



Taking A Food Systems Approach To Policymaking:

Evidence On Benefits And Risks In Five Policy Areas Across The Food System

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ABBREVIATIONS

AU	African Union
ASEAN	Association of Southeast Asian Nations
CSB	corn-soy blend
CSG	child support grant
EAS	extension and advisory service
FAO	Food and Agriculture Organization of the United Nations
FBD	food-borne disease
FFS	farmer field school
FTC	farmer training center
GAP	Good Agricultural Practices
GDP	gross domestic product
HACCP	Hazard Analysis and Critical Control Point
HFIAS	Household Food Insecurity Access Scale
HDD	household dietary diversity
IPM	integrated pest management
MLDP	Meket Livelihood Development Project
NGO	nongovernmental organization
OECD	Organisation for Economic Co-operation and Development
PAL	Programa de Apoyo Alimentario (Mexico)
PFS	pastoral field school
PROCOMIDA	Programa Comunitario Materno Infantil de Diversificación Alimentaria (Guatemala)
PSNP	Productive Safety Net Program (Ethiopia)
WFP	World Food Programme

- **All the elements of a food system—which consists of everything and everyone involved in bringing food from farm to fork—are connected.** Policies that affect one part of the food system can therefore have ripple effects in multiple directions, influencing people, activities, and outcomes in ways both intended and unintended. A food systems approach requires policymakers to consider that any single policy raises the potential for *risks* that can make food systems less nutritious, sustainable, and equitable—but it also holds the potential for *benefits* that can improve food system outcomes.
- **This review highlights key considerations for designing policies and programs to maximize benefits and minimize risks for objectives across the food system.** It provides examples from existing studies on a range of impacts of policies and programs on different food systems outcomes. It aims to provide insights into what needs to be considered when designing policies to maximize benefits across food systems.
- **The review focuses on five policy areas critical to food systems transformation:** (1) cash and food transfers, (2) food safety, (3) road transport infrastructure, (4) agricultural extension, and (5) land tenure. It looks at the impacts of these policy areas on five outcomes: (1) diets and food environments, (2) agricultural production, (3) livelihoods, (4) gender equality, and (5) environmental sustainability. In each case, the evidence was reviewed, and examples of benefits and risks were identified. The main benefits and risks of these policies on these outcomes are summarized in the box on pages 5-7.
- **Working in collaboration, policymakers have the opportunity to design policies to deliver not only their main objectives but also added benefits for other food system outcomes.** For example, the right transportation policies can support the livelihoods of food producers, agricultural production and local diets. Failing to consider other outcomes can, however, bring unintended risks. The evidence of the outcomes reviewed here found for example, that policies on cash and food transfers, food safety and road transport, brought many benefits but failed to consider the food system risks of the spread of unhealthy ultra processed foods on dietary outcomes.
- **Identifying how to balance trade-offs between benefit and risk requires an understanding of the context into which a policy is being delivered.** A policy that promotes one desirable food system outcome may detract from another. Understanding the potential for benefits and risk depends on understanding how a policy interacts with the relevant context. For example, results showed food system policies can benefit gender equality in some cases while also running the risk of reinforcing harmful gender norms in others. Policymakers are likely to minimize risk if they consider the context of gender norms in their decision-making.

Benefits and Risks of Five Policy Areas Across Food System Outcomes: Summary from the Evidence Review



CASH AND FOOD TRANSFER POLICIES

BENEFITS

- Cash and food transfers can increase dietary diversity
- Cash transfers can promote investments in agricultural production by poor rural households
- Cash transfer policies can improve farmers' livelihoods
- Cash transfers can benefit women's empowerment
- Cash transfers can benefit climate change adaptation by farmers

RISKS

- In the context of unhealthy food environments, cash and food transfers can bring risks for unhealthy diets
- In situations of inadequate supply, cash transfers can lead to higher food prices
- Cash transfers can reinforce gender inequality



FOOD SAFETY POLICIES

BENEFITS

- Ensuring the safety of nutritious foods could raise consumers' willingness to pay for those foods
- Food safety policies could prevent consumers from buying ultra-processed food
- Food safety interventions tailored to support food vendors can support their livelihoods
- Food safety standards can raise incomes for smallholder farmers

RISKS

- Food safety policies could bring risks for healthy diets by raising the price of nutritious foods beyond the reach of low-income consumers
- Food safety policies that encourage formalization of entities in food supply chains can undermine access to nutritious, healthy, and safe food
- Food safety policies can bring risks to the livelihoods of smallholder farmers and vendors
- Food safety policies can impose disproportionate risks on the livelihoods of women food producers, processors, and vendors
- Food safety policies could bring risks for environmental sustainability, but there is inadequate evidence to know whether this risk exists in practice



POLICIES ON ROAD AND TRANSPORT INFRASTRUCTURE

BENEFITS

- Policies to develop roads and reduce transport costs bring benefits for household food security and more nutritious diets in rural areas
- Road and transportation networks reduce costs for farmers and prices for consumers
- Roads bring benefits for agricultural productivity
- Road networks benefit farmers' livelihoods
- Improved transportation reduces food losses

RISKS

- Expanding roads into remote areas can lead to increased access to unhealthy food
- Road transport policies risk bringing more benefits to men than women, thus reinforcing and exacerbating gender inequality
- Building more roads could bring risks for environmental sustainability, but there is not enough evidence to know whether this is the case in practice



AGRICULTURAL EXTENSION POLICIES

BENEFITS

- Agricultural extension services can improve diet quality in producer households
- Agricultural extension services can raise yields and diversification of agricultural production
- Agricultural extension services can lift farmers' incomes
- Agricultural extension services can promote the adoption of environmentally sustainable farming practices
- Agricultural extension can benefit gender equality in recipient families

RISKS

- Agricultural extension services may undermine environmentally sustainable farming methods, but more evidence is needed on the impacts on environmental outcomes
- Agricultural extension may exacerbate biases against gender equality



LAND TENURE POLICIES

BENEFITS

- Land tenure policies can bring benefits for household diets and food security
- Land tenure security can bring benefits for factors associated with agricultural production
- Land tenure security improves the livelihoods of food producers
- Women's land tenure can benefit equality in decision-making but is not always sufficient to offset preexisting gender norms and inequalities
- Land tenure can promote sustainable land management

RISKS

- Land tenure policies that enable greater landownership by women may introduce new vulnerabilities
- Policies that limit access to land for environmental reasons may risk undermining environmental benefits



Introduction

1.1. What Is A Food System?

A food system consists of everything and everyone involved in bringing food from farm to fork.

It includes

- the chain of activities from producer to consumer, including agricultural production, distribution, processing, manufacturing, and retail
- the interconnections between that chain of activities; the elements, entities, institutions, and people involved; and the economic, political, environmental, health, and social outcomes that are produced¹

Food systems have wide-ranging and complex implications. They shape people's diets. They affect the sustainability of the environment in which food is gathered, farmed, raised, distributed, traded, processed, and retailed, as well as the livelihoods of the people who depend on those activities. They influence economic development and how gender equity is improved.

1.2. Which Policies Influence Food Systems?

Transforming food systems to make them more nutritious, sustainable, and equitable involves a wide array of policies and related actions.² Some policies with effects on food systems are explicitly about food. Agricultural policies and food safety policies, for example, aim to support food security, livelihoods, and safe food directly. Other policy areas—such as transportation, energy, or poverty reduction—are not about food explicitly but nevertheless shape elements of the food system. Transportation policies, for instance, influence the ability to get food to market.

Policies relevant to food systems are carried out at multiple levels, from local to global. They range from the highly specific (such as a rule on the use of a particular food contaminant) to extremely broad (such as agri-food trade liberalization).

They can take many forms, including action plans, strategies, framework legislation, statutes, court decisions, licensing, approvals, directives, regulations, guidelines, standards, codes of practice, and voluntary initiatives.³

1.3. What Is A Food Systems Approach to Policymaking?

Because all the elements of the food system interconnect, policies that affect one part of the food system can have ripple effects in multiple directions, influencing people, activities, and outcomes in unintended ways. For example, if a policy subsidizes fertilizers to enhance food security, it shapes what farmers produce and how, potentially influencing environmental sustainability and food prices, in turn shaping what people eat and their nutritional status. If the subsidy is given to a man rather than a woman, it might exacerbate gender inequality, which in turn could influence other outcomes as well.

These kinds of interconnections are at the core of the food systems approach to policymaking. Owing to ripple effects across food systems, any single policy raises the potential for unintended risks that can make food systems less nutritious, sustainable, and equitable—but it also holds the potential for benefits that can strengthen food systems. A food systems approach requires policymakers to consider the potential that a single policy can have impacts on multiple outcomes, both beneficial and harmful. It requires the adoption of policy instruments that are purposefully designed to deliver benefits and manage risks across different food systems goals (see Brief I in this series, "[What, How, and Why](#)"). Such an approach can support the transition to more nutritious, sustainable, and equitable food systems by enabling policymakers to design policies in a way that maximizes alignment between objectives to achieve win-win outcomes and minimizes counterproductive negative outcomes.

1.4. Purpose of and Audience for this Review

This review aims to inform the process of taking a food systems approach to policymaking by exploring what needs to be considered when designing policies and associated means of implementation to achieve multiple benefits across food systems (see Briefs I and II in this series, “[What, How, and Why](#)” and “[Managing Stakeholders and Identifying Policy Entry Points](#)”). It does so by providing examples from existing studies in the academic literature on the impact of policies and programs on different food systems outcomes. It shows that policies can have multiple outcomes across food systems. The actual impact of any policy or program will of course vary with context, population, and the design of the policy or program; the review draws on examples to show the potential for benefit, recognizing that this benefit may not be realized in all circumstances and that studies that show no outcomes are less likely to be reported. It likewise illustrates that policies also bring risks, which again will not emerge in all cases or contexts. This review thus illustrates the benefits that policies could maximize and the risks they could they incur, with implications for what trade-offs might be needed to balance these benefits and risks. Any policymaker serious about food system transformation should consider the possibility of these benefits, risks, and trade-offs when designing food system policies and programs.⁴

Among the vast array of policies that affect the food system, this review focuses on five policy areas critical to food systems transformation:

1. Cash and food transfers
2. Food safety
3. Road transport infrastructure
4. Agricultural extension
5. Land tenure

These policy areas were selected because they represent a variety of sectors, government departments, and policy goals and because evidence is available on the impacts of these policy areas on the five outcomes we consider in this brief:

1. Diets and food environments
2. Agricultural production
3. Livelihoods
4. Gender equality
5. Environmental sustainability

For example, studies on land tenure were reviewed to assess their impacts on food production, the livelihoods of food producers, and the consumption of diverse, nutritious diets. Improving these outcomes is key to transforming food systems.

In each case, the evidence was reviewed and examples of benefits and risks were identified. Examples were selected only if they provided sufficient details on the linkages of interest. If a study solely assessed the association between a policy element and an outcome of interest without further details or discussion, we did not include it as an example in this report. In addition, whenever we identified systematic reviews on a specific subject, we included the results as an example.

The process of conducting the review faced specific challenges:

- The breadth of some of the policy areas and outcomes of interest made it difficult to define search terms specific enough to capture all of the relevant literature without retrieving an unmanageable number of articles. Using search terms to reduce the unmanageable number of retrieved papers may have inadvertently led to gaps in the articles identified.
- For some of the policy areas, it was challenging to determine whether the outcome was influenced by an actual policy or by an issue that could be linked to a policy (for example, did large-scale land investments, rather than land tenure policy itself, undermine land tenure?).

- In most cases, outcomes are influenced by multiple factors, which also made it challenging to single out the influence of the policies specifically.
- Studies were not always available on the full range of food systems outcomes for each policy area. As a result there are some gaps in the review. In addition, this meant that some policy areas of interest (such as food environment policies like food labeling and taxes on sugary drinks) could not be included. Based on these gaps, recommendations for further research are made throughout the text and summarized in Box 7 (page 57)

The policy areas and outcomes described here are important for food systems, but they represent just a small number of potential policy areas and outcomes. Policymakers can apply a food systems approach to any policy relevant to food systems. Different outcomes of some of these policies— notably, school food programs⁵ and agricultural subsidies⁶—have been reviewed elsewhere. For others, evidence of impact on a range of outcomes is lacking.

The concept and potential of a food systems approach to policy are now gaining traction among policymakers. In 2021, the UN Food Systems Summit and associated national and subnational processes called for a food systems approach in order to make progress across the Sustainable Development Goals (SDGs).⁷ The primary audience for this report consists of policymakers in various government ministries and agencies who are committed to taking this type of approach or who have the potential to do so. This includes any decision-maker with responsibility for any policy that can influence diets and nutrition, such as food, agriculture, environmental, health, transport, trade, education, and economic policy. It is also relevant to stakeholders running programs and designing other forms of intervention.

By showing the wide range of policies across government that can be leveraged in support of a nutritious, sustainable, and equitable food system, a food systems approach can help policymakers design policies to benefit different sectors and support the development of alliances of policy professionals who need to be involved in this policy design process. Policymakers can and should embed this approach into the food system transformation pathways that countries are now taking forward from the UN Food Systems Summit.



**Understanding the
potential for benefits
and risks across food
system outcomes:
Evidence from five
policy areas**

2.1. Cash and Food Transfer Policies

Key considerations for policy design to maximize benefits and minimize risks

- Cash and/or food transfers have potential to create multiple benefits for household food security, dietary diversity, agricultural production decisions, producers' livelihoods, women's empowerment, and climate change adaptation by farmers.
- Depending on the context where they are delivered, cash and food transfers bring risks for unhealthy diets, higher food prices, and entrenchment of existing gender inequalities.
- Gender inequalities merit particular consideration in the design of cash transfers, which have significant potential to empower women or to reinforce existing inequalities. To fully consider gender as they design transfer policies, policymakers will need more gender- and age-disaggregated data, along with qualitative and quantitative evaluations to help monitor the impacts on family dynamics and women's empowerment.

These policies and programs can have potentially transformative impacts on food systems by increasing demand for nutritious food, stimulating local supply of food, facilitating investment in agriculture, and enabling households that generate their livelihoods from food systems to continue working during times of crisis.¹¹

According to the World Bank, 75 countries have social safety net programs, reaching about 20 million poor and vulnerable households, benefiting nearly 92 million individuals.¹² The COVID-19 pandemic led to further growth in cash transfer policies: since December 2020, more than 3,000 social protection measures have been planned or implemented in 222 countries or territories, representing an increase of nearly 148%.¹³ Cash and food transfer programs vary significantly between countries. They may be delivered with conditions that households must meet or with no conditions. They can include cash payments, food vouchers, food subsidies, and food baskets (see Box 1, next page, for specific examples).

A huge challenge facing the global food system is the 711 million people living in extreme poverty as of 2021.⁸ A large share of the world's population—3 billion people—is too poor to afford an adequate diet. The Food and Agriculture Organization of the United Nations (FAO) estimates that up to 811 million people were undernourished in 2020.⁹

Cash and food transfer programs are part of the social safety net designed to reduce poverty and food insecurity. By providing households with income or food, these programs allow households to increase their consumption, invest in productive activities, educate their children, or better manage risks.¹⁰

BOX 1

REAL-WORLD EXAMPLES OF CASH AND FOOD TRANSFER POLICIES

Conditional cash transfers

Conditional cash transfers aim to develop human capital and typically target households with children of a certain age. Beneficiaries must commit to undertaking certain activities such as pre- and postnatal health care appointments and child growth-monitoring check-ups.¹⁴ Examples include Bolsa Família in **Brazil**, Oportunidades in **Mexico**, and Familias en Acción in **Colombia**.

Unconditional cash transfers

Unconditional cash transfers, which target households with children as well as the elderly or disabled, disburse cash with no conditions. Such programs include government-run social grant programs for vulnerable groups as well as small-scale pilot projects, often financed by donor agencies and implemented by nongovernmental organizations (NGOs). Conditional cash transfers are more common in **Latin America**, whereas unconditional transfers are more common in **Africa**.¹⁵ For example, the unconditional cash transfer programs in **Lesotho**, **Malawi**, and **Zambia** are child grant programs providing cash to mothers or primary caregivers of young vulnerable children.

Food transfers

Food transfers may take the form of vouchers, stamps, a given value or quantity of food, or direct subsidies. For example, **India's** targeted Public Distribution System (the largest-scale social assistance program worldwide) provides wheat and rice at subsidized prices to 800 million people.

Combined cash and food transfers

Some countries combine cash and food transfers. In **Mexico**, for example, the Programa de Apoyo Alimentario (PAL) and Oportunidades provide food vouchers and cash.¹⁶ **Ethiopia's** Productive Safety Net Program (PSNP) provides a combination of food and cash transfers as well as public works programs (which employ people to construct public infrastructure in exchange for food or cash) and direct cash grants to pregnant and lactating women and the elderly.

Who is targeted?

Many cash transfer programs are targeted to women on the assumption that women have sufficient bargaining power to negotiate with other household members, that they receive or take control of the benefit on behalf of the household, or that they at least benefit from it. This assumption is often mistaken, with the result that such programs may fail to empower women.¹⁷

Box 1 continued: Real-world examples of cash and food transfer policies

How large is the transfer?

