FNS-REPRO Sudan Key Findings Report

Key findings emerging from the FNS-REPRO generated studies and other sources as input for the sensemaking events and adaptive programming

Eelke Boerema, Charles Chapman, Cecile Kusters

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This report describes the key findings that emerged from the analysis of the studies generated by the Food and Nutrition Security Resilience Programme (FNS-REPRO) in Sudan and from and other relevant sources. The FNS-REPRO is designed to strengthen the resilience of food systems for food and nutrition security in conflict affected regions in the Horn of Africa and focuses on Somaliland, South Sudan and Sudan. These findings have been summarized and used as input for the annual sensemaking event, during which they were reflected upon by FAO & WUR staff and key stakeholders, so as to generate key suggestions for improvement of the program. The key suggestions for improvement serve as input for the next annual plan of FNS-REPRO and as such influence adaptive programming. The analysis of these findings and the facilitation of the sensemaking events have been carried out by Wageningen Centre for Development Innovation, Wageningen University and Research, as a key partner for FNS-REPRO for the knowledge agenda.

Keywords: climate, evidence, findings, food security, gender, gum Arabic, nutrition, producers, resilience, shocks, stressors, Sudan, youth

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Photo cover: FAO, 2020

Contents

List of abbreviations and acronyms

CoP	Community of Practice
FAO	Food and Agriculture Organization of the United Nations
FCS	Food Consumption Score
FIES	Food Insecurity Experience Scale
FNS	Food and Nutrition Security
FNS-REPRO	Food and Nutrition Security Resilience Programme
GA	Gum Arabic
GAPA	Gum Arabic Producers' Association
HDP	Humanitarian-Development-Peace
HDDS	Household Dietary Diversity Score
IPC	Integrated Phase Classification
INGO	International Non-Governmental Organization
NGO	Non-Governmental Organization
NRM	Natural Resource Management
RCI	Resilience Capacity Index
RIMA	Resilience Index Measurement and Analysis
USD	United States Dollar
WCDI	Wageningen Centre for Development Innovation, Wageningen University & Research
WUR	Wageningen University & Research

Summary

This Key Findings Report provides an overview and summary of the key information that emerged from FNS-REPRO's studies and reports, and other sources on Sudan. The information and data presented in this report is disaggregated into key chapters, each representing the key thematic areas FNS-REPRO is focused on and which are relevant to the program, such as Food and Nutrition Security, Healthy Diets, Resilient Livelihoods, Gum Arabic Value Chain etc. This information has been summarized in presentations used during the sensemaking event and the subsequent annual review and planning meeting that took place end of July 2021. The sensemaking of the key findings led to key suggestions for improvement of the program in the next annual plan. These summary key findings and suggestions for improvement are described in a separate report. Below is a summary of the key findings/data emerging from each of the main chapters:

Chapter 3: Food and Nutrition Security
Based on most recent IPC data[1], 7.3 million people, or 16 per cent of the analysed population face high levels of acute food insecurity (IPC Phase 3 or above) in Sudan. Household food stocks from the previous season will likely be insufficient to sustain adequate food consumption throughout the lean season. High(er) food prices are also projected and will likely affect food access. Areas under conflict, insecurity and floods are expected to experience a depletion of their food stocks. Shortages of water for human consumption, will be particularly harmful to the pastoral and nomadic communities (adapted from IPC, 2021). According to the RIMA study, male headed households are generally better off than female HHs in regards to FCS and HDDS. Households engaging in livestock production and non-skilled labour are worst off (lowest HDDS). Overall, it was concluded that households tend to have inadequate dietary diversity, especially lacking in protein sources (except milk) as well as fruits & vegetables. Wealth index, agricultural assets index, tropical livestock unit holding, size of land cultivated during summer, education of the household head (years) were found to be positively associated with household food security. The main shock that undermines food security in the survey area is reduced household income; this is consistent in both FCS and HDDS (adapted from RIMA, 2020).

Chapter 4: Healthy Diets
Inadequate dietary intake and communicable diseases are among the immediate causes of undernutrition in Sudan. Poor infant and young child feeding practices are also a leading cause of malnutrition (GRFC, 2021). According to the RIMA study, male headed households tend to have a higher HDDS and FCS compared to female headed households. Households engaging in livestock production and non-skilled labour worst off (lowest HDDS). Overall, there is inadequate dietary diversity amongst households, with diets lacking in protein (except milk), as well as fruits & vegetables. Reduced household income is the main shock that undermines food security in the survey area. Households engaging in livestock production and non-skilled labour have the least HDDS (RIMA, 2020).

Chapter 5: Resilient Livelihoods
Both the food security and the resilience of target communities in the East and North Darfur states are still under siege. These are affected by a number of political, socio-economic and environmental issues which in turn are closely related to conflicts, climate change, economic slowdown and weak governance. The main shocks and stressors reported by community members in REPRO target localities in North Darfur are, in order of severity and recurrence: dry spells, crop pests and fire outbreaks. Whereas, in East Darfur the main shocks and stressors are, in order of severity and recurrence: crop pests, price volatility and fire outbreaks (RIMA, 2020). To be resilient in North and East Darfur refers to "the ability of agro-pastoralists to resist, absorb, accommodate to and recover from the negative impacts of drought, incidences of violent conflict and staple food price increases in order to remain food secure without compromising the ability to continue livelihood activities in the future. The long-term sustainable development of the identified and currently insufficient socio-

[1] The latest IPC data covers the period April 2021 - May 2022. It was issued in May 2021.

economic and environmental drivers to promote the development of resilience will contribute to people's ability to increase resilience through improvement of practices and abandonment of negative coping strategies" (Ham, 2020). In sum, resilience can only be truly achieved through the tackling of agriculturalist-pastoralist tensions which result in conflict and serve as both a direct shock to livelihoods, as well as a continued driver for land degradation and further conflict (Ham, 2020).

Chapter 6: Gum Arabic Value Chain

There are various factors influencing the participation in value chain activities by different segments of the population and population groups. These range from government policies to the control of gum-producing forested areas by tribal leaders, and village traders with access to markets and market information, and town traders with access to credit and knowledge on export requirements. The Forests National Corporation (FNC) charges traders' fees and royalties for gum transport and Government offices charge taxes and other local duties. The producers seem to benefit the least as they have no property rights and no limited access to credit to invest in gum production. Their participation is mainly limited by poor agricultural practices, pests and plant diseases, high prices for agricultural inputs, low access to technical assistance and many more factors.

Chapter 7: Conflict and Stability

The evidence shows that over the last years the situation in Sudan has generally improved in terms of peace and stability. However, there are still conflicts between various actors. These include government, traditional authorities, farmers, animal herders/pastoralists, as well as to some extent traders and money lenders. Interests and motivations vary and include, greed and power, control over natural resources, political influence, tribal/ethnic prejudice and extremism, and finally injustice (Sudan multi-disciplinary context analysis report). It was also reported that land disputes between farmers and pastoralists especially over grazing routes are reportedly on the increase due to Covid-19 restrictions (FAO Covid-19 Conflict Report, 2020). Nevertheless, the current political situation in Sudan presents a good opportunity for furthering peace and stability in the North and East Darfur States. The operational environment in both states is now less securitized, opening space for engagement and collaboration between CBOs, NGOs and local authorities. Local traditional leaders and executive directors from the localities feel less threatened and intimidated by formal security systems and are more willing to advocate on their community's behalf (FNS-REPRO Inception Report, 2020).

Chapter 8: Gender Disparities

At this stage we can't see the impact yet on existing power relations and inequalities at household level but can describe the current situation. Nevertheless, there are three types of disparities, based on: area, gender, and wealth. The RIMA study further revealed that male-headed households are better off than female headed households in regards to the following indicators: income, income sources, wealth index, resilience, food and nutrition security (HDDS & FCS), agricultural assets index, livestock, land, basic services, literacy, and access to education. The CoP survey also indicated that men have the greatest access to and control of resources in gum Arabic production. Over time we can review if and how the FNS-REPRO programme has impacted on these disparities.

1 Introduction

1.1 Background to this document

This Key Findings Report provides an overview and summary of the key information that emerged from FNS-REPRO's studies and reports, and other sources on Sudan. These reports have been coded using the Nvivo Software Program for qualitative data analysis. The list of reviewed documents can be found in the references. Key reports include the Sudan multi-dimensional context analysis, the Sudan RIMA baseline report, FAO special studies and the Food Security Assessment (FoSRA) report. The key findings emerging from an online survey among key stakeholders which were then reflected on by the Sudan Community of Practice (CoP) are also reviewed. Some external reports were also incorporated to generate further information and knowledge on the gum Arabic value chain in Sudan.

Coding took place on the following key topics:

- Resilience
- Livelihoods of the gum Arabic value chain actors
- Food and Nutrition security (FNS) and related diets
- Conflict and stability
- Gender
- Youth

After coding, the information was analysed to generate key findings to be discussed during the sensemaking event, where key findings were discussed and suggestions for improvement given for adjustment of the next annual plan. The summary of the findings and key suggestions for improvement where then validated in the subsequent annual review and planning meeting.

The information and data presented in this report is disaggregated into key chapters, each representing the key thematic areas FNS-REPRO is focused on and which are relevant to the program, such as Food and Nutrition Security, Healthy Diets, Resilient Livelihoods, Gum Arabic Value Chain etc. As a result, this Key Findings Report serves as a consolidation document, summarizing the key information emerging from FNS-REPRO's existing studies and reports. This information has been summarized in presentations used during the sensemaking event and the subsequent annual review and planning meeting that took place end of July 2021. The sensemaking of the key findings led to key suggestions for improvement of the program in the next annual plan. These summary key findings and suggestions for improvement are described in a separate report.

1.2 Background to the FNS-REPRO programme

The Food and Nutrition Security Resilience Programme (FNS-REPRO) is designed to strengthen the resilience of food systems for food and nutrition security in conflict affected regions in the Horn of Africa and focuses on Somaliland, South Sudan and Sudan. The program is "funded by the Government of the Netherlands to the Food and Agriculture Organization of the United Nations (FAO) and is a four years programme of USD 28 million that contributes directly to the operationalization of the United Nations Security Council 2417 by addressing the "cause-effect" relationship between conflict and food insecurity, in Sudan (Darfur), Somaliland and South Sudan". (Source: FNS REPRO Final Proposal).

"FNS-REPRO is the first programme in Eastern Africa specifically designed to foster peace and food security at scale, through a multi-year livelihood and resilience-based approach, in some of the least stable regions, where interventions are normally of humanitarian programming nature exclusively. Its design allows FAO and partners to set examples of building food system resilience in protracted crises. The programme adopts an innovative area- and livelihood-based approach that looks at the multidimensional threats and risks that communities are exposed to, while identifying and utilizing

opportunities for improved livelihood resilience. FNS-REPRO will promote coordination with relevant stakeholders involved in targeted areas to reach collective outcomes between multi-sectoral humanitarian and development interventions. The programme is also unique in its approach to the Humanitarian, Development and Peace building Nexus, as it encompasses a serious and rigorous learning agenda along the Nexus – under the leadership of Wageningen University & Research (WUR) – that will start from the very beginning of programme implementation, contrary to normally applied post-factum learning processes. The uniqueness of the learning agenda lies with a grassroots and localised approach to learning where targeted communities and local institutions will be active participants in design and implementation of the intervention – rather than just being key informants. Furthermore, the learning agenda will contribute to quality programme implementation (through flexible and adaptive programming) as well as to policy dialogue as it will be linked to the Global Network Against Food Crises, through alignment of learning targets, processes and methodologies". (Source: FNS REPRO Final Proposal).

"The proposed programme is an initiative by the Dutch Government to operationalise United Nations Security Council Resolution-2417, which forbids the creation of food crises and famine as an act or result of war, by investing in food system resilience in times of crises and situations of conflict". "The aim of the Dutch government funded Food and Nutrition Security REsilience PROgramme (FNS-REPRO) is to strengthen the resilience of food systems for food and nutrition security in conflict-ridden regions in the Horn of Africa (South Sudan, Sudan and Somaliland). This will be done through investing in initiatives that:

1. Strengthen sustainable management of the natural resource base;
2. Increase the resilience of agriculture- and livestock-based livelihoods and food systems, and;
3. Contribute to meeting medium to longer-term food needs.

The attention for the resilience of food systems is a systems approach which aims to strengthen the enabling environment in which livelihoods and food systems operate and resilience takes shape". (Source: FNS REPRO Final Proposal).

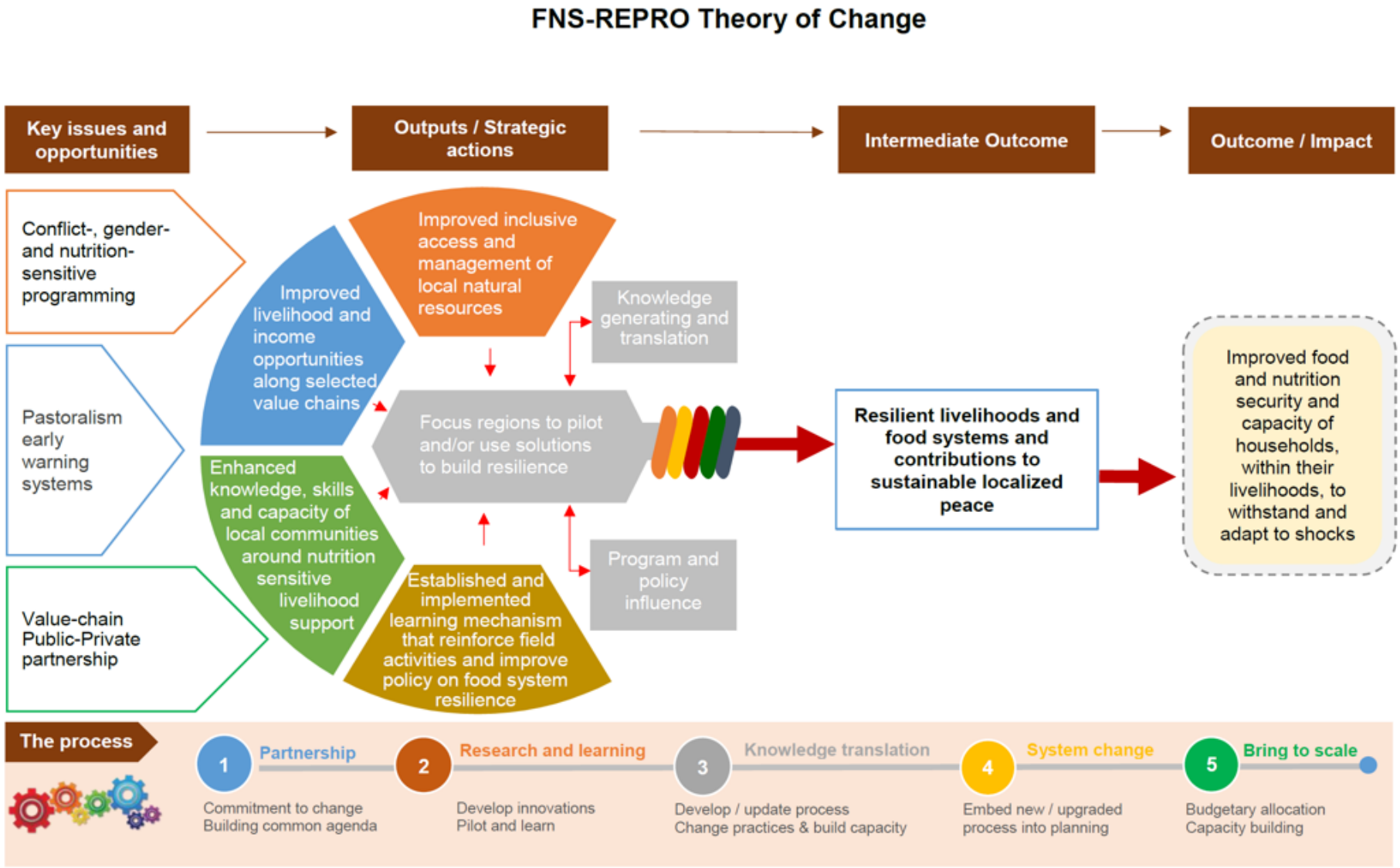
"The programme starts from the premise that livelihoods are people's best defence against hunger and malnutrition: people with resilient livelihoods are better prepared for and can better cope with shocks and withstand crises. Investment in resilience reduces humanitarian needs and allows for a more targeted allocation of humanitarian resources, increasing resilience and reducing vulnerability and needs. In this regard, the attention to the resilience of food systems is an innovative approach, which aims to strengthen the enabling environment in which livelihoods operate and resilience takes shape.

Interventions will be strategically designed and will be context specific, gender- and nutrition-sensitive, and aimed to contribute to building the resilience of livelihoods and food systems in protracted crisis situations. The programme will invest in sustaining or boosting local food production, by supporting farmers and livestock owners/communities.

The programme will assist people to strengthen the resilience of their livelihoods by building their capacities to absorb and adapt in the face of shocks and stressors to the food system and building community-based institutions that help transform their exposure to risk. This means helping people to anticipate, prepare for and prevent crises; responding effectively when crises do occur, and; investing in stronger recovery and resilient livelihoods. While strategically choosing interventions that have a transformative effect on the resilience of food systems". (Source: FNS REPRO Final Proposal).

The FNS-REPRO chain described is based on the principle that "If the specificities of local livelihood and food system resilience in selected areas of Sudan, Somalia, and South Sudan are understood by both local and international stakeholders, and if those stakeholders adapt their interventions, based on field realities and evidence of success, and if they can successfully co-create and coordinate with other stakeholders, then the overall resilience of livelihoods and food systems in areas of protracted crises will improve, contributing to addressing the root causes of food insecurity, malnutrition, destabilization, forced displacement and irregular migration. FNS-REPRO has been designed to do this by combining interventions aiming at creating economic and equal opportunities, using an ecologically and conflict sensitive area-based approach". (Source: FNS REPRO Final Proposal).

The FNS-REPRO Theory of Change is illustrated on the next page.



***Source**: FNS REPRO Final Proposal.*

1.3 Background to the FNS-REPRO program in Sudan

The FNS-REPRO Annual Plan provides an overview on what FNS-REPRO is focusing on in Sudan:

"The gum Arabic value chain performance in North and East Darfur states is not market-driven and is still well below aspirations. At production level, productivity is very low and gum trees are not distributed equally, with important variation with regards to number and productivity among the different localities and states. The majority of the of Hashab trees (Acacia senegal) are concentrated in the localities of Kalamendo and Tewisha, followed by Ele'iet, Adeela and Abu Karinka and to a lesser extent Um Keddada, rural El Fasher and Ed Daein. Although all pre-identified target localities present favourable ecological conditions for the production of high quality Hashab gum Arabic (Acacia senegal), the production potentials in all target localities if far below aspirations". (Source: FNS-REPRO Annual Plan).

To this extent, FNS-REPRO priorities for the March 2020 – September 2021 implementation period in Sudan are the following:

- "Increase the area under gum Arabic production and increase productivity and tapping (Output 2)
- Promote and inclusive development of the upstream gum Arabic value chain (Output 2)
- Improve access and management to natural-resources and promotion of conflict-resolution mechanisms at village level (Output 1)
- Enhance knowledge, skills and capacity of local communities around nutrition-sensitive livelihood support (Output 3)". (Source: FNS-REPRO Annual Plan).

