Wageningen Economic Research | Supporting paper 1

Transforming Food Systems

Towards nutritious, inclusive, sustainable and efficient outcomes

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Preface

The UN Food Systems Summit UNFSS and the many dialogues and extensive research preceding it create the momentum to re-define and re-think our food systems. Acknowledging that many trade-offs in current food systems are structural and leading to unacceptable outcomes, and that many global goals as reflected in the SDGs will not be met, implies our food systems need profound transformations. This can only be achieved when we understand how our systems evolve, interact and can be steered towards more desirable outcomes.
During 2019 and 2020 Wageningen University & Research (WUR) coordinated and implemented background research that informed IFAD's 2021 Rural Development Report. In addition to 23 background papers, a modelling paper and a regional consultation report, four supporting papers were prepared. These are published as standalone papers: 'Transforming Food Systems supporting paper 1, 2, 3 and 4.' The papers were written from the perspective of an overall report and refer to concepts, examples and recommendations in the final RDR report.

- Key messages: these are the key findings, possibilities and priorities Wageningen University & Research sees coming out of all the background research, reports and papers.
- Supporting paper 1 provides more extensive explanation of the need for food systems transformation, in particular due to structural undesirable trade-offs between nutrition, livelihoods and environment. It places possible responses in the context of the need to focus on rural transformation broadly, beyond a focus on primary agricultural production.
- Supporting paper 2 provides greater detail on the governance necessary to drive urgent and accountable implementation of food system agendas.
- Supporting paper 3 provides more detail on possible pathways to food systems transformation in different contexts, which consider integrated, desired outcomes of health, inclusion and sustainability.
- Supporting paper 4 provides an overview of how four categories of food systems perform against key system indicators.

The research and papers are the result of a fruitful collaboration between Wageningen and IFAD. The main objective was to generate and share insights, peer-reviewed information and robust evidence on impacts of different strategies to support improvements in the performance of agri-food systems in the dimensions of safe and healthy nutrition, inclusiveness, sustainability/resilience and efficiency. All background work thus contributes to insight into the impact of different types of innovations and investments on multiple food system dimensions and for specific target groups (children, women, young people).

A special thanks goes to Romina Cavatassi and Leslie Lipper from IFAD for their intellectual contribution to and strict but indispensable and professional process guidance during the analytical and writing steps.

We are very grateful to IFAD for the grant that made the background research and these publications possible. We hope this will contribute substantially to healthy food systems that are of greater benefit to all.

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PLEASE CLICK ON THE SECTION OF YOUR CHOICE

1 Envisioning healthy, inclusive and sustainable food systems

This year's Rural Development Report looks at challenges, prospects, and strategic options for transforming food systems to become:

- *Healthy and nutritious* – providing nutritious and affordable diets for good health.
- *Inclusive* – enabling decent livelihoods for those who work in the food system so no-one is left behind.
- *Environmentally sustainable* – consuming and producing food with respect for planetary boundaries.
- *Resilient* – ensuring that people can access food and protect their livelihoods when food systems are hit by weather extremes, natural disasters, pest infestations or market and political instability.

Of special concern here are poor people, particularly in rural areas. What will food system changes mean for the rural poor? What kind of food system transformations can improve their well-being? By answering these questions, we can identify pathways for desirable food system transformations – pathways that will require governance and policy incentives to make the desired change possible.

Two constituencies are at the core of the transforming food systems: about half a billion small-scale farmers, and about two billion food value chain workers who are currently poor. How can their poverty be addressed through food system changes that harnesses opportunities while avoiding or limiting trade-offs and reducing inequalities? What factors will drive food system transformation in less developed countries? Can these drivers interact in ways that will further promote healthy, inclusive and sustainable food systems? What policy instruments can support such transformation processes? Food systems include all elements and activities related to food production, processing, distribution, preparation, consumption and disposal – including market and institutional networks for their governance – and they include the outcomes of these elements for health, livelihoods and the environment. The analytic framework of HLPE (2017) underlies this definition of food systems (Box 1.1).

This framework can clarify the trade-offs within the different drivers and pillars of food systems as well as the structural imbalances, deficiencies and disconnects that prevent the delivery of desired outcomes for nutrition, for inclusive livelihoods and for environmental sustainability and resilience.

This chapter develops four key messages:

1 *Around the world, imbalances and disconnected food markets and governance are forcing undesirable trade-offs in nutrition, livelihood and the environment.* Current trends in poverty, malnutrition and climate change reflect widespread food system failures. To address the trade-offs and make progress in all three requires a clear view of how food systems are organised and how stakeholders interact.