Some country governments spend large sums on cash transfers—**Brazil, China, and Mexico** each spend more than US\$10 billion a year—whereas other countries can dedicate only minimal amounts. The size of cash transfers per person also varies widely between countries. In **Argentina, Mexico, Mongolia, and South Africa**, transfer amounts exceed US\$100 a year. China, India, and most Sub-Saharan African countries spend less than US\$25 per person per year.¹⁸ A larger transfer is associated with greater effects on, for instance, education, poverty, and other outcomes. Evidence on cash transfers in **Sub-Saharan Africa** generally suggests that cash transfers equivalent to 20% or more of baseline household monthly expenditures are required to achieve any meaningful change.¹⁹

How is the transfer delivered?

Recent electronic delivery modes can disburse cash transfers through mobile phones, banks or ATMs, or point-of-sale devices. More research is needed to determine how these modes affect women's financial inclusion.

Are any conditionalities attached?

Conditional transfer programs tie the receipt of benefits to specific behaviors by beneficiary households.²⁰ Different conditionalities have been shown to lead to different outcomes. A systematic review found that unconditional programs seemed more successful in improving child weight, as shown by indicators of wasting and food consumption.²¹ Some conditionalities could have unintended consequences by reinforcing gender stereotypes.²²

Are complementary interventions included?

Complementary additions to cash or food transfer policies include nutritional supplements²³ and behavior change communication. **Mexico's** PROGRESA program provides participating children with a package of health service interventions, including calorie- and micronutrient-dense food supplements.²⁴ As part of the **Ethiopia's** Productive Safety Net Program (PSNP), agriculture and health extension workers provide monthly nutrition behavior change communication sessions to pregnant and lactating women and caretakers of malnourished children.²⁵

2.1.1. Food system benefits of cash and food transfer policies

Cash and food transfers can increase dietary diversity

A substantial number of studies show that conditional and unconditional cash transfer programs increase dietary diversity.²⁶ The effects of transfer programs are influenced by the specifics of program design and context, such as whether cash transfers are conditional or unconditional.

- Existing evidence reviews show that cash transfer programs increase dietary diversity.** A recent systematic review identified 13 studies conducted in countries with per capita GDP below US\$10,000 with data on the diversity of diets of children enrolled in cash transfer programs. It found an average increase in dietary diversity of 0.73 food groups,²⁷ especially in nutrient-dense foods such as milk, meat, eggs, fruits, and vegetables.²⁸ Another systematic review found moderate-certainty evidence that conditional cash transfers slightly improve dietary diversity but low-certainty evidence that unconditional cash transfers, vouchers, or subsidies increase dietary diversity.²⁹
- A nutrition-cash transfer program in Ethiopia increased household dietary diversity.** An evaluation of Ethiopia's pilot Integrated Nutrition-Social Cash Transfer found that the program increased household dietary diversity scores by 1 food group out of the 12 and improved the share of women who consumed a minimally acceptable diet. Women in the program also received important nutrition messages and behavior change communication and improved some practices, such as breastfeeding.³⁰
- Guatemala's PROCOMIDA program increased consumption of foods provided by the program as well as enhancing dietary diversity.** The Programa Comunitario Materno Infantil de Diversificación Alimentaria (PROCOMIDA) distributed family and individual food rations,

including corn-soy blend (CSB), beans, rice, and vegetable oil. It also required beneficiaries to participate in behavior change communication sessions on health and nutrition-related behaviors and to use preventive health services. A study found that the program led to an increase in the amount and frequency of consumption of foods provided by the program and a decrease in the financial burden associated with food buying. Beneficiaries also diversified their diets, consuming more foods not provided by the program. They consumed more vegetables and tubers because vegetables were added to program foods, because they had money available to purchase vegetables, and because they consumed more local plants. The behavior change communication sessions increased beneficiaries' food preparation skills and their knowledge about the health benefits of specific foods. The authors concluded that providing food alone may not result in desirable dietary behaviors.³¹



"Before the program, I didn't use cilantro, onion, or tomato as often, because I didn't know how to use them. But now they [program staff] have taught me how to cook."

—32-year-old mother

"We used to spend more. Now we don't spend as much because we don't buy beans, rice, or oil."

—32-year-old mother, Guatemala

"When we've been in the classes, they've told us those [cookies, sweets, bread] are not as important as fruits and vegetables and meat are... I used to spend a lot of money. But now I have great help from PROCOMIDA. My husband gives me the same amount of money, so I have a little bit more left over to buy meat."

—33-year-old mother with seven children, Guatemala³²

- A social protection program in Ecuador with different modalities (cash, vouchers, food) increased caloric intake and dietary diversity.** Overall, program participation led to significant increases in food security measures: the value of per capita food consumption increased by 13%, per capita caloric intake increased by 10%, the Household Dietary Diversity Score (HDDS) increased by 5.1%, the Dietary Diversity Index (DDI) increased by 14.4%, and the Food Consumption Score (FCS) increased by 12.6%. Beneficiaries receiving vouchers experienced larger increases in dietary diversity, and beneficiaries receiving food consumed more calories.³³
- In Mexico, a cash transfer program led households to consume a greater variety of foods and food groups.** A study of the impact of the cash transfer program Oportunidades on agricultural production found an increase in the probability that a household would consume food from its own production and a rise in the value of their consumption and the variety of foods and food groups they consumed. Specifically, the program raised the probability of consuming fruits, vegetables, and meat.³⁴
- In Mexico, the Programa de Apoyo Alimentario (PAL), a cash and in-kind transfer program, had positive impacts on household diets.** Beneficiaries consumed more fruits and vegetables, which resulted in higher consumption of vitamins A and C and fiber. The program also increased consumption of iron and zinc, and households' diets became more nutrient-dense. The food transfer led to a significantly greater impact on energy and nutrient consumption than the cash transfer.³⁵
- Cash transfers in Ghana, Kenya, and Zimbabwe allowed farmers to spend more time farming their land and invest more in production.** Farmers increased their investment in tools (hoes, sickles) and inputs (fertilizer, pesticides, certified seeds), rented land, bought livestock, and made changes to sharecropping arrangements. Cash transfers also allowed beneficiaries to focus their labor on their farms instead of engaging in casual wage labor. Cash transfers reduced but did not eliminate coping mechanisms such as land sales or distress sales of livestock.³⁸
- Child grant programs in Lesotho and Zambia resulted in increased agricultural production.** Zambia's Child Grant Programme led to an increase in worked land as well as a rise in the use of agricultural inputs, including seeds, fertilizers, and hired labor. This led to a rise in the value of overall production, which was mainly sold in markets rather than consumed. In Lesotho, the child grant program led to an increase in crop input use and expenditure, which resulted in an increase in maize and sorghum production.³⁹
- Two cash transfer programs in Brazil led to increased protein production.** The Brazilian Zero Hunger subprograms Bolsa Família and the National Program to Strengthen Family Farming (PRONAF) increased protein production (milk and poultry) in part by raising the incomes of poor agricultural households, allowing them to invest in agricultural production.⁴⁰
- South Africa's Child Support Grant (CSG) led recipients to diversify their production.** Rural South African households in areas with access to grazing, production land, or fishing that received the CSG were more likely to invest in productive assets and engage in poultry, staple crop, and vegetable production. CSG incomes also led to producers to grow a larger variety of crops in an environment where farmers' livelihoods are under threat. Given the sample's average crop diversity of about three crops per household, the likelihood of growing more than three crops increased about 12% for every 10 years of receiving a CSG.⁴¹

Cash transfers can promote investments in agricultural production by poor rural households

Cash transfers can affect the production decisions made by poor rural households by reducing their liquidity constraints, allowing them to invest in productive assets and agricultural inputs.³⁶ When combined with agricultural interventions, these transfers can improve farmers' access to technology, knowledge, inputs, and factors of production, increasing their yields.³⁷

Cash transfer policies can improve farmers' livelihoods

Social safety nets can help rural farming households build sustainable livelihoods.⁴² Cash transfers can make it possible for households to invest in agricultural assets and devote their labor to their own farm instead of to low-skill or casual wage labor.⁴³ Cash transfer policies have the potential to reduce destructive coping mechanisms such as distress sales of land or livestock. By financing livelihood activities and influencing labor decisions, cash transfers can allow farmers to focus more on their production or venture into starting small businesses.⁴⁴

- **Mexico's Oportunidades Program increased agricultural income.** Launched in Mexico in 1997, Oportunidades provided cash to female household heads conditional on children attending school and on family members obtaining preventive medical care and attending education talks on health-related topics. Beneficiary households increased ownership of productive farm assets (like farm animals and land) more quickly than control households. After 18 months in the program, beneficiary households experienced a 9.6% increase in agricultural income and had started substantially more microenterprises than had control households. These positive impacts proved to be durable over the long term. The program was found to have achieved these long-term increases in consumption by stimulating households' investment in productive activities and alleviating their liquidity and credit constraints.⁴⁵

Cash transfers can benefit women's empowerment

Cash transfers are often targeted to women instead of men based on evidence that women are more likely to spend more resources on their household's and children's well-being.⁴⁶ Cash transfers directed at women can empower them and increase their self-confidence and control over household resources, affecting how they interact with the food system and what food they buy.⁴⁷

- **Cash transfers in Bangladesh were found to increase women's decision-making and mobility.** The largest impacts were found in the programs that made the largest payments and that challenged traditional norms of gender seclusion. The cash enabled married women to control resources they were previously unable to control and to expand their decision-making beyond their traditional roles as food providers and caregivers. Programs that required women to work may have contributed to their greater sense of ownership over the income they earned, causing them to seek a greater role in family decision-making and to become more independent.⁴⁸
- **Cash transfers paid directly to women through Mexico's PROGRESA program increased their decision-making power.** Many women said the cash transfers put them in a stronger negotiating position with their husbands on day-to-day matters, such as what to spend their money on. The program also had a positive effect on husbands' attitudes toward housework and female autonomy. For instance, it significantly decreased the probability that husbands would assign wives the duty of doing laundry. PROGRESA was found to positively change husbands' views about women administering their own cash. Receiving a cash transfer had greater marginal returns for wives who were more economically dependent on their spouses at baseline.⁴⁹
- **In Zambia, women in households that received cash transfers made more sole or joint decisions (including decisions related to spending their partner's income), especially related to their own and their children's health.** The transfers of the Child Grant Programme are given to mothers or primary caregivers of young children aged zero to five years of age. Overall, 34% of the sample increased joint participation in one decision-making domain. However, qualitative interviews revealed that only modest perceived changes in decision-making occurred owing to entrenched gender norms in which men are heads of households and primary decision-makers. The authors conclude that although women

often stated they made decisions (either solely or jointly), they also acknowledged that if there was a disagreement or difference of opinion, women's preferences often came second to men's.⁵⁰



"I am very happy because I don't have to wait for him to make enough money as he puts it. I am able to suggest anything for the children now. He is in charge, but at least the money is in my hands."

—Female beneficiary of cash transfer in Zambia, married, age 24⁵¹

Cash transfers can benefit climate change adaptation by farmers

Cash or food transfers can help households cope with climate risk. Humanitarian aid agencies can use cash and food transfers to respond to and anticipate the impacts of climate change by, for instance, protecting households from weather-related shocks and strengthening economic opportunities for vulnerable groups.⁵² Small unconditional cash payments to the rural poor can help foster climate-resilient development.⁵³ These approaches are currently being piloted in different countries to help build household resilience and enable households to better cope with negative climate shocks.⁵⁴ The evidence on the impact of cash transfers on climate change adaptation is limited but positive. However, as one study notes, "studies of cash transfers only rarely analyze social resilience outcomes directly and ... although cash transfers support improvements in indicators associated with absorptive and adaptive resilience outcomes, changes in transformative resilience indicators are rare."⁵⁵

- **In Zambia, cash transfer programs helped households mitigate the impacts of weather shocks and cope with agricultural production and price shocks.** Declines in rainfall typically reduce agricultural and livestock production and result in negative coping mechanisms such as reduced consumption. The *Zambian Child Grant*

Programme provides cash transfers to eligible households that are extremely poor. A study found that the cash transfers allowed farming households to mitigate the impact of weather shocks by using more agricultural inputs. Thus, cash transfers protected more against the negative effects of weather instability for poorer households than for less poor households.⁵⁶ The *Zambian Child Grant Programme* cash transfers also empowered poor, rural households to use coping strategies usually used by non-poor households in response to negative shocks: beneficiary households increased their food consumption by 35% and were 21–27% less likely to be food insecure than control households.⁵⁷

- **In Ghana, farm households used cash transfers for a mix of off-farm and on-farm activities associated with climate change adaptation.** A study investigated the role of social cash transfers from the *Livelihood Empowerment Against Poverty (LEAP)* program in climate change adaptation in rural Ghana. Responses from 325 beneficiaries showed that they used the cash for farm intensification, purchase of early-maturing crop varieties, shea butter processing, and purchase of livestock and poultry to respond to climate-induced events. Respondents mentioned that over the years droughts have reduced their crop yields and affected their household food security. At such times, they said, they seek transfers to purchase food from the market to supplement household food needs.⁵⁸



"Our crops are affected by drought every year. The transfers help us out in conditions like this. Last year, for instance, I used the transfer to buy one bag of maize to support the household food need. The transfers actually help in conditions like this... I am happy, though the money is not always enough."

—Beneficiary farmer, LEAP Program, Ghana⁵⁹

2.1.2. Food system risks of cash and food transfer policies

In the context of unhealthy food environments, cash and food transfers can bring risks for unhealthy diets

Some food transfer programs undermine healthy diets either by directly providing or by subsidizing foods, snacks, and beverages high in energy, sugar, fat, and salt. Given the unhealthy nature of many food environments—where unhealthy foods are widely available, affordable, and appealing—cash from cash transfer programs may also be used to purchase unhealthy foods.⁶⁰ Higher rates of obesity among women have been reported from evaluations of food assistance programs in Peru,⁶¹ conditional cash transfer programs in Mexico⁶² and Colombia⁶³, and combined programs in Mexico⁶⁴, suggesting that cash and food transfers may heighten the risks already posed by unhealthy food environments.

- **In Egypt, urban beneficiaries of the national food subsidy program had less diverse diets and consumed vegetables, meat, and fish less often than non-beneficiaries.**⁶⁵ Between 1941 and 2013, Egypt's national food subsidy program provided bread and flour, and a targeted ration card provided subsidies for rice, sugar, cooking oil, and black tea. This subsidy program appears to have exacerbated both chronic undernutrition and overweight in children and the existing problem of overweight and obesity in women. In 2014, the government reformed the program, restricting the bread subsidy and including an expanded basket of subsidized, micronutrient-rich foods like lentils, fava beans, meat, chicken, fish, milk, and cheese.⁶⁶
- **Mexico's PROGRESA program was found to increase consumption of processed carbohydrates and saturated fats.** A study of the conditional cash transfer program PROGRESA found that although the program improved intake of vitamin A, iron, and possibly calcium, it also increased consumption of processed carbohydrates by 23% and saturated fat by 5%.⁶⁷

- **In Mexico, the Programa de Apoyo Alimentario (PAL), a cash and in-kind transfer program, had positive and negative impacts on household diets.** Though the program led to increased consumption of some nutritious foods, a study also found a significant increase in household energy consumption, with the food transfer leading to a significantly greater impact on energy and nutrient consumption than the cash transfer. The large difference between groups in the impact on energy consumption from cereals and legumes was most likely due to the fact that the food basket contained relatively large quantities of grains and legumes.⁶⁸

Additional research would help improve understanding of whether and how unhealthy food environments undermine the food system benefits of cash transfers and how cash and food transfers can be optimized to incentivize nutritious and healthy diets.⁶⁹

In situations of inadequate supply, cash transfers can lead to higher food prices

If markets are well connected, neither food assistance nor cash transfers are likely to affect local market prices of food. Cash transfers can also stabilize demand for food and reduce the market risk for producers and vendors. Occasionally, however, if cash or food transfers drive up demand for food with no corresponding increase in supply, they can lead to higher prices.⁷⁰

- **In Mexico, cash transfers led to higher food prices while in-kind transfers led to lower prices.** A randomized trial with remote communities not included in the national cash transfer program, PROGRESA, found that cash transfers led to higher prices of different food items locally, while in villages receiving in-kind transfers, prices fell. In response, producer households adjusted supply by producing more when the price of what they produced increased and producing less when the price decreased.⁷¹

- **Cash transfers contributed to higher grain prices in Ethiopia.** In a public works program implemented in one woreda (district), workers were paid 5 birr each day, supposedly enough to buy 3 kilograms of staple grain. In the first year of the program, however, grain prices rose abnormally high. Traders failed to respond promptly to increased demand from the injection of cash, and some traders exploited cash recipients by charging excessive profit margins. Many farmers who received cash transfers opted to not sell their own grain, since they no longer needed to sell it to meet expenses. Finally, issues with program implementation also contributed to this price increase.⁷²
- **The Pantawid cash transfer program in the Philippines increased prices for some perishable, protein-rich foods in remote villages.** Price increases occurred in remote villages with high rates of household participation in the cash transfer program. A study found that while the cash transfers resulted in an aggregate 15% increase in village income, they also raised the local prices of protein-rich, perishable foods by 6 to 8%. The price of staple foods remained unchanged. While participating households saw a net gain in child nutritional status, non-beneficiary children in ineligible households within these rural villages with high program saturation experienced increased rates of stunting and wasting.⁷³
- **In Niger, the majority of women in a study reported giving the cash transfer to men immediately upon return to the household.** A qualitative study on the gender, social, and cultural influences on the management and use of unconditional cash transfers in Niger found that the male head of household primarily managed cash at the household level, reflecting gender norms in the household and community. The cash transfer was used mainly for food for the household, with the women using a portion of the money to purchase foods for the target child.⁷⁷



“It’s the men who manage the money. In my home, we divide the money into two parts. One part is assigned to expenses for the child who is the beneficiary and the other part to buying grain for the family.”

