COVID-19 and food systems, pathways to resilience
Preliminary findings and recommendations from six studies

DRAFT Brief
Background to the final webinar of 17 December 2021
CGIAR COVID-19 Hub
Working group 4
ADDRESSING FOOD SYSTEMS' FRAGILITIES AND BUILDING BACK BETTER

Set up in April 2020 at the onset of the pandemic, the **CGIAR COVID-19 Hub** provides a coordinated research response to the global pandemic, health and food systems worldwide, to local businesses and national economies;

The covid hub associates researchers from the CGIAR, partners and stakeholders in countries under four different working groups:

1. Address value chain fractures

2. Integrate a One Health approach to COVID-19 responses

3. Support country COVID-19 responses

4. Address food systems' fragility and build back better

Working Group 4, has worked to identify the impacts of COVID-19 on food systems' fragility and to investigate priority options and solutions to improve resilience and build back better, with a particular emphasis on vulnerable groups and countries. It adopted a forward-looking lens, identifying the points of vulnerability but also the points of resilience of food systems, both in the immediate but also in the medium and long term response, looking at impacts on health, nutrition, livelihoods, and at links with the social and environmental systems.

In March 2021, it released the first world-level assessment on the impacts of COVID-19 on food security, led by **Chris Bene** (Alliance of Bioversity International and CIAT). The food system, globally did not collapse, but COVID-19 was a major, large scale stressor to food systems worldwide, while also putting a spotlight on how some forms of organization of food systems, of urban and rural relations, can provide resilience in times of crisis. The crisis did also force to revisit, with new lenses, important questions for the future of food, health and environment systems.

Going forward, how to "build forward better"? To look at this, building on its initial work, WG4 undertook in 2021 a series of 6 innovative studies, to harness knowledge for designing better emergency responses, recovery, and to build resilience.

The studies investigate the main six following questions.

① What role for **governance, decision-making and crisis management mechanisms** in explaining food systems outcomes during the pandemic? How were managed the effects of the crisis on food systems? Were there specific mechanisms, how was it part of the overall management of the crisis? Were current governance arrangements used? Did novel governance arrangements (new working groups, intra-departmental crisis teams, etc.) in the food systems domain emerge during the COVID-19 crisis and were these effective or responsive in dealing with the crisis? To which degree can the emergence of novel governance arrangements be viewed as a function of specific institutional characteristics at country-level? Did current or novel governance arrangements predate the emergence of novel of innovative (and more effective) policy instruments in the food systems domain, or not? Which key recommendations emerge for preparing countries to better manage large-scale (societal) disruptions and their impacts on food systems?

② Why isn't **disease surveillance** working in low and medium income countries? Surveillance systems do exist, but they are partial, often paper-based, not risk-targeted and most importantly not integrated across sectors. One Health is a relatively new paradigm that predicated that the health of humans, animals and the environment are closely linked and interdependent. But can we better understand the existing distribution and emergence of diseases that arise in food systems in order to reduce the cost of their control? How to improve existing surveillance systems across the human health, animal health and environment domains, taking into account incentives and disincentives for disease reporting at every level?

③ Several aspects **of the food environment** have been affected by the COVID-19 crisis – food accessibility, proximity, convenience, stability, etc. What interventions, changes in behaviour or strategies adopted in response to the shocks have contributed to reduce the negative impacts of the pandemic on those actors and processes? How can we improve the food environment to make our food systems more resilient to shocks and crises?

④ Production diversification is often found to increase farm resilience and diversification of risk management strategies positively contributes to resilience. Diversification can reduce risks of disruption in supply chains (processors, retailers, sellers, etc.). But some forms of diversification can also be maladaptive and may reduce resilience capacity. **Does diversification of production and consumption markets contribute to more resilient food systems**? Which shocks and stressors can be better absorbed in case of higher diversity? What are the drivers and conditions of enhanced food system diversity?