2 Progress in rural and agrarian change offers wide and diverse opportunities for sustainable and inclusive food system transformations. Different types of food systems face different challenges in providing healthy, affordable and sustainable diets – and different problems require tailor-made solutions. The evolution of food systems will not be linear, and multiple trends can appear simultaneously.

3 Strategies for promoting inclusive food systems require combinations of policy incentives, public investments and institutional and business innovations. Given the wide variety of resources, diets, livelihoods, cultures and markets globally, we envision transformation through coordinated policy incentives, targeted investments, and technical, institutional and behavioural innovations that link healthy consumption to sustainable food supplies, with broad participation by relevant stakeholders.

4 To build constituencies for inclusive food system transformations, policy dialogues must draw on solid evidence, on local and regional voices and on farsighted assessments of future options. Tools should include systematic evidence reviews, stakeholder surveys and simulated future scenarios that offer strategic insight

Box 1.1 Food systems defined: adapted from the HLPE food systems framework

Food systems are not just about food. The High Level Panel of Experts (HLPE) on Food Security and Nutrition has a framework that distinguishes linkages and feedbacks among three key food system areas:

- Drivers – external factors, including population growth and urbanisation, technological development, climate change and economic growth.
- Components – elements directly involving food, whether in food value chains (production, processing and distribution), in diets (preparation and consumption) or in the food environment (markets and institutions).
- Outcomes – healthy diets, livelihood well-being including equity or inclusiveness, and sustainability as well as resilience to climate change.

Playing a central and critical role in the food system framework is the food environment. It includes all the infrastructure, public and private institutional regimes and governance frameworks that guide food availability, access, quality, safety, sustainability, reliability and affordability (Caspi et al., 2012; Herforth and Ahmed, 2015; Turner et al., 2018).

Source: Adapted from HLPE (2017).

into feasible and effective transformation policies and strategies.

Structural production-demand imbalances and disconnected markets and governance

This chapter starts by analysing the causes and effects of critical trade-offs in today's food systems among nutrition, inclusive livelihoods and the environment.

Safe and nutritious diets are inaccessible and unaffordable due to structural constraints

Nutritious food is not always available and generally very expensive. Poor people can seldom afford it. Their diets therefore remain heavy in staple foods, with little diversity. Low purchasing power keeps poor people away from safe and healthy diets. Low farm incomes, limited and irregular rural employment opportunities and low wages keep household incomes low.

A large proportion of households cannot afford nutrient-adequate diets (GLOPAN, 2020). The EAT–*Lancet* reference diet exceeded household per capita income for at least 1.58 billion people. This diet costs about $2.84 per day (IQR 2.41–3.16) in 2011, with the largest share for fruits and vegetables (32 per cent), followed by legumes and nuts (19 per cent), meat, eggs and fish (15 per cent) and dairy (13 per cent). This diet takes a large share of average incomes and is 1.6 times more expensive than the minimum costs for nutrient adequacy (Hirvonen et al., 2020).

Healthy diets are now out of reach for at least three billion people, most of them in Asia (1.9 billion) and Africa (965 million) (Herforth et al., 2019). The Covid-19 crisis has substantially increased this number. High relative food prices largely explain the prevalence of undernutrition and overweight (Heady and Alderman, 2019). The onset of the Covid-19 pandemic led to a devastating loss of jobs and income across the Global South, threatening hundreds of millions of people with hunger and lost savings and raising an array of risks for children. Telephone interviews in nine countries in Africa, Asia and Latin America report income losses for up to 80 per cent of respondents. Roughly 50 per cent were forced to eat smaller meals or skip meals altogether, as for 87 per cent of rural households in Sierra Leone (Egger et al., 2021).

Inequalities in accessing opportunities and benefits of food systems

The prevalence of stunting, wasting and overweight in children is particularly skewed towards rural areas – while wide inequalities also appear between girls and boys, between poor and non-poor and by education (Figure 1.1). The largest absolute inequalities appear in stunting. Stunting and wasting are higher in rural areas, whereas overweight is higher in urban areas – though the gap is shrinking. Stunting, wasting and overweight are all related to differences in wealth and education that create poverty gaps and reinforce existing vulnerabilities (Global Nutrition Report, 2020). And because poor people obtain a larger share of their food at informal markets and tend to buy cheaper convenience foods, they are more vulnerable to food safety and overweight challenges.