The FNS-REPRO Annual Progress Report (March-December 2020), provides a general overview of the progress made in Sudan in relation to FNS-REPRO project components:

"Despite the COVID-19 restrictions, FNS-REPRO reached 3 000 beneficiaries in North and East Darfur states, who received food and cash crops seeds and agricultural tools. The good gum Arabic harvesting and post-harvest practices trainings covered about 10% of the total number of beneficiaries reached, who will transfer the skills and knowledge to their peers. It is worth to mention that almost no beneficiaries engaged in any post-harvest practices before: Other noteworthy achievements include:

- Procurement and distribution of a range of agricultural seeds and tools to project beneficiaries. See "Work Plan Status" for details and numbers.
- Distribution of 9MT Acacia senegal seeds and 48,000 seedlings to beneficiaries in both States.
- Production of training modules in Arabic on good gum arabic harvesting and post-harvest practices, as well as on concepts and systems of agroforestry.
- Training of gum Arabic producers on good gum Arabic harvesting and post-harvest practices.
- Completion of a feasibility study on potential water harvesting interventions (Hafir construction and rehabilitation, ponds rehabilitation, rehabilitation of water yards).
- Establishment of peacebuilding and natural resources management committees in East Darfur.
- Facilitation of partnerships between Gum Arabic Producer Associations (GAPAs) and gum Arabic private sector companies. Fair Organic Gum Africa (FOGA) Company responded and started communication with producers." (Source: FNS-REPRO Annual Progress Report).

"Due to COVID-19 restrictions, project implementation activities in the field and procurement procedures were delayed. The actions that were taken to continue project implementation mitigating as much as possible these delays included the use of teleworking modality for the staff involved in the project, ensuring proper social distancing and sanitary measures in the project sites, and reduction of the number of participants in meetings and training workshops. In addition, price fluctuations due to the devaluation of national currency affected the purchase of inputs. For example, the 2020 procurement plan included a purchase 19MT of groundnut seeds for North Darfur (under the first bullet point above), however, due to devaluation issues the budget was sufficient for just 9MT". (Source: FNS-REPRO Annual Progress Report).

2 Sudan General Context

"The Horn of Africa (HoA) is one of the most food-insecure regions in the world with over 20 million people permanently in acute food insecurity (Integrated Food Security Phase Classification 3 and above)5 and more than 40 percent of people undernourished. Over the past 50 years a continuous stream of man-made and natural shocks has, and continues to affect, the region. These include drought, conflict, livestock disease and plant pests, economic crises and degradation of the natural resource base. Shocks and stressors often overlap and persist over time as protracted and complex crises. The Horn's dryland regions are familiar with extreme environmental variability such as repeated droughts and floods (El Niño and La Niña effect), and increased variability of rains. Over the last decades the multiple levels and types of conflict affecting the region, combined with poor governance of land and other natural resources and long term economic and demographic trends, have challenged even the most resilient dryland livelihood systems". (Source: FNS REPRO Final Proposal).

In relation to the political situation in Sudan, the country still faces a number of challenges. "Since October 2016, when the National Dialogue for Peace was declared to be over and the 'National Document' was submitted to former President Omar El-Bashir, Darfur has witnessed a reduction in violence. However, the region still faces unacceptable levels of insecurity, particularly in pocket areas in South, Central and North Darfur. This scenario was driven by changing regional dynamics, the strategic defeat of Armed Opposition Groups (AOGs) by the government in Darfur, the willingness of the Government of Sudan to undertake unilateral ceasefires in Darfur and a reduced public appetite for conflict. In part due to the reduction in violence, the African Union – United Nations Mission in Darfur (UNAMID) was to withdraw from Sudan by the middle of 2020 (after 14 years). Despite the reduction in violence, the structural drivers of conflict (poor rule of law, lack of basic services, economic marginalization, land tenure system and unsustainable management of natural resources), coupled with the structural impact of 15 years of active fighting, still remain unaddressed". (Source: Sudan Multi-disciplinary context analysis, 2020).

3 Food and Nutrition Security

Summary: Based on most recent IPC data[1], 7.3 million people, or 16 per cent of the analysed population face high levels of acute food insecurity (IPC Phase 3 or above) in Sudan. Household food stocks from the previous season will likely be insufficient to sustain adequate food consumption throughout the lean season. High(er) food prices are also projected and will likely affect food access. Areas under conflict, insecurity and floods are expected to experience a depletion of their food stocks. Shortages of water for human consumption, will be particularly harmful to the pastoral and nomadic communities (adapted from IPC, 2021). According to the RIMA study, male headed households are generally better off than female HHs in regards to FCS and HDDS. Households engaging in livestock production and non-skilled labour are worst off (lowest HDDS). Overall, it was concluded that households tend to have inadequate dietary diversity, especially lacking in protein sources (except milk) as well as fruits & vegetables. Wealth index, agricultural assets index, tropical livestock unit holding, size of land cultivated during summer, education of the household head (years) were found to be positively associated with household food security. The main shock that undermines food security in the survey area is reduced household income; this is consistent in both FCS and HDDS (adapted from RIMA, 2020).

3.1 IPC Acute Food Insecurity Analysis

The latest data from the Integrated Food Security Phase Classification (IPC) report, shows that high levels of acute food insecurity in Sudan is driven by currency devaluation, inflation and localized conflicts. The number of people in each IPC phase for the three periods (current, first projection, second projection) is summarized below:

Current situation (April – May): Latest data shows that an estimated 7.3 million people in Sudan (16% of the population analyzed) are in high levels of acute food insecurity (IPC Phase 3 or above) between April and May (current period) and require urgent action.
First Projection (June – Sep 2021): About 9.8 million people are expected to be in high acute food insecurity (IPC Phase 3 or above) from June to September 2021.
Second Projection (Oct – Feb 2022): About 6 million people are expected to be in high acute food insecurity (IPC Phase 3 or above) from October to February 2022. (Adapted from IPC, 2021).

[1] The latest IPC data covers the period April 2021 - May 2022. It was issued in May 2021.

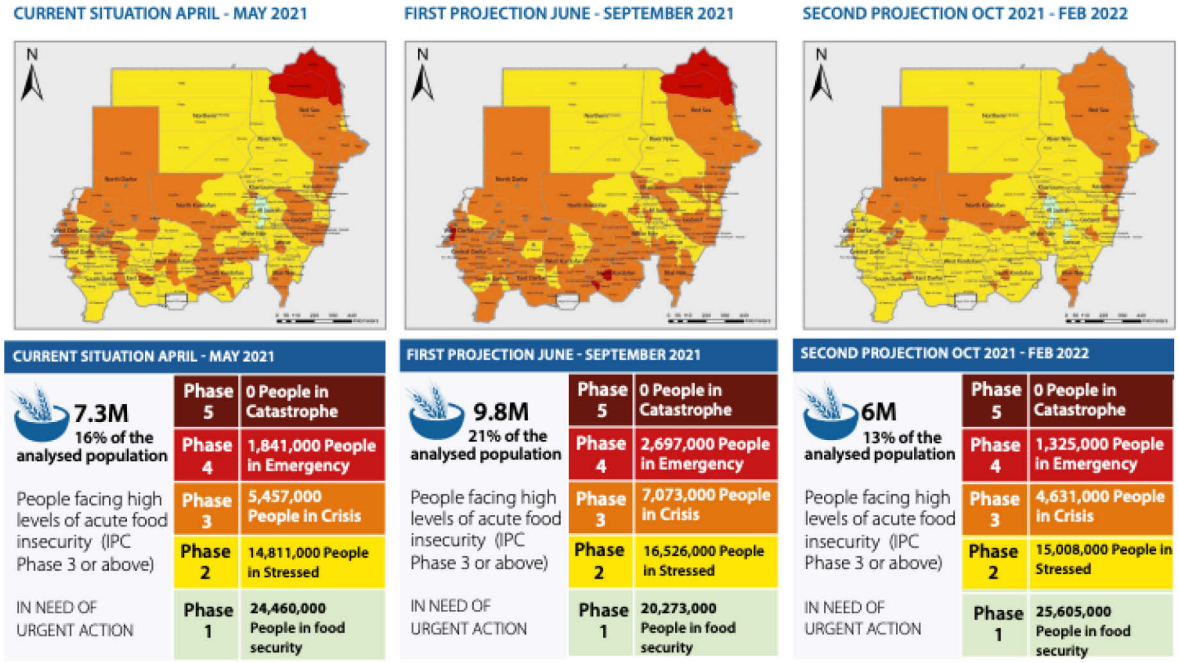


Figure 1 *IPC Acute Food Insecurity graphs*[2]*.*

The analysis of the first projection period (June to September 2021) is based on the below assumptions as indicated in the most recent Sudan IPC report:

Food Availability

"In general terms, this lean season will be more complex than the previous year, but mainly due to high level of prices (100-150 more than last year and over six times the fiveyear average). An earlier depletion of food stock is expected at household level as of May, and increased demand for cereal for local consumption is expected in most parts of the States, due to earlier than normal depletion of food stocks" (IPC, 2021).

Food Access

"As most households in the current period do not have stocks to carry over till the end of the lean season, the dependence on markets will increase further in the first projection period. Areas under conflict, insecurity and natural hazards like floods, where cereal production levels were significantly below average level, will see most households depleting their stocks before the start of the lean season. Price levels are expected to increase seasonally and will be well above the long-term average, further limiting household food access" (IPC, 2021).

Food Utilization

"Shortages of water for human consumption, especially in the desert, arid and semi-arid areas of the pastoral and nomadic communities, will expose these populations to diseases, health hazards, and potential loss of productive assets. Additionally, most localities have poor access to inadequate cooking fuel and proper storage facilities. Therefore, malnutrition is expected to increase due to poor feeding practices and poor hygiene caused by water scarcity and distance to clean water sources" (IPC, 2021).

3.1.1 IPC Data for Sudan

"Using the IPC data sheets (Appendix 2 Sources of IPC datasets) an overview can be created of how FNS outcomes changed for how many people over a long period of time. IPC data became first available on the Darfur region in 2012. Every year after several reports have been published documenting the changing IPC levels for the different regions (Appendix 2 IPC Data Sudan). Only the

[2] These graphs are also presented in Appendix 1 for better view.

situation reports have been taken into account for this analysis as it was determined that due to the lack of access to Darfur and the limited amount of reliable data the 'projection' reports were not reliable enough to include" (Ham, 2020).

The IPC data has been processed into Figure 2 and Figure 3, providing an overview of the FNS situation in North and East Darfur according to IPC classifications.

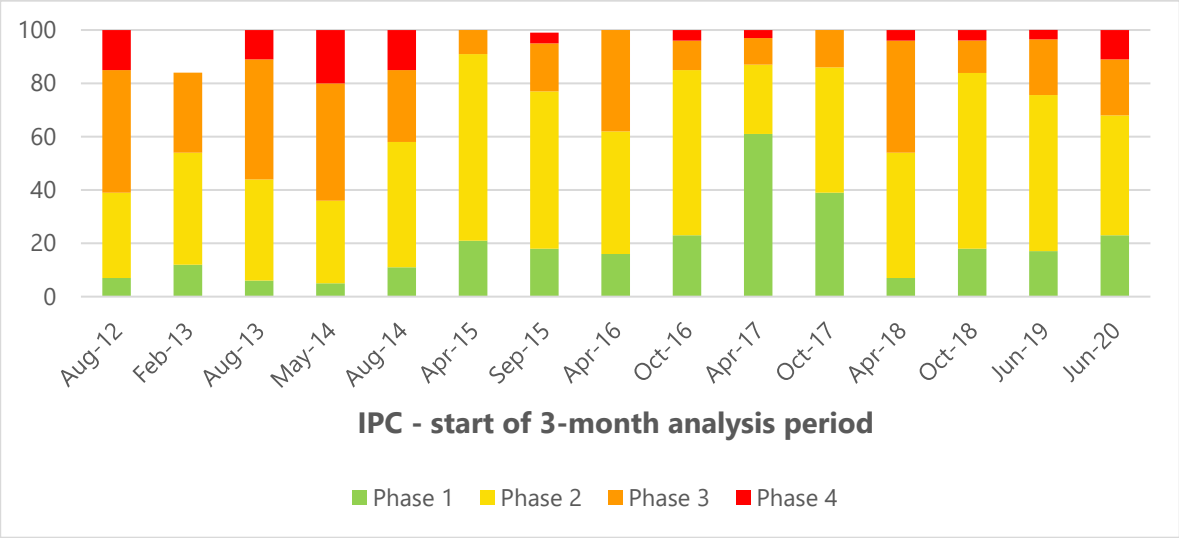


Figure 2 *IPC data North Darfur 2012-2020.*
Source: Ham, 2020. (Appendix 2 IPC Data Sudan).

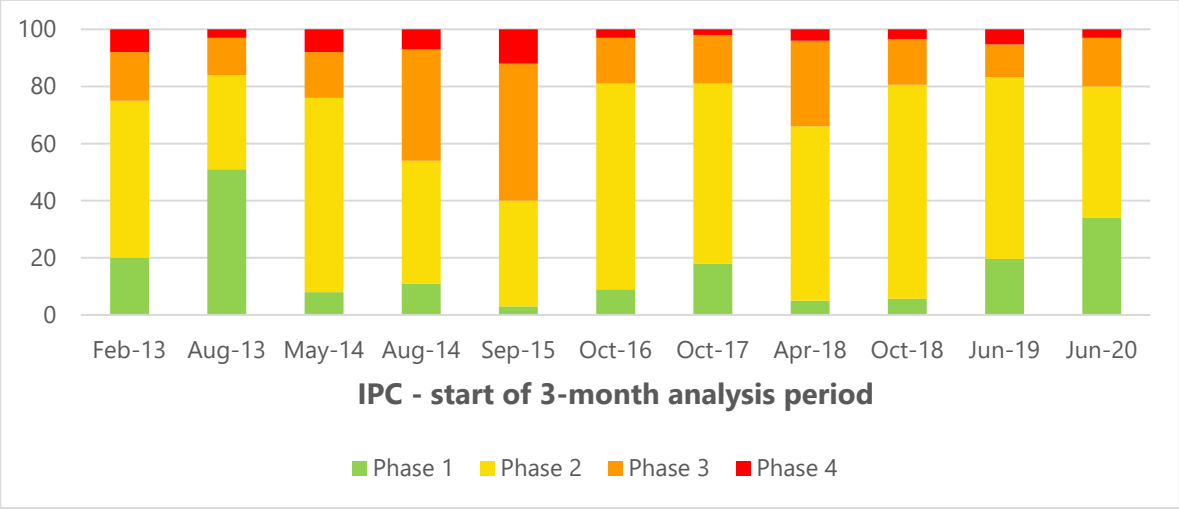


Figure 3 *IPC data East Darfur 2012-2020.*
Source: Ham, 2020. (Appendix 2 IPC Data Sudan).

"Figure 2 and Figure 3 illustrate and visualize how IPC levels in North and East Darfur changed between 2013 and 2019. "Of note is that before 2012 it was virtually impossible to collect FNS data in Darfur due to the ongoing conflict. Secondly, IPC data is not available for East Darfur in the years 2015 and 2017 while there is only one report in 2016. North Darfur does not show a steady trend of improvement although there has been a reduction of people stuck in IPC level 3 and 4 although the overall line keeps fluctuating due to the fragile context of Darfur. East Darfur shows a similar line as North Darfur, with a small reduction of people entering phases 3 and 4 but fluctuations among the people moving in and out of phase 1 and 2. North and East Darfur are relatively similar when it comes to IPC levels due to similar constraints and challenges faced in relatively similar livelihood systems" (Ham, 2020).

"The least amount of people in the lowest IPC phase (phase 1) in North Darfur was recorded in the first part of 2014 and in East Darfur the least amount of people in IPC phase 1 was recorded in 2015. The highest amount of people in the worst IPC phase (phase 4) in North Darfur were recorded in the first part of 2014 and in East Darfur the highest amount of people in phase 4 were recorded in 2015. From the IPC data it can be concluded that 2014 was the worst year regarding FNS outcomes for North Darfur and 2015 was the worst year for East Darfur" (Ham, 2020).

"Figure 4 shows the number of people in both North and East Darfur who were in IPC phase 3 or higher. As shown, there is not a discernible trend line when it comes to the amount of people in crisis or worse" (Ham, 2020).

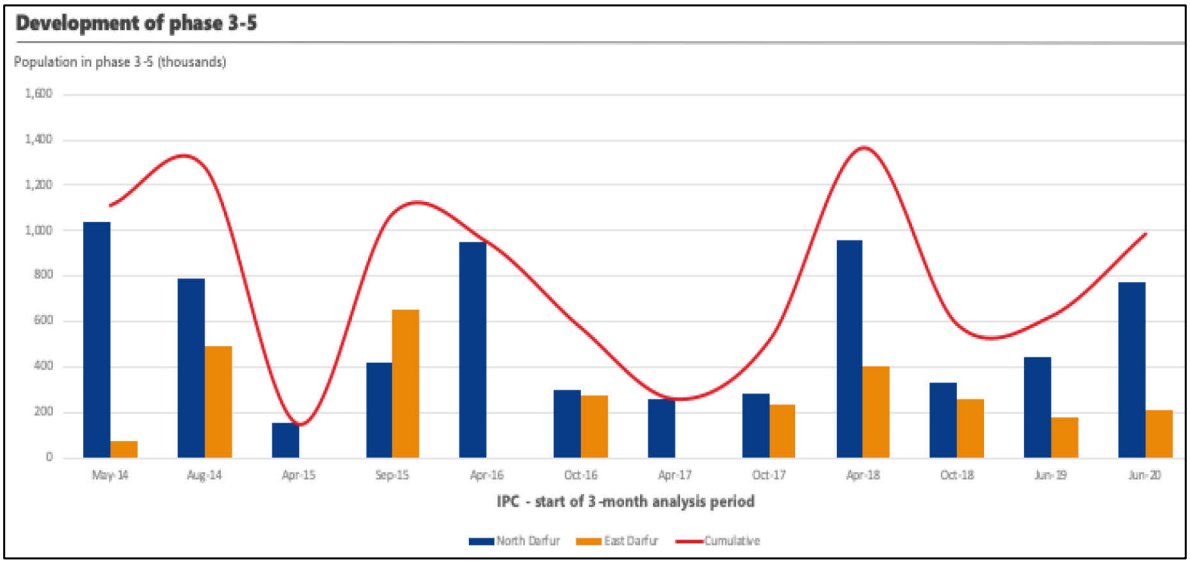


Figure 4 *Number of people in IPC Phase 3 (2014-2020).*
Source: Ham, 2020. (Appendix 2 IPC Data Sudan).

3.2 Food Security Indicators

The below information was obtained from the Sudan RIMA baseline report (2020).

3.2.1 Food Consumption Score (FCS)

"The average FCS in the surveyed area is 51. Approximately 68% of the households have an acceptable FCS. There is a statistically significant difference in FCS by sex of the household head; male headed households have higher FCS. In terms of the particular foods eaten in the past 7 days, oils & fats, cereals, spices and milk are frequently consumed; at least four days in a week. Proteins from meat, eggs and pulses are least consumed by the households" (RIMA, 2020).

Table 1 *FCS categories by sex of household head and beneficiary type.*

FCS category	Non-beneficiaries	Beneficiaries	Male	Female	Overall
Poor	14%	17%	13%	28%	16%
Borderline	17%	16%	17%	14%	16%
Acceptable	69%	67%	70%	58%	68%

Source: RIMA, 2020.

