South Sudan Agricultural and Food Insecurity Dynamics (2006-2020)

1. Introduction

South Sudan’s food security has been deeply and permanently disrupted by the impacts of war since 2013, yet it is the economic and markets impact of conflict, rather than the violence itself, that have become the most prominent drivers of food insecurity. South Sudan faces one of the world’s most dire food insecurity situations. A September 2019 analysis by the FAO found that 6.35 million people (more than half of the country’s population) faced crisis-level food insecurity or worse, with 10,000 of these facing all-out catastrophe. The prevailing narrative around food insecurity in South Sudan focuses on conflict as a major threat to food security. These accounts are not wrong—South Sudan faces conflict-induced instability that affects the ability to grow, buy, and sell food, ensuring a cycle of food insecurity. Millions have been displaced from their homes due to conflict, further destabilizing food access. Looking at conflict alone, however, misses crucial elements of the food security situation in South Sudan. Before the COVID-19 pandemic, critical aspects of market dynamics and weather and climate patterns already played important and often overlooked roles in South Sudan’s post-independence food security situation. Today, in light of the ongoing pandemic, further market disruptions from supply-chain breakdowns threaten to intensify increases in food insecurity.

Conflict in South Sudan, resulting disruptions to oil revenues, and economic mismanagement have led to a situation where market factors play the greatest direct role in today’s food insecurity. Market effects including poor trade conditions and hyperinflation have stemmed in large part from conflict and economic mismanagement, and today play a major role in the availability and accessibility of food to the South Sudanese population. Other secondary effects of conflict, including displacement and infrastructure destruction, have additionally contributed to this situation. Despite South Sudan’s ample and growing agricultural potential, agricultural production has suffered due to insecurity and lack of farm labor.

Recent modeling work highlights that market factors and environmental influences play a critical role to food security in South Sudan. Experts informing the United Nations Security Council identify conflict-driven displacement, low crop yields, economic crisis, climatic shocks and difficulties for humanitarian access as key drivers of food insecurity in South Sudan. To further examine the relative importance of these drivers, the recent study aimed at predicting historical (2009-2019) critical food insecurity levels in 21 countries including South Sudan, using data on conflict, market prices, and the environment, observed prior to critical food insecurity events. Critical food insecurity is measured through the Integrated Phase Classification (see Table 1) and defined as crisis or worse.

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2 (FAO, 2019a)
3 (World Bank, 2017)
4 (World Bank, 2020a)
Factors influencing food insecurity have shifted dramatically since pre-independence. This shift is highlighted in Figure 1 that summarizes the explanatory power of key drivers of interest over time. While violence has long been associated with greater food insecurity, more than half of the current populations experiencing crisis or worse conditions can attribute this to the breakdown of markets and high inflation experienced starting in 2015. In fact, the influence of markets prices on modeled food insecurity has skyrocketed since late 2015, coinciding with conflict and politically-induced economic collapse. Decades of war have influenced a shift toward market dependence that is now closely tied with food insecurity.6

![Figure 1: Decomposition of estimated populations in areas experiencing critical food insecurity each month in South Sudan based on 3-month centered average results, national level](image)

6 (Thomas, 2019)

7 Data from (Andree et al., [forthcoming]), with results updated specifically for this report using the methods and data sources described in that source. As noted in (Andree et al., [forthcoming]), the decomposition is produced using methods that provide model interpretability by tracing variables leveraged by the model to predict future outcomes. Model interpretability should not be interpreted in a causal sense. Nevertheless, such results may help dissect which data sources are most predictive of future crisis outcomes and aid in broadly understanding historical dynamics.
At the national level, the analysis showed that market prices have the largest explanatory power of recent food security in South Sudan, following the depreciation of the South Sudanese Pound (SSP) in December 2015. Market influences on food security appear relatively independent of local agricultural supply, which is especially evident following the SSP’s depreciation and subsequent skyrocketing inflation. Before that time, market prices were of little importance in explaining food security. Instead, conflict was the most prominent explanatory factor (Figure 2). The FAO and World Food Programme (WFP) found that during the 2018 lean season, over 40% of cereals and roots consumed by households nationally were acquired from markets.\(^8\)

![Figure 2: Average influence of food security factors before and after 2015](image)

**Modeled influences of violence, inflation, and crop health on food security align with key indicators shown in Figure 3.** Food price index and price volatility show a dramatic increase in food costs following the December 2015 collapse of the South Sudanese Pound, coinciding with rising populations in food insecurity crisis areas. Conflict death intensity since 2013 does not appear to trend with food insecure populations in the same way—rather, conflict intensity has subsided and stabilized to some

\(^8\) FAO & World Food Programme (2019). This market dependence varies considerably by region. FAO and WFP note that 2018 figures indicating a decrease in market dependence from 2017 are unlikely to signal increased crop production and rather may signal excessive difficulty in obtaining market goods due to inadequate market supplies and/or extreme prices.
extent since 2017, yet food insecurity has remained high. Environmental factors, too, show volatility, but not a trend that matches post-2015 growth and sustained level of food insecurity.