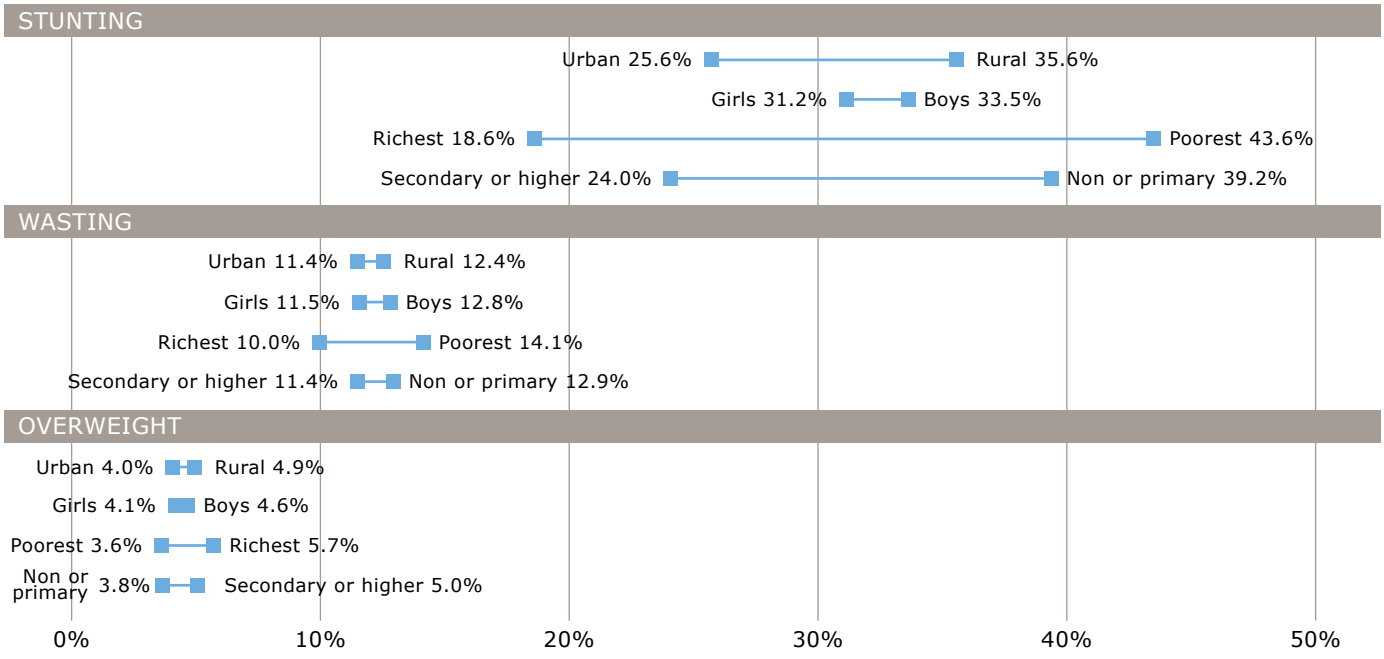

Figure 1.1 Inequalities in stunting, wasting and overweight in children under 5.

Note: Population-weighted measures means for 98 countries

Source: GNR (2020), based on data from the UNICEF/WHO/World Bank Joint Child Malnutrition Estimates Expanded Database.

Women are active participants in food systems – but on highly inequitable terms

Gender and inequality are strongly related. Women are actively involved in food systems in a range of roles from production and processing to retailing and consumption. Women grow and manage crops, tend livestock, work in agribusinesses and food retailing, prepare food for their families and much more (Malapit et al., 2020). Even so, women's contributions to food systems seldom are formally recognised, and women face constraints that prevent them from engaging on terms that are equitable and fair

Women's empowerment has been positively associated with better maternal nutrition (in both diets and outcomes, such as anaemia), as well as with child anthropometric indicators, child diets and infant feeding practices. The strength and magnitude of this association varies across countries, and nutritional status is more closely related to empowerment in some domains than in others. Regionally, patterns vary between South Asia and Africa – South Asia shows greater positive associations between women's empowerment and nutrition outcomes, possibly because overall levels of women's empowerment are much lower in South Asia than in Africa (Quisimbing et al., 2020).

Indigenous people manage much of the worlds' land resources – but face severe constraints in realising decent livelihoods

Of the global population of 476 million indigenous people, nearly three-quarters live in rural areas, primarily engaged in agriculture-related activities. Their livelihoods are linked to their natural resource endowments and landscape. Indigenous people, especially women and children, are affected disproportionately by malnutrition and diet□related health problems. The main reasons are structural inequalities – typically including a lack of access to land and other resources – and threats to their food systems and nutrition that undermine individual and communal resilience, including environmental degradation and the loss of biodiversity (Lemke and Delormier, 2018).