3.2.2 Household Dietary Diversity Score (HDDS)

"The average HDDS for the households in the survey area is 7. On average a household in the survey area consumed 7 different kinds of food out of the 12 food groups in the 24 hours preceding the survey. Male headed households tend to have a higher HDDS compared to female headed households. There is not much variation in HDDS between beneficiaries and non-beneficiaries. There is high consumption of cereals, oils and sugar in the survey area. The main source of protein is milk and meat; very few households consume eggs. Approximately 40% of the households consumed fruits in the past 24 hours. Households engaging in livestock production and non-skilled labour have the lowest HDDS. On the whole there is room to improve on the diversity of foods eaten, especially in terms of eggs, fruits but also vegetables". (RIMA, 2020).

Table 2 *HDDS categories by sex of household head and beneficiary type.*

HDDS categories	Male	Female	Non-beneficiaries	Beneficiaries	Overall
Poor	3%	3%	2%	4%	3%
Medium	27%	38%	32%	27%	29%
High	70%	59%	66%	69%	68%

Source: RIMA, 2020.

3.2.3 Household Food Insecurity Experience Scale (FIES)

"FIES is a measure of household food insecurity based on whether they experienced certain aspects of food insecurity or not. Some 8% of beneficiaries felt severely food insecure, compared to 13% for non-beneficiaries. About one third (36%) felt moderately food insecure (36% beneficiaries, 33% non-beneficiaries). These differences between beneficiaries ad non-beneficiaries are not statistically different" (RIMA, 2020).

Table 3 *FIES prevalence by beneficiary type.*

Food insecurity prevalence	Beneficiaries	Non-beneficiaries	Overall
Severe Food Insecurity	8%	13%	10%
Moderately food insecure	36%	33%	35%
High			

Source: RIMA, 2020.

3.3 Crops contributing to Food and Nutrition Security

As stated in the Sudan multi-disciplinary context analysis report (2020), "the most important crops for food security in North and East Darfur REPRO localities are millet, sorghum, groundnut, sesame, watermelon seeds and hibiscus". "Vegetable gardens are mainly found in areas along the Wadies (e.g. Maba village in Rural El Fasher and Sag el Naam in Kalimando) and in villages where shallow wells are available (Broush). The number of people engaged in the production of vegetables (e.g. tomatoes, okra and onions) during the winter season is marginal. This is mostly due to the limited access and availability of supplementary irrigation schemes. As a result, vegetable production in target localities is mostly practiced by better-off people who can afford access to water" (adapted from Sudan multi-disciplinary context analysis report, 2020).

"Preparation of land is done in a traditional way and no conservation agriculture practices were reported. Although, on average, each farmer grows different crops, no intercropping methods of agroforestry are being adopted. Use of chemical or organic fertilizers was not reported, nor was the use of any pesticides to control weeds". (Sudan multi-dimensional context analysis, 2020).

The crops which contribute the most to people's livelihoods in both North and East Darfur localities can be seen in Appendix 3.

3.4 Factors that negatively influence FNS of households

3.4.1 Food system activities

The CoP survey identified a number of key issues that influence food and nutrition security (FNS) of households that are active within the gum arabic value chain in Sudan. These are further explained below.

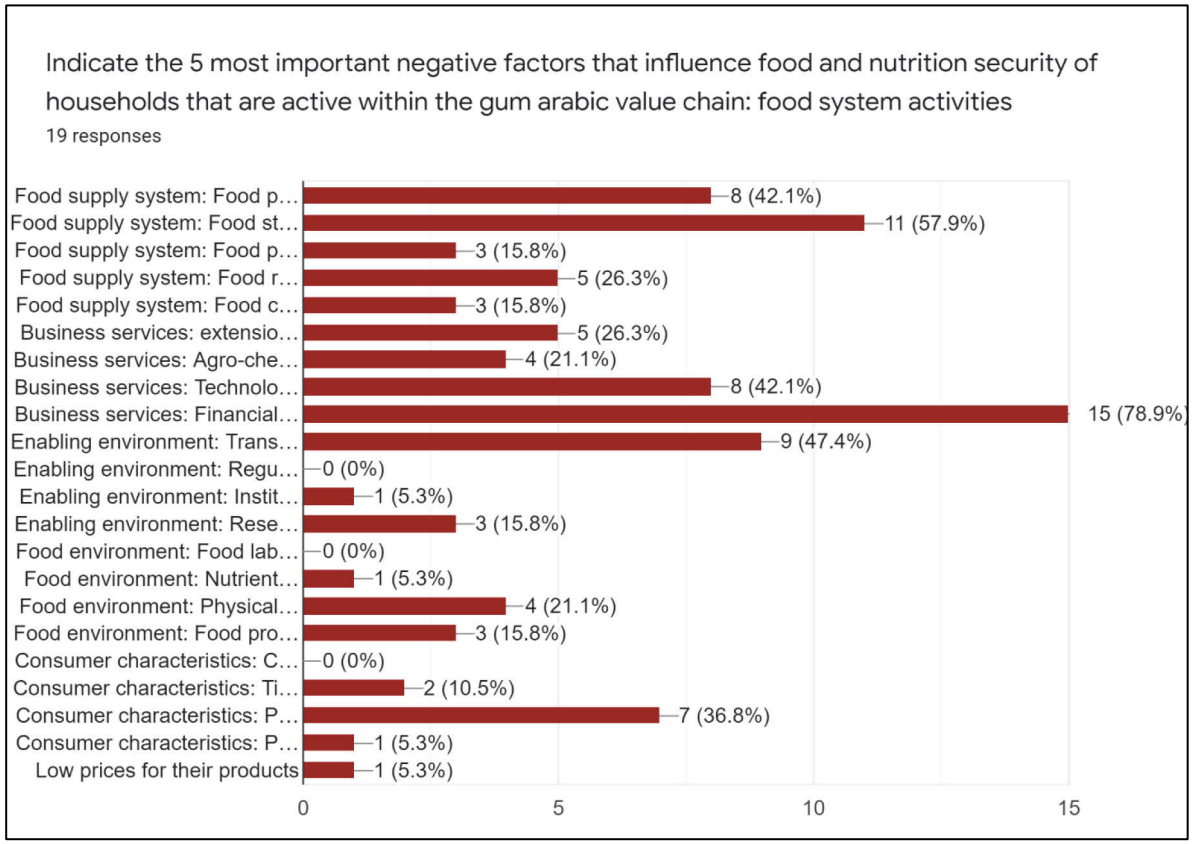


Figure 5 *Most important food system activities that negatively affect FNS of households in the gum Arabic value chain. (CoP survey).*

According to the CoP survey results (Figure 5), the main food system activities that are inadequate and thus negatively affect the FNS situation of households in the gum Arabic value chain are:

1. Business services: Inadequate access to (formal) financial services (78.9%).
2. Food supply system: Lack of food storage facilities, and poor infrastructure (57.9%).
3. Enabling environment: Poor transport networks (47.4%).
4. Food supply system: Poor food production (42.1%).
5. Business services: lack of technological support (42.1%).
6. Consumer characteristics: low purchasing power of consumers (36.8%).

These are further explained below. In a sensemaking workshop with the Sudan CoP, organised by WUR, the results from the survey were discussed to understand the reasons behind the results.

1. Business services: Inadequate access to financial services

- Gum Arabic (GA) producers lack access to (formal) financial services. Banks cannot provide funds in November and December because of closing their accounts to prepare for the new year, as per the

regulations of the Central Bank of Sudan. This leads to the inability of GA producers to access finance in times where it is needed most (e.g. the GA tapping and collection periods).
- Reluctance of financial institutions to provide finance to GA producers. Risk and uncertainty involved with GA production makes it an unfavourable investment opportunity. This reluctance is also attributed to the fact that producers do not have collateral to offer in return for investment.

2. Food supply system: Lack of storage facilities and poor infrastructure
- Due to the geographical nature of Darfur food supply activities such as the transportation of food, the storage and the trade are pertinent challenges that impact FNS outcomes. Agro-pastoralists require access to markets in order to get a good price for their goods.
- There are very limited GA storage facilities. GA is produced in remote and far away areas with poor to no infrastructure, limiting access to markets.
- Storage capacity is necessary in order to be able to store goods for later sale or consumption and roads or other transport networks are required to safely reach destinations with stored goods intact. When the food transport, storage and trade component is of insufficient quality it directly impacts the ability of people to sustain themselves.

3. Enabling environment: Poor transport networks
- The transport networks are not of poor quality and the number of asphalted roads is very low.
- Inaccessibility of the Darfur region causes several restraints on efficiency within the food system.
- The lack of sufficient transport networks causes difficulty in accessing markets or transporting goods before expiration and livestock migration routes are long and hard roads to travel.
- North and East Darfur could benefit from better connection in order to promote economic activity.

4. Food supply system: Poor food production
- Sudan has experienced droughts and environmental degradation impacting soil quality and rangeland quality. Desertification impacts food production while lack of precipitation puts further stress on pastoral communities.
- Insufficient rainfall and decreasing land fertility have led to a sharp decline in the production of rain-fed crops (O'Reilly, 2004, p. 15).
- Pest and disease outbreaks such as locusts threaten agricultural production.
- The food system in Darfur is defined by seasonality and activities related to seasonal production.
- The livelihood calendars for North Darfur and East Darfur (Appendix 4) provides insights into the main constraints faced by the people of Darfur when it comes to agricultural production and pastoralism.

5. Business Services: Lack of technological support
- Business services, "while not at the heart of the value chain, provide services and goods to the actors in the chain. This can involve training, agricultural inputs, technical support or financial services" (Berkum, et al., 2018).
- Business services in Darfur will be mostly relevant to the supply of agricultural inputs or animal medicine for farmers and pastoralists alike. The business services are not developed extensively due to the reliance on locally produced seed variety or the lack of interest in improved seed variety.
- Due to the developing and rural context of Darfur, little information is available on technological innovation being developed in Darfur. North Darfur has a University in El-Fasher and East Darfur has Ed Daein University which researches conflict analysis, human rights and agriculture.

6. Consumer characteristics: low purchasing power of consumers
- "Characteristics of consumers, who – through their knowledge, available time, resources (purchasing power), age, sex, culture, religion, etc. – develop certain preferences that influence their food choices" (Berkum, et al., 2018).
- Relevant is also the lack of purchasing choice faced by many communities in the target localities due to food insecurity.
- Lack or purchasing choice could refer to the unavailability of varied food items necessary for a healthy diet due to a lack of local production or a drastic lack of purchasing power, resulting in consumption of the cheapest and often times the lowest quality of food.

3.4.2 Environmental drivers

Figure 6 shows that the key stakeholders that participated in the CoP survey identified droughts, lack of water, and land tenure system among the most important factors negatively influencing FNS of households active within the gum Arabic value chain. These factors are further discussed below.

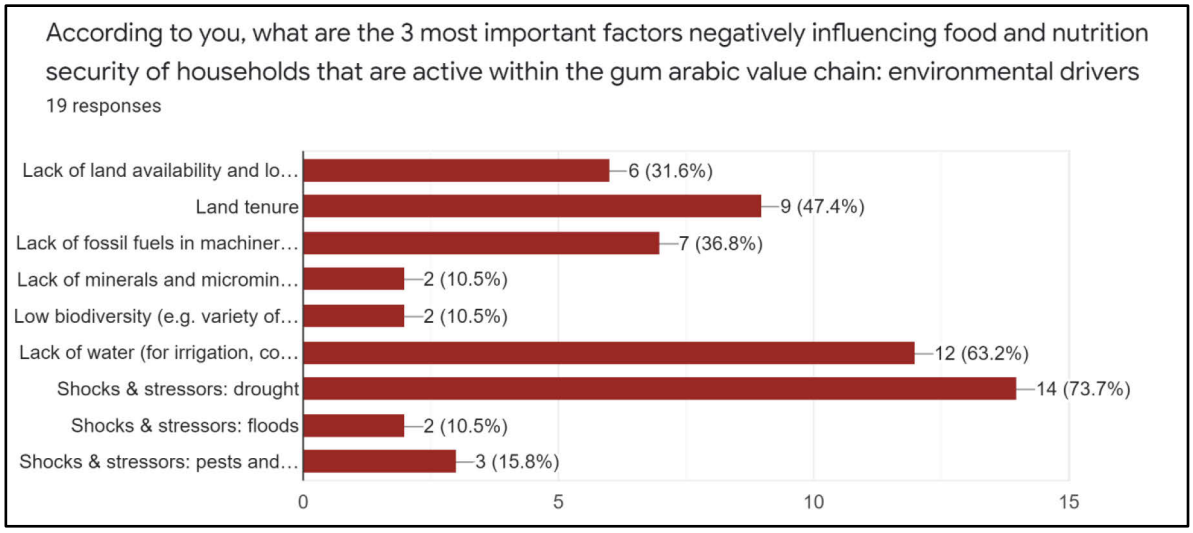


Figure 6 *Environmental drivers (CoP survey).*

1. Shocks & stressors: Drought

- Drought is the most important main environmental driver that negatively affects the FNS situation of GA households.
- Sudan has experienced droughts and environmental degradation impacting soil quality and rangeland quality. Desertification impacts food production while lack of precipitation puts further stress on pastoral communities.
- "Persistent drought conditions in the northern parts of Darfur has had the effect of pushing the nomadic herders into the southern areas, who, in huge numbers, have searched for pasture and drinking water, intensifying the ongoing process of desertification and causing inter-tribal discord". (O'Reilly, 2004).

2. Lack of water (for irrigation, cooking, drinking, cleaning)

- Drinking water is a challenge, not irrigation as GA is rainfed and very drought resistant. There are very limited permanent water sources in North / East Darfur, depending on the seasonal rains, so production in remote areas is challenging.
- Rains are erratic and shorter every year. This is not enough to provide adequate access to safe drinking water.
- Longer and more frequent droughts dry up surface water sources.
- Improved water storage is an opportunity for intervention. The management of water resources is vital for continued survival in Darfur and crucial in preventing or mitigating tensions between pastoralists and agriculturalists.

3. Land tenure

- The lack of a formal land tenure system reduces good practices and investment for continued sustainable production, likewise, it also compounds the existing tensions between nomadic pastoralists and settles agriculturalists for example through the increased presence of enclosures which prevent pastoralist herd migration.
- The lack of a comprehensive legal framework for land use and ownership results in ongoing conflict between different groups regarding land use. This conflict can take on many forms and sizes including but not limited to: Conflict between government and civilian over government owned land, conflict between agriculturalists and pastoralists regarding grazing rights/overgrazing, the presence of gold or other valuable minerals leading armed groups to push people off viable land.

- Land tenure reform necessary to reduce conflict occurrence and possibly improve farming practices. Insecurity about land ownership causes a lack of sustainable investment in farmland.

4. Lack of fossil fuels in machinery and equipment, storage, cooling, processing, transport

- After the secession of South-Sudan in 2011, Sudan lost the majority of its oil reserves. However, in 2014 the executive director of the energy commission of the African Union estimated the Darfur oil fields contain between 5 and 15 billion barrels of oil (Dabanga, 2014).
- Data on oil exploitation in Darfur is limited with claims from unverifiable sources saying Darfur oil reserves are largely exaggerated.

5. Lack of land availability and low soil quality

- There is an issue of mono-cropping, such as groundnut which is produced for cash. There is a need for intercropping strategies to increase yields and improve soil health. In Darfur, there is increased attention for cash crops as opposed to GA or food crops, but this deteriorates the soil quality and thus undermines soil productivity.
- The issue of clean energy. Trees are being cut for charcoal for cooking, but this reduces biodiversity and increases vulnerabilities for shocks and stressors.
- In East Darfur availability of land was reported as "one of the bottlenecks for agricultural expansion/greater productivity for farmers in East Darfur. Competition over land between farmers and pastoralists, as well as among settled communities, refugees and IDPs, is a potential source of conflict in the target areas in East Darfur. With regards to access to land, the situation is somehow similar to North Darfur: the majority of people have access to land for cultivation, though they do not have formal tenure right" (adapted from Sudan multi-disciplinary context analysis report, 2020).

6. Migration

- During the CoP migration also came up as an issue, and influenced by the environmental drivers. Since people, especially youth, migrate to other areas for work (e.g. the gold mining areas), there is lack of labour for GA production. During the tapping period (October to December) there are not enough people to tap the trees. This leaves only old people present for tapping. Whilst gold mining is a coping strategy, it also creates a challenge as it reduces availability of labour for GA tapping and collection practices.

3.4.3 Socio-economic drivers

Figure 7 shows that Sudan CoP members identified especially poor markets systems but also inadequate policies, conflict and economic shocks and stressors as the most important factors negatively influencing FNS of households that are active within the gum Arabic value chain.

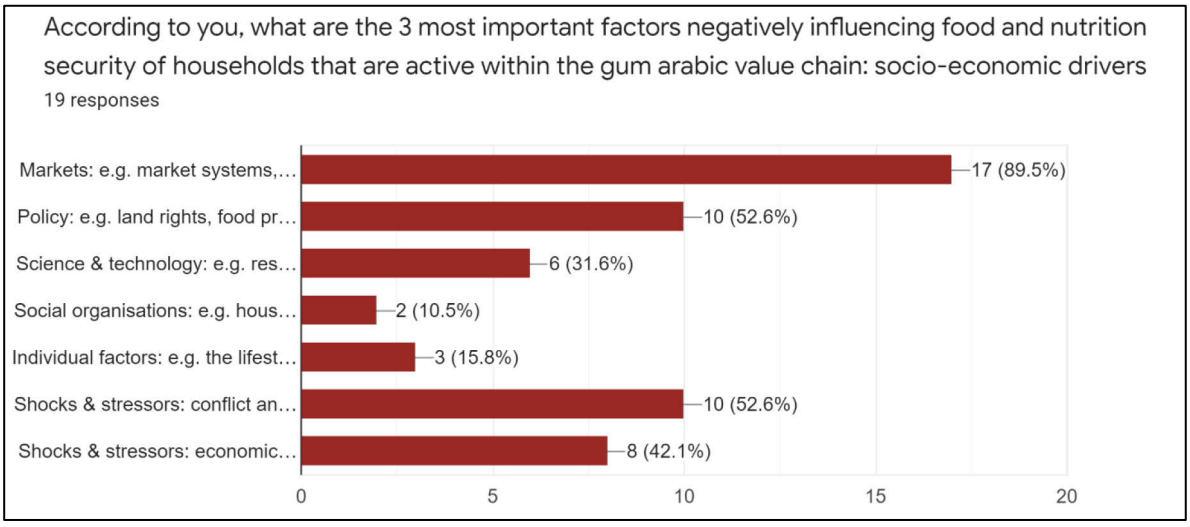


Figure 7 *Socio-economic drivers (CoP Survey).*

These factors are further elaborated below.

1. Markets: e.g. market systems, prices, trade relations, incomes, profits, wages, labor availability

- Market systems do not function properly as there is poor availabily of food in the market. Some markets are only open for 1 or 2 days a week. If prices are low at that time, GA producers get low prices for their produce, while at the same time facing high costs (e.g. for transportation because of poor infrastructure networks).
- Also market prices are dominated by a few powerful traders. They keep prices (for GA) very low.
- Lack of proper infrastructure leads to reduced market access.
- Food prices in Darfur have risen drastically the past few years and it continues to do so. The price of food is one of the most important factors for households whether they can remain food secure or not. Price stability would massively improve the opportunities for people in Darfur to plan their livelihood activities around a reliable and stable food price.
- Staple food price increases impacting household FNS outcomes directly.
- When labour migration is excluded as a livelihood strategy due to conflict or the ongoing Covid-19 crisis, the income and therefore the FNS outcomes in North and East Darfur are jeopardized.

2. Inadequate policies

- There is a land rights issue as the land tenure system is not fair. Local leaders own the land. GA producers are often not allowed to tap the trees without sharing the profit (50/50 in some areas). As such, land that cannot be owned by producers will not be utilized as the producers will lose a lot of the income generated through GA sales. This does not stimulate GA production. There is need for win-win arrangements, such as contract farming (FNC initiative).