![Graph showing key indicators of market prices, violence, and environmental condition, South Sudan (2007-2020)](image)

**Figure 3: Key indicators of market prices, violence, and environmental condition, South Sudan (2007-2020)**

**Food security has also become more dependent on environmental factors in recent years, along with an increase in rainfall and longer growing seasons across the country.** Environmental variables related to rainfall and agricultural stress shift cyclically, coinciding with growing seasons and the varying supply of food available during harvest and lean times. These influences have grown during times of higher violence and market shocks, despite violence and market disruptions being attributed to non-environmental causes. An agricultural shock of similar magnitude may have more destructive impacts on livelihoods when the economic system is weak, hence the overall impact of agricultural shocks on food insecurity can increase despite positive environmental developments. Moreover, increases in rainfall are not guarantees of greater crop output—rather, increased volatility and a lack of water management capacity can threaten farmers’ livelihoods. 2019 floods, for instance, are estimated to have caused more than a 15 percent loss in agricultural production in affected areas.\(^9\)

**Conflict remains a latent threat to food security.** Outbreaks of conflict in December 2013 and July 2016 are reflected in rising influence of conflict on food security in the months following the outbreaks. These

\(^9\) (FAO, 2019b)
two outbreaks occurred at the beginning of the dry season and the middle of the rainy season, highlighting conflict’s negative impacts on food security in spite of relative abundance or scarcity. A decrease in the influence of conflict on food security following the September 2018 peace deal, attributed to increased trade flows, market access, and domestic production.\textsuperscript{10} Despite this improvement, food prices remain unaffordable for many households and modeling efforts indicate continued impacts of violence on food security remain considerable. Qualitative analysis in nine South Sudanese towns indicates that conflict’s main influences on food security appear through displacement and lack of infrastructure, rather than directly through crop destruction.

\textbf{In the following three sections, the influences of weather and climate, market prices, and conflict on food security are explored further at the sub-national level.} While many factors shift the availability of food for an individual, food security research often points to these factors as main categories of influence. This research focuses mainly on food security among subsistence farmers,\textsuperscript{11} who comprise more than 80\% of the country’s population.\textsuperscript{12} This chapter draws on new econometric modeling of FEWS NET (IPC) phases, key informant interviews and focus group discussions on value chains, market analysis of food prices, and an agricultural assessment related to crop potential.

2. \textbf{Weather, climate, and agricultural productivity}

\textbf{South Sudan’s agricultural potential has increased over the past decade as rainy seasons have lengthened.} A novel analysis of 2006-2019 historical climatic data finds that areas where agriculture faces high levels of seasonal vulnerability have decreased since 2006. Figure 4 shows agricultural potential\textsuperscript{13} from 2006-2013 and 2014-2019, highlighting that the last 6 years have been wetter, and therefore more agriculturally viable, than the previous 8 years. This also indicates fewer vulnerable agricultural areas in the recent period.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure4.png}
\caption{Agricultural potential for period 2006-2013 and 2014-2019, May through September. Analysis by (aWhere, 2019).}
\end{figure}

\textsuperscript{10} (World Bank, 2020b)
\textsuperscript{11} Food security in nomadic pastoral communities is not covered in-depth in this chapter. For more information on this topic, see for instance, Asenso-Okyere, Mekonnen, & Zerfu (2013); Beyene (2015); Gemechu, Palmujoki, & Virtanen (2019); Kräti, Huelsebusch, and Brooks, & Kaufmann (2013).
\textsuperscript{12} (U. J. Pape et al., 2018)
\textsuperscript{13} Agricultural potential refers to mean precipitation divided by potential evapotranspiration (P/PET)
BOX 1. SOUTH SUDAN’S LANDSCAPE

South Sudan’s landscape is highly diverse with many livelihood specialties. FEWS NET classifies the country in 12 zones (FEWS NET, 2018). Agricultural activity is widespread, with pastoralism around the Nile River running north-south through the center of the country and west of the Nile in the south. Livestock raising occurs mainly in eastern areas, while crop farming occurs in a wider area.

