

**Drivers of Resilience and Food Security in North-east Nigeria:  
Learning from Micro Data in an Emergency Setting**

*Final Report to the Food and Agriculture Organization*

Project: “Knowledge, Learning and Analysis Module for the FAO  
Programme in North-east Nigeria”

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## Executive summary

The objective of this report is to support FAO in **building knowledge, learning and capacity** in three ways, based on the case of North-east Nigeria. First, we review and summarise robust evidence on the structural interrelations between food insecurity and conflict that are relevant to North-east Nigeria (Work Package 1). Second, we use baseline and endline survey data provided by FAO to analyse the short-term impacts of the FAO programme in North-east Nigeria (Work Package 2). Third, we discuss implications for FAO's programming, monitoring and learning agendas in the region.

The **literature survey in Work Package 1** reveals that many linkages between food security and conflict that are relevant for North-east Nigeria have been widely, but still inconclusively, debated across disciplines for many years. The linkage mechanisms between conflict and food security span all four pillars of food security: stability, availability, access, and utilisation. In spite of impressive progress, three fundamental implications for North-east Nigeria are apparent: First, **more and better micro data (especially on resilience) is imperative** for understanding and monitoring the full diversity, nature and interrelations of food security and conflict. Second, strengthening food insecurity and resilience requires **context-specific and conflict-sensitive policy approaches that integrate immediate assistance and long-term impacts**. And third, whenever and to the extent possible, **programme and policy responses should be designed, monitored and evaluated in a way that allows to assess causal impacts**.

Our main **empirical analysis in Work Package 2** demonstrates that the **FAO programme had strong, positive impacts on food security and resilience**. Accounting for pre-programme differences between beneficiaries and non-beneficiaries, the programme increased the Food Consumption Score (FCS) by about 13% and the Reduced Coping Strategy Index (RCSI) by about 9% of the average baseline scores of beneficiaries. The programme also decreased the probability that households had to use a harmful coping strategy available to them – our main measure of resilience – by about 16%. We also show that higher resilience is clearly associated with higher food security.

Our heterogeneity analysis reveals that the FCS **benefits were particularly large among internally displaced households and those that live in areas of high and extreme conflict intensity**. The impact on the RCSI was strongest among the internally displaced and those living in low conflict areas. It is worth noting that despite these strong programme returns, the absolute level of food security is still the lowest for the internally

displaced and those residing in areas of intense conflict, relative to other sub-groups. Similarly, our results reveal that the programme builds resilience, unless the household is hit by a personal shock, like theft or loss of a family member. These households require additional support to build resilience. These findings emphasise that in North-east Nigeria programme effects were strongest and essential for the most vulnerable.

Our analysis of programme impacts beyond food security and resilience suggests that **programme participation generally mitigates respondents' concerns about conflict between members of their community and local security**. Yet, we find that worries about walking alone at night increase among both beneficiaries and non-beneficiaries. A potential explanation is that, in addition to the positive impacts on perceptions among participants, the programme may also induce beliefs in programme locations that the expected returns to robbery at night rise.

For the analysis, we used rare high-quality data not only from programme beneficiaries but also from non-beneficiaries residing in the same location (treatment and control groups). In addition, both beneficiary and non-beneficiary data were collected both before the programme (baseline) and after the programme (endline). Such a design helps to assess structural differences between beneficiaries and non-beneficiaries, to detect time-trends, and ultimately strengthens causal claims about programme impacts, which are critical for further improvements in the design of subsequent interventions. However, **the design of the analysis suffers from one key weakness**, in that the baseline sample was not the same as the endline sample, i.e. we analysed two representative but different cross-sections of households.

Based on Work Packages 1 and 2, we **discuss implications for FAO's programming, monitoring and analysis agendas** in the region and beyond. We focus here on three implications.

First, **the available capacity for collecting programme and learning data in North-east Nigeria was sufficiently good to enable us to address these important questions** despite the presence of the on-going crisis. Having the capacity to collect micro data is not a luxury but a necessity when operating in an environment where key causal relationships are not well known or understood – or where these relations may change fundamentally due to the crisis.

Second, while the empirical approach adopted was very useful and robust, **a panel design would offer more advantages and opportunities** at relatively little extra cost.

In such a longitudinal design, exactly the same beneficiary and non-beneficiary households are interviewed before and after the programme. This would, for instance, allow to net out unobservable individual characteristics that do not change over time, mitigate selection concerns when programme assignment is not perfectly random, and provide a more nuanced picture of programme impacts beyond average effects. We recommend to adopt such a design in future monitoring for North-east Nigeria.

Third, we see realistic opportunities for **substantial further learning about the crisis and food security in North-east Nigeria**. These **learning opportunities** include, but are not limited to, these topics:

(1) The existing survey data would allow to study other important questions. These include, for instance, how **conflict shapes displacement** or how the **FAO programme affects physical capital, labour supply, land use and livestock**.

(2) Another short-term survey follow-up, revisiting endline respondents quite soon, would allow to collect information on variables that were not included at endline to study either a **more advanced analysis of the short-term programme impact on resilience**, e.g. based on variables required to build FAO-RIMA's Resilience Capacity Indicator, or how the crisis and the programme affected **intra-community conflict**, e.g. over land, and the local institutions of conflict resolution.

(3) Revisiting endline respondents in the long-term, and repeating some key questions in, for instance, one or two years from now, would allow to assess **long-term impacts of the programme**. This would deepen our understanding of the long-term programme impacts on food security and resilience, and how conflict shapes these impacts.

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# 1 Introduction

Food insecurity affects the lives of millions of people across the world and is increasingly concentrated in conflict-affected regions. All 19 countries the FAO currently classifies as being in a protracted food crisis are also currently affected by conflict and violence ([Holleman et al., 2017](#)). Globally, 60% of the 815 million undernourished individuals and 79% of the 155 million stunted children live in countries affected by violent conflict ([FAO et al., 2017](#)).

Monitoring food insecurity in conflict-affected settings, understanding the causal drivers of and inter-linkages between food insecurity and conflict, and evaluating the causal impact of food security interventions are crucial to informing evidence-based programming by practitioners and policy-makers. Yet, producing evidence on these topics faces serious programme, data and ‘endogeneity’ challenges: in these contexts, it is extremely difficult to implement programmes, to collect high-quality micro data and to identify the role of third factors that may strongly and simultaneously affect food security and conflict (and programme impacts). A recent review commissioned by the FAO emphasises a dearth of evidence on these important questions ([Brück et al., 2016](#)), which has significant costs in terms of understanding and improving the effectiveness of interventions.

The objective of this report is to support FAO in building knowledge, learning and capacity, based on the case of the FAO programme in North-east Nigeria ([FAO, 2016](#)). North-east Nigeria is particularly suited to study the interrelations between food insecurity and conflict and how policy interventions can break adverse pathways for four reasons. First, North-east Nigeria is, tragically, characterised by high levels of violence and food insecurity, which both vary over time and space. Second, at the same time other stressors like climatic factors are present, which also vary over time and space and may affect both conflict and food insecurity outcomes. Third, FAO implemented an ambitious programme that tackled immediate needs and at the same time allows causal inference for the impact. Fourth, FAO conducted extensive background surveys before and after the programme, which provide rare micro data from a crisis setting and allow to measure the impact of the programme.

The report contributes to FAO’s knowledge, learning and capacity in three ways. First, we review and summarise robust evidence on the structural interrelations between food insecurity and conflict that are relevant to the context of North-east Nigeria. We delineate two types of knowledge gaps: a) gaps that can be addressed based on FAO’s current programme and data base in North-east Nigeria, and b) gaps that could be addressed with future extensions of the current programme and data base. Second, we use baseline and

endline survey data provided by FAO to analyse the short-term impacts of the FAO programme in North-east Nigeria. Third, we will discuss implications that are relevant to FAO’s programming, monitoring and analysis agendas in the region and beyond.

The report is structured as follows. [Section 2](#) discusses the North-east Nigerian setting. [Section 3](#) reviews and summarises robust evidence on the structural interrelations between food insecurity and conflict that are relevant to North-east Nigeria (Work Package 1). [Section 4](#) presents our analysis of the short-term impacts of the FAO programme in North-east Nigeria (Work Package 2). [Section 5](#) discusses policy implications of our findings. [Section 6](#) offers concluding remarks.

## 2 North-east Nigeria

### 2.1 Crisis

North-east Nigeria is a humanitarian, development and conflict crisis setting. The complexity of the crisis, created by multiple adversities and institutional changes, requires effective policies not just to address urgent humanitarian needs (‘the symptoms of the crisis’), but also to try to break the structural pathways to these needs and their interplays (‘the causes of the crisis’). We discuss a few key domains of development challenges, personal adversities and institutional changes below.

**Food insecurity.** Food insecurity is pervasive in North-east Nigeria, and FAO estimates that 3.7 million individuals will be at risk of ‘critical’ food insecurity in the next lean season of 2018 ([FAO, 2018](#)). 88% report that they (have to) buy most of their food from the market ([WB, 2018](#)). 79% of households reported that during the last 7 days they did not have enough food or money to buy food. The principal reason stated for not being able to buy food from the market were increases in food prices.

**Consumption and nutrition.** Households in North-East Nigeria rely on various extreme strategies to cope with adversity that put their nutrition at risk. The main strategy to cope with insecurity is reducing meals or portion sizes ([WB, 2018](#)).

**Demographics, livelihoods and production.** Demographic pressure is high, education levels are modest and income relies heavily on rain-fed agriculture. According to the World Bank, an average household has 11 members (WB, 2018). 57% household heads ever attended school, 10% are female. The average household head completed 5.8 years of education, 1.3 years if female, 6.3 years if male. 50% of household heads report their main income source to be their own farm, for 23% it is wage labour in agricultural and non-agricultural sectors. 38% of households own farming assets, 54% own livestock, and 98% of farms mostly rely on rain for irrigation.

About 80% of individuals depend on agriculture, fishery and livestock for their livelihoods, but the conditions for agriculture have worsened. Access to inputs factors for production has deteriorated, including physical access to input like access to land, physical capital (like livestock and seeds), and water/irrigation, access to consumers has become more complicated for smallholder farmers, including physical access to local markets, and prices faced have increased, including transportation costs and input purchases (AGI, 2014).