3. Shocks & stressors: conflict and insecurity

- There are conflicts and tensions between pastoralists and farmers competing over land and other natural resources such as water. This also includes looting, raiding and causing of wildfires. Because of this, some production areas are abandoned and not utilized. This conflict and violence limits the movement of producers and as such affects their FNS situation.
- There are a wide variety of reasons for conflict in Darfur. Including but not limited to: Tribal conflict, ethnic tension, religious differences, access to land, access to migration routes, access to water resources or access to mineral resources.
- Access to water resources is a source of conflict between agriculturalists and pastoralists and the greater Darfur region could benefit by making the water management system more resilient against conflict and more sustainable for long term use.
- Community conflict mediation could be a valuable tool in conflict reduction. Invariably, community conflict mediation, participation of civil society and armed groups and the involvement of government policy makers are all necessary in order to reduce the likelihood of armed conflict and to mitigate the effects it has on the population of Darfur.

4. Economic shocks and inflation

- The presence of high inflation and increasing prices of staple foods further put pressure on people's ability to obtain food. All inputs experience severe price rises and as such this reduces the profitability of GA production.
- High inflation and the ongoing Covid-19 pandemic are factors that hinder the amount of labour migration that is normally prevalent within Darfur, resulting in a decreasing amount of remittances flowing into Darfur.
- There is a challenge of how to provide pre-finance for GA producers to timely offer their products to the markets and obtain good and fair prices.
- The secession of South-Sudan resulted in a series of economic shocks in Sudan, the most important of which was the loss of half of government revenue and 95% of export from oil reserves no longer possessed by Sudan (World Bank, 2019).
- The declining economic situation has led to increased inflation and rising food prices which have led to violent protests erupting since 2013 (World Bank, 2019).

5. Science & technology: research, innovation & education

- Research is not transferred to the producers. There is a disconnect between research and knowledge generation and the people who need to use it.
- Technology needs to be made accessible for the producers.

4 Healthy Diets

Summary: Inadequate dietary intake and communicable diseases are among the immediate causes of undernutrition in Sudan. Poor infant and young child feeding practices are also a leading cause of malnutrition (GRFC, 2021). According to the RIMA study, male headed households tend to have a higher HDDS and FCS compared to female headed households. Households engaging in livestock production and non-skilled labour worst off (lowest HDDS). Overall, there is inadequate dietary diversity amongst households, with diets lacking in protein (except milk), as well as fruits & vegetables. Reduced household income is the main shock that undermines food security in the survey area. Households engaging in livestock production and non-skilled labour have the least HDDS (RIMA, 2020).

The main factors that influence the GA producers to consume a healthy diets are described below. But first a definition of healthy diets is given in the box below to show the depth and breadth of healthy diets. Note: see also section 3.2 on FCS, HDDS and FIES.

Box 1. WHAT IS A HEALTHY DIET?

A healthy diet ensures adequacy of energy and all essential nutrients, promotes all dimensions of individual health, and prevents malnutrition in all its forms and diet-related noncommunicable diseases, such as type 2 diabetes, cardiovascular diseases, and some forms of cancer. A healthy diet includes enough fruits, vegetables, nuts, seeds, whole grains, and legumes; sufficient but not excessive calories and amounts of starchy staples and animal-sourced foods (milk, eggs, poultry, and fish); and limited or no foods, food groups, or nutrients that could lead to health risks when eaten in excess, such as free sugars (including sugar-sweetened beverages), saturated fat, salt, red and processed meats, and ultra-processed foods. A healthy diet should have only minimal levels, or none if possible, of pathogens, toxins, and other agents that cause foodborne diseases (WHO, 2020). The exact makeup of a healthy diet varies depending on individual requirements and physical activity, cultural context, local food availability and access, and dietary customs, but there are general principles for making healthy diets possible. These include ensuring that a diversity of nutritious and safe foods are available and accessible year-round; that healthy diets are affordable to all; that foods are produced with a low environmental footprint; and that consumers are informed, empowered, supported, and willing to make healthy dietary choices (GLOPAN, 2020).

4.1 Factors influencing healthy diets and FNS

Whilst the role of FNS-REPRO and other factors are yet to be determined, it is clear that currently wealth index, agricultural assets index, tropical livestock unit holding, size of land cultivated during summer, education of the household head (years) were found to be positively associated with household food security. Relevant indicators used include: HDDS, FCS (Sudan RIMA baseline report, 2020). See also section 3.2. However, healthy diets encompass more than food security. Horticulture and market gardens support households' income as well as increased dietary diversity. Commonly grown vegetables/fruits in Sudan are okra, onions, tomatoes, watermelon, green leafy vegetables, beans, spices, dates, and citrus fruits (WFP, 2016).

4.2 Factors that negatively influence consumption of healthy diets

Reduced household income is the main shock that undermines food security in the survey area. Households engaging in livestock production and non-skilled labour have the least HDDS (Sudan RIMA baseline report, 2020).

A number of interesting factors influencing the consumption of healthy diets were found in the study, 'Food Security and Agricultural Development in Sudan: The case of Kassala State', written by Prof. Dr. Samia Mohamed from Nour University of Khartoum, Sudan. While the study focused solely on Kassala State, some of the findings and insights which emerged may be characteristic of the broader context of Sudan. Some key findings to emerge from the study are:

- Mohamedain (2020) found that low income has affected the pattern of households' food consumption. He indicated that there exists low variation in food typically consumed by households, which also implies poor diet quality and poor dietary diversity. This is because the majority of consumption comes from five items: Sorghum (54.37%), Millet (12.43%), Sesame (11.24%) and Bread (10.24%), while minor food consumption includes Legumes, Fruit, Wheat, Purchased meal, Chicken, Fish, Eggs and Groundnut. It also showed that there is a high share of Sorghum in total food consumption (54.37%) which is not surprising as Sorghum has a high share of total agricultural production (41.5%).(adapted from Mohamedain, 2020).
- The poor variety of agricultural crops also implies poor agricultural food production capacity that meets just some of the household's consumption and demand for various food needs. The main impeding factors are the lack of agricultural land ownership, the small size of cultivated land, few crops cultivated in agricultural land, few types of irrigation, shortages of agricultural services (adapted from Mohamedain, 2020).

"Food security dynamics in the target localities are strongly linked to the performance of the agriculture sector. In addition to the underling and basic causes of malnutrition, limited nutrition and hygiene knowledge, including knowledge in appropriate food handling, also prevents households from optimally consuming their own production". (Sudan multi-disciplinary context analysis report, 2020).

The Sudan Communities of Practice (CoP) survey, further revealed a number of factors which hinder or prevent households that are active withing the gum Arabic value chain to eat healthy diets. As seen in Figure 8, the main factors identified by CoP participants were: income to purchase healthy foods, market access, availability of healthy and diverse foods, production of healthy food crops, and awareness of healthy diets (food choices).

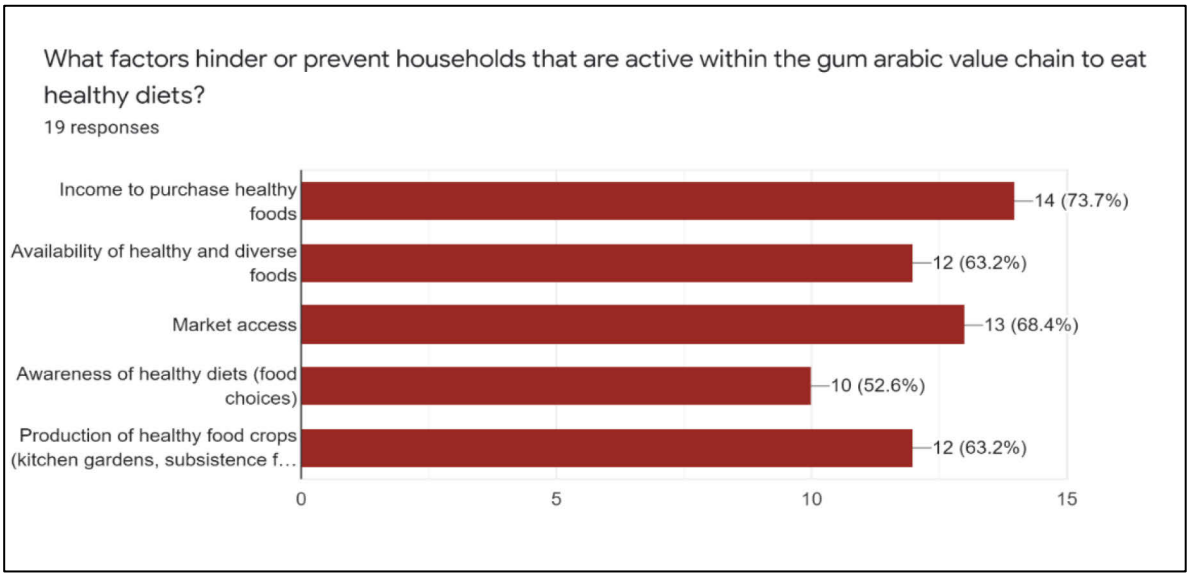


Figure 8 *Factors influencing healthy diets (CoP survey).*

5 Resilient Livelihoods

Summary: Both the food security and the resilience of target communities in the East and North Darfur states are still under siege. These are affected by a number of political, socio-economic and environmental issues which in turn are closely related to conflicts, climate change, economic slowdown and weak governance. The main shocks and stressors reported by community members in REPRO target localities in North Darfur are, in order of severity and recurrence: dry spells, crop pests and fire outbreaks. Whereas, in East Darfur the main shocks and stressors are, in order of severity and recurrence: crop pests, price volatility and fire outbreaks (RIMA, 2020).

To be resilient in North and East Darfur refers to "the ability of agro-pastoralists to resist, absorb, accommodate to and recover from the negative impacts of drought, incidences of violent conflict and staple food price increases in order to remain food secure without compromising the ability to continue livelihood activities in the future. The long-term sustainable development of the identified and currently insufficient socio-economic and environmental drivers to promote the development of resilience will contribute to people's ability to increase resilience through improvement of practices and abandonment of negative coping strategies" (Ham, 2020). In sum, resilience can only be truly achieved through the tackling of agriculturalist-pastoralist tensions which result in conflict and serve as both a direct shock to livelihoods, as well as a continued driver for land degradation and further conflict (Ham, 2020).

5.1 Main Livelihoods

Livelihoods (North Darfur)
"The dominant livelihood in the five target localities in North Darfur is agriculture followed by agro-silvo-pastoralism and petty trade. In all project localities, agriculture is practiced with simple hand tools and depends on rain-fed production systems. Animal drafting and small-scale mechanized systems are practiced in groundnut production and, to a lesser extent, vegetable production (limited to Wadi areas and Sag el Nam area, which borders Kalimando/Dar Es Saalm localities). The different sources of livelihoods can be grouped in three main zones: (i) the millet based agro-pastoral area, (ii) the millet and gum Arabic-groundnut based agro-silvo-pastoral area and (iii) the groundnut-millet agro-pastoral area. Eastern Rural El Fasher and Umm Keddada fall into the first group, Kalimando and Tweisha into the second and Al Lait into the third". (Sudan multi-disciplinary context analysis report, 2020).

Livelihoods (East Darfur)
"The three FNS-REPRO target localities in East Darfur rely on a subsistence economy with two major dominating sectors: small-scale rain-fed farming and semi-nomadic pastoralism. These two sectors constitute the main source of income and livelihood for most of the population. All three target FNS-REPRO localities rely on groundnut-millet agro-pastoral systems. Groundnut is the main cash crop which is cultivated by the majority of farmers across all three localities, while millet is the main food crop. However, the production of food crops is very limited comparted to the areas dedicated to groundnut production. Food crops are mostly produced for family consumption while groundnut is the main cash crop, sold to the local village and urban markets in Ed Daein. From Ed Daein, groundnut reaches Khartoum/Omdurman market and a big share of it is exported to International markets (China, Guelf States and Europe)". (Sudan multi-disciplinary context analysis report).

The livelihood calendars for both North Darfur and East Darfur can be seen in Appendix 4.

5.2 Key shocks, stressors and other factors influencing resilient livelihoods

The RIMA baseline report (2020) identified a number of shocks and stressors impacting the resilience of livelihoods in Sudan:

- Drought impact resulting in crop failure (shock) and continued land degradation (stressor);
- Fire outbreaks in the localities falling into the Millet and gum Arabic-groundnut based agro-silvo-pastoral area (Kalimando and Tweisha);
- Flash floods (shock) from extreme precipitation in short bursts coupled with deforested areas lead to destruction of crops and infrastructure while increasing chance of waterborne disease;
- Locust and other crop pests which impact food availability through destruction of fields;
- Price shocks that directly affect people's ability to purchase sufficient food as wages stay the same and food prices go up.

Figure 9 presents the main shocks experienced by households in the survey area in the last 12 months preceding the RIMA survey. The main shocks are high food prices, high cost of transport/fuel, reduced income/employment, serious illness and epidemic.

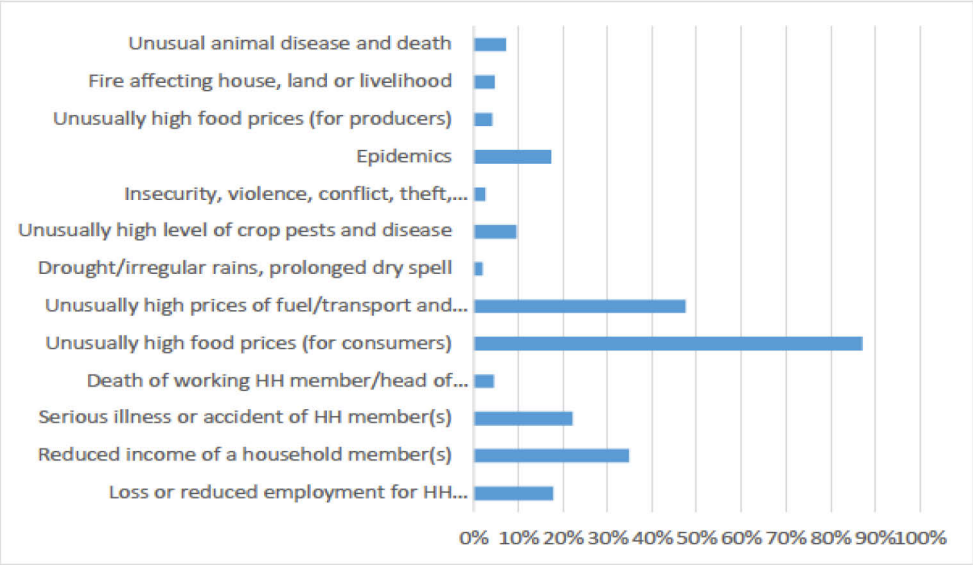


Figure 9 *Key shocks and stressors.*
Source: Sudan RIMA baseline report (2020).

The Sudan multidisciplinary context analysis (2020) report also highlights shocks and stressors:

- "Main shocks and stressors in North Darfur are, in order of severity and recurrence: dry spells, crop pests and fire outbreaks. The effects of dry spells on agriculture productivity and food security are particularly evident in Northern localities (Rural El Fasher and Um Keddada). Fire outbreaks were reported to be the top concern in the localities falling into the Millet and gum Arabic-groundnut based agro-silvo-pastoral area (Kalimando and Tweisha). Almost all villages in the five localities listed crop pests (especially for watermelon and millet) as main vulnerability factors affecting crop production and thus their livelihoods. Many producers reported that they had to stop practices of integrated production systems (e.g. gum Arabic and watermelon agroforestry systems) due to the increase of crop pests. Lack of knowledge in Integrated pest Management (IPM) may be one of the factors explaining this situation. Animal pests were reported as main shocks only in Um Keddada locality. This may be explained by the fact that the locality has the highest number of animal heads and it is a famous site for nomads coming from and outside the state". (Sudan multidisciplinary context analysis, 2020).
- "Main shocks and stressors reported by community members in REPRO target localities in East Darfur are, in order of severity and recurrence: crop pests, price volatility and fire outbreaks. The effects of price volatility for the key food crops is particularly evident throughout the localities, with an increase

of prices of main staples up to +50 percent compared to 2019. Almost all villages in the five localities listed crop pests (especially for millet and sesame) as main vulnerability factor affecting crop production and thus their livelihoods. Fire outbarks and loss of productive rangelands was also reported as third main shock in the target localities". (Sudan multidisciplinary context analysis, 2020).

5.3 Income Situation

In regards to household income, the Sudan RIMA (2020) report provides substantial evidence:

- "The poverty line is USD 1.90 per day. The RIMA baseline report shows that the median annual income of households in the survey area USD 1,112 is, which is USD 3.05 per household per day (See Table 4).
- The median household size in the study area is 7. So on average there is USD 0.44 per household member per day, which is way below the poverty line. The situation for female-headed households (USD 760 annually) is worse compared to male-headed households (USD 1208 annually). There is no statistical difference between beneficiaries and non-beneficiaries in terms of the above.
- The three main sources of income for the households in the last 12 months preceding the survey are crop farming (excluding gum Arabic) (77%), agricultural labour (43%) and non-skilled labour (25%) as summarized in Figure 10. The same trend is observed for the main source of household income for the last three months.
- Male headed households are more dependent on income from crop production, agricultural labour and livestock production while female headed households are more dependent on crop production, agricultural labour and trade/petty trade.
- Approximately 8% of the households reported to have received remittance from family members, and of these, each household received an average of USD 180 as remittance in a period of 12 months preceding the survey. Only 3% of the households have bank accounts. The key expenses taking a large percentage of household income are food (59%), health (16%), transport/communication (9%) and drinking water (5%). Reduced household income is the main shock that undermines food security in the survey area" (RIMA, 2020).

Figure 10 *Livelihood sources in the last 12 months.*
Source: Sudan RIMA baseline report, 2020.

Table 4 *Annual income in USD by sex of household head.*

	Male		Female		Total	
Income source	**Mean**	**N**	**N**	**Median**	**Median**	**N**
Crops	521.27	454	89	271.49	543	452.49
Gum Arabic	253.39	135	15	217.19	150	253.39
Livestock sale & livestock products	217.19	167	24	135.75	191	217.19
Agricultural labour	452.49	297	70	361.99	367	434.39
Skilled labour	579.19	43	11	868.78	54	579.19
Non-skilled labour	483.26	132	21	325.79	153	452.49
Trade/Petty trade	651.58	94	26	624.43	120	633.48
Sale of firewood	217.19	47	13	173.76	60	217.19
Salary (Employment)	841.63	44	10	651.58	54	814.48
Total income	1208.13	542	120	760.18	622	1122.17

Source: Sudan RIMA baseline report, 2020.

Some key information related to income emerged from the report, 'Gum Talha (Acacia seyal) Value Chain Analysis in East Darfur, Sudan', written by Dr. Yahia Omar Adam (2016). The study, conducted in February 2016, used snowball sampling to select 197 study participants (130 producers, 50 village traders, 15 town traders/agents and two companies/exporters) along the value chain.

- "Estimates vary, however, in terms of gum Arabic's contribution to total household income in rural areas. Some estimates put that contribution at 50% while more conservative estimates indicate that 25% of rural household income comes from gum arabic (Adam, 2016). The value chain study showed that half of the male producers (50 per cent) indicated livestock as their most important income source, but 60 per cent of the female producers considered Gum Arabic as their most important income source. While all of the surveyed male gum Arabic producers work full-time on producing and selling Gum Arabic during the season, only half of the female producers do so". (Adam, 2016).
- "The study found that the profit margin for the rural collectors was 48.76 per cent, while that for village traders was 54.94 per cent, and that for town traders was 6.4 per cent. The main cost items for the rural producers include food (45 per cent), labour (22 per cent), drinking water (18 per cent), gum transportation (9 per cent), medication (4 per cent) and tapping tools (2 per cent)". (Adam, 2016).

