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Farming in Crisis: Livelihood Challenges and Resilience in Conflict-Affected Sudan

Insights from the Sudan 2024 Smallholder Farmers Survey

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EXECUTIVE SUMMARY

Sudan's agricultural sector in 2026 is facing unprecedented challenges due to the ongoing conflict, economic instability, and climate-related shocks. These overlapping crises have severely disrupted farming activities, market systems, and rural livelihoods across the country. The situation is particularly critical for smallholder farmers, who form the backbone of Sudan's food production and rural economy.

This report assesses the state of agriculture in conflict-affected Sudan, with a focus on input use, crop production, market access, and farming household-level challenges. It draws data from the Sudan 2024 Smallholder Farmers Survey, conducted across 13 of Sudan's 18 states. The survey covered both the 2023/24 winter cropping season and preparations for the 2024 summer season.

The findings reveal that Sudan's agriculture sector has been severely disrupted by the ongoing conflict. Migration and displacement due to the conflict are reshaping the structure of farming households, while asset losses, reduced cultivated land, and declining livestock holdings undermine their resilience. Household incomes have contracted sharply. Engagement in agricultural activities has dropped, while reliance of farming households on non-agricultural businesses, casual labor, and humanitarian assistance has increased. Food insecurity has reached alarming levels—fewer than one in four households are food secure, while over half are severely food insecure. Food-insecure households are most prevalent in conflict-affected states, such as South Kordofan, North Kordofan, and Blue Nile.

However, improvements were seen in access to input and output markets and the adoption of agricultural inputs in the 2023/24 winter season compared to the 2023 summer season. Farmers reported better availability of improved seed and fertilizer and more reliable input markets and crop-selling channels. However, these gains are overshadowed by growing uncertainty—a large portion of farmers indicated that they did not plan to cultivate crops during the 2024 summer season. Farmer's access to finance and external assistance remained highly constrained. Farming households that used credit primarily relied on informal credit sources. More than three-quarters reported receiving no external assistance in 2024. Where support is available, its distribution remains uneven, with conflict-affected areas facing severe delivery challenges.

Farmers report widespread exposure to both idiosyncratic and covariate shocks such as illness, flooding, theft, and violence—all of which compound their vulnerability. The coping strategies they use include selling household goods, reducing agricultural investment, or liquidating assets. Such choices provide short-term relief but jeopardize their long-term recovery. Perceptions of insecurity remain widespread, particularly in states experiencing active conflict.

Overall, the findings paint a picture of a farming sector under extreme strain in Sudan. Without urgent, state-specific, and conflict-sensitive interventions, rural livelihoods will continue to deteriorate, further threatening national food security. The report concludes with recommendations to strengthen humanitarian support, revitalize agricultural input and finance systems, protect the assets of farming households, restore markets, and invest in building the resilience of farming households to both conflict and climate risks. Tailored interventions are needed to address state-level disparities, including food and security support in the Kordofan region, water and health services in Red Sea and Kassala states,

and agricultural inputs in Aj Jazirah and River Nile. Long-term strategies must also invest in climate-smart agriculture, strengthen social protection systems, and ensure conflict-sensitive approaches that protect farmers and rebuild trust in rural communities.

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1. INTRODUCTION

The ongoing conflict between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) continues to devastate agriculture and food security outcomes across Sudan's 18 states. It has severely disrupted critical infrastructure, public services, and market functionality across Sudan (Abushama et al. 2023; Kirui et al. 2023b; Siddig et al. 2023; Guo et al. 2024; Ahmed et al. 2026). As of 1 December 2025, 11.9 million people had been forcibly displaced, 4.3 million of whom had fled to neighboring countries since the outbreak of the conflict in April 2023 (UNHCR 2025). This mass population displacement has disrupted primary food production, agrifood processing and manufacturing, and food trade. As a consequence, food insecurity among Sudanese households has reached unprecedented levels—45 percent of the population (21.2 million) people face acute levels of food insecurity (IPC 2025).

Even before the start of the current conflict in 2023, the country was economically fragile. Sudan was classified as a low-income nation. An estimated 66 percent of the population lived below the poverty line (AfDB 2024). This widespread and deep poverty posed a serious challenge in its own right, leaving millions highly vulnerable even in times of relative peace.

The conflict has eroded all economic sectors. Its early concentration in Khartoum paralyzed much of the national economy, given the city's central role in production and trade in the country. Many firms based in Khartoum went out of business, while others relocated to other states (Kirui et al. 2023a). The agrifood system was particularly hard hit, with its GDP contribution falling by 21 percent in 2023 relative to pre-conflict levels (Siddig et al. 2023). Agro-processing was also severely disrupted, as Khartoum, which is home to most processing facilities, became a major conflict zone. An estimated 73 percent of food-processing firms permanently or temporarily closed in 2023 after the start of fighting (Kirui et al. 2023a).

Prior to the conflict, Sudan had significant potential in agriculture. The agricultural sector contributed 35 percent of the national GDP and 40 percent of total employment in 2023 (World Bank 2025). However, the sector generally witnessed slow growth, particularly in light of limited political commitment towards enhancing agricultural productivity and agricultural value addition. Despite the sector's importance, the share of government budget allocated annually to agriculture and the implementation of agricultural development strategies remained small (Alhelo et al. 2023). Primary agricultural production, which is primarily conducted by smallholder farmers, typically receives the smallest share of total government expenditure on agriculture. In contrast, large commercial irrigated farming receives significantly higher public investment (World Bank & MOFEP 2016).

Primary agricultural production suffered as the conflict spread in 2023 beyond Khartoum into agriculture-intensive rural states. Many farming households faced severe displacement pressure as a result of the conflict (IFPRI and UNDP 2024). In 2023, 28 percent of farming households were displaced, with half relocating within their own state and the other half moving beyond their state (Kirui et al. 2023b). An earlier rapid farmers survey showed that conflict directly undermined the ability of farmers to adequately prepare for the upcoming planting season. Limited seed reserves and an inability to purchase improved seed and fertilizer were reported by 61 percent of farmers, underscoring the deep constraints facing primary production in a context of conflict (Kirui et al. 2023b).

This report presents findings from the Sudan 2024 Smallholder Farmers Survey, which was conducted in 2024 across 13 of Sudan's 18 states. A sample of 2,101 farming households was surveyed to assess their capacity to plant, harvest, and market crops during the 2023/24 winter season and the 2024 summer season. The survey sheds light on the scale of food insecurity in farming communities and among rural households amid conflict, while also identifying areas of resilience and adaptation that can inform policy design for post-conflict recovery.

The report is organized as follows: an overview of the data is presented in section 2. Section 3 consists of a presentation of key findings on livelihoods and challenges faced by smallholder farmers. Conclusions and policy recommendations to address the urgent food security challenges facing Sudanese agricultural households are presented in section 4.

2. SURVEY IMPLEMENTATION

2.1 Survey design and sampling framework

The Sudan 2024 Smallholder Farmers Survey was designed to assess the evolving conditions of smallholder farmers amid escalating conflict, displacement, and economic instability. The primary objective of the survey was to generate timely data from farming households to inform humanitarian and policy responses to the livelihood challenges arising from the conflict. The survey was implemented using a computer-assisted telephone interviewing (CATI) approach.

The survey was originally designed to target a sample of 4,500 farmers across all 18 states of Sudan. A stratified sampling approach was employed, with quotas allocated by state to ensure geographic representation while allowing for adjustments to field realities. The sampling frame was built from a combination of existing contact databases from previous IFPRI survey engagements, new numbers sourced through local consultants and enumerator networks, and two external vendors. This ensured coverage of both urban and rural farmers across diverse agro-ecological zones.

However, due to widespread disruptions in telecommunications and access constraints, especially in the Darfur region and parts of the Kordofan region, the target was revised downward to 3,465 respondents. Ultimately, 2,110 validated and usable interviews were completed, representing 60.6 percent of the revised target (Table 2-1). Despite falling short of the planned sample, the achieved sample size remains sufficient to provide statistically meaningful insights across the surveyed states.

Table 2-1: Validated interviews for the Sudan 2024 Smallholder Farmer Household Survey, by state

State	Validated	Target	Shortfall
TOTAL	**2,101**	**3,465**	**1,441**
Khartoum	500	621	121
North Kordofan	34	302	268
South Kordofan	102	126	24
West Kordofan	45	270	225
Sennar	77	176	133
Aj Jazirah	179	702	523
Blue Nile	153	176	23
White Nile	111	235	124
Northern	126	113	0
River Nile	185	180	0
Gedaref	248	230	0
Kassala	202	194	0
Red Sea	140	140	0

Source: Authors' compilation.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

To administer the survey questionnaire to sample farming households, telephone numbers for households were randomized and distributed to enumerators. The enumerators attempted multiple callbacks before replacing non-responsive cases. Sampling with replacement was used, and state-level targets were monitored continuously. The final dataset was weighted following standard protocols to ensure representativeness in the analysis.

The survey achieved partial or full coverage across 13 of the 18 states. The five states making up the Darfur region remained inaccessible due to either network failure or security concerns. Gedaref, Kassala, Khartoum, and River Nile states recorded the highest response rates, while others, notably West Kordofan, North Kordofan, and Sennar, experienced significant shortfalls. Table 2-1 presents the state-level breakdown of validated interviews against survey sample design targets.

2.2 Data collection tools and procedures

During the CATI data collection process, enumerators received comprehensive training in survey ethics, CATI protocols, and troubleshooting techniques. The survey questionnaire was available in both Sudanese Arabic and English to ensure that the enumerators could administer it with clarity and consistency. Interviewers followed a strict callback protocol and tracked call disposition for each contact they made. Data collection was managed by a local data collection firm, with robust training protocols and daily monitoring by the research team throughout the process. To safeguard data quality, a multi-layered assurance system was implemented. This included real-time monitoring, post-interview reviews, and verification calls—280 callbacks were conducted to validate responses. A total of 119 interviews were discarded due to non-compliance or critical inconsistencies in questionnaire administration.

Data collection occurred in two main periods in 2024. The first ran from July 29 to August 13, yielding 666 completed interviews. Data collection was paused between August 14 and September 9 due to widespread telecommunications blackouts, particularly in Darfur and

parts of Kordofan, and the exhaustion of all active telephone numbers from previous surveys. During this pause, efforts focused on expanding the contact database to enable the continuation of questionnaire administration. The second phase of data collection resumed on September 10 and continued until November 29, generating an additional 1,382 complete interviews. In summary, 2,101 interviews were completed across both data collection phases, based on over 19,500 call attempts made to 17,219 unique telephone numbers. The large volume of call attempts in both phases underscores the scale of effort required to conduct household surveys effectively under Sudan's complex and disrupted communication environment.

3. KEY FINDINGS FROM THE SUDAN 2024 SMALLHOLDER FARMERS SURVEY

This section presents the core findings from the Sudan 2024 Smallholder Farmers Survey. The survey captures the condition of smallholder farm households across 13 states, providing a comprehensive view of their demographic profiles, livelihood strategies, agricultural practices, and coping mechanisms during a period of heightened instability.