—Cash transfer recipient in Niger⁷⁸

“Everything that the wife will have is up to the husband to keep so that it doesn’t cause any problems between them.”

—Cash transfer recipient in Niger⁷⁹

Cash transfers can reinforce gender inequality

Cash and food transfers may be directed to women, but the effects can reinforce their existing household roles and responsibilities.⁷⁴ While evidence shows they can lead to positive indicators of women’s empowerment, failing to recognize men’s socially constructed “masculine” behavior as problematic can undermine or reduce the intended positive effect.⁷⁵ Depending on the conditionalities and the amount of the transfer, transfers may increase women’s workload and undermine their decision-making.⁷⁶ In a number of cases, women immediately turn over cash transfers to men or other family members who control the household’s budget.

- **In Nepal, women’s group facilitators, their supervisors, and community members compelled women benefiting from unconditional cash transfers to spend the cash according to criteria developed by the group.** This restricted women’s ability to make decisions about their cash transfers. Although group facilitators and their supervisors attempted to intervene when beneficiary women handed over cash transfers to their mother-in-law, many beneficiaries simply waited until they got home before they offered it to their mother-in-law. Such beneficiaries found it inconceivable to openly refuse the authority of their mother-in-law by keeping the cash transfer.



"I had to give the cash transfer to my mother-in-law. Since we had nothing at home to eat, then it was my duty to give money to buy rice, salt, oil, and other things for the kitchen... I had given her [the cash transfer] so that she could buy food for all of us in the family, and I too had eaten what she bought."

—Female cash transfer beneficiary in Nepal⁸¹

- **Ghana's cash transfer program Livelihood Empowerment Against Poverty (LEAP) aimed to address the care burden of women but did not reshape household dynamics because the transfer amounts were too low and not directly accessible to women.** The low transfer amount did not provide women with significant financial independence or start-up capital for petty income generation projects. There was also a lack of public awareness that the cash grant was designed to support caregivers (predominantly women). Moreover, in the absence of complementary empowerment measures, there has been little change in women's community participation.⁸²



"LEAP money is given to our husband, who tells everyone what the money should be used for. He consults his wives and seeks a consensus, but he decides."

—Married woman in Ghana LEAP

"I make the decisions about how to use the LEAP money—my two wives do not disagree with me."

—Married man in Ghana LEAP program

"When my husband was alive, he consulted me about decisions. I now receive LEAP money and give it to my son, who decides how to use it. He gives me some of it back."

—Elderly widow in Ghana LEAP program⁸³

These examples show that ongoing research is needed on cash transfers that collect, analyze, and disseminate gender- and age-disaggregated data to ensure that gender considerations inform programs.⁸⁴ Both qualitative and quantitative research is needed to help monitor and evaluate impacts in relation to family dynamics and women's empowerment.⁸⁵

2.2. Food Safety Policies

Key considerations for policy design to maximize benefits and minimize risks

- Policies to increase food safety policy have the potential to bring benefits not just for reducing foodborne disease, but for healthy diets. Studies show that assuring the safety of nutritious foods increases consumers' willingness to pay for them. In contrast, perception of inadequate food safety standards drives consumers toward unhealthy ultra-processed food.
- At the same time, food safety policies can bring risks for healthy diets. This occurs if they have the effect of raising prices of nutritious foods beyond the reach of low-income consumers or of reducing access, such as through policies that discourage traditional and informal markets. While more research is needed in this area, policymakers should carefully consider the trade-offs between the risks of food safety and the risks of inadequate and unhealthy diets when designing policy.
- Food safety interventions can bring benefits for the livelihoods and income of small food vendors and farmers. But to do so, food safety policies must be designed to meet their needs and circumstances. If they do not, food safety policies can threaten the livelihoods of smallholder farmers and vendors unable to comply with regulations. This risk may have disproportionate impacts on women who rely on these businesses for their livelihoods.
- To ensure that food safety policies support gender equality, more research is needed on how they affect women, from farm to fork. There is also a major research gap on whether food safety policies bring risks for environmental sustainability. Filling this gap is important in order to design food safety policies that also benefit environmental sustainability.

To be nutritious and sustainable, food systems must produce food that is safe to eat. Currently a range of physical, chemical, and biological contaminants—bacteria, viruses, parasites, adulterants, mycotoxins, and chemicals such as pesticides and additives—enter food chains at different points and present serious health risks.⁸⁶ Most foodborne diseases result from consuming animal-source foods and fresh vegetables.⁸⁷ Most of the burden of foodborne disease comes from microbial pathogens, such as salmonella and *E. coli* (450,000 deaths or 79% of the burden of foodborne disease in 2010) and foodborne parasites (45,000 deaths). Combined, these contaminants lead to a high global burden of foodborne disease, estimated in 2010 at 600 million illnesses.⁸⁸ Foodborne diseases also have important implications for women's health and well-being, especially listeriosis and toxoplasmosis during pregnancy.⁸⁹

Fresh foods in lower-income countries tend to be more contaminated than in higher-income countries,⁹⁰ and fruits, vegetables and dairy are commonly consumed raw, without washing.⁹¹ Moreover, as rising incomes increase the demand for fresh foods, and urbanization increases the volume of food being transported between food producers and consumers, the burden of foodborne disease is expected to increase in low- and middle-income countries. In contrast, the incidence of other infectious diseases generally declines as nations develop.

Food safety policies consist of regulations, standards, and surveillance designed to prevent the contamination and adulteration of food in order to avert foodborne illness and enable trade. Because contaminants can enter at many different points along food supply chains, food safety regulations, standards, and surveillance are required throughout. During production, contaminants can enter through soil, water, fertilizers or agricultural chemicals, animal feeds, agricultural workers, livestock pesticides, and harvesting practices. During processing and retail, they can come from infected food handlers, adulteration, and poor preservation, packaging, storage, or transport conditions.

BOX 2

REAL-WORLD EXAMPLES OF FOOD SAFETY POLICIES

Codex Alimentarius

Codex Alimentarius is a global compilation of standards, guidelines, and codes of practice related to food safety, food quality, and the fairness of international food trade. Codex standards and related texts are voluntary; to be enforceable, they must be translated into national legislation or regulations. The guidelines address, among other things, food hygiene, food additives, pesticide residues, veterinary drug residues, contaminants, labeling and presentation, methods of analysis and sampling, and import and export inspection and certification.⁹⁷ For instance, Codex guidelines on nutrition labeling (CAC/GL 2-1985) are intended to inform consumers about the nutritional properties of foods. Of the 124 member countries in the World Health Organization (WHO), 85% require that food packaging display nutritional content.⁹⁸

Food safety risk communication

Many countries apply a risk analysis framework to food safety. The framework consists of three interconnected components: risk assessment, risk management, and risk communication. Risk communication is the exchange of information and opinions concerning risk and risk-related factors among risk assessors, risk managers, consumers, and other interested parties. The main goals of food safety risk communication are to increase understanding among various food safety stakeholders of the rationale behind decisions taken to assess hazards and manage food safety risks, and to help people to make more informed judgments about the food safety hazards and risks they face. Decision-makers and risk managers within governments have an obligation to ensure effective risk communication with interested parties when developing scientific and technical analyses. They must involve the public and other stakeholders when appropriate in the risk analysis process. And they must understand and respond to the factors driving public concerns about health risks and educate the public about food safety and hygiene guidelines.⁹⁹

Good Agricultural Practices

For farm production, guidelines exist on Good Agricultural Practices (GAPs), which are “principles to apply for on-farm production and post-production processes, resulting in safe and healthy food and non-food agriculture products, while taking into account economic, social and environmental sustainability.” They can include certification by a governmental or private body. GAPs include practices related to using chemicals and veterinary drugs and applying manure. For example, the **ASEAN** GAPs are a voluntary standard promoted by member-state governments to facilitate trade. The ASEAN GAPs create one standard for ASEAN members trading with larger regional countries, such as **China** or **India**, and they are generally in line with or moving toward the more stringent GAP standards for high-income markets. The ASEAN GAP standards also provide a common basis for governments’ agricultural extension efforts.¹⁰⁰

Box 2 continued: Real-world examples of food safety policies

Private food safety standards

Besides government food safety standards, especially in **Europe** and the **United States**, private food safety standards exist through which the food retail industry influences the application of standards all over the world.¹⁰¹ Multinational companies operating in **low- and middle-income countries** and, to a lesser extent, the domestic formal sector apply similar private standards to those prevailing in high-income countries.¹⁰² For example, GLOBALG.A.P. is a Europe-based retailer-led organization that sets GAP standards for agricultural production that apply wherever European retailers source food.¹⁰³ It is “a collective private standard for the implementation of generally agreed principles of GAP in primary production, initially in fruit and vegetables and now in a wide range of plant and animal products.”¹⁰⁴

Certification of safe food

Certification involves writing or supporting certification standards that inform consumers about food safety and aligning these standards with known food safety risks. Consumers often rely on food labels as a guide for safe food, or at least what they perceive to be safer food. In **low- and middle-income countries**, voluntary food safety certification and labeling schemes are growing, and these often have the strong backing of governments. In **China**, for example, the Ministry of Agriculture supports three voluntary food standards: for safe (or hazard-free) food, green food, and organic food. In **Vietnam**, the Ministry of Agriculture and Rural Development has backed a “safe vegetable” program and labeling regime for many years.¹⁰⁵

Modernization and formalization of retail

In **low- and middle-income countries**, policymakers often respond to health risks by promoting industrialization and reducing smallholders’ access to markets.¹⁰⁶ Formal markets such as supermarkets are considered key to improving food hygiene and safety through private food safety standards and management systems.¹⁰⁷ Supermarkets are also considered important instruments and drivers for the transformation of a country into modern society.¹⁰² For example, government authorities in **Asia** actively discourage wet-market retailing and promote the spread of modern supermarkets.¹⁰⁸ In **Vietnam**, retail modernization policies aim to expand the number of supermarkets in Hanoi to 1,000—a 10-fold increase—from 2015 to 2025, while reorganizing and reducing the number of traditional food markets.¹⁰⁹

During household food preparation, potential points of contamination may be related to inappropriate storage, cross-contamination, and poor handling.⁹² Entry points in food retail include informal markets, street foods, and supermarkets.⁹³ Most of the meat, milk, eggs, and fish produced in low- and middle-income countries are sold in traditional, domestic markets that lack modern infrastructure, food safety regulations, or inspections.⁹⁴ In growing urban centers in those countries, street food is increasingly important but often prepared under poor hygienic conditions.⁹⁵

Many policy instruments at national, regional, and global levels have been designed to improve food safety (see Box 2, page 24, for examples). While most are promulgated by the public sector, the private sector has also developed standards in certain areas. The private sector standards are often more robust than public or Codex standards and create a de facto higher bar for those along the supply chain, which can be challenging to navigate.

Nearly all low- and middle-income countries have laws on different elements of food safety and on the responsibilities of specific public institutions for enforcing these laws. But far fewer countries have clearly defined policy frameworks to lay out (1) how the system for food safety operates; (2) the mechanisms for coordinating activities and functions among concerned agencies; (3) the modes of engagement with food business operators and consumers, and the responsibilities of both; (4) how food safety regulations and other related actions are prioritized; and (5) control systems and penalties for noncompliance.⁹⁶

2.2.1. Food system benefits of food safety policies

Ensuring the safety of nutritious foods could raise consumers' willingness to pay for such foods

Effective food safety policies bring benefits for healthier diets not just because the foods are safer, but because consumers are more willing to pay for nutritious foods when they perceive them as safe. A 2021 systematic review found ample evidence that perception of food safety risk is an important driver of food-purchasing decisions.¹¹⁰ Studies show that consumers are willing to pay higher prices for nutritious foods they perceive as safe, which could improve the safety of their diets.¹¹¹

- **Consumers in Vietnam were willing to spend more money on safe food.** Food safety was important to shoppers from lower-income groups, who spent on average 50% of their daily budget on food. They were particularly willing to spend more on safe vegetables. While the study found that hardly any consumers bought vegetables at the supermarket, where prices are higher, in focus group discussions and in-depth interviews, lower-income households showed an interest in buying vegetables at supermarkets. Consumers valued the better hygiene and food safety certification in supermarkets.¹¹²
- **In Kenya, consumers said they were willing to pay a premium for safe kale.** Several studies found high levels of fecal bacteria on kale purchased from Nairobi markets. Contamination at supermarkets and high-end specialty shops was significantly lower. Concern about food safety was high among consumers who shop at Nairobi supermarkets and specialty grocery stores, where prices for fruits and vegetables were higher than in open-air markets. In one study, consumers at a specialty grocery shop stated they would pay a premium of up to 68% for kale produced and handled to ensure food safety. Customers interviewed at roadside markets stated they would be willing to pay an average of 28% more for safer kale. The authors also identified significant potential for farmers to benefit economically from the production of safe, high-quality produce if credible certification systems can be developed.¹¹³

- **Consumers in Kenya, Tanzania, and Uganda were willing to purchase more meat if its safety was assured.** In a survey of more than 1,000 consumers in Kenya, Tanzania, and Uganda, 83%, 90%, and 73%, respectively, said they would purchase more meat products if food safety were assured. The same study showed 80%, 62%, and 64% of consumers, respectively, willing to pay more for antibiotic-free meat and other products.¹¹⁴

Food safety policies could prevent consumers from buying ultra-processed food.

This finding emerges from evidence that a perceived lack of adequate food safety standards can lead consumers to buy less perishable food and more ultra-processed, unhealthy foods. Food contamination scares may also lead to the destruction or removal of certain food items, causing consumers to perceive packaged, ultra-processed foods as safer.¹¹⁵

- **In Vietnam, most respondents to a survey avoided vegetables they perceived as unsafe.** A study found that 88% of surveyed consumers avoided vegetable varieties they perceived as unsafe and switched to safer alternatives. The most frequently cited vegetables included seven leafy vegetables (pak choy, choy sum, cabbage, broccoli, morning glory, watercress, lettuce). Just over one-third of respondents reported eating fewer vegetables than before owing to food safety concerns. While urban residents were more likely to perceive vegetables as unsafe, in both urban and rural regions the more frequently consumers heard about food safety events, the higher the probability that they cited a very high risk.¹¹⁶
- **In Benin, adolescents said they were reluctant to eat fruits and vegetables sold in school settings.** A study in urban Benin assessing urban adolescents' perceptions of factors that influence their fruit and vegetable intake found that the adolescents avoided fruits and vegetables not only in school, but also outside the home in general, because of "bad hygiene" in washing and preparing the fruits or vegetables or the absence of packaging.¹¹⁷



"I dislike eating fruits outside home, but I like eating biscuits; [biscuits are] my preferred food... I prefer biscuits to mangoes because biscuits are packaged."

—Private school student, Benin

"I eat fruits more at home because I can wash them correctly,...and be at ease, and at home you can hide from flies."

—Private school student, Benin

"I eat vegetables at home because there you can be sure of the hygienic quality; you know how they are cooked."

—Private school student, Benin¹¹⁸

- **Fear of pesticide residues was found to reduce consumers' acceptance of fruits and vegetables in a range of countries, including Ghana, Myanmar, Turkey, Uganda, and Vietnam.** A systematic review on food safety found that concerns about pesticides, chemicals, and hormones in foods can affect consumption. Studies in Myanmar, Turkey, Uganda, and Vietnam pointed out that consumers were afraid to eat fresh fruits and vegetables owing to fear of chemical fertilizers and pesticides used in production. In Turkey, consumers mitigated perceived risk of chemicals such as pesticides by reducing their consumption of fish and poultry.¹¹⁹



“The tomatoes, the cabbages, they grow up on pesticides, everything is sprayed with pesticides. Yes, even though we would like to eat them, but when we think about the pesticides, we leave them.”

—Female, Uganda¹²⁰

- **Concerns among adolescents about food safety in Iran and Ethiopia led them to choose unhealthy packaged snacks over healthier unpackaged ones.**

A study of Iranian high school students found that participants feared eating traditional snacks because they were prepared by hand in unsanitary conditions. Instead, they preferred non-nutritious snacks such as cheese puffs and potato chips, which are produced using machines and hence carry less risk of microbial infection.¹²¹ A qualitative study assessing adolescents’ perceptions of factors influencing their dietary behaviors in Ethiopia likewise identified food safety as a major factor. If fruits and vegetables were presented in a clean manner, adolescents were motivated to eat them. However, given that the sales outlets, their surroundings, and the food itself were often perceived as unsafe, the participants perceived packaged foods as a healthier option when buying snacks near schools. The adolescents also appreciated the information related to ingredients and expiration dates on packaged foods.¹²²



“A snack which is produced by dirty hands contains microbes and can cause illness. For instance, I have seen hairs in bread and cheese snacks sold at the school café. Therefore, I prefer packed puffs and chips to traditional bread and cheese because they are safer.”