5.3.1 Major constraints and bottlenecks for Gum Arabic producers in gaining income

The report, 'Gum Talha (Acacia seyal) Value Chain Analysis in East Darfur, Sudan', identified the major constraints and bottlenecks for GA producers in gaining income:

- Low gum prices, lack of market information, lack of producers' organizations, lack of financial credit, lack of training on gum cleaning and drying, lack of drinking water, low regeneration capacity of Hashab trees and poor tree management.
- For the entire production season (five to six months) a producer receives a gross income of only 5,120 SDG which is equivalent to the average income for women who clean the gum. The main reason for the low incomes of the producers is that they are not able to sell their product by themselves to the end users; they must sell to village traders (adapted from Adam, 2016).
- The cleaning and cutting is very difficult and time consuming. Women are paid 3.5 Sudan ginah (SDG) per guntar and each woman handles between five and eight guntar of gum each day (adapted from Adam, 2016).

5.4 Factors influencing resilient livelihoods

There are various factors that influence resilient livelihoods in Sudan. The reports show the following factors:

- Covid-19: In an assessment conducted by FAO between July and August 2020, the Covid-19 pandemic was found to be impacting negatively on the 'already fragile food security situation' in the country, and that the most affected were farmers and pastoralists who depend on land, water, pasture, labour and favourable crop/livestock production for their food security and income generation (Covid-19 Conflict Report, 2020).
- Mass cutting of Acacia Senegal in Darfur for short term coping strategies could have long term negative impacts on the ability of people to sustain their livelihoods (Ham, 2020).
- Land tenure is a continuous driver for challenges regarding livelihood strategies. The lack of a comprehensive legal framework for land use and ownership results in ongoing conflict between different groups regarding land use (Ham, 2020).
- 'Health and Safety' is a component central to resilience. The livelihood strategies dominant in North and East Darfur face various challenges regarding health due to the prominence of disease (and livestock diseases), lack of nutritious food and limited access to health services (Ham, 2020).
- Impact of droughts: Drought and soil degradation play into each other to create a vicious destructive cycle which farmers can hardly escape from. Resilience against droughts in this context could mean 'the ability to reduce impact of droughts on crop and animal products while mitigating soil degradation and actively contributing to soil restoration (Ham, 2020).
- Resilience against floods: It is known that these flash floods cause a variety of issues such as destruction of farmland, increased risk of waterborne diseases and destruction of roads and infrastructure leading to reduced access to markets and social services. Note the conflict report showed that "in September 2020, 17 out of 18 states were affected by floods. North Darfur was one of the most affected states. This disaster slowed down efforts to mitigate the impacts of the Covid-19 pandemic on the population" (Covid-19 Conflict Report, 2020).
- Resilience against pests: Presence of crop pests is a continues stressor for agriculturalists in Darfur, the current locust plagues that affect East Africa are causing acute foot shortages and show no sign of letting up. As of 2020 there does not seem to be a viable strategy to increase resilience against locust swarms (Ham, 2020).
- Enclosures are being set up, limiting herd migration and causing violent conflict regarding land use. This response includes the increased practice of enclosures which as mentioned is a driver for conflict (Ham, 2020).
- Access to finance/credit is one of the challenges that gum Arabic producers face. Household access to credit plays an important role in improving their daily productivity, increase in knowledge, improve well-being and an avenue to escape from poverty. Approximately 38% of households reported to have accessed some form of credit in the last three months preceding the context analysis. (Sudan multi-disciplinary context analysis, 2020).
- Conflict reduction: Many conflicts are about natural resources. It may include:
  Management of water resources for equitable access can help reduce conflict.
  - Land management in order to improve soil quality, grazing pasture quality and the reduction of desertification, overgrazing and deforestation while simultaneously restoring depleted soil. But also dealing with conflict over land.
  - Management of control over mineral resources (especially gold), both to remove power from armed militias and improving safety and security status of people in Darfur.

5.4.1 Key negative factors emerging from CoP survey

The Sudan CoP survey further identified a number of factors that influence a GA producer household's capacity to withstand shocks and stressors (Figure 11). The six most negative factors identified (in order of significance) include: lack of income and savings, climate prone agriculture (shortage of water and monocropping), undiversified livelihoods (mainly dependent on GA production), desertification or drought, migration (especially youth), insufficient food and food storage, lack of negotiation power by smallholder producers (especially GA producers, more particularly women and youth).

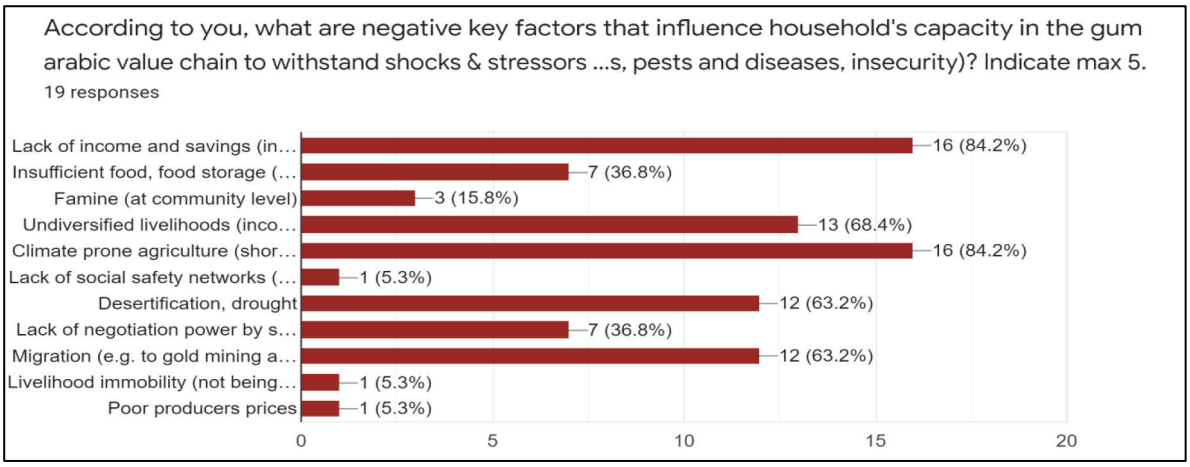


Figure 11 *Key negative factors (CoP survey).*

5.5 Resilience capacity

The average Resilience Capacity Index (RCI) in the surveyed areas is estimated at 56. There is a disparity in terms of resilience capacity, between male and female headed household and between different areas. Male headed households (RCI=57) are more resilient than female headed households (RCI=51.7). Households in El Daein (RCI=65.4) and Rural El Fasher (RCI=65.8) have the highest resilience capacity while households in Tweisha (RCI=50.2) have the least (RIMA, 2020).

Table 5 *RCI and Income disaggregated by beneficiary and non-beneficiary.*

Indicator	Beneficiary	Non-beneficiary	Overall value
RCI	56.1	55.9	56
Total annual income (USD) (median)	1176	1066	1122

Source: RIMA, 2020.

In order to understand the extent to which the FNS REPRO has influenced all these aforementioned indicators, a mid-line or end-line dataset is required so that the change in these indicators can be estimated and attributed to the current project.

There are a variety of strategies for adaptation and survival:

- Food and nutrition: "…The household strategies include reliance on less preferred and/or less expensive food, limited portion size, reduction of meals eaten per day, restricted consumption and borrow food from friend or relatives. Poor people who neither have livestock or the ability to migrate to other states, are obliged to reduce the quality and quantity of their daily food consumption and/or borrow money from traders to be repaid in kind by working as agriculture labour – especially in the groundnut sector the next season". *(*Mohamedain, 2020).
- Migration: "… When agriculture productivity is very low, many people rely on internal migration to Ed Daein to sustain their livelihoods by performing non-skilled labour (e.g. brick industry, transportation and petty trade mostly). Others migrate to oil rich areas in Darfur or to Kurdufan to work in the mining and oil sectors. Like in North Darfur, this coping strategy is particularly practiced by youth." (Sudan multi-disciplinary context analysis, 2020).
- Selling: "…People who cannot afford to migrate and are not wealthy enough to own livestock might sell their productive assets." (Sudan multi-disciplinary context analysis, 2020).
- Tree cutting: "In addition, cutting of productive trees for energy needs is a common practice adopted by communities, particularly during periods of stress. When agriculture productivity is very low, to sustain their livelihoods, women, who usually do not migrate, rely heavily on collection of dead wood, crop residues and water as well as petty trade (tea selling and/or pottery production)". (Sudan multi-disciplinary context analysis report, 2020).

The Sudan Community of Practice (CoP) further identified resilience capacities that households within the gum Arabic value chain need to deal with recurring shocks and stressors (Figure 12). These can be summarized into the following capacities:

- Human Capacities: Post-harvesting activities. A lot of value is lost because of poor post-harvest practices as GA becomes contaminated and loses weight thus value.
- Financial Capacities: Lacking access to finance, investments and savings.
- Natural Capacities: Access to land a is challenge. No land tenure systems or land rights for producers in place. Reduced water sources (for drinking and cooking).
- Physical Capacities: Lack of proper tools to produce GA. Lack of infrastructure to support GA trading and market access.

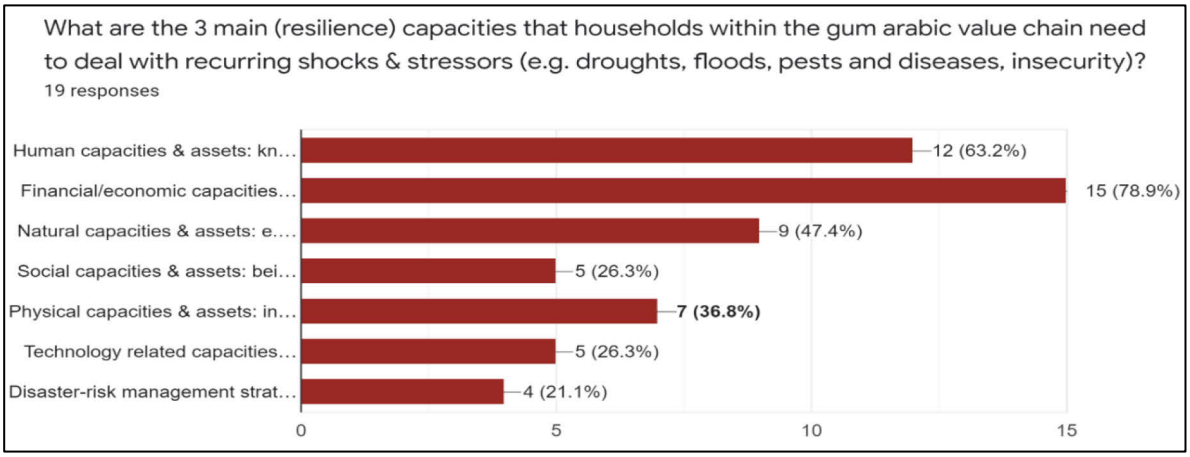


Figure 12 *Key resilience capacities of households (CoP Survey).*

Figure 13 shows the 3D resilience framework applied to Sudan context. According to Bene et al. (2012), "The salient point of the framework is the fact that resilience emerges as the result not of one but all of these three capacities: absorptive, adaptive and transformative capacities, each of them leading to different outcomes: persistence, incremental adjustment, or transformational responses. It also suggests that these different responses can be linked (at least conceptually) to various intensities of shock or change. The lower the intensity of the initial shock, the more likely the household (or individual, or community, or system) will be able to resist it effectively, i.e. to absorb its impacts without consequences for its function, status, or state".

	Absorptive coping capacity	**Adaptive capacity**	**Transformative Capacity**
Positive	• Gathering of wild fruit consumption • Moving livestock away from drought affected areas	• replanting and management of gum-producing trees • Partial herd destocking in times of crisis • Migrating abroad for increased employment opportunities	• Water management for floods • Investing in the Desert Locust Control Organization for eastern Africa • Establishment of community conflict mediation groups
Negative	• cutting gum-producing trees for charcoal • Reducing household food intake • Saving grain storages beyond expiration date	• Switching livelihood strategies towards war-economy • Fencing of grazing or agricultural land creating enclosures • Over cropping or mono culture exacerbating land degradation	

Figure 13 *The 3D Resilience Framework.*
Source: Thesis Report – Luuk Van dem Ham, adapted from Béné, et al., 2012.

5.6 Capital assets of households

The different types of livelihood capital assets that gum Arabic producers have to increase the resilience of their livelihoods are described below.

Social capital: This concerns social networks and assets available to the household in times of difficulty, such as the ability to rely on familial and community networks. "Approximately 27% of the households have a household member belonging to at least one community network/group. The three main networks in the study area are gum Arabic producer's association (14.5%), women groups (5.4%) and youth groups (5%)". (RIMA, 2020).

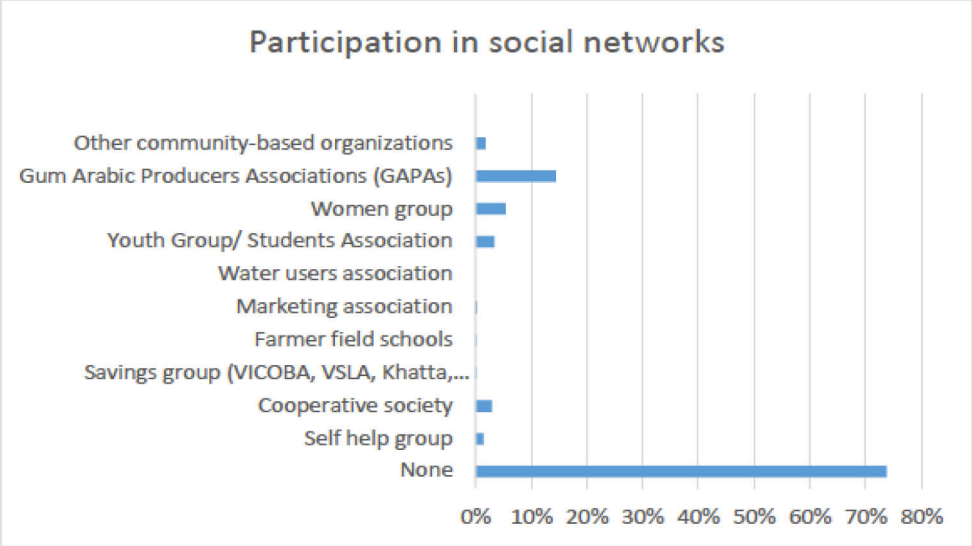


Figure 14 *Social Networks and associations.*
Source: Sudan RIMA baseline report, 2020.

Physical capital: This concerns livestock assets, access to productive tools, etc. Access to assets increases the household's ability to manage and mitigate against assorted shocks (including drought, conflict, etc.) as well as help in smoothing consumption during such periods. Figure 15 presents the agricultural tools owned by households. Furthermore, according to the RIMA report, "Over 94% of the households in the project area involved in gum Arabic production, use Sonki as a tool to tap gum Arabic and the same proportion do not use protective gear while undertaking the tapping".

Figure 16 presents livestock ownership and average number of livestock species owned per household.

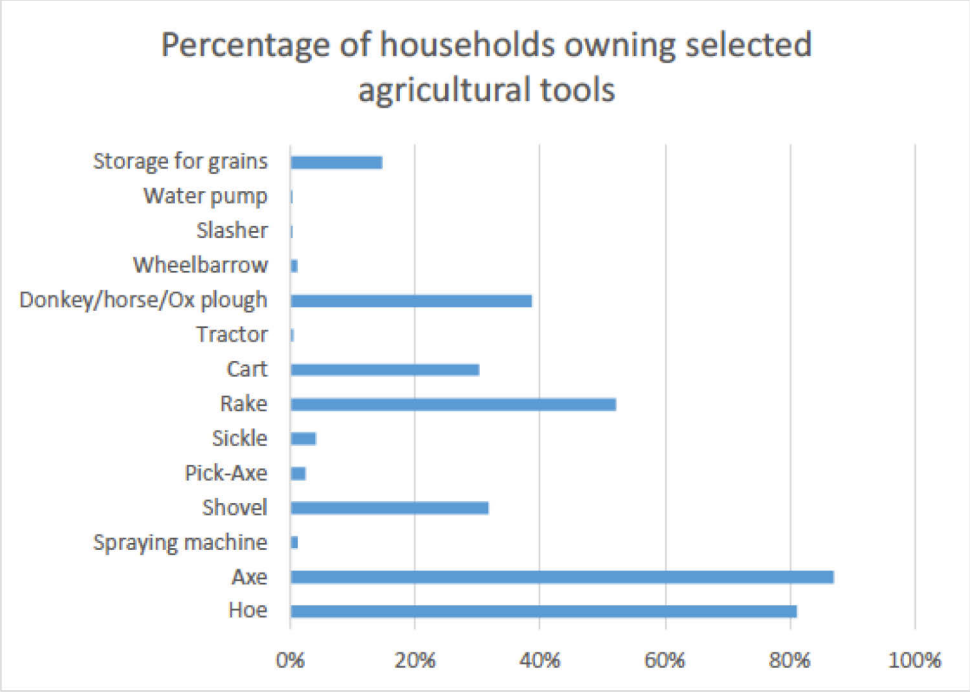


Figure 15 *Agricultural tools owned by households.*
Source: Sudan RIMA baseline report, 2020.

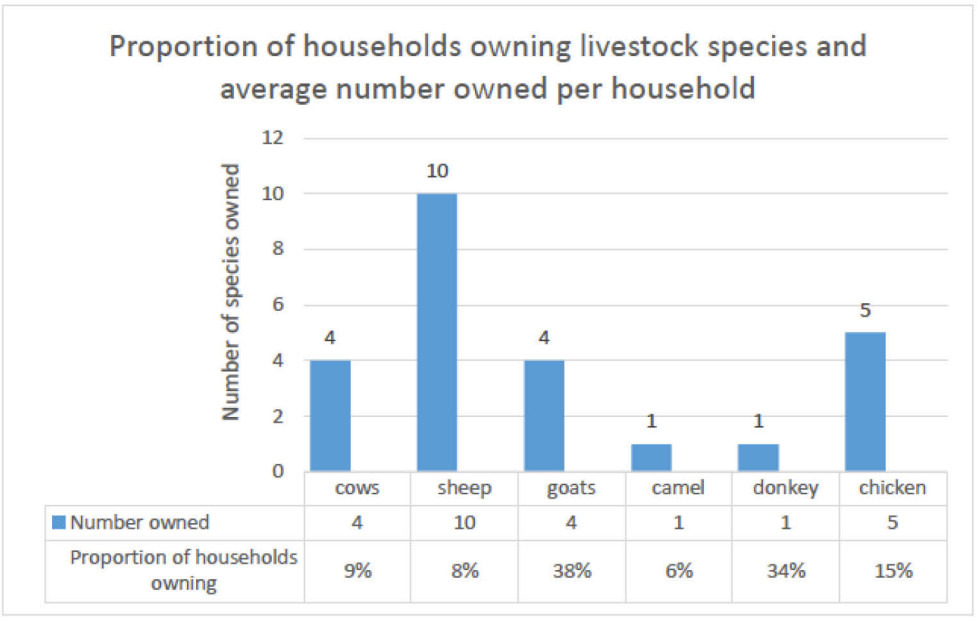


Figure 16 *Summary of livestock ownership and average number of livestock owned.*
Source: Sudan RIMA baseline report, 2020.