**Market dependence and prices.** Even though a lot of households engage in agriculture in North-east Nigeria, many strongly rely on food purchases from local markets even in the absence of conflict, and the conflict exacerbates the market dependence. 85% of households recently report that they bought most of their food from the market (WB, 2018). Yet, many households can only buy much less food than required because of high prices, and not because of food availability: while 97% of households report that food availability is not the main issue, 66% cite prices hikes are the main challenge. This notion is consistent with official estimates of food price inflation rates of around 20% (WB, 2018).

**Violence by armed groups.** The region is characterised by frequent violence between armed actors. In 2009, Jama'atu Ahlis Sunna Lidda'awati Wal-Jihad (People Committed to the Propagation of the Prophets Teaching and Jihad) – often referred to as Boko Haram – radicalised and became violent. In 2012, Jama'atu Asaril Muslimina Biladis Sudan (Vanguards for the Protection of Muslims in Black Africa) – often referred to as Ansaru – emerged as a split-off of Boko Haram. In 2013, the Nigerian government launched large-scale military campaigns to fight against Boko Haram and Ansaru, supported by Joint Task Force by the police force, the military and civilians who provide intelligence (IISS 2013) and declared states of emergency in Adamawa, Borno and Yobe states. Intergroup violence was highest in 2014 and has continued to affect large parts of the



region until today.

Starting with civilian killings in Maiduguri (Borno), by 2013 extreme violence against civilians had already spread across the region and country. As various humanitarian organisations report, there have also been incidences of violence against civilians by State Forces and the “counter-terrorism campaign” (e.g. Human Rights Watch 2013). In total, recent reports estimate that the conflict has already caused around 20,000 deaths (UNDP 2018).

**Displacement and mobilisation.** Around 2 million people are internally displaced in North-east Nigeria, about 200,000 have fled across international border to Cameroon, Chad and Niger. Inflows of displaced and returnee populations increase the demographic pressure on and local demand for food in host and home communities.

While reliable numbers – to the best of our knowledge – do not exist, many have been forcibly recruited into insurgent groups. Beyond abduction, many worry that young people may mobilise or engage in other anti-social behaviour voluntarily, due to low economic opportunity, feelings of being let down or excluded by the state and/or perceptions of unfairness and marginalisation (NSRP, 2014).

**Physical, economic and social damages.** Much physical infrastructure has been destroyed, including factories, roads, schools and agricultural machinery. As a result many businesses closed down, agricultural activity has plummeted, many farm lands are abandoned, many trade routes are not accessible and the once flourishing trade of agricultural produce to Cameroon, Chad and Niger has decreased dramatically. Public and social services by the state have been disrupted, many schools were destroyed and teachers kidnapped. The total damages to infrastructure and social services are estimated at around US\$9.2 billion, the agricultural sector accounting for US\$3.7 billion, the total recovery needs for infrastructure and social services are estimated at US\$ 6.0 billion (IBRD, 2016).

Social cohesion has been deeply damaged, spreading fear and mistrust, eroding the social contract between citizens and government and worsening ethnic divisions within communities and even families. The capacity of traditional local institutions to mitigate and resolve local conflicts on issues such as land tenure has been corroded.

**Local institutions and conflicts (specifically around land).** Issues around land tenure, natural resource access, and related physical capital (especially livestock) contribute to conflict and of insecurity at local and regional levels. For example, land degradation can drive economic insecurity, put pressure on households and create potential for conflict, while conflict-induced displacement often create stress on communities when refugees and returnees increase the local demand for factors related to agricultural production. Yet, the local institutions to regulate land and resource systems and those to support communal security and mitigate conflicts around these issues have been transformed and degraded.

**Armed group governance.** Beyond killings, non-state actors also engage with civilians in less violent ways (than killing or looting), which not only critically shapes both conflict and food insecurity adversities but also directly affects local systems and institutions. Boko Haram and Ansaru secured the monopoly of violence in several subregions and were the de-facto rulers; by 2014 non-state groups controlled a territory as large as Belgium (WB, 2018). Examples of common interactions include religious education and the regulation of the local economy and social life.

**Climate change and weather shocks.** A large share of the population relies on rain-fed agriculture, making them vulnerable to adverse climatic conditions. While – to the best of our knowledge – no severe, large scale drought has hit North-east Nigeria recently, such shocks could have devastating effects in addition to and in combination with conflict shocks.

## 2.2 FAO responses to the crisis

In a response to the crisis, FAO has expanded its operational presence in North-east Nigeria and the broader Lake Chad Basin. FAO developed an ambitious framework for strengthening resilience and mitigating risk in the region via two programmes: a 9-month “Mitigating the impact of the conflict on the livelihood crisis” action plan in North-east Nigeria from September 2016 till May 2017 to address the emergency (FAO, 2016), and a three-year programme for the Lake Chad Basin for the period 2017-2020 to support the transition from emergency to recovery (FAO, 2017a). This ‘twin-track’ approach allows to tackle both the immediate needs and at the same time analyse and mitigate some of the roots causes of conflict in the region. In practice, this includes several modalities and approaches including, among others, the provision of agricultural input kits, the

implementation of other productive transfers approaches (e.g. cash transfers), ‘Caisses de resilience’ approaches (an integrated community-centred approach to strengthening social cohesion, capacity and productivity), ”Safe Access to Fuel and Energy” approaches (a multidisciplinary strategy to reducing environmental, health and protection risks associated with lack of fuel), and a ‘knowledge, learning and capacity’ programme to produce better evidence-based policies seeking to improve food security, strengthen resilience, reduce and prevent conflict, and promote stability.

## **2.3 FAO agricultural input programme**

In this report we evaluate the impact of an FAO intervention that seeks to protect the livelihoods of IDPs, returnees and host communities with access to land in Adamawa, Borno and Yobe states through the provision of “quality agriculture inputs”. These inputs include cereal, pulse and vegetable kits, which were defined in collaboration with the Nigerian Ministry of Agriculture and distributed by state and LGA. Their type and quantity were chosen based on the agro-ecological characteristics of the different LGAs.

The minimum programme requirements for beneficiaries were having a secure access to land for planting and being able to cultivate a plot with the kits received (FAO, 2017b). Several household were to be prioritised: beneficiaries of the World Food Programme (WFP) intervention or other food/cash assistance programme; the most vulnerable households among returnees, IDPs and host communities; large households; female-headed households; households with children below 5 years of age; and households with malnourished children (FAO, 2017b).

## **3 Interrelations between food insecurity and conflict relevant to North-east Nigeria (Work Package 1)**

### **3.1 Conflict and food insecurity – the micro level**

One way to think about conflict is that it exposes people to various forms of conflict-specific adversities and economic, political and social institutions. We know from large literatures in the social sciences that exposure to adversity (like parental violence, and institutional

environments, like schools, can have strong impacts on short- and long-run decisions and outcomes that shape food security. Salient adversities include violence, displacement and fear, armed groups and violence alter local markets, governance and social rules.

On the other hand, it is also individuals who organise and sustain collective violence and many other behaviours that contribute to conflict. Examples include ideological and political support of, material and monetary contribution to, and joining armed groups.

The relationships between conflict and food insecurity are complex, difficult to measure, disentangle and quantify, and often confounded by other (mostly unobservable) factors (Sarsons, 2015). High-quality micro data remains rare in high-intensity conflict settings, where omitted variables and simultaneity bias often complicate causal analyses. Moreover, controlled experiments are not available which hinder answering complex questions to disentangle the mechanisms in play. Factors like conflict exposure or weather shocks can't be controlled or simulated, for several natural and ethical reasons.

Yet, a recent wave of scholarship has found innovative ways of producing rigorous and reliable evidence. These include smart cross-sectional analyses (incl. synthetic control approaches), panel data analyses (incl. lag specifications), and exploiting exogenous variation from controlled or natural experiments (incl. instrumental variable and regression discontinuity design). The next section summarises key robust results from this literature which are suitable to infer causal claims on relationships relevant to North-east Nigeria.

## 3.2 Pathways from conflict to food insecurity

**Conflict and nutritional status.** A large literature has identified adverse short-term effects of exposure to conflict on childrens nutritional status. Most evidence exists for anthropometric outcomes, which are directly associated with nutritional status. These are primarily the height-for-age z-score (HAZ), assessing 'chronic' malnutrition, weight-for-age z-score (WAZ), assessing with 'general' malnutrition, weight-for-height measures, assessing 'acute' malnutrition.

Many studies show that exposure to civil war and violence adversely affect young children's anthropometric outcomes, especially the HAZ-scores. This finding is supported by evidence from a range of conflict-affected contexts, such as Angola, Burundi, Colombia, Cote d'Ivoire, Eritrea, Ethiopia, India, Iraq and Mexico (Bundervoet et al., 2009; Guerrero-Serdan, 2009; Akresh et al., 2011, 2012b; Arcand et al., 2015; Duque, 2016;

[Minoiu and Shemyakina, 2014](#); [Tranchant et al., 2014](#); [Akresh et al., 2016](#); [Nasir, 2016](#))

The magnitudes of the adverse effects of exposure to armed violence on anthropometric outcomes are markedly similar across case studies and contexts, despite significant differences in conflict duration, war strategies and other context-specific characteristics. Yet, two key limitations remain. First, poor nutritional status is often directly linked to food insecurity. However, a child's nutritional status may or may not be the result of food insecurity, i.e. due to lack of access to sufficient, safe and nutritious food (access defined as physical, social and economic). Second, most of the rigorous and robust evidence documents adverse effects in chronic malnutrition, rather than acute malnutrition. More rigorous evidence on the impact on acute malnutrition is of paramount importance as it threatens children's lives and, sadly, characterises North-east Nigeria and many other emergencies.