South Sudan’s rainy season reaches up to 248 days in some locations and begins in most areas between April and June14. The southern reaches of the country have the earliest onset and longest rainy seasons. These southern areas, including the Equatoria provinces, are considered some of the most fertile in South Sudan, and are used to cultivate crops including maize, cassava, and sorghum.

Figure 6 highlights the diversity of South Sudan’s landscape, as well as the agricultural vulnerability felt in some areas15. Over 70% of South Sudan’s land is favorable for agriculture, but less than 4% of South Sudan’s land was farmed by 2012 (2.7 million ha).16 The World Bank estimates that increasing agricultural land use to 10% of total land area (6.3 million ha) would increase the value of total agricultural output from approximately US$808 million to US$2 billion.17 Barriers to this expansion include low adoption of productivity-enhancing technologies, capacity constraints, non-tariff barriers, high labor costs, and lacking infrastructure.

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14 aWhere (2019). Length of rainy season refers to the number of days where the rolling 10-day P/PET is greater than 0.70 with no period of 21 days where the rolling 10-day P/PET is below 0.70.
15 Areas requiring irrigation for farming refer to those with P/PET less than 0.8 P/PET, vulnerable areas refer to P/PET between 0.8 and 1.2, and arable refers to areas with P/PET above 1.2.
16 (World Bank, 2012)
17 (World Bank, 2012)
Despite promising agricultural potential in South Sudan, more than an estimated 7.5 million people lived in agriculturally vulnerable areas at the time of the 2013 conflict\textsuperscript{18}. Error! Reference source not found. shows areas of South Sudan that are most vulnerable to weather variability during the May-September rainy season. The shift toward less vulnerable conditions in South Sudan is important for food security of those still living in South Sudan as well as potential returnees. As much of the country relies on subsistence, reliably wetter growing seasons can yield better food production.

A marked rise in the amount of precipitation across South Sudan has meant growing opportunity for crop production, but volatility remains an issue. Figure 7 shows anomalies in plant productivity and rainfall nationally, showing the instability of crop conditions beyond seasonal variation. This variability is a concern for farmers who cannot access water management equipment and/or facilities, and therefore face the threats of inundation without the benefit of increased water availability throughout the growing season. In 2019, 73,000 metric tons of potential harvests were destroyed by flooding and nearly one million people were affected by these events.\textsuperscript{19}

\textsuperscript{18} aWhere (2019) using WorldPop 2013 data. “Vulnerable” refers to the areas where P/PET is between 0.8 and 1.2 (home to an estimated 7,528,000 people in 2013).

\textsuperscript{19} (World Food Programme, 2019)
Trend analysis suggests that in coming years, growing seasons across South Sudan will start earlier, last longer, and have more days with greater than 5mm of rain. This could be positive for agricultural production as a whole if farmers are able to adjust and adapt to changing conditions. This will be difficult given a lack of institutional resources including water management support (e.g. through building water storage facilities and providing pumping and irrigation equipment) and crop adaptation (e.g. via research and provision of seeds for crops that best fit the changing ecology of South Sudan’s regions). Environmental changes in a context of violence and high inflation will pose a even greater challenge.

3. Conflict factors
Conflict has been considered the main precipitator of food insecurity in South Sudan for many years, yet recent informant analysis finds that the main effects of conflict on food security are through secondary factors such as displacement and decreased crop production and market access.

Prior studies have connected conflict to agricultural productivity and food security in many ways, including pastoralist raid/revenge cycles; displacement leading to disrupted growing and harvest cycles and farming reduction, as well as gender-based violence; destruction of infrastructure and disruption of maintenance worsening market access and disrupting trade routes; decreased consumption; unsustainable deforestation for conflict financing; and market closure. Incidents of crop destruction and looting as part of violent offensives, such as that that occurred in Unity state in April to July 2018, can be devastating. However, these occurrences do not capture the broader macroeconomic impacts of conflict on South Sudan’s agriculture and food security situation.