⑤ In the COVID-19 crisis, urban poor were considered most food insecure, due to a combination of income loss and reduced physical access to stores. But we have still a limited understanding of the channels and "the hidden middle" through which food moves from rural producers to urban consumers. What are the mechanisms through which **improved urban-rural linkages** may enhance food system resilience, and what are relevant policy responses? Does strengthening interconnectivity between urban and rural areas as well as mobility of human capital bring positive effects on food system employment and the capacity to respond to shocks and stressors of wage labourers? Can stronger urban-rural linkages be associated with higher levels of labour mobility in terms of workers returning (temporarily) to rural areas to secure their livelihoods in times of negative impacts of shocks, and is it a good thing to improve overall resilience?

(6) The COVID19 pandemic showed that we need to be prepared for the unexpected, when it comes to the future of our food systems, and the shocks they may suffer. What can we learn from the COVID-crisis in terms of **foresight of agri-food systems?** Do we need to alter some of our big hypothesis regarding the future of food, key drivers and consequences? What kinds of shocks to agri-food systems are likely to create more harm? What are lessons to best help countries deal about it?

This document presents the provisional findings, that are presented for discussion at a webinar on 17 December 2021.

CGIAR COVID-Hub WG4

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1

The role of crisis governance in mitigating food system risks: lessons from the COVID-19 pandemic in five low- and middle-income countries.

Authors: Daniel Polman, Marjolein Selten, Nina Motovska, Ezra Berkhout, Ron Bergevoet, Jeroen Candel

1) Problem statement and objectives

Initial COVID-19 crisis responses by governments typically aimed at limiting health risks (infections, hospitalizations, deaths). Consequently, the majority of studies on government responses have focused mitigating these primary health risks. However, it is now well documented how measures such as mobility restrictions and closing off economic sectors also had impacts on the functioning of food systems, by compromising food access and availability and exposing or amplifying existing food system inequalities. These secondary risks on food supply and security have received considerably less attention in literature on crisis responses.

The focus of this study is to improve the understanding of how food system risks were governed in emergency responses during the COVID-19 outbreak, in particular by looking at governance and institutional characteristics. The aim is to distil key lessons that help countries to enhance crisis preparedness as well as food system resilience. To do so, this study relies on in-depth case studies from five low- and middle-income countries (Bangladesh, Ethiopia, Mexico, Nigeria, Vietnam) capturing diverse levels of development, food system organisation and styles of governance.

We identify five sequential stages of crisis governance: *pre-assessment*, *risk appraisal*, *characterization and evaluation*, *risk management, and feedback.* Subsequently, we explore how the organizational/institutional response structure and the actors involved in these stages have affected the governance of food system risks, and its capacity to deal with food risks during a pandemic. The study is based on a review of primary and secondary literature and interviews with key informants (on average 4-5 per country) representing a diverse group of stakeholders (government employees, academia, representatives from UN bodies and donors, as well as farmer organisations and NGOs).

2) Preliminary findings

Before and during the COVID-19 pandemic **food systems risks** were notable across all five countries. Food and nutrition insecurity are common for all economically and socially marginalized groups, especially so in Ethiopia and Nigeria. These risks were amplified during the pandemic due to income losses. Mobility restrictions and market closures led to initial, mostly local, food shortages in Nigeria, Bangladesh, and Vietnam, but were often quickly addressed. Other ongoing crises, like the civil war in Ethiopia, further deteriorated the food security of these marginalized groups.

With respect to **pre-assessment of risks,** most countries had crisis management plans in place and even dedicated government departments, but these focused strongly on containing infectious disease outbreaks and not on adjacent food systems risks. Moreover, agriculture and food ministries and stakeholders were not actively involved in these plans. In parallel, all these countries had schemes in place (notably cash transfer schemes) to support vulnerable groups, although limited in scope. Existing mechanisms to monitor food security (like famine early warning systems) exist in some countries (e.g. Ethiopia), but these were not explicitly designed for, or linked to, pandemic crisis management plans.

Considering the intertwined phases of **appraisal** and **characterization and evaluation** of risks, measures to contain health risks were often assessed against the impact on national economies, but rarely on food systems. For most countries, reducing circulation of the virus was prioritized. Food system stakeholders were not regularly involved in the first rounds of sense-making after the outbreak. However, in some countries there was a higher urgency about mitigating potential economic concerns.