Globally, in rural areas, indigenous people are more than twice as likely than others to be in extreme poverty (ILO, 2020). While making up around 6 per cent of the global population, indigenous people manage or have tenure rights over a quarter of the world's land surface and about 40 per cent of all terrestrial protected areas and ecologically intact landscapes (Garnett et al., 2018). More than 20 per cent of carbon stored in tropical forests lies within indigenous territories (Environmental Defense Fund & Woods Hole Research Center, 2015). Given indigenous people's poverty and the close link between natural resources and their livelihoods, food systems are critical to their well-being – and their well-being is critical for the sustainable management of a large share of the world's natural resources.

Structural deficiencies limit the availability of high quality food and the diversity of food types

Improving food quality and safety remain underappreciated, as agricultural development has long focused mostly on increasing food production and availability. Diversity also requires attention: different food groups make different contributions to employment, income and nutrition, so food system transformation initiatives should seek to diversify food production. Investments in fruits and vegetables, animal-based products (Chapter 8) and food processing (Chapter 6) provide off-farm work and reduce the costs of more diverse diets. Moreover, interest is growing in local varieties and indigenous foods.

Structural imbalances lead to substantial environmental externalities

Efforts to strengthen sustainable production systems also remain insufficient. Agriculture and food systems generate 37 per cent of global greenhouse gas (GHG) emissions. Production of specific foods, such as animal products, vegetable oils, rice and sugar, contributes most to GHG emissions, and the environmental footprint may almost double between 2010 and 2050 (GLOPAN, 2020). Without substantial changes in agricultural production systems and food consumption, the environmental externalities will surpass their boundaries.

Food systems are also a major source of deforestation, water pollution, soil erosion and biodiversity loss. The challenge is to see how improving the livelihoods of the rural poor and strengthening farm and non-farm employment can drive the process of transforming food systems to reach better environmental and livelihood outcomes.

Missing links between food supply and demand constrain small-scale producers

Links between food production and consumption suffer from three major constraints that severely impede food system transformation: unequal food market competition, heavy dependency on food imports and high rates of food loss and waste in value chains for staples and perishable crops (Chapter 7). Behind these constraints lie the largely informal market environment and the unbalanced playing field between local small and medium enterprises and larger national and international companies.

Food market integration for more inclusive and sustainable (circular) food systems can be supported through changes in practices, technologies and innovations that increase transparency and trust and strengthen the exchange of information. In addition to public regulation, producers

and farmer organisations play a key role for improving the quality, integrity and sustainability of food systems (Chapters 4 and 5).

Diversification is a major strategy in transforming food systems. Diversifying diets can improve nutrition and health, if a diversified food supply comes with increased affordability and accessibility for nutrient-dense and diverse foods. Diversifying food production can improve the composition of the food supply while supporting biodiversity and the landscape management of natural resources (Bonmarco et al., 2013). Enhancing the diversity of biological communities can also regenerate biotic interactions, increase resource use efficiency and enhance the stability of ecosystems over time (Tamburini et al., 2020). And diversified livelihoods can increase resilience.

Disconnects in food system governance reflect the lack of key voices

Today's agricultural policies are disconnected from food system challenges. Policy incentives are heavily biased towards staples and export crops, neglecting nutrient-dense food groups. To improve access to affordable food and to support healthier food choices by poor people, the food environment needs a substantial transformation. Food governance should be organised to provide equal opportunities for participation based on clear rules and competitive markets (Leeuwis et al., 2020).

Integrated, interactive strategies can focus on key leverage points to overcome food system failures

Bringing desirable food system innovations and practices to scale will become more feasible with broad participation by public, private and civic parties, and with open spaces for interaction, experimentation and cooperation. Critical stakeholders – such as women, youth, and ethnic minorities – must be fully included in food system decision-making processes at all levels. Connecting agents to food systems implies that key attention is given to governance regimes guiding different transformation pathways (chapter 9).

Policies for more inclusive and nutrient-sensitive investment will enhance food quality and food system sustainability. Both market incentives (taxes and subsidies) and regulation (grades and standards) can therefore be used. In addition, anchoring food system change requires attention to social norms and differences in preferences, priorities and power. Nudging and bargaining are essential components of bottom-up strategies for food system transformation.

Rural and agrarian change shape the potential for inclusive transformation pathways

Opportunities for food system transformation largely depend on two processes. One is rural transformation, or exploiting the potential agricultural productivity (by reducing yield gaps and improving labour productivity). The other is structural transformation, comprising shifts in labour use from agriculture to non-farm employment in trade, processing and service sectors.

Both transformations imply effects on farm size, on land use patterns and cropping systems and on input, output and labour markets – with each also affording diverse opportunities and potential pathways to inclusive food system transformations. The levels of rural and structural transformation also determine, in a region or country, the trade-offs that appear among desirable food system outcomes for nutrition, livelihoods and the environment. In addition, various types of food systems face specific challenges for guaranteeing healthy, sustainable and affordable diets.