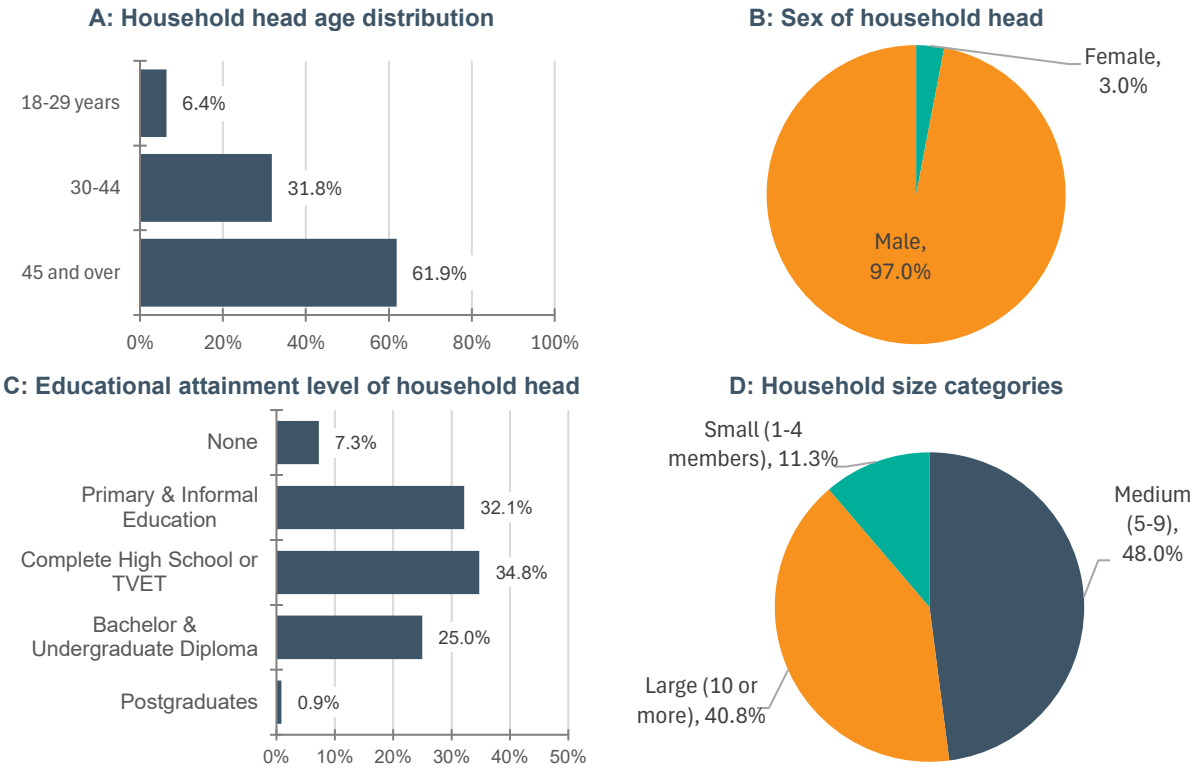
The analysis begins with an overview of household characteristics, including the sex and age distribution of household heads, migration patterns during the conflict, and asset ownership. It then explores household income sources and shifts in livelihood strategies triggered by conflict-related disruptions. Agricultural activities during the 2023/24 winter and 2024 summer seasons are then examined, with attention to crop choices, input use, market access, productivity, and the challenges farmers face in the production and marketing. It also highlights the extent of food insecurity, exposure to shocks, access to assistance, and levels of financial inclusion among the surveyed households. Together, the findings offer critical insights into the resilience and vulnerabilities of Sudanese smallholder farmers in the context of the ongoing conflict. The insights offered by the analysis of the survey data are intended to inform both targeted policy responses and humanitarian interventions.

3.1 Characteristics of farming households in conflict-affected Sudan

3.1.1 Demographic characteristics

The survey reveals that the heads of farming households in Sudan are predominantly male and aging. As shown in Figure 3-1, 97 percent of household heads are male, underscoring persistent gender disparities in land ownership and agricultural leadership in the surveyed states. Age-wise, Sudanese farmers tend to be older—nearly two-thirds of household heads are 45 years or older. This aging trend is common in sub-Saharan Africa (HelpAge International 2014) and has potential adverse implications for the generational renewal of the agricultural workforce. It also raises concerns about the long-term sustainability of smallholder agriculture, particularly amid conflict-related migration and economic shocks.

Figure 3-1: Demographic characteristics of surveyed farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: TVET = "technical and vocational education and training".

In terms of education, over half of the heads of the farming households surveyed completed some form of post-primary education. Compared to other sub-Saharan African countries, these educational attainment figures are relatively high—for instance, 37 percent of heads of farming households in Nigeria and 66 percent in Ethiopia have received no formal education (Kirui & Njiraini 2019). However, it should be recognized that these high educational attainment levels are in part attributable to the nature of our sample, which was collected through CATI, which may have reached a better-educated population. Heads of farming households in Sudan who never attended school can be expected to be less likely to have a telephone.

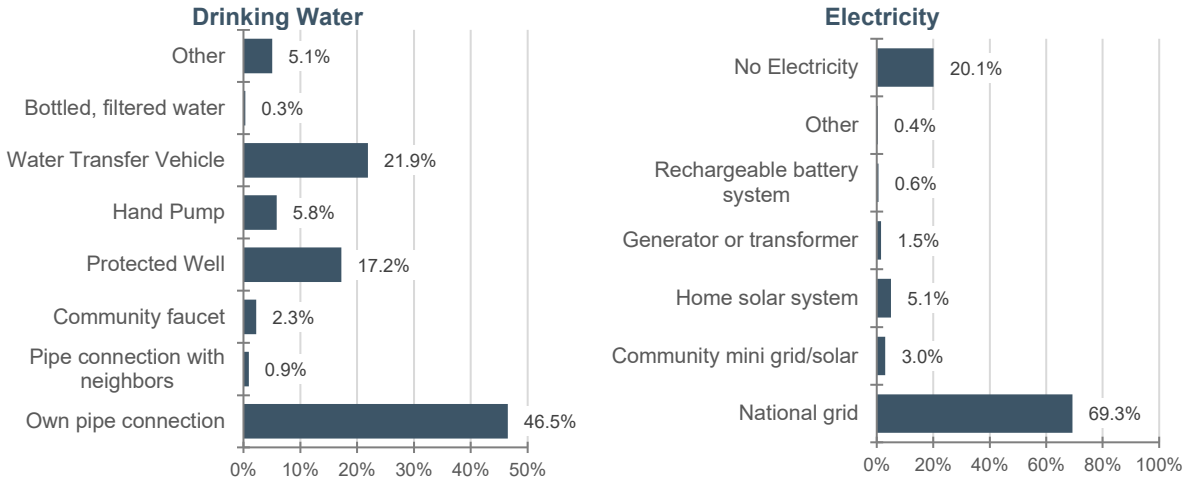
The number of members in a farming household shapes both its labor capacity and vulnerability to food insecurity. As shown in panel D of Figure 3-1, nearly half of the farming households surveyed were medium-sized with between five and nine members, while about 40 percent had 10 or more members. Few reported less than five members. These figures suggest a generally high dependency burden on adults within these households, but also the potential for greater in-house labor supply to sustain their agricultural activities

3.1.2 Access to basic services

As shown in Figure 3-2, nearly half of farming households obtain potable water through piped systems, reflecting the availability of formal or semi-formal infrastructure in many rural areas. About one-sixth of households obtain their water from protected wells. Over one-fifth rely upon water tankers, a costly source, while others reported using bottled water or filtered water. Smaller shares of households rely on hand pumps or community faucets. These

patterns in sources of water for the household highlight persistent vulnerabilities, especially in conflict-affected areas where infrastructure is often compromised.

Figure 3-2: Main sources of drinking water and electricity, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Electricity access is also uneven. Almost 70 percent of households are connected to the national electricity grid, making it the dominant source of power. Yet, one-fifth reported having no access to electricity at all. Among off-grid solutions, solar home systems and community mini-grids are more common than generators or battery-based systems. These patterns in the access of farming households to electricity underscore both the challenge of expanding grid infrastructure in fragile settings and the potential for scaling up renewable off-grid solutions in rural farming communities.

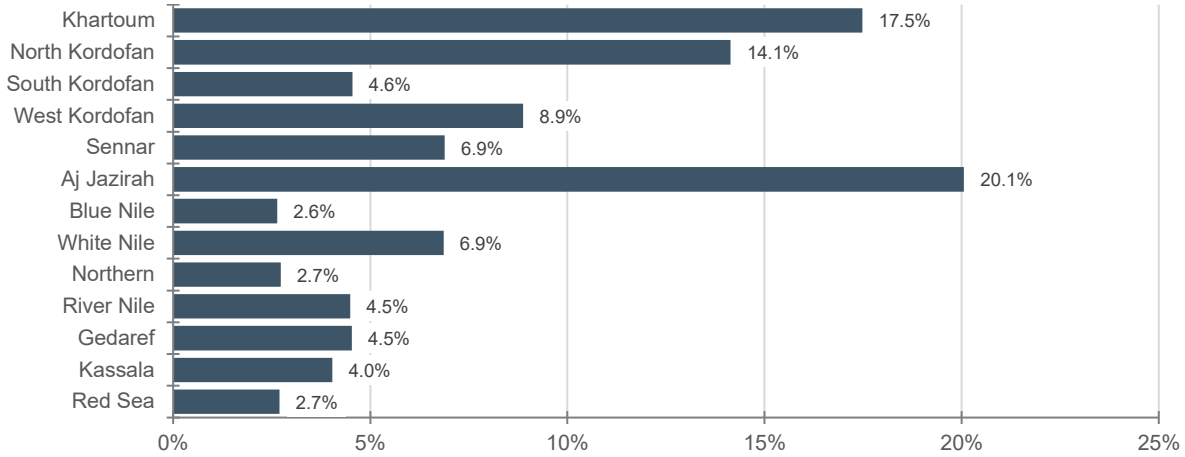
3.2 Conflict-induced outward and inward migration

3.2.1 Out-migration among farming households—trends and destinations

The survey reveals a substantial level of outward migration by farming households in Sudan, driven by the ongoing conflict, with notable variation across states in both incidence and contribution to national displacement. Nationally, 35 percent of farming households surveyed reported that at least one family member had left due to the conflict since the previous survey round. This highlights the scale of social disruption and the mobility pressures facing rural and peri-urban communities across the country.

Figure 3-3 shows the relative contribution of each state to the total out-migration cases reported. Aj Jazirah and Khartoum are the leading contributors, reflecting both their large population bases and direct exposure to the conflict. Aj Jazirah's role as both a refuge and a dispersal hub for displaced people from Khartoum and surrounding areas also explains its prominence. North Kordofan also ranks high for out-migration. In contrast, Northern, Blue Nile, and Red Sea contributed minimally to total out-migration, reflecting their relative safety and more stable conditions.