A related body of evidence shows that adverse short-term effects of conflict on children through nutritional channels may already be activated before a child is born ('in-utero'). Pregnant women who are exposed to high levels of conflict give birth to children of lower weight, which thus immediately transmits the adverse effects of conflict across generations. This finding is also supported by evidence from a range of conflict-affected contexts, such as Brazil, Colombia Mexico, Nepal, Kashmir and Palestine ([Camacho, 2008](#); [Valente, 2011](#); [Mansour and Rees, 2012](#); [Parlow, 2012](#); [Brown, 2015](#); [Foureaux Koppensteiner and Manacorda, 2016](#)). While the relationship between conflict exposure in-utero and birth weight is robust, questions about the underlying mechanisms which are likely to be highly context-specific and the impacts on measures such as height as a child are hitherto only inconclusively debated ([Akresh, 2016](#)).

The famous 'fetal origins hypothesis' posits that variation in access to nutrition in the womb codes long-run differences in health and well-being. The original hypothesis has been extended to early-life nutrition after birth and confirmed by a large body of empirical evidence ([Almond and Currie, 2011](#); [Currie and Vogl, 2013](#)). Conflict exposure early in life, including nutritional deficiencies and other adverse experiences, may thus pre-determine detrimental long-term impacts, which threaten food security as an adult. A few number of recent studies have started to produce robust support for the damaging effects of exposure to violence on the physical and cognitive development outcomes as an adult, which have been reported from various other conflict-affected settings, e.g. Cambodia, Germany, Mozambique, Nigeria (Biafra war), and Zimbabwe ([Alderman et al., 2006](#); [de Walque, 2006](#); [Akresh et al., 2012a](#); [Domingues and Barre, 2013](#); [Akbulut-Yuksel, 2014](#)).

Taken together, the literature has rapidly accumulated a wealth of robust micro-evidence that the exposure to conflict at a young age is causally linked to irreversible harm to short- and long-run development from nutritional disadvantages. What aspect of violent conflict causes these immediate nutritional deficits, and how, remains not well understood, and is likely to include multiple and context-specific pathways. While a recent literature demonstrates that conflict may have detrimental long-run effects, it also remains to be understood how food security is affected, and how much. Specifically, conflict exposure may nudge children into a reinforcing cycle of food insecurity, where food insecurity at young age may eventually cause or contribute to compounding dietary health and food insecurity issues in adulthood.

**Conflict and coping/consumption.** To better understand reactions to conflict exposure and its associated impacts on outcomes related to food security, many economists have directly studied micro-strategies to cope with conflict, reduce conflict risk and smooth consumption ([Justino, 2009](#)). Descriptive evidence suggests that these strategies are dynamic and likely to differ at conflict onset and during protracted conflict as in the Lake Chad basin ([Ogbozor, 2016](#)). Many of the stronger findings describe migration and forced displacement, and document a wide range of adverse effects on food security. Several quantitative studies rely on refined household survey data related to the quantity and quality of consumption, despite the challenges to conduct thorough data collection in these regions. Indicators include activity choices, detailed consumption diaries, resulting calorie intake data, food expenditures, food produced and food gifts combined with local food price data. However, teasing out and quantifying causal relationships is once again daunting and robust evidence is thus rare ([Ruiz and Vargas-Silva, 2013](#)).

A few convincing studies validate and quantify the correlational evidence. Studies from settings like Rwanda, Uganda and Burundi suggest that displacement may have strongly adverse long-term legacies, which - without assistance - may be impossible to overcome for the poorest populations ([Kondylis, 2010](#); [Bozzoli et al., 2016](#); [Verwimp and Munoz-Mora, 2013](#)). Beyond displaced populations, other studies have investigated food consumption patterns in conflict zones more generally, linking them to conflict event data. As expected, the findings confirm that households living close to registered conflict events often experience drops in consumption levels in settings as diverse as Afghanistan, Cote d'Ivoire and Rwanda ([D'Souza and Jolliffe, 2013](#); [Dabalen and Paul, 2014](#); [Serneels and Verpoorten, 2015](#)).

**Conflict and production.** A separate literature studies the impact of conflict on production of food and factors related to it. A few recent studies have used innovative farm-level and conflict data, as well as modern techniques, to analyse the causal impact of violent conflict in East Africa and Colombia on agricultural production, including livestock and a variety of crops, such as coffee. The findings suggest that food production drops substantially in regions affected by conflict, due to its adverse direct effects on labour supply, access to land and credit, and capital due to looting and destruction (Nillesen, 2007; Verpoorten, 2009; Blattman and Miguel, 2010; Rockmore, 2015; Munoz-Mora, 2016).

There is also growing empirical evidence on the coping strategies of conflict-affected individuals and households to protect their productivity, livelihoods and food security. The literature has focused on agricultural coping strategies given that, for instance, in Africa 70 per cent of the population rely on agriculture for their food supply (Paul et al., 2015). Well-documented strategies include shifts in crop production portfolios, labour reallocation, destroying or hiding livestock (and other visible assets), changes in land use patterns, economic cooperation with local ruling groups and other activities that minimise victimization risks and uncertainty (Bozzoli and Brück, 2009; Brück and Schindler, 2009; Verpoorten, 2009; Rockmore, 2011; Arias et al., 2012; Fernández et al., 2014; Gáfaró et al., 2014; Menon and van der Meulen Rodgers, 2015).

Several studies emphasise that shifts in crop, livestock and asset portfolios are often consistent with households increasing the share of low-risk, low-return activities (Vlassenroot, 2008; Justino, 2009; Paul et al., 2015; Rockmore, 2015). Such low-risk low-return coping strategies may provide immediate and medium-term benefits, as positive returns to subsistence farming when the welfare benefits from social and economic markets are limited (Brück, 2003; Bozzoli and Brück, 2009). However, such positive effects of subsistence modes of production during conflict must be balanced against the potential longer-term effects of low productivity, which may be strongly negative.

### 3.3 Pathways from food insecurity to conflict

**Food insecurity and anti-social behaviour.** At the individual level, food insecurity – or the threat thereof – may create both material and non-material incentives for individuals to engage in some form of behaviour that threatens peace (to which this section will refer to as ‘anti-social behaviour’). Pinning down a single channel empirically is difficult, however, and the rigorous empirical evidence at the individual level is markedly thin. Two key challenges

are that these motives are a) in and of itself very complex and hence difficult to measure and b) difficult to untangle empirically from alternative mechanisms that are often credibly not directly related to food insecurity, such as abduction, peer-pressure, ideology, and emotions.

**Food price shocks and conflict.** There is now a growing body of econometric evidence – broadly in the vein of [Hendrix et al. \(2009\)](#) – suggesting that rising food prices can cause or contribute to very different forms of social unrest, such as protests, riots, violence and war, with most studies relying on the FAO price index of food commodities.

Most evidence exists for urban social unrest in contemporary Africa ([Berazneva and Lee, 2013](#); [Smith, 2014](#)), including studies that link the Arab Spring uprisings to international food price shocks ([Johnstone and Mazo, 2011](#); [Maystadt et al., 2014](#)). More recent findings suggest global relevance ([Bellemare, 2015](#); [Cadoret et al., 2015](#)). Studies of the intensive margin of violent conflict are more scarce, but point to broadly similar, positive relationships with increasing food prices ([Breisinger et al., 2015](#); [Maystadt and Ecker, 2014](#)).

Relatively little is known on how and how much food prices drive violent conflict. Among the most fundamental unsettled questions is whether and when it is the level versus the volatility of food prices that breeds conflict. In this regard, the most convincing evidence is provided by [Bellemare \(2015\)](#), who forcefully argues that increases in food price levels cause urban unrest, while those in food price volatility do not.

The dominant explanation for the mechanisms underpinning food price-conflict links are consumer grievances: higher prices create or increase economic constraints and/or sentiments of perceived relative deprivation, which activates grievances that in turn lead to conflict. This causal chain is very difficult to both measure and isolate empirically, for reasons already noted above, which is why it is usually assumed rather than tested directly. In addition, most contributions have looked at the impact of international food prices on conflict at the national level, which is reasonable in principle, as many fragile and conflict-affected countries are net importers of food. However, a few recent studies emphasise the need to use country-specific food price indexes to better understand the consumption patterns and constraints faced by vulnerable populations ([Arezki and Brueckner, 2014](#); [Cadoret et al., 2015](#); [Weinberg and Bakker, 2015](#)).

A second set of explanations for the food price-conflict relationship emphasises breakdowns of state authority and legitimacy: the state fails to provide food security, activating grievances against the state ([Lagi et al., 2011](#)). A few recent analyses have



sought to document the related impact on state-level correlates of conflict. For instance, [Arezki and Brueckner \(2014\)](#) argue that the cohesiveness of political institutions in low-income countries deteriorates significantly when international food prices increase, while [Berazneva and Lee \(2013\)](#) show that rising food prices and riots in Africa are associated with more political repression.

**Food production and conflict.** While many developing countries increasingly rely on food imports for domestic consumption, agriculture not only in Nigeria but also in many other places remains the largest economic sector, delivering labour opportunities and sustaining livelihoods. A large body of literature thus focuses on the role of variation in food production on violent conflict. As food production is strongly dependent on climatic conditions in many developing countries, new evidence is emerging on food production variation induced by climatic fluctuations, which is reviewed separately in the next section.

Decreases in labour demand due to shifts in agricultural production may directly lower the opportunity cost of engaging in anti-social behaviour ([Miguel et al., 2004](#)). For instance, conflict intensity in Iraq and Pakistan is higher outside the harvest season, when demand for labour in agriculture is lower ([Guardado and Pennings, 2017](#)). More generally, decreases in agricultural productivity may directly activate societal grievances due to adverse downstream effects on destitution, famine, distress, migration or aggravated social inequalities ([Barnett and Adger, 2007](#); [Raleigh and Kniveton, 2012](#); [Kelley et al., 2015](#); [Reuveny, 2007](#); [Raleigh, 2010](#)).

A third main source of violent conflict emphasised by the literature are increased grievances against the state, when agricultural deficits at the state level result in losses of tax revenues and higher food prices, as also discussed above ([Homer-Dixon, 1999](#); [Kim, 2016](#)). In this case, associated forms of maldistribution, patronage, corruption and embezzlement of aid may then also activate or exacerbate existing grievances against the state ([Benjaminsen, 2008](#); [Hendrix and Brinkman, 2013](#); [Nunn and Qian, 2014](#)).

### 3.4 Key structural factors

In this section we discuss four “structural factors” that pervade the behavioural and economic relationships of conflict and food security at the micro-level and are particularly relevant in North-east Nigeria.