—Student participant, Iran¹²³



“Most of us eat fruits and vegetables, and the cleanliness of the area and the attractive arrangement is appealing and motivating us to eat healthy food.”

—Adolescent girl, Ethiopia

“This is a marketplace, and it is not clean at all. The food sold here might be attractive, but because the surroundings are not clean it doesn’t entice you to buy and consume it.”

—Adolescent girl, Ethiopia

“You can see the packed food here, and you can read their contents and understand what you want to eat.”

—Adolescent boy, Ethiopia¹²⁴

Food safety interventions tailored to support food vendors can support their livelihoods

Food safety interventions that include training and certification schemes can raise vendors’ profits by increasing their incomes and cutting their losses and costs through better food quality and greater acceptance by consumers.

- **In Kenya, a training and certification scheme for small-scale milk vendors reportedly generated a range of benefits for vendors’ livelihoods.** In 2004 Kenya’s revised Dairy Policy allowed the Kenya Dairy Board to offer a training and certification scheme for informal, small-scale milk vendors, who sell the vast majority of milk in the country. The scheme aimed for the progressive registration and formalization of these informal businesses while upgrading traders’ milk-handling practices. The low-cost training on milk handling, quality control, and entrepreneurship was short-term (to avoid loss of earnings) and tailored to vendors’ realities (providing guidance on practices they could change). Study respondents said the scheme help them reduce losses, raise their incomes, generate more business, lower their transaction costs, and sell higher-quality (i.e., safer) milk.¹²⁵

- **Kenya's Dairy Policy increased dairy operators' turnover and delivered benefits to producers, vendors, and consumers.** Another study of the Kenyan Dairy Policy found that small-scale dairy operators profited from quick, relatively high-volume turnover, and as a result welfare benefits for small-scale milk vendors increased. A large proportion of the small-scale milk vendors were also producers who substantially benefited from the policy change. The policy led to more than a fourfold increase in average quantities purchased and sold per small-scale vendor in Nairobi and more than a threefold increase over all locations. Total benefits accruing to the sector were estimated at US\$33.5 million a year. More than 70% of the benefits accrued to producers and consumers, and less than 30% to small-scale milk vendors and input suppliers.¹²⁶

Food safety standards can raise incomes for smallholder farmers

For farmers who comply with global food safety programs, income benefits can outweigh added costs.¹²⁷ GLOBALG.A.P. adopters, for example (Box 2, page 24), have benefited in terms of increased income,¹²⁸ improved technology, access to more remunerative markets,¹²⁹ and longer employment periods.¹³⁰

- **In Chile, government assistance with meeting food safety standards helps smallholder raspberry producers improve their product quality and raise their income.** Chile's government has supported a program to conduct audits, create farm-specific plans, provide credit, and cover the cost of certification for participating smallholder farmers for their first few years of operation. It subsidizes a trade association that adapts international standards for Chile and obtains benchmarking and recognition from foreign buyers.¹³¹ An analysis of 57 certified and 169 uncertified smallholder raspberry producers in Chile finds that, when the certification fees are covered by the government, certification raises produce quality and farmers' income.

The positive effect on income is likely due to improved raspberry quality and yield performance; the study does not find evidence of a higher price paid for certified raspberries or selective buying by exporting firms.¹³²

- **Farmers in Kenya reported substantial increases in income from participation in GLOBALG.A.P.** A study assessed the influence of GLOBALG.A.P. (Box 2, page 24) on growers of fresh fruits and vegetables. GLOBALG.A.P. consists of prescriptive, production-oriented standards developed by supermarket chains in Europe and requiring certification by an independent, internationally accredited certification body. An estimated 70% of exported vegetables are produced by smallholders. The study showed that adoption of the GLOBALG.A.P. standards raised farmers' net income from export vegetables by KSh 8,727 per cropping season. Although the investment by individual farmers accounted for approximately 30% of their total annual crop income, they nonetheless achieved a financial internal rate of return of between 30 and 66%.¹³³

2.2.2. Food system risks of food safety policies

Food safety policies could bring risks for healthy diets by raising the price of nutritious foods beyond the reach of low-income consumers

A 2021 systematic review of 46 studies from 20 low- and middle-income countries reported that despite widespread food safety concerns, consumers could not always afford to purchase safe food. Food safety policies could increase prices of safe food by taking risky food off the market, by making safe foods more expensive, or by replacing affordable small vendors with more expensive supermarkets. There is a significant paucity of research in this area. Studies from Vietnam set out in Box 3 (page 32) illustrate the point by revealing that more than 85% of households considered the food safety-certified fruits and vegetables sold in supermarkets to be unaffordable.¹³⁵



“The supermarket? No! We never go. We’re too poor! With my salary, I can’t afford to shop at the supermarket. I know that vegetables are safe and guaranteed, but they cost twice as much as outside.”

—Consumer, Vietnam¹³⁶

Food safety policies that encourage formalization of entities in food supply chains can undermine access to nutritious, healthy, and safe food

Some low- and middle-income countries have sought to improve food safety and hygiene by formalizing informal entities such as traditional wet markets, which are often key in food supply chains, in order to implement private food safety management systems and standards.¹³⁷ As a result, these entities have often been threatened or closed. Wet markets have been singled out as major sources of foodborne disease, and several attempts have been made to ban them.¹³⁸ Government authorities in Asia, for example, actively discourage wet-market retailing while stimulating the development of modern supermarkets.¹³⁹

Banning traditional markets can also affect key social and cultural traditions by limiting interactions with friends and neighbors, putting local businesses and livelihoods at risk.¹⁴⁰

While direct evidence of the impact of policies to formalize wet markets and other entities on diets is lacking,¹⁴¹ evidence suggests that such policies may risk lowering the availability and affordability of perishable nutritious food such as fruits and vegetables while increasing access to a wide selection of unhealthy ultra-processed foods.¹⁴²

- **Policies to formalize food retail in Vietnam may reduce consumers’ intake of perishable, nutritious foods.** See Box 3, page 32.
- **In Brazil, overregulation of slaughterhouses appeared to increase the number of informal slaughterhouses.** One study suggested that overly strict regulation of slaughterhouses could lead to

more informality, whereas more lenient sanitary standards meant that slaughterhouses that had been informal moved into the formal sector.¹⁴³

Food safety policies can bring risks to the livelihoods of smallholder farmers and vendors

While food safety policies can support farmer livelihoods as described, they can also threaten the livelihoods of small-scale farmers and food vendors through, for example, global food safety regulations. Global regulations increasingly determine whether and how low- and middle-income countries can participate in global trade—especially for fresh fruits and vegetables, fish and fishery products, meat, spices, and nuts¹⁵⁴—and complying with them can impose a heavy burden on small firms or farms. Adopting Good Agricultural Practices entails developing farm food safety plans, establishing recordkeeping practices, hiring additional labor, training workers, and investing in additional inputs, supplies, infrastructure, and equipment. These costs could act as barriers to small farmers¹⁵⁵ and lead exporters to prefer contracting with large-scale farmers and to exclude and marginalize smallholder farmers and processors.¹⁵⁶

- **In Kenya, most smallholder farmers ceased exporting fruits and vegetables to Europe under GLOBALG.A.P.** In 2006, 60% of smallholder farmers had been dropped by the export company or had withdrawn from the compliance schemes. While there were several reasons for failure, the primary reason was financial rather than lack of technical ability to meet the standard. Certification of individual farms—which cost £8,628 to establish and £5,666 a year to maintain—was not viable for small-scale growers.¹⁵⁷
- **In South Africa, international food safety standards on broiler meat were found to impose implementation costs across the whole food system.** Informal value chain actors were less likely to incur the costs of implementation, and there was little incentive for them to do so if they were not monitored or did not experience repercussions. These costs risked pushing smaller actors out of business or transferring costs to consumers.¹⁵⁸



“Compliance costs on food safety are high. We do need to look at strengthening our food safety systems and using new technologies, but if we are going to do that, you know it comes at a cost. There is a huge health benefit, but someone would have to bear the costs.”

—Representative of economic research institute, South Africa¹⁵⁹

- **A policy designed to formalize retailing in Ecuador resulted in declines in income for a large majority of participating vendors.** As part of a push to formalize retail in Quito, street vendors were relocated to newly constructed shopping centers. Although the vendors owned the stores awarded to them in this process, they were not allowed to rent out or sell the store for a period of seven years. Upon completion of that period, they were issued property titles and were free to dispose of the store as they wished. Only 7% of vendors reported increases in income after formalization; 85% reported a decrease in income and fluctuations in sales.¹⁶⁰

Food safety policies can impose disproportionate risks on the livelihoods of women food producers, processors, and vendors

Given that women are heavily represented among small farmers and informal vendors, food safety policies could have a disproportionately risky impact on women. In Harare, Zimbabwe, for example, about 9,000 people, of whom 81% are women, are involved in street food vending; in Pretoria, South Africa, most informal vendors involved in the sale of ready-to-eat chicken and chicken by-products were women. Informal food production, processing, and marketing are therefore highly important to women’s livelihoods.¹⁶¹ If food safety policies are punitive for these groups, they risk bringing harm. While this presents a major research gap, the following example illustrates the point:

- **The European Union’s food safety regulations were shown to reduce aggregate agricultural employment and to disadvantage women relative to men.** A study on the impact of the EU’s food safety regulations showed that they reduced aggregate agricultural employment in 90 low- and middle-income countries. It also suggested that women may have less technical education than men and may thus be less able to comply with standards. Furthermore, women often have fewer financial assets or less access to financing to pay for standards certification and other requirements. These requirements can be costly, particularly for smallholder farmers, most of whom are women in many developing countries.¹⁶²

More research is needed on how policies can be adapted to the requirements of informal market vendors and the poorest producers, especially women.¹⁶³ Participatory research and analysis of structural and societal factors are needed to clarify the impacts on informal vendors, especially women entrepreneurs.¹⁶⁴ There is a major gap in understanding regarding whether and how food safety policies affect female-led businesses relative to male-led businesses and regarding the overall impacts of food safety policies on women, from farm to fork.

BOX 3

POLICIES TO FORMALIZE FOOD RETAIL IN VIETNAM RISK REDUCING CONSUMERS' INTAKE OF PERISHABLE, NUTRITIOUS FOODS

In part to improve food safety, Vietnam has sought to modernize its retail sector while reorganizing and reducing the number of traditional food markets.¹⁴⁴ Policies have included (1) restricting the construction of new traditional markets; (2) upgrading and renovating markets; and (3) transforming markets into supermarkets.¹⁴⁵ Most vegetables (95%), which are a daily staple of the Vietnamese diet, are distributed through traditional markets and vendors, and just 2% go through supermarkets.¹⁴⁶

Although poorer consumers are concerned about unsafe food, they rely on informal vendors because they often cannot afford supermarket prices, they cannot afford or store large volumes of food, and they lack transportation from the store to their home.¹⁴⁷ A study in Hanoi found that supermarkets were on average 35% more expensive than traditional markets. While respondents considered supermarkets somewhat affordable overall, more than 85% of households considered the food safety-certified fruits and vegetables sold in supermarkets to be unaffordable. When vegetables were purchased at traditional markets, they accounted for about 19% of the food budget, compared with 27% at supermarkets.¹⁴⁸ For wealthier consumers, perceived food safety was the main reason for buying vegetables at a supermarket (85%) or convenience store (76%).¹⁴⁹

Owing to patronage of wet markets by low-income consumers and the perceived higher price of perishable foods, replacing wet markets with modern markets risks cutting into consumers' daily practice of shopping for vegetables, with negative implications for consumption.¹⁵⁰ Evidence shows that markets established as part of the government policy lacked an important characteristic of traditional markets: personal relations with vendors. They offered food safety guarantees but in an anonymous atmosphere, limiting consumers' desire to shop in them.¹⁵¹ There is also a risk that this approach pushes consumers to shift their food shopping toward poorly controlled, unhygienic, but convenient street vendors.¹⁵²

Evidence shows that supermarkets also increase consumers' access to a wide selection of unhealthy ultra-processed foods. Modern retail outlets in Vietnam offer a higher percentage of ultra-processed foods than traditional markets (more than 60% compared with less than 25%). Ninety-two percent of study respondents using supermarkets less than once a week went there primarily to purchase processed foods, like snacks and sweets. While consumers purchased only a limited amount of food in supermarkets and convenience stores (19%), these outlets contributed to 84% of the ultra-processed foods consumed.¹⁵³

Food safety policies could bring risks for environmental sustainability, but there is inadequate evidence to know whether this risk exists in practice

There is a significant evidence gap on the impacts of food safety policies on environmental sustainability in low- and middle-income countries. Hypothetically, there could be a link, with existing literature suggesting several pathways along which such impacts might

occur. Packaging could help prevent food waste across the supply chain but also increase energy consumption and packaging-related waste. Consumer concerns about products' shelf life could lead to more food waste. Maintaining cold chains, which are necessary for food safety, could increase energy costs.¹⁶⁵ Strict global sanitary and phytosanitary standards could reduce agrobiodiversity.¹⁶⁶ Whether any of these pathways play out in practice remains a critical research gap.

2.3. Policies on Road and Transport Infrastructure

Key considerations for policy design to maximize benefits and minimize risks

- Investing in roads and associated transportation can bring multiple benefits for farm households in rural areas, including better diet diversity and food security, reduced cost of getting produce to markets, lower price volatility, higher productivity, increased incomes, and reduced food losses when transporting food (which is also an environmental benefit).
- Road networks and lower transportation costs could also make healthier diets more affordable for consumers. But when they open up previously remote areas, they also introduce the risk that diets will become less healthy owing to increased availability of ultra-processed foods high in fats, sugar, and salt.
- While road expansion could be expected to have negative environmental impacts, there is a significant evidence gap on the environmental

costs of roads used by agricultural communities to transport food and inputs.

- There is a significant risk that road-building policy can worsen gender inequalities by failing to take women's transport patterns and needs into account.

In many countries, inadequate road infrastructure is a critical constraint on a well-functioning food system. Poor-quality road infrastructure presents significant challenges to the accessibility, affordability, quality, and safety of nutritious foods for consumers.¹⁶⁷ It also impedes the ability of food producers, processors, and traders to obtain crucial inputs, resources, and information while hindering their ability to deliver their products to market. This situation in turn has implications for food losses: fruits, vegetables, and animal-source foods all need to get from the producer to the market or processor relatively quickly to reduce food losses. Thus investments in road transport—such as extending road networks, upgrading road quality, and improving public transport and vehicle transport on these roads (see Box 4, below, for examples)—have important implications for the functioning of food systems. They also have important implications for environmental sustainability, land use, greenhouse gas emissions, and the production of unhealthy processed foods.

BOX 4

REAL-WORLD EXAMPLES OF ROAD POLICIES

Road construction or rehabilitation

Rehabilitation brings degraded roads back to their original usable condition, while upgrading roads (for instance, converting gravel roads to sealed or concrete roads) raises them to a higher classification.¹⁶⁸ Between 2006 and 2011 **Nepal** focused on constructing new unsealed roads rather than upgrading road quality.¹⁶⁹ In **Ethiopia**, the government has put considerable effort into rural road development. In 2010, under the umbrella of the Growth and Transformation Plan, the government launched the Universal Rural Road Access Program to construct and upgrade more than 70,000 km of rural roads. The program aimed to ensure that all Ethiopian rural communities had all-weather connections. In its first five years the program cost US\$1.4 billion.¹⁷⁰ In **Kenya**, the Ministry of Roads and Public Works adopted a program called Roads 2000 to rehabilitate and maintain roads based on district networks.

Box 4 continued: Real-world examples of road policies

This approach was designed to raise operating conditions on 55,000 km of unpaved roads. The Roads 2000 strategy of partial rehabilitation, spot graveling, and improved drainage was designed to improve road conditions, increase accessibility, and bring the network to a maintainable standard.¹⁷¹ In **Vietnam**, rural road improvements were carried out under the large-scale Third Rural Transport Project, implemented between 2008 and 2015. The country rehabilitated approximately 3,100 km of rural roads and performed maintenance on more than 19,000 km of rural roads spread across 33 provinces in northern and central Vietnam.¹⁷²

Public transport

Transport services available to the public can be supplied by public or private operators, with or without predetermined schedules, routes, stops, fares, and subsidies. Many users use public transport to reach food outlets.¹⁷³ While sustainable urban mobility policies tend to promote public transport, the reality is that most cities have developed around individual transport. Public authorities in African cities often struggle to control the supply side of public transport and traffic management. Cape Town is one of the most advanced African cities in this respect: it has regulated public transport services supplied by informal private operators. Findings from field reviews in **Cape Town, Johannesburg, Accra**, and **Dar es Salaam** show that, if properly regulated, this informal transport sector can play a significant role in providing safe and reliable transport services where large-scale scheduled bus or rail services are lacking.¹⁷⁴

Road safety for women

In **Kenya**, the Integrated National Transport Policy¹⁷⁵ acknowledges that women bear a disproportionate burden in terms of household social and economic activities and aims to promote equal access to and use of transport by women. In **Ghana**, the National Transport Policy seeks to ensure that transport systems respond to the socioeconomic needs of women, children, and the aged and to promote women's role as service providers, professionals, and managers.¹⁷⁶

Private-sector participation

Most national governments cannot afford to finance growing infrastructure needs through tax revenues and aid alone; private-sector participation in infrastructure investment can help reduce pressure on public finances and increase the portfolio of projects in the public-sector investment program. In **Kenya**, the government promotes private-sector participation in infrastructure for sustainable, long-term economic growth. The private-sector is encouraged to engage in joint ventures with the government to undertake privately financed projects. The aim is to progressively reduce the public sector's role in the economy and accelerate privatization. To improve the environment for private sector investment in productive sectors, special attention is paid to rehabilitating and expanding infrastructure.¹⁷⁷

2.3.1. Food system benefits of road policies

Policies to develop roads and reduce transport costs can bring benefits for households' food security and lead to more nutritious diets in rural areas

A small number of studies find that having better road infrastructure, living close to roads, and having access to transport facilitates food security and dietary diversity among households in rural areas.