The varied rhythms of changes in rural and structural development point to different pathways for food system transformations

Food system transformations follow various pathways anchored in specific constellations of food supply and demand, food value chains and markets and food system governance. Depending on the rhythm of rural and structural transformation, different types of food systems are likely to emerge that are characterised by their production, demand, availability and accessibility, by their food policy and business environment, and by their implications for nutrition, health, livelihoods and social inclusion. To identify structural and institutional differences and to outline spaces for food policy and governance, the High Level Panel of Experts on Food Security and Nutrition looks at interactions between food markets and the food environment (HLPE, 2017). An elaboration of this framework by Reardon et al. (2019) focuses on the transformation of food value chains and distinguishes three food systems:

- *Traditional*. Food production mainly by smallholder farmers and most of the food trade takes place through spot markets, informal trade and short value chains, with high competition between small-scale farms and little quality differentiation.
- *Mixed/transitional*. Growing farm differentiation, better infrastructure and greater diversity of foods that are traded through. longer food value chains serving a growing urban population, with more attention to food safety and public quality standards.
- *Modern*. Global food production by more industrialised farms, more processed foods and cold chains, and food sales through modern retail chains. Food produced farther away from cities, with rising concentration in

upstream and downstream segments of the value chain, and more differentiated and processed products.

The overview to the RDR includes a classification of countries by income group and predominant food system type. This analysis looks at the implications for opportunities and constraints for improving rural livelihoods and welfare across five country categories, including fragile states and areas of conflict. There is a high degree of correlation between food system type and country income level, although there is also diversity of food system types within countries.

Developing countries present various food supply dynamics

Livelihood strategies in rural areas present important variations, depending partly on natural resource distribution and access (land, water, energy), and partly on the opportunities and conditions for rural households to participate in various markets (input, product, labour, credit and knowledge). A rural household's opportunities to divide livelihood strategies between farm and off-farm activities thus reflects its combined resource and market potential, which shapes its rural opportunity space. That space largely determines progress in factor productivity and agricultural value added – and this progress is what make food supplies more efficient and food more available and affordable.

Pathways for reducing rural poverty can be distinguished by improvements in resource productivity within agriculture, by diversification of employment outside agriculture, or by both at once (IFAD, 2019). Opportunities depend largely on the natural resource potential and the market opportunities for enhancing the returns to resources. Differences in the rhythm of population growth, urbanisation and infrastructure represent important drivers for differences in nutrition and health.

When smallholders and medium-size producers increase their engagement in commercial food supply and their land and labour productivity, or total factor productivity, two pathways towards inclusive agrarian transformation can emerge. One is through sustainable agricultural intensification and activity diversification. The other is through in-depth investment in better infrastructure, knowledge and technologies (which improve food supply and reduce food prices). Higher resource productivity increases wages for rural labourers, enabling broad-based rural poverty reduction and increasing access to more nutritious diets.

Developing countries face varying challenges in meeting food demand

Developing countries differ in their economic structure and their degree of structural transformation. Some remain heavily dependent on agricultural production. Others are becoming more urban, with a rising share of non-agricultural activities in GDP: in these countries, an increasing number of people are becoming net buyers of food and seeking access to reliable, safe food sources at reasonable prices and guaranteed quality.

Economic growth is usually accompanied by increasing rural non-farm and off-farm employment opportunities that absorb rural and peri-urban surplus labour. Investments in midstream small and medium enterprises for local processing and retail are important new sources of employment, support value added creation and create opportunities for circular resource use. Linking farmers and consumers to stable, reliable and transparent informal and formal markets contributes to food quality, efficiency and safety and thus reinforces nutrition, inclusion and sustainability. Improved diets in turn generate substantial welfare and health benefits and can become an additional source of pro-poor growth.

The Food Systems Index – a framework for assessing food system outcomes

To further enrich this analysis of the forces that shape food systems, the Food Systems Index (FSI) is a multi-dimensional indicator to assess how rural and agrarian change translate into differences in food system performance and outcomes. The index is built using a selection of already existing indicators of food demand and supply, food policy and business environment, and the ecological boundaries of food systems. It captures key components of food system transformation processes at country level, focussing on the links between types of food systems and processes of agrarian and rural transformation (Van Berkum and Ruben, 2020). When analysed with country structural and rural transformation, significant insights emerge. In particular, using the countries data sources from the 2019 IFAD RDR, where 85 low- and medium-income countries (LMIC) were characterised by indicators of structural transformation, country FSI rankings are related – but not equivalent – to their structural and rural transformation. Plotting countries by degree of structural and rural transformation, while colour-coding them by FSI status, reveals a strong correlation of food system change with progress in structural agrarian transformation – even while notable variation in FSI status over different rural transformation levels persists (Figure 1.2).