Key informant interviews and focus group discussions in nine South Sudanese towns show that effects of violence on agriculture and food security are diverse in their magnitude, but share similarities in disruptive effects on markets, trade, and the feasibility of farming. Table 2 summarizes findings from nine towns surveyed in Spring 2019. In many of these towns, conflict has had dire consequences to livelihoods and wellbeing. Impacts on agricultural production and food security, however, appear to be impacted by conflict mainly via market effects from trade disruption and displacement, rather than by actual acts of violence. This finding challenges the prevailing narrative that

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20 NDVI and rainfall anomalies are frequently used to monitor vegetation. For further information on NDVI, see Meroni et al. (2019)
21 (United Nations Security Council, 2019)
22 (OXFAM, 2017)
23 (U. Pape & Finn, 2019)
24 (United Nations Security Council, 2019)
26 (World Bank, 2019b; Table 2)
conflict is the main influence on food security in South Sudan, and that conflict’s impacts are direct. Rather than crop destruction or theft as a major mode of harm to food security, these interviews and discussions reveal that harm from conflict exacerbates already strained market systems by affecting local supply and demand.
The 2013 conflict has affected people in so many ways, because it didn’t allow people to cultivate well, because the farms are located outside of the town in the villages and the villages were where the conflict was. So this has led to reduction in supply of groundnut and groundnut paste in the market because there was no production.” (LA KII)

“Although there is conflict in the country, there has not been any change in the crops people grow in Juba. Only the economic situation is very bad because there is no money and things are expensive.” (Trader FGD)

A 2012 conflict between Pakam, Kuei, and Rup pastoral communities escalated with the 2013 national conflict. Violence continues despite a 2019 peace agreement. Displacement to and from Rumbek occurred; many farmers fled to urban areas.

“Since the war or conflict occurred in 2013, people ran away from their cradle land to seek refuge in other areas causing high population in the places they settled in resulting in a shortage of land for crop production.” (P FGD)

“A few weeks before the conflict started in Torit, there was a food glut in the market because of the supply of fertilizers by the government before the 2013 conflict to help farmers.” (MS FGD)

“Conflict has affected my work because currently I don’t have many customers like before, also before conflict I was having many branches such as in Fashoda, KaKa, Malakal and Nazir but now they have closed up due to conflict.” (Male Traders)

“A small part of the town is largely destroyed; the rest has been affected by the conflict.” (fajoma)
Many of the effects of conflict seen across the surveyed towns outlined in Table 2 are related to displacement and trade disruption. 1.8 million people are displaced within South Sudan, while there are over 2.3 million South Sudanese refugees, mainly in Sudan, Uganda, and Ethiopia. Interviewees and focus group participants attributed displacement to worsened food security outcomes through three main channels. First, instability that displaced people from their towns and into UN Protection of Civilians (PoC) camps took producers and consumers out of market systems, thereby weakening local markets and reducing crop production in towns including Malakal and Torit. Second, displacement to other countries and towns weakened local food production like in Bor. Third, movement away from farmlands on the outskirts of towns in favor of more secure lands close to towns such as Wau, Rumbek, and Yambio. This movement has meant smaller plots, and therefore less production.

In addition to shifting populations, conflict-induced trade disruptions have shifted the supply and demand of food across South Sudan. The destruction of infrastructure and insecurity of trade routes has made trade logistically difficult, for instance due to destroyed roadways around Renk, Torit, and Wau, or destroyed markets in Bor and Juba. Larger-scale producers and traders have also shifted their trading away from towns such as Malakal to more stable markets.

During the decade before independence, Southern Sudan had stable seasonal trade of agricultural products with nearby countries. South Sudan would export beans to DRC and Ethiopia and cassava to CAR and DRC from November to January, and import maize, beans, and cassava from Uganda (with beans additionally coming from Ethiopia). In February and March, Southern Sudan would export maize to DRC and CAR and import maize from Ethiopia. Exports mainly left from Yambio in Western Equatoria, an area of high production.

4. Market factors
South Sudan’s shift to cash economy has made selling at markets important, but low yields and transportation barriers have hindered market access in rural areas. Movement toward market-oriented practices and cash use began a transition from self-sufficiency to market dependence well before South Sudan’s independence. This shift, triggered to a large extent by preceding wars, has led to a market system shaped by conflict. Previous market assessments in South Sudan show high prices in hub markets with low effective household demand, while rural markets have low supply due to long-term conflict effects and deteriorated infrastructure. Markets in Juba and other urban areas are highly dependent on imports and have high, unstable prices due to demand from international clientele. Many market sellers come from outside South Sudan and sell imported goods, turning local capital into international income.

While agriculture is relevant to the survival of many South Sudanese, it serves as a means of subsistence but not necessarily income. Today, many farmers rely upon their own subsistence crops and those of farmers nearby, creating a volatile supply chain with few safeguards if crop growth is impeded. In urban areas, food insecurity is also influenced by markets, though in a different manner. Inelasticity of staple food demand, particularly for poor households, often results in greater proportions of income being spent on food as prices increase.