- **In Nepal, a shorter time required to reach a paved road is positively correlated with dietary diversity.** Evidence on the determinants of dietary diversity in Nepal showed that household-level characteristics accounted for 54% of the variation in dietary diversity, and district and community-level characteristics accounted for 19% and 27% of total variation in dietary diversity. Specifically, at the community level, the time required to reach a paved road was associated with dietary diversity.¹⁷⁸
- **In Pakistan, closer roads and lower transport costs were associated with increased food security of farm households.** A study in Pakistan on the causes of food insecurity among agricultural households found that distance to a paved road in kilometers was significantly associated with food security status; a one-kilometer increase in the distance to a paved road decreased a household's chances of being food secure by 2%. For transportation costs, the study found that an increase of US\$100 led to a 0.3% decrease in a household's probability of being food secure.¹⁷⁹
- **In Ethiopia, lower transport costs provided an enabling environment for higher dietary diversity in rural areas.** Ethiopia has made significant investments in transport infrastructure since 2000; between 1994 and 2015 the population living within one hour's travel time of a town of at least 50,000 rose from 9% to 25%.¹⁸⁰ A study in a remote rural area found a relationship between nutrition knowledge and improved dietary diversity, but *only*

for children living in households with good market access, measured in terms of transportation cost.¹⁸¹ Reduced costs of transportation enabled households to convert their knowledge into practice, whereas where transport costs were too high, lack of access to markets constrained people's ability to access sufficient nutritious foods, even when they were knowledgeable. A further study shows that being close to a road network in rural Ethiopia increased households' resilience to child undernutrition due to drought.¹⁸²

More research is needed to ascertain the relationship between dietary diversity and different measures of road infrastructure and transportation, particularly for rural households, as well as how this relationship interacts with other variables, including food prices.

Road and transportation networks reduce costs for farmers and prices for consumers

Road and transportation networks, which are critical in getting produce from farm to markets at reasonable costs,¹⁸³ have implications both for the prices consumers pay for food¹⁸⁴ and for the prices farmers receive from informal and formal markets.

- **Cross-country studies show that stronger road networks make nutrient-adequate diets more affordable.** A simulation estimated that investments in the road networks of 14 African countries would raise the affordability of nutrient-adequate diets by reducing transport costs by up to US\$50 per household annually, thereby reducing prices of key food commodities. The study found that potential savings resulting from more efficient transportation owing to a better road network would average US\$7 per capita per year across the countries analyzed.¹⁸⁵ Another study of diet costs in 177 countries around the world found that after controlling for national income, the costs of nutritious diets are significantly correlated with rural travel times—that is, the lower the rural travel time, the lower the cost of nutritious diets.¹⁸⁶

- In Nepal, roads and bridges were important for moderating price levels and price volatility for rice and wheat.** A study showed that improved market infrastructure, measured by an increase in a road density index, was associated with decreases in rice and wheat prices. Roads and bridges explained roughly half of the variation in price markups between regional and local markets across different locations and over time. The authors concluded that improving connections between local and regional markets through the construction or improvement of roads and bridges could reduce prices in remote locations and dampen price volatility in local markets.¹⁸⁷
- In East and Central Africa, countries with greater domestic distances and low road quality had higher within-country price differences.** A study using monthly consumer prices for 150 towns in 13 African countries and detailed data on the length and quality of roads linking the towns found a substantial effect of distance and share of paved road on the level of market integration, as measured by relative prices. For example, relative price differences within the Democratic Republic of the Congo (DRC), which showed on average the lowest quality of roads, were on average twice as high as in Kenya, which had the highest share of domestic paved roads. Road length and road quality also had a substantial effect on price differences between countries. City pairs connected by a road that was only 65% paved had a higher relative price difference of 1.2% compared with city pairs where 94% of roads connecting them was paved. If road quality between Rwanda and DRC (35.7% paved) increased to the level of road quality between Tanzania and Malawi (95.5% paved), relative prices would be lower by 2.5%.¹⁸⁸

In contrast, studies show how poor-quality road networks make it challenging for farmers to access domestic and national markets:

In Indonesia, the high cost of transportation made local fruits and vegetables less competitive than imports and less attractive to wholesalers.

Horticultural crops in Indonesia are often produced in remote, high-altitude areas with poor infrastructure. Because unpaved roads were difficult to access, especially during the rainy season, farmers had to pay to carry vegetables from the fields to the nearest paved road. Indonesian farmers trying to sell their produce to supermarkets were severely constrained by poor supply chains, including lack of good roads, cold chains, and logistics services. Supermarkets on islands other than Java (e.g., Sulawesi and Kalimantan) source their fruits and vegetables from Java because local production sites lack transportation connections. Furthermore, supermarkets rapidly turned to a high level of fruit and vegetable imports because fruits and vegetables from China and Thailand were usually cheaper and higher in quality.¹⁸⁹

Rural transport for food products in Central America was inadequate for efficiently getting farmers' products to local markets. A study found that more than half of rural producers had to hire a vehicle to bring their goods to the market. The roads were so narrow that only a vehicle smaller than a five-ton truck could get in. Most of these trucks could not carry more than 20 quintals, so the load could not all be carried in one trip. None of the fruit, vegetable, pulse, or cereal growers used refrigeration to transport their food to market. However, fruits and vegetables for export were packed and held in cold storage at the plant for subsequent export abroad.¹⁹⁰

Roads bring benefits for agricultural productivity

Investment in roads can encourage farmers to engage in market-oriented agricultural production. Improved access to roads and markets can also lead farmers to shift from growing subsistence crops to higher-value crops.

- A systematic review concluded that investments in road expansion lead to gains in agricultural productivity.** The 2013 review concluded that most evidence on investment in road infrastructure reports positive impacts on agricultural productivity, largely through GDP, and poverty reduction.¹⁹¹ According to the review, "It is reasonable to expect that the impact of road infrastructure would lead to the

following agricultural changes: 1) extension or intensification of cultivable area; 2) increased number and range of crops being grown; 3) greater use of agricultural inputs and credit; 4) increased productivity and marketed surpluses, and 5) greater use of external markets with a commensurate increase in prices and returns.¹⁹² The review identified some important nuances. For example, studies show that in China, low-quality earthen roads have GDP benefit-cost ratios for agricultural productivity that are four times greater than those for high-quality roads.¹⁹³ In Uganda, low-grade access roads had much larger impact on agriculture than higher-grade roads surfaced with gravel or tarmac.¹⁹⁴

- **Every 1% increase in road investment in Vietnam was estimated to raise agricultural production by 0.11%.** A 2004 study used national and provincial government expenditure data from 1993 to 2000 to model several sectors' impacts on agricultural production. Road investment was reported to have the second-largest agricultural growth impact after government investment in agricultural research.¹⁹⁵

Road networks benefit farmers' livelihoods

Reasonable transport costs and well-functioning connections to road networks can raise farm household incomes by reducing the cost of moving agricultural inputs and products, enabling farmers to sell more, opening up livelihood opportunities beyond subsistence farming, and improving employment opportunities.

- **Ethiopia's rural road development increased household welfare and helped households cope with severe droughts.** A study estimated that rural roads increased average household consumption. The largest effects of rural road development were in the most remote communities, where household consumption rose by 27.9%. Between 2012 and 2016, in the communities most affected by the El Niño drought, the likelihood of falling into poverty was 14.4% lower if the community was connected to a rural road. Rural farmers in remote areas sold more crops when connected to rural roads.¹⁹⁶

- **In Bangladesh, investments in rural roads had positive impacts on agricultural development and rural poverty.** Road investments, such as upgrading to create motorized vehicle access, led to an average increase of 5–7% in rural household incomes by lowering transport and input costs and raising output prices, which led to higher agricultural production. This agricultural intensification process provided greater employment opportunities and higher agricultural wages for landless and functionally landless laborers.¹⁹⁷
- **Investments in low-grade roads in China boosted GDP and reduced rural and urban poverty.** A study found that rural infrastructure significantly reduced poverty, largely through growth in agricultural and non-agricultural production. Investments in roads did more to reduce poverty and stimulate economic growth than did investments in electricity or telephones, and investments in lower-grade roads had consistently greater returns than those in higher-grade roads for total GDP, urban GDP, and rural nonfarm GDP. Low-grade roads also lifted more rural and urban poor out of poverty than high-grade roads.¹⁹⁸

Improved transportation reduces food losses

More research is needed to understand the linkages between road transport, food losses, and food prices, but indicators are that improved transportation plays a key role in tackling food losses.

- **Reviews of existing studies show transportation is key to reducing losses of fruits and vegetables.** A literature review of interventions to reduce postharvest losses for 22 food crops in 57 countries of Sub-Saharan Africa and South Asia found the use of improved handling methods, transportation, and cold storage reduced losses in fruits and vegetables.¹⁹⁹
- **In Kenya, poor roads from farms to markets resulted in food loss and waste.** Most rural areas in Kenya suffer from poor infrastructure, particularly roads, especially during the rainy season. Inadequate transport for reaching markets in the rainy season led to food loss and waste, and delays during transportation and distribution meant that the vegetables that actually reached markets were poor in quality.²⁰⁰

2.3.2. Food system risks of road policies

Expanding roads into remote areas can lead to increased access to unhealthy food

Better access to roads can lead to livelihood shifts away from agricultural production, potentially decreasing the amount of local, homegrown, and indigenous food being produced and consumed while raising the appeal of unhealthy, processed foods that are readily accessible in markets.²⁰¹

- **A community in Brazil experienced a significant change in their diets with the construction of roads and other infrastructure.** When new industries, roads, river transport, and electrical lines came to a previously isolated community in the Brazilian Amazon, community members gained access to food from commercial supply chains. A comparison of food intake in 1999 and 2010 showed a significant increase in their consumption of cereals, beef, and frozen, commercially farmed chicken. Families consumed more fruits and vegetables, but also more soft drinks and packaged, canned, and processed foods. At the same time, deforestation and expansion of pasturelands reduced the availability of forest-derived foods for the community, and consumption of traditional unprocessed Amazonian foods, including forest fruits and game meats, decreased.²⁰²
- **In Peru, road development led to more calorie-dense, processed Western diets.** A study assessed the influence of the new Interoceanic Highway in the Peruvian Amazon. Traditional diets in the Andean Amazon rely mostly on cassava, plantains, fish, game meats, cultivated and wild fruits, nuts, and other starchy tubers. The study found that heads of household over age 60 residing in their district longer than 10 years were associated with lower Western diet scores (defined as diets dominated by processed foods high in fat or sugar). Younger, urban households who had moved into their district more recently were more likely to eat Westernized diets.

The authors concluded that the younger population moving to the area and the increased mobility due to the highway could have contributed to the dietary transition in this part of the Amazon.²⁰³

- **Construction of a new road in Nepal led to less dietary diversity and more consumption of processed foods.** After a new road was constructed, 42% of households in a village in Nepal abandoned a portion of their land to devote more time to road-related opportunities, making people more reliant on food markets. Most of the market-purchased foods were nutrient-poor. Villagers could obtain more rice than before, but as people ate more rice they ate fewer nutrient-rich traditional crops such as amaranth, barley, and bitter buckwheat. While more commodities were available, most were processed foods and other foods high in sugar and additives. Furthermore, the new road reduced consumption of indigenous foods in the village. Data suggested that the population was experiencing the double burden of malnutrition (the coexistence of overweight and undernutrition).²⁰⁴

Road transport policies risk bringing more benefits to men than women, thus reinforcing and exacerbating gender inequality

Transport infrastructure matters for women. A survey conducted in Uganda concluded that poorly designed and unsafe transport can restrict women's and girls' participation in economic, political, and social activities outside the home, especially after dark.²⁰⁵ Although road and transport policies have the potential to increase women's productivity, income, and assets, women are often excluded from planning and policy making surrounding road and transport decisions.

- **In Ethiopia, women had little influence over road planning.** A study found that personal safety concerns of female heads of households while traveling—such as the possibility of sexual assault while traveling alone or after dark—limited their mobility and was not sufficiently addressed in

road plans. The participation of both women spouses and female-headed households in the road-planning process was low. Men had much greater influence than women did in road planning and much greater access to transport services. Women in focus-group discussions explained that their limited participation was due largely to lack of time or existing gender norms.²⁰⁶

- **In Ghana, men dominated discussions about rural transport infrastructure and services.**

A study assessed how gender was addressed as part of Ghana's Transport Rehabilitation Programme. While the National Transport Policy aims to prevent discrimination against women, children, the aged, and the physically challenged, the Medium-Term Expenditure Framework for the sector (2016–2018) neither mentioned nor allocated a budget line for gender considerations. Also, the introduction of nonmotorized transport was not successful, because obtaining bicycles or trailers to reduce head portorage among women proved to be unaffordable. The study concluded that gender issues were absent in budgeting, legislation, and regulation, demonstrating weak gender responsiveness in the transport sector. Key barriers to women's participation in and benefit from investments in the rural transport sector included existing gender norms and women's underrepresentation in science- and technology-based subjects.²⁰⁷

Transport policies are not typically sensitive to the needs of women even though mobility is part of their everyday life. Women tend to have more complex transport patterns than men, as they combine errands with being in transit rather than going point to point. Many women perceive public transport and road travel spaces as unsafe.²⁰⁸ Some modes of transport may also be viewed as being less suitable for use by women. As a consequence of these existing patterns and norms, policies on roads and associated transportation may fail to benefit women.

Building more roads could bring risks for environmental sustainability, but there is not enough evidence to know whether this is the case in practice

There is a lack of knowledge from low- and middle-income countries on how road and transport investments that affect the functioning of the food system also influence environmental outcomes, such as land degradation and greenhouse gas emissions.²¹¹ A major research gap is in how improving transportation infrastructure could bring net environmental benefits.

- **Improvements in road infrastructure in Vietnam created opportunities that only male-headed households were able to exploit.** Better road infrastructure offered economic opportunities in agriculture, but only male-headed households could take advantage of these opportunities by increasing crop production. Male-headed households showed an increase in income from agriculture and a decrease, albeit smaller, in income from the sale of assets. Production and income did not increase in female-headed households, which had less household labor and less access to capital. In contrast, female-headed households experienced a decrease in income from agriculture and an increase in income from the sale of assets.²⁰⁹

Further research is needed on what kinds of improvements in roads and modes of transportation specifically benefit women and address gender inequalities, as well as on how women's participation in decision-making bodies related to local transport infrastructure could improve gender outcomes.²¹⁰

2.4. Agricultural Extension Policies

Key considerations for policy design to maximize benefits and minimize risks

- Agricultural extension services can bring benefits for participating farm households, including higher-quality diets, greater crop yields and diversification, higher incomes, adoption of environmentally sustainable farming practices, and more equitable participation by women in household activities and decision making.
- However, male bias in agricultural extension services risks exacerbating gender inequality both on the farm and in the household and may limit women's potential to contribute. Agricultural extension should thus be purposefully designed to minimize the risks for gender inequality. More research is needed on how agricultural extension services can be designed to promote gender equality.
- While agricultural extension services focused on sustainable farming methods can enhance the adoption of such practices, agricultural extension services may bring risks if they focus only on farm productivity and yields. There is a lack of evidence to show whether this is a concern. Even in the absence of evidence, agricultural extension should be purposefully designed to benefit environmental sustainability and minimize risks.

The world's food system depends on the efforts of hundreds of millions of small-scale farmers and pastoralists who are coping with a daunting array of challenges, including land degradation, ecosystem losses, climate change, and loss of natural resources. Many of these farmers are women. In many areas, they confront these challenges without adequate agricultural inputs, knowledge, capacity and innovations.²¹² Building a food system that is productive, equitable, and sustainable will require ensuring that these farmers have the support

and capacity they need to produce food, support themselves, and to do so environmentally sustainably.²¹³

Agricultural extension services can help fill the gap. Agricultural extension workers reach and interact closely with farmers to deliver knowledge and practices in different settings. They can function as significant service providers on crop, livestock, and forestry aspects of food security, consumption, and production.²¹⁴ By building farmers' capacity and promoting technology adoption, agricultural extension services aim to improve the yields, income, natural resource management, empowerment, or health of farmers as well as their neighbors or the wider community.

Many countries thus have policies to invest in agricultural extension services or farmers. Instead of national-scale programs, some countries focus on specific settings, such as regions with high levels of stunting or food insecurity. Agricultural extension programs themselves take many different forms, including farmer field schools (FFSs), farmer training centers (FTCs), home economics services, and mobile and radio extension services (see Box 5, next page, for more examples). This review focuses on these programs.

