stretch the purchasing power of our budget to feed many more children.

Indeed, regenerative sourcing for school meals can directly advance multiple policy objectives simultaneously:

- **Nutrition and Education:** Stable food supplies sustain meal programs that improve child health and attendance leading to long-term health, education, and economic benefits.
- **Fiscal Efficiency:** Higher and more stable yields typically means lower food costs and more meals per dollar, feeding more children within existing budgets.
- **Climate Adaptation & Mitigation:** Regenerative production could help buffer against rising global temperatures and climate impacts while reducing greenhouse gas emissions and boosting the ability of farmers to bounce back from changed weather patterns and climate events.
- **Local Development:** Linking schools to regenerative producers drives demand for sustainable, rural livelihoods and can mitigate risk from global supply shocks.



Priorities for a Climate-Resilient School Meals Framework

1. Embed Regenerative Criteria into Procurement

Set national or regional targets requiring a portion of school meal procurement to come from regenerative farms – those that are practicing reduced tillage, cover cropping, crop rotation, or other-context-specific practices.

2. Diversify the Plate

Incentivize inclusion of a greater variety of foods, including culturally or locally relevant crops like millet, sorghum, cowpeas, to increase resilience and improve diet quality.

3. Strengthen Data and Monitoring

Support systematic and more detailed food frequency data collection and procurement information to support climate-resilient program design.

4. Invest in Value Chains and Infrastructure for Improved Logisitics

Develop storage, processing, and distribution systems suited to local, perishable, or underutilized crops, particularly in rural areas.

By reimagining school meals through a resilience lens, governments can feed millions more children within existing budgets, strengthen rural economies, and build food systems that thrive under a changing climate.

7 This analysis does not account for either the costs of transitioning to regenerative systems, or the potential additional benefits from regenerative agriculture, such as improved soil health, biodiversity conservation and restoration, water use and improved livelihoods.

The full report was developed by the Center on Food Security and the Environment at the Freeman Spogli Institute for International Studies & Doerr School for Sustainability, Stanford University, Stanford, CA, USA.

The report was supported by The Rockefeller Foundation which has committed more than US$220 million to food systems transformation initiatives. Building upon initial work in Brazil and Kenya, this funding includes US$100 million to reach 100 million children worldwide with more nutritious, locally grown, and regeneratively-sourced foods by supporting more than a dozen countries' efforts to expand and further develop their school meal programs.

Data Sources

Plate Composition Data: Data from the FAO Supply Utilization Accounts (SUA) on total food supply in 2022, FAO Yield data, and the Global School Meals reported food group frequencies are merged to estimate the average composition of school meal plates.

School Meals Data: Drawn from the Global Survey of School Meal Programmes (Child Nutrition Foundation, 2023–2024), covering program coverage, procurement types (domestic vs. international), and meal composition through a food group frequency questionnaire. Not all countries provided full responses, so some analyses exclude incomplete datasets.

Climate and Crop Data: Combined crop yield data from FAOSTAT (1961–2023) with temperature and precipitation data from ERA5 and CHIRPS, matched using CROPGRIDS geospatial crop area data. This analysis creates a panel dataset linking weather and yields across 173 crops and 161 countries, allowing for causal estimation of climate impacts on yields.

Price Data: FAOSTAT producer price data (1991–2024) for 161 countries are used to analyze how climate and yield variations influence farm-gate prices. We also compared domestic price fluctuations with International price fluctuations (from FAOSTAT Food Balance Sheets) to understand the price volatility of domestically produced versus traded foods.

Regenerative Agriculture Data: Based on ~490 studies and ~3,000 paired yield observations from trials comparing conventional and regenerative systems (e.g., reduced tillage, cover cropping, crop rotations). The analysis covers maize, rice, soybean, and wheat, with yield change estimates extrapolated globally across climate zones. Results are heterogeneous but generally indicate positive or neutral impacts on yields, but do not account for the costs of transitioning to a new production system.

Case Studies: Detailed analyses were conducted for Kenya, Ethiopia, Burkina Faso, Ghana, the Philippines, Brazil, supplemented by interviews with program leaders from four countries. These qualitative insights contextualize the quantitative findings and reveal how programs balance nutrition, cost, and climate resilience within procurement and policy constraints.

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