**Local institutions and conflict (specifically around land).** The local institutions regulating land and resource systems and mitigating local conflicts are intimately related to both food security, conflict and the link between the two. While their salience is undisputed, the literature has only recently started to study them systematically. A key challenge is how to study these topics empirically and not many household surveys exist that collect data that would allow to infer information about local systems and institutions. A promising, new line of research uses new data sources, such as remote sensing data from satellites. A recent study has compared land use in Syrian areas by how much they were controlled, attacked and supported by the Islamic State (IS). The study shows that the impact of IS influence vary significantly, but – in contrast to popular beliefs – the use of cropland was generally maintained and sometimes even expanded (Eklund et al., 2017). This example emphasises the role of armed groups like IS and Boko Haram in these processes. We discuss their general importance to the food security-conflict nexus in the next section.

**Armed group governance.** Armed groups like Boko Haram and Ansaru are at the heart of violent conflict. Many of the ways in which they interact with civilians shape local institutions, food security and their relationships with conflicts.

An emerging literature offers descriptive evidence on the ‘governance’ of armed state and non-state groups (Arjona et al., 2015). On the one hand, such groups often invest in local public goods and production (Sanchez de la Sierra, 2016), which may increase food production, consumption and security locally. On the other hand, however, food is essential for the survival of armed groups and may increase the risk of negative interactions, such as stealing food or looting, which may decrease food production, consumption and food security locally. At the extreme end of the spectrum, these processes also include scenarios where food and hunger are used as ‘a weapon of war’ against certain populations (Messer and Cohen, 2015) and tragic incidences of personal violence against civilians like massacres and rape.

Taking a different perspective that emphasises civilian agency, a growing number of studies document strategies chosen by civilians to survive and protect their livelihoods and food security through forms of voluntary support for armed groups or actively engaging with the group (Wood, 2003; Kalyvas, 2006; Arjona et al., 2015; Justino and Stojetz, 2018). These processes are, of course, endogenous to the preferences, policies and needs of local ruling groups, as described above.

Integrating both perspectives, a growing literature studies recruitment of individuals into armed groups. Armed groups sometimes incentivise mobilisation via basic needs, by promising food, shelter and physical security or as strategy of risk reduction (e.g. [Kalyvas and Kocher, 2007](#); [Humphreys and Weinstein, 2008](#)). Collecting micro-level data on these processes is difficult, and many of these processes have not been studied and quantified systematically. Thus, rigorous evidence beyond descriptive and qualitative analyses is very scarce.

**Climate and weather.** A burgeoning literature focuses on the quantitative links between variation in climatic conditions and conflict outcomes ([Burke et al., 2015](#)). Impacts of climatic conditions on conflict may be substantiated by multiple pathways, some of which are closely related to food security and include those operating via economic conditions and outcomes. While no extreme, large-scale weather shock has hit North-east Nigeria recently, it may still be that the links between food security and conflict vary slightly with climatic conditions across the regions. The region is vulnerable to climatic shocks, so when one occurs, it may exacerbate these difference and add new channels that may fuel conflict.

Most attention in the literature has focused on assessing whether empirical estimates of the purported net link between climatic variation and conflict outcomes are spurious and have a causal interpretation. Studies from numerous settings find that both above-average temperatures and below-average precipitation levels are positively associated with conflict onset and duration, starting with an influential analysis on temperature and civil war incidence by [Burke et al. \(2009\)](#). Others have contested the existence of this relationship and highlight that such a conclusion may be flawed, due to measurement error, data set selectivity and methodological strategies ([Buhaug, 2010a,b](#); [Sutton et al., 2010](#)). Yet, the leading perspective nowadays is that the climate-conflict link is ‘real’ ([Burke et al., 2010a,c,b](#)), which is backed up by recent meta-analyses of 50+ prior studies documenting substantial effects of temperature increases on the likelihood of interpersonal and intergroup conflict ([Hsiang et al., 2013](#); [Burke et al., 2015](#)). This also includes increases in conflict violence against civilians ([Vanden Eynde, 2018](#)).

Beyond the basic discussion about the existence of the climate-conflict link, there is a very active debate about whether and how the effect of climate on conflict operates through local economic conditions. The first step in the chain of causation via local economic conditions is that unusually high temperatures and low rainfall depress agricultural production and

output, which is not disputed for Africa (Barrios et al., 2008; Schlenker and Lobell, 2010). While the intuitive link with an associated drop in food security is often essentially assumed, a number of studies have explicitly documented negative impacts of climatic variation on household food security (Dercon and Krishnan, 2000; Demeke et al., 2011; Di Falco et al., 2011).

In a second step, diminished agricultural yield and incomes are theorised to drive conflict by affecting local employment opportunities, prices, and grievances. Subsequent studies have thus sought to predict the consequences of climate change on violence levels by extrapolating from historical temperature and rainfall trends in rural Africa (Gleditsch, 2012; Hendrix and Salehyan, 2012; Raleigh and Kniveton, 2012; Theisen, 2012). Yet, the mechanisms substantiating this second step remain largely untested empirically. Raleigh et al. (2015) not only demonstrate the complexity of these relationships and the difficulty to untangle them empirically, but also provide rare convincing evidence of how the link from climatic variation to conflict can flow via food prices.

Recent research points to alternative mechanisms of how temperature anomalies may be related to conflict. Temperature-induced variation in agricultural yield can alter migration patterns, with potential effects on sub-state violence and conflict (Salehyan and Gleditsch, 2006; Feng et al., 2010; Hsiang et al., 2011; Feng et al., 2012; Bohra-Mishra et al., 2014). Excessive heat may also reduce the broader supply of crops, raising the price of food (see above). Temperature anomalies also have effects on economic activity beyond agricultural production. Several studies have documented that higher temperatures may depress economic output and growth, which may lead to conflict (Hsiang, 2010; Jones and Olken, 2010; Dell et al., 2014; Carleton and Hsiang, 2016). While these economic factors may well be linked to food security, empirical psychological research at the individual level has long established the tendency of individuals to behave more violently due to higher temperatures (Burke et al., 2015). These mechanisms are likely to interact with conflict risks due to food security and it is also possible that food security-based mechanisms are weak or even absent. The recent study by Bollfrass and Shaver (2015) provides an interesting finding. Using new global data at the provincial level they document the universal existence of a temperature-conflict link, which it also obtains in regions without agricultural production.

**Food security interventions.** The number of policy interventions addressing food insecurity like the FAO programme in North-east Nigeria has grown substantially, including

in conflict-affected settings.

Arguably the most prominent academic literature relevant for this report is a broad body of empirical studies analysing the impact of foreign aid and assistance on conflict outcomes. While clearly very important, it is also one of the most controversial literatures in the fields of development and conflict. Theoretical models suggest that the welfare effects of material aid in fragile and conflict-affected settings are broadly ambiguous, depending on factors such as the ‘cohesiveness’ of political institutions and the level of government capacity, while technical assistance (if effective) should reduce conflict (Besley and Persson, 2011). The key empirical issue is that – by construction – aid assistance or state type is not randomly allocated. The existing evidence from both within as well as from across countries is markedly mixed. Depending on the measures used, the level of aggregation, the empirical strategy employed and the context, results range widely from very negative to very positive impacts of aid on conflict (Galiani et al., 2016).

Beyond aid, it is obvious that many sub-national interventions related to food security, including in conflict-affected settings, exist, and many have successfully relieved food security stresses. While surveying these is beyond the scope of this section and deserves an entire literature review in its own right, the actual impacts of improved food security status on reducing conflict risk appear to be highly context-specific and are often assumed rather than tested rigorously. This encompasses various forms of food security and also includes innovative policies that build resilience (Breisinger et al., 2014).

### 3.5 Key limitations and opportunities

The review reveals that the linkages between food security and conflict relevant for North-east Nigeria have been widely, but still inconclusively, debated across disciplines for many years. In the past few years, the increasing availability of more fine-grained and high-quality data, combined with modern econometric analytic approaches, has produced a remarkable wealth of solid quantitative findings. These findings validate, complement and extend descriptive results that causal and substantive linkages exist between food security and violent conflict, spanning the individual, local, regional, country and global levels.

Conflict creates multiple, compounding and simultaneous outcomes spanning all four pillars of food security: stability, availability, access, and utilisation. Some of these are interrelated and may create lasting “webs” of impact. On the other hand, deficiencies in all

four of these pillars can contribute to increased risks of mobilisation, conflict and violence. Due to the extreme extent of both food insecurity and conflict in North-east Nigeria, many channels flowing through all four pillars in either direction are present, i.e. from conflict to food insecurity and from food insecurity to conflict. Yet, some channels are more dominant or “active” than others in North-east Nigeria, which are also likely to vary across province and regions. In this regard, the analysis of food-basket measures could be particularly valuable for refining our understanding of these links and their salience.

Despite the impressive progress that has been made, three fundamental implications for North-east Nigeria are apparent.

First, the most robust empiric evidence to date exists on the net links between food security and conflict relevant in North-east Nigeria. That is, we know fairly well how the combination of all challenges jointly impact on people. In contrast, the literature offers fairly little evidence disentangling the underlying, individual causal channels. These complex channels must be better measured and recognised to advance our understanding of the details of how people are hit by conflict - and how they cope with it. And such understanding is a prerequisite for designing and implementing more effective policies and programmes.

This leads us to conclude that **more and better micro data (especially on resilience) is required for understanding and monitoring the full diversity, nature and interrelations of food security and conflict**. At the regional and local levels, food systems and conflicts needs to be much better accounted for and measured. This particularly includes non-violent aspects of conflict and the political economy of food systems. At the household level, better information is required on how individuals and groups affect, are affected by and cope with conflict and fragility, including strategies related to food security.

Second, in addition to the complex and often prolonged impacts of conflict on food security systems just described, our review highlights that the context critically shapes both these impacts and the specific objectives and approaches to tackle them. The design of policies and programmes responding to crises must therefore account for the nature of the conflict and the specific context, which can vary by sub-groups of the population (for example by ethnicity or gender).