2.4.1. Food system benefits of agricultural extension services

Agricultural extension services can improve diet quality in producer households

A number of studies show that agricultural extension services have been shown to help farming households increase and diversify their production, improving their access to food and the quality of their diets.

- **A program using mentor farmers helped raise children's dietary diversity in Tanzania.** A recent study in Tanzania evaluated an agroecology intervention using mentor farmers. Each farmer household received 0.5–3 kg of legume seeds as well as support from mentor farmers, who received training on sustainable agricultural practices, nutrition, women's empowerment, and participatory learning. The intervention improved children's dietary diversity score by 0.57 food groups, and the percentage of children achieving minimum dietary diversity increased by 9.9 percentage points during the postharvest season.²²⁸

BOX 5

REAL-WORLD EXAMPLES OF AGRICULTURAL EXTENSION POLICIES

Agricultural extension or advisory services support people engaged in agricultural production by helping them solve problems and obtain information and technical, management, and organizational skills and practices to improve their livelihoods and well-being. Although agricultural extension services can be provided by government agencies, nongovernmental organizations, producer organizations, and private sector actors, including input suppliers, purchasers of agricultural products, training organizations, and media groups, the public sector provides 80% of extension services.²¹⁵ Overall, the World Bank estimates that there are more than half a billion official extension workers worldwide, about 90% of whom are in low- and middle-income countries.²¹⁶ **Ethiopia** has put in place one of the largest public agricultural extension service systems in Africa, going from 2,500 extension workers in 1995 to more than 45,000 in 2009.²¹⁷ Ethiopia has 21 extension workers per 10,000 farmers, with even more in high-potential areas. Every *kebele* (smallest administrative unit) has three extension workers, who specialize in crop production, livestock production, and natural resource management respectively. Additional workers responsible for animal health work across a cluster of *kebeles*.²¹⁸

Forms of agricultural extension services include the following:

Farmer field schools

Farmer field schools were introduced by the Food and Agriculture Organization of the United Nations (FAO) in 1989 in response to the negative side effects of the Green Revolution in **Southeast Asian** rice production. The insecticide-induced pest outbreaks threatened food security and demonstrated the inability of the prevailing extension strategy of technology transfer to deal with those adverse effects.²¹⁹ Today the model is implemented in more than 90 countries and is no longer restricted to integrated pest management (IPM) but encompasses a wide array of topics related to farming and rural livelihoods, such as food security, water, soil management, dairy, poultry, fisheries management, and organic agriculture.²²⁰ Farmer field schools can also integrate issues beyond agricultural production, such as HIV, gender, and nutrition.²²¹ They are a participatory method of learning, in which a group of farmers with common interests engage in a season-long study program, with weekly meetings to experiment in the field.²²² The facilitators lead the farmers in experiential group learning activities, including experiments with different cultivation techniques, field observations, and group analysis. Farmer field schools were introduced into **Sub-Saharan Africa** in the mid-1990s.

Pastoral field schools (PFSs)

PFSs are a type of farmer field school adapted to agropastoral contexts. PFSs began when the International Livestock Research Institute (ILRI), FAO, and Vétérinaires Sans Frontières applied the farmer field school approach to livestock production in **Kenya**, focusing on smallholder dairy and extensive mixed farming systems. The PFS model has been implemented in **Djibouti, Ethiopia, Kenya, Somalia, Sudan, and Uganda**, as well as in countries in **West Africa**.²²³

Box 5 continued: Real-world examples of agricultural extension policies

Farmer training centers (FTCs)

FTCs are local hubs where farmers can receive advisory services and information, training, and demonstrations on improved and sustainable agricultural practices.²²⁴ **Ethiopia's** extension system is based on FTCs coupled with farmer groups. FTCs, assisted by extension workers and farmer groups, are expected to provide a wide range of agricultural extension services. The Ethiopian government has established nearly 12,500 FTCs.²²⁵

Home economics services and nutrition education

Home economics extension agents are often associated with agriculture ministries and can specialize in nutrition. These agents, mostly female, address the nutritional needs of vulnerable family members. In **Kenya**, home economics is a subdivision of the Ministry of Agriculture, and it includes frontline home economics extension agents as well as home economics at the district and subdistrict levels. The frontline staff is composed mostly of women, though some men also participate. **Guatemala** has a cadre of female home economics extension agents who work mostly with mothers on food preparation, home gardens, hygiene, self-esteem, and gender equity.²²⁶ Agricultural extension services can also include linked nutrition and health behavior change communication programs.

Mobile or radio extension services

Adoption of basic mobile phone technology presents opportunities to improve upon existing in-person agricultural extension efforts, which are expensive. Smartphones with GPS systems allow extension services to transmit various media, such as videos, and locally customized information on soil characteristics, weather, pest outbreaks, or price information.²²⁷

An increased proportion of children were found to be consuming eggs, meat, dairy, and legumes. The intervention also reduced the proportion of households experiencing moderate or severe food insecurity by 12.5 percentage points in the postharvest season.

- **Farmer nutrition schools in Bangladesh improved the diversity of women's diets.** A project in Bangladesh implemented a farmer nutrition school (FNS) intervention, targeting pregnant and lactating women and women with children under two years of age. The FNS integrated nutrition, hygiene, and homestead food

production into agricultural training modules. The aim was to promote production and consumption of nutrient-dense vegetables available in the project area and animal-source foods, such as fish, poultry, and eggs. This intervention raised women's mean dietary diversity scores from 3.9 to 5.6 within two years. The proportion of women who reported consuming eggs, vitamin A-rich fruits and vegetables, and meat increased significantly.²²⁹

- **Participation in farmer field schools in DRC improved households' dietary diversity and food security.** Farmer field schools offered training

on farming practices, postharvest handling, and business and natural resource management skills, focusing on locally common crops, such as cassava, maize, rice, beans, banana, and peanuts. The schools also had community demonstration plots, and members received a starter package of seeds and tools. A study found that participating households improved their average dietary diversity from 3.4 to 5.6 food groups (out of 12), whereas households in the control group improved from 3.4 to 4.8 food groups over the four-year implementation period. The study also found an improvement in household food security.²³⁰

- **Farmer field schools in Tanzania had strong and sustained positive effects on diet quality and food security among participating households.**

The farmer field schools equipped farmers with necessary information, gave hands-on experience with different technologies, and provided each farmer with the means to choose which technologies to adopt. The introduced crops and technologies included improved varieties of banana with new cultivation techniques, conservation agriculture and crop diversification, improved animal husbandry, fruit and multipurpose trees, soil and water conservation, postharvest technologies, and encouragement to participate in savings groups. More than a year after the end of the project, participating households had greater access to food, increased food consumption, and better diet quality. Those households experienced less hunger in the lean period, were more likely to have animal protein in their weekly diet, and were more likely to give children in the household at least three meals a day.²³¹

Agricultural extension services can raise yields and diversification of agricultural production

Studies suggest that by promoting technologies, providing agricultural inputs, and sharing skills and knowledge, agricultural extension services can contribute to farmers' adoption of improved practices and in turn higher yields and more diverse agricultural production.

- **Participation in agricultural extension programs enhanced both farm productivity and household income.** In Ghana, the Ministry of Food and Agriculture as well as other stakeholders (such as donors and NGOs) have invested in building the capacities of smallholder farmers through agricultural extension programs. The Association of Church-based Development NGOs (ACDEP), a network of more than 40 NGOs in northern Ghana, is well known for providing agricultural extension programming, including capacity building in good agricultural practices, creating linkages among value chain actors, and promoting other value-adding techniques. A 2018 study found that participating in ACDEP agricultural extension programs had a positive effect on the farm productivity and incomes of smallholder farmers.²³²
- **Providing agricultural information using digital technologies in a range of African countries and India increased productivity.** A meta-analysis of six studies in Kenya and Rwanda found that, on average, farmers who received advisory text messages promoting the use of agricultural lime adopted the input at a rate 11.3% higher than farmers who did not.²³³ A second meta-analysis of seven studies in Africa and India indicated a 4% average yield gain associated with digital agriculture programs (such as text message interventions, video interventions, and in-person programs using mobile software applications). On average, the value of increased output exceeded the marginal cost of delivery via mobile phones.²³⁴
- **Farmer field schools have been shown to raise farmers' yields and profits.** A systematic review of farmer field schools published in 2014 concluded that they led to an average 13% increase in yields and also increased profits or net revenues by 19%. Yields rose by 9% for farmer field school graduates who received training in IPM, 20% for those who received complementary input or marketing support, and 37% for those who received training on growing rice, other staples and rice, or vegetables. In addition, farmer field schools that had been implemented for longer than two years delivered more significant effects.²³⁵

- **Farmer field schools in multiple countries have helped farmers diversify their agricultural production.** In Bangladesh, an evaluation of a program that promoted agricultural diversification found that farmer field school households produced significantly more types of agricultural products than the control group, suggesting that the schools led to diversification. Furthermore, the farmer field school households generated more of their income from livestock, fruits, and vegetables than the control group. In Rwanda and Uganda, farmer field schools promoting kitchen gardens and vegetable production were found to result in a self-reported increase in and diversification of food production. In Tanzania, an intervention presented farmers with a basket of technology options such as new crop varieties, crop diversification, and improved animal husbandry. Farmer field school graduates had a higher number of crops, grew more fruit trees, and kept more improved breeds of livestock than the control group, suggesting an impact on agricultural diversification.²³⁶
- **Outsourced extension services in South Africa contributed significantly to crop income and net income of households.** Lima, a rural development NGO, has provided extension services to small farmers in two districts since 2002. These services, which include provision of agricultural information and training as well as linkages to input and product markets, are driven by personal interactions between facilitators and farmers. A study found that these extension services added R3326 per adult equivalent to crop revenues, whereas households in the sample earned just R1404 from the sale of crops and livestock per adult equivalent. In addition, those who participated in extension services perceived gains in diets and health, product quality, and job creation.²³⁸
- **Farmer field schools have raised household incomes and net profits in several countries.** A review of studies published in 2020 concluded that farmer field schools improved household income in Ethiopia, increased net profits in Cambodia, and raised family income and the number of income sources in Kenya. Increased income was also reported in studies from Ecuador, Ethiopia, Nepal, and the Philippines.²³⁹ An earlier systematic review published in 2014 also found that farmer field schools can lead to improved net revenues or profits (monetary value of production less costs). For example, two studies in Pakistan and China found a significant increase in profits of 19% among participants over comparison farmers.²⁴⁰

Agricultural extension services can lift farmers' incomes

A significant number of studies show that agricultural extension can help improve farmers' field practices, produce more food, diversify their agricultural production, and enhance their food security. The increased income, profits, savings, and credit generated as a result of extension services have the potential to reduce poverty. For example:

- **Increased access to agricultural extension services increased consumption and lowered poverty rates in Ethiopia.** A study in 15 *woredas* in Ethiopia found that at least one visit from an agricultural extension agent reduced the likelihood of the household being poor by 9.8 percentage points. The same study showed that being visited at least once by an agricultural extension agent increased consumption growth by 7.1%.²³⁷
- **Farmer field schools boosted incomes among women, low-literacy farmers, and medium-scale farmers in Kenya, Tanzania, and Uganda.** When results were pooled, participation in farmer field schools increased income by 61%. They had the largest impact on agricultural income in Tanzania and the smallest (non-significant) impact in Uganda. In Tanzania, participation in farmer field schools led participants' agricultural income to double. In Kenya, agricultural income increased by 21%. At the regional (project) as well as country level, the per capita agricultural income of female-headed households participating in farmer field schools increased significantly more than for

male-headed households, demonstrating that this project was more beneficial for female-headed households than for male-headed ones.²⁴¹

Agricultural extension services can promote the adoption of environmentally sustainable farming practices

Agricultural extension services can improve environmental sustainability as well as farmers' resilience to climate change, drought, and other shocks by improving farmers' knowledge and promoting sustainable natural resource management, agroecology, climate-smart agriculture, and conservation techniques.

- **Farmer training in the Ethiopian highlands increased the use of soil and water conservation practices.** A study evaluated the farmer training conducted by ADHENO Integrated Rural Development Associated, an NGO operating in the central highlands of Ethiopia. ADHENO works with government extension agents to engage farmers in training on soil stability, climate change adaptation, and agricultural livelihoods. Practices shared in the training sessions include trench digging, terracing, stabilization of soil by planting vegetation, intercropping, and irrigation. The study shows that the ADHENO-trained farmers were 30–48% more likely to practice these methods than other farmers. The trained farmers also had higher incomes than those who did not attend.²⁴²
- **Multiple studies show that farmer field schools have led farmers to reduce pesticide use.** One review found that farmer field schools improved farmers' knowledge about natural systems and ecosystem management skills. Ecosystem management practices were addressed in 42 out of the included 65 studies on farmer field school outcomes and impacts. Nineteen studies reported on pest management, with most studies showing a reduction in pesticide use or spray frequency, indicating more evidence-based decisions on crop protection; 4 of the studies showed no effect of the farmer field schools on pest management practices.

A study from Vietnam suggested that the schools were more effective than a “no early spray” messaging campaign at reducing farmers' pesticide use. In an advanced rice production system in Thailand, the farmer field schools did not increase farmers' yields but did lead to a significant net benefit due to reduced pesticide inputs. In Cambodia, a farmer field school had a convincing and durable impact on pesticide use, which was reduced by about 50%, even measured six years after the project. Another study from Cambodia reported medium- and long-term reductions in rice farmers' use of pesticide inputs after the farmer field school. In Nepal, farmers who participated in a farmer field school reduced their pesticide use by 70% compared with control farmers.²⁴³

- **Farmer field schools led Bangladeshi farmers to be more eco-efficient.** Agro-environmental training programs on integrated crop management for rice farmers included training on pesticide, seed, fertilizer, and irrigation management along with several season-long field trials. Participating farmers were almost 24% more eco-efficient than nonparticipants. That is, they created more output while using fewer resources and generating less waste and pollution. Participants reduced environmental pressure by conserving more nitrogen, phosphorus, potash, and pesticides as well as energy and irrigation water. The authors concluded that cooperative farming appeared more eco-efficient because it exploited economies of scale in the use of environmental resources.²⁴⁴

Agricultural extension can benefit gender equality in recipient families

Agricultural extension services are often biased toward men, with information targeted mainly to male members of a farming household and in formats that are rarely tailored to female farmers and their needs.²⁴⁵ Limited women's access to these services means they are not given the opportunity to gain knowledge and skills or adopt innovative technologies and management practices that could support their work.²⁴⁶

Focusing agricultural extension on women is thus an opportunity for transforming social norms by including human, social, and financial asset engagement in farmer education,²⁴⁷ while also improving women's production-related outcomes, income, and decision-making power.²⁴⁸ Some studies do show that agricultural extension has the potential to address gender inequality.

- **Farmer field schools in Kenya helped men overcome gender biases and increased women's self-sufficiency and communication skills.**

A qualitative study of transformative learning among men and women who participated in farmer field schools in Kenya found that women "became more adept in public speech and more involved in communal activities due to increased communication skills." Women also gained a sense of the importance of self-sufficiency at the household level. A significant change in perspective occurred among men, who overcame personal biases around giving land only to their sons. However, women were unable to apply some of the technical training because of men's control over assets and resources.²⁴⁹



"I learned that women are the ones who do the farming in the community. I even tell my daughter not to depend on her husband for the upkeep of her family. If you focus on agriculture, you will not go hungry. Neither will your family."

—Female farmer participant in farmer field school, Kenya²⁵⁰

- **Farmer field schools helped modify gender roles and habits at the household and community levels in Kenya.** Another study in Kenya found that mixed-sex farmer field schools increased household collaboration and joint decision-making between men and women. In that locality, some farming traditions specified that men should not grow vegetables, that women should not plant certain trees such as bananas or eat eggs or chicken, and that only women should plant sweet potatoes.

The breaking of some of these taboos is often associated with a high level of fear, but experimentation in the farmer field school setting was shown to reduce people's fear and increase their willingness to try new practices. In addition, the school seemed to have contributed to changes in gender roles and habits. One male farmer said he came to see the role and capacities of women differently and recognized how limited traditional gender roles were. Another farmer shared that it was now considered acceptable to take advice from a female farmer.²⁵¹



"It was assumed that women do not have any mind to organize themselves along economic lines. The FFS sittings shifted me from that belief, and I went as an outgoing lady to look for the basic necessities for my own house. I am now currently exploiting the incomes of my household from my own sources... I am playing the role of a man as well as a woman, so as not just to sit and wait. Sometimes, back before when we were living below the poverty line, there were more quarrels, more suspicion, a lack of confidence between us in the marriage relationship, a lot of noise, a lot of quarrels, because I was demanding what he [husband] could not manage at that time. But when we started to graduate from that economy to this level, now we are at part, more equal, and most of our issues are sorted out."

—Female farmer field school participant, Kenya²⁵²

- **In Papua New Guinea, the Family Farm Teams Program had an impact on gender dynamics.** The Family Farm Teams Program has demonstrated the effectiveness of place-informed pedagogy with men and women farmers. One study assessed the impact of a two-day workshop where community educators used a range of experiential learning activities focused on daily life and gender relations in the family and on the farm. It was designed to enable female and male family heads of households learn how to map their current division of labor and consider more equitable ways to work as a family.