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27 (UNHCR, 2019)
28 (FEWS NET, 2008a, 2008b, 2008c)
29 (Thomas, 2019)
30 (FEWS NET, 2019)
Inflation of food prices compared with non-food prices shows high volatility, but with less overall range in food prices (Figure 8). Before July 2015, inflation rates between food and non-food items were an average of 10 points apart, with non-food inflation higher than food inflation 55% of the time, and food inflation higher 45% of the time. After July 2015, food and non-food inflation became erratic, and decoupled to some extent when compared with pre-July 2015 figures. Noticeably, food inflation was higher during this ramp-up in overall inflation.

![Inflation rate - food CPI vs inflation rate - non-food CPI](image)

**Figure 8: National-level food and non-food price inflation (compared with previous year), 2012-2019. Data from South Sudan National Statistics Office (2019).**

Local variations in market prices and inflation show that food insecurity and market factors are highly correlated across the country, but in varying ways. Three studied towns were non-food stressed following independence. Juba and Wau only began to face severe food insecurity in 2016, aligning with runaway inflation. Malakal faced worsening food insecurity already in 2014, suggesting that that town may have different drivers of food insecurity. Decoupling of food and non-food inflation may also serve as a warning sign of increased food scarcity and food insecurity, although conclusive evidence of this relationship requires additional research beyond the scope of this chapter.

Sub-national models reveal the vast differences in how these variables relate to food security within South Sudan. In recent years, market factors are found to be the most influential estimator of food security in the districts of the nine towns surveyed on conflict above (see Figure 9). The magnitude and timing of this influence differs greatly across these areas, however. While Aweil, Bor, Juba, Torit, Rumbek, and Wau show similar patterns of food insecurity shock following the collapse of the South

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31 Market impacts at the local level in Juba, Malakal, and Wau are explored in Annex 1.
Sudanese Pound, Malakal and Renk show trends of increasing food insecurity before this. Malakal especially shows a marked increase following the outbreak of violence in 2013, attributed to a combination of conflict, environmental, and market factors. While already highly food insecure, this area too, shifted toward market trends as the more pronounced factor following the monetary collapse. Among the nine towns, only Yambio is seen to have maintained seasonal food security following the collapse, though this is offset by high levels in lean seasons. Yambio’s location near the border with the Democratic Republic of Congo and relatively fertile land may help to explain the seasonal pattern of food security not seen in other districts. These modeled outputs are further explained by underlying factors including food price index and volatility, conflict intensity, and environmental trends (see Annex 2).

Formal and informal cross border trade were deeply affected by the outbreak of civil war in South Sudan in 2013. While agricultural trade (particularly informal trade) suffered, the strongest impacts were felt by industrial trade (see Figure 10). This study finds that formal agricultural trade from Uganda, for example, continued flowing despite outbreaks of violence. The study attributes inflation of food prices in South Sudan to factors such as low local production, depreciation of the South Sudanese pound, and lower imports from other countries rather than due to lower informal agricultural product exports from Uganda.

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32 (Rauschendorfer & Shepard, 2019)
Informal cross-border trade of agricultural products among Uganda’s border crossings also shows that agricultural exports from Uganda to South Sudan followed a downward trend following outbreaks of violence in 2013 and 2016 and rising inflation from 2015 onward (see Figure 11). The drastic dip in agricultural exports around the 2016 conflict is prevalent as events largely occurred in Juba, an important hub for trade. Interestingly, agricultural imports appear to not have been affected to the same extent.

5. Breaking food insecurity cycles
Market factors hold the greatest influence over food insecurity, and therefore offer the greatest opportunity to improve food security outcomes. Underlying conflict-related instability affects markets through disrupted trade routes and lower crop yields, yet inflation has seen the greatest rise in food insecurity since before South Sudan’s independence. 2015’s mismanaged macroeconomic decisions have resulted in additional food insecurity far beyond the direct impacts of violence. Macroeconomic oversight is a crucial piece in the puzzle of food security.

(Rauschendorfer & Shepard, 2019)
Longer rainy seasons offer increased opportunity for agricultural production, but do not guarantee increases to livelihoods. The double-edged sword of wetter conditions brings greater risk of flooding resulting in rotted crops and devastated towns. In addition to the risks of flooding, the onset of seasonal rains is often followed by breakout of diseases such as cholera, which jeopardize health and disrupt labor supply. Heavy rains in East Africa during the 2019-2020 winter season have contributed to the ongoing desert locust outbreak which threatens crops and food security throughout the region.

