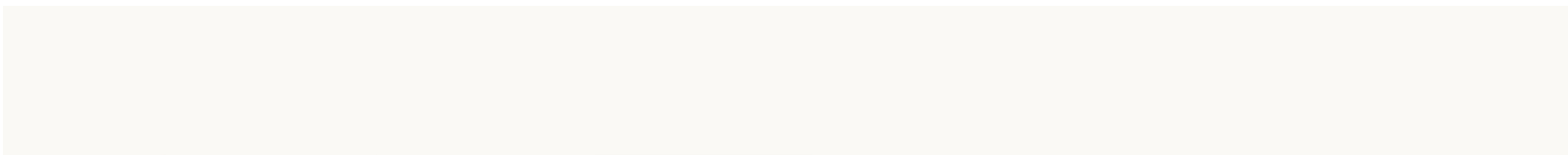


Conflict and Food Systems

Synthesis Report

TEAM COMPOSITION

The research team was led by Dr. Ronak Patel from the Harvard Humanitarian Initiative and Brigham Women's Hospital and Dr. Caitriona Dowd from Dublin City University, with Dr. Kelsey Gleason from the University of Vermont and Samuel Polzin from Purdue University. Rebecca Yang, Pranay Narang, Denise Ripamonti and Angela Garvey worked as research assistants. The research team collaborated with local experts Eric Calpas (Haiti) and Dr. Hassan Osman (Sudan) for specific country reports. Lastly, the research team worked extensively with country program staff from Concern Worldwide in each country context.



EXECUTIVE SUMMARY

The 2022 *Global Report on Food Crisis* highlights conflict as the major driver of acute food insecurity, which forced approximately 139 million people into crisis-level acute food insecurity (IPC Phase 3 or worse¹) in 2021 (FSIN, 2022). The scale of this impact on households and communities, which is compounded by economic shocks and weather extremes, spans economic, political, social, and environmental activities, emphasizing that conflict's impacts should be considered through a food systems lens rather than the narrower outcomes of food and nutrition security alone. The 2018 United Nations Security Council Resolution 2417 recognized the link between conflict and hunger, condemning the starving of civilians as a method of warfare and the unlawful denial of humanitarian access to civilian populations (UN Press, 2018).

OVERVIEW

Overall, this research program sought to **investigate the impact of conflict on various elements of the food system to identify those with the biggest influence on food and nutrition security amongst people experiencing extreme poverty**. Drawing on evidence from Somalia, Haiti and Sudan, this cross-country research systematically mapped components of local, national and international food systems; identified specific pressure points where conflict interacts with them; and proposed operational, policy and research actions tailored to supporting and strengthening food systems disrupted and transformed by conflict.

A growing body of research examines the links between armed conflict, food security, and food systems. These identify the two-way relationship between food price and conflict, and the influence of excessive risks on transport, harvest, and market security costs (Raleigh et al., 2015; Weinberg & Bakker, 2015; Ismail, 2021). Others focus on how conflict reduces regional food availability by destroying productive assets and infrastructure and creates security risks associated with accessing food markets thus driving up local prices

¹ The Integrated Food Security Phase Classification system (IPC) is a system for estimating the severity of food insecurity. Acute food insecurity is measured on a scale from Phase 1 (None/Minimal) to Phase 5 (Crisis/Famine). Estimates of the number of people in Phase 3 (Crisis) or above, are widely used as a measure of the scale of humanitarian need and the urgency of required response. For further information, see IPC, 2022

(Bora et al., 2010; Kah, 2017). However, disentangling existing structural challenges—e.g., input supply disruptions, seasonal price volatility, or investment risk aversion—from those caused by conflict, particularly in places where armed violence is a constant in everyday life, can be difficult and a precise understanding of the specific ways conflict interacts with food systems in many contexts, remains elusive.

In seeking to investigate the impact of conflict on various elements of the food system to identify those with the biggest influence on food and nutrition security amongst people experiencing extreme poverty, the research team worked with the Concern country teams in Haiti, Somalia and Sudan to arrive at three key thematic areas for investigation in relation to the food system:

- **Haiti:** Gender and the rural to urban food value chain
- **Somalia:** Displacement and the rural to urban food value chain
- **Sudan:** Natural resources and peacebuilding in conflict and the food system

To address these themes, the research team developed a mixed-methods design, employing a combination of secondary evidence mapping, qualitative consultations, and quantitative data-gathering through surveys. Together, the data generated were mapped in the form of Fuzzy Cognitive Maps (FCMs). FCMs are a promising area of participatory modelling that can visually translate the knowledge and experience of local stakeholders into an accessible and standardized format (see Gray et al., 2015; Papageorgiou et al., 2019). This data can then be mapped to visualize and document multiple components of complex systems and their interactions; assess the respective direction, connectedness and influence of different components and relationships; and develop scenarios based on changes in complex systems that take account of multiple potential interactions and feedback loops.

The research finds that across all three country contexts, conflict has a negative impact on the food system in ways that are **Connected** - complex interconnections between different nodes in the food system; **Cumulative** - successive, repeated exposure to specific distortions and disruptions in the food system that intensify impacts; and **Compounding** - combined impacts of co-occurring effects on the food system that act together to multiply impacts. Below, those findings

that were shared across all three country contexts are highlighted.

CONNECTED FACTORS

First, connected factors include **imports and inflation**. Food imports can help meet the need for food quantity and dietary diversity in combination with local food production but can also be harmful when suppressing local food systems. There are connections between local food production, imported food and agricultural inputs that inflation can modulate. However, the cost of local foods, to make it from farm to table, is also inflated by conflict due to taxation, roadblocks and limited mobility, as described below. The abandonment of food system-related livelihoods, discussed below, has a further, mutually reinforcing impact on agricultural production as it heightens import dependence, contributing to a less sustainable, more volatile and fragile food system in both the short and longer-term.

Also in this category are **host and IDP community relations**. Host communities and IDPs often have very similar needs in acute crisis settings and this research on food security in conflict reflects very much the same, with similar pressures bearing down on both populations. Conflict has wide ranging impacts on the food system that may be felt initially by displaced and non-displaced populations in different forms, displaced populations forced from agriculturally productive areas or urban host communities observing initial impacts in markets. The surveys point out that they experience or perceive differential immediate impacts on the food system perhaps as conflict in food production activities and locations cause displacement to urban areas that may not perceive the same initial impact or find processing and trade more greatly impacted. Yet the combined effects of conflict on the food system lead to the same pathways for food insecurity in both groups with decreased local production and availability as well as higher prices, while urban displacement puts a strain on municipal services and basic goods that also affect the host communities.

CUMULATIVE FACTORS

Second, cumulative factors include **roadblocks and taxation**. Roadblocks – instituted both by non-state armed groups and by state actors as security measures

in response to armed group activities – and related disruptions to mobility are central components affecting how food systems function. Their impacts accumulate throughout the food system in various ways, including a) decreased food availability by disincentivizing production and restricting the movement of goods; b) diminished food accessibility from increased transport and production costs transmitted to consumers in higher prices; and c) poor food consumption indirectly by driving food spoilage, and forcing households to depend to a greater extent on smaller, local markets with more limited selection and often, nutritionally inferior food. Armed groups may also impose taxes at every stage of the food system from production to processing to transport, and trade. This burden combined with taxes from the government can add up to make food system activities prohibitively expensive or significantly diminish returns and ultimately degrade local food systems.

Cumulative factors also include **integrated market functioning**. Integrated markets are to the resilience of food systems. Specialized but integrated market functioning allows efficiencies, increased food availability and an enhanced capacity to produce and store food locally. However, food systems can also be fragile due to this networked and specialized nature, and high levels of interdependence between different markets and areas producing and marketing complementary food items. Integrated market functioning is profoundly disrupted by conflict, which also creates risk for communal tension by disrupting this integration. Normally, farmers and pastoralists can trade goods through loans, but this is undermined during conflict and raises tensions. Finally, as various communities specialize in specific food items, any disruption in one community can lead to acute food shortage of specific items. Ultimately, these combined effects often mean that exchange of goods and services between different communities is lost.

A third set of cumulative factors found across country cases were the **gendered impacts of conflict on the food system**. Conflict's impacts bear down unequally on women and girls at every stage of the food value chain. Small vendors are often women, and they face a combination of targeted violence, rising food prices, and the inability to obtain food to sell. Armed conflict also can result in women being forced to stop trading due to reduced movement of both food and people. Mobility restrictions prevent women from being able to work and carry out their trade as key intermediaries in the food system. Women may need to be accompanied when they leave the home during times of conflict, which often leaves them isolated at home and

lacking many freedoms. This loss of mobility has a compounding effect, particularly on women-headed households, as they are unable to obtain work or food, face reduced incomes and the inability to support their families, and experience greater vulnerability. As a consequence, women can further be drawn towards supporting gangs, driven by the need for women to seek protection and security.

COMPOUNDING FACTORS

Finally, compounding factors include **maladaptive coping strategies that degrade the local food system and incentivize food imports**. The research highlights how food and livelihood systems are transformed by conflict into maladaptive states that undermine endogenous food systems and food security. Conflict initiates maladaptive cascades – a combination of mutually reinforcing negative coping strategies that have cumulative consequences. These maladaptive cascades initiated by conflict lead to pathways that diminish, degrade or disable local food systems. Often, the coping strategy used to deal with conflict navigates people into behavior that disrupts the food system in the medium to long-term, by reducing local food production, availability and access. In Haiti, the economic fabric of neighborhoods experiencing armed conflict has crumbled. An increase in violence and decrease in sales has led vendors to renew their stock less often and to stock food products of lower quality that are more accessible to consumers. As producers have less access to large-scale markets, they must sell directly to consumers or find alternative small-scale provincial vendors, which often means they have to take lower prices and receive less income. As a result, producers face greater food losses and are less able to invest in their operations. This situation reduces production in the next season and has forced some producers to abandon the agricultural sector altogether. As large markets shut down and household mobility is further restricted by intense violence, food purchases are increasingly limited to hyperlocal markets that do not provide the same dietary diversity and offer higher prices to consumers. Broadly speaking, consumers are seeking to limit their travel for safety reasons and locate the lowest cost options to feed themselves. These factors can further increase the reliance on imported food and food which undermines local systems.

Compounding factors are also present across **climate change and natural resource management**

considerations. Natural resource pressures from climate change such as drought combined with conflict greatly handicap food systems. Water and pasture shortage and denial of access compound leading to death of livestock. Similarly, loss of arable land from denial of access and climate change reduces agricultural output. Various climate-driven incentives to transition away from food production combine with the decreased investment caused by conflict and failures of financial supports disables local food production. Conflict induced transitions to bush products such as firewood and charcoal can further accelerate environmental degradation that can amplify impacts of climate change on the agricultural sector. Finally, competition over natural resources such as water and land that does not involve armed actors, but communal groups can lead to conflict and further increases food prices. Access to land historically accommodates the needs of farmers and pastoralists who used to effectively negotiate that access through communal institutions. However, this is not as respected as it used to be in the past. Local and traditional natural resource management processes may also privilege established community hierarchies, leading to disengagement and a lack of buy-in among more marginalized groups, including young people.

Lastly, **complex interactions between health, food security and conflict** constitute a third key set of compounding factors. When either food prices or income are independently altered, the health status of a population deteriorates; in the context of a country that is highly reliant on agricultural and food-systems livelihoods, as in Somalia, Sudan, and Haiti, the joint and compounding impacts of rising food prices and disruptions to income are vast. Yet when communities lose both their income and their food source simultaneously, the resulting health impacts are staggering. Morbidity and mortality increase significantly when livelihoods and income are disrupted, and this negative effect on health is further exacerbated by the independent effect of conflict. Taken together, the conflict-driven disruptions to livelihoods and income have a synergistic effect on health and wellbeing, potentially increasing the rates of morbidity and mortality in an already-stressed healthcare system. Public health risks include an increase in the spread of infectious and chronic diseases (such as diarrhea and respiratory infections), increased rates of mortality for pregnant women, increased under-5-mortality, and a higher risk of SGBV.

RECOMMENDATIONS

Based on these findings, the report makes six recommendations for those working to support and strengthen food systems:

1. **Design targeted protection interventions that support vulnerable stakeholders in the food system.** Providing targeted protection services for vulnerable stakeholders - particularly women - in the food system is both an important service for at-risk populations, and an intervention with the potential to mitigate disruptions in the food system. Protection activities might include targeted health and psychosocial support; targeted protection trainings for state security forces and informal authorities highlighting the violation of rights and disruption to the food system; and wider community awareness-raising, sensitization and public information around rights and entitlements to support a more enabling environment and shifting norms in armed actor behavior.
2. **Target food system stakeholders for engagement in social cohesion activities.** The research highlights the multiple ways food system stakeholders - including producers, transporters, vendors, and merchants - face compounding threats at every stage of the food value chain. This exposes stakeholders to unique risks, but also affords them unique perspectives on the dynamics of conflict, its impacts in communities, and the steps required to address and resolve conflict to build more peaceful and resilient communities. Where social cohesion and broader peacebuilding efforts are already underway, programming activities can play a valuable role by providing targeted support to the engagement of food systems stakeholders in these activities. Their representation, participation and leadership in such initiatives could help ensure their unique perspective and experience of the leveraging of food and food systems in conflict is considered in conflict resolution efforts, and moreover, could serve to amplify food system stakeholder protection programming efforts (see above).
3. **Support nutrition-sensitive activities in secondary and tertiary markets.** In light of profound mobility restrictions in all three country contexts, supporting access to more nutritious foods to be sold in smaller, local markets could have positive effects throughout

the food system. Large, central markets are an integral component of a functioning food system, but in a context of heavy control by armed groups, restricted movement of goods, and often prohibitive transport costs and risks, efforts to support secondary and tertiary markets to fill the gap in food accessibility in local neighborhoods would be valuable.