Management and implementation of crisis responses started mostly centralised, top-down and often at the highest level at the office of the (vice-)president. This is a textbook approach, but countries differ in the degree to which other stakeholders were consulted and engaged. Ethiopia, Nigeria, and to a degree Bangladesh, actively engaged with the international donor community in formulating responses. Moreover, these countries also relied on the active engagement of civil society organisations, NGOs and private initiatives. In some cases the impacts on food systems were mitigated due to the ability to deploy existing mechanisms such as cash transfers, coupled with the active engagement of these stakeholders. Yet, the extent to which vulnerable groups were successfully reached requires additional investigation. Conversely, Mexico and Vietnam implemented policies much more in isolation of other stakeholders, donors and international organizations.

Regarding **feedback** on food system risks during the crisis, monitoring on the impact of COVID related measures by governments was limited. However, in close cooperation with key international partners (World Bank, FAO, CGIAR) there has been a notable increase in monitoring of food security status in several countries, including Mexico, Bangladesh and Ethiopia. In Bangladesh and Nigeria, the impact of mobility restrictions on food systems was initially overlooked and important feedback on food insecurity in vulnerable groups was provided by non-governmental actors (CSOs, NGOs, and international organizations). This led to ad-hoc coalitions for food aid involving local and non-governmental actors.

3) Key recommendations for stakeholders

Looking specifically at the institutional organisation and actor networks involved we come to three recommendations to increase the capacities of governments to improve their governance of food system risks in preparation for future crises.

First, in order for timely responses to food system risks, a check on food systems is required when considering new crisis measures. This requires additional **coordination capacity** of governments by bringing together relevant stakeholders and actors, both from local governments or outside of government echelons, such as international organizations and NGOs. It is recommended to look into integrative leadership styles, which can bring together these diverse groups and interests, while maintaining swiftness in response.

Second, there is a trade-off between the depth of decentralized input (i.e. potential impacts on food systems) and the speed at which information is required. This highlights the need to improve **analytical capacity** to be better able to quickly assess impact of interventions on food systems. Again, this may be done by systematic involvement of local and non-governmental actors..

Third, **operational capacity** for implementing emergency policies can be strengthened. Cash transfer instruments have been used ubiquitously, but may overlook some vulnerable target groups. In some countries efforts were made to increase digital registries and communication tools, allowing for speedier targeting of groups in future crises. In other responses, involving local governments and NGOs helped with reaching vulnerable groups with food aid, again highlighting the need for integrative approaches to crisis governance.

4) Key knowledge gaps and recommendations for research

This study explored how organizational/institutional response structure and the actors involved in these stages have affected the governance of food risks during the COVID-19 pandemic. It is highly recommended to do in-depth investigations of national responses, by including observational studies of vulnerable and food insecure societal groups, and their perceptions and actions related to food system risks. Moreover, our focus lies predominantly on top-down measures, while a large share of mitigating food insecurity takes place outside government channels. Future research should look into more informal resilience during crises. Finally, we have seen many ad-hoc responses, however, future research should also look into more systematic approaches to use the current pandemic to make food systems more resilient, particularly for vulnerable groups.

2 **One Health: The Role of Surveillance and Incentives in detecting emerging diseases**

Authors: Winnan Lucia, Lara Mbithi, Alma Dogra, Delia Grace

1) Problem Statement

Zoonotic spillover events arise in food systems including farmed livestock, as well as wildlife. The origin of new pathogens in humans is often wildlife, jumping species either directly or using livestock as a bridge. As the COVID-19 pandemic continues to unfold, interest has grown in detecting these emerging pathogens. However, the track record and capacity for detecting potential and actual zoonotic spillovers is very poor. There are two key problems: current surveillance systems are under-resourced and under-improving and incentives for reporting are absent or perverse. The crucial questions being raised include how well are we equipped to detect emerging zoonotic diseases and what should be done to improve our capacity.