Even when more rain has the potential to help production, the issue of poor water management leaves many farmers without the benefit. Conflict-related instability that has limited areas viable for crop production will also not be overcome by wetter seasons—rather, underlying conflict factors still limit the agricultural production of South Sudan. Key informant interviews and focus group discussions, for instance, show that insecurity in many areas has resulted in the movement of farmers from large plots on the outskirts of towns to smaller, more secure plots near towns. Even with these smaller plots, farm labor is often too expensive for many farmers to hire. Other factors not explored in-depth in this report, such as gender dynamics of South Sudan’s agriculture and food systems can also impact farmers’ production.

**BOX 2. IMPACTS OF COVID-19 ON SOUTH SUDAN’S FOOD INSECURITY**

International organizations and others are raising alarm bells over the impacts of the COVID-19 pandemic on food security. Export restrictions, broken value chains, labor shortages, and loss of income and remittances have all been identified as potential threats to food availability for people worldwide.

Greater instability in South Sudan’s food security situation has emerged in light of COVID-19. News of the virus’ spread among UN workers, heads of government, and UN PoC camps has raised concern for extensive infection throughout the country and region. Coupled with underlying risk factors explored in this chapter, COVID-19 presents a critical threat to the wellbeing of South Sudan’s population. Decreases in food imports among populations highly reliant on markets is expected as a major threat to food security in the country. As market-related factors of food security have played the leading role in South Sudan’s food insecurity over the past five years, this decrease in supply could easily exacerbate an already dire situation.

Forecasted food insecurity over the next year, shown in Figure 12, estimates continued high populations facing food insecurity crisis, with less seasonal change than in the past two years (in essence, a temporary relief from insecurity following crop harvests). With the uncertainty of COVID-19 and its effects on not only health, but markets and general instability, outcomes could certainly be worse than current forecasting suggests.

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34 (UNICEF South Sudan, 2019)
35 (World Meteorological Organization, 2020)
36 (World Bank, 2019a)
37 On this topic, see for instance: OXFAM (2017), OXFAM Canada (2013), and World Bank (2015)
38 (World Bank, 2020c)
40 (UN OCHA, 2020)
Current initiatives to increase agriculture in South Sudan have not significantly moved the dial on food security. The South Sudanese government’s Green Horizon project, for instance, included an investment of $45 million in 2016, funded through prepayments for crude oil. Approximately $90 million approved for projected costs of the project’s second phase for 2018/2019. While the UN Panel of Experts has verified agricultural activity occurring on one location established by the first phase of this project, the funding seems to have been moved outside of typical national budget activity, taking away the oversight and accountability typically required. Furthermore, the operators of this project, the Global Group, whose owner has been sanctioned by the United States Department of Treasury in part for using an agricultural company as a cover for approximately $150 million in weapons sales to the government. As oil revenues are planned to fund new agricultural projects, increasing oversight, accountability, and transparency should be employed to help ensure that funds are used for their intended purpose.

Response to South Sudan’s food insecurity crisis from the international community has largely been addressed through humanitarian initiatives. The World Food Programme assisted 5.3 million people in South Sudan in 2018 through food assistance, cash transfers, school meals, and nutrition outreach. The UN Peacekeeping Mission in South Sudan (UNMISS) was established in 2011 and now

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41 (United Nations Security Council, 2019)
42 Israel Ziv and another individual were sanctioned in December 2018 for “being leaders of entities whose actions have the purpose or effect of expanding or extending the conflict in South Sudan” (U.S. Department of the Treasury, 2018)
43 Such projects are currently in the works, as reported by Malak (2020)
44 (World Food Programme, 2018)
includes over 19,000 deployed personnel. Following the outbreak of war in December 2013, the UN Security Council reprioritized UNMISS to protect civilians, monitor human rights, and support the delivery of humanitarian assistance.\textsuperscript{45} Peacekeeping and aid have assisted South Sudan through the aftermath of the 2013 and 2016 conflict outbreaks, food assistance comprises about 13\% of cereals and roots consumed nationally during lean seasons.\textsuperscript{46} Working with UNMISS, WFP, and other humanitarian actors can ease the transition toward self-sustaining food production will be necessary to ensure long-term food security.

In 2015, a World Bank Systematic Country Diagnostic suggested that low productivity and low commercialization of agriculture and livestock could be addressed by strengthening smallholder-based agriculture and developing large-scale commercial farms.\textsuperscript{47} This recommendation was intended to improve food security and nutrition in the short term and reduce poverty in the long-run. Supporting this development can also pair with programs that promote social inclusion, such as women’s training for productivity and market access.\textsuperscript{48} Improving capacity at national and state levels of government can help to support related social programs.