Furthermore, immediate assistance and long-term development cannot be viewed in isolation. In fact, the former critically shapes the latter. Just as conflict structurally transforms the economy and society, assistance (or its absence) has a structural impact,

emphasising the value of long-term policy consistency.

We therefore suggest that **strengthening food insecurity and resilience requires a context-specific and conflict-sensitive approach that integrates immediate assistance and long-term impacts.**

Third, there is a relative dearth of reliable evidence from the analysis of food policies and interventions. Producing such evidence in crisis settings is complicated by many practical and ethical challenges facing programme implementation, research designs and data collection. However, such evidence is critically important to producing ever more informed, effective and equitable policy Interventions.

Based on these insights, whenever and to the extent possible, **programme and policy responses should be designed, monitored and evaluated in a way that allows to assess causal impacts.**

FAO's capacity, programme, and database in North-east Nigeria offers a unique opportunity to make progress in these research and policy gaps. While other high-quality data exist in Nigeria, like the General Household Survey panel data, these do not permit a fine-grained analysis of food security in conflict areas. Similarly, the design of the FAO programme in Nigeria is also unique in the sense that it provides large-scale support but also allows a rigorous evaluation of its impact based on baseline and endline samples.

The next section discusses the questions we address in this report, the FAO data and external data we use, and presents our findings. In [Section 6](#) we discuss further questions that could be addressed on the basis of the FAO projects in North-east Nigeria and the broader Lake Chad Basin region.

## **4 The short-term impacts of the FAO programme in North-east Nigeria (Work Package 2)**

We empirically study the questions below:

1. Causal programme impact on food security

*What is the short-term impact of the FAO programme on food security? (reduced-form)*

2. Mechanism: resilience

*What is the short-term impact of the FAO programme on resilience? (first-stage)*

*What is the impact of resilience on food security? (second-stage)*

3. Heterogeneity: conflict exposure

*How does conflict exposure affect the reduced-form, first-stage and second-stage effects?*

4. Externalities and downstream effects: communal conflicts and security

*What is the short-term impact of the FAO programme on (survey-reported) conflicts and security in the community?*

## 4.1 Data and methods

To answer these questions, we use survey data from programme sites in the three states of Adamawa, Borno, and Yobe in North-east Nigeria. FAO collected representative data from programme beneficiaries as well as non-beneficiaries residing in the same location (“treatment and control groups”). Locations were surveyed both before and after the implementation of programme (“baseline and endline samples”). The baseline survey took place in June 2017 at the start of the planting season (and just before the programme started), the endline survey was conducted in October 2017 immediately after the harvest. The endline respondents were not the same as the baseline respondents, which means that we analyse two representative cross-sectional surveys. The endline questionnaire was (nearly) similar to the baseline questionnaire, providing rich household-level information on food security, use of coping strategies, agricultural production, exposure to shocks, and perceptions of violence and insecurity.

For both baseline and endline, the number of control group observations was about one quarter of the number of treatment group observations. Surveying a control group before and after the implementation of the programme is key for understanding its ‘true’ impact. It allows to not only compare differences between the treatment and control group but also within each group over time. In the absence of control group observations, it would be difficult to tell if observed changes in food security or resilience among beneficiaries were really driven by the programme itself, or rather by other differences over time, such as seasonality. For instance, food availability is generally higher after the harvest than during the planting season.



**Beneficiaries versus non-beneficiaries.** Throughout the analysis, we will differentiate between beneficiaries and non-beneficiaries based on our main indicator of ‘programme treatment’ status. This indicator equals one if the surveyed household received a agricultural input kit from the FAO programme, including cereal, pulse and vegetable kits. Unfortunately, we lack detailed information on *which* a surveyed beneficiary household received. Thus, we are not able to distinguish the different impacts of cereal, pulse and vegetable kits on food security and resilience and compare them.

**Measuring food security.** Our main food security indicator is the Food Consumption Score (FCS). The FCS is a composite score of dietary diversity and food frequency, based on different food items/categories consumed. The score is based on self-reported information of the frequency of consumption of different food groups by a household in the week preceding the survey. The food groups include cereals and pulses; legumes; fruits and vegetables; meat, fish and dairy products, as well as sugars, oils and fats. As the items vary in their nutritional value, items with relatively higher nutritional importance receive more ‘weight’ when the FCS is constructed. The final FCS score ranges from 0 to 112, and determines whether a household’s food security is considered ‘poor’, ‘borderline’, or ‘acceptable’.<sup>1</sup>

As a second measure of food security, we analyse the Reduced Coping Strategy Index (RCSI). The RCSI captures if and to what extent households had to use a set of harmful coping strategies that are assumed to directly impair food security. Such harmful strategies include, among others, going to sleep hungry, and prioritizing food needs of children in the household. The RCSI combines the frequency of use of these detrimental behaviours, and takes into account how ‘severe’ they are. As a result, higher RCSI values indicate *less* food security.

**Measuring resilience.** Measuring and understanding resilience requires in-depth knowledge on drivers of risk, perceptions of resilience, available and used coping strategies, the institutional environment, and resilience outcomes. This notion is emphasised in the 9-month Action Plan behind the FAO programme: “Resilience is the multidimensional outcome of multi-sectoral interventions often involving a large set of agencies and donors”

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<sup>1</sup>The FCS indicator has various advantages. First, food groups are clearly defined and summed up to generate a simple and straightforward indicator, which takes differences in nutritional value of the different food groups into account. Second, the one-week recall period of consumption of aggregate food groups is relatively recent and mitigates concerns of memory failure and misreporting. Third, the measure has been widely used in academic and policy work, which facilitates comparison to other contexts.

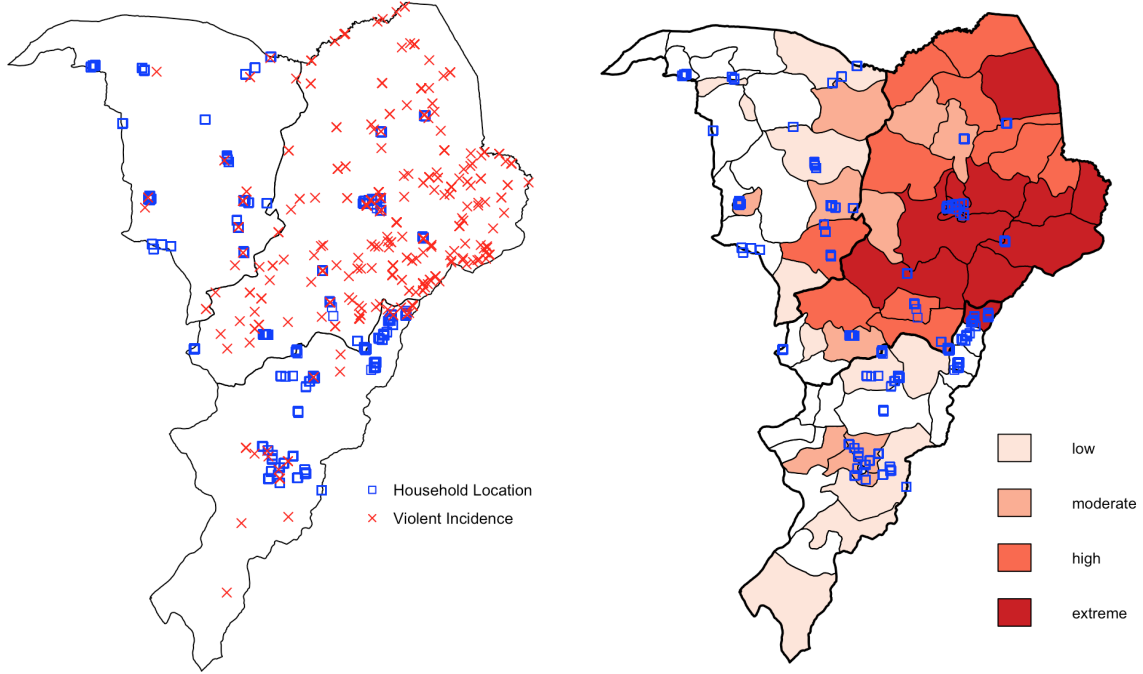
(FAO, 2016). Measuring resilience comprehensively would thus require a complex and dynamic composite indicator, such as the FAO Resilience Index Measurement and Analysis (RIMA) resilience capacity index. Yet, despite the richness of the database, the information collected at baseline and endline is not sufficient to build such a data-intensive measure. Therefore, we need to rely on a less comprehensive measure that can be used as a proxy measure of specific aspects of resilience during conflicts. We use a list of seven questionnaire items that provide information on whether households had to adopt harmful livelihood strategies during the past 30 days. The seven items are selling household assets, using credit to purchase food, spending savings, selling productive assets, consuming stored seeds, selling their house or land, and removing children from school. In case households did not use a certain strategy, the survey also includes information on whether household could have used that could have used a strategy in theory but did not (and why). The combination of these two sets of questions allows us to create an indicator of a household's capacities to cope with the crisis.

Hence, our main proxy measure for resilience is based on the number of (available) coping strategies used by the household in 30 days preceding the survey. The indicator is a ratio: the total number of harmful livelihood strategies adopted by a household divided by the total number of strategies available to the household. Our proxy indicator of resilience reflects both the capacity and the need of a household to adopt harmful livelihood coping strategies, which is one important aspect of resilience.

**Measuring exposure to conflict.** To complement the survey data with objective measures of exposure to conflict and violence, we use geo-coded conflict event data from the Armed Conflict Location Event Database - ACLED (Raleigh et al., 2010). We use information on the number of incidences of violence such as skirmishes between armed actors and targeted violence against civilians for the period January 2016 – October 2017. We spatially match this information with the survey data based on GPS data on the geographic location of a surveyed household, and produce aggregate exposure measures at the LGA level.

Figure 1 plots the spatial spread of households surveyed at endline in October 2017 and the number of violent events in North-east Nigeria that occurred between January 2016 and October 2017. The map on the left shows the spatial distribution of violent events (crosses) and surveyed households (squares). We observe that between January 2016 and October 2017 much violence took place in the far eastern part of Borno, where FAO had less

**Figure 1:** Spatial distribution of endline sample and violent events



access to households. However, we also observe a substantial spatial overlap of violence and surveyed locations. To illustrate this further, the map on the right displays conflict intensity at the district level (LGA). Based on the distribution of the total number of events that occurred in LGAs, we divide LGAs into four categories: districts of low, moderate, high and extreme conflict intensity. Thus, surveyed households can be categorised as living in an area of low, moderate, high or extreme conflict intensity, based on the location of the survey site.