Natural capital: Access to sufficient cultivation and grazing land is important in increasing rural household productivity and diversification of income sources. Table 6 presents the main crops grown in the survey area during summer disaggregated by sex of household head and beneficiary type. "Approximately 93% of households in the study have access to arable land and use it for cropping." As can be seen in Table 6, "the four main crops are groundnuts, millet, sorghum and sesame. Very few households (5%) do crop production in winter and the main crops during that time are millet, sorghum and groundnuts". (RIMA, 2020).

Table 6 *Crops grown in summer by beneficiary type and sex of household head.*

	Beneficiary	Non-beneficiary	Male	Female	Overall
None	6%	5%	4%	13%	6%
Maize	2%	1%	1%	1%	1%
Sorghum	43%	37%	45%	45%	45%
Millet	73%	66%	72%	61%	70%
Rice	1%	1%	2%	0%	1%
Cowpeas	7%	4%	5%	7%	6%
Groundnut	82%	87%	85%	81%	84%
Sesame	45%	38%	43%	37%	42%
Water melon	15%	8%	14%	5%	12%

Source: Sudan RIMA baseline report, 2020.

Financial capital (access to credit):

As can be seen in Figure 17 below, the three main purpose of seeking credit are "purchase of food (86%), access to health care (46%), and purchase of agricultural inputs (15%). The source of the accessed credit was mainly from friends, neighbours and relatives (99%). This is an indication of low access to formal financial services and especially credit". (adapted from RIMA, 2020).

Similarly, as seen in Table 7, "Approximately 39% of households reported to have accessed some form of credit in the last three months preceding the survey". While only 3% have access to a bank. From this evidence, it can be concluded that increasing household's access to financial services would go a long way to improve well-being and provide an avenue to escape from poverty. (adapted from RIMA, 2020).

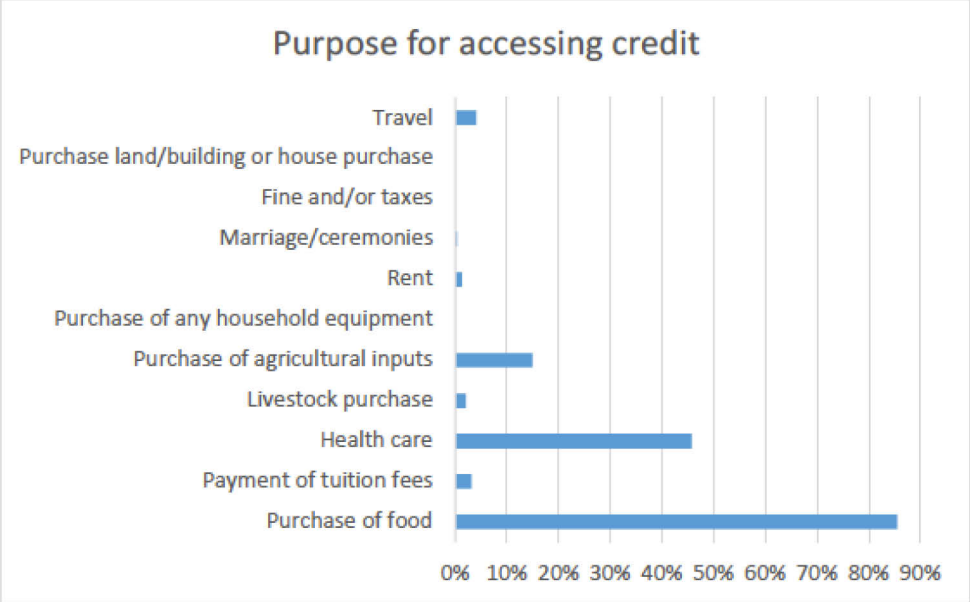


Figure 17 *Main purpose of accessing credit.*
Source: Sudan RIMA baseline report, 2020.

Table 7 *Access to transfer, credit, banking services and number of social networks engaged in.*

	Male headed (%)	Female headed (%)	Non-benenficiaries (%)	Beneficiaries (%)	Total (%)
Access to informal transfers	8	13	7	10	9
Access to formal transfers	58	59	31	77	58
Number of association	32	25	21	37	30
Access to credit	37	48	37	40	39
Access to bank	4	1	4	3	3

Source: Sudan RIMA baseline report, 2020.

6 Gum Arabic Value Chain

Summary: There are various factors influencing the participation in value chain activities by different segments of the population and population groups. These range from government policies to the control of gum-producing forested areas by tribal leaders, and village traders with access to markets and market information, and town traders with access to credit and knowledge on export requirements. The Forests National Corporation (FNC) charges traders' fees and royalties for gum transport and Government offices charge taxes and other local duties. The producers seem to pull the short straw as they have no property rights and no access to credit to invest in gum production. Their participation is mainly limited by poor agricultural practices, pests and plant diseases, high prices for agricultural inputs, low access to technical assistance and many more factors, which is further explained below.

6.1 Gum Arabic production overview

The RIMA report (2020) provides an overview of GA production in Sudan:

"Approximately 22.7% of the households reported to have at least one member of the household involved in gum Arabic production in the last 12 months and majority of these households are in North Darfur. Of these households involved in gum Arabic production, 10% are female-headed households. The median household land under Hashab tree/Acacia trees is 10 Mukhamas. Among the households involved in gum Arabic production, 44% reported to be mixing the production of gum Arabic with other crops. Approximately 21% of households accessed gum Arabic market information in the last 12 months. All the households surveyed in the project area sell the gum Arabic produced as independent traders; none sells through registered cooperative groups". (RIMA, 2020).

Poor Agricultural practices

- No conservation agriculture practices were reported.
- No intercropping methods of agroforestry were reported. The only exception is Kalimado locality where agroforestry systems (GA and water melon seeds) were observed (Sani Karaw).
- Use of chemical or organic fertilizers was not reported.
- The horizonal expansion of agriculture land is proceeding in an unsustainable way putting additional pressure on the already precarious livelihoods of communities (adapted from RIMA, 2020).

Challenges in crop production

Table 8 below presents challenges faced by households while undertaking crop production in the survey area. The main challenges are pests and plant diseases, high prices of agricultural inputs, low availability of agricultural inputs and lack of labour (adapted from RIMA, 2020).

Table 8 *Challenges in crop production disaggregated by beneficiary type and sex of household head.*

	Beneficiary	Non-beneficiary	Male	Female	Overall
Pests and plant diseases	72%	81%	76%	75%	76%
Low availability of agricultural inputs	27%	29%	28%	27%	28%
Too high prices of agricultural inputs	48%	50%	49%	50%	49%
Lack of labour	28%	29%	30%	22%	28%
Low access to technical assistance services	13%	9%	11%	16%	12%
Too much rain	3%	5%	3%	6%	4%
Too little rain	13%	7%	11%	9%	11%
Untimely rain	1%	0%	1%	1%	1%
Poor roads	1%	0%	1%	1%	1%
Poor soil fertility	12%	10%	10%	18%	11%
Bush Fire	1%	2%	1%	1%	1%
Area of small size	7%	9%	8%	9%	8%
Insecurity/conflict	0%	0%	0%	0%	0%

Source: Sudan RIMA baseline report, 2020.

6.2 Factors influencing participation in value chain activities

According to the study, 'Gum Arabic in Sudan: An Analysis of the Value Chain' (Hassan, 2017), the key factor affecting Sudan's Gum Arabic sector "has been the national government policy for the product, particularly the domestic marketing arrangements and pricing. Low prices encouraged cross-border smuggling of Gum Arabic, especially from Darfur to Chad. In 2009, the Government of Sudan liberalized trade in Gum Arabic and committed to abolishing the export monopoly held by Gum Arabic Company (GAC). This liberalization had an immediate positive impact on producer prices". (Hassan, 2017).

Benefits in the Gum Arabic value chain (see Adam, 2016 pg. 28), are derived through access to the natural resources (trees), access to family labour and access to capital and markets. The various groups of actors involved in the Gum Arabic chain use different mechanisms to control and maintain benefits derived from sale of the product, as described below:

- Tribal Leaders: Tribal leaders have direct control over the gum-producing forested areas. They have the traditional right to regulate gum production in terms of allocation of land with trees within the boundary of the village or in the area under their responsibility. This means that they also have the right and the ability to limit access of those who do not belong to their group.
- Producers: Producers who have no property rights gain access to the forest through permits from tribal leaders. The producers establish relationships with village traders, so as to access credit to pay for initial investments in the production process, including food and tools.
- Village traders: Village traders have access to markets and market information. Village traders and middlemen have access to capital in the form of credit from town traders and agents. Traders in most cases borrow money on behalf of producers, and therefore those producers have to sell their products to them.
- Town traders and agents: Town traders and agents have access to capital and have knowledge of the quality requirements of exporters due to their access to exporters and their agents. Higher amounts of capital are invested at the town traders' and agents for cleaning and packing. Town traders use credit arrangement mechanisms and strong social ties with village traders to maintain access to benefits.
- Forests National Corporation (FNC): The FNC charges traders' fees and royalties when they transport gum from rural and urban markets.

- Government offices: The various government offices charge taxes and other local duties like zakat, state fees and truck departure fees (adapted from Adam, 2016).

6.2.1 Key challenges in Gum Arabic value chain participation

The survey undertaken in the CoP showed that the main areas requiring improvement to increase participation in Gum Arabic value chain activities (in order of priority) are:

1. Increasing access to and control over financial resources (gender based);
2. Improving access to and functioning of markets;
3. Improving level of education of all household members (male and female);
4. Improving technical competencies (e.g. in production, processing).

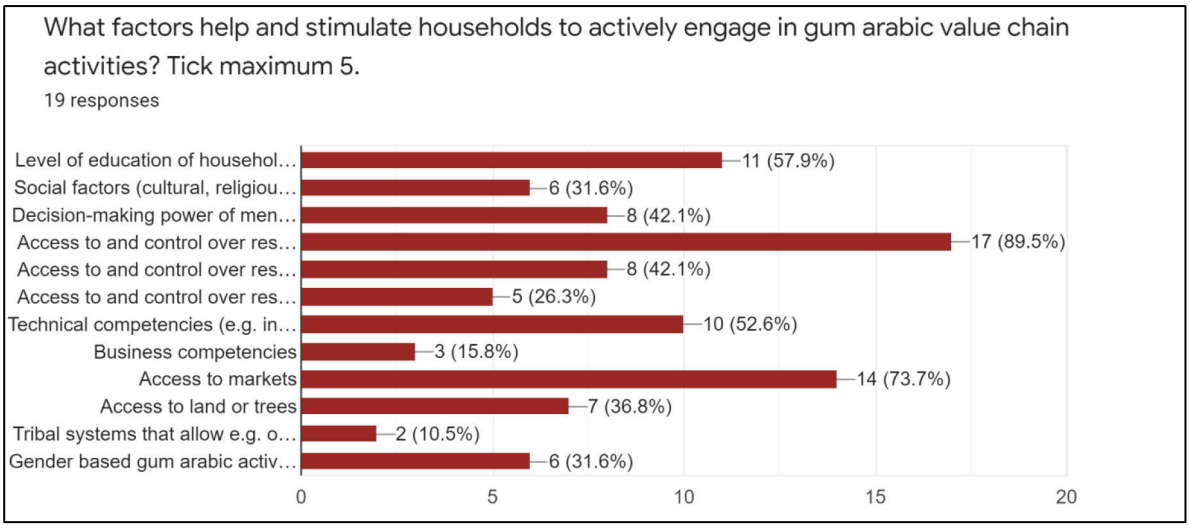


Figure 18 *Factors influencing participation in Gum Arabic value chain activities (CoP survey).*

The Sudan CoP learning also identified the following as key challenges in Gum Arabic value chain participation:

- Decision-making power: Gendered approach to structuring activities. Role of women is underestimated. Men do heavy labour and sales, but women do a lot of the other works. Role of women should be more appreciated.
- Natives / Tribal systems: Unequal access and participation, depending on tribe norms. Powerful tribes dominate lands and do not offer equal access to other tribes. Disparities between groups (creates friction).

6.3 Challenges in relation to production of Gum Arabic

This section deals with the existing needs, preferences and existing capacities of beneficiaries in Sudan, which are the gum Arabic producers. They face challenges and lack capacity in terms of the production as well as processing and marketing of the gum. These are further explained below.

In terms of production, the problem is that producers mostly rely on traditional tapping methods and don't get good returns. "This coupled with improper gum collection, cleaning, grading and storage practices, do not allow gum producers to realize good returns from the gum business. To add to this, there are many middlemen along the gum value chain, who reap more financial benefits than the producers" (Adam, 2016). The RIMA baseline report (2020), also shows that the way gum Arabic is tapped needs improvement: "Over 94% of the households in the project area involved in gum Arabic production, use Sonki as a tool to tap gum Arabic and the same proportion do not use protective gear while undertaking the tapping".

Part of not using the correct tools and practices is lack of training: "Majority of the households (83%) did not receive any training while 15% received training on improved tapping techniques and 7% received training on agroforestry" (see Figure 19). Other studies found that that producers lack training on gum post-handling activities and knowledge and capacities on sustainable gum Arabic production, value-addition and entrepreneurship (see for example, Gum Value Chain Analysis in East Darfur, Sudan).

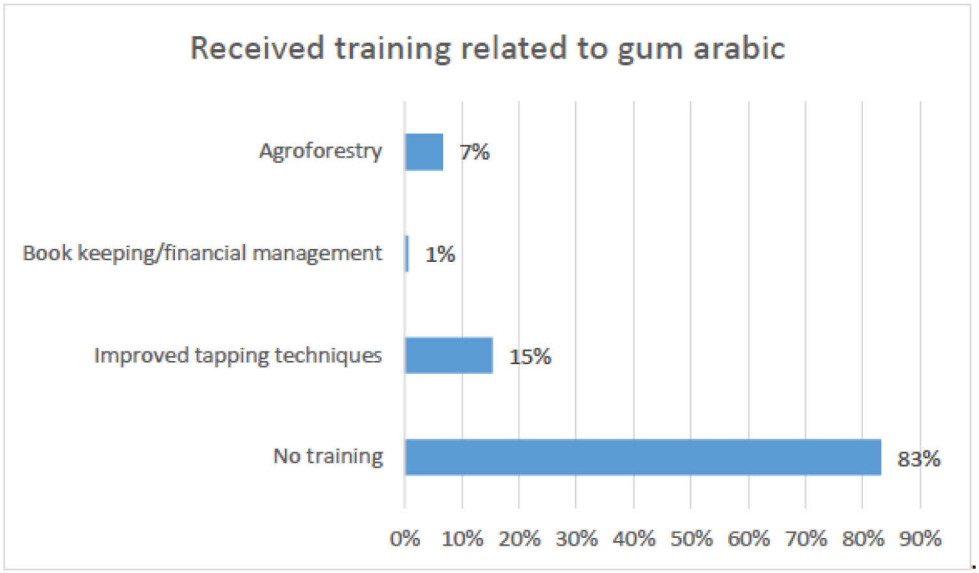


Figure 19 *Received training related to gum Arabic production.*
Source: Sudan RIMA baseline report, 2020.

There are more challenges that gum Arabic producer face. Figure 20 shows the main constraints faced by households involved in gum Arabic production in the last 12 months. The five main constraints are pests and diseases (56%), bush fire (42%), overcutting (24%), theft (20%) and low access to technical assistance (15%), according to the RIMA baseline report (2020).

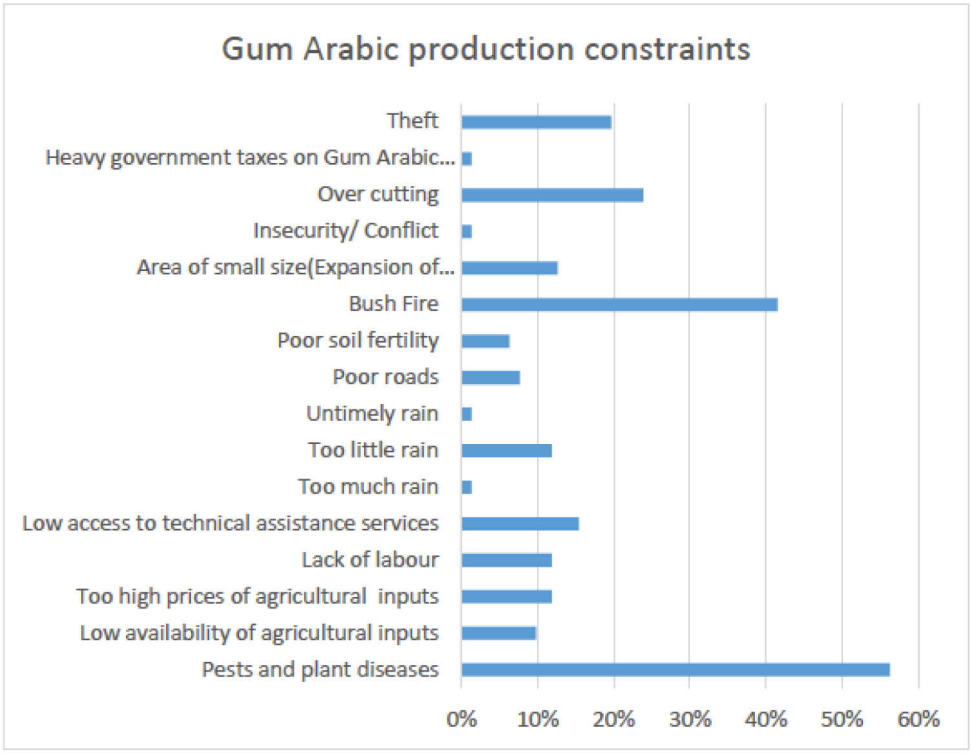


Figure 20 *Gum Arabic production constraints.*
Source: Sudan RIMA baseline report.

The RIMA report further identifies a number of constraints and bottlenecks producers face (Table 9). These include: low gum prices and lack of market information (100 per cent), lack of a producers' organization (95 per cent), lack of financial credit (92 per cent), lack of training on gum tapping and drying (90 per cent) and lack of drinking water (90 per cent), while over three quarters (78 per cent) listed low regeneration capacity of the Hashab tree.

Table 9 *Constraints and bottlenecks, as identified by producers.*

Constraints/bottlenecks	% of producers (n-130)*
Low gum prices	100
Lack of market information	100
Lack of producers organization	95
Lack of financial credit	92
Lack of training on tree tapping and gum cleaning and drying	90
Lack of drinking water	90
Low regeneration capacity of Hashab trees	78
Poor tree resource management	30

* figures add up to more than 100% as each gum producer mentioned multiple constraints and bottlenecks.

Source: Sudan RIMA baseline report, 2020.

Table 10 presents challenges faced by households while undertaking crop production in the survey area. The main challenges are pests and plant diseases, high prices of agricultural inputs, low availability of agricultural inputs and lack of labour (RIMA, 2020).

Table 10 *Challenges in crop production disaggregated by beneficiary type and sex of household head.*

	Beneficiary	Non-beneficiary	Male	Female	Overall
Pests and plant diseases	72%	81%	76%	75%	76%
Low availability of agricultural inputs	27%	29%	28%	27%	28%
Too high prices of agricultural inputs	48%	50%	49%	50%	49%
Lack of labour	28%	29%	30%	22%	28%
Low access to technical assistance services	13%	9%	11%	16%	12%
Too much rain	3%	5%	3%	6%	4%
Too litte rain	13%	7%	11%	9%	11%
Untimely rain	1%	0%	1%	1%	1%
Poor roads	1%	0%	1%	1%	1%
Poor soil fertility	12%	10%	10%	18%	11%
Bush Fire	1%	2%	1%	1%	1%
Area of small size	7%	9%	8%	9%	8%
Insecurity/conflict	0%	0%	0%	0%	0%

Source: Sudan RIMA baseline report, 2020.