Stabilizing smallholder agriculture will require public safety to allow for voluntary return of IDPs and refugees. Part of the challenge of voluntary returns will surround land claims, and land ownership and tenure will require support as returnees reclaim previously occupied or held property. Land issues related to conflict, such as between cattle-owning Dinka and sedentary farmers, will likely pose further challenges if Equatorian farmers return from Ugandan PoC camps. Conflict avoidance measures may be necessary and could require formal agreements by community leaders. Landholding reform, including allowing women to own land without man,\textsuperscript{49} can additionally increase shared prosperity and social inclusion.

Given the influence of inflation on market prices and food security, it is crucial that economic stabilization occurs.\textsuperscript{46} Inflation has already reduced from its 2016 peak, yet prices remain higher than consumers are able to meet. Stabilizing the overall economic situation and supporting and protecting the incomes of the poor is crucial to redeveloping markets. Improved agro-logistics\textsuperscript{50} are also necessary to support locally-sourced markets. Part of this strategy is to establish safe access to markets, e.g. through collective activity like local co-ops/aggregators, or through safe routes that allow passage without extortion or violence. Infrastructure improvement, including the improvement of roadways and connectivity, and regional trade integration can help farmers access markets and increase agricultural livelihoods.\textsuperscript{51} Infrastructure and security must both be strengthened in order to restore trade to pre-civil war levels. Even local access to markets has become dangerous or impossible due to infrastructure and security break-down, which has kept markets from rebounding following conflict.

Technological improvements intended to increase agricultural productivity can be challenging due to infrastructure constraints but has the potential to improve food security outcomes and reduce poverty in the long term.\textsuperscript{52} Shortages and high costs of fuels signal a need for technological solutions

\textsuperscript{45} (United Nations Peacekeeping, 2019)
\textsuperscript{46} (FAO & World Food Programme, 2019). Data from 2016-2018 (Figure 19 in cited material).
\textsuperscript{47} (World Bank, 2015)
\textsuperscript{48} (OXFAM, 2017)
\textsuperscript{49} (World Bank, 2015)
\textsuperscript{50} (U. Pape et al., 2017)
\textsuperscript{51} (World Bank, 2015)
\textsuperscript{52} (World Bank, 2015)
that do not rely on fuel. Rather, farm equipment, storage, and other facilities should be tailored to the needs of small farmers. Augmentative irrigation can further stabilize growing and provide a cost-effective solution for weather/climate variability. Such improvements would require long-term commitment to agricultural research.

**Overall, food insecurity requires a comprehensive approach that covers multiple angles to best address the needs of South Sudan.** Addressing a single factor—whether underlying conflict-related insecurity, or supply-chain breakdown, or water storage—will not solve the severe food crisis that South Sudan faces. Rather, this multidimensional problem requires multi-dimensional solutions. As seen through the dramatic shifts in influences on food security, this crisis is not static, and requires constant vigilance to respond appropriately to new and evolving hazards.

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53 aWhere analysis
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Annex 1: Market Analysis

Despite growing relative importance of agriculture to South Sudan’s economy, currency inflation has devalued the industry significantly since 2015 (see Figure 13). The Bank of South Sudan unpegged its fixed exchange rate of the South Sudan Pound to the US dollar on December 15, 2015. This move was intended to stabilize the country’s money market and correct for market distortions, but caused an extreme currency devaluation and a dive in purchasing power for consumers.\textsuperscript{54}

![Figure 13: Agriculture, forestry, and fishing, value added (current US$)](image)

South Sudan’s economy, including the prices individuals pay for food at markets, plays a major role in the population’s food security. Oftentimes, food security is linked to agricultural productivity, with harvests celebrated for their bounty and droughts signaling lean times. Indeed, agriculture has played an increasing important role in South Sudan’s (formal) economy since the country’s independence. This shift did not occur through agricultural expansion, however. Instead, the oil industry’s contraction raised the relative importance of agriculture to the country’s economy. In fact, as oil production sharply declined following the rise of conflict in December 2013, economic repercussions were simultaneously felt in the agricultural sector, which contracted due to displacement and insecurity.\textsuperscript{55} As GDP has declined from 2011 on, the value added from agriculture, forestry, and fishing grew from just under $670 million (constant 2010 US$) in 2011 to a peak of over $900 million in 2015. This change raised agriculture, forestry, and fishing from around 4% of the country’s GDP in 2011 to over 12% in 2015 before slightly dipping to 11.4% in 2016\textsuperscript{56} (see Figure 14). Agriculture employs approximately half of South Sudan’s population, accounting for over 60% of female employment and more than one-third of male employment in 2018.\textsuperscript{57}

\textsuperscript{54} (World Food Programme, 2016)
\textsuperscript{55} (World Bank, 2015)
\textsuperscript{56} (World Bank, 2019b)
\textsuperscript{57} 49.6% of population in agricultural employment (modeled ILO estimate) published in World Bank, “World Development Indicators [Data].”
**Food price inflation**

Looking at local CPI and inflation prices illuminates differences within South Sudan. Prices and inflation can vary dramatically between cities and markets, as seen in Figure 15 showing monthly sorghum prices in two locations. Expanding price differentials in recent years highlight market volatility following currency inflation.