It introduced the concept of a family team as an effective and inclusive way to work as a farming family. The family heads collaboratively determined their own farming goals, financial goals, and general family goals. Both genders found the family teams approach to farming activities relevant and constructive. The learning activities for male and female heads appear to have been a nonthreatening way to engage with gender dynamics in families.²⁵³



“In the past our family never talked together. My husband never discussed plans or worked with me; I did things on my own. After the training, my family sits together and discusses our goals, my husband and the children work with me, and we always plan together. My husband and I work together as best friends, and I am so happy.”

—Western highlands woman in Papua New Guinea²⁵⁴

Farmers reported being advised or encouraged to abandon their traditional methods in order to adopt the intensive use of agrochemicals such as fertilizer; they also lacked opportunities to share the benefits of their traditional methods with extension personnel. Furthermore, farmers who tend to practice organic farming techniques had limited access to information; applying agrochemicals was perceived as a less labor-intensive approach for farmers.²⁵⁵



“Here in my farm I plant various crops in the same piece of land, but I buy and apply fertilizers and pesticides because the extension agents will always advise we use chemicals. Even when you tell them our own method is good, they do not listen; they want us to do away with our ancestral ways of farming and adopt their style.”

—Nigerian farmer²⁵⁶

2.4.2. Food system risks of agricultural extension services

Agricultural extension services may undermine environmentally sustainable farming methods, but more evidence is needed on the impacts on environmental outcomes

Agriculture extension services have historically focused on the adoption of modern technologies. If these services promote unsustainable use of inputs and the adoption of unsustainable practices, there is potential for risk.

- **Agricultural extension agents in Nigeria disregarded farmers’ traditional resource management knowledge.** A study in Nigeria found that extension personnel currently focus almost exclusively on intensive agricultural practices. Farmers rely on extension staff for information and tend to be influenced by the information they receive, even when it is contrary to their traditional practice or local knowledge.

No further studies could be identified to assess the impact of agricultural services on this outcome. Far more research on risks related to agricultural extension and environmental sustainability are needed in order to draw conclusions.²⁵⁷ More research is also needed on the impact of agricultural extension focusing on agroecology on environmental outcomes.

Agricultural extension may exacerbate existing biases against gender equality

Female farmers are often disadvantaged in the targeting of extension services. Women’s relatively low rates of literacy and education, their family responsibilities, and their daily work on subsistence crops often preclude significant access to extension services. To reach the most neglected households, extension services must ensure that the selection of participants is not biased toward farmers with more land and resources.²⁵⁸

- **Extension selection and training methods in Malawi favored men over women.** In selecting participants for agricultural extension in Malawi, extension officers used availability of land, particularly land near water sources, as a key criterion. Officers used this rationale to justify the presence of fewer women than men. The assumption that men, as household heads, were the decision-makers influenced the extension approach. Furthermore, the training methods were not friendly to women's literacy levels, which reinforced the existing belief that they were less intelligent, lazier, or more helpless than men. Thus, women's training needs were regarded as secondary to men's, although women were perceived to participate more in production-related activities.²⁵⁹
- **Women had limited access to advisory services in rural Pakistan despite their participation in relevant farming activities.** A study in a district in rural Pakistan showed that female farmers had limited access to crops and livestock advisory services, although their participation in those activities may be higher than male farmers. The top reasons reported by the study included lack of proper transport facilities for female extension staff, unavailability of female extension staff, lack of reorganization and appreciation of rural women's work, and lack of agricultural land rights for rural women. The study recommended that in addition to hiring female agricultural extension agents, the government should establish women's training centers to advance gender equality in agricultural extension and rural development services.²⁶⁰



"We invite household heads [for training]. In most cases it is men who are the household heads. They take it as a program that is going into the family to be headed by the household head. In cases where the household is led by the woman, it is the woman who comes."

—Male agricultural extension worker, Phalombe, Malawi²⁶¹

- **Even where women are beneficiaries, preexisting gender norms and power dynamics may limit their ability to adopt the innovations or technologies featured in extension services.** Women may face additional work burdens and time commitments that prevent them from participating in agricultural extension programs and adopting new technologies. Simply targeting women is not enough to enable them to overcome gender-related obstacles to applying their training knowledge. More research is needed to evaluate the many gender-responsive extension methods that exist.²⁶² Further studies should also examine gender-transformative learning outcomes and food system risks for female farmers who are excluded from extension services.²⁶³

2.5. Land Tenure Policies

Key considerations for policy design to maximize benefits and minimize risks

- Land tenure policies that provide rights to vulnerable and marginalized groups in rural areas have the potential to bring benefits for household diets and food security, agricultural investments, rural livelihoods, gender equality, and sustainable land management. In contrast, policies that fail to protect rural landownership, to preserve access to land, and to prevent high levels of fragmentation can undermine these outcomes, even where they aim to bring economic benefits to communities and/or conserve land for environmental protection.
- Land tenure policies may have little impact on the outcomes mentioned if the context is not favorable, such as when landholdings are too small or gender norms are not accounted for. Taking account of the context of implementation is particularly critical when designing land tenure policies to maximize benefits across different food system outcomes.
- Where preexisting gender inequalities are not taken into account, land tenure policies can actively create risks for women. All aspects of discrimination against women need to be carefully considered when designing land tenure policy.
- To support policy design, it will be important to fill critical research gaps. These include the pathways between land tenure and household food security and diets, the impacts of large-scale land investment and enclosures in pastoral communities on income and dietary intake, the risk of land tenure policies for gender equality, and the climate change impacts of land tenure policies, especially related to women's and smallholder farmers' ability to implement adaptation measures.

The land where food is produced is clearly foundational to food systems. Much of the land in low-income countries is productively occupied and used, but its users lack secure property rights. In particular, women, ethnic minorities, indigenous people, and people who rely on common land like rangeland face insecure tenure.²⁶⁴ In addition, existing agricultural land is under pressure from urbanization, agricultural expansion, overgrazing, and overexploitation of resources.²⁶⁵ Furthermore, international investors have leased or purchased an estimated 50–80 millions of hectares of land in low- and middle-income countries, resulting in expropriation of farmers' agricultural and forest lands.²⁶⁶ Insecure land tenure can lead to poor land management, land degradation, reduced land productivity, and consequent food insecurity. Overall, the widespread problem of insecure land tenure not only impedes people's ability to consume healthy diets and achieve good nutrition but also undermines other aspects of food systems, including food production, food security, livelihoods, and gender equality.

Land tenure policies are developed and implemented to address these challenges (see Box 6, next page). Their objectives vary with context and include improving people's livelihoods, community cohesion, gender equality, agricultural production, and/or food security.²⁶⁷ Land tenure security is defined as the protection of peoples' access to and use of land against the actions of others by systems of rights and governing institutions, enforceable by a legitimized authority. Land tenure security entails three related rights: (1) use rights (to use and gain benefits from land), (2) control rights (to make decisions on who may benefit from use of the land and for what purpose it may be used), and (3) transfer rights (to transfer or sell ownership rights to others, including the right to inherit).²⁶⁸ Policy instruments to strengthen land tenure include land titling and registration; titling and registration targeted to certain groups, such as women or pastoralists; formal recognition of customary land rights; and promotion or regulation of large-scale land investments for large agricultural production sites (see Box 6, next page). In contrast, some policies, such as some large-scale investment policies and environmental policies, can undermine land tenure security.

BOX 6

REAL-WORLD EXAMPLES OF LAND TENURE POLICIES

Land registration and titling

Several countries, such as **Cambodia, Ethiopia, Ghana, Laos, and Mozambique**, have undertaken land registration and titling programs. In Laos the government has allowed for communal land titling, but such titling has been extremely limited.²⁶⁹

Land registration and titling laws targeting women

Legal provisions in many countries do not adequately protect women's rights to land,²⁷⁰ and some countries have adopted laws and policies to attempt to rectify this inequity. In **Liberia** laws and policies on rights to land and forests aim to give equal protection to the rights of men and women, though in communities governed primarily by customary law, men benefit from protection more often than women.²⁷¹ **Rwanda** has initiated the Land Tenure Regularization program to protect the property rights of women in a legally registered marriage. The law requires spousal consent for transaction of matrimonial property by either marriage partner, but it does not protect the property rights of women who live with unmarried partners or are in an unregistered marriage.²⁷² In **India** many states have tried to ensure gender equity in land grant programs by issuing joint titles. In Odisha joint-titling initiatives around homestead and other land grant programs, with an additional focus on women-only titles to single women, have been recognized as good practices.²⁷³

Land rights targeting pastoralists and agro-pastoralists

Many African countries have tried to increase livestock production in communal areas while maintaining the forage quality of the rangeland by establishing enclosures (or exclosures) to keep livestock in or out. These policies are designed to rehabilitate degraded pastoral landscapes and allow vegetation to regenerate. Because policymakers often view traditional pastoralism as unproductive and directly responsible for rangeland degradation, enclosure and exclosure policies often lead to the settlement of mobile pastoralists.²⁷⁴

Recognition of customary law

Owing to the limited land registration and titling in rural areas, rural communities often use customary land tenure systems, but government officials and policymakers frequently fail to understand or officially recognize these customary law systems. For instance, **Laos's** laws concerning land, agriculture, and forests do not recognize customary land rights.²⁷⁵ Customary rights are protected, to varying degrees, under **Mali's** Land Code 2000, **Mozambique's** Land Act 1997, **Tanzania's** Land Act and Village Land Act 1999, and **Uganda's** Land Act 1998.²⁷⁶ In **Ghana** about 80% of land is estimated to be owned under customary law, pursuant to the ultimate control of a paramount chief, and is allocated locally through matrilineal leadership.

Box 6 continued: Real-world examples of land tenure policies

In **Kenya** the National Land Policy promotes a plural approach, in which different tenure systems coexist and provide equal guarantees of tenure security, but customary law is valid only to the extent it is consistent with the Constitution.²⁷⁸

Large-scale land investments

Large-scale land investments relevant to food systems involve purchasing or leasing long-term land rights and subsequent establishment of large-scale agricultural production sites such as plantations. They can include global investors or national governments aiming to acquire land. These investments can influence land tenure through land dispossession, which can infringe the rights of vulnerable groups, such as smallholder farmers. The actual impact depends on country and local contexts. Large-scale land investments can have positive implications for farmers' livelihoods if they provide employment opportunities, raise public revenues, and include infrastructure projects that connect previously remote areas.²⁷⁹

When linked to land dispossession, studies show that they undermine rural livelihoods.²⁸⁰ Data also shows that besides foreign investors, national actors account for a large share of land acquisition for agribusiness plantations. While these investments may account for only a small share of national land suitable for rain-fed agriculture, they are often concentrated in specific high-value districts or regions, where they exacerbate competition for land. Since mid-2010, fewer investments have been made, and more deals appear to be at the implementation stage, raising issues concerning the operation, upgrading, or expansion of existing investments. In addition, growth corridors and other coordinated efforts to develop priority geographic areas and economic sectors can affect land use while catalyzing wider spillover effects on livelihoods.²⁸¹

2.5.1. Food system benefits of land tenure policies

Land tenure policies can bring benefits for household diets and food security

Evidence from a number of countries shows that improving rural households' ability to own and control land can benefit household diets and food security. This benefit emerges from the links between landownership and other factors, including farming and access to credit.²⁸²

- **Land tenure policies in Ethiopia led to greater calorie availability in landholding households.** In 1997 Ethiopia launched a land certification program granting perpetual inheritable user rights to the land. A 2013 study found that holding a land certificate had significantly raised households' calorie availability.

Between 1997/98 and 2009/10, the overall prevalence of severe undernourishment in the sample fell from 81% to only 49%. Over the same period, the prevalence of food insecurity among landlord households fell from 78% to only 27%. In fact, food deficits were lower in female-headed households on average than in male-headed households. By comparison, less tenure-secure households consumed fewer calories and had lower per capita consumption spending than more tenure-secure households.²⁸³

- **Landholding helped raise household milk consumption in India.** Landholding households, which use their land to produce fodder for their livestock, consumed about twice as much milk as landless households farming their own plot.

Households with land also consumed much more milk than households that depended on agricultural wage labor, sharecropping, or the nonfarm economy. In the villages studied, 77–92% of landholding households owned a buffalo cow, compared with only 19–42% of landless households. Whereas landholding households obtained 84–95% of the milk they consumed from home production, for landless households that share was only 31–51%. Landless households had to obtain fodder by purchasing it, by trading agricultural labor for grazing rights, or by collecting forest leaves.²⁸⁴

- **Landholding in Myanmar increased the probability of a household's being food secure and having a more diverse diet.** A study of 4,000 rural households in Myanmar found that landholding was associated with improved food security and dietary diversity, and the positive associations increased as landholding size increased. Households with more than 10 acres of land were significantly less likely to be in the hunger category, to change their diet owing to food shortages, to report food shortages, and to have to borrow money and food compared with landless households. These households were also 15.6 percentage points more likely to have high dietary diversity and more likely to consume protein than landless households. However, landownership was not significantly related to consumption of vegetables or dairy.²⁸⁵

However, in some cases land tenure is not associated with improved household food security or diets. A systematic review of links between agricultural inputs and nutrition in South Asia found no consistent association between landownership and diets. Of two studies in Bangladesh that included landownership, one reported a small but negative association between landownership and dietary diversity, when controlling for other factors.²⁸⁷ The other study found that although landownership reduced household food insecurity, it had no impact on women's dietary diversity.²⁸⁸ One study in Nepal showed that landownership increased the likelihood of being above

minimum dietary diversity only for the oldest age group of children considered but was insignificant for younger groups.²⁸⁹ These mixed results suggest that the influence of land tenure and ownership is highly dependent on context.

Land tenure security can bring benefits for factors associated with agricultural production

Land and its administration are important factors for agricultural production. Secure access to land can be an incentive to engage and invest in farming and can facilitate access to credit, government support, and international programs.²⁹⁰ Theoretically, when rural people are confident they can maintain control over their private and communal lands in the long term, they are more likely to invest time and resources in the land and in producing food crops.²⁹¹ Evidence likewise indicates that lack of land tenure security undermines factors associated with agricultural production.

- **Registering land rights in Benin increased farmer investment in cash crops.** A randomized control trial in Benin found that the first stage of a government intervention to map and register customary land rights increased beneficiary investment in perennial cash crops and trees by 39%. The study found a shift in investment toward long-term crop production under the first stage of the formalization procedure (demarcation). The study also showed that following increased by 1.5 percentage points for female-headed households compared with the control group, suggesting increased confidence in their land security. However, the trial found no increase in agricultural output or farm yields. The authors concluded that such productivity gains would take longer to show than the one year of observed investment.²⁹²
- **Degree of land tenure security in Ghana influenced factors associated with agricultural productivity.** In a qualitative study in Ghana, farmers reported that inequalities in land rights and consequent tenure insecurity was contributing to food insecurity for their families. Focus group discussion participants reported that the challenge of land rights inequalities

and consequent tenure insecurity had directly reduced farm sizes, farming investments, yields, and food security.²⁹³ Another study in Ghana found that individuals who held powerful positions in a local political hierarchy had more secure tenure rights, invested more in land fertility, and achieved substantially higher output. The intensity of investment on different plots cultivated by a given individual corresponded to that individual's security of tenure over those specific plots.²⁹⁴

As for household food security and diet, the benefits of land tenure for agricultural production depend on context, tending to increase with the size of the plot and to be potentially negligible if the plots are too small.²⁹⁵

Land tenure security improves the livelihoods of food producers

The evidence that land security would benefit livelihoods comes largely from studies showing that lack of land security bring disbenefits for livelihoods. Land insecurity emerges because land tenure, ownership, and rights can be undermined by many factors, including large-scale land investments, privatization, and policies that reduce the size of landholdings (see Box 6, page 59). When linked to land dispossession, evidence shows that these factors undermine rural livelihoods.²⁹⁶

- **Laotian villagers who lost land were left more vulnerable.** Large-scale commercial land investments in Laos dispossessed people of land used to produce and collect food and products for consumption and income generation, resulting in increased food insecurity. Laos PDR's national dataset on land concessions shows that, as of 2011/12, 2.1 million hectares—or 9% of the country's total land area—had been granted to investors for plantation, infrastructure, and mining projects. While the commercial land investments provided wage employment for villagers who lost land, the jobs offered were few, infrequent, inconsistent, low-wage, and unable to meet the level of food security provided by former land-based livelihoods.

Given the type of land most commonly ceded, women are particularly negatively impacted by these concessions and must travel even farther to find non-timber forest products.²⁹⁷

- **Privatization and subdivision of land in Botswana reduced pastoralists' sources of income.** A study in Botswana showed how diminishing access to land has affected pastoral livelihoods. In many countries, traditional pastoralism is viewed as unproductive, and policies have pushed pastoralists into settling. Privatization and rangeland enclosures resulting from Botswana's Tribal Grazing Land Policy have fragmented pastures and undermined the mobility of pastoralists, which is essential to their livelihoods. The study found that since 1975 about 65% of communal lands have been lost to privatization and subdivisions. In addition, pastoralists in the study area had had diverse sources of income, but their access to these resources was closed off by the fences surrounding the private ranches.²⁹⁸



"I used to cut logs, droppers (wood spacers), thatching grass and gather wild berries in there and sell. Now my business has collapsed because all these resources are now on private land... We can't even go near that fence because we are afraid of the soldiers."