2) Key Findings

A house that is built on sand cannot stand. While multiple disease surveillance platforms exist, with increasingly sophisticated websites and interfaces, once we dig beneath the surface we find that all official animal disease reporting comes from government surveillance systems. In low- and middle-income countries, where disease emergence risk is increasing these systems vary from weak to completely unreliable; moreover they are not purposefully designed to detect an entirely novel disease. Reporting of diseases is heavily dependent on official veterinary reports backed by laboratory confirmation, which omits a pathway for reporting something entirely new. Alternative surveillance systems, such as "Health Map" which scrapes the web for media reports on novel disease lack triangulation and integration with official sources. Research-based approaches such as 'virus hunting' and 'hot-spot' mapping have not demonstrated much added value.
In terms of incentives to report, literature is lacking, but expert opinion suggests that in most LMICs there are active disincentives to report. Either unusual events are detected during illegal activities (poaching) or reporting disease creates much inconvenience and cost for farmers (lock-down, culling) and few benefits.

3) Recommendations for stakeholders

Detecting pandemics early can avert the majority of costs. If the world wants adequate and early detection of emerging diseases, there must be investment in better surveillance systems. Already some promising options exist and operate at small scale, but they have not been mainstreamed. Some examples that can already be endorsed are:

- incorporation of participatory and syndromic surveillance and rumour registers in national reporting
- use of unconventional sources which don't require reporting by people with conflicts of interest (e.g., media reports, satellite data, citizen science etc.)
- piggy-back surveillance on other systems (e.g., analyse bushmeat seized at airports, sero-surveillance of hunters and slaughterhouse workers for multiple pathogens)
- design penalty-free surveillance for high risk, legally ambiguous systems (e.g., wet markets selling live animals, wildmeat hunters and eaters)

- make disease reporting easier (nudges) and provide incentives for disease reporting (e.g., if you send a photo on a smart-phone you get money back or information on how to manage your disease problem)

4) Knowledge gaps / Recommendations for research

The above endorsed options should be better evaluated in terms of effectiveness and value for money.

Hotspot mapping could be extended to looking at wildlife populations which are known to be more likely to be involved in spillover events, such as bats, and rodents.

There should be better identification and more focus on surveillance for key pathogens of concern rather than the traditional notifiable diseases.

Emerging technologies such as multi-plex diagnostics and phylogenetics should be made cheaper and more available.

Better One Health integration is required so entirely novel diseases in people can be tracked back to animals.

There should be multiple use of current and historical samples to look for novel diseases and greater use of aggregate sampling for laboratory testing in the human population.

Aggregators should spend more on collection of primary data and less on playing with it and making it pretty.

We still lack information on how to design a better surveillance system for being able to detect something novel, through use of a risk-based approach, suitable for low- and middle-income country settings, and one that does not get hindered by the issue of incentives for reporting.

Research on conceptual frameworks, hypothesis generation, hypothesis testing, piloting, and evaluating efficacy, feasibility, acceptability and cost-benefit is lacking and required.

3

Impacts of COVID-19 on food environment – A review of the literature
Authors: Chris Bene, Jenny Melo and Brice Even

1) Problem statement and objectives of the study

Combined with the social and economic impacts of the public health measures imposed to stop its spread, COVID-19 has had important negative impacts on global and local food systems and their actors. It has been reported to threaten directly and indirectly people's food security and nutrition in low-, middle-, and high-income countries indistinctively.

While a large number of studies describing the impact of the pandemic are now available in the form of peer-reviewed articles, many of those studies have been designed as a 'black box' between the outburst of the pandemic and its subsequent responses (lockdown, social distancing, curfew, etc.) on one hand (input), and the food/nutrition security status of certain groups / populations on the other hand (output). Much less has been proposed to analyze changes as they took place at the interface between the food system itself and the consumers. This interface corresponds to what is generally called the "food environment". A reasonable working assumption is that any changes affecting the food environment as a consequence of policy or interventions related to COVID-19, will have repercussion on the consumers, their choice of food and eventually their diets.

The objective of this study was to document the changes as they occurred in the food environment during the COVID pandemic and to analyze how those changes have (or not) affected consumers' food choice and their diets, and if so, through which component(s) of the food environment and which causal pathway(s).