All countries ranked high on the FSI are also highly transformed structurally – more than 80 per cent of their

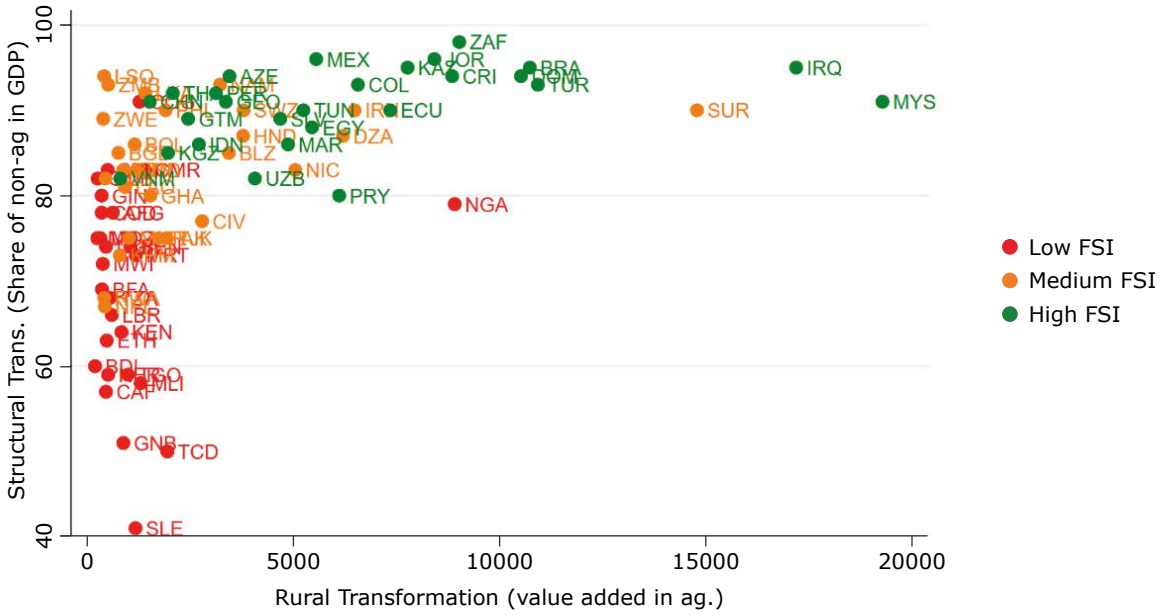

Figure 1.2 Food systems at different stages of rural and structural transformation

Source: Arslan et al. (2020).

GDP comes from non-agricultural sectors. At the same time, around 45 per cent of highly structurally transformed countries (21 of 47) have a medium or low FSI, indicating that structural transformation is a necessary but not a sufficient condition to foster a highly performing food system. And 21 low FSI countries report low rural transformation (value added per worker below the sample median of $1,592) and low structural transformation. Rural transformation alone – without structural transformation – is thus not sufficient to achieve higher food system performance.

Effective strategies rely on policy incentives, public investments and business innovations

Because different countries face different policy challenges for guaranteeing healthy, affordable, safe and sustainable diets, they also present various specific food system transformation opportunities. In addition, several pathways may co-exist within a country, and their evolution is not linear. No single approach to food system transformation will work everywhere. Portfolios of policies, technologies and incentives must be tailored to address each food system's enabling and constraining factors.

Whereas much energy has been devoted to classifying food systems, far less is known about the pathways for their evolution or transformation. Generating more structurally anchored, irreversible food system transformation processes will require prior insight into the range of incentives that can engage public, private and civic stakeholders.

Overcoming critical trade-offs in food system outcomes will require a comprehensive policy strategy and a coordinated intervention portfolio

Food system transformations confront trade-offs – for example, between poverty and nutrition, between food production and consumption within environmental boundaries, and between opportunities for economic growth and inclusive rural employment. The triple challenge of nutrition, environment and inclusive livelihoods can be addressed only through multiple coordinated interventions and only with wide space allowed for experimentation. Overcoming food system trade-offs also requires a smart package of technological innovations, institutional reforms and behavioural change incentives for harmonising the components of food systems.

Particular attention must be paid to the lowest income countries, to post-conflict and fragile areas and to the poorest communities in less-favoured areas. These are the places most vulnerable to food system failures, and they need differentiated and targeted support to overcome structural constraints. In particular, the adaptive capacity of these areas to respond to external shocks needs to be reinforced – and they need broad-based initiatives to support social safety nets that can address Covid-19 setbacks.