4. **Pursue humanitarian assistance strategies that support local food systems and minimize negative externalities.** The humanitarian assistance community, including donors, must take a conflict-sensitive approach to understand not only how conflict and food security exist in relationship with one another but how specific humanitarian assistance strategies related to food assistance can reinforce the maladaptive transformations described above. There are unintentional negative consequences to long-term food security and perpetuating conflict that may be avoided or minimized with a more holistic understanding of how humanitarian assistance impacts local food systems. Donors should understand the food import pricing relative to local food and the relationship with challenges in producing, processing, and accessing local food.
5. **Pursue protection agenda and associated advocacy around cumulative impacts of taxation and mobility barriers (e.g., roadblocks).** Humanitarian and development responses alone cannot fully address the depth and complexity of many of the obstacles affecting food security for people experiencing extreme poverty in these countries. Political actors within each context primarily, and in the wider international system secondarily, have an important role to play in protecting food systems stakeholders. Targeted advocacy efforts can make an important contribution by first, raising awareness of the extent to which roadblocks and attacks on food systems stakeholders affect food security for the most vulnerable; and second, calling for policy action to better protect food systems stakeholders. Potential policy asks to explore include greater consideration of roadblocks, transport barriers and attacks on food systems stakeholders in transit under the remit of UN Security Council Resolution 2417 and associated reporting; greater consideration of the gendered effects of roadblocks, transport barriers and attacks on

women food systems stakeholders under the remit of UN Security Council Resolution 1325 and associated reporting and briefings; and/or exploring international legal and accountability provisions related to attacks on food systems stakeholders and the gendered impacts where appropriate.

6. **Explore future research opportunities to further develop, deepen and operationalize the FCM analysis piloted here.** Research in which program teams are supported to apply, monitor, evaluate and reassess the insights gleaned from the FCMs developed in the first phase of research would allow program staff to evaluate the impacts of interventions against the predicted outcomes to repopulate and refine the maps with further unidentified variables, different relationships and reassess weights of relationships according to the observed results. This would help create more precise maps that may also reflect the latest dynamics and continue to better inform program design. Key opportunities for utilization across humanitarian assistance programming may include: design, development and evaluation of large-scale, multi-sectoral programs and/or consortia programming with multiple partners; country-level strategic planning or annual review; application of adaptive management approaches in programming; and informing advocacy around humanitarian assistance and diplomatic policies at national and multinational levels among others.

1. INTRODUCTION

1.1. OVERVIEW OF THE GLOBAL SITUATION

Conflict as a key driver of food system dynamics, particularly how chronic and acute violence affect the ability of people experiencing extreme poverty and vulnerability to access and utilize food, is not adequately understood by researchers and humanitarians alike.

In 2018, the United Nations Security Council (UNSC) took up the issue of conflict-induced food insecurity and famine and starvation of civilians as a method of warfare, adopting Resolution 2417, which formally condemned such violations and called on parties to conflict to uphold their obligations to provide safe and unimpeded humanitarian access to civilian populations (UN Press, 2018). This view of the relationship between conflict and food insecurity as a simply humanitarian issue, however, overlooks all of the food system disruptions, lost livelihoods, mass displacement, and psychological terror that fundamentally change how people feed themselves. The scale of this impact on households and communities, which compounds with economic shocks and weather extremes, spans economic, political, social, and environmental activities, emphasizing that conflict should be considered through a food systems lens rather than the narrower outcomes of food and nutrition security.

The topic of conflict has been on many food security agendas for years. In 2017, it was noted as a central factor explaining why global hunger appeared to be on the rise after declining for years (FAO et al., 2017). More specifically, hunger and malnutrition have become further concentrated in fragile states—places which are likely to be suffering from poor governance and multiple forms of conflict at the same time (Breisinger et al. 2015; Quiroz et al., 2021). This year, while the impact of the war between Russia and Ukraine has yet to be formally included in most annual reports on food security, its short-term effects on the production, trade, and global availability of commodity grains has left conflict, humanitarian, and development actors scrambling to predict and respond to evolving food insecurity, social unrest, and humanitarian assistance needs across poor importing nations (Abu Hatab, 2022). The history of global food price spikes exacerbating fractures and discontentment in the economic and socio-political cohesion of national governments—e.g., the 2008 global food price crisis and simultaneous upsurge in rioting—foreshadows new,

shifting, or intensifying violence in already fragile states (Weinberg & Bakker, 2015; Heslin, 2021).

As of September 2022, the Famine Early Warning Systems Network (FEWS NET) has raised food insecurity concerns to emergency levels (IPC Phase 4) in three regions—Northern Ethiopia, Horn of Africa, and South Sudan (FEWS NET, 2022a). Though conflict may not be the primary driver pushing all of these households toward the precipice of famine, it is a structural feature of these complex emergencies,¹ where weakened institutions are unable to lead a response to natural disasters, civil strife, and macroeconomic conditions. Observers in East Africa express concern about barriers to food assistance distribution, large-scale intra- and inter-border displacement, disruptions to trade, multiple disease outbreaks, poor conditions for production and grazing, and significant food price inflation (WFP, 2022a). Unfortunately, the situation is all too familiar, but models for how to navigate food systems that have been fundamentally reconfigured by armed conflict are still insufficient. Agencies operating in these locales need a map, literally, to help identify how new uncertainty could travel through food systems and interact with existing vulnerabilities to food insecurity.

Academic research has taken great interest in the connections between violent conflict and food security in recent decades, typically focusing on inter-group violent conflicts such as inter-state conflict, civil war, insurgencies, and state violence toward civilians (see Shemyakina, 2022). In this time, authors have called attention to the links between hunger and conflict and revisited these links, highlighting innovations in conflict-sensitive agendas and calling out poor policy responses that have yet to integrate resources addressing conflict, food insecurity, malnutrition, and displacement (Messer et al., 1998; Messer & Cohen, 2015). On the whole, these studies demonstrate a reciprocal relationship in which armed conflict contributes to food insecurity, and vice versa (Hendrix & Brinkman, 2013). Changes in land use, access to markets, and resource extraction through looting and taxation are several consequences of conflict on food systems (Eklund, 2017; Adong et al., 2021; Humphreys & Weinstein, 2006). Conversely, commodity prices, crop yields, and land access are food system drivers

¹ The Inter-Agency Standing Committee defines a ‘complex emergency’ based on several characteristics emerging from a breakdown of assets, infrastructure, and markets (see IASC, 1994).

that have been shown to have an effect on conflict (Bellemare, 2015; Koren, 2018; El Amin, 2016).

Research at both the household and national levels has significantly focused on agricultural production resources and why people both intentionally or unintentionally reduce production during conflict to reduce their exposure to violence (de Soysa & Gleditsch, 1999; Howard & Simmons, 2020). Farm households that are exposed to armed actors are less likely to invest in agricultural activities, such as planting the full amount of seed to which they have access, due to fear of future attacks and the possibility of further looting and displacement (Adelaja & George, 2019; Noubissi & Njangang, 2020). This behavior inadvertently affects yields. Studies highlight how some farmers completely abandon their land in the course of fleeing violence, which can lead to additional long-term losses and lower sector-wide productivity in the event of protracted displacement (Yin et al., 2019). Pastoral livelihoods can similarly face human loss, livestock mortality, limited resource access, and forced migration as a direct result of violence, including raiding and farmer-pastoralist conflict (Schilling et al., 2012; Dimelu et al., 2017).

The 'linkages' throughout a food system also break or contract as the stress of conflict radiates through society. For example, fear of attack and of further crisis can encumber flows of foodstuff as various stakeholders must weigh new costs of doing business, trading, or even being seen (Awodola & Oboshi, 2015). Furthermore, formal financial institutions in fragile states are either lacking or not fully equipped to support local demand, leaving social networks, humanitarian assistance actors, and a variety of other informal arrangements to fill this gap in the food value chain (Hiller et al. 2014). The host communities who become home to internally displaced persons (IDPs) can experience new pressures on their livelihoods, as well, such as higher unemployment or lower wages as the local workforce may be displaced (George & Adelaja, 2021). The experience of violence can ultimately damage social cohesion and trust within communities, which is problematic for long-term development prospects, investments in the growth of a country, and the ability to fortify a food system against future shocks (Rohner et al., 2013; Jakiela & Ozier, 2019).

These research findings should not be taken to mean that food systems do not work—i.e., feed people—in contexts of protracted crisis. For instance, farmers are able to access seeds despite conflict, but their quantity and suitability may not be adequate for a successful

planting season (FAO, 2021). On the consumption side, loss of reliable energy access also means people will commonly switch to burning biomass to cook or prepare food (Caniato et al., 2017). These barriers suggest that food systems are more inefficient, face substantial transaction costs, and become more brittle as fundamental livelihood activities are eliminated, displaced, or forced to be modified. Therefore, the international response in fragile contexts is not just about facilitating change through individuals, but it must understand, stabilize, and support the functioning of food systems as a whole. It is also essential to recognize how different types of conflict and violence produce different outcomes and how conflict variably affects the many different parts of a food system with which different households may engage.

We seek to use the available data from existing studies on conflict and food security, as well as novel interview, focus group, and survey data, to model the relationship between the elements in these systems. Researchers, governments, and non-governmental organizations have looked in-depth at food insecurity, famine conditions, and human suffering as a result of armed conflict and even worked to develop early warning systems to help agencies plan for and respond to humanitarian crises; however, much of this analysis happens after the fact or analysis of the conflict factors is missing altogether. We fill a gap that has yet to systematically consider and incorporate the consequences of conflict into food system assistance and development. The practical significance of this approach lies in the possibility of improving decision-making by inputting country-specific data gathered from crisis response, development planning, and other current programming activities to optimize the food system model and forecast degrees of food system disruption due to conflict.

1.2. DESCRIPTION OF THE RESEARCH AND OBJECTIVES

1.2.1. OVERARCHING RESEARCH AIMS AND OBJECTIVES

Overall, this research program strives to investigate **the impact of conflict on various elements of the food system to identify those with the biggest influence on food and nutrition security amongst people experiencing extreme poverty**. Drawing on evidence from Somalia, Haiti and Sudan, this cross-country research systematically maps components of local,

national and international food systems; identifies specific pressure points where conflict interacts with them; and proposes operational, policy and research actions tailored to supporting and strengthening food systems disrupted and transformed by conflict. By determining priority areas for humanitarian assistance and programming based on the influence and impact of context-specific events, activities, and outcomes, there is potential for humanitarian assistance organizations to shift and refocus their priorities in near real-time as new information is available and entered into the model.

The most visible elements of an armed conflict might include the destruction of food production resources and infrastructure, in addition to attacks on markets and food diversion. However, social unrest, violence between factions, or civil war all produce many more kinds of disruptions around which local food system actors must operate—frequently unreported and unseen by larger institutional actors. A village market shuttered for several days, an extra tax levied by an armed group controlling the roads, and a late harvest that leaves a farmer’s crop exposed to damage from migrating or displaced groups can all add extra costs that may be hard to discern amidst chronic instability. In such cases, program teams should move to utilize a multi-scalar and interdisciplinary toolbox to understand the cascading cause-and-effect interactions between stressors, institutions, and individual outcomes in a food system.

We employ a broad definition of food systems in our approach, such as that defined by the Global Panel (2014), which refers to the “production, marketing, transformation and purchase of food, and the consumer practices, resources and institutions involved in these processes”. As seen in the complexity of the global situation, our rationale for taking a (food) system approach is tied to the sum of overlapping actors and interactions which drive the flow of foodstuff, acknowledging that there are interlinkages between seemingly disparate value chains and their components (Ingram 2011). This approach is increasingly important to the achievement of the Sustainable Development Goals (SDGs) and how associated food policy agendas are being set at multiple levels of government (Morton et al., 2017; van Berkum et al., 2018). Approaching conflict through this same conceptual framework lends itself to cross-country research that allows us to address a set of standardized issues while also recognizing how different in-country modifiers and intervening factors act on similar sets of variables.

1.2.2. COUNTRY-SPECIFIC RESEARCH AIMS AND OBJECTIVES

Working with the country teams in Haiti, Somalia and Sudan and conducting a review of existing research, we arrived at a key question to answer about the food system in each context (Table I):

Table I. Research Questions by Country Program

	Haiti	Somalia	Sudan
Research Question	How does conflict and violence create and disrupt the rural to urban value chain for food and how do women navigate this chain from farm to table?	How does conflict disrupt the rural to urban value chain for food in the current state of protracted conflict and how does displacement relate to these dynamics?	How do various conflicts disrupt food production to marketing linkages and what role do natural resource management and peacebuilding play in conflict and the food system?

2. METHODS

2.1. RESEARCH DESIGN

The research has a mixed-methods design, employing a combination of secondary evidence mapping, qualitative consultations, and quantitative data-gathering through surveys. Together, the data generated are mapped in the form of Fuzzy Cognitive Maps (FCMs). Discussed further below, FCMs are a promising area of participatory modeling that can translate the knowledge and experience of local stakeholders into an accessible and standardized format (see Gray et al., 2015; Papageorgiou et al., 2019). For multi-stakeholder FCM research studies in which the worldview of many different system actors needs to be captured, the combination of technical (Jetter & Kok, 2014). Thus, the research proceeded in three stages: first, a literature review to map existing research and evidence on conflict's impacts on food systems globally; second, key informant interviews (KIIs) and focus group discussions (FGDs) to gather evidence on key factors and relationships in the case study contexts; and third, triangulation and verification of the qualitative data through surveys.

2.1.1. EVIDENCE REVIEW

Initially, a systematic search methodology used several academic databases and organizational resource libraries to identify relevant literature that studied conflict impacts on food systems. We extracted evidence about conflict impacts on food system activities around the world from the academic and gray literature, which produced a general network map showing the complex relationships of a system in conflict (Map 1.0). This work provided a baseline that would direct future country-specific topic identification, questions, and analyses.

The unit of analysis for this coding process is considered the discrete claim, which proposes a degree of correlation between two variables. A distinct causal claim entails the following proposal:

1. There is a correlation between cause and effect;
2. The nature of that correlation (positive or negative) is identifiable; and,
3. There is a plausible explanation of the process by which this happens.

Each discrete causal claim is disaggregated, and its constituent independent and dependent variables coded accordingly. The independent variable is defined as the *cause* identified in the causal claim. The dependent variable is defined as the *effect* identified in the causal claim. Additionally, higher level thematic analysis grouped conceptually related variables under consolidation terms.

2.1.2. KEY INFORMANT INTERVIEWS AND FOCUS GROUP DISCUSSIONS

Our team conducted KIIs with in-country experts to adapt the network map produced through the literature review to the particular country context (Map 2.0). All expert consultations took place virtually over Zoom, and translators were used when necessary.

The FGDs followed a similar process and discussion guide but were carried out in-country by the local researcher. The team identified food system actors who were of interest and practically accessible on the ground. Across the three country programs, these groups included:

- Pastoralists and agro-pastoralists;
- Farmers;
- Market vendors;
- Women traders;
- Food system stakeholders involved in processing and transport;
- Displaced and host populations.

A fuller account of the composition of FGD groups is available in individual country reports.

We trained and worked with contracted in-country researchers to carry out FGDs with key stakeholder groups, which deepened our insights and helped identify any critical food system components that we may have missed in the first round of interviews (Map 3.0). Together with the in-country researcher, we reviewed each group of variables and their relationships through the lens of each focus group.

At this stage, we introduced FCM tools to advance the strength and utility of our initial model. This methodology looks similar to network analysis but is specifically applied to determine directionality between cause-and-effect relationships and to compute the “strength of impact” (i.e., impact factors) of these network elements. FCM ultimately allows us to detect models of cascading impacts and path dependencies of particular groups or locations.

2.1.3. SURVEY TRIANGULATION AND WEIGHTING

The final research stage included the development and fielding of a three-part survey module. With the goal of producing relative weights differentiating which variables had the greatest system-wide impact in the conceptual map, the most referenced and representative topics from KIIs and FGDs were picked to be rated on the survey. This questionnaire enabled the project team to further identify central conflict variables and relationships which emerged at the local level and to improve the accuracy of the impact factors assigned to the concepts, events, and activities on the FCM (Map 4.0).

2.2 DATA ANALYSES

2.2.1. EVIDENCE MAPPING

Two centrality measures—degree centrality and eigencentrality—mapped the contours of the existing research. Degree centrality counts the number of degrees between nodes in a network, showing which node has the most interconnections. Eigencentrality (or eigenvector centrality) creates a relative score of each node’s influence in the network by capturing the importance of a node relative to the importance of the nodes to which it connects, and the nodes to which they connect, and so forth. In other words, while high degree centrality reflects more connections between a given node and others in the network, high eigencentrality highlights the connections between a given node and other highly connected nodes compared to all other nodes. These two indicators help translate relationships into simpler terms and reveal the most influential variables, as well as potential gaps in our understanding of system connectivity.

2.2.2. FCM

Fuzzy cognitive mapping (FCM)—the interactive methodology which provides the foundation for much of the following analysis—generates graphical models of complex causal relationships that are useful for transparent decision making. FCM provides a “mental landscape” of unique system elements (e.g., concepts, events, activities) and their impact on each other, allowing quantitative weights to be assigned to imprecise data. While these maps can appear visually complex, they promote a standardized understanding of a system and represent causal reasoning which may otherwise be hazy and ambiguous. This way of assessing systems is increasingly premised on a bottom-up approach of modeling to more directly incorporate the knowledge and experience of local stakeholders and experts in the modeling process.

Through this analysis, we identify the most critical potential leverage points within a system for potential intervention. In other words, we focus on those causal relationships that promise the greatest downstream potential to prevent, mitigate, or support recovery from conflict’s impacts on, for example, household resilience, market activities, or agricultural production.

2.2.3. SURVEY DATA

The survey sample sizes were as follows:

- **Haiti:** 972 respondents (133 male and 839 female);
- **Somalia:** 405 respondents (35 male and 370 female); and
- **Sudan:** 1,111 respondents (332 male and 779 female).

Further survey descriptions are presented in each country report.

One of the purposes of the survey is to illuminate how different types of respondents experience the food system. Survey respondents can be identified by sex (although in most cases, this heavily skews the resulting responses in favor of women respondents). Alternative categories for disaggregated analysis included respondent age, household location (both specific neighborhoods and whether location was urban or peri-urban), household size, and sex of household head, among others.

2.3. ETHICAL APPROVAL AND DATA MANAGEMENT

Ethical approval was sought and granted by both Dublin City University's research ethics board and the Mass General Brigham Institutional Review Board, protocol #2021P003682, affiliated with Harvard Medical School in Boston, Massachusetts, USA. All data was stored securely on a drive only accessible to the research team. At no point did this research use data which personally identified individuals.

OPERATING CONTEXTS

3.1. HAITI

3.1.1. CONFLICT ANALYSIS & FOOD SYSTEMS OVERVIEW

Haiti has been experiencing a long-lasting period of political instability following the assassination of the President Jovenel Moïse on the 7th of July 2021 and the repeated postponement of elections under the current interim government led by the acting President and Prime Minister Henry Ariel. The restoration of democratic institutions and the transition to a more inclusive elected government continues to be characterized by rivalries among political factions – notwithstanding the Montana Accord signed in August 2021 – and recurrent anti-government mobilizations across the country (ICG, 2021; Abi-Habib and Kitroeff, 2022; Thomas and Ellsworth, 2022).

Even when agricultural production, market access, and the overall food supply have ostensibly fulfilled consumption requirements in Haiti, criminal activity and disruptions by armed gangs have shaped both national infrastructure and household behaviors. Underlying conflict across the country means “normal activity” has had to account for encumbered access, higher costs, and fewer options. Local markets could be paralyzed suddenly by armed gang clashes. Targeted attacks damage imports, harvests, and food stores. General fear, poor access to services, and lack of local mobility further drive grievances. Subsequently, internal displacement has been a direct result of gang violence as well as a downstream effect as households try to cope with extensive livelihood losses (IOM, 2022; 2023).

Gender differences and gender roles further pervade the food system and create undue risks and vulnerabilities for women (Kellum et al., 2022). For example, women face disproportionate barriers to accessing formal institutions like livestock markets and often perform informal work in an effort to procure foodstuff and offset income losses that may occur due to violence.

Since 2018, the sharp increase in the prices of food and basic goods as well as the absence of concrete policies to counter Haiti’s economic crisis and expanding insecurity have combined to generate recurrent waves of national protests that have been met with harsh repression from state authorities to date.

Experts do not yet understand how to identify these slower onset (or chronic) emergencies in presumably peaceful countries or how to respond to the so-called invisible victims of violent crime, gang violence, brutality by state enforcement bodies, and intimate partner violence who may suffer from hunger in silence. Moreover, we have a generally weak grasp of the food systems in high-density areas of large cities (i.e., slums), the spatial layout of their food networks and markets for common goods, and the effects that disruptions like conflict can have on these areas. Particularly in a country that has suffered from so much humanitarian need, a focus on bringing together conflict, peace, and food security knowledge in tandem with both development and humanitarian programming experience is essential to filling systemic gaps that have long plagued Haiti.

A fuller discussion of conflict dynamics and actors can be found in the individual country report.

3.2. SOMALIA

3.2.1. FOOD SYSTEM OVERVIEW

Due to repeated poor rainfall seasons since late 2020, Somalia is among the countries that have been hardest hit by a drought emergency in East Africa and by the risk of localized famine (OCHA, 2022a). Zones of heightened concern are the agro-pastoral areas of the South-Central administrative divisions of Hiraan, Bay, Bakool, Mudug, Middle Juba, and Lower Shabelle (OCHA, 2022b; ReliefWeb, 2022) and the IDPs camps in Mogadishu, Baidoa, and Dhuusamarreeb (OCHA, 2022b).

Conflict in Somalia interacts with climate stressors and issues of natural resource management, which is key to this analysis. However, considering that Somalia’s domestic production of staple foods meets less than one-fourth of its food needs, production resources are only a piece of overall food security.

The effects of conflict are transmitted through various channels, such as input markets for seeds and fertilizer, availability of support extension services, food processing and marketing capacities, informal taxation, access to financial services, and disruptions to infrastructure and transportation.

In urban and semi-urban areas, mobile pastoralist and agro-pastoralist IDPs from rural regions have to adapt livelihood strategies in the absence of accessible farmland, which often implies a restructuring of gender roles within families (OCHA, 2021). With a lack of adequate skills to navigate the urban environment, as well as the unavailability of strong supporting clan networks, many IDPs eventually find jobs as casual laborers, adding to the already high number of people experiencing extreme poverty in urban settings (UN Somalia, 2020; OCHA, 2021). The COVID-19 pandemic has further exacerbated the humanitarian needs and economic destitution of IDPs due to a sharp decrease in employment opportunities, also in the informal sector (OCHA, 2021). As a response to the loss of their credit sources, jobs, and their community-based safety nets, IDPs have been reported to often resort to risky and negative coping strategies such as indebtedness; sale of essential assets like livestock; child labor; child abandonment; and child marriages (OCHA, 2021).

There is also a need to identify the relationship between food and power in rural areas and how these dynamics influence the sale of land, displacement, and other business dealings (Jaspars & Majid, 2020). These impacts can be both chronic, for instance through a reluctance to invest in the area, provide essential services, or the prevailing pattern of land use, or more acute, including the impact even minor clashes can have on access and travel to markets and on the price of inputs and food.

At a time when more nations are simultaneously experiencing fragmented violence and multiple other threats to food security, such as disease, pests, and climate change, it is necessary to have a clear methodology for mapping the causal chains that results from conflict and the leverage points where food systems can be made stronger and more efficient while potentially addressing the root causes of systemic violence. Currently, conflict early warning is weak, and discussion of conflict as a “contributing factor” to food security outcomes minimize its relevance if it is even included in analysis altogether (Maxwell and Hailey, 2020). The more specific humanitarian concern is not so much to predict conflict itself, as it is to systematically consider and incorporate the consequences of conflict into early warning for specific humanitarian outcomes.

3.2.2. CONFLICT ANALYSIS OVERVIEW

The transfer of power to the new President of the Federal Republic of Somalia, Hassan Sheikh Mohamud, on 15 May 2022, though peaceful, ended a long pre-election period marked by a series of postponements, violent tensions, and political infighting (Al Jazeera, 2022b; Hujale, 2022). Starting in 2020, the electoral process for the renewal of both the parliament and the presidential office generated divisions within the central government and reignited long-running hostilities between the center and the federal states, specifically over the reform of the electoral system, interferences in state elections, and delays in arranging long overdue voting in the country (Al Jazeera, 2021a; Carboni, 2021; Al Jazeera, 2022d). Anti-government demonstrations sparked at the end of 2020 and continued in 2021 and 2022 in different regions of Somalia. These were particularly prominent in the capital Mogadishu, where they often took a violent turn, with clashes between security and armed opposition forces as well as violent attacks on peaceful protesters (Al Jazeera, 2021b, 2021c; Carboni, 2021; Al Jazeera, 2022c; Sheikh, 2022). Violent clashes also erupted between state and government forces at regional level and between clans loyal to different political factions at local level (Carboni, 2021).

Taking advantage of the political crisis, Al-Shabaab (AS) further destabilized the pre-electoral process by staging recurrent violent attacks on government targets and foreign security forces, especially in Mogadishu, where the Federal Government of Somalia (FGS) continues to retain control over the territory of the capital (Al Jazeera, 2022a). South-Central Somalia remains the center of the long-lasting fight against the Islamist group, whose strength is particularly significant in rural areas. Since the deadly hotel attack by AS in Mogadishu in August 2022, the Somali government has been carrying out an all-out operation against the insurgents supported by local clan militias and foreign forces (Faruk, 2022). The recent military offensive against AS has been aiming at regaining government control in the regions of Hiraan, Galgaduud, Bay, Lower and Middle Shabelle, and Mudug (ACLED, 2022b, 2022d). In response to this operation, AS has lately increased attacks on government targets, local militias, ATMIS forces (i.e., the African Union Transition Mission in Somalia) as well as civilians, especially in the regions of Lower Shabelle, Lower Juba, Hiraan, and the capital region of Banaadir (ACLED, 2022c, 2022b, 2022d).

These conflict dynamics have been unfolding against the backdrop of a severe humanitarian crisis driven in large part by the extreme drought currently engulfing

the Horn of Africa (Anyadike, 2022). In a region with high levels of violence and insecurity, the current crisis affecting large swathes of South-Central Somalia has contributed to escalating communal clashes among pastoralists/agro-pastoralists over access to ever scarcer resources at the local level (OCHA, 2021).

A fuller discussion of conflict dynamics and actors can be found in the individual country report.

3.3. SUDAN

3.3.1. FOOD SYSTEM OVERVIEW

The November 2022 *Food Security Outlook* for Sudan notes several ongoing and compounding macroeconomic factors that have undermined the current harvest season, including shortages of agricultural inputs, above average food prices, and weakening household purchasing power (FEWS NET, 2022b). The resulting food environment is contributing to IPC Phase 2/3 outcomes across the country. While access to food tends to improve in Sudan as the harvest gets under way, high production costs that have carried over from 2021 are putting negative pressure on both producers and consumers (WFP, 2022b). Notably, the one area experiencing emergency (IPC Phase 4) conditions, Abyei, is suffering from concentrated violence and displacement that has limited access to markets and reduced incoming food supplies. The situation across Sudan is also leading to below average winter planting, which is further regionally influenced by poor weather conditions and pests (GEOGLAM, 2022).

More broadly, Darfur and other states have experienced renewed inter-communal clashes as nearly two decades of protracted conflict have been, in part, fed by high food and fuel imports, poor agricultural prospects, and multiple overlapping crises that span the economic, political, and environmental spheres. Baked into these outcomes are millions of conflicted-affected people and IDPs who will be most affected when food stocks dwindle. Where distributions of seeds and farm inputs, food assistance, and cash transfers are critical to reducing negative coping strategies and staving off mass hunger, these assistance measures are imprecise tools for maintaining a functioning food system and falter when environmental factors.

Concern's team in Sudan highlights how current conflicts in Sudan occur at the ethnic, tribal, sub-tribal, clan, and sub-clan levels, as well as directly between groups of farmers and herders in competition over

natural resources. Other in-country research further investigates the major drivers of inter- and intra-communal violence, reasons for people joining armed rebel groups, and how livestock and agricultural-based livelihoods cope with the insecurity of resource disputes (Young et al., 2005; Satti, 2020). But there is a need to explore whether different types of violent conflict differently impact specific parts of the food system and to what extent. Particularly as humanitarian and development actors focus on peacebuilding and natural resource management activities as long-term solutions to reducing conflict and creating stability, it is necessary to identify the production to marketing to consumption linkages that break down under conflict and that could be restored in a more secure and resilient system.

3.3.2. CONFLICT ANALYSIS OVERVIEW

Following the end of the UNAMID mandate on 31 December 2020 in Darfur, there has been an increase in large-scale attacks on civilians in both urban and rural areas of West Darfur by militia groups active in the region (PBF Sudan *et al.*, 2021a; ACLED, 2022; HRW, 2022). It has been reported that looting and attacks on villages of farmers and IDP camps by militias have led to widespread intercommunal tensions between the agro-pastoralist and farming communities, especially in the localities of Kereinik, El Geneina, Kulbus, Sirba, and Jebel Moon (OCHA, 2021a, 2021b, 2022d; ACLED, 2022; HRW, 2022). It is understood that armed Janjaweed militias are primarily involved in these episodes of violence and it is believed that they are supported by the paramilitaries of the Rapid Support Forces (RSF) (ACLED, 2022; Radio Dabanga, 2022i, 2022n). Identity politics based on ethnic affiliations of agro-pastoralist and agriculturalist communities play a key role as mobilizing factors in these disputes over regional governance, land and natural resources, eventually shaping their course and perceptions. Similar conflicts have been taking place in other regions of Darfur and in other states of the Sudanese federation such as South and North Kordofan (ACLED, 2022; OCHA, 2022a).

As a result of these large-scale clashes, an ever growing number of people are being displaced in neighboring localities and to Chad since 2021 leading to a renewed displacement emergency in West Darfur (Aljazeera, 2022; OCHA, 2022b). Security remains fragile in the region notwithstanding the deployment of a joint security force composed of the Sudan Armed Forces (SAF), the Central Reserve Police, and the Rapid Support Forces (RSF) since 21 January 2022

(OCHA, 2022c). Following the signing of a series of RSF-backed reconciliation agreements between agro-pastoralist and farming communities in West Darfur since June 2022 to end intercommunal tensions, the RSF paramilitaries have launched a mass detention campaign in the region targeting community leaders that have been refusing to support or have been withdrawing from their reconciliation initiatives. In this ongoing campaign, the RSF have also been targeting teachers, students, and activists and there have been reports of forced disappearances (Radio Dabanga, 2022b, 2022g, 2022c, 2022d, 2022k).

Subnational conflicts in peripheral territories of Sudan are unfolding against the backdrop of a national political crisis, developed in the aftermath of the military coup of 25 October 2021, which stalled the difficult transition to democratic rule that had started with the end of the al-Bashir regime in 2019. This has reignited a new nation-wide cycle of violence in the capital Khartoum and other major cities of Sudan, where protests for democracy and the establishment of a civilian government are being met with intense repression from the security forces (Burke and Salih, 2022).

A fuller discussion of conflict dynamics and actors can be found in the individual country report.

4. RESULTS

4.1 REVIEW OF LITERATURE

A growing body of research examines the links between armed conflict, food security, and food systems. These identify the two-way relationship between food price and conflict, and the influence of excessive risks on transport, harvest, and market security costs (Raleigh et al., 2015; Weinberg & Bakker, 2015; Ismail, 2021). Other authors focus on how conflict reduces regional food availability by destroying productive assets and infrastructure and creates security risks associated with accessing food markets thus driving up local prices (Bora et al., 2010; Kah, 2017). But disentangling existing structural challenges—e.g., input supply disruptions, seasonal price volatility, or investment risk aversion—from those caused by conflict, particularly in places where armed violence is a constant in everyday life, can be difficult.

The review of literature we undertook examined the available evidence on the multi-scalar effects of conflict on food system outcomes, specifically looking beyond the food security impacts and investigating the cumulative interactions from production to consumptions. Using observational and network analysis methods to synthesize the searched evidence on conflict's interactions with food systems, we

assess key thematic, sectoral and geographic areas of consensus in the present research, along with gaps and relatively under-studied phenomena, to identify key opportunities for advancing understanding of this critical relationship.

Following our data extraction framework (detailed in Section 2.5.1), our final dataset included 3,505 discrete causal claims, coded from 131 studies. Applying the analytic strategy described above, we present these findings first through descriptive statistics followed by network analysis. Table II summarizes the 3,505 causal claims extracted from the literature into 29 thematic consolidation terms. The top five thematic areas are: conflict and violence (1,563 observations), agricultural assets and activities (747), food security (523), displacement and migration (365), and trade and markets (340). The bottom five thematic areas are: mortality (51 observations), labor and employment (46), other services (36), other infrastructure (30), and peace and peacebuilding (11).

Table II. Frequency of themes (consolidation terms) identified in literature

Theme	Frequency
Conflict and violence	1,563
Agricultural assets and activities	747
Food security	523
Displacement and migration	365
Trade and markets	340
Government and politics	289
Food access	275
Health	273
Food supply	243
Household income, assets and resources	240
Aid	230
Natural resources	226
Other livelihood/economic activities	208
Land use	190
Climate and disasters	188
Transport and mobility	150
Armed group control and activities	148
Destruction of resources	146
Community and social cohesion	145
Other food system assets and activities	81
Coping	70
Disputes and unrest	69
Energy	64
Business, finance and investment	63
Mortality	51
Labor and employment	46
Other services	36
Other infrastructure	30
Peace and peacebuilding	11

Table III classifies the causal claims in the literature based on the sector of the food system to which they relate: production, processing, distribution, or consumption, with some claims coded as relating to multiple components of the food system (multiple), and some unrelated to these components. Production variables receive the greatest attention in the literature (966 observations), followed by claims which refer to multiple food system areas (677). Food processing receives the fewest references (7), far behind distribution (395).

Table III. Frequency of food system components identified in literature

Food System Focus	Frequency
Production	966
Consumption	523
Distribution	395
Processing	7
Multiple	677
N/A	438

Table IV captures geographic dimensions of the evidence, coded to the geographic region to which they relate, with the aim of identifying which regions are relatively well-represented, and which are less so, in scholarship on this subject. Regionally, Africa is by far the most represented in the literature surveyed, with over 1,717 claims, or almost half of all coded. This is followed by claims related to more than one region (696) and then by Asia and the Pacific (334).

Table IV. Frequency of geographic regions referenced in literature

Geographic region	Frequency
Africa	1,717
Asia and the Pacific	334
Eastern Europe	33
Latin American and Caribbean	224
Western Europe and Others	2
Multiple	696
N/A	499

Table V summarizes the centrality of the 20 most common variables (by frequency) found in the analyzed research literature. By nature of our methodology, armed conflict had the most interrelations (327), preceding food security, which had more than 100 fewer degree centrality connections but held the greatest eigencentrality score (1.0). Of all the downstream food system variables, agricultural production holds very clear influence in the conflict discourse, as both its degree of centrality and eigencentrality closely follow food security, while food prices and food availability also have relatively high degree centrality values.

Our analysis ultimately points to three trends. First,

within food systems research, studies are heavily focused on production, with relatively less attention to conflict's effects on aspects including transport, trade, and household utilization. Second, geographically, food systems within Africa and at the country-level – as opposed to, inter alia, transnational or local systems – are well-represented in existing research, at the expense of other geographic regions and scales. Third, specific modalities of violence are often under-specified in literature on conflict and food systems, where we observe a tendency to aggregate discrete forms of insecurity and unrest which plausibly have distinct impacts on food systems.

Table V. Centrality of 20 most frequent variables (ordered by degree centrality)

Variable	Degree Centrality	Eigencentality
Armed conflict	327	0.65
Food security	184	1
Agricultural production	138	0.80
Displacement	108	0.33
Food prices	95	0.58
Food availability	93	0.63
Civil war	75	0.41
Violence (general)	69	0.29
Agricultural production (food crops)	63	0.44
Food aid	63	0.18
Access to food	58	0.47
Income	53	0.45
Access to agricultural land	46	0.27
Communal conflict	44	0.21
Security (general)	42	0.16
Livestock	41	0.32
Access to water	40	0.21
Drought	32	0.07
Poverty	32	0.36
Market activities	30	0.17

4.2. FCM MAPPING

Figures 1-3 visualize the Fuzzy Cognitive Map (FCM) for conflict and the food system in Haiti, Somalia and Sudan, respectively.

Each box represents a component (node) in the system, connected to other components through directional relationships (edges) represented by arrows. Blue arrows represent positive relationships (when one component increases, it is associated with an increase in the other component to which it points) while brown arrows represent negative relationships (when one component increases, it is associated with

a decrease in the other component to which it points). The direction of the arrow represents the component driving the change (the independent variable). Although not visually represented in the maps below, each relationship (edge) is also weighted according to the relative importance of that relationship: in other words, the relative importance of the independent variable, driving change in the dependent variable.

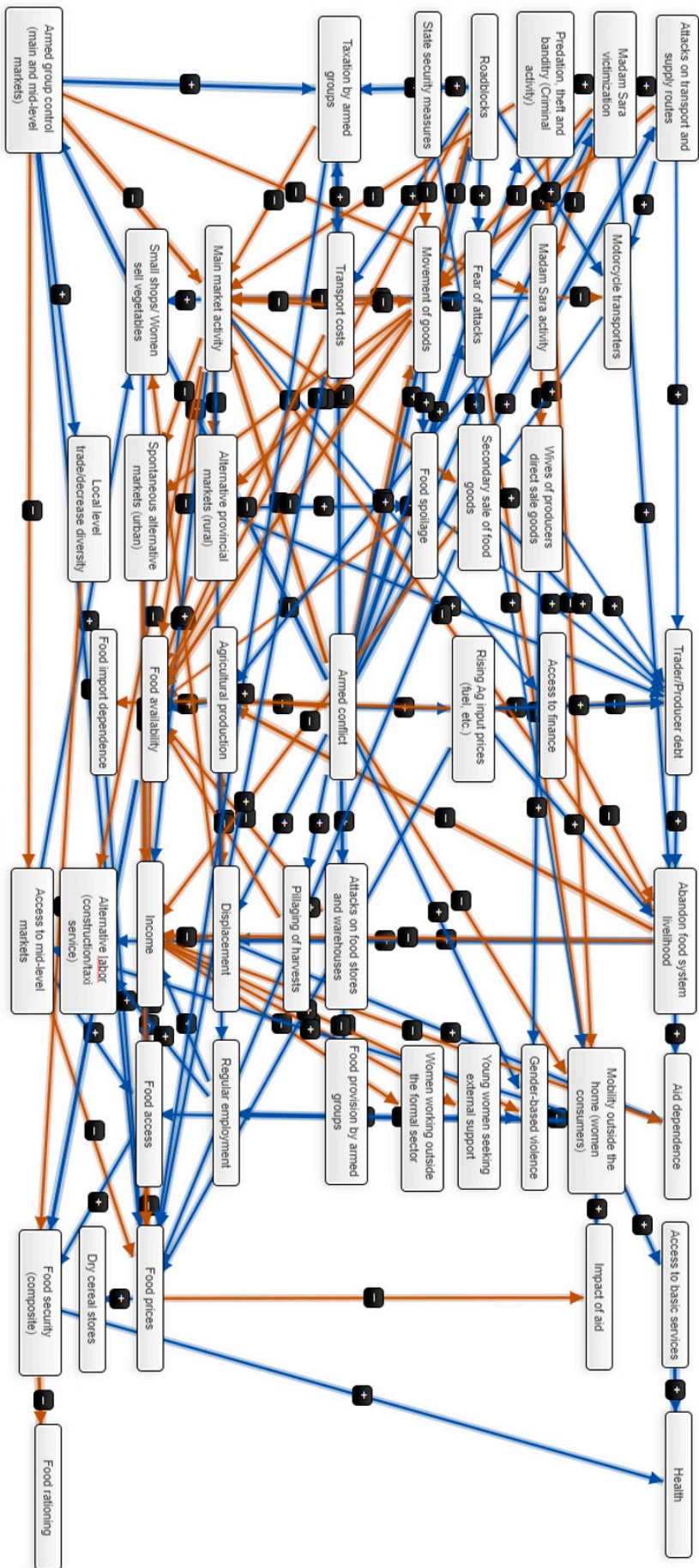


Figure 1. Fuzzy Cognitive Map of Conflict and Food Systems in Haiti

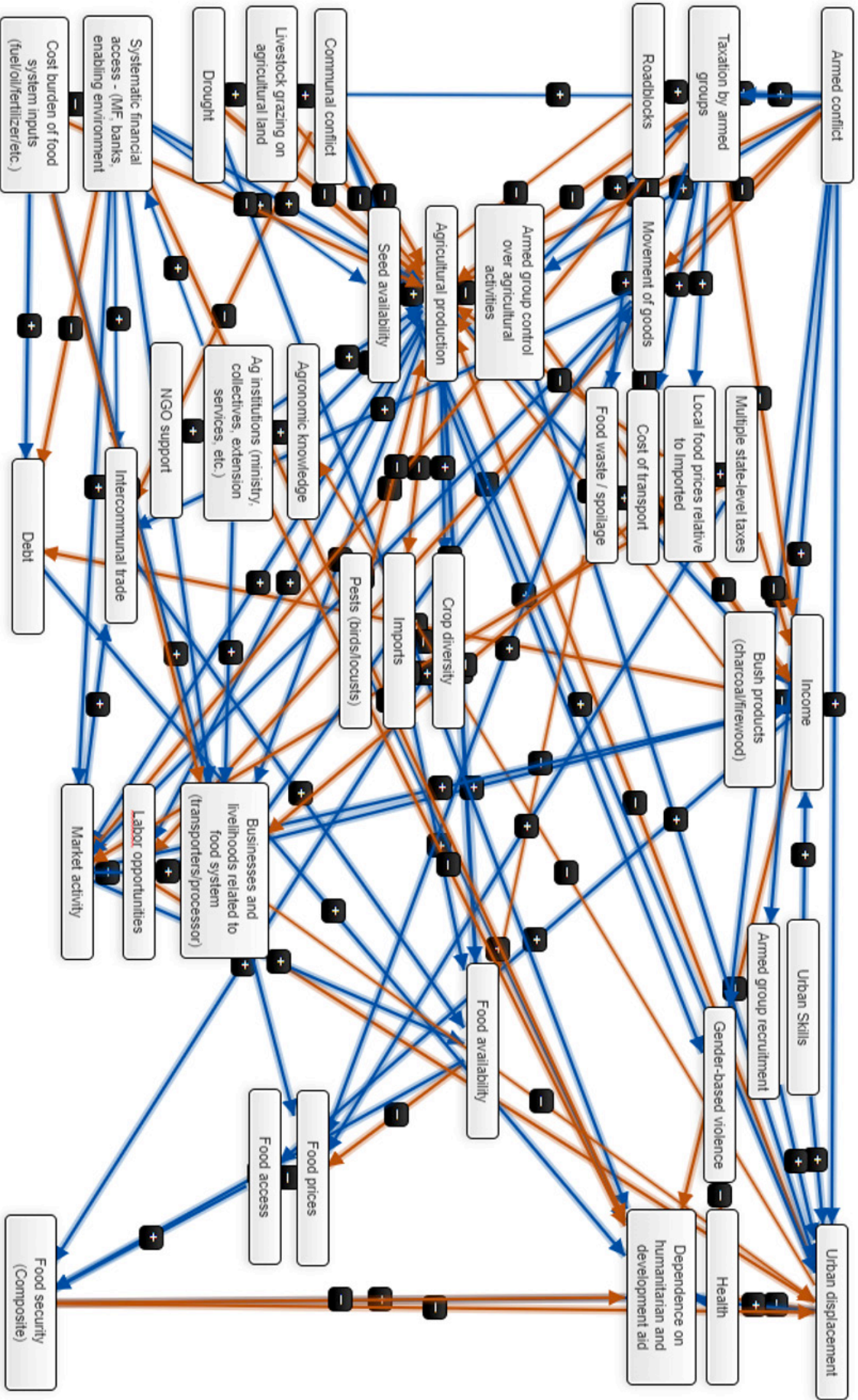


Figure 2. Fuzzy Cognitive Map of Conflict and Food Systems in Somalia

4.1.1. MOST-CONNECTED COMPONENTS

Table VI summarizes the most connected (central) components in the Haiti, Somalia and Sudan food system Fuzzy Cognitive Maps (FCMs).

All three country contexts share some common highly connected factors. These include, unsurprisingly, armed conflict. Beyond this central factor, however, primary or main market activity features in all three countries, highlighting the pivotal role large, central markets play,

and the subsequent critical importance of market integration in a context where the secondary or tertiary (usually, local) markets may be disrupted, intermittent and/or insufficient to meet the nutritious food needs of consumers.

Somalia and Sudan share three further features in common: agricultural production, income and displacement, while food prices and the movement of goods are more central in Haiti.

Table VI. Top Most Connected (Central) Components in Haiti, Somalia and Sudan Food System FCM

Country	Map Density	Total Components (Nodes)	Total Connections (Edges)	Top Three Most Connected Components	Centrality	Eigencentality
Haiti	.058	50	136	Main market activity	17	1
				Armed Conflict	16	.92
				Movement of Goods	12	.77
				Food prices	12	.54
				Food availability	11	.64
Somalia	.073	39	108	Agricultural production	22	1
				Urban displacement	12	.57
				Income	12	.56
				Market activity	10	.59
				Armed conflict	10	.50
Sudan	.056	49	133	Armed conflict	23	1
				Income	15	.7
				Agricultural production	14	.69
				Primary markets activity	11	.49
				Displacement	11	.60

4.1.2. SCENARIOS

In addition to visualizing and weighting the relative importance of factors in the Haiti food system, the FCM approach also facilitates an analysis of scenarios if specific factors were increased or reduced by a certain amount.

For example, across all three country contexts, a scenario which sees a reduction of 20% in armed conflict has widespread and significant impacts across the food system (see Figures 4-6 4).

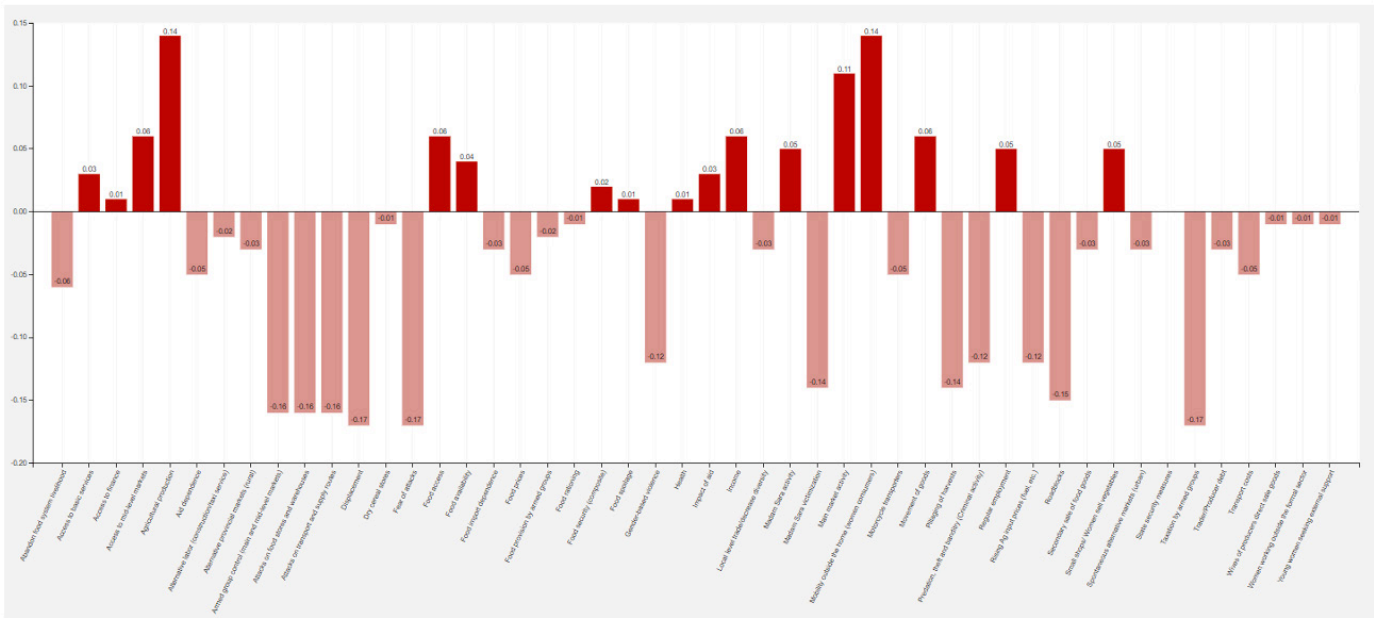


Figure 4. Fuzzy Cognitive Map of Haiti Food System Scenario: Impacts of Reduction of Armed Conflict by 20%

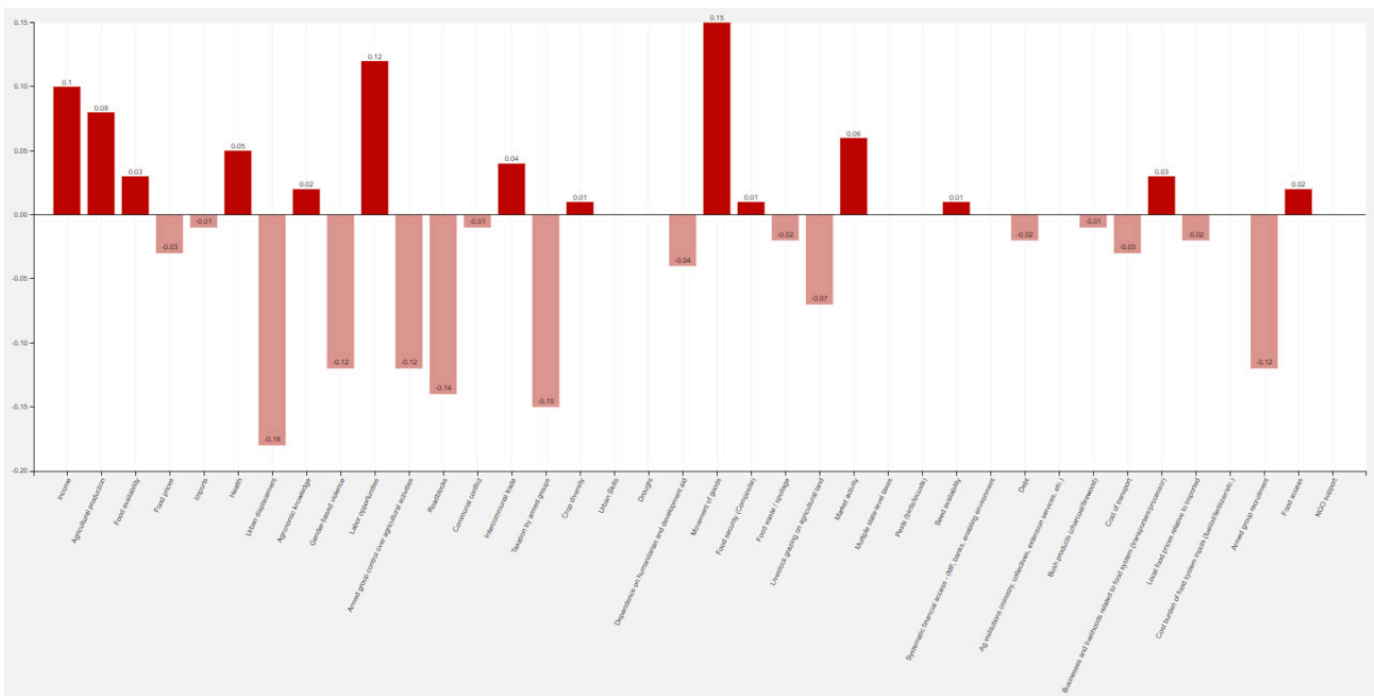


Figure 5. Fuzzy Cognitive Map of Somalia Food System Scenario: Impacts of Reduction of Armed Conflict by 20%

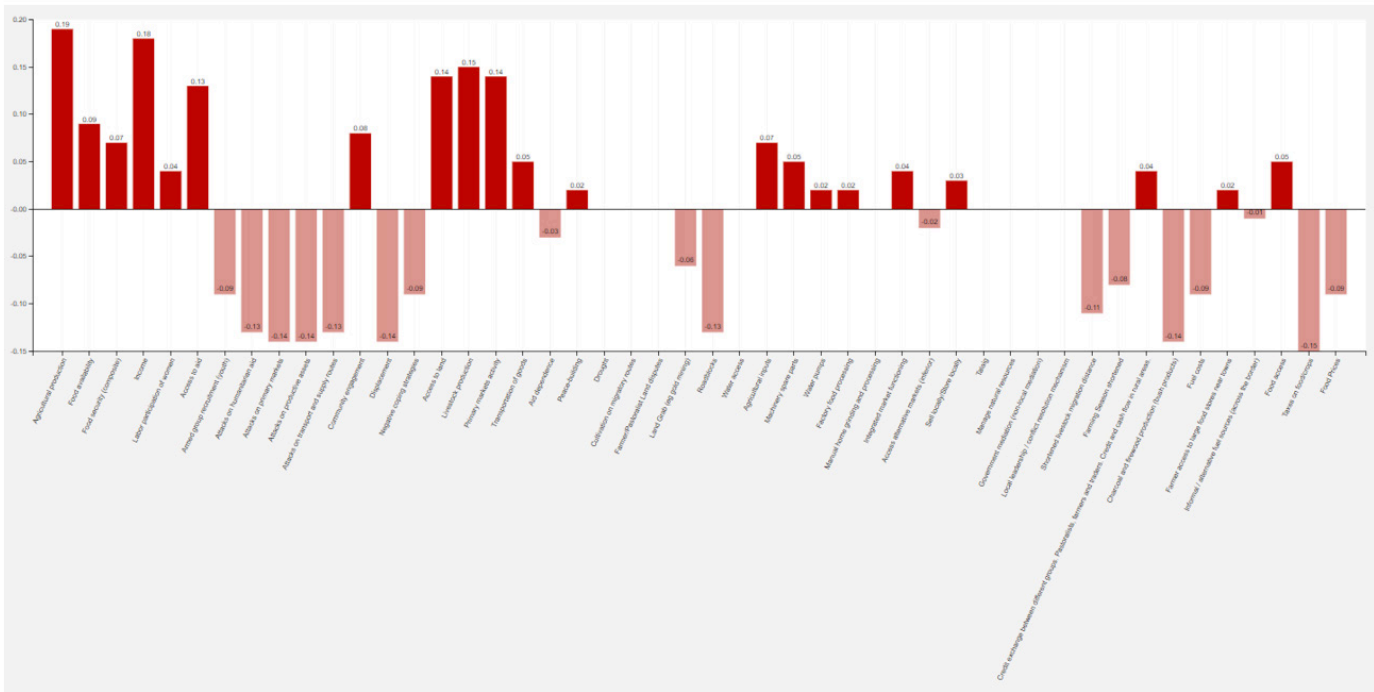


Figure 6. Fuzzy Cognitive Map of Sudan Food System Scenario: Impacts of Reduction of Armed Conflict by 20%

Among the most notable of the impacts of a reduction of armed conflict by 20% in each scenario are:

- **Haiti:** Increases in access to mid-level markets and mobility for women outside the home (both increased by 14%), and reductions in taxation by armed groups, fear of attacks and displacement (all reduced by 17%);
- **Somalia:** Increases in movement of goods (15%) and labor opportunities (12%), and reductions in urban displacement (-18%), taxation by armed groups (-15%) and roadblocks (-14%); and
- **Sudan:** Increases in agricultural production (19%), income (18%) and livestock production (15%), alongside reductions in taxes on food and crops (-15%), and attacks on primary markets, attacks on productive assets, displacement, and reliance on bush products such as charcoal (all -14%).

While a reduction in armed conflict generally may be highly desirable, it is likely beyond the scope of any individual organization to achieve a reduction of this size. However, the food system map can still illustrate the sizable effects of more specific and concrete changes. For instance, roadblocks and disruptions to the movement of goods were a prominent theme across all three country contexts. This is most notable in Haiti, where movement of goods features among the top three most connected factors (see Table I), but the same theme recurred in both Somalia and Sudan maps, and in qualitative consultations and across survey data in all contexts (discussed further below).

In Haiti, a reduction of approximately 20% in the significance of roadblocks results in decreases across the food systems map in fear of attacks (-11%); taxation by armed groups, and reliance on motorcycle transportation (both -14%); and transport costs (-16%). Meanwhile, we see significant increases across movement of goods (an improvement of 5%) and food availability (8%) - see Figure 7.

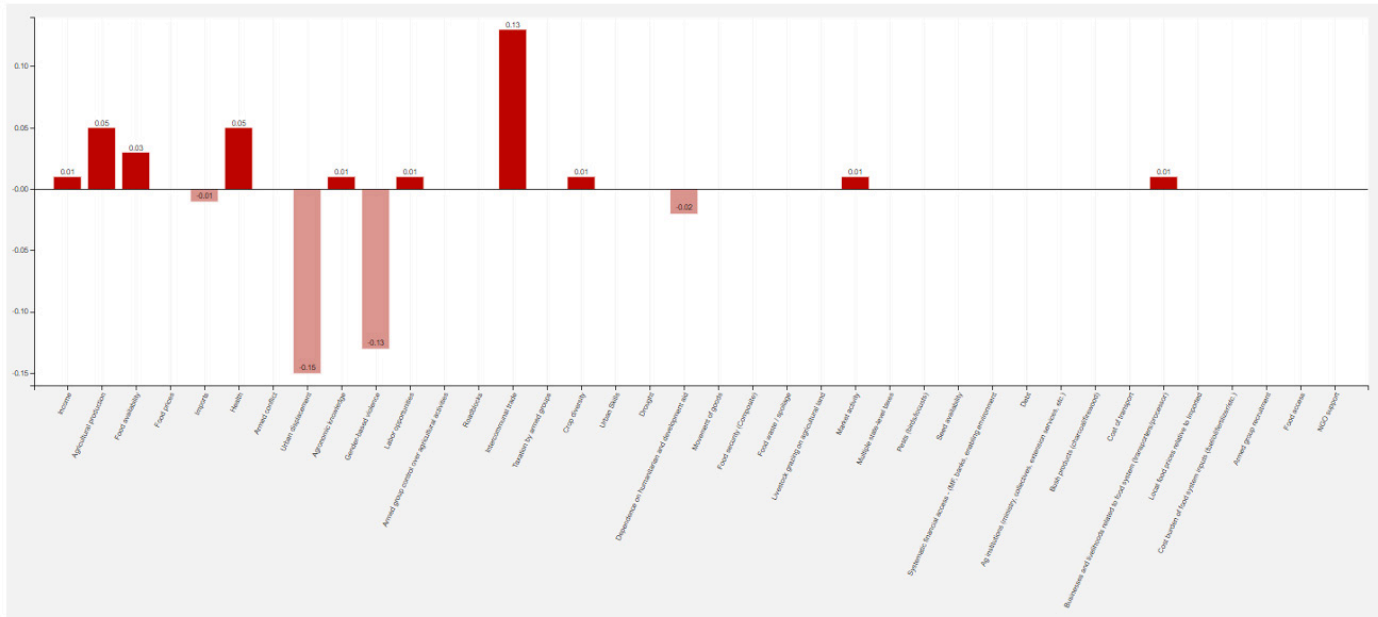


Figure 10. Fuzzy Cognitive Map of Somalia Food System Scenario: Impacts of Reduction of Communal Conflict by 20%

In Sudan, a similar scenario in which a suite of changes take place including a 20% reduction in pastoralist-agricultural land disputes and in cultivation on migratory routes, alongside an 20% increase in credit exchange between different communities, result in wide-ranging impacts across the system (see Figure 11). These include increases in both livestock and agricultural production (9% and 7%, respectively), and a reduction in armed conflict more generally (-8%), attesting to the interconnected nature of different forms of violence and unrest in the context.

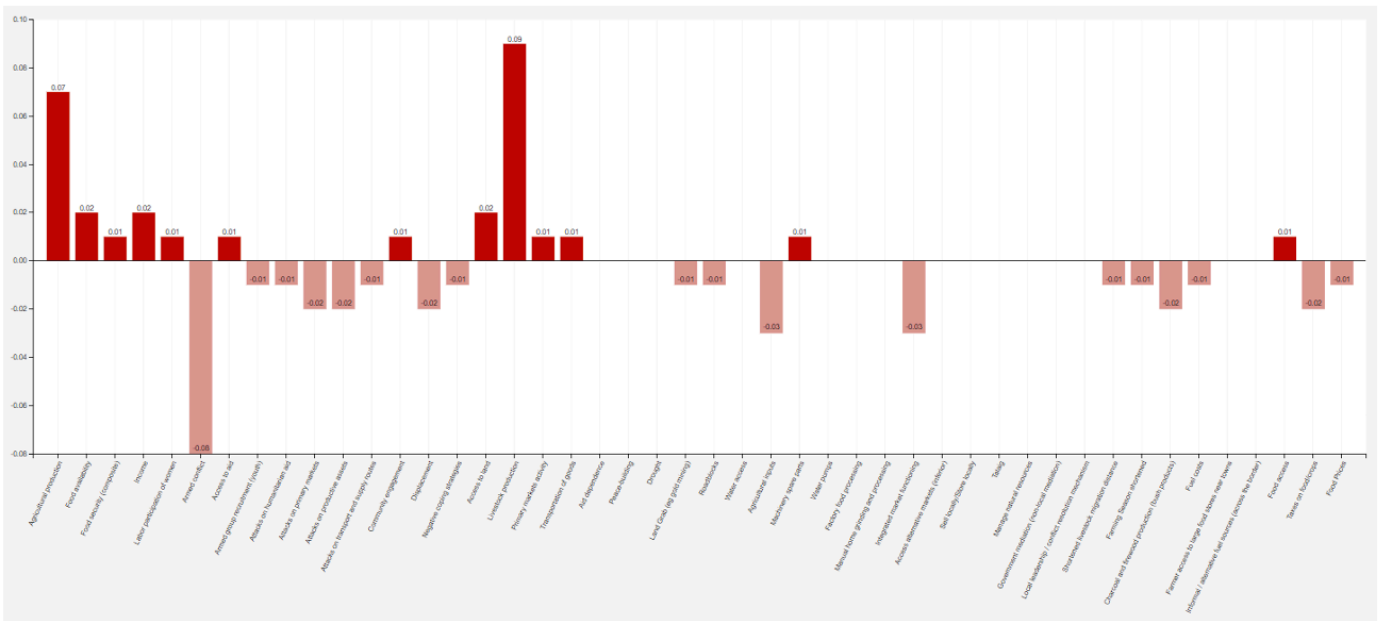


Figure 11. Fuzzy Cognitive Map of Sudan Food System Scenario: Impacts of Reduction of Land Disputes and Cultivation on Migratory Routes by 20%, and Increase in Credit Exchange between Groups by 20%

4.2. SURVEY TRIANGULATION

Table VII summarizes the top five most-affected factors by conflict, as reported by survey respondents in each country context.

Table VII. Top Five Most-Affected Factors by Conflict Reported by Survey Respondents, in Haiti, Somalia and Sudan Food System FCM

Rank	Haiti	Somalia	Sudan
1	Sale of household assets (16.4%)	Forced displacement (24.9%)	Taxes on food and crops (21.9%)
2	Grazing or livestock activity (12.7%)	Prices for imported foods (23%)	Sale of household assets (9.8%)
3	Planting and harvesting activity (12.5%)	Prices for local foods (22.2%)	Planting and harvesting activity (8.5%)
4	Migration (8.8%)	Unemployment or informal employment (7.7%)	Forced displacement (7.7%)
5	Forced displacement (7.8%)	Processing of food (7.6%)	Roadblocks or checkpoints (7.6%)

4.2.1. GENDERED IMPACTS IN HAITI

In assessing the impacts of conflict on women's participation in the food system in Haiti, over one-in-five (22.5%) survey respondents strongly agree with the statement, "Thinking about your own community [...] Conflict results in more women needing to compensate for household income," while over three-in-five (61%) agreed with the statement. Responses were comparable across the sex of respondents (a finding that was confirmed with statistical analysis, $p=0.799$). Disaggregation by location, however, reveals important differences: in both Cité Soleil and Martissant, over 30% of respondents strongly agree with the statement; followed by 21% in Center Ville; but only 5-8% in Varreux 1, Varreux 2 and La Gonave (a finding that was confirmed with statistical analysis, $p<<0.001$).

Just under 30% of respondents strongly agreed with the statement, "Thinking about your own community [...] Conflict results in fewer women selling food in the market," followed by over 55% who agreed. Responses were very similar across male and female respondents (a finding that was confirmed with statistical analysis, $p=0.597$); while urban respondents were more likely to strongly agree with the statement (31.4% compared to 24.1% among peri-urban counterparts) (a finding that was confirmed with statistical analysis, $p=0.033$). This difference is driven by a higher share of urban women in particular who strongly agree with this statement (31.7% compared to 23.1% among peri-urban counterparts), with no discernible difference among

urban and peri-urban male respondents (both at 28.6% strongly agreed).

Considering the specific role of Madan Saras¹ in the food system, just under two-in-five (38.5%) of respondents strongly agreed with the statement, "Thinking about your own community [...] Conflict results in fewer Madan Saras bringing food into the urban areas," followed by 46.2% who agreed. Responses are comparable across male and female respondents (a finding that was confirmed with statistical analysis, $p=0.8299$); while urban respondents were more likely (40.8%) to strongly agree than peri-urban counterparts (34%) (a finding that was confirmed with statistical analysis, $p=0.035$). This impact appears to be particularly acutely felt in Martissant and Cité Soleil, where 55.8% and 50.9% of respondents respectively strongly agreed; followed by Center Ville (33.4%), La Gonave (23.7%), Varreux 2 (20%) and Varreux 1 (15.4%). Statistical analyses confirmed the observed differences between cities ($p<<0.001$).

A quarter of respondents (25.1%) strongly agreed with the statement, "Thinking about your own community [...] Conflict results in more women migrating to urban centers," followed by 51.1% who agreed. Responses are broadly similar across male and female respondents (29.3% of male respondents strongly

¹ Madan Sara are women who work to buy, distribute, and sell food within Haiti. Madan Saras are considered a critical component of the Haitian economy.

agreed, compared to 24.4% of women respondents; a finding that was confirmed with statistical analysis, $p=0.549$), while respondents in urban areas were notably more likely to strongly agree (29.1%) than their peri-urban counterparts (17.4%) (a finding that was confirmed with statistical analysis, $p=0.0001$). As above, location is a key factor, with over one-third of respondents in Martissant (35.7%) and Cité Soleil (33.8%) strongly agreeing, compared to 25.4% in Center Ville, 15.8% in La Gonave, 7.7% in Varreux 1 and 3.9% in Varreux 2. Again, statistical analyses confirmed the observed differences between cities ($p<<0.001$).

The findings highlight how women's mobility and capacity to traverse urban and peri-urban nodes in the food system appear to be profoundly affected by conflict in multiple ways. This is occurring at precisely the same time that many women report increased pressure to compensate for lost household income. Direct programming activities which seek to strengthen women's protection in these contexts, and/or advocacy initiatives which seek to raise awareness and shape the policy environment surrounding women's rights and vulnerability to violence, could be helpful in creating a more enabling environment for women's meaningful inclusion and participation in the food system.

4.2.2. DISPLACEMENT IN SOMALIA

Overall, 95.8% of survey respondents either strongly agree, or agree, with the statement: "Thinking about your own community [...] Displacement into the community causes more violence and insecurity." These are almost exactly split by strongly agree (48.4%) and agree (47.4%) with an almost negligible minority disagreeing (3.5%) or strongly disagreeing (0.74%). Across the self-reported impact of displacement on communities, respondents who reported being 'Very Badly' affected were no more likely to strongly agree with the statement than those 'Badly' and 'Slightly' affected (47.6% compared to 52.2%, respectively), though they were considerably more likely to agree (51.5% compared to 27.5%, respectively) and noticeably less likely to disagree (0.3% compared to 18.8%, respectively).

There are no significant, discernible patterns across respondent household size, sex or age (see tabs 16b, 16c, and 16d, respectively). However, there are differences by location: respondents in Karan and Bondhere were almost twice as likely to strongly agree with the statement, than those in Wadajir (see Table II). This observation was confirmed with statistical analyses, indicating a statistically significant difference by location ($p>>0.001$).

Table II. Responses to Whether Displacement Causes More Violence, by Location

Displacement Causes More Violence	Wadajir (n=171)	Karan (n=167)	Bondhere (n=67)
Strongly agree	32.2%	59.9%	61.2%
Agree	66.7%	31.7%	37.3%
Disagree	0.6%	7.8%	-
Strongly disagree	0.6%	0.6%	1.5%

In terms of livelihoods, respondents who reported their communities to be relatively less severely affected by forced displacement were consistently more likely to disagree with statements on forced displacement disrupting livelihoods (either requiring displaced populations to seek new livelihoods or move to areas in which there are no livelihood options available to them). This may indicate that either these respondents reside in communities where livelihood options are relatively accessible to displaced populations (and therefore, they do not see these significant disruptions), or it may be a function of the perception of relatively less displacement-affected populations that displacement is not so disruptive to livelihoods

(regardless, potentially, of the reality). Further analysis into the extent to which this is conditioned by location and/or potentially a function of (mis)perception on the part of less affected populations, would be valuable in informing interventions that may better connect displacement-affected and less-affected communities in food systems interventions.

It is important to note that these differences – particularly in the level of disagreement with the statements – may in part be a function of how the question is framed (for example, those likely to perceive their communities as 'very badly' affected by displacement – itself, a negative characterization – may be systematically more likely to associate displacement

with violence than those ‘Badly’ or ‘Slightly’ affected). However, bearing this caveat in mind, the results point to the potential value of social cohesion and peacebuilding activities within and across severely displacement-affected communities.

Lastly, in considering the profile of those affected by forced displacement, there is relatively high consensus across respondents that ‘Conflict displaces more women and girls than men and boys’ (with 94.3% of respondents agreeing, and no notable differences across respondent sex); and that ‘Conflict displaces younger people more than older people’ (with 94.8% agreeing, and no notable differences across respondent age group). Together, these point to the potential importance of tailoring interventions for displacement-affected populations at young people, and young women in particular, as a way of reaching the most-affected.

4.2.3. PEACEBUILDING AND NATURAL RESOURCES IN SUDAN

In Sudan, overall, 27.9% of respondents strongly agreed with the statement, “Thinking about your own community [...] Conflict reduces the ability to maintain/access agricultural land,” followed by 60.2% who agreed. Male respondents were more likely to strongly agree than women counterparts (32.8% and 25.7%, respectively), while older respondents were more likely to strongly agree than younger people (21.4% of respondents 29 and younger strongly agreed, rising to 30.9% among respondents 30-59, and 35.1% among respondents 60 and older). Meanwhile, responses were broadly comparable across locations. A similar pattern is found in responses to the statement, “Thinking about your own community [...] Conflict reduces the ability to build/access water infrastructure.”

Just under two-fifths (39.7%) of respondents strongly agreed with the statement, “Thinking about your own community [...] Conflict is caused by disputes over natural resources,” followed by 41.5% who agreed. Male respondents were more likely to strongly agree than women counterparts (48.2% compared to 36%), while older respondents were more likely to strongly agree than younger respondents (with 31.7% of respondents 29 and under strongly agreeing, rising to 44.4% among 30-59-year-olds, and 45.3% among those aged 60 and over).

Just under one-fifth of respondents (17.7%) strongly agreed with the statement, “Thinking about your own community [...] Conflict over natural resources is exacerbated by climate change,” followed by 58.6%

who agreed. Male respondents were slightly more likely to strongly agree than women counterparts (20.2% compared to 16.6%, respectively), while younger respondents were less likely to strongly agree (at 13.8% of respondents 29 and younger, rising to 20% among those 30 and older).

Together, this pattern of responses suggests that older, male respondents are more acutely concerned with conflict’s impacts on agricultural land access, and on the role climate change and natural resources play in driving and exacerbating conflict. Meanwhile, younger respondents and women respondents are less likely to highlight these factors. Further research into the drivers that women and younger community members perceive as key to conflict would be particularly valuable in understanding how vulnerable groups navigate conflict’s impacts on the food system, and how to engage them in peacebuilding efforts that seek to address climate-related factors.

Turning to the potential impact of peacebuilding on these factors, 38.4% of respondents strongly agree with the statement, “Thinking about your own community [...] Peacebuilding activities reduce conflict over natural resources,” followed by 44.9% who agree. Male respondents are somewhat more likely to strongly agree with the statement than women counterparts (44% to 36%, respectively), while younger respondents appear considerably less likely to strongly agree than older counterparts (29.5% of respondents 29 and younger, compared to 43.8% of those 30 and older). Younger respondents are also more likely to disagree and strongly disagree with this statement. This observation was confirmed with statistical analyses, indicating significant differences in views on peacebuilding activities impact on reducing conflict over natural resources by younger and older respondents.

With responses broadly comparable across location, the above pattern of responses may indicate that peacebuilding efforts have largely failed to engage and impact upon young people in a way that has had a tangible impact on conflict over natural resources. Together with the apparent diverging opinions among younger and older community members as to what drives conflict (above), consequently, considering approaches to peacebuilding that would more directly engage young people and address what they perceive as critical drivers of conflict would be valuable.

5. DISCUSSION

5.1 SUMMARY OF RESULTS

In seeking to investigate **the impact of conflict on various elements of the food system to identify those with the biggest influence on food and nutrition security amongst people experiencing extreme poverty**, the research found that:

In Haiti, conflict has a negative impact on the food system throughout the value chain from rural production to urban consumption by:

- a) Severely compromising mobility through insecurity, roadblocks, and taxation, handicapping the flow of goods and capital;
- b) Broadly impacting women that play a vital role in the food system, especially Madan Saras, but also others, leading to less food availability and market activity; and,
- c) Pushing food system actors into maladaptive coping strategies that degrade the local food system and incentivize food imports.

In Somalia, conflict has a profoundly negative effect on the food system through

- a) Crippling illegal taxation and territorial control by armed actors;
- b) Exploiting a lack of systematic supports to the local food system from the public and private sector;
- c) Magnifying the destructive forces of climate change; and
- d) Promoting maladaptive livelihood transformations that undermine the local food system and can disable their ability to recover.

Lastly, in Sudan, the most significant negative impacts of conflict on the food system were found to be:

- a) Disrupting access to natural resources (farmland, pastureland, firewood and water);
- b) Disrupting access to markets (physical and financial); and
- c) Limiting the integration of different markets (which is essential resilience mechanism for food systems)

While each of these context-specific impacts, and the recommendations to address them, are detailed further in individual country reports, the sections below highlight cross-cutting themes and commonalities across all three countries. To do so, the report distinguishes between impacts of conflict on the food system that are -

- **Connected** - complex interconnections between different nodes in the food system;
- **Cumulative** - successive, repeated exposure to specific distortions and disruptions in the food system that intensify impacts; and
- **Compounding** - combined impacts of co-occurring effects on the food system that act together to multiply impacts.

5.1.1. CONNECTED

IMPORTS AND INFLATION

Imports have an important role to play in food security by supplementing local food production with food imports as well as providing key inputs in the form of seeds, fertilizer, fuel and other humanitarian supplies that may not be available in sufficient supply locally. Food imports can help meet the need for food quantity and dietary diversity in combination with local food production but can also be harmful when suppressing local food systems. There are connections between local food production, imported food and agricultural inputs that inflation can modulate. Conflict acts to drive inflation on both agricultural inputs and local food prices to degrade local food systems. In the food system map, rising agricultural input prices contribute indirectly to food import dependence by undermining agricultural production when the cost of agricultural inputs rise. If food imports are of low-quality calories such as processed carbohydrates, they can disincentivize local nutritious food in the short term and change diets in the long term.

The cost of local foods, to make it from farm to table, is also inflated by conflict due to taxation, roadblocks and limited mobility, as described below. When imported foods are relatively lower priced and replace local foods directly, they also disincentivize local food systems. The cost of agricultural inputs also contributes to a more systematic abandonment of agricultural livelihoods, as landless producers abandon production because inputs outweigh profits, particularly when renting land.

The abandonment of food system-related livelihoods, discussed below, has a further, mutually reinforcing impact on agricultural production as it heightens import dependence, contributing to a less sustainable, more volatile and fragile food system in both the short and longer-term.

HOST AND IDP COMMUNITIES

As other humanitarian crisis research shows, host communities and IDPs often have very similar needs in acute crisis settings and this research on food security in conflict reflects very much the same, with similar pressures bearing down on both populations. Conflict has wide ranging impacts on the food system that may be felt initially by displaced and non-displaced populations in different forms, displaced populations forced from agriculturally productive areas or urban host communities observing initial impacts in markets. The surveys point out that they experience or perceive differential immediate impacts on the food system perhaps as conflict in food production activities and locations cause displacement to urban areas that may not perceive the same initial impact or find processing and trade more greatly impacted.

Yet the combined effects of conflict on the food system lead to the same pathways for food insecurity in both groups with decreased local production and availability as well as higher prices. IDPs are more often housing stressed and may have few coping capacities, making them more vulnerable, but food security interventions must recognize the shared consequences of conflict on food systems that drive their food insecurity. Finally, urban displacement puts a strain on municipal services and basic goods that also affect the host communities.

5.1.2. CUMULATIVE

ROADBLOCKS, TAXATION AND MOBILITY

While roadblocks are a direct manifestation of armed conflict, illegal taxation and mobility are closely linked. The impacts of illegal taxation and restricted mobility due to conflict accumulate throughout the food system in various ways. Their food security impacts are transmitted through a) decreased food availability by disincentivizing production and restricting the movement of goods; b) diminished food accessibility by from increased transport and production costs transmitted to consumers in higher prices; and c) poor food consumption indirectly by driving food spoilage and forcing households to depend to a greater extent

on smaller, local markets with more limited selection and often, nutritionally inferior food.

Inputs into the food system, such as seeds, oil and fuel transports from central or port cities are also illegally taxed by armed groups raising the cost of food production and processing. Armed groups may impose taxes at every stage of the food system from production to processing to transport, and trade. This burden combined with taxes from the government can add up to make food system activities prohibitively expensive or significantly diminish returns and ultimately degrade local food systems.

SPECIALIZED AND INTEGRATED MARKET FUNCTIONING

In Sudan, the specialized but integrated market functioning allows efficiencies, increased food availability and an enhanced capacity to produce and store food locally. However, the food system is very fragile due to its networked and specialized nature, and the high level of interdependence between different markets and areas producing and marketing complementary food items.

Integrated market functioning is profoundly disrupted by conflict. For example, large central markets such as Geneina are critical for many food system inputs including seeds, water pumps, pesticides, fuel, and others. Large scale processing of food items such as dried okra, dried tomatoes, groundnuts and hot pepper also requires big markets such as Geneina. Any conflict impacts on Geneina market, then, has a range of cumulative impacts throughout the food system. In some cases, there are alternative markets for inputs and for processing, but they differ in their size and function with fewer vendors and lower capacity. Trading in these secondary markets drives up costs for inputs and processing while lowering returns. Farmers also store their produce in Geneina to protect it against theft in case a conflict erupts. However, if conflict affects Geneina, then they cannot have access to their produce which leads to spoilage. Access to a larger market such as Geneina is also critical for marketing and importing specific food items, a function which is not replicated in smaller markets during periods of conflict. These markets are also important for lending and exchange of benefits between different producers, and these are also affected by market shutdowns.

Conflict also creates risk for communal tension by disrupting this integration. Normally, farmers and pastoralists can trade goods through loans, but this is undermined during conflict and raises tensions. This also affects the circulation of cash in communities,

meaning access to cash and subsequent financing is disrupted. Trade is dependent on credit and traders are expected to return to their markets to pay in due amounts, so suppliers are also affected. Finally, as various communities specialize in specific food items, any disruption in one community can lead to acute food shortage of specific items. Ultimately, these combined effects often mean that exchange of goods and services between different communities is lost.

GENDERED IMPACTS

The pervasive impacts of conflict in the food system can be illustrated by their gendered effects. Throughout the system, there are specific impacts that disproportionately bear down on women and girls on top of the general impacts that affect everyone from working on bush products such as firewood and charcoal, manually processing food in Sudan and Somalia and engaging in informal labor outside the home to supplement income in all three. Many of these activities also expose them to gender-based violence.

In Haiti, the gendered impacts of conflict's effects in the food system accumulate throughout the food value chain. In the most direct examples, Madan Saras - who play a critical role in food transport and marketing, linking suppliers to consumers - are targeted for attack. The vulnerability of these key food system stakeholders is significant, as they are exposed to the threat of kidnapping on main and secondary arteries and gun violence in key marketplaces. Consequently, the role of Madan Saras is changing, and the decline is particularly impactful on the food system: there are both fewer Madan Saras operating as key intermediaries and driving market activities, and those who remain active are often taking fewer trips (reduced frequency from twice a week to once a week) and carrying a smaller volume of goods. Past coping strategies - including Madan Saras being hosted by certain suppliers when transport was unfeasible or unsafe - still exist but are also in decline.

Further adaptations also impact women in this value chain as the wives of producers resort to the direct sale of goods which exposes them to risk when traveling outside the home. They may also take a greater role in manually processing foods when larger scale processing is hindered by cost and limited mobility. In cities, and specifically neighborhoods dominated by gangs, many women are pushed into informal labor outside the home as they may be seen as less of a target to the controlling gang. They also bear the responsibility of going to market for food and many

become informal vendors themselves when markets are compromised by conflict. Yet, these activities, as in all the roles that women play through the food value chain in conflict settings, exposes them to gender based violence.

5.1.3. COMPOUNDING

MALADAPTIVE LIVELIHOOD TRANSFORMATION

The most striking revelation enabled by this holistic mapping analysis is that food and livelihood systems are transformed by conflict into maladaptive states that undermine endogenous food systems and food security. Maladaptive cascades initiated by conflict lead to pathways that diminish, degrade or disable local food systems. Often, the coping strategy used to deal with conflict navigates people into behavior that disrupts the food system in the medium to long-term, by reducing local food production, availability and access.

As conflict drives production, processing, transport and market costs higher or simply makes transport or doing business more risky or difficult, stakeholders in the system often reduce their activity. Farmers will cope by growing less crop or switching to cash crops if profits decline or limited mobility leads to excess waste. Some turn to bush products such as charcoal to compensate for income which further degrades the environment and undermines future food production. Manual processing as a coping strategy for lack of mobility to machine processing sites or diminished capacity among industrial processors leads to less food availability. Transporters reduce their risk with fewer trips or alternative cargos. All stakeholders may resort to alternative markets with less business.

These coping strategies, however, cannot meet the needs required of the local food system, generate enough return for risk and expense among food system stakeholders and undermine the flows of capital that allow that system to run and reinvest in itself. Ultimately, this leads to displacement and abandonment of food system livelihoods for alternatives which disables local food systems further increasing food import dependence. In addition to the cyclical relationship between conflict and food security as drivers of one another, the map reveals these more destructive pathways that can be difficult to overcome and not easily ameliorated by simply addressing conflict.

CLIMATE CHANGE AND CONFLICT

Natural resource pressures from climate change such as drought combined with conflict greatly handicap food systems. Water and pasture shortage and denial of access compound leading to death of livestock. Similarly, loss of arable land from denial of access and climate change reduces agricultural output. Along with conflict impacts on access to machinery, spare parts and fuel costs, water pumps, critical for compensating for a lower water table and drying natural sources from drought are compromised as well. Similarly, drought tolerant plants often require imported seeds, but their access is also stymied by conflict, limiting availability and increasing their cost.

In addition to extremes of weather-related phenomena, such as severe droughts and floods, climate change makes harvests less predictable and disincentivizes investments in following seasons. Transitions away from traditional farming are also common under climate change as cash crops return greater value and cereal grains are easier to grow requiring less investment for future production, but both make reverting back to traditional crops difficult. Both these climate driven disinvestments combine with the decreased investment caused by conflict and failures of financial supports disables local food production. Climate change has caused multiple years of environmental stress that are difficult to recover from without sustained support and investment. Conflict induced transitions to bush products such as firewood and charcoal can further accelerate environmental degradation that can amplify impacts of climate change on the agricultural sector. Finally, competition over natural resources such as water and land that does not involve armed actors but communal groups can lead to conflict and further increases food prices.

NATURAL RESOURCE MANAGEMENT, PEACEBUILDING, CLIMATE AND YOUTH

In Sudan, natural resource management and peacebuilding have interactive effects throughout the food system but are modulated by youth disengagement and climate change. There are structural challenges facing natural resource management in the region. Access to land historically accommodates the needs of farmers and pastoralists who used to effectively negotiate that access through institutions such as *talaig* (discussed further above in the conflict analysis). However, this is not as respected as it used to be in the past. Tensions arise when, as a response to conflict induced limitations on access,

mobile pastoralists' herds graze on crops before harvest is complete (particularly those travelling long distances from other areas, compounded by shorter migration seasons) and farmers grow crops in livestock migratory routes and resting areas.

Local peacebuilding committees indicated that they are capable of resolving disputes between different users, but that capacity appears to be limited to certain cases. In particular, while committees have some capacity to resolve disputes between local communities - including by charging fines to pastoralists who damage crops, for example - it is far more difficult to secure accountability from groups who are passing through an area and are unknown to local committees and leaders.

Conflict has also transformed to such an extent that disputes that were historically amenable to traditional conflict mechanisms may no longer be, given changes in the circulation and availability of light arms, intensity of conflict, and legitimacy of local authorities. Local and traditional natural resource management processes may also privilege established community hierarchies, leading to disengagement and a lack of buy-in among more marginalized groups, including young people. Youth disengagement is another compounding factor that arises from conflict's effects on the food system in multiple ways. The survey data revealed a clear skepticism among younger respondents about the efficacy of peacebuilding activities as well as impacts of climate on food systems, suggesting a potential legitimacy crisis for peacebuilding actors and efforts in the region. Finally, climate change can compound the conflict induced impacts on land access with further stress on limited natural resources and combined with ineffective resolution mechanisms, exacerbates conflict.

HEALTH, CONFLICT, AND FOOD SECURITY

Disruptions to food systems livelihoods has serious implications on both income and food availability with cascading effects at all levels of the food chain. As conflict erupts and both food systems and livelihoods are disrupted, food prices rise, and both income and food availability suffer. As a result, rates of malnutrition and undernutrition rise, particularly among children. The damaging impacts on livelihoods documented throughout this study, lead to significantly reduced income which is critical to maintaining health and wellbeing from adequate shelter and basic needs as well as self-care. Coping strategies employed in response to livelihood disruptions are also often specific to health from skipping meals to forgoing

medication and even basic hygiene.

When either food prices or income are independently altered, the health status of a population deteriorates; in the context of a country that is highly reliant on agricultural and food-systems livelihoods, as in Somalia, Sudan, and Haiti, the joint and compounding impacts of rising food prices and disruptions to income are vast. Yet when communities lose both their income and their food source simultaneously, the resulting health impacts are staggering. Morbidity and mortality increase significantly when livelihoods and income are disrupted, and this negative effect on health is further exacerbated by the independent effect of conflict. Taken together, the conflict-driven disruptions to livelihoods and income have a synergistic effect on health and wellbeing, potentially increasing the rates of morbidity and mortality in an already-stressed healthcare system.

Conflict itself reduces healthcare access and the provision of healthcare services. Because the conflict in each of the three focus countries is unstable and volatile, healthcare availability, quality, and access have suffered significantly. This violent context makes operating and maintaining clinics challenging and accessing services dangerous and difficult. As a result, the health status of the population suffers not only from direct combat-related morbidity and mortality, but predominantly from indirect public health effects. These public health risks include an increase in the spread of infectious and chronic diseases (such as diarrhea and respiratory infections), increased rates of mortality for pregnant women, increased under-5-mortality, and a higher risk of SGBV.

5.2. CONCLUSIONS AND RECOMMENDATIONS

5.2.1 OPERATIONAL RECOMMENDATIONS

1. Design targeted protection interventions that support vulnerable stakeholders in the food system.

Across mapping, surveys and qualitative consultations, this research revealed how reduced mobility and vulnerability of transport and intermediary actors in the food system is a key component driving reduced availability of food, higher prices, and abandonment of food-related livelihoods.

Providing targeted protection services for vulnerable stakeholders - particularly women - in the food system

is both an important service for at-risk populations, and an intervention with the potential to mitigate disruptions in the food system. Protection activities might include targeted health and psychosocial support for women vendors and the wives of producers directly involved in sales; targeted protection trainings for state security forces and informal authorities (such as community leaders, elders, and other actors) highlighting the violation of rights and disruption to the food system that arises due to the targeting of women stakeholders; and wider community awareness-raising, sensitization and a public information campaign around rights and entitlements to support a more enabling environment and shifting norms in armed actor behavior. Ultimately, the establishment of 'safe zones' such as safe markets, or safe transport corridors through engagement with diverse actors could be a medium- to longer-term objective of a campaign and combination of interventions such as this.

Given the highly specialized and sensitive nature of protection work, partnership opportunities with organizations with existing technical capacity and expertise in health, psychosocial support, and engagement with armed actors on rights-based work would be valuable.

2. Target food system stakeholders for engagement in social cohesion activities.

Evidence from the FCM, KIIs, FGDs and survey respondents all demonstrates the multiple ways in which food system stakeholders - including producers, transporters, vendors and merchants - face compounding threats at every stage of the food value chain. Moreover, our research highlighting the frequency of attacks on food transport workers and extractive taxation of food system stakeholders suggests these are not incidental features of the conflict, but rather, integral strategies in armed group control and coercion. This exposes stakeholders to unique risks, but also affords them unique perspectives on the dynamics of conflict, its impacts in communities, and the steps required to address and resolve conflict to build more peaceful and resilient communities.

A significant breakdown of social cohesion contributes to localized conflict and its cascading effects throughout the food system. Where social cohesion and broader peacebuilding efforts are already underway, programmatic efforts can play a valuable role by providing targeted support to the engagement of food systems stakeholders in these activities. Their representation, participation and leadership in such

initiatives could help ensure their unique perspective and experience of the leveraging of food and food systems in conflict is taken into account in conflict resolution efforts, and moreover, could serve to amplify food system stakeholder protection programming efforts (see above).

3. Support nutrition-sensitive activities in secondary and tertiary markets.

In light of widespread mobility restrictions in all three country contexts, supporting access to more nutritious foods to be sold in smaller, local markets could have positive effects throughout the food system.

Particularly in Haiti and Sudan, the FCM, KIIs and FGDs all highlighted key distortions in market functioning that disrupted the food system. In Haiti, this manifested in the centrality of main (primary) markets, where secondary and tertiary markets which were more accessible locally typically sold costlier and less nutritious food. In Sudan, this was reflected in limited market integration: in periods of conflict, markets which specialized in particular items were inaccessible to certain or all communities, with ripple effects throughout the system. In these contexts of market control by armed groups, restricted movement of goods, and often prohibitive transport costs and risks, efforts to support secondary and tertiary markets to fill the gap in food accessibility in local neighborhoods would be valuable.

Any intervention of this kind should be designed after careful analysis of conflict dynamics and the potential for unintended consequences throughout the conflict system - specifically, the risks of making smaller markets more attractive to armed groups and drawing conflict actors into more localized markets.

5.2.2. POLICY AND ADVOCACY RECOMMENDATIONS

1. Pursue protection agenda and associated advocacy around cumulative impacts of taxation and mobility barriers (e.g., roadblocks).

Humanitarian and development responses alone cannot fully address the depth and complexity of many of the obstacles affecting food security for people experiencing extreme poverty. Political actors within Haiti primarily, and in the wider international system secondarily, have an important role to play in protecting food systems stakeholders. Targeted advocacy efforts

can make an important contribution by first, raising awareness of the extent to which roadblocks and attacks on food systems stakeholders affect food security for the most vulnerable; and second, calling for policy action to better protect food systems stakeholders.

Potential policy asks to explore include greater consideration of roadblocks, transport barriers and attacks on food systems stakeholders in transit under the remit of UN Security Council Resolution 2417 and associated reporting; greater consideration of the gendered effects of roadblocks, transport barriers and attacks on women food systems stakeholders under the remit of UN Security Council Resolution 1325 and associated reporting and briefings; and/or exploring international legal and accountability provisions related to attacks on food systems stakeholders and the gendered impacts where appropriate.

2. Pursue humanitarian assistance strategies that support local food systems and minimize negative externalities.

The humanitarian assistance community, including donors, must take a conflict-sensitive approach to understand not only how conflict and food security exist in relationship with one another but how specific humanitarian assistance strategies related to food assistance can reinforce the maladaptive transformations described above.

There are unintentional negative consequences to long-term food security and perpetuating conflict that may be avoided or minimized with a more holistic understanding of how humanitarian assistance impacts local food systems. Donors should understand the food import pricing relative to local food and the relationship with challenges in producing, processing and accessing local food. Directed strategies at overcoming these challenges and preventing maladaptive transformations should be considered as part of a holistic humanitarian assistance strategy.

An FCM approach can reveal potential avenues for supporting local food systems rather than dependence on food imports. For example, as many of the maladaptive coping strategies are centered around changing livelihoods, programming that can support food system livelihoods present an avenue for intervention. More specifically, the prohibitive costs of continuing to do business relative to profit drive these transformations and subsidies targeted at specific local food system businesses may be reasonable at times of stress. Accompanying cash transfer programming,

a voucher system for use only on local food vendors or suppliers could help support local food systems. Finally, direct food assistance should be the least preferred mode of humanitarian assistance made available and used under very specific criteria.

5.3. FUTURE DIRECTIONS

5.3.1. OPPORTUNITIES FOR OPERATIONALIZING FCM

As depicted throughout this report, using FCM, factors of interest in the system are depicted as nodes that are linked to one another through causal pathways that are weighted based on their relative strength of relationship to one another. Yet these factors can represent a wide variety of things beyond those displayed here, from specific entities such as armed actors or grain supplies to more complex and abstract concepts such as insecurity, well-being and social cohesion. They can also represent unique complex systems, as in this case of food systems in conflict, or specific programs and operations as used by business to model their operations to optimize performance. This can serve an important role in planning organizational programs or other efforts with a high level of complexity.

This tool provides a powerful and structured way to interrogate complexity through its individual components and its processes to understand how the whole system and each component is affected throughout these various outcomes. It moves beyond singular or linear approaches that cannot represent this complexity allowing for more informed decisions. FCM can analyze a complex system in a single model with multiple diverse factors to understand how it can be changed or stressed or made more resilient or perform better.

Key opportunities for utilization across humanitarian assistance and programming may include:

- The design and development of large-scale, multi-sectoral programs;
- Design and development of consortia programming with multiple partners;
- Informing humanitarian assistance and diplomatic policies at national and multinational levels;
- Training and on-boarding staff with context specific content.
- Evaluation of large-scale, multi-sectoral programs and/or consortia programs;
- In the application of adaptive management approaches in programming; and/or
- The transition from emergency or short-term response to nexus-based or otherwise longer-term programming.

FCM presents a valuable tool to address the complex intersectional challenges to achieving its mission of ending extreme poverty.

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