2) Key findings

The research was based on a literature review of 77 peer-reviewed articles identified with the use of relevant keywords. The articles included both quantitative and qualitative analyses. The review reveals that very few papers provide information on the food environment *per se*, or on some of its components. A significant number of the papers attempt to assess the food security and dietary changes induced by the COVID-19 crisis (many of them focusing more broadly on lifestyle changes). These papers however describe dietary changes without exploring the causalities between those dietary changes and the food environment changes.

3) Recommendations for stakeholders

At this stage, few concrete recommendations have been identified from this analysis essentially due to the absence of tangible conclusions regarding the causalities between dietary changes and changes in the food environment (see Knowledge gap section below).

4) Knowledge gaps / recommendation for research.

In many cases, the papers limit their analyses to assumptions between changes in the general macro-economic context and the observed changes in food security and diets. On one side, they provide general descriptive information about this macro-economic context, referring in particular

to the amplitude of the COVID-19 pandemic at the country level and the related restriction measures (e.g., lockdown, social distancing, and mobility restrictions measures). On the other side, they measure dietary changes within a given population or socio-economic group(s). They then assume a direct causality between this overall context and the observed changes in terms of food security and/or diets, but they do not provide actual data to measure how the different components of the food environment changed because of the pandemic, and how these food environment variables affected food security and diets.

In sum, with one or two exceptions, none of the papers included in this review provides empirical test (or any kind of data) allowing to test the causality between food environments changes and dietary changes. This is partially explained by the fact that most of the authors did not adopt a multidisciplinary approach (e.g., combining economics, nutrition and health sciences) when designing their research.

4

Does Diversification Enhance Food System Resilience?
Trang Nguyen, Siemen van Berkum and Bart de Steenhuijsen Piters

1) Problem statement and objectives

The resilience of our food supply is high on policy agendas since the outbreak of the COVID-19 pandemic. Among the many measures considered to mitigate the effects of the pandemic, diversification has been proposed to increase the resilience of food systems. Diversification can stabilize national food production, reducing the level of disruption in supply chains faced by producers and other actors, thus mitigating the potential negative effects on food value chains when shocks occur.

However, diversification by actors in the food system can also be an expression of systemic stress or result from their vulnerability. Beyond a certain threshold, specialisation may contribute more to food system outcomes than diversification. And whether diversification benefits the actors in a food system depends mainly on contextual factors.

This paper aims to elucidate the causal pathways from diversification to enhancing food system resilience. It investigates how diversification by different food system actors, namely producers, midstream and retail actors, and consumers can influence the resilience of a food system. This study focuses on food systems in low- and medium-income countries (LMICs).

2) Key findings

In this paper, *diversification* is understood as an actor-oriented economic strategy. Diversification has many forms, is applied at different levels of organization, and is supported by ample evidence as an economic act that may reduce the impact of shocks and stressors on parts of the food system. For producers, diversification can lead to resilience by increasing productivity and income, improving nutrition outcomes and reducing vulnerability to shocks and stressors, such as climate change, at household levels. Yet, diversification can reach an 'optimum' contributing to household resilience after which benefits decline as compared to, for example, specialisation. Context-specific factors such as market access, gender dynamics and land ownership determine the merits of diversification for households. For midstream actors, diversification can reduce the negative impacts of market distortions, such as price fluctuations on business's revenues. However, in times of shocks and stressors, such as the Covid-19 pandemic, production and business differentiation may not provide enough resilience capacity to withstand negative impacts. Economic growth through export diversification can contribute to the resilience of a national food system, but this stability may come at the cost of greater income inequality and negative environmental effects associated with such structural economic changes. In other words, diversification at country level may come with trade-offs in food system outcomes and within system disparities.

There is little evidence available on how diversification strategies by upper-stream actors impact on other actors in the food system, including consumers. This is mostly due to methodological constraints and limited data. Consumers have been demonstrated to have creative agency in

shaping their food environment to enhance their food supply resilience, for example by diversifying food sources and modes of preparations.

Diversification of parts of the food system may result in their enhanced resilience. But food system resilience is not a simple sum of the resilience of its parts. There is little or no evidence available of measurements of resilience at food system levels. Limited attention has been paid to food system trade-offs associated with diversification. Therefore, we conclude that diversification of parts of the food system does not automatically result in enhanced resilience of the food system.