## 4.2 Systematic differences between beneficiaries and non-beneficiaries

Before analysing programme impacts we need to assess systematic differences between beneficiaries and non-beneficiaries that are not due to the programme. In the absence of “perfectly random” assigned programme participation it is necessary to account for such systematic differences before the programme. In addition, the survey sample drawn at endline may overlap with the sample surveyed at baseline, but is not the same (“repeated cross-section”). Therefore, it is important to also investigate average characteristics of beneficiaries and non-beneficiaries after the programme.

Unfortunately, many household and individual characteristics, such as age and education of household head, or household size, were not collected at endline. This has two important limitations in terms of inference. First, we are not able to conduct robust tests with the endline data, which reduces our analytical ability to attribute any detected differences in food security and resilience between the beneficiaries and non-beneficiaries at endline to the programme. Second, the lack of sufficient information on the household characteristics at endline also limits the applicability of “matching techniques” – a common way to “correct” for systematic differences between beneficiaries and non-beneficiaries. The only variables related to household characteristics that were collected both before and after the programme, and can be used for matching, are location, household type (IDP, host, returnee), and gender of household head.

We conduct three exercises. First, we compare average characteristics of beneficiaries and non-beneficiaries in the baseline data. Second, we compare a reduced number of average characteristics of beneficiaries and non-beneficiaries in the endline data. Third, we later not only test the impact of the FAO programme by comparing average outcomes at endline, but also factor in detected pre-programme differences. Where applicable and possible, we calculate ‘difference-in-difference’ estimates of programme impacts based on the repeated cross-sections at baseline and endline.

**Differences before the programme.** [Table 1](#) compare average characteristics of beneficiaries and non-beneficiaries in the study sample at baseline, i.e. before the implementation of the programme. We report mean outcomes for non-beneficiaries (column 1) and beneficiaries households (column 2) for three categories of variables: location (Panel A), household characteristics (Panel B), and food security, shock exposure and perceptions of insecurity (Panel C). We omit standard deviations to keep the table simple, and test for significant differences between non-beneficiaries and beneficiaries. We find that average outcomes between beneficiaries and non-beneficiaries are highly statistically significant (indicated by three stars) for only 4 out of the 24 indicators. Overall, there are no systematic differences in households’ location. In terms of household characteristics, non-beneficiary households are, on average, much less likely to be a WFP recipient (25% versus 68%), slightly more likely to be headed by a female (25% versus 21%) and marginally smaller in size (8.1 members versus 8.5). There is no statistically noticeable difference in the average RSCI, but the FCS is significantly lower for households who were to receive treatment (39.8 versus 43.35), which might reflect targeting of the programme. To mitigate concerns that the “real” impact of the programme is conflated by the minor

imbalance in the FCS, we statistically account for this in the analysis of the causal programme impact below.

**Table 1:** Differences between treated and control households at baseline

	Baseline			Significance
	Non-beneficiaries	Beneficiaries	Difference	
A. State				
Adamwa	28%	30%	2%	
Borno	47%	46%	-1%	
Yobe	25%	24%	-1%	
B. Household characteristics				
Age of head (years)	43.1	43.7	0.6	
Household size (members)	8.1	8.5	0.4	***
Head has secondary education	24%	21%	-3%	*
Head is female	25%	21%	-4%	***
IDP	18%	18%	0%	
Host	37%	36%	-1%	
Returnee	45%	46%	1%	
World Food Programme recipient	25%	68%	43%	***
C. Food security, shocks and insecurity				
FCS (score)	43.4	39.8	-3.6	***
RCSI (score)	10.1	10.6	0.5	
Shocks (score)	1.0	0.94	-0.06	*
Insecurity (score)	9.04	8.93	-0.11	
N	1260	4547		

*Note:* Levels of statistical significance: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Differences after the programme.** Table 2 compares available average characteristics of beneficiaries and non-beneficiaries in the study sample at endline, i.e. after the implementation of the programme. Panel A shows that location at the state level is also balanced across beneficiaries and non-beneficiaries at endline (and not significantly different from the baseline shares or differences). Panel B suggests that significantly more

**Table 2:** Differences between beneficiaries and non-beneficiaries at endline

	Endline			Significance
	Non-beneficiaries	Beneficiaries	Difference	
<b>A. State</b>				
Adamawa	30%	30%	0%	
Borno	46%	48%	2%	
Yobe	24%	22%	2%	
<b>B. Household characteristics</b>				
Head is female	30%	26%	-4%	***
IDP	10%	17%	-7%	***
Host	44%	36%	8%	***
Returnee	46%	47%	-1%	
Returnee	28%	43%	15%	***
<b>C. Food security</b>				
FCS (score)	39.8	41.6	1.8	**
RCSI (score)	8.2	7.8	-0.4	
<i>N</i>	1510	4481		

*Note:* Levels of statistical significance: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

non-beneficiary households were female-headed than beneficiary, as in the baseline sample. The magnitude of this ‘imbalance’ is similar that at baseline (see [Table 1](#)). In contrast to the baseline sample, we observe significant differences in the shares of IDP and host community. At endline, 17% of beneficiary households are IDP households, but only 10% among non-beneficiary households. 36% of beneficiary households live in host communities, and 44% of non-beneficiary households. The share of returnee households is (nearly) identical for both groups (about 46%). Lastly, we observe a substantial difference in the share of WFP recipients, but compared to the baseline sample, the magnitude of the difference is smaller at endline. At endline. 28% of non-beneficiary households received WFP support, which is similar to the baseline share (28%). Among beneficiary households, now 43% are WFP recipients, which is much lower than the 68% at baseline.

### 4.3 Programme impacts on food security

**Simple differences at endline.** Panel C in [Table 2](#) compares food security and resilience outcomes between programme beneficiaries and non-beneficiaries at endline. The results suggest that the FCS after the programme is significantly higher among beneficiaries (FCS scores of 41.6 versus 39.8). The mean difference in the RCSI also suggests a positive effect on resilience, but it is modest in magnitude and not statistically significant (scores of 7.8 versus 8.2).

The simple differences at endline may reflect systematic differences between beneficiaries and non-beneficiaries that are not due to the programme (see [Table 1](#) and [Table 2](#)).

**Standard difference in differences.** To account for pre-existing differences between beneficiaries and non-beneficiaries before the start of the programme, we calculate the mean difference between beneficiaries and non-beneficiaries at both baseline and endline, based on the two cross-sections. We then subtract the mean difference at baseline from the mean difference at endline. In other words, we calculate the ‘difference in differences’. Panel A of [Table 3](#) presents the resulting estimates of the ‘net change’ in food security. The programme on average increased the score by 5.4 points, which is about 13% of the average baseline score among programme beneficiaries. The effect is highly statistically significant (at the 1% level). The RSCI score decreases by 0.9 points, also suggesting an improvement in food security (statistically significant at the 10% level). The improvement in the RCSI score equals about 9% of the average baseline score of beneficiary households.

**Difference in differences on matched dataset.** To check the robustness of our positive results for food security indicators further, we statistically ‘match households’ at endline using the Propensity Score Matching (PSM) method. In essence, we ensure mechanically that we compare ‘similar’ households and then re-run the difference in difference estimation. As mentioned earlier, we are only able to match by the household type, the gender of the household, and its location, given that there are no other household and individual characteristics available at endline.

The results displayed in Panel B of [Table 3](#) confirm the positive impacts on both food security. We observe that non-beneficiary households’ FCS at baseline and endline increased slightly after conducting the PSM and find positive net impacts on both food insecurity measures. The estimated magnitude of the effects is similar to the results in Panel A: the

estimates suggest a net improvement in the FCS by 4.1 points and in the the RCSI by 1.1 points.

**Table 3:** Difference-in-differences estimates the programme impact on food security

	Baseline		Endline		Net impact	
	Non-benef.	Beneficiaries	Non-benef.	Beneficiaries	$\Delta$	Sign.
<b>A. Standard</b>						
FCS	43.4	39.8	39.8	41.6	5.4	***
RCSI	10.1	10.6	8.2	7.8	-0.9	*
<b>B. With matching at endline and baseline</b>						
FCS	44.1	40.4	43.3	43.7	4.1	***
RCSI	10.0	10.5	8.0	7.4	-1.1	*

*Note:* Levels of statistical significance: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

#### 4.4 Towards resilience: building household capacities

**Programme impacts on resilience.** Table 4 displays the effects of the programme on households' use of harmful livelihood strategies. As information on resilience was not collected at baseline, we present results from simple differences between beneficiaries and non-beneficiaries at endline as well as 'corrected' differences where we match endline household via PSM (see above).

The results presented in Panel A suggest that programme beneficiaries resort significantly less to (harmful) coping strategies that are available to them. This trend holds across all seven categories: selling household assets, using credit to purchase food, spending savings, selling productive assets, consuming stored seeds, selling their house or land, and removing children from school. The positive impact is highly significant for the first five categories, where we see an average decrease in usage of about 6 percentage points. These results are confirmed when we match households through PSM (Panel B). After matching, we observe an average reduction of about 7-8% in resorting to the first five strategies listed, and the effects are statistically significant.