In summary, based on the constraints and bottlenecks listed by the gum producers, the basic assets needed by gum producers can be divided into three categories:

- Natural assets (trees, drinking water);
- Human assets (capacity building, skills);
- Financial assets (infrastructure, favourable prices, credit).

6.4 Key needs of households to improve production and income

According to the results obtained from the CoP survey and learning event (Figure 21), the key areas requiring improvement for Gum Arabic production and incomes (in order of priority):

1. Access to drinking and cooking water;
2. Tools and equipment for GA production (e.g. tapping, planting, storing);
3. Development and enforcement of land rights and land tenure systems;
4. Access to finance, credit, loans and investments;
5. Labour force for GA production;
6. Conflict resolution mechanisms (to mediate conflict over land, resources, e.g. farmer and pastoral clashes, land-based conflicts);
7. Training on and documentation of good agricultural practices (e.g. agro-forestry, biodiversity, soil health, gum Arabic production and value addition, etc).

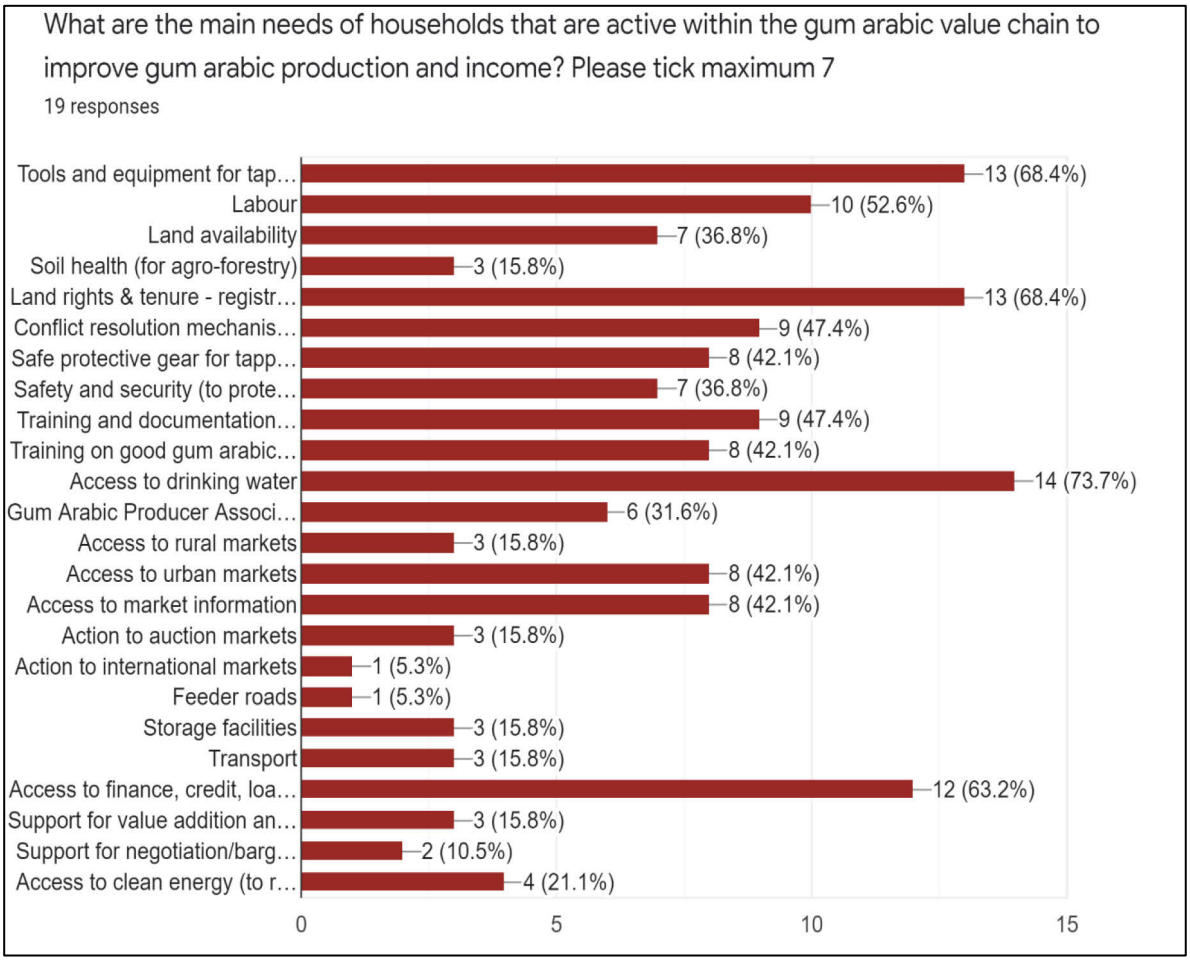


Figure 21 *Main needs of households (CoP survey).*

6.5 Challenges related to marketing & business development

Apart from the challenges related to production, the gum Arabic producers face a series of other challenges, mostly related to marketing and business development. The reports identified the following challenges:

- Limited access to market information: "Approximately 21% of households accessed gum Arabic market information in the last 12 months" (RIMA, 2020).
- Access to credit is another point that needs attention: "If producers were able to get access to credit for their initial investment in gum production, they would have more control over the prices they receive for their product and their profits would increase tremendously" (Adam, 2016).
- Value addition would also need attention: "... value added processing at the local level has high potential to increase the profits of the producers. Primary processing requires training on processing and gum standardization measures, processing and preservation equipment, and access to creditt" (Adam, 2016).
- Gum Arabic producers are poorly organised: "They also lack organization, so do not have the ability to negotiate, as a group, with buyers, and cooperate in terms of, for example, prices, and do not undertake group activities such as sharing the costs of transporting their product to distant markets" (Adam, 2016). "All the households surveyed in the project area sell the gum Arabic produced as independent traders; none sells through registered cooperative groups. However, 42% of these households reported to belong to at least one GAPA" (RIMA, 2020).

6.6 Recommendations for Gum Arabic value chain development

The Gum Arabic Value Chain study (Hassan, 2017) concludes with five major recommendations for upgrading the gum arabic value chain in Sudan:

- "Stimulate innovation and investment in gum arabic tapping tools utilizing design competitions to promote and encourage commercialization of designs made by local artisanal workers.
- Promote research in expanded uses of gum arabic with focus on medical and health-promoting applications capitalizing on emerging scientific evidence that attributes health benefits to gum arabic.
- Support local value addition and export promotion with focus on improving the marketing capacities of Sudanese producers, traders and exporters and linking them with knowledge and trade facilitation resources.
- Support Sudan's interest in two separate Codex specifications by providing technical assistance in the application process and by supporting lobbying at relevant international organizations.
- Improve producers' negotiating position by building the marketing capacities of GAPAs and through facilitating timely access to price and market information". (Hassan, 2017).

The multi-dimensional context analysis in East and North Darfur States (2020), confirmed that integrated actions towards i) inclusive access and management of local natural resources; ii) improved livelihood and income opportunities along the gum Arabic value chain; and iii) enhanced knowledge, skills and capacity of local communities around nutrition-sensitive livelihood support are pivotal dimensions that needs to be enhanced in order to improve the food security and resilience of the target communities.

7 Conflict and Stability

Summary: The RIMA baseline report and the FNS-REPRO Inception report show that over the last years the situation in Sudan has improved in terms of peace and stability. However, there are still conflicts between various actors. These include government, traditional authorities, farmers, animal herders/pastoralists, as well as to some extent traders and money lenders. Interests and motivations vary and include, greed and power, control over natural resources, political influence, tribal/ethnic prejudice and extremism, and finally injustice (Sudan multi-disciplinary context analysis report). It was also reported that land disputes between farmers and pastoralists especially over grazing routes are reportedly on the increase due to Covid-19 restrictions (FAO Covid-19 Conflict Report, 2020). Nevertheless, the current political situation in Sudan presents a good opportunity for furthering peace and stability in the North and East Darfur States. The operational environment in both states is now less securitized, opening space for engagement and collaboration between CBOs, NGOs and local authorities. Local traditional leaders and executive directors from the localities feel less threatened and intimidated by formal security systems and are more willing to advocate on their community's behalf (FNS-REPRO Inception Report, 2020).

7.1 Conflict drivers

Conflict over natural resources (access, ownership and use) predominantly centres around resources such as water and land (evident throughout the communities visited), and to a lesser extent on mineral resources such as oil, in the eastern parts of East Darfur state (Adeela Locality). Land disputes between farmers and pastoralists especially over grazing routes are reportedly on the increase due to Covid-19 restrictions (adapted from FNS-REPRO Inception Report, 2020).

Socio-political conflicts are mostly between tribes and more evident in East Darfur than in North Darfur. These tribal tensions are rooted in recent violent conflicts in the East Darfur state between the Rizegat and the Maaliya (targeting REPRO localities in East Darfur), the Birgid and Rizegat, and the Maaliya and Hamar (adapted from FNS-REPRO Inception Report).

There are differences in terms of conflict drivers in different areas. For example, the three localities (Ad Daein, Abu Karinka and Adeela) in East Darfur share several common characteristics in terms social, economic, natural and environmental factors. Although the major conflicts can be traced back to the near past, the impacts of minor and intermittent conflicts and clashes over time, and whose underlying causes have remained unresolved, has created mistrust, eroded confidence between communities, and spurred the competitive and destructive use of natural resources. Table 11 and 12 summarize the key issues by village (adapted from Sudan multi-disciplinary context analysis report, 2020).

Table 11 *Prevalent conflict causes and drivers across the project locations in East Darfur.*

	Adeela		Abu Karinka		Adaein	
	Adeela	**Sharif**	**Abu Karinka**	**Bakhiet**	**Adaein**	**Al-Jalabi**
Farmland ownership and trespassing	X	X	X	X	X	X
Encroachment on animal migration routes and resting sites			X		X	X
Inequality/marginalization and generational disputes	X	X		X		X
Tribal tensions and affluence			X		X	
Access/availability of water	X	X				
Political and idealogical differences			X		X	
Refugees, IDPs, IDP Returnees and Hot community tensions		X			X	
State boundary tensions and disputes	X	X				
Drugs, Usury and Illicit economic activity		X	X		X	
Use and exploitation of mineral/non-renewable resources	X	X				

Source: Sudan multi-disciplinary context analysis report, 2020.

Table 12 *Prevalent conflict causes and drivers across the project locations in North Darfur.*

	Kalamindo			Tweisha		Al-La'ait	
	Wadaa	**Sani Karaw**	**Gusa Gamat**	**Gabir**	**Eyal Amin**	**Fataha**	**Abu Sufian**
Farmland ownership and trespassing	X	X		X	X	X	X
Encroachment on animal migration routes and resting sites	X		X		X	X	
Inequality/marginalization and generational disputes	X				X		X
Tribal tensions and affluence	X						
Access/availability of water							
Political and idealogical differences	X						
Refugees, IDPs, IDP Returnees and Hot community tensions							
State boundary tensions and disputes							
Drugs, Usury and Illicit economic activity					X	X	X
Use and exploitation of mineral/non-renewable resources							

Source: Sudan multi-disciplinary context analysis report, 2020.

7.2 Peace actors

Different actors can play a role in conflict management. Communities themselves can play an important part. For example "the local traditional authorities who are seen to play a positive role in relation to resolving conflict and are also seen as champions of peace. To a lesser extent, youth and women's leaders were also referenced as peace actors. In the state capitals (Al-Fashir and Adaein), as

well as a few of the neighbouring localities (Ab-Karinka), community-based structures for conflict resolution are also in existence, however there are complaints about the inclusiveness of these structures/mechanisms, especially considering that youth and pastoralists are inadequately represented in their membership" (Sudan multi-disciplinary context analysis report, 2020).

7.3 Key issues related to NRM and Conflict

Conflicts over natural resources (access, ownership and use) predominantly centres around resources such as water and land. One of the main conflict dynamics in the REPRO target localities involve land disputes between farmers and pastoralists especially over grazing routes, land and water sources. Therefore, it is of vital importance to identify the key issues related to NRM & conflict and how REPRO can work together with other civil society actors and community members on the ground, to promote peacebuilding activities to ensure the sustainable management of natural resources (adapted from Ham, 2020).

Relevant components of the food system to improve resilience:
Land tenure: land tenure reform is necessary to reduce the occurrence of conflict and possibly improve farming practices. Insecurity about land ownership causes a lack of sustainable investment in farmland. Land tenure needs to be reformed in order to mitigate the issues caused by the lack of land tenure systems now.
Conflict reduction: this affects amongst others freedom of movement. Many conflicts are about natural resources:

- Management of water resources for equitable access can help reduce conflict.
- Land management in order to improve soil quality, grazing pasture quality and the reduction of desertification, overgrazing and deforestation while simultaneously restoring depleted soil. But also dealing with conflict over land.
- Management of control over mineral resources (especially gold), both to remove power from armed militias and improving safety and security status of people in Darfur.
- Resilience can only be truly achieved through the tackling of agriculturalist-pastoralist tensions which result in conflict and serve as both a direct shock to livelihoods, as well as a continued driver for land degradation and further conflict (adapted from Ham, 2020).

7.4 Expected contribution of FNS-REPRO to the HDP Nexus

The multi-disciplinary context analyses undertaken during the inception phase have informed FNS-REPRO's understanding of the humanitarian, development and peace needs in the target areas. It has also highlighted some of the recommendations that will guide its integration – including conflict sensitive programming. During revision of its results framework, FAO and WUR have further strengthened the FNS-REPRO approach and strategy, to ensure that it will work across the Triple Nexus by:

- Strengthening resilience by linking emergency, development & peace actions more strongly;
- Addressing the drivers of conflict and supporting peaceable outcomes;
- Building inter-clan capacities to understand and address resource-based conflicts
- Simultaneously identifying opportunities to contribute to improved prospects for local peace/conflict prevention (e.g. improving inclusive NRM between groups);
- But at a minimum implementing the programme in a conflict-sensitive way.
- *(FNS-REPRO Inception report, 2020).*

In all target areas, FNS-REPRO will work on *Livelihoods Stabilization* (the "H"), *Economic Growth and Resilient Food Systems* (the "D") and *Conflict Prevention & the Peace Dividend* (the "P").

Example activities for each component of the Nexus include:

Figure 22 *Humanitarian-Development-Peace Nexus.*

Livelihoods stabilization

- Agricultural tools distribution
- Seed and seedling distributions
- Animal feed interventions

Economic growth and resilient food systems

- Commercial fodder and feed production
- Integrated seed sector development
- Contract farming and private sector engagement
- Capacity building for gum arabic cooperatives, producers and upstream value chain actors
- Infrastructure development and rehabilitation (water catchments, storage infrastructure, etc.)
- Communities' engagement on policy & investment
- Pastoral early warning systems

Conflict management and the peace dividend

- Demarcation of livestock corridors and identification of livestock routes
- Community-based rangeland/natural resource management
- Improved availability and use of conflict prevention, management and mediation tools including community dialogues over resource sharing
- (Source: FNS-REPRO Final Report, 2020).

8 Gender disparities

Summary: At this stage we can't see the impact yet on existing power relations and inequalities at household level but can describe the current situation. Nevertheless, there are three types of disparities, based on: area, gender, age and wealth. The RIMA study further revealed that male-headed households are better off than female headed households in regards to the following indicators: income, income sources, wealth index, resilience, food and nutrition security (HDDS & FCS), agricultural assets index, livestock, land, basic services, literacy, and access to education. The CoP survey also indicated that men have the greatest access to and control of resources in gum arabic production. Over time we can review if and how the FNS-REPRO programme has impacted on these disparities.

8.1 Gender based disparities

The RIMA study (2020) shows that there are currently significant differences between male and female headed households in terms of:

- Income: female-headed households have a lower median annual income (USD 760) compared to male-headed households (USD 1208).
- Income sources: male headed households are participating in many income sources compared to female headed households.
- Wealth index: Male headed households have a significantly higher wealth index - this captures key household items.
- Resilience (Resilience Capacity Index = RCI): Male headed households (RCI=57) are more resilient than female headed households (RCI=51.7).
- Household Dietary Diversity Score (HDDS): Male headed households tend to have a higher HDDS compared to female headed households.
- Food Consumption Score (FCS): male headed households have higher FCS compared to female headed households.
- Agricultural assets index: Male headed households have significantly higher agricultural assets index--this captures key agricultural equipment that households have/own.
- Livestock: Male headed households have higher livestock holding than female headed households.
- Land: male headed households cultivated almost double the size of land cultivated by their female counterparts.
- Basic services: male headed households seem to be staying closer to many basic services than female headed households.
- Literacy: a higher proportion of household heads that are male can read and write compared to female household heads.
- Schooling: the cumulative number of years household members have gone to formal schooling is higher for male headed households compare to female ones.

8.2 Area based disparities

We find large variation in households' food insecurity between localities, with rural Kassala having most food insecure households. This may be explained by the variation in monthly income between localities. Furthermore, there is geographic inequity in child malnutrition (a key indicator of food security) as reported in the Multiple Indicator Cluster Survey (MICS) in 2014 which shows that children living in rural areas are most affected by child malnutrition. In Sudan, the prevalence of underweight children is 23.2% in urban areas in comparison to 37.1% in rural areas; 17.4% of children living in rural areas are affected by acute malnutrition in comparison to 13.4% for urban areas. For child stunting, the gap is also high: 43% in rural areas and 27.1% in urban areas. In

Sudan, children are mostly affected by malnutrition in the states affected by conflicts and population displacement: Darfur, Kordofan, and Kassala state, with Kassala having the highest number of children facing malnutrition (adapted from Mohamedain, 2020).

8.3 Wealth based disparities

There are also disparities in terms of wealth. The RIMA baseline report shows that the median annual income of households in the survey area is USD 1,112. Male-headed households earn higher (USD 1208) compared to the female-headed households (USD 760). There is variation in income generated from the main sources disaggregated by household head sex (Table 13). Male-headed households are more dependent on income from crop production, agricultural labour and livestock production/sales while female headed households are more dependent on crop production, agricultural labour and trade/petty trade (RIMA, 2020).

Table 13 *Annual income in USD by sex of household head.*

	Male		Female		Total	
Income source	**Mean**	**N**	**N**	**Median**	**Median**	**N**
Crops	521.27	454	89	271.49	543	452.49
Gum Arabic	253.39	135	15	217.19	150	253.39
Livestock sale & livestock products	217.19	167	24	135.75	191	217.19
Agricultural labour	452.49	297	70	361.99	367	434.39
Skilled labour	579.19	43	11	868.78	54	579.19
Non-skilled labour	483.26	132	21	325.79	153	452.49
Trade/Petty trade	651.58	94	26	624.43	120	633.48
Sale of firewood	217.19	47	13	173.76	60	217.19
Salary (Employment)	841.63	44	10	651.58	54	814.48
Total income	1208.13	542	120	760.18	622	1122.17

Source: Sudan RIMA baseline report, 2020.

8.4 Gender roles and disparities

According to the CoP survey, it can be seen that men are in control of all resources in gum arabic production. However, it is interesting to note that in general, women have slightly more access to resources than male and female youth.

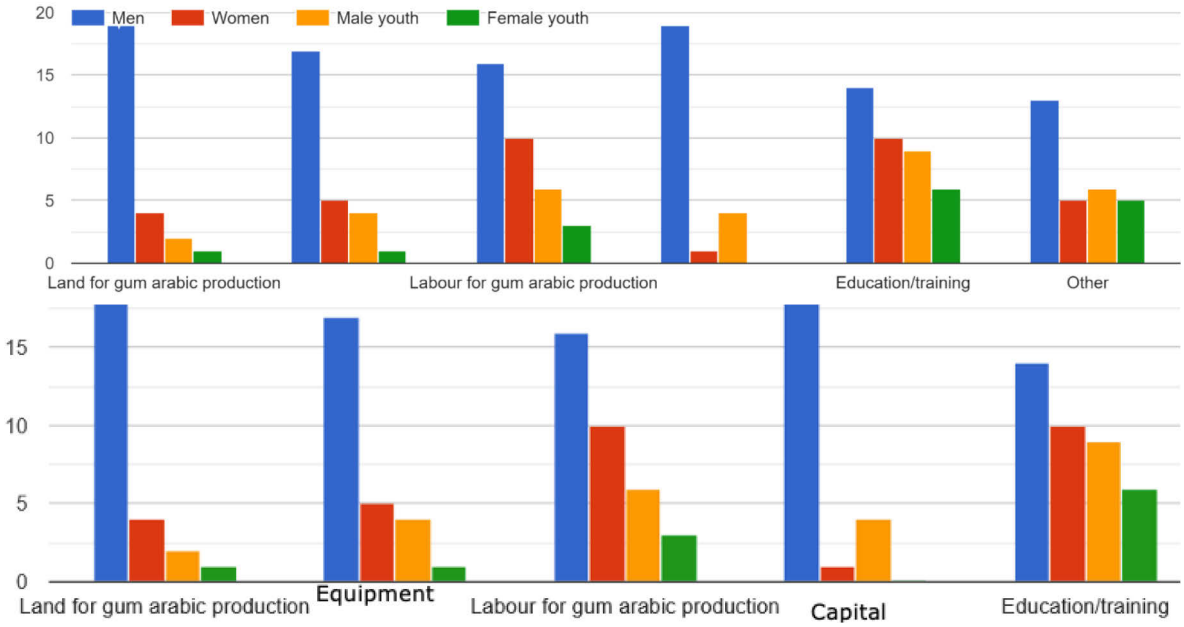


Figure 23 *Access to and control over resources (CoP Survey).*

The following aspects on gender were captured during the Sudan CoP learning event:

- Male youth involved in transport.
- Male and youth involved in marketing.
- Women's main involvement is in the processing of GA.
- No women involved in negotiation and decision-making.
- After the establishment of GAPAs, women are starting to have a more important role.
- Women play a major role in controlling home gardens e.g. okra, tomatoes, cucumbers for household food consumption.
- Women are involved in a non-direct manner as they have other household duties.
- In regards to control over land and capital, women completely disappear.
- Women more involved in producing feed and other (cash) crops.

Women & youth:

- No role in traditional conflict resolution mechanisms.
- Almost no participation in negotiation and decision making processes.
- (Almost) no control over land and capital.
- High youth unemployment in Sudan (around 25%).
- Youth often work as unskilled labor.

Graphs showing the division of labour in the Gum Arabic value chain can be seen in Appendix 5.

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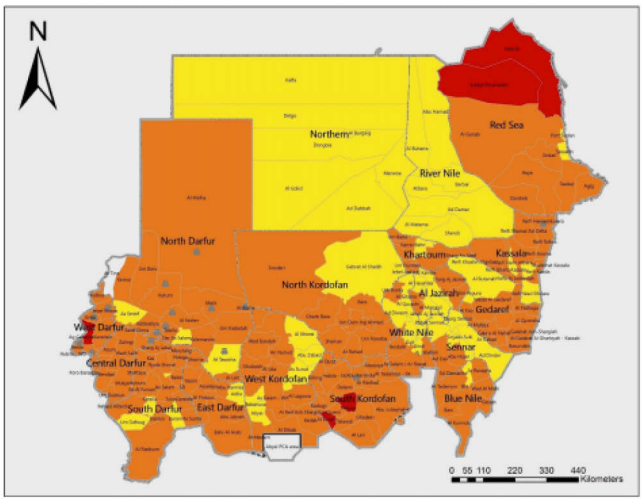
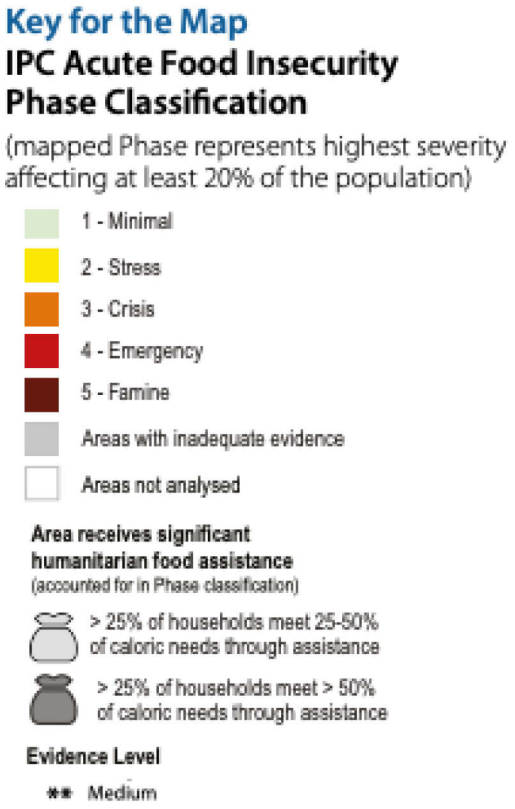
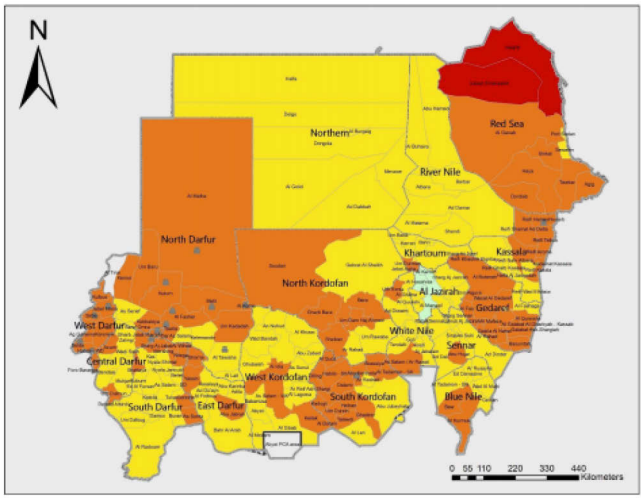
Appendix 1 Sudan IPC Acute Food Insecurity

Current situation map (April - May 2021).

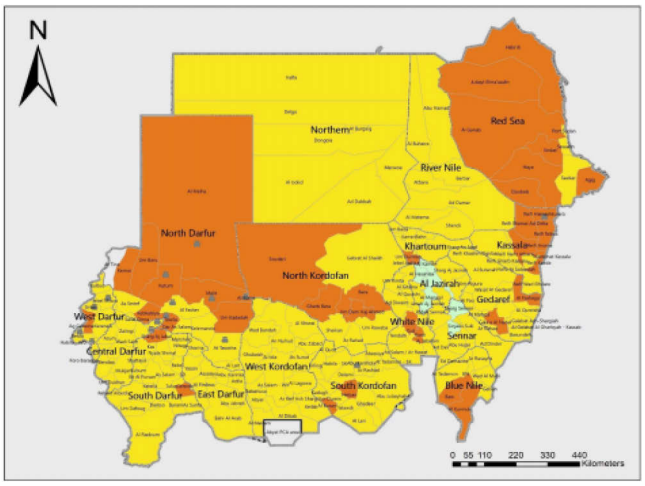




First projection map (June-Sep 2021).



Second projection map (Oct 2021 - Feb 2022).



Source: IPC, 2021.

Appendix 2 Sources of IPC datasets

Name Data Set	Year	Month	Title Data Set	Source (Weblink)
2012-1	2012	8-10	Sudan: Acute Food Insecurity Situation August - October 2012	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/459503/?iso3=SDN
2013-1	2013	2-4	Sudan: Acute Food Insecurity Situation February - April 2013	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1073057/?iso3=SDN
2013-2	2013	8-10	Sudan: Acute Food Insecurity Situation August - October 2013	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/459545/?iso3=SDN
2014-1	2014	5-7	Sudan: Acute Food Insecurity Situation May-July 2014	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/459575/?iso3=SDN
2014-2	2014	8-10	Sudan: Acute Food Insecurity Situation August - October 2014	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/459599/?iso3=SDN
2015-1	2015	4-6	Sudan: Acute Food Insecurity Situation April - June 2015	http://www.ipcinfo.org/ipc-country-analysis/details-map/fr/c/459606/?iso3=SDN
2015-2	2015	2-6	Sudan: Acute Food Insecurity Situation September-November 2015	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/459628/?iso3=SDN
2016-1	2016	4-7	Sudan: Acute Food Insecurity Situation April - July 2016	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/459646/?iso3=SDN
2016-2	2016	10-12	Sudan: Acute Food Insecurity Situation October - December 2016	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/457873/?iso3=SDN
2017-1	2017	4-6	Sudan: Acute Food Insecurity Situation April - June 2017	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1027011/?iso3=SDN
2017-2	2017	10-12	Sudan: Acute Food Insecurity Situation October - December 2017	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1151896/
2018-1	2018	4-7	Sudan: Acute Food Insecurity Situation April - July 2018	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1137790/
2018-2	2018	8-12	Sudan: Acute Food Insecurity Situation October - December 2018	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1151896/
2019-2	2019	6-9	Sudan: Acute Food Insecurity Situation for June - August 2019	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1152151/
2020-1	2020	6-9	Sudan: Acute Food Insecurity Situation for June – _September 2020	http://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1152718/

Appendix 3 Main crop production systems

Crops which contribute the most to people's livelihoods in East Darfur REPRO localities.

Locality	Village	Cash Crop 1	Cash Crop 2	Cash Crop 3	Food crops (family-consumption)
Ed Daein	Jallabi	Groudnut	Gum Arabic	Sesame	1. Millet 2. Sorghum
Ed Daein	Um Dai	Groundnut	Sesame	Roselle Karkade	1. Millet 2. Sorghum
Abu Karinka	Abu Karinka	Groundnut	Sesame	Gum Arabic	1. Millet 2. Sorghum
Abu Karinka	Bakhit	Groundnut	Gum Arabic	Sesame	1. Millet 2. Sorghum
Adeela	Adeela	Groundnut	Roselle Karkade	Sesame	1. Millet 2. Sorghum
Adeela	Sharif	Groundnut	Roselle Karkade	Sesame/Gum Arabic	1. Millet 2. Sorghum

Source: Sudan multi-dimensional context analysis, 2020.

Crops which contribute the most to people's livelihoods in East Darfur REPRO localities.

Locality	Crop 1	Crop 2	Crop 3	Crop 4
Rural El Fasher	Millet	Sorghum	Watermelon seeds	Groundnuts
Um Keddada	Millet	Sorghum	Watermelon seeds	Groundnuts
Kalimando	Millet	Sesame	Sorghum	Groundnuts
Tweisha	Groundnut	Millet	Watermelon seeds	Sesame
Al lait	Groundnut	Millet	Sorghum	Sesame

Source: Sudan multi-dimensional context analysis, 2020.

Appendix 4 Sudan livelihood calendars

Livelihood calendar of REPRO target localities in East Darfur.

ACTIVITY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Summer season												
Rainfall												
Land preparation (all food and cash crops)					HIGH	HIGH						
Cultivation (millet and groundnut)							VERY HIGH	VERY HIGH				
Cultivation (millet)							HIGH	HIGH				
Cultivation (sorghum, sesame, watermelon seeds & Hibiscus)							MEDIUM - HIGH	MEDIUM - HIGH				
Harvesting (all food and cash crops)	HIGH									HIGH	HIGH	HIGH
Gum Arabic tapping*	LOW/MEDIUM	LOW/MEDIUM	LOW/MEDIUM	LOW/MEDIUM							LOW/MEDIUM	LOW/MEDIUM
Winter season												
Land preparation											MINIMAL	MINIMAL
Cultivation (vegetables)	MINIMAL	MINIMAL	MINIMAL									
Harvestig (vegetables)			MINIMAL	MINIMAL								
Animal movments: North to South												
Animal movments: South to North												
Seasonal diseases (Malaria)												
Lean season												
Internal migration to Ed Daein to work as unskileld labour (brick industry mostly)	MEDIUM	HIGH	HIGH	HIGH	MEDIUM							
Youth migration to other states (e.g. Kurdufan) to work in the gold mining sector and/or in oil reach areas in Darfur	MEDIUM	HIGH	HIGH	HIGH	MEDIUM							
Migration to other localities to work as agriculture labor (e.g mostly for groundnut harvesting)											LOW	LOW
Work as livestock sheperds		LOW	LOW	LOW	LOW							
Wood and crop residues collection (moslty women)	HIGH	HIGH	HIGH	HIGH	HIGH							
Petty trades	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW

* Gum Arabic is tapped 6 - 7 times per year, with intervals of approximately 2 weeks from one tapping to the other.

Source: Sudan multi-disciplinary context analysis report, 2020.

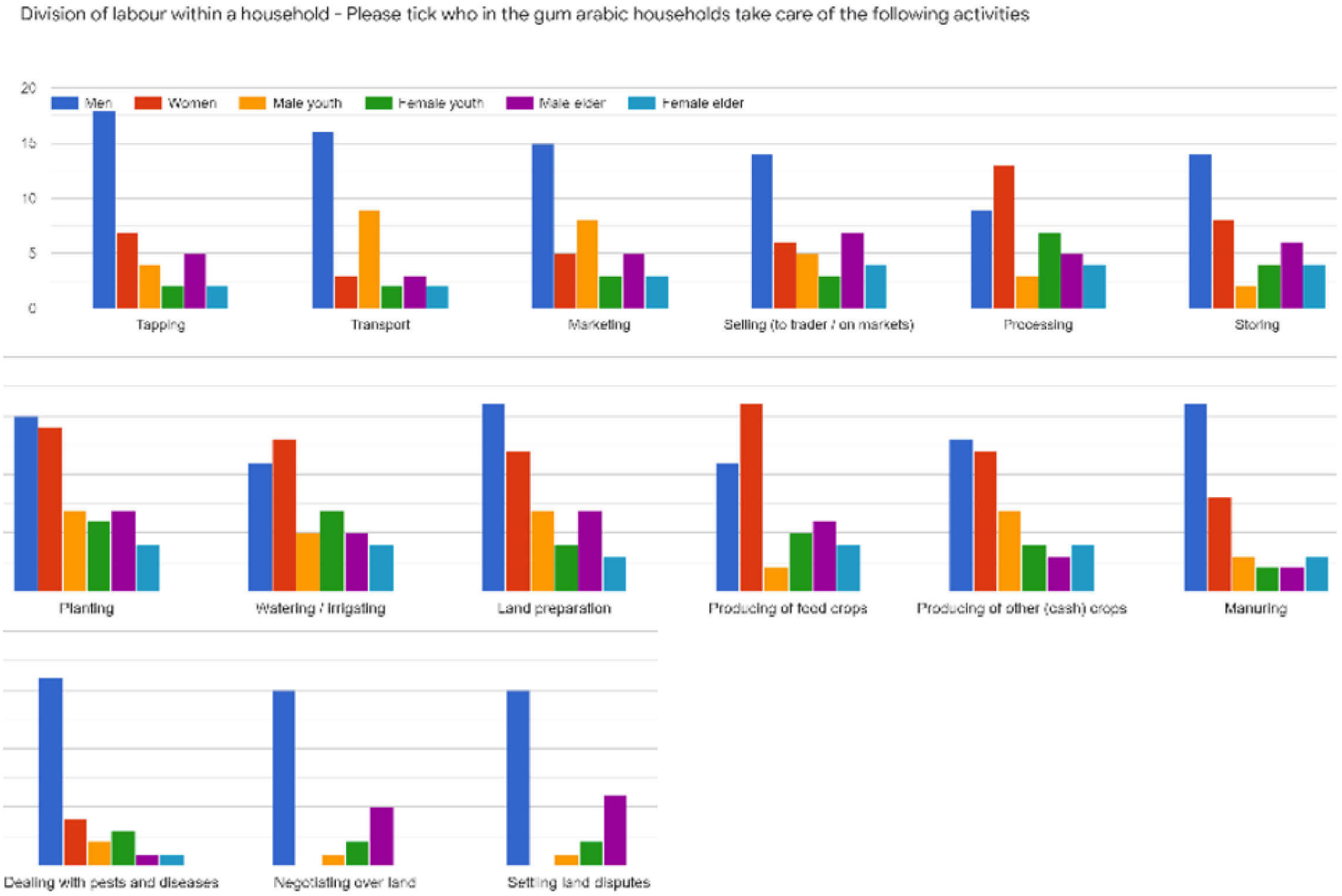
Livelihood calendar of REPRO target localities in North Darfur.

ACTIVITY	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
Summer season												
Rainfall												
Land preparation (all food and cash crops)					HIGH	HIGH						
Cultivation (millet and groundnut)							HIGH	HIGH				
Cultivation (sorghum, sesame, watermelon seeds & Hibiscus)							MEDIUM - HIGH	MEDIUM - HIGH				
Harvesting (all food and cash crops)	HIGH									HIGH	HIGH	HIGH
Gum Arabic tapping*	MEDIUM	MEDIUM	MEDIUM	MEDIUM							MEDIUM	MEDIUM
Winter season												
Land preparation											VERY LOW	VERY LOW
Cultivation (vegetables)	VERY LOW	VERY LOW	VERY LOW									
Harvestig (vegetables)			VERY LOW	VERY LOW								
Animal movments: North to South												
Animal movments: South to North												
Seasonal diseases (Malaria)												
Lean season												
Internal migration to El fasher to work as unskileld labour (men as well as youth)	MEDIUM	HIGH	HIGH	HIGH	MEDIUM							
Youth migration to other states (e.g. Kurdufan) to work in the gold mining sector	MEDIUM	HIGH	HIGH	HIGH	MEDIUM							
Migration to other localities to work as agriculture labor (e.g to Allait for groundnut harvesting)											LOW	LOW
Work as livestock sheperds		LOW	LOW	LOW	LOW							
Wood and crop residues collection (mosity women)	HIGH	HIGH	HIGH	HIGH	HIGH							
Petty trades	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
* Gum Arabic is tapped 6 - 7 times per year, with intervals of approximately 2 weeks from one tapping to the other.												

Source: Sudan multi-disciplinary context analysis report, 2020.

Appendix 5 Division of labour

Division of labour (CoP Survey)



Wageningen Centre for Development Innovation
Wageningen University & Research
P.O. Box 88
6700 AB Wageningen
The Netherlands
T +31 (0)317 48 68 00
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Wageningen Centre for Development Innovation supports value creation by strengthening capacities for sustainable development. As the international expertise and capacity building institute of Wageningen University & Research we bring knowledge into action, with the aim to explore the potential of nature to improve the quality of life. With approximately 30 locations, 6,800 members (6,000 fte) of staff and 12,900 students, Wageningen University & Research is a world leader in its domain. An integral way of working, and cooperation between the exact sciences and the technological and social disciplines are key to its approach.

To explore the potential of nature to improve the quality of life

Wageningen Centre for Development Innovation
Wageningen University & Research
P.O. Box 88
6700 AB Wageningen
The Netherlands
T +31 (0)317 48 68 00
www.wur.eu/cdi

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