3) Recommendations for stakeholders

Emerging from this study are three key recommendations for policy makers, impact investors or other stakeholders who aspire to enhance the resilience of a food system:

- Diversification of parts of the food system does not automatically result in higher levels of food system resilience. Policymakers must assess a priori how measures to enhance diversification will impact stability or enhancement of food system outcomes.
- Measures to enhance diversification in food systems will have synergies and trade-offs on a variety of food system actors, which need to be known by policymakers to make evidence-based decisions.
- As diversification may have heterogeneous impacts even among the same group of actors (such as farm households and firms of different scale), one-size-fits-all approaches are to be avoided.

4) Knowledge gaps / recommendations for research.

In this study we found ample literature on diversification of farm households and relations to their resilience. Other areas such as export diversification and power relations in the supply chain and their respective effects on food systems resilience are comparatively less well studied. We also identified important gaps in our knowledge about how diversification contributes to food system resilience. These are:

- What are the conditions for 'benevolent' diversification – that enhances the resilience of parts of the food system?
- How can the (potential) impacts of diversification by one actor on other actors and parts of the food system be assessed? How can trade-offs of measures to enhance diversification in food systems be forecast and assessed?
- How do different segments of consumers respond to more diversified food environments?
- How can we assess the resilience at food system level?

5

The role of urban-rural relations in building food system resilience

Authors: Ezra Berkhout, Anne Sonneveld, Lucie Sovova

1) Problem statement and objectives of the study

Whether or not changes in urban-rural connectivity have made food systems more resilient to shocks is the focus of this study. It zooms in on three particular cases that capture distinct actor and policy foci in a wider literature on urban-rural interactions. These are: the role of secondary cities as central nodes in urban-rural food systems; the role of infrastructure and particularly a renewed policy focus on digitalization; and finally a focus on street food vendors as a particular group of actors in linking rural supply with urban demand for nutritious food.

We reviewed literature and consulted key experts in order to understand how rural-urban relations influenced food system resilience in low- and middle-income countries during the COVID-19 pandemic. Our investigation is structured around three concepts developed to study urban-rural interactions. First, the notion of new localities grasps hybrid forms of rural-urban settlements and acknowledges that administrative boundaries do not match with the practical governance challenges on the ground. Second, smart development describes the need to target development in such zones taking advantage of competitive strengths. Third, network governance emphasizes the need for multi-actor and multi-level decision making processes in guiding urban-rural development.

2) Key findings

- Developing countries' secondary towns are typically a central node in a wider agricultural landscape, with livelihoods stretching across rural-urban boundaries and types of activities (multilocality and multiactivity). Relocating offers enhanced employment opportunities, particularly for women household members with street food vending being a recurring employment type. Enhancing resilience is often a central motivation for households (re-)locating to such secondary towns;

- Policies focused on improving connectivity can help to integrate secondary towns in national economies and diversify their economic base away from agricultural production and processing. Local governments' limited means and capacity hinders their agency in identifying and implementing smart development policies;

- While digitalization and e-commerce have the potential to overcome administrative boundaries, they remain dependent on existing physical infrastructure. This gives advantage to urban areas with well-developed storage and distribution networks. Conversely, rural areas as well as secondary towns are often disadvantaged in both physical and digital infrastructures. It is thus unlikely that digitalization can leapfrog the wider agri-food sector without concomitant investments in physical infrastructure particularly in rural and smaller urban settlements;

- A lack of agency is the prime factor contributing to the lack of resilience of street food vendors who are excluded from governance processes, marginalised by current policies, or both. This aggravates their already precarious position and, conversely, redressing it will significantly strengthen their resilience;

3) Key recommendations for stakeholders

- Policies should explicitly take account of the multilocality and multiactivity livelihood strategies of households, for instance, by developing integrated policy approaches for broader city-region food systems, or explicitly considering temporary migration strategies;

- Network governance approaches to inform such policies should be inclusive of all relevant actors, and pay particular attention to the most vulnerable ones. For instance, planning and policies should consider informal livelihoods such as street food vending. Development of both digital and physical infrastructures should be mindful of current inequalities and ensure equal access and agency. Participation of diverse actors in decision-making ensures that possible trade-offs and negative consequences are identified early.