Strategies need to recognise diversity in resources, livelihoods and food groups

Poor people cannot put all their eggs in one basket. They thus diversify risks and diets by engaging in different livelihood activities, linking to diverse market outlets and becoming part of multiple networks. While specialising in

a limited number of activities can create economies of scale and scope for a minority of producers, the livelihoods of the majority of resource-poor smallholders remain dependent on multiple activities and practices.

Understanding how this diversity can be mobilised for different types of households, at different stages of the food system transformation, is a vital part of inclusive transformation strategies.

Strategies should guarantee a broad constituency and wide policy participation

Food systems are not the exclusive domain of ministries of agriculture or rural development, but also include ministries of health, environment, trade, finance and others. A broad constituency needs to be created around a jointly shaped agenda, with key food system transformation objectives and a well-defined governance framework for discussions on priorities and opening spaces for innovations.

A common food policy transformation agenda that includes strategies for co-innovation, for inclusive trade and for sustainable finance needs support from a broad coalition of stakeholders, plus incentives and investments to promote collaboration. This agenda needs to address dilemmas between the interests of food producers and consumers, and between rural and urban constituencies. Due attention needs to be given to women's empowerment, to opportunities for rural youth and to the rights of indigenous people.

Policies to change food system performance rely mainly on market incentives, public investment and business innovations

Concerted efforts for dovetailing changes in rural and agrarian systems to food system transformation need to rely on newly enabling institutional settings and on a tailor-made portfolio of innovations, incentives and investments. Food policies should aim to influence both production and market conditions, and to induce behavioural changes in the attitudes and interests of producers and consumers.

A machine learning scan of the IFAD investment portfolio shows how the broader food system perspective is already being programmed into IFAD's lending activities. The analysis shows the growing importance of interventions aimed at consumer behaviour, the food environment, food supply chains and individual factors (wealth, cognition, aspirations) in IFAD projects and policies (Figure 1.3) (Garbero et al., 2020). Further integration of these interventions is important for anchoring food system transformation strategies.

Detailed analysis of 1,769 documents for 849 IFAD projects confirms these factors' predictive value for various food system outcomes. Overall, factors that lead to the greatest changes involve improvements in food safety, in the reach of social impact and in sustainable food production.

Most effective food policies combine a portfolio mix of positive and negative incentives and a sequence of public

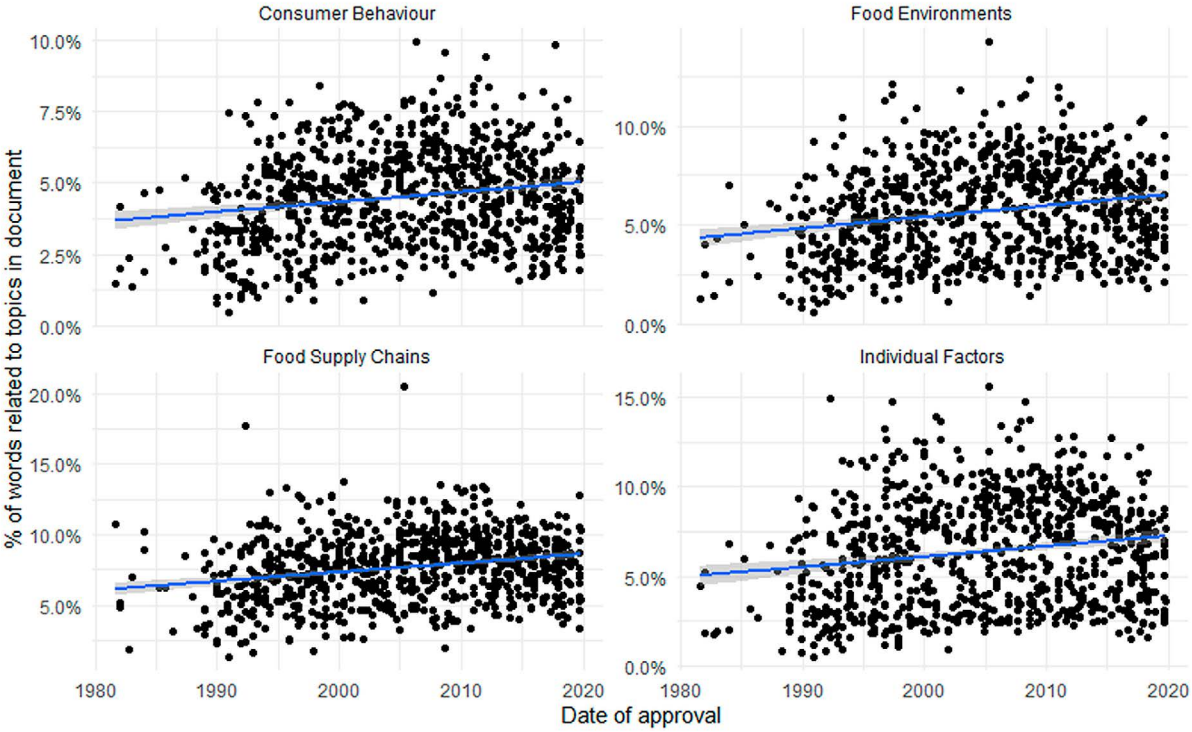

Figure 1.3 Food system components in IFAD documents (1981–2019)