Figure 3-3: State-level contribution to total conflict-induced outward migration in Sudan reported by farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

The survey not only captures the scale of displacement across Sudan but also offers important insights into where conflict-affected household members are relocating. Understanding these destination patterns—whether migration occurs within the same state, across state lines, or internationally—is necessary for designing responsive policies, anticipating service pressures in host areas, and tracking displacement dynamics over time. Among households reporting out-migration due to conflict, most displaced household members (88 percent) remained within Sudan.

A more granular picture emerges when considering where displaced individuals from each state have relocated. Table 3-1 presents these destination patterns by state of origin, showing the percentage of each state's out-migrants who went to different types of destinations.

Table 3-1: Destinations of outward migration, by state of origin, percentage share of migrant households

State	Within state	To another state	Abroad
Khartoum	51.9	30.1	18.1
North Kordofan	17.7	76.5	5.9
South Kordofan	53.3	40.0	6.7
West Kordofan	58.8	23.5	17.7
Sennar	12.5	87.5	0.0
Aj Jazirah	13.0	82.6	4.4
Blue Nile	26.9	61.5	11.5
White Nile	10.4	72.9	16.7
Northern	10.2	73.5	16.3
River Nile	8.6	74.3	17.1
Gedaref	12.7	74.6	12.7
Kassala	7.3	56.4	36.4
Red Sea	19.5	61.0	19.5

Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The table shows the percentage of displaced individuals from each state who moved to each destination category. The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

In some states, out-migration was predominantly internal within the state. For example, in Khartoum, more than half of the displaced individuals relocated elsewhere within the state—mainly to Omdurman. Such patterns of displacement suggest efforts to escape conflict hotspots without severing ties to local livelihoods, property, or services. Similarly, West Kordofan and South Kordofan showed high internal displacement rates.

In contrast, states such as Sennar, Aj Jazirah, and North Kordofan recorded very high shares of inter-state migration. This likely reflects situations where conflict, economic distress, or destruction extended across wide areas in the states of origin, leaving few safe zones within those states. Additionally, Kassala stands out for its exceptionally high international out-migration, as does Red Sea, which may be due to their proximity to international borders and maritime routes, as well as preexisting migration pathways.

In sum, while most displaced household members remain within national borders, principal destinations vary by state. Migrants originally from states with broad violence or weak absorptive capacity go to other states, while urban centers and border states show complex patterns of internal displacement, regional mobility, and cross-border flows. The findings suggest a need for targeted policy and humanitarian responses that reflect these differentiated mobility dynamics. These might include:

- Scaling up of local support services and protection measures in states with high internal displacement, like Khartoum and West Kordofan.
- Establishing cross-state coordination mechanisms to manage flows from high-sending regions, like Sennar and Aj Jazirah.
- Strengthen international protection and monitoring mechanisms along border states with high rates of cross-border migration, such as Kassala and Red Sea.

3.2.2 Inward migration among farming households—pattern and sources

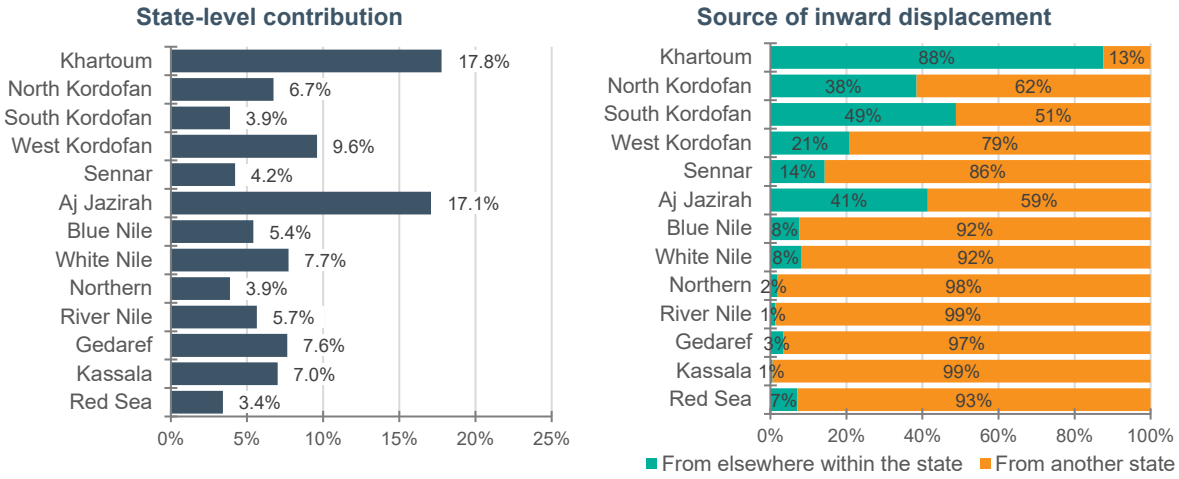
The conflict in Sudan has significantly reshaped rural household structures, with notable regional differences reflecting patterns of violence, displacement, and return. The survey data show that 57 percent of sampled farming households have hosted displaced family members since late 2023, underscoring the widespread nature of forced movement during the war. Most of this migration flows from urban centers—where fighting is more intense—toward rural areas that are perceived as safer.

A closer look at migration sources reveals that displacement often crosses administrative boundaries. Almost 70 percent of the surveyed farming households that reported hosting migrants hosted migrants from other states, while the others hosted migrants who came from within the same state. This highlights the mobility of displaced populations and the role of extended family networks in providing refuge.

States that experienced early or sustained violence—particularly Khartoum and Aj Jazirah—are major contributors to this inward migration. Together, the two states accounted for more than one-third of all reported displaced members (Figure 3-4). However, the dynamics vary within these states. For example, 88 percent of Khartoum's reported inward migration occurred within the state, reflecting intense conflict in central areas of the state where people move across neighborhoods in the urban area rather than across state lines. Aj Jazirah shows a different pattern—over one-third of households surveyed in the state reported

hosting displaced members. As such, the state is both a source and a destination as people move from urban centers to rural zones.

Figure 3-4: State-level contribution to total inward migration and sources of inward migration reported by farming households, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

In contrast, states such as River Nile, Northern, Gedaref, and Kassala primarily host migrants from other states, indicating their role as safer destinations for displaced families.

These results highlight how social safety nets extend across distances, particularly in rural areas. They also signal the need for location-specific approaches to supporting displaced populations and their hosts:

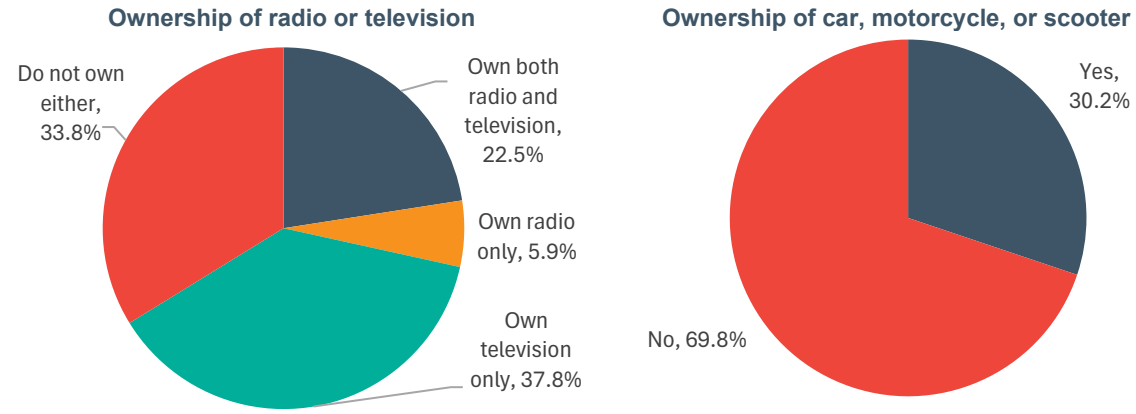
- In states receiving high numbers from elsewhere, interventions should focus on service provision, housing support, and food security.
- In states with high intra-state displacement, efforts should prioritize conflict-sensitive recovery and safe movement within localities, especially in urban or densely populated settings.

3.3 Asset ownership by farming households

3.3.1 Household assets

Among key household assets, ownership of communication devices remains uneven. About one-third of farming households own neither a radio nor a television, which limits their ability to receive critical information, especially agricultural information and information related to conflict escalations (left panel, Figure 3-5). The significant share of farming households that are disconnected in this way raises concerns over the effectiveness of media-based outreach and extension efforts in times of crisis.

Figure 3-5: Ownership of household assets by farming households



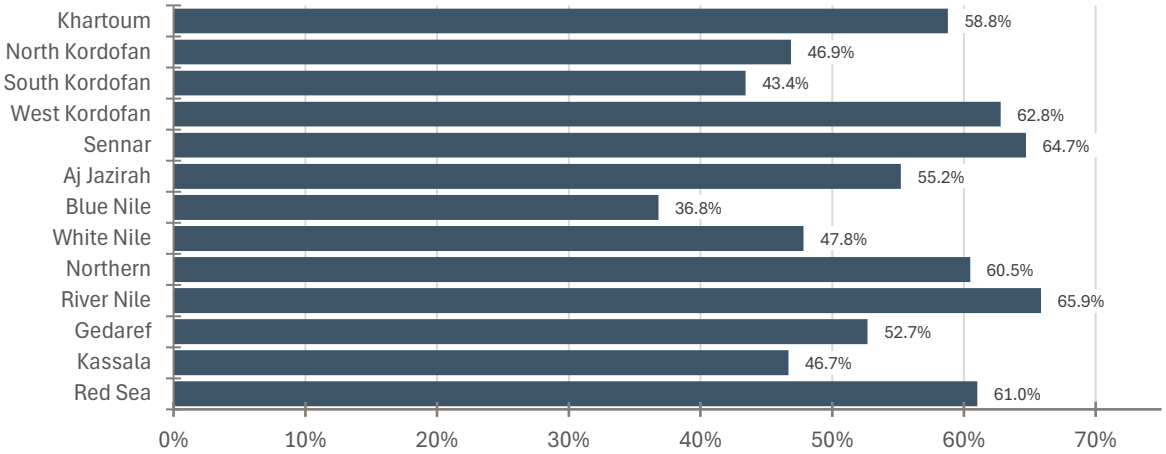
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Mobility is another dimension of household economic resilience (right panel, Figure 3-5). Almost 70 percent of farming households do not own a car, motorcycle, or scooter. This lack of access to personal transport may restrict the ability of farming households to evacuate during conflict, access markets with their farm output, or easily obtain agricultural inputs and services.