These results emphasise the critically important impact of the programme: they show that households who benefited from the FAO programme are less likely to revert to the use of harmful livelihood strategies to cover their basic survival needs. In other words, the



**Table 4:** Resilience 1: Use of Harmful Livelihood Strategies in the last 30 days

	Endline			
	Non-beneficiaries	Beneficiaries	Difference	Significance
<b>A. Standard</b>				
Sell household assets	31%	26%	-5%	***
Purchase food on credit	44%	37%	-7%	***
Spend Savings	43%	36%	-7%	***
Sell productive assets	32%	27%	-5%	***
Consume seeds stock	31%	27%	-4%	***
Sell house or land	22%	21%	-1%	
Remove children from school	22%	21%	-1%	
<b>B. With matching at endline</b>				
Sell household assets	28%	20%	-8%	***
Purchase food on credit	31%	23%	-8%	***
Spend Savings	31%	24%	-7%	***
Sell productive assets	29%	21%	-8%	***
Consume seeds stock	28%	22%	-6%	***
Sell house or land	24%	19%	-5%	*
Remove children from school	24%	20%	-4%	

*Note:* Levels of statistical significance: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

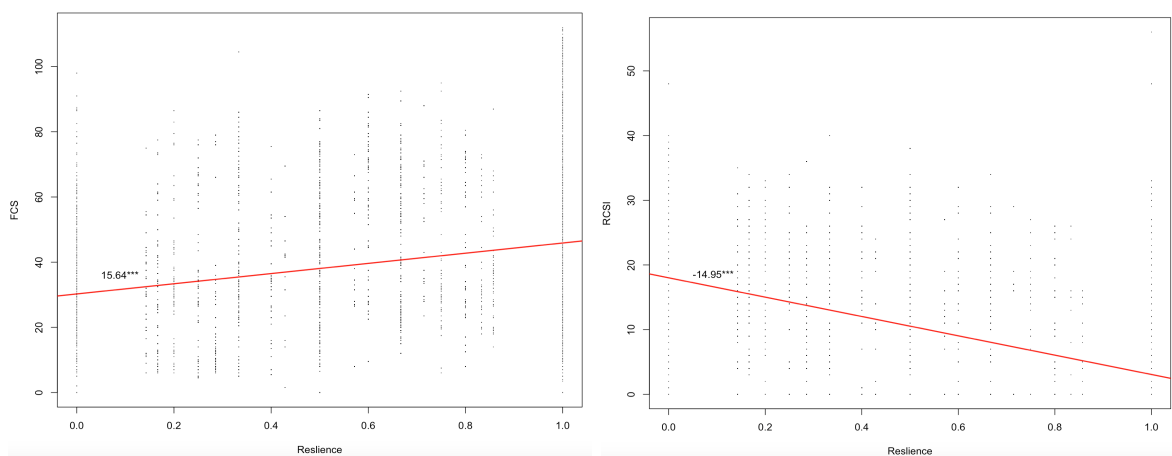
programme has strengthened the capacities of household to cope with the crisis, which is an important stepping stone for building resilience at the individual and household levels. However, given that we are not able to assess the difference between the beneficiaries before and after the intervention, the comparison can only be undertaken between the beneficiary and non-beneficiary groups at endline. This limits our ability to attribute these positive impacts to the programme in a causal sense. Nevertheless, the robustness of the results after using propensity score matching emphasise the critical importance of the programme in strengthening capacities of households to cope with the crisis.

**Resilience and food security.** We now explore whether improvements in resilience (measured through strengthened capacities) are associated with strengthened food security

in our study sample. The short-term impacts of resilience on food security are complex. For instance, households who resort to selling their assets are less resilient, as we assume that they have to resort to such a harmful strategy. Yet, using of such strategy could smooth food security in the short-term. Considering that both outcomes were measured with a focus on the past 7 and 30 days. Therefore, it is important to check if the households who benefited from the programme were able to increase their food security without having to use harmful livelihoods strategies such as selling assets or depleting their seeds stocks.

Figure 2 plots the relationship between resilience and our two measures of food security, the FCS (left) and the RCSI (right). The graphs illustrate that there is substantial variation in food security at the various levels of (our measure of) resilience. Yet, visual inspection reveals a clear pattern: higher resilience values are strongly associated with higher food security scores (for the RCSI, a lower value implies *higher* food security). The linear fits of the relationship (indicated as the red lines) confirm that the correlation is strong and statistically significant for both food security measures.

**Figure 2:** Resilience and food security



The two figures have important implications. First, they suggest that positive immediate impact on food security is not achieved at the cost of damaging capacities of households. Second, they rather suggest that the programme simultaneously strengthened food security and decreased the use of harmful livelihood strategies. In other words, the programme can build both food security and resilience at the same time.

**Table 5:** Heterogeneity of net impact on food security

	Baseline		Endline		Net impact	
	Non-benef.	Benef.	Non-benef.	Benef.	$\Delta$	Significance
<b>A. Food Consumption Score (FCS)</b>						
Full Sample	43.35	39.79	39.81	41.56	5.31	***
IDPs	40.82	35.60	30.13	35.08	10.18	***
Non-IDPs	43.91	40.74	40.79	42.44	4.82	***
Low Conflict	43.87	42.12	45.25	43.90	0.40	
High Conflict	45.26	39.01	29.30	36.12	13.06	***
Extreme Conflict	52.16	31.66	29.64	38.29	29.15	***
<b>B. Reduced Coping Strategy Index (RCSI)</b>						
Full Sample	10.10	10.64	8.18	7.77	-0.94	*
IDPs	11.48	13.51	13.48	12.20	-3.32	***
Non-IDPs	9.72	9.89	7.55	7.08	-0.64	
Low Conflict	9.46	9.18	9.09	7.33	-1.49	**
High Conflict	8.86	10.88	7.81	9.14	-0.69	
Extreme Conflict	8.13	9.47	11.15	12.76	0.27	

*Note:* Levels of statistical significance: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table 6:** Heterogeneity in resilience: Available coping strategies uses in past 30 days

	Endline			Significance
	Non-beneficiaries	Beneficiaries	Difference	
Full Sample	33%	30%	-3%	**
With Personal Shock	37%	38%	1%	
No Personal Shock	27%	22%	-5%	***
Low Conflict	36%	32%	-4%	**
High Conflict	30%	29%	-1%	
Extreme Conflict	37%	33%	-4%	*

*Note:* Levels of statistical significance: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## 4.5 Heterogeneity: conflict exposure

**Food security.** We now test whether the extent to which a household was exposed to the conflict affects the impacts of the programme on food security. The results presented in

Table 5 reveal that the net impact of the programme on food security varies conflict exposure. Each row shows the difference-in-difference effects, which take pre-intervention differences into account, for various sub-groups that are specified in the first column. While we observe strong positive impacts across (almost) all sub-groups, the net impact on the FCS (Panel A) was particularly large among internally displaced households and those that live in areas beset with extreme conflict violence.

To explore what drives these effects in the FCS we first look at changes between baseline and endline among beneficiaries (columns 3 and 5). For beneficiaries in extreme conflict areas the FCS increased only mildly, while for IDP beneficiaries it remained more or less the same. Focusing on columns 2 and 4 reveal a strikingly different pattern for non-beneficiaries: IDPs and those living under extreme conflict intensity suffered enormous decreases in the FCS. For both sub-groups, it is important to note that at baseline non-beneficiaries were much better off than beneficiaries (columns 2 and 3). In other words, the programme played a fundamentally important role for beneficiaries: assuming that they would have experienced similarly adverse effects than their non-beneficiary counterparts, the absence of the programme would likely have pushed them a FCS below 25 points, which is devastatingly low. These findings also emphasise the importance of a ‘control’ group for understanding and quantifying programme impacts. In the absence of observation from non-beneficiaries it would not have been possible to document these strong achievements of the programme.

Panel B presents results on the net impacts of the programme across sub-groups on the RCSI. The impact on the RCSI was strongest among the internally displaced and those living in low conflict areas. The results again reveal an important additional insight about IDPs: in spite of the strong impact among IDPs, the absolute level of food security after the intervention is still the lowest for IDPs. This adds further to the conclusion that the critical importance of the programme for the most vulnerable but also suggests that they require continued support.

**Resilience.** For resilience, we also explore how local variation in conflict intensity and additional ‘personal shocks’, affects the programme capacity to build resilience. The shocks covered by the endline questionnaire include robbery or theft, displacement for security reasons, loss of land, death of a relative or friend, physical violence, psychological violence, corruption, and a disease/drought/floods-category. As we only have endline information, we cannot study net impacts but have to focus on simple differences after the intervention.

Table 6 shows that resilience at endline varies with both the intensity of political violence and the experience of personal shocks. We observe that beneficiary households that did not suffer a personal shock in the three months preceding the survey were those who gained most in terms of resilience, compared to non-beneficiaries (row 3). However, these benefits vanish in the sub-sample of households that did experience a personal shock: in this case, beneficiaries are not more resilient than non-beneficiaries (row 2).<sup>2</sup>

The weak impact of the programme for building resilience when households face shocks might be driven by the fact that the endline survey was conducted shortly after the programme ended. Beneficiary households in conflict-affected regions may require more time to restore their capacity to cope with ‘additional’ challenges. Given the strong impact of the programme on food security and resilience in the absence of large shocks, we are likely to observe more resilience to shocks in the medium-term. However, these conclusions are speculative and would require a longer-term survey and analysis.

Rows 4 to 6 in table Table 6 break down the resilience impacts by conflict intensity in the survey location. The programme significantly benefited recipient households residing in areas that experienced little to no conflict as well as those that experienced extreme conflict (rows 4 and 6). The effect is weaker and not statistically significant for household living in areas with high conflict. The strong impact under extreme conflict intensity strengthens the conclusion that in the face of extreme conflict household often benefit tremendously and the programme critically mitigates devastating effects on food insecurity and building resilience.

## 4.6 Conflicts and security in the community

As a final exercise, we analyse whether the programme affected the respondents’ perceptions of conflict between members of their community and of local insecurity.<sup>3</sup> We analyse six different categories. For each category, respondents were presented with a statement, such as “I feel safe walking alone in my neighbourhood during the day”, and asked how much they agree with the statement, on a scale from 0 (“I strongly disagree” to 4 (“I strongly

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<sup>2</sup>Table 6 shows the results for the “no-shock” and “at-least one shock” sub-samples. When we look at the actual number of shocks a household experienced in the past three months, we observe that beneficiaries are more resilient than non-beneficiaries if the number of shocks was smaller than three. The effect disappears for household who experienced three shocks or more. We omit these results for brevity but they are available upon request.

<sup>3</sup>Unfortunately, a specific question on land conflict (“How much conflict over land use exists in this location?”), which had been asked at baseline, was not included in the endline questionnaire, and can therefore not be analysed.