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**Figure 14: GDP (constant 2010 US$) and % Value Added from Agriculture, forestry, and fishing**

**Figure 15: White sorghum (feterita) grain prices in Wau Center and Yambio markets, 2009-2019 (imputed)**

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58 Data source: CLiMIS South Sudan market prices ([https://climis-southsudan.org](https://climis-southsudan.org)), using price index imputation method in (Andree et al., [forthcoming]).
CPI and inflation rates of food and non-food items in Juba, Malakal, and Wau (Figure 16) further demonstrate the range and volatility of prices across South Sudan. In all three towns, food inflation decoupled from non-food inflation leading up to the unpegging of the South Sudan Pound from the US dollar, and the subsequent fallout of near-hyperflation. Food inflation reached similarly high levels (around 500%), though CPI shows the vast discrepancy in food price levels between these areas. Price increases since early 2019, especially in Malakal and Wau, have resulted in a spike in food inflation. Malakal now faces a food CPI more than five times that of Juba.
Food and Non-Food Inflation

Figure 16: Food and non-food inflation rates (2012-2019) for Juba, Malakal, and Wau. Data from South Sudan National Statistics Office (2019).

The implications of these variations in price level over time and across districts corresponds with troubling food security implications. Overlaying price and inflation data with IPC levels shows a clear relationship between prices and food security. The relationship between these factors is not static across
towns, however. In Wau, for instance, food inflation and IPC have a 0.78 correlation, while in Juba this correlation is 0.51 and in Malakal only 0.33. Food CPI in Juba, however, is highly correlated with IPC at 0.76, while this correlation is 0.63 in Wau and 0.33 in Malakal. These correlations suggest that food security in Juba and Wau may be more dependent on market prices than in Malakal.

![Figure 17: Food and Non-Food Inflation with HA-adjusted FEWS Phases, Wau (Phase refers to last declared phase by FEWS NET)](image)

These findings align with the 2019 key informant interviews and focus group discussions\(^{59}\) that find Wau markets suffer from inflation and insecurity. The town of Wau faced a major population outflow in response to the 2013 and 2016 conflicts, which has not recovered today. Local farmers have little access to markets and face insecure transportation routes. Most food sold at Wau’s markets is brought by importers, who face high transportation costs that drive up prices beyond their already inflated levels.

\(^{59}\) (World Bank, 2019a)
Figure 18: Food and Non-Food Inflation with HA-adjusted FEWS Phases, Malakal (Phase refers to last declared phase by FEWS NET)

Malakal, the second largest city in South Sudan, has been nearly abandoned since 2013, with many residents now living in a nearby UN PoC camp. Prior to the 2013 conflict, farming was largely communal and reciprocity-based. Malakal was a trading hub for within-country and cross-border trade until 2013, at which point trade routes were disrupted and large-scale suppliers took their goods to other parts of the country or abroad. Worsening insecurity and inflation further deteriorated Malakal’s markets, as local people could not afford goods and transportation became more difficult. Many farmers have moved closer to town and decreased production, while also shifting to less diverse crops as the economy moves away from bartering and toward cash exchange. While conditions have begun to improve in Malakal, cash-strapped smallholder farms have little option to hire returning workers.\(^60\)

\(^{60}\)(World Bank, 2019a)
Markets in Juba have high prices beyond the effects of inflation due to demand for goods from the international community living in the capital city. Most goods sold at Juba’s markets come from outside the city, though local farmers face insecurity issues that prevent them from selling at the markets before 2013.61

Annex 2: Key descriptive factors of food insecurity in nine selected districts
Food price index, food price annual volatility, estimated share of population in food crisis areas, average death intensity of conflict, NDVI anomaly, and rainfall anomaly are presented below for nine districts from January 2007 to April 2020: Juba, Aweil Centre, Bor South, Malakal, Renk, Rumbek Centre, Torit, Wau, and Yambio. These districts correspond with the nine towns surveyed for on conflict.

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61 (World Bank, 2019a)