—Oral history, 68-year-old pastoralist, Botswana

"We now depend on government handouts for survival because the land is not enough for sustainable pastoral farming and there are no markets for livestock products."

—Focus group participant, Botswana²⁹⁹

Women’s land tenure can benefit equality in decision-making but is not always sufficient to offset preexisting gender norms and inequalities

The relationship between land tenure and women’s empowerment is complex. Policies that create greater equality for women in access to land and participation in land policymaking have positive implications for decision-making within households. These benefits, however, depend on preexisting contextual factors and gender rights and norms, such as unmarried women’s rights, women’s rights within marriage, and their right to inherit land. And the benefit of land rights for women is also shown by the negative outcomes when they lose their rights.

- **Legal reforms facilitating women’s landownership in Nepal increased their household decision-making.** A study in Nepal examined the role of women’s sole or joint landownership in improving their bargaining power within the household. The study included data from 2001 and 2011—before and after legal reforms facilitating joint landownership by both husband and wife. The study concluded that women’s bargaining power increased significantly from 2001 to 2011. For example, in 2001, 20% of women reported having final say in decisions about their healthcare and 24% in decisions about major household purchases; in 2011 these percentages were 58% and 47%, respectively. Women’s age at first marriage and education level also increased over that period. Women’s landownership in Nepal therefore significantly increased their empowerment, and the estimated impacts of landownership increased over time.³⁰⁰
- **Joint land certification for spouses increased women’s decision-making power in Ethiopia.** Ethiopia’s land tenure reform was conducted in four regions in the country at different times during 1998–2005. In the Tigray region land certificates were issued only to household heads, who were primarily male, and in three other regions land certificates were issued jointly to

household heads and spouses. One study found that when land was certified to both household spouses, households increased the share of resources spent on healthcare and the share of consumption allocated to homegrown food. The increase in consumption of homegrown food after joint land certification suggested that increased women’s bargaining power extended to decisions concerning household production. The authors concluded that improving women’s land tenure security can transform household dynamics and contribute to achieving important health objectives.³⁰¹

- **Tenure rights for women in Bolivia influenced their decision-making power.** Land tenure was not a priority for the Quechua men in the study area until the commoditization of quinoa occurred. Quechua women had traditionally sown quinoa collectively on communal land, which they managed without formal recognition of tenure rights, but the recent international demand for quinoa brought changes to how the land is managed. The collective land has been claimed and sold to outsiders as individual plots. Though women still provide labor for quinoa farming, the decision-making and marketing power have been taken over by men, and women have had to adapt to new hierarchies and dependence on them. Large-scale mechanized cultivation of quinoa dramatically decreased market prices, with the result that traders no longer informally barter with Quechua women in markets. Male traders that visit the Quechua community prefer to speak with men over women, since men are the landowners and are more likely to speak Spanish. These changes have challenged the women’s traditional practice of managing the commons, and both men and women report the quinoa boom has pushed them to produce twice the amount of quinoa to earn what they did previously.³⁰²



“We [women] used to manage the production of quinoa and kañawa crops, and the small earning helped us to run our households. The collective land was never disputed nor claimed. However, this has changed.”

—Quechua woman, Bolivia

“Men traders when they arrive they prefer to talk to our men. Moreover, I do not speak the Spanish language, and traders don’t understand Quechua.

My husband is the owner of the land; therefore he makes the decisions.”

—Quechua woman, Bolivia³⁰³

Land tenure can promote sustainable land management

Land tenure can motivate farmers to invest in soil conservation practices. Farmers with land rights or land titles are more likely to adopt soil conservation technologies or invest in reforestation.³⁰⁴ In contrast, absence of secure land tenure might discourage farmers from investing in sustainable land management.

- **Ethiopian farmers with property rights invested more in reforestation.** All land in Ethiopia, where land degradation is a major challenge, is owned by the government; farmers only have the right to use and rent out part of the land. Since 1991 land registration and certification reforms have aimed to improve farmers’ access to land. A study in northwest Ethiopia found that farmers’ probability of investing in reforestation increased by 24 percentage points as their sense of tenure security strengthened. The authors suggested considering applying property rights to land for reforestation purposes.³⁰⁵

- **Farmers with secure land tenure invested in longer-term soil conservation measures in Ghana.** Results from a study suggested that most farmers who rented their farmland used short-term soil conservation practices, such as mulching and application of inorganic fertilizers, to boost productivity. These short-term conservation practices can compromise the sustainability of land management in the long term. In contrast, farmers who owned their farmland used both long-term conservation practices and adaptation strategies such as agroforestry. During qualitative interviews, farmers who were renting farmland claimed that the customary tenure system prohibits them from planting trees that could last longer than annual food crops and that such plantation crops offered no immediate returns to non-owner farmers.³⁰⁶



“We [migrant farmers] do not have any incentives to employ long-term land management practices such as planting trees. We are mindful of the fact that the farmland has been rented out to us for just a short period. Thus, we mainly resort to short-term land management practices that may not entail huge financial commitments.”

—Migrant farmer, Ghana, qualitative interview³⁰⁷

More research is needed on the climate change impact of land tenure policy, especially of women and smallholder farmers’ ability to implement adaptation measures.³⁰⁸

2.5.2. Food system risks of land tenure policies

Land tenure policies that enable greater landownership by women may introduce new vulnerabilities

Social norms, rules, and perceptions about men's and women's roles, responsibilities, and capabilities in their households, families, and communities in some cases mean that land tenure can create risks for women.

- **Land controlled by women in Cameroon was at greater risk of being targeted for land deals.** In Cameroon the land where men produce perennial cash crops is considered to have long-term economic potential and tends to be avoided in land deals, even if the farmers have no land certificate. In contrast, the land where women grow annual crops for household consumption is considered "empty." It is easier and less adversarial for the government or land investors to target that land. In a study interviewing local women, more than 70% reported that they were experiencing shortages of land and were forced to cultivate marginal lands less suitable for their crops.³⁰⁹ Overall, the processes of large-scale land acquisitions in Cameroon were reported to neglect women. While investing companies created some off-farm jobs, these jobs were few, temporary, and low-wage. Researchers concluded that to ensure large-scale land acquisitions are equitable, laws should provide for the direct inclusion of women as statutory members in institutions managing land.³¹⁰



"We use land to grow food crops. This company took it to grow palms; other parts have been marked... We no longer have access."

—A female participant³¹¹

- **Women's landownership in Malawi does not reduce inequities.** Matrilineal systems of land tenure are predominant in Malawi, but gendered division of labor and women's traditional roles as primary caretakers have restricted their

participation in agriculture by limiting their mobility, even if they owned the land. With men still making the decisions, Malawi's postcolonial agricultural policies have in many respects strengthened the norm of the male household head.³¹²



"The fact that it is a matrilineal system does not affect the power relations in the family. It is still the man who makes the decisions although he is farming his wife's land."

—Female farmer, Malawi

"My husband makes decisions over farm techniques. He is the one who tells the household what to do because he is the head of the family."

—Wife of a male farm manager, Malawi³¹³

Women's improved access to land may also reflect men's pursuit of off-farm activities that may not be available to women and a shift in how land and agriculture are valued as livelihood resources as they become more dominated by women.³¹⁴ Overall, more research is needed on the risk of land tenure for gender equality,³¹⁵ with the need for more gender-disaggregated data.

Policies that limit access to land for environmental reasons may risk undermining environmental benefits

There is minimal available evidence on this risk. More evidence is needed to assess the mutual benefits and risks of policies that aim to protect land for environmental reasons and those that aim to secure land tenure access to land. One study showed that limiting access to land to conserve land may inadvertently lead to negative environmental consequences.

- **Botswana's 1975 Tribal Grazing Land Policy limited land access for pastoralists and led to overgrazing.** The law, intended to promote conservation of dryland ecosystems, targeted land that was believed to be unused.

Yet traditional herding practices in Botswana involved following seasonal transhumant patterns between the Okavango Delta in the dry season and grasslands in the wet season, giving grazing areas sufficient resting time from the previous grazing cycle. This policy had the effect of limiting

land access for pastoralists, forcing them to change their traditional livestock management approaches. In a study, focus groups and expert interviews stressed that the resulting overgrazing had significantly reduced the area's grass cover density and biodiversity.³¹⁶

BOX 7

SOME RESEARCH GAPS TO HIGHLIGHT

Designing policies to maximize benefits and minimize risks for food system outcomes depends on understanding the potential range of implications of policy choices. In some cases, policymakers must make choices with incomplete information, and more research is needed to clarify the potential impacts of policy choices. The following are some of the research gaps that need to be filled in the five policy areas considered here, in order to make a food systems approach to policymaking as effective as possible:

Cash and food transfer policies

- To better assess the impacts of cash transfers on family dynamics and women's empowerment, research is needed to collect, analyze, and disseminate gender- and age-disaggregated data.
- Additional research would help improve understanding of whether and how unhealthy food environments undermine the food system benefits of cash transfers and how cash and food transfers can be optimized to incentivize nutritious and healthy diets.

Food safety policies

- Research is needed to better determine whether food safety policies risk raising the prices of safe or nutritious foods beyond the reach of low-income consumers or of reducing their access to these foods by discouraging traditional and informal markets.
- There is a major gap in understanding on the overall impacts of food safety policies on women. More research is needed on how policies can be adapted to the requirements of informal market vendors and the poorest producers, especially women.
- In theory, food safety policies could have a range of effects on environmental sustainability, and whether any of the potential pathways play out in practice remains a critical research gap.

Box 7 continued: Some research gaps to highlight

Road policies

- More research is needed on the relationship between dietary diversity in rural households and different measures of roads and transportation, as well as how this relationship interacts with other variables, including food prices and food losses.
- Not enough is known about what kinds of improvements in roads and modes of transportation specifically benefit women and address gender inequalities. Research is also needed on how women's participation in decision-making bodies related to local transport infrastructure could improve gender outcomes.
- Environmental outcomes of road policies are an area where more research is needed. How do road and transport investments that affect the functioning of the food system also influence environmental outcomes, such as greenhouse gas emissions? A major research gap is in how improving transportation infrastructure could bring net environmental benefits.

Agricultural extension policies

- More research is needed on how agricultural extension services can be designed to promote gender equality and on the impacts of gender-responsive extension methods. Further studies should also examine gender-transformative learning outcomes and the food system risks for female farmers when they are excluded from extension services.
- Far more research on risks related to agricultural extension and environmental sustainability are needed. More research is also needed on how agricultural extension focusing on agroecology affects environmental outcomes.

Land tenure policies

- Critical research gaps include the pathways between land tenure and household food security and diets, the impacts of large-scale land investment and enclosures in pastoral communities on income and dietary intake, and the climate change impacts of land tenure policies, especially related to women's and smallholder farmers' ability to implement adaptation measures.
- More research is needed on the risk of land tenure policies for gender equality; this work will require more gender-disaggregated data.
- There is also a knowledge gap on the relationship between land policies designed to protect the environment, use of land by local people, and environmental consequences.

This report borrowed elements of a realist review approach, which aims to synthesize a multimethod, multidisciplinary evidence base with an explanatory rather than judgmental focus. Instead of seeking generalizable lessons or universal truths, such an approach “recognizes and directly addresses the fact that the ‘same’ intervention never gets implemented identically and never has the same impact, because of differences in the context, setting, process, stakeholders, and outcomes.”³¹⁷

The starting point for this review of food systems policy actions was a list of 42 previously identified policies and actions.³¹⁸ The reason for selecting individual policy actions was to describe the complexity of taking a food system approach using existing policies, in order to help identify entry points for taking a food system approach, which can be a daunting task. Various approaches and criteria were used to identify selected actions for this review. Consultations with members of the advisory group revealed their main priorities, interests, or needs for evidence. We also considered the evidence base, which had to address not only diets but also other food system outcomes, and the feasibility of transforming the selected policies. Based on these criteria, the following policies were selected for this review:

1. Cash and food transfer policies
2. Food safety policies
3. Transport policies
4. Agricultural extension policies
5. Land tenure policies

Our review proceeded as follows:

1. Clarifying the scope of the review: This step involved identifying the review question, which was broadly defined as how different food- or nutrition-related policies influence diets, food environments, livelihoods, gender, or environmental sustainability. This question was based on a conceptual framework of food systems developed for this project, which

placed the food supply chain at the center and visualized the linkages with other systems and potential outcomes across the system. The question and related sub-questions were both refined internally and discussed with the project’s advisory group. The advisory group, consisting mostly of policymakers, had a special interest in potential synergies and trade-offs, which we included as part of more detailed research questions.

2. Refining the purpose of review: For this review, we wanted to identify selected policy actions and actions to orient food systems toward healthier diets for all but also actions leading to other food systems outcomes. We reviewed global reports on food systems, which helped identify the existing theory related to the different policies and actions. The following information from these global reports was extracted in Excel: 1) linkages with or unintended consequences for diets or food environments, gender, livelihoods, or environment; 2) references to academic papers as well as grey literature; 3) availability of qualitative evidence; and 4) interventions, tools, projects, and relevant policies to consider for the search strategy. We reviewed the references of these reports that were relevant for the different policies and actions to find potential theories of change about how the different policy actions might influence diets, food environments (food availability, affordability, safety, and appeal), gender, livelihoods, and environmental sustainability. This step contributed to a better understanding of the different linkages within the food systems. For each of the potential linkages, evidence was sought.

3. Articulating key theories to be explored: As part of consultations with the advisory group, we aimed to understand how expert framing related to food systems and their priorities related to specific policies. These consultations helped refine the scope of the review, resulting in a manageable number of policy actions.

4. Searching for relevant evidence, and refining inclusion criteria in the light of emerging data: We sought evidence from a wide range of literature on how existing policies from different sectors could influence diets, food environments, gender, livelihoods, and environmental sustainability.

This evidence included policy analyses, impact assessments, evaluations, qualitative research on people’s lived experience, and practical examples of existing food systems in specific contexts.

The search for these publications was conducted in several stages: (1) scoping searches for different policy actions to get a better understanding of the literature and what kind and amount of evidence might be available; (2) systematic searches on selected policy actions in four different search engines to cover different disciplines and types of evidence (Pubmed, Scopus, CABabstract, PsychInfo) using defined search terms for each policy action, diets, food environments, gender, livelihoods, and environmental sustainability (Table 1, below) to find literature on the identified linkages in our framework; and (3) targeted searches in selected databases, including Google scholar, to seek out additional publications on hypothesized linkages for which limited evidence had been found in step 1 and 2.

The systematic searches resulted in numerous citations (from 730 for road and transport policies to 2,970 for cash and food transfers), which were screened by title and abstract, resulting in 1,337

papers, which were all screened. Since there are many potentially relevant sources of information than any review could feasibly include, we purposively sampled papers. Based on the title and abstract, we categorized them according to the outcome they primarily covered. For instance, for evidence on cash transfers and gender outcomes, numerous papers were identified, which were all screened, but especially when multiple studies addressed the same outcomes, only the most relevant ones were included.

The approach to searching applied for this review was iterative and interactive, and the search terms evolved from the ones listed in Table 1 as the understanding grew. For instance, the literature on cash transfers revealed that agricultural productivity was an important outcome. As part of targeted searches, literature specifically on agricultural productivity was sought. Also, the literature on food safety policies reported on potential linkages between food safety regulations focused on formalization of “informal” food businesses and women’s livelihoods. No concrete evidence was found in the first stages of searching, so a more targeted search on women’s livelihoods as informal vendors and food safety regulations was conducted.

Table 1: Search terms adapted for the specific databases: Pubmed, Scopus, CABabstract, PsychInfo

Concept	Search terms
Exposure: Food system policy domain	
Cash or food transfer policies	“safety net” OR “social protection” OR “cash transfer*” OR “food assistance” OR “food distribution”
Infrastructure or road policies	road* OR transport* Or infrastructure OR “fuel cost”
Land rights policies	“land rights” OR “land access” OR “land tenure” OR “land ownership”
Agriculture extension	“agriculture extension” OR “farmer training” OR “farmer field school” OR “agricultural training”
Combined with:	polic* OR intervention* OR strategy OR strategies OR regulation* (FOR FOOD SAFETY: OR standard*)
Outcomes	
Food environment or diets	“food availability” OR “food affordability” OR “food price” OR “Food promotion” OR “food access” OR “food safety” OR diet
Other outcomes	“gender” OR “women empowerment” or “climate” OR “environment” OR “livelihood*”

5. Extracting different data: All downloaded papers were categorized by the outcome on which they primarily reported (diet, food production, food prices, gender, environment, livelihood). A data extraction sheet was prepared in Microsoft Excel, in which key information was entered (title, author, year of publication, country, type of policy, the outcome of interest, the pathway through which the policy influences the outcome, risks or benefits, and evidence gaps). Data extraction took place in several stages: (1) data from key papers referenced in global reports were extracted, and key findings were broadly synthesized; (2) all downloaded papers were reviewed, and data were extracted into the extraction form; (3) through purposive sampling the most relevant papers were identified for more detailed synthesis in the report; and (4) from publications identified through targeted searches, data were extracted later in the process.

6. Synthesizing data: The synthesis of the evidence followed an iterative approach. As evidence was initially summarized by outcome, individual linkages between policies and outcomes were identified. As we then synthesized the information for each policy-outcome linkage, risks and benefits emerged. Next, evidence was summarized with selected case studies or examples of evidence for each of the risks and benefits.

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