Source: Garbero et al. (2020).

and private investments: some of the investments increase opportunities and create synergies for desirable food system transformation, others reduce resistance and constraints. Push incentives ('enforcers') use legislation, taxation (to reflect true costs) and investments in internal and external infrastructure to modify food supply conditions and the cost structure of food systems. Pull incentives ('enablers') rely on providing market information, on shifting social norms and habits (nudging) and on introducing standards (certification and labelling) to shape the demand for heathier and more sustainable diets.

Complementing policy analysis with solid evidence, expert knowledge and system modelling

Creating constituencies for inclusive food system transformation requires policy dialogues that draw on solid evidence, on local and regional voices and on farsighted assessments of future options. For this reason, the various inclusive transformation pathways referred to in Supporting Paper 3 and referred to in the RDR, reflect a range of opportunities available to policy makers, producer and consumer organisations, investors and civil society actors for overcoming critical trade-offs among nutrition, livelihoods and environmental goals.

Creating inclusive food systems also requires transparent and participatory governance regimes that support coordinated decision-making on the objectives and instruments that enable food system transformation processes. Insights from field experiences combining backcasting (actions to attain certain goals) with foresight analysis (future scenarios based on current trends) are particularly helpful. Such combined insights can acknowledge the potential for innovations in different parts of food systems and convene wider constituencies around a common transformation agenda.

Providing empirical evidence for inclusive food system transformation strategies

The background research, as analysed for and synthesised in, the RDR outlines the evidence base for food system transformation strategies: evidence derived from field surveys, systematic reviews and comparative case studies in different settings. To support our analysis and reporting we account for experiences from IFAD investment programs and evidence from empirical studies to assess the importance and potential impact of various kinds of interventions and investments on food system transformation processes.

Individual RDR chapters look more deeply into regional differences in food systems, signalling diverse perspectives on challenges, identifying specific trade-offs and registering alternative views on policy priorities. They also make use of an extensive survey conducted among 621 stakeholders from 32 countries to assess the importance of various food system deficiencies and the potential of specific interventions for particular local interest groups. Stakeholders from different backgrounds have participated in expert seminars to exchange views on strategic policy priorities for desirable food system transformation. Analysis of the different inputs confirms differences across countries and regions in their most pressing food system problems and potential transformation strategies. For example, in sub-Saharan Africa attention is focused mostly on sustainable supply and stable access to basic food, but in Southeast Asia issues of safety and reliability of perishable foods receive more attention – whereas in Latin America concerns are rising about fat and sugar content in processed foods, specifically ultra-processed foods (WUR-IFAD, RDR2021 stakeholder survey).

Assessing the potential impact of policy changes using stylised food system modelling

As input for the RDR a scenario exercise was carried out to explore the interactions between different dimensions of food system outcomes in response to a major change in policy; this was published in conjunction with the RDR. Using the MAGNET modelling framework, it generates scenarios of the impact of major policy shifts on four key food system dimensions: nutrition, inclusiveness, efficiency and sustainability, defined by 28 indicators that broadly measure progress in SDG performance (see the features at the end of Chapter 1). Changes in these 28 indicators due to targeted policy incentives are reported in a consistent manner in each chapter to enable comparisons across simulated interventions, and to keep overall food system impacts in view when diving more deeply into parts of the food system.

Identifying the next steps towards integrated policy action

Fundamental governance changes are necessary to shift from the current triangle of food system trade-offs towards a circle of synergies harmonising food production with dietary needs and organising food systems around people's livelihood and the environment. Supporting Paper 2 on governance suggests further steps towards an integrated policy action framework for anchoring inclusive and equitable transformation strategies. Equitable food system transformations rely on a portfolio of incentives, investments and innovations that simultaneously reinforce healthier diets and sustainable livelihoods for the rural poor.

Looking at food systems as complex multi-dimensional spaces with limited possibilities for central steering and control, the next chapters analyse the challenges and opportunities across the food system components and their drivers. They draw insights about policy strategies

and principles that can influence inclusive food system transformations, address trade-offs and synergies, and identify governance processes that support structural innovation and behavioural change.

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