3.3.2 Livestock and poultry ownership and losses

Livestock and poultry ownership remain central to farming households' livelihoods across Sudan, serving as a vital source of income diversification, food security, and resilience. Just over half of the farming households surveyed reported owning some form of livestock or poultry. This highlights the critical role of these assets, while also underscoring the vulnerability of the nearly half of farming households without livestock. However, ownership rates are not evenly distributed across the country and vary largely by state (Figure 3-6). These differences underline variation in agro-ecological conditions, market access, and the impact of the conflict. Households in River Nile, Sennar, West Kordofan, Red Sea, and Northern states recorded the highest rates of livestock and poultry ownership by farming households, all above 60 percent.

Figure 3-6: Share of farming households that own livestock or poultry, by state



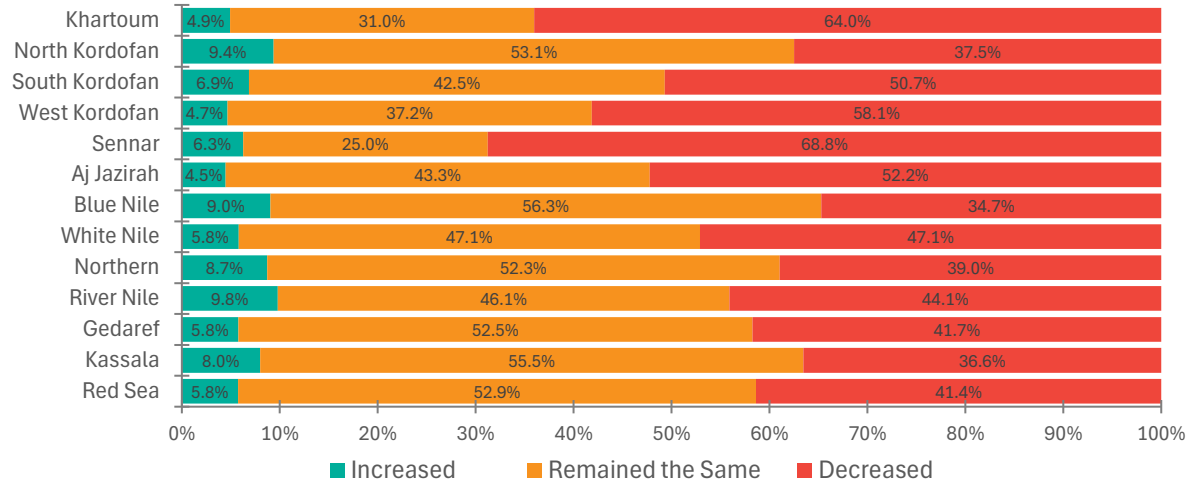
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

In contrast, ownership of livestock and poultry was lowest in Blue Nile, South Kordofan, and Kassala. In Blue Nile state, ownership extends to only about one-third of households. These differences reveal significant geographic differences in resilience capacity—households in high-ownership areas are better positioned to buffer shocks.

Beyond current ownership patterns, the survey also explored changes in livestock holdings since the outbreak of conflict. Across the surveyed states, over half of the farming households surveyed reported a decrease in livestock assets. Only just over 6 percent reported an increase in livestock holdings since the conflict started.

At the state level, the proportion of households reporting a decline in livestock holdings varied significantly (Figure 3-7). The highest rates of decline were observed in Sennar and Khartoum, while farming households in Blue Nile and Kassala reported comparatively lower levels of loss of livestock and poultry. In nearly all states, the share of households reporting losses exceeded those who maintained or increased the livestock and poultry they owned.

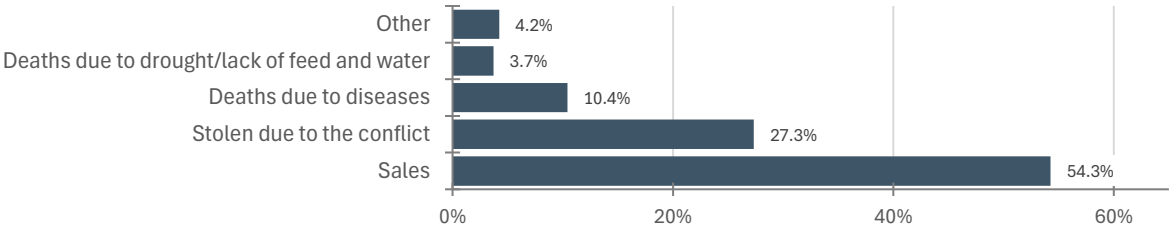
Figure 3-7: Reported change in livestock assets compared to the pre-conflict period, share of farming households that own livestock, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

The primary drivers of these declines provide insight into how the conflict is affecting agricultural livelihood systems. Among households reporting losses in livestock and poultry holdings, just over half reported making distress sales, likely motivated by a need for cash or food or a fear of losing animals to conflict-related insecurity (Figure 3-8). About a quarter reported theft and looting, underscoring the direct impact of violence on rural assets.

Figure 3-8: Main reason for decrease in livestock assets, share of farming households that reported a decrease in their livestock holdings



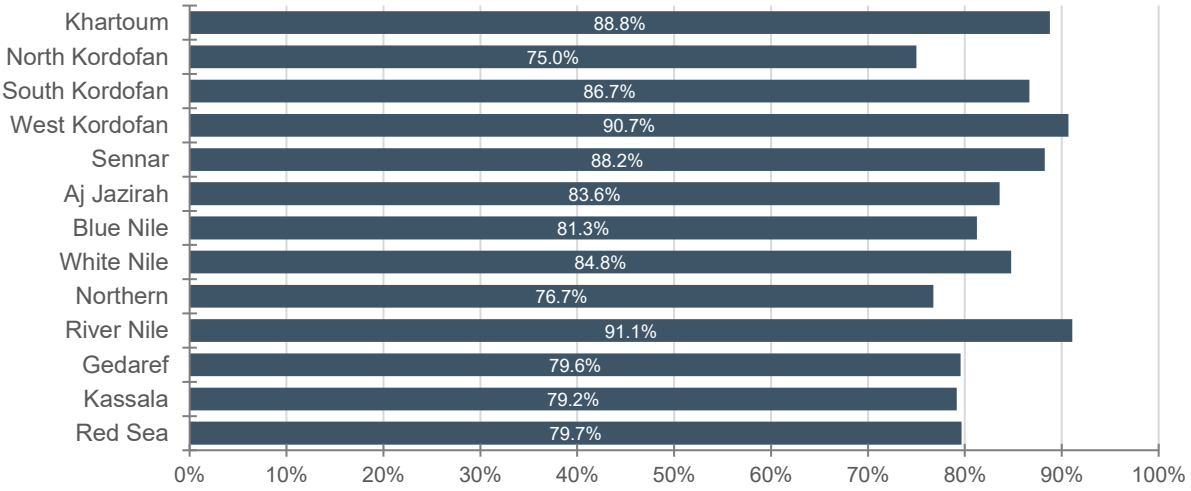
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Overall, these findings confirm that the conflict has eroded the livestock capital of Sudanese farming households both directly through theft, looting, and violence and indirectly through displacement, economic strain, and reduced access to grazing and veterinary services. Programs aiming to support recovery in the livestock sector must therefore consider both restocking and risk mitigation strategies, including protection from theft and other forms of insecurity.

3.3.3 Agricultural land access and tenure

Agricultural land ownership remains a cornerstone of farming livelihoods in Sudan. According to the Sudan 2024 Smallholder Farmers Survey, four-fifths of farming households reported owning some form of land, whether cropland, fishponds, or land for livestock rearing. This asset ownership pattern underscores the centrality of land to rural production systems. Figure 3-9 shows, by state, the distribution of the farming households surveyed that reported owning land.

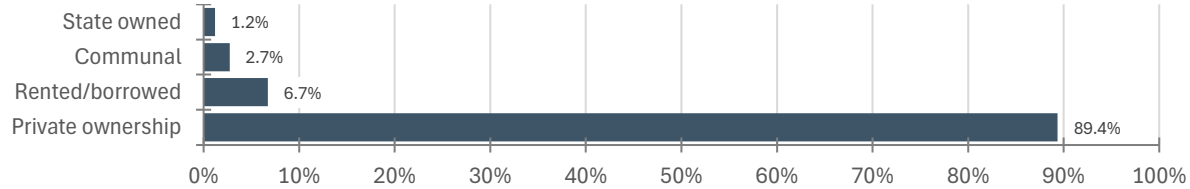
Figure 3-9: Share of farming households surveyed that reported owning agricultural land, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: "Agricultural land" includes cropland, fishponds, and land for livestock rearing.

In terms of tenure security, the vast majority of landowners—almost 90 percent—reported private ownership, suggesting a degree of stability in land rights even amid conflict (Figure 3-10). Much smaller shares of farming households rely on borrowed or rented land, communal arrangements, or state-owned land. Although not common, these non-private arrangements for gaining access to land expose households to heightened risks of dispossession and tenure insecurity.

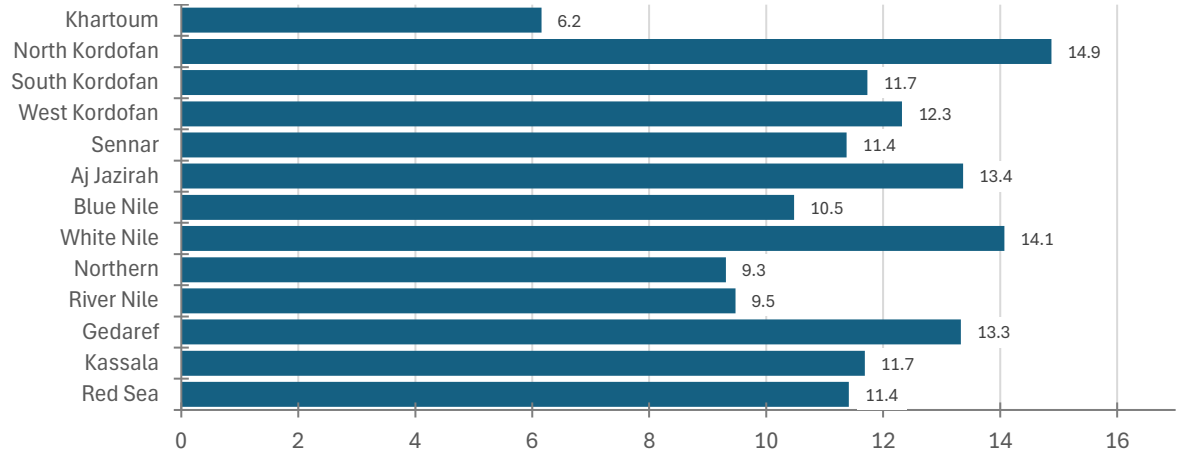
Figure 3-10: Land tenure among farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Average landholding size further underscores differences between states. North Kordofan and White Nile recorded the largest land holdings, averaging 14.9 and 14.1 feddans per household, respectively (Figure 3-11). In contrast, farming households in Khartoum reported an average of just 6.2 feddans, reflecting urban encroachment, land fragmentation, and high population density in the urban state.

Figure 3-11: Average agricultural land owned per farming households, by state, feddans



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: 1.0 feddan = 0.42 hectares. The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

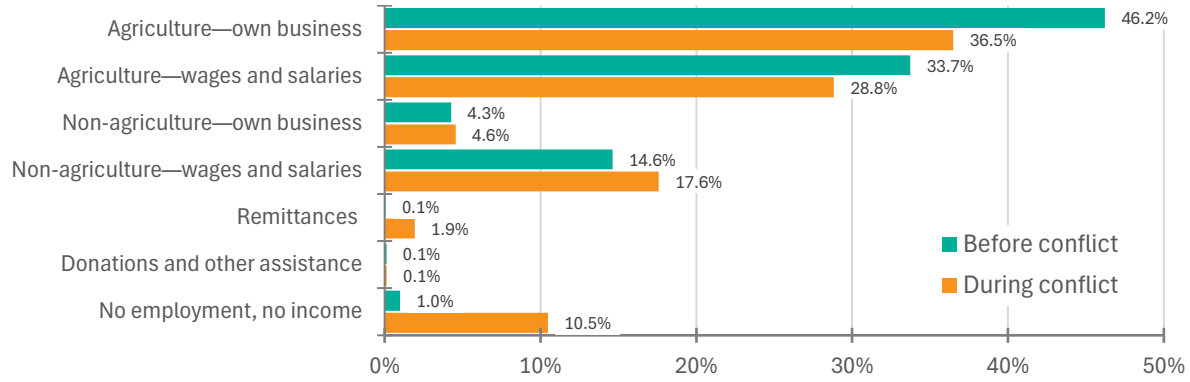
These findings from the survey on agricultural land ownership reinforce the importance of land access in shaping rural livelihoods and productivity. The variation in both the incidence and size of landholdings across states points to the need for location-sensitive agricultural policies and support programs, particularly in states where landlessness is more common or holdings are more limited.

3.4 Livelihood sources and income changes among farming households

3.4.1 Changes in livelihood sources due to conflict

Prior to the start of the conflict in April 2023, most farming households in Sudan relied heavily on agriculture for their livelihoods. Roughly 46 percent were engaged in their own agricultural businesses, while another 34 percent depended on agricultural wages and salaries (Figure 3-12). The conflict has triggered major shifts in engagement in own agricultural businesses, which dropped from 46 percent to 36 percent, while agricultural wage labor declined from 33 percent to 29 percent. Concurrently, participation in non-agricultural businesses and wage employment has increased since the conflict began, indicating a shift away from farming toward alternative income sources. These changes reflect both the disruption of rural livelihoods and the urgent need for households to diversify income sources for survival amid conflict.

Figure 3-12: Main income-generating activities of farming households before and during the conflict, share of farming households



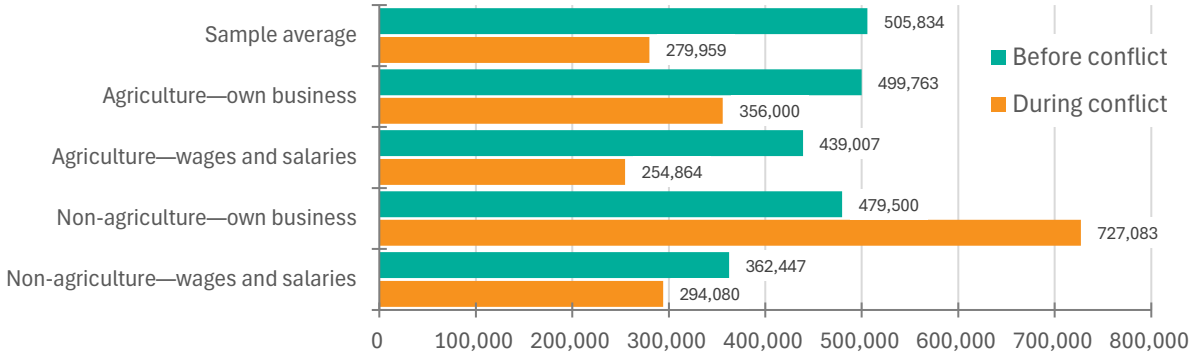
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Although still relatively minor as income sources, dependence on donations, humanitarian assistance, and remittances has noticeably increased during the conflict, underscoring growing reliance on social and humanitarian support networks. More concerning, the share of households reporting no income or employment jumped sharply from almost none before the conflict to over 10 percent during the conflict, highlighting severe economic vulnerability.

3.4.2 Changes in income during the conflict

The income that farming households received from nearly all sources declined sharply during the conflict compared to the pre-conflict period. Average monthly income from own agricultural businesses dropped about 30 percent on average from roughly 500,000 SDG to about 350,000 SDG, while average earnings from agricultural wages and salaries dropped more steeply, from around 440,000 SDG to 255,000 SDG, or about 42 percent (Figure 3-13). These declines align with the reduced participation of households in agricultural income-generating activities.

Figure 3-13: Income levels from various income-generating activities before and during the conflict, SDG



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: In June 2024, 1,000.00 SDG ≈ 0.71 USD compared to 1.70 USD in March 2023.

Although more households turned to non-agricultural wage employment during the conflict, this shift did not translate into higher earnings, likely due to an oversupply of labor spilling over into non-agricultural livelihoods from the disrupted agricultural sectors. However, for non-agricultural business owners, their income increased significantly—from about 480,000 SDG pre-conflict to 727,000 SDG, an increase of 66 percent, during the conflict.

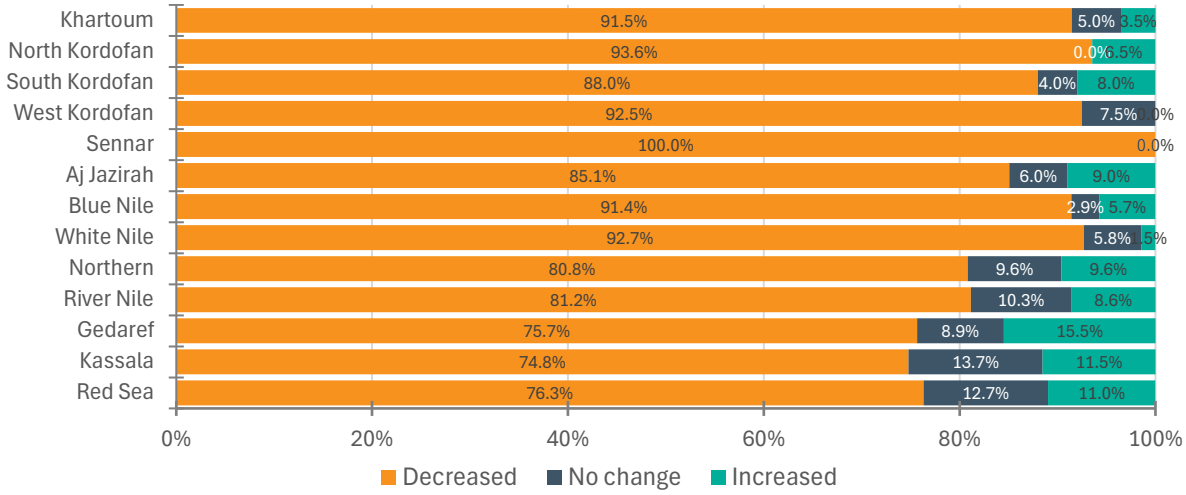
This pattern suggests that self-employment outside agriculture has emerged during the conflict as a relatively more profitable and adaptive livelihood strategy.

3.4.3 Perceived income change during the conflict

At the national level, most (86 percent) of the farming households surveyed reported that their current income had decreased compared to their income before the conflict began, reflecting a widespread perception of economic decline. Only 6 percent perceived an increase in their income. These findings showcase significant financial stress among farming households, likely driven by conflict-related disruptions, declining participation in agricultural income-generating activities, and inflationary pressures on food and non-food items.

In addition to the temporal decline in income, Figure 3-14 highlights at the state-level the income changes farming households perceived since the conflict began. The largest shares of farming households reporting declines in income were in Sennar, North Kordofan, and West Kordofan states. In the other states, large but smaller shares of households reported declines in income levels. These findings emphasize the widespread conflict-induced economic strain facing farming households, while also underscoring the importance of understanding state-level differences.

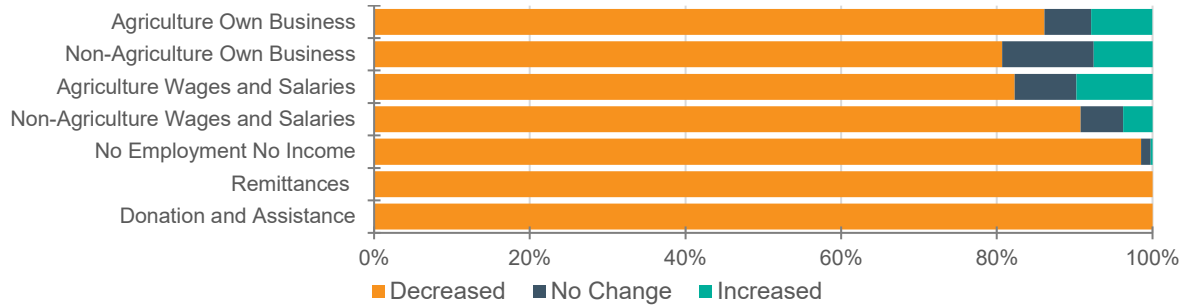
Figure 3-14: Perceptions on income change among farming households during conflict, by state, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

Perceptions on income changes also varied by livelihood activity (Figure 3-15). Households relying on donations, humanitarian assistance, or remittances reported the steepest declines, with no cases of stability or increase. This indicates that many of these households have shifted into dependence after losing their main income sources, with external transfers serving primarily as distress support rather than as a stable or growth-enabling livelihood. This underscores both the depth of livelihood collapse and the heightened vulnerability of transfer-dependent households. Notably, households with no employment or income overwhelmingly reported further deterioration, highlighting the compounded hardships facing the most vulnerable groups.

Figure 3-15: Perceived income change by main income-generating activity, share of farming households



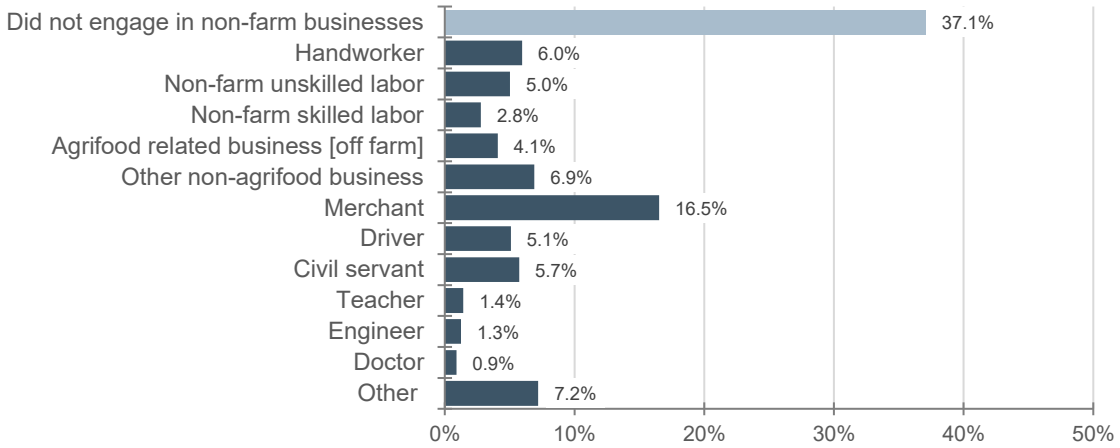
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Among income-generating activities, those engaged in their own businesses in both the non-agricultural and agricultural sectors showed slightly more resilience—while over 80 percent reported declines, about 8 percent noted improvements, suggesting that self-employment provided limited but important adaptive opportunities. By contrast, households depending on non-agricultural wages reported declines of about 90 percent, reflecting the fragility of labor markets in conflict settings.

3.4.4 Participation in non-farm business activities

Figure 3-16 highlights further the types of non-farm activities reported by farmers. The largest share of those engaged in such activities is engaged in trading. Other notable non-farm activities include in the civil service, handworkers, drivers, and unskilled laborers. Very few respondents were involved in skilled or professional occupations such as education, construction, or healthcare, suggesting that most farmers have limited access to skilled employment opportunities.

Figure 3-16: Share of farming households engaged in non-farm business activities



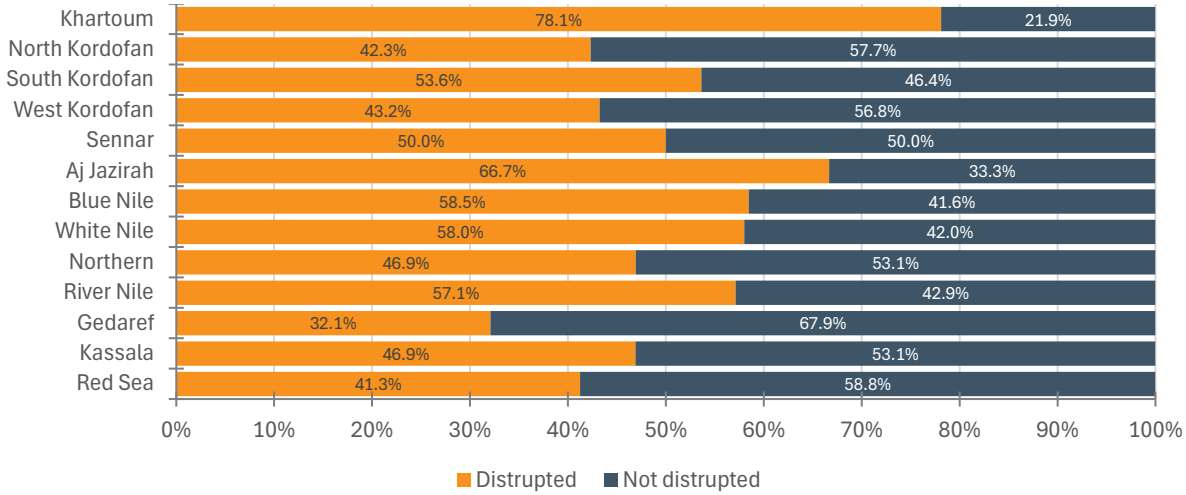
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

3.5 Farming disruptions due to conflict

The 2024 farming household survey highlights significant disruptions to farming activities caused by the conflict. In response to the question, "Was your farming disrupted by the conflict?", three-quarters of respondents reported having experienced disruption. However, this share varies across states, as shown in Figure 3-17. Disruptions were most commonly

reported by farming households in Khartoum, followed by Aj Jazirah. In contrast, farming households in Gedaref and Red Sea states were least likely to report conflict-related disruptions. These findings align with the fact that Khartoum and Aj Jazirah were at the center of the conflict for an extended period.

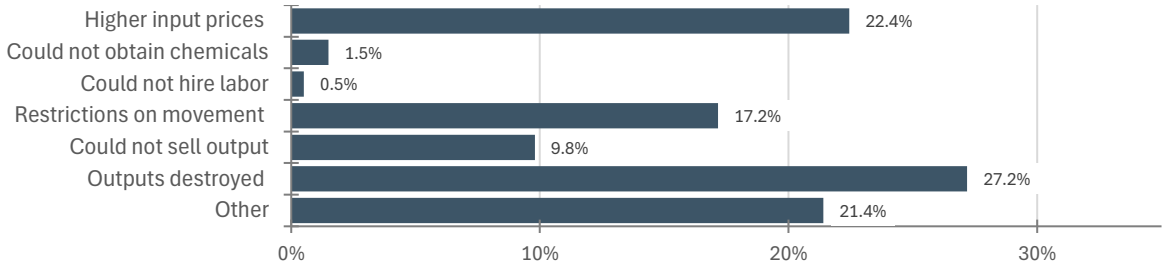
Figure 3-17: Farming disruption by conflict, by state, share of farming households reporting



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

The most frequently reported disruption was the destruction of produce due to war or conflict (Figure 3-18). Higher input prices compared to previous years ranked second. Restrictions on movement, which limited access to markets, were also commonly mentioned.

Figure 3-18: Forms of conflict-related disruptions to farming reported by farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

3.6 2023/24 Winter season farming in conflict-affected Sudan

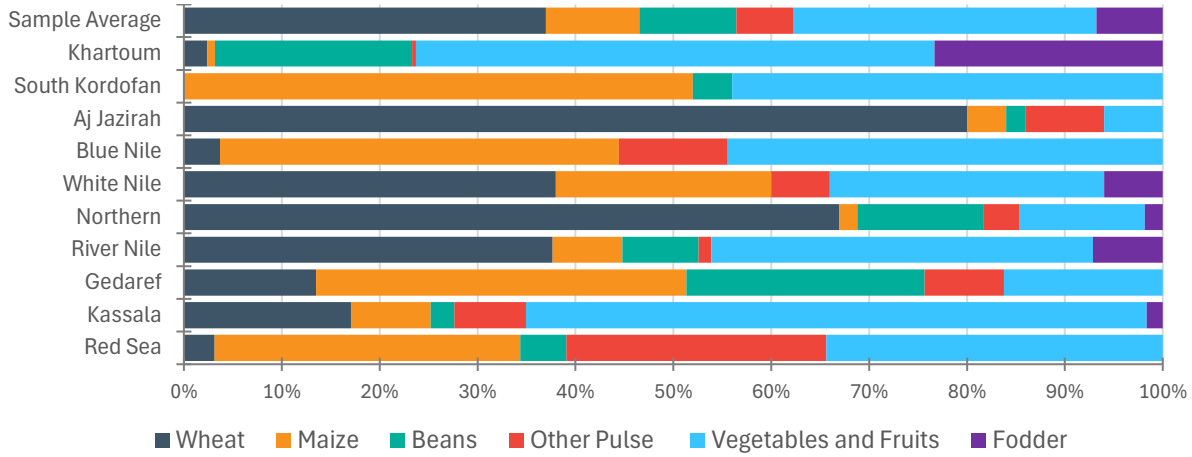
The winter season in Sudan involves mainly irrigated cropping from October to December, with harvest in March. It supports a diverse range of crops, including wheat, millet, and maize among cereals, alfalfa, fodder sorghum, and Rhodes grass among forage crops, broad bean and pigeonpea among pulses, and a variety of horticultural crops, including okra, onion, tomato, citrus fruits, and mango. Winter season crops are particularly dependent on commercial agricultural inputs and fuel for irrigation, making them highly vulnerable to conflict-related economic disruptions.

3.6.1 Crop patterns and cultivated land in the 2023/24 winter season

Crop specialization in the winter season varies significantly across states. Beans and dates dominate in Northern and River Nile states, while fruits and vegetables are concentrated in Kassala and Khartoum. Millet is widely grown in the Kordofan region (World Bank 2020). Wheat remains the most important winter crop, with Aj Jazirah alone accounting for about 60 percent of national production, thanks to its large irrigation schemes. Wheat is also cultivated in Kassala (New Halfa Project), River Nile, Northern, and White Nile states, reflecting its critical role as a staple food for urban diets (ARC 2018; FSD Africa 2023).

Figure 3-19 graphs the distribution by state of the primary winter crops planted by smallholder farmers in the 2023/24 winter season. Wheat was the most cultivated crop across the surveyed states, followed by vegetables and fruits, beans, and maize. Regional patterns show wheat's dominance in Aj Jazirah, Northern, and White Nile states; maize in South Kordofan and Gedaref; and vegetables and fruits in Kassala, Khartoum, and Blue Nile.

Figure 3-19: Distribution of primary crops planted by farming households in the 2023/24 winter season, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

3.6.2 Average cultivated land per farming household in the 2023/24 winter season

Land size is a critical factor influencing agricultural productivity, input utilization, and household food security. The survey results show regional disparities in land access and cultivated land for winter farming. Farmers in Aj Jazirah reported the largest average cultivated area (5.6 feddans), followed by River Nile (4.4 feddans). Other states above the sample average of 3.1 feddans include Kassala, White Nile, Northern, and Khartoum. In contrast, Blue Nile, South Kordofan, and Gedaref reported the smallest averages.

In terms of type of crop cultivated, wheat farmers in Kassala, White Nile, and Aj Jazirah cultivated the largest plots of between 8 and feddans on average, while bean cultivation was concentrated in Northern and River Nile, with average cultivated plots of above 6 feddans (Figure 3-20). Vegetables were cultivated on the largest plots on average in White Nile state. These differences reflect agro-ecological conditions, local consumption preferences, and market opportunities.

Figure 3-20: Average land cultivated per farming household during the 2023/24 winter season, by state and crop, in feddans

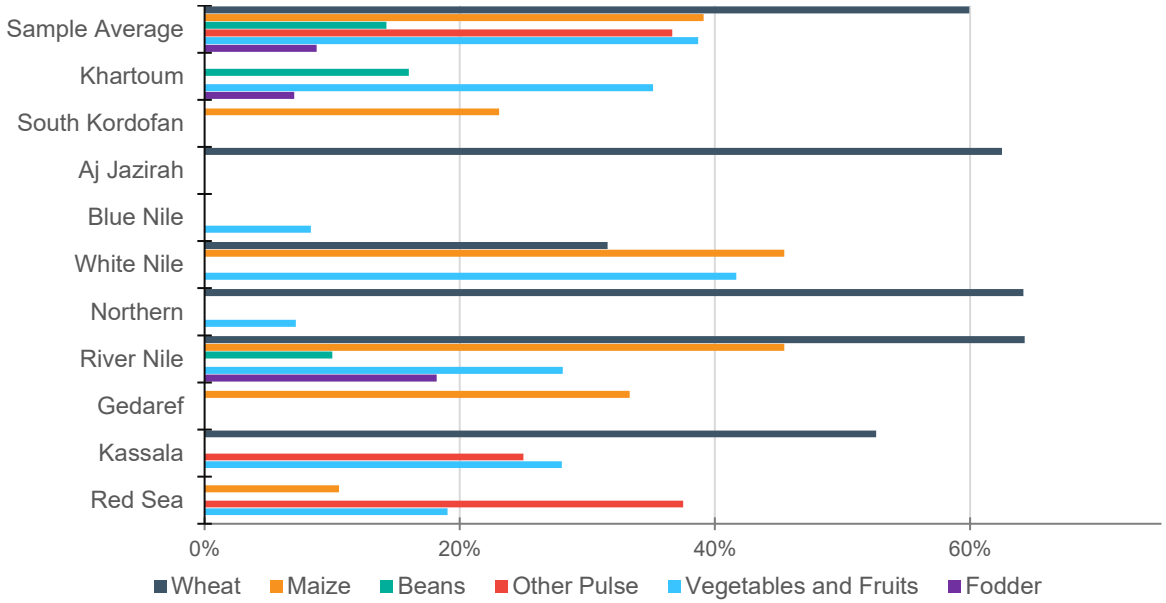
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: 1.0 feddan = 0.42 hectares. The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

3.6.3 Use of agricultural inputs and irrigation during the 2023/24 winter season

Use and sources of seed in the 2023/24 winter season—The survey data indicate that, on average, about 60 percent of smallholder farming households used local seed varieties during the previous winter season. The others used improved seed varieties. This represents a significant increase in the adoption of improved seeds compared to 2023, when only one-quarter of farmers reported using them (Kirui et al. 2023b). This improvement can be partly attributed to the distribution of improved seed to farmers by various international organizations, including the Food and Agriculture Organization of the United Nations (FAO) (FAO 2024).

Figure 3-21 illustrates notable variations in the use of improved seeds by crop type and state in the 2023/24 winter season. Wheat farmers exhibited the highest adoption rates, particularly in River Nile, Northern, and Aj Jazirah. For maize, the highest shares of improved seed use were reported in White Nile and River Nile. In the case of vegetables and fruits, White Nile recorded the highest proportion of farmers using improved seeds. Conversely, improved seed adoption rates were lowest among farmers cultivating beans and fodder crops across all surveyed states.

Figure 3-21: Use of improved seed during the 2023/24 winter season, by state and primary crop, share of farming households that reported using

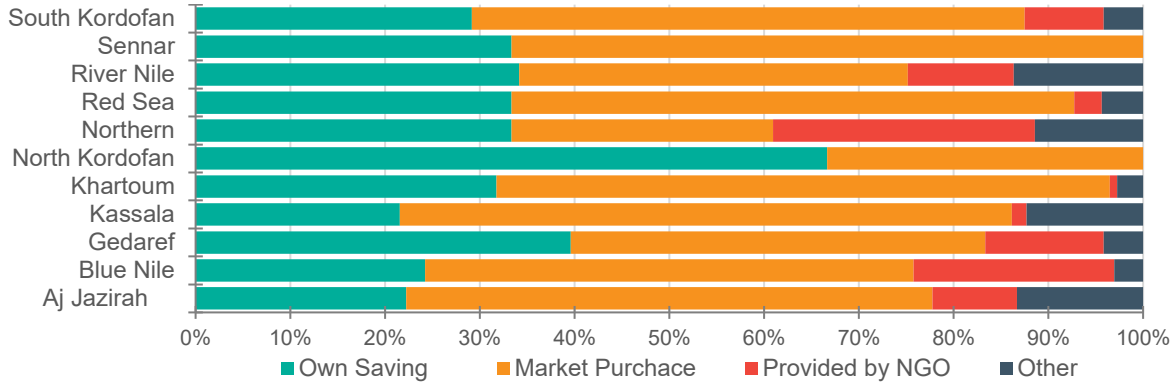


Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

An analysis of the sources of the seed used by the surveyed farming households during the 2023/24 winter season reveals a shift in access patterns. Almost 60 percent reported purchasing seeds from the market, while about 30 percent relied on seeds saved from previous harvests. A small share relied on seed provided by non-governmental organizations. These figures suggest an improvement in access to seed markets for the 2023/24 winter season compared to the 2023 summer cropping season, when the majority of farmers depended primarily on retained seeds from previous harvest due to limited availability of commercial inputs (FAO 2024).

A closer look at seed sources by state reveals significant differences in access during the 2023/24 winter season. Farming households in White Nile, Sennar, Khartoum, and Kassala predominantly relied on market purchases, reflecting their stronger integration with input supply chains (Figure 3-22). In contrast, almost 40 percent of farming households in Gedaref reported depending on seeds saved from previous harvests. Northern state recorded the highest proportion of farmers receiving seed from non-governmental organizations, suggesting targeted seed support in that region.

Figure 3-22: Source of seed during the 2023/24 winter season, by state, share of farming households

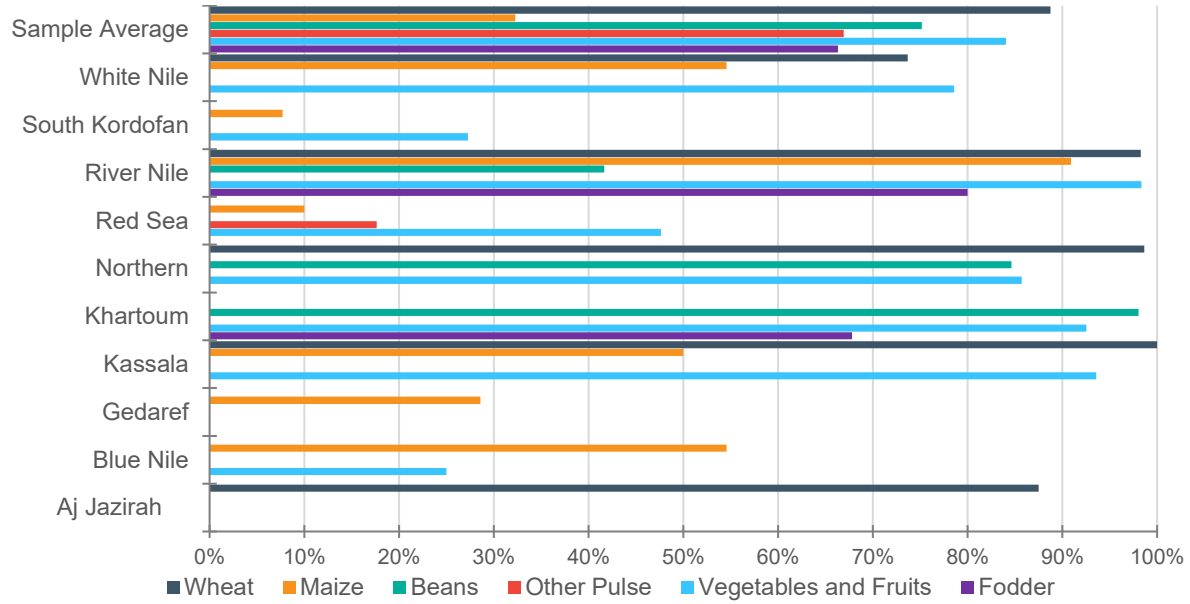


Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

Use and sources of fertilizers in the 2023/24 winter season —Fertilizer use among Sudanese farmers during the 2023/24 winter season shows considerable variation across states, reflecting differences in access, crop types, and farming intensity. Over three-quarters of farming households used fertilizers during the 2023/24 winter season. This marks a significant increase compared to the 2023 summer cropping season, when over 40 percent of farmers reported not using fertilizers (Kirui et al. 2023b). This trend suggests that there has been a gradual recovery in input access despite ongoing conflict-related disruptions.

Figure 3-23 offers a detailed view of fertilizer use by primary crops and state in the 2023/24 winter season. Fertilizer use among wheat farmers was nearly universal, with particularly high shares of wheat farmers applying the input in Kassala, Northern, and River Nile states. Similarly, vegetable and fruit farmers in River Nile and Kassala, as well as bean farmers in Khartoum, commonly reported the use of fertilizer on their crop. In contrast, fertilizer application for maize varied considerably across states—while usage was high in River Nile, it remained very low in Gedaref, Red Sea, and South Kordofan.

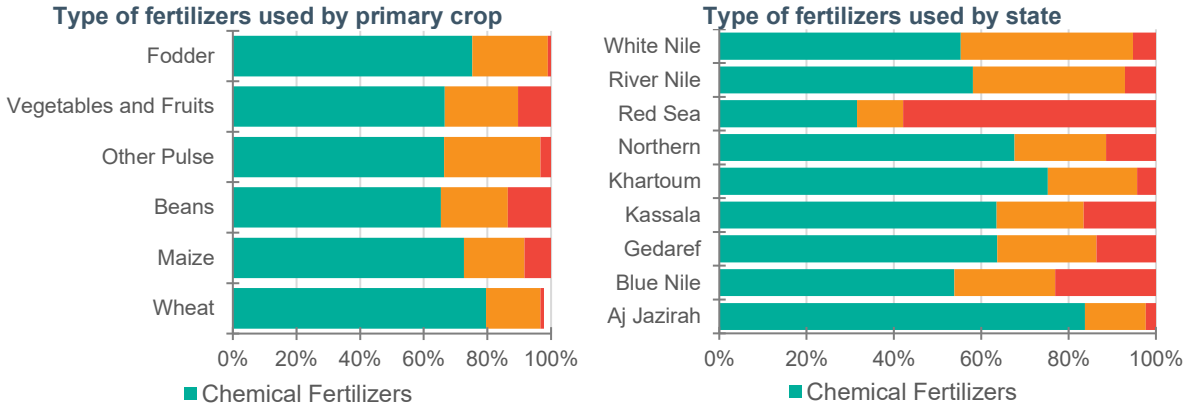
Figure 3-23: Use of fertilizers in the 2023/24 winter season, by state and primary crop, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Farmers' Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

Disaggregating fertilizer use by type in the 2023/24 winter season, almost three-quarters of the farming households surveyed reported using chemical fertilizers, while 20 percent used organic fertilizers, and a small percentage relied on compost. Figure 3-24 presents the distribution of fertilizer types by the primary crop and by state. The use of chemical fertilizers is particularly prevalent among farmers growing wheat, fodder, and maize. At the state level, Aj Jazirah recorded the highest proportion of chemical fertilizer use, followed by Khartoum. In contrast, only 30 percent of farmers in the Red Sea state reported using chemical fertilizers; there, a notable 55 percent reported using compost instead.

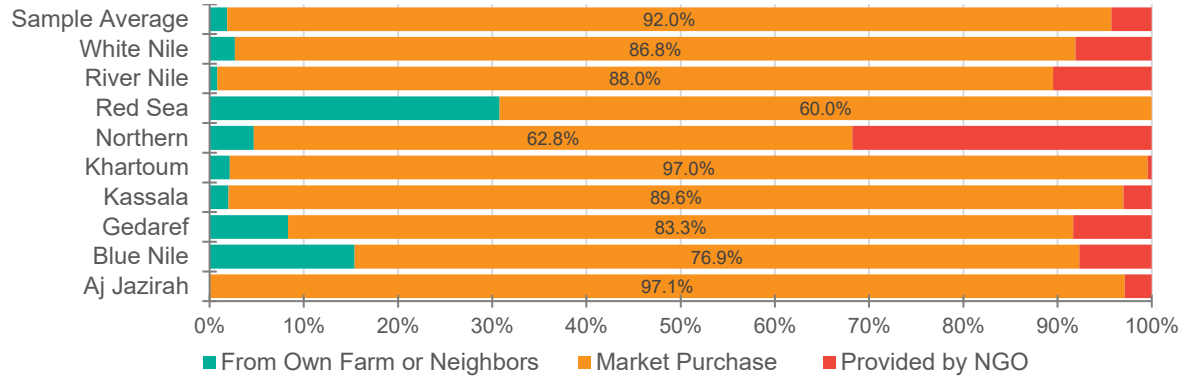
Figure 3-24: Type of fertilizers used during the 2023/24 winter season, by primary crop and state, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farm Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented. In addition, incomplete information on fertilizer use was obtained from farming households in South Kordofan.

The survey data indicated a strong reliance on market channels for fertilizer acquisition during the 2023/24 winter season across the surveyed states. Most of the farming households that used fertilizer reported sourcing it primarily from the market, reflecting improved access compared to the 2023 summer cropping season, when input markets were significantly constrained (FAO 2024). Much smaller proportions of farmers received fertilizers from non-governmental organizations, from neighbors, or produced them on their own farms. At the state level, Aj Jazirah, Khartoum, Kassala, and River Nile reported the highest proportions of farmers purchasing fertilizers from the market (Figure 3-25). In contrast, Northern state had the largest share of farmers receiving fertilizers from non-governmental organizations. Red Sea state showed the lowest reliance on market sources, with a relatively higher dependence on fertilizers obtained from neighbors or produced on-farm, primarily compost.

Figure 3-25: Source of fertilizers during the 2023/24 winter season, by state, share of farming households



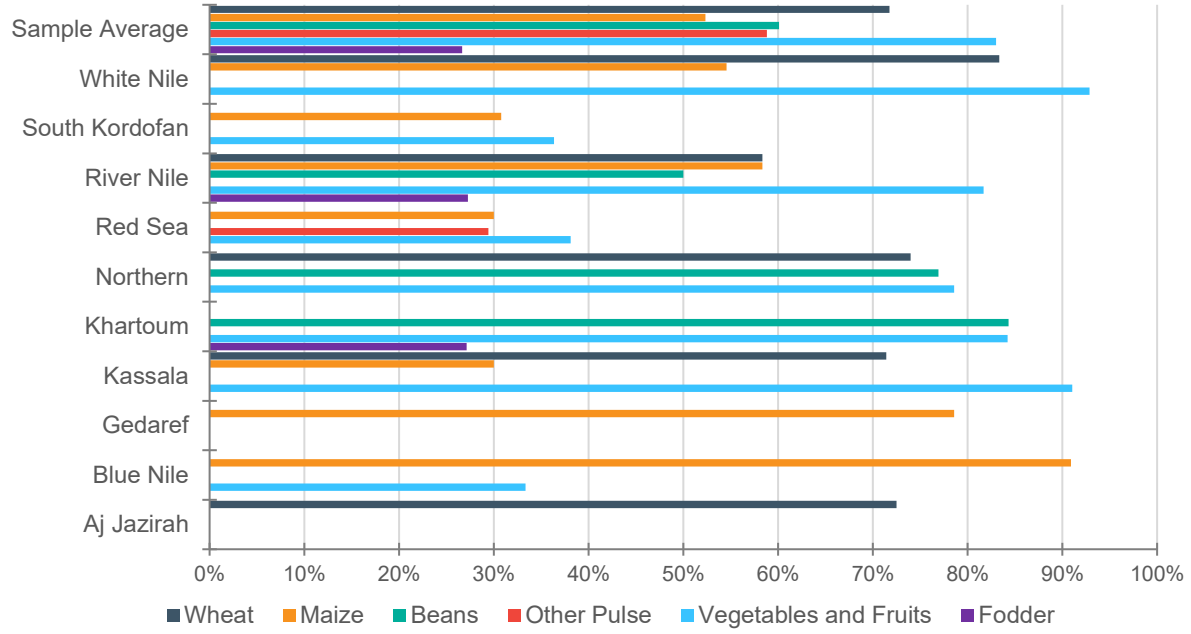
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farm Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented. Incomplete information on fertilizer used was obtained from farming households in South Kordofan.

Use of pesticides and herbicides in the 2023/24 winter season—The availability of pesticides and herbicides declined significantly across several states as a result of the outbreak of the conflict. This shortage led to a sharp rise in input prices—notably, the price of the herbicide 2,4-D increased by 157 percent in 2023 relative to 2022 (FAO 2024). Egypt has since emerged as a key supplier of agrochemicals to Sudan, particularly pesticides and herbicides (FAO 2025).

The farming household survey data show that over two-thirds of farming households applied pesticides or herbicides to their crops during the 2023/24 winter season. However, usage patterns vary considerably by crop type and geographic location, as seen in Figure 3-26. The highest share of farmers applying the inputs to their crops was among vegetable and fruit farming households, particularly among vegetable and fruit producers in White Nile, Kassala, and Khartoum. Wheat also showed a high share of producers using pesticides or herbicides, especially in White Nile. Maize producers were less likely than producers of other crops to use pesticides or herbicides. Nonetheless, high shares of maize producers used the inputs in Blue Nile and Gedaref, but much lower shares of maize producers in Red Sea, Kassala, and South Kordofan used them. These differences likely reflect differences in production systems and in local access to inputs. Farming households producing beans and other pulses showed moderate usage of pesticides or herbicides on those crops overall, with somewhat higher

shares of farmers on average reported for beans in Khartoum and Northern states. Fodder crops received relatively low levels of pesticides or herbicides overall.

Figure 3-26: Use of pesticides and herbicides for the 2023/24 winter season, by state and primary crop, share of farming households

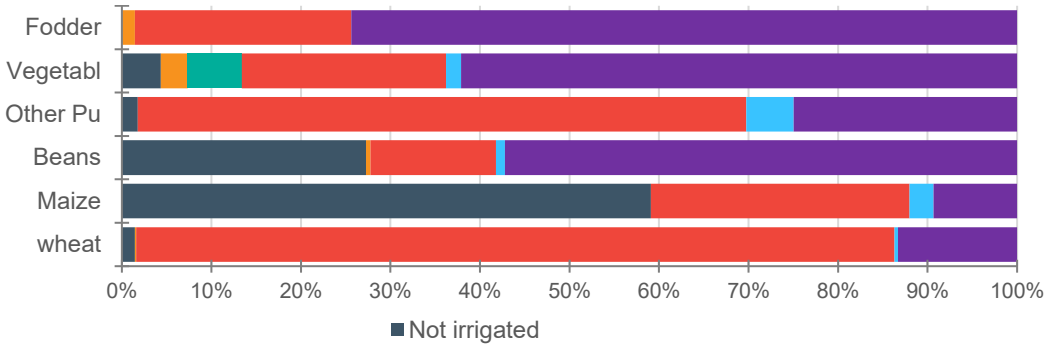


Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

Irrigation practices in the 2023/24 winter season—Farming households reported various irrigation mechanisms during the 2023/24 winter season. Just under half reported using furrow irrigation methods; 37 percent relied upon pump-based irrigation; and 11 percent reported not irrigating their crops at all. The ongoing conflict has severely impacted irrigation systems, particularly in conflict-affected areas. In Aj Jazirah, home to the country's largest irrigation scheme, significant damage has been reported to irrigation infrastructure, storage facilities, and standing crops (FAO 2024).

Irrigation practices varied significantly by crop type in the 2023/24 winter season. Furrow irrigation is the dominant method to supply water to wheat and other pulses, reflecting a continued reliance on traditional irrigation systems. Maize is primarily grown under rainfed conditions, with almost 60 percent of farming households reporting that they do not irrigate their maize. Pump-based irrigation is the main method used for beans, vegetables and fruits, and fodder crops, indicating a dependence on mechanized water extraction for these high-value or water-intensive crops. Drip and sprinkler irrigation methods remain marginal across all crops, suggesting limited adoption of modern irrigation technologies.

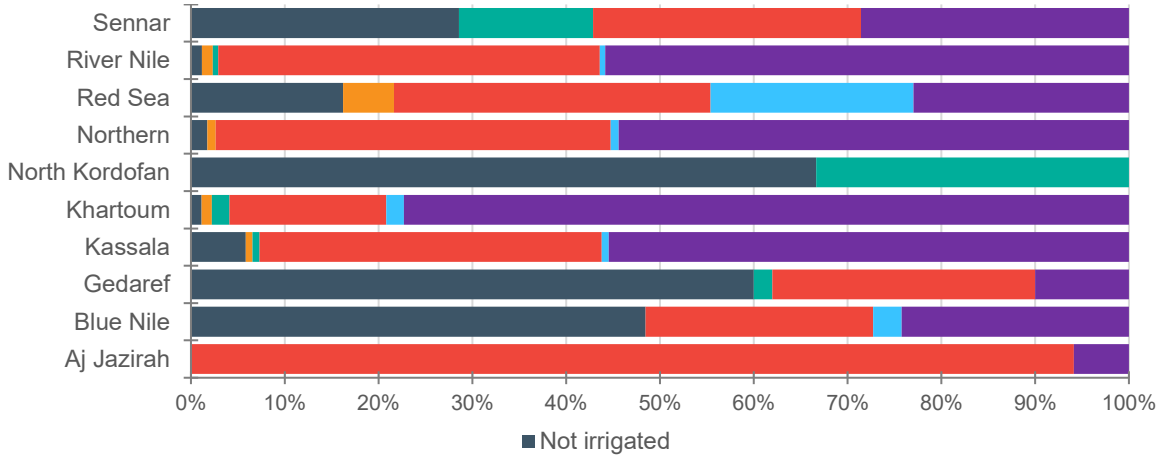
Figure 3-27: Type of irrigation used during the 2023/24 winter season, by primary crop, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Irrigation practices also varied significantly across states during the 2023/24 winter cropping season (Figure 3-28). Aj Jazirah stands out with 94 percent of farming households reported having used furrow irrigation, consistent with the state's status as the country's largest irrigated scheme. In contrast, rainfed agriculture dominates in South Kordofan, Gedaref, and Blue Nile. Pump-based irrigation is the leading method in Khartoum, River Nile, Kassala, Northern, and White Nile, suggesting greater access to mechanized irrigation in those states. Modern irrigation technologies, such as drip and sprinkler systems, remain marginal across all states.

Figure 3-28: Type of irrigation used during the 2023/24 winter season, by state, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