- The potential of secondary cities as natural rural-urban bridges merits further investigation. Our insights suggest that more agency (including financial means) of local governments could enable smart development trajectories. In addition, targeted rural development policies addressing rural market failures, with respect to digital and physical connectivity, still have merit.

4) Key knowledge gaps and recommendation for research

Strengthening 'urban-rural integration' and 'enhancing food system resilience' are recurrent themes in development policy. While there is no shortage of studies conceptualizing these themes, our review reveals a paucity of empirical studies that zoom in, or quantify, specific elements of resilience or urban-rural integration. There is an urgent need to assess whether hypothesized changes on food system resilience due to proposed closer urban-rural integration indeed materialize, and for whom;

6 **Preparing for the unexpected in complex dynamic agri-food systems: Integrated solutions for resilient agri-food systems that provide adequate, affordable, and healthy diets while staying within planetary boundaries**

Author: Gideon Kruseman

1) Problem statement and objectives of the study

By 2050, we will be with about 10 billion people. Furthermore, there is overall economic development which leads to migration and urbanization and ultimately in changes in consumption patterns and more generally changes in the food production environments. These pressures on agri-food systems from the demand side are compounded by challenges on the supply side related to resource availability and distribution, including but not limited to water, phosphate and nitrogen. Moreover, agriculture has a major impact on biodiversity. Ensuring that the world population has access to ample, diverse, and nutritious food while staying within the planetary boundaries is a major challenge for humanity. This is compounded by climate change. This alone already implies that we must do things differently making agri-food systems more efficient and sustainable. The COVID19 pandemic and the more frequent occurrence of weather extremes as well as the emergence of new pests and diseases in agricultural production systems indicates that we also need to be prepared for the unexpected. Some understanding of the sources or lack thereof of resilience in complex dynamic agri-food systems, exist, but placing that in the context of a complex dynamic system is missing, especially when the focus is on the future of which there remain many unknowns.

The key research questions addressed by this project are:
1. What are the most important resilience-related challenges in complex dynamic agri-food systems going forward?
2. What does past foresight research tell us about current and future solution directions?

2) Key findings

The complex dynamic nature of agri-food systems is clear during the COVID19 pandemic. Disruptions to value chains due to restrictions on mobility both locally and globally led to major challenges initially. Many of those challenges were overcome to a large extent, especially in local contexts. However, global value chains still suffer the effects of the disruptions.

Initially there was a general fear that the food system disruptions caused by COVID10 would lead to major food and nutrition security challenges. The evidence available today provides a mixed picture. There are income-loss related increases in food and nutrition insecurity, but overall the pandemic itself has not led to additional increases in food and nutrition insecurity.

3) Recommendations for stakeholders

Different types of crises due to major unexpected events or expected but unpredictable events will require different approaches. Preparing for the unexpected requires scenario analysis and risk management analysis.

Using combined scenario and risk analyses, no-regret options can be determined to enhance resilience of agri-food systems.

4) Knowledge gaps/ recommendation for research.

Foresight research has traditionally focused on mega trends and average outcomes. While this is useful for understanding the big picture, it does not provide sufficient insights into the impacts of specific events, whether these are extreme weather events, geo-political tensions, multiple bread-basket failures, or global pandemics like COVID19 to name a few possibilities.

In order to better prepare for future disruptions a multi-pronged approach is needed. Partly related to foresight research priorities

1. Continued quantitative foresight research considering mega trends, related pressures and responses and their interactions, albeit taking into account some of the underserved impact areas that are of particular interest during crises.
2. Systematic scenario development related to major unexpected events or expected but unpredictable events. The scenario development builds on both quantitative and qualitative approaches.
3. Application of big data analytics tools to get a better understanding of the emerging patterns of pressures and responses during crises.
4. Combining the three approaches outlined above to better prepare policy makers

Partly the multi-pronged approach is related to multi-stakeholder engagement in the preparation for the unexpected and the unpredictable. This requires a democratized approach to foresight analysis.