**Table 7:** Perceptions of communal conflict and security

	Baseline		Endline		Net impact	
	Non-benef.	Benef.	Non-benef.	Benef.	$\Delta$	significance
Feel safe walking alone (day)	3.32	3.43	3.56	3.51	-0.15	***
Feel safe walking alone (night)	2.68	2.76	2.58	2.65	-0.01	
Concerns of community violence	2.42	2.56	2.55	2.46	-0.23	***
Avoid perceived dangerous roads	2.50	2.52	2.66	2.53	-0.15	***
Community is overall peaceful	2.91	3.00	2.75	2.78	-0.07	
Violence increased from last year	1.07	1.06	1.05	0.99	-0.05	
<i>N</i>	1260	4547	1510	4481		

*Note:* Levels of statistical significance: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

agree”).

As displayed in Table 7, two remarkable structural patterns are apparent in the statements of how safe respondents feel walking alone during the day, at night, and how concerned they are about violence between members of their community (“community violence”). First, there were significant differences in all three of these variables *before* the programme started: compared to non-beneficiaries, beneficiaries felt safer during the day and at night, but were more concerned about community violence. While this raises questions about targeting, it may also suggest that “community violence” relates to a different form of violence and safety concern than those faced when walking alone. Second, there are strong differences before and after the programme *within both* groups. Compared to the baseline level, beneficiaries felt safer during the day, less safe at night, and less concerned about community violence, while non-beneficiaries also felt safer during the day and less safe at night, but *more* concerned about community violence.

These patterns result in a negative net impact of the programme on feeling safe during the day, a negligible net impact on feel safe at night and a strong negative impact on concerns of community violence (i.e. less concerns). This provides further support for the assumption that the question on “community violence” captured something different than the other two questions. A potential explanation for the overall picture is that the programme mitigated concerns of community violence and walking alone in general, but at night they may feel more at risk of being robbed, for instance. The net impact of the programme on safety at night is negligible, because non-beneficiaries also felt less safe at endline than at baseline. This

means that the programme, in addition to its positive impacts on perceptions of security, may have induced beliefs that the expected returns to robbery at night increased irrespective of beneficiary status.

## 5 Implications for policy and practice

Our findings have important implications that are relevant to FAO’s programming, monitoring and learning agendas in the region and beyond.

**Lessons from the findings of the FAO programme.** Our findings suggest that food security interventions in a crisis setting can have strong short-term impacts: the FAO programme in North-east Nigeria strongly supports food security shortly after its implementation. In addition, the programme also built resilience. We also show that high resilience is clearly associated with higher food security.

Our heterogeneity analysis reveals particularly strong short-term returns for those affected most by the conflict: the effect on FCS was particularly large among internally displaced households and those that live in areas of high and extreme conflict, while the impact on the RCSI was strongest among the internally displaced and those living in low conflict areas. It is worth noting that even though there are strong impacts on IDPs, the absolute level of food security was still the lowest for IDPs and those in areas of intense conflict, as compared to other sub-groups. Similarly, the short-term programme returns on resilience were the largest for households residing in areas of extreme conflict intensity and when household did not experience exogenous shocks. These results emphasises the critical importance and potential such programmes for protecting the most vulnerable in an extreme crisis.

Our analysis of programme impacts on perceptions of security find generally positive impacts, but the programme may have induced beliefs that the expected returns to robbery increased, increasing worries among *both* beneficiaries and non-beneficiaries about walking alone at night. While it is difficult to assess the underlying reasons, future interventions may try to prevent such negative externalities, e.g. by how the programme is communicated to communities. Some qualitative research following up this finding may also help to contextualise this insight.

**Lessons from the M&E design of the FAO programme.** We were able to conduct a robust impact analysis due to the impressive combination of FAO’s capacity, programme, and database in North-east Nigeria. This permitted us to use rare high-quality data not only from programme beneficiaries but also from non-beneficiaries residing in the same location at both points in time (treatment and control groups). Randomly selecting beneficiaries and monitoring non-beneficiaries often faces important practical and ethical challenges, especially in fragile and conflict-affected settings. However, in the absence of a monitored counterfactual it is difficult to understand the true impact of a programme. In the FAO programme, programme participation was – to the best of our knowledge – not randomised, but the control group was monitored. While randomised designs are the gold standard to measure clean, causal effects, a monitored control group is still very informative, helps to assess structural differences and supports causal arguments, if (also) surveyed before the programme is implemented.

In the FAO programme, beneficiary and non-beneficiary data were collected not only after the programme (endline), but also before the programme (baseline). Next to assessing and correcting for structural differences between beneficiaries and non-beneficiaries, this design also allowed to assess time-trends within both groups and ultimately strengthen causal interpretations of the programme impacts.

The endline sample was not the same as the baseline sample, i.e. we analysed two representative cross-sections. While this approach is very useful and robust, a panel design, where the same beneficiary and non-beneficiary households are interviewed before and after the programme, would provide additional advantages and may be considered for future interventions in the region. It would, for instance, allow to net out unobservable individual characteristics that do not change over time, mitigate selection concerns when programme assignment is not perfectly random, and provide a more nuanced picture of the programme impact beyond average effects.

Tracking households and individuals in North-east Nigeria is a daunting task. Yet, several strategies have recently been developed, tested and applied in other crisis settings, including situations of intense violence and high levels of displacement. These insights and techniques could be transferred and adapted to the North-eastern Nigerian context and ISDC would be happy to provide technical assistance.



## 6 Conclusions

North-east Nigeria offers an important and unique opportunity to study five important topics related to conflict and food security. These include: a) how (and where) extremism rises, violence occurs and conflict is sustained; b) how households respond to adversity and policy interventions in crisis settings; c) how institutional factors, such as regional, national, and international governance as well as food and agricultural markets, shape these responses; d) how effective existing policy interventions are in supporting food security and stability in crisis settings, and e) how existing food security interventions in crisis settings can be strengthened.

**This report.** In this report, we review and summarise robust evidence on the structural interrelations between food insecurity and conflict related to these topics (Work Package 1). Our empirical analysis uses baseline and endline survey data provided by FAO to analyse the short-term impacts of the FAO programme in North-east Nigeria (Work Package 2). Specifically, we study the short-term impacts of the FAO programme on food security and resilience, how conflict exposure affects these impacts, how resilience is related food security, and how the programme affected perceptions of conflicts and security within communities. Based on our results, we derive recommendations of how the design, impact and evaluation of policy interventions in crisis settings could be strengthened.

The tragic North-east Nigerian context, in combination with FAO’s activity, and the availability of relatively detailed external data, such as conflict event data, provides ample and realistic opportunities for further learning. These **learning opportunities** include, but are not limited to, these topics:

**Opportunities for further learning in North-east Nigeria with the current database.** While the focus of this project was on food security, some variables in the existing database could be analysed in more detail to address additional questions. Moreover, relatively detailed external data of high-quality exist, which can be matched to the survey data as the conflict event data we use in this project, strengthening the depth and scope of open questions that can be explored. Examples of such questions include:

- *Who are the displaced, where are they from, where do they go, and why?*

- *What are the short-term impacts of the FAO programme on physical capital (source of income, land, livestock)?*
- *How do climatic conditions affect the programme impacts on food security and resilience?*
- *How is ‘objective exposure’ to conflict related to subjective experience of violence (perceptions and beliefs)?*

**Opportunities for further learning in North-east Nigeria with additional survey data.** We believe that learning from the current FAO programme and database will contribute both to stronger MEAL capacity throughout FAO and its implementing partners. Monitoring and analysis in the region could be improved and extended by continuously building up the capacity and the data collection to create evidence to strengthen our understanding of mechanisms of crisis impact and coping. In that sense, building relevant knowledge over the years is an **iterative process**.

In that regard, it is important to emphasise that conflict and development are inherently dynamic phenomena. Continuing to analyse the impacts of new and other programmes will allow to study the effectiveness of policy assistance in different stages of the crisis in North-east Nigeria. In line with FAOs programming framework in region, these stages primarily include the emergency phase and post-emergency recovery and transition. In addition to the quantitative analysis this policy brief focuses on, qualitative analyses could also provide important insights about programme impacts and the context.

In terms of broadening the scope, analysing further components of the FAO programme would allow to assess the importance of the agricultural input interventions relative to other interventions. Detailed programme would then allow advanced analyses of programme and intervention “performance”, such as different components returns to investment and cost-effectiveness.

Producing high-quality survey data in the extreme conditions of North-east Nigeria is a steep task, yet the extraordinary data base and robust analysis presented in this report prove that FAO is capable of doing so. Another survey round, ideally revisiting endline respondents, would allow to collect information on variables that were not included at endline. Examples of questions that could be addressed include (conditional on relevant data collected):

- *What is the short-term impact of different agricultural input kits on resilience? (Based*

*on information on which input kits beneficiaries received)*

- *What is the short-term impact of other components of the FAO programme, beyond agricultural input kits?*
- *What is the short-term impact of the FAO programme on resilience? (With a more complex measure of resilience, such as the FAO-RIMA Resilience Capacity Indicator (RCI))*
- *What is the short-term impact of the FAO programme on agricultural production? (Relevant variables were not collected for the full endline sample)*
- *What is the short-term impact of the FAO programme on household decision-making? (The well-being analysis would benefit from data on household finance and behavioural/subjective measures. A module on behavioural measures, such as on risk preferences and interpersonal trust, had been considered for the endline survey, but eventually was not included)*
- *How do conflict and the FAO programme affect conflicts within communities, e.g. over land, and traditional local institutions of conflict mitigation and resolution? (Questions about communal conflict such as over land, and about the institutions to mitigate them, were not collected for the endline sample)*
- *How does local governance by armed actors affect food security and FAO programme impacts? (This would require information on local governance and policies by armed actors)*

Lastly, revisiting endline respondents and repeating some key questions in a long-term follow-up visit (one, two or three years from now), would allow to assess long-term impacts of the FAO programme. Examples of questions that could be addressed include (for variables that were asked at endline):

- *What is the long-term impact of the FAO programme on food security?*
- *What is the long-term impact of the FAO programme on resilience?*
- *How does conflict exposure affect the long-term impacts of the FAO programme on food security and resilience?*
- *How does strengthened resilience support the transition from emergency to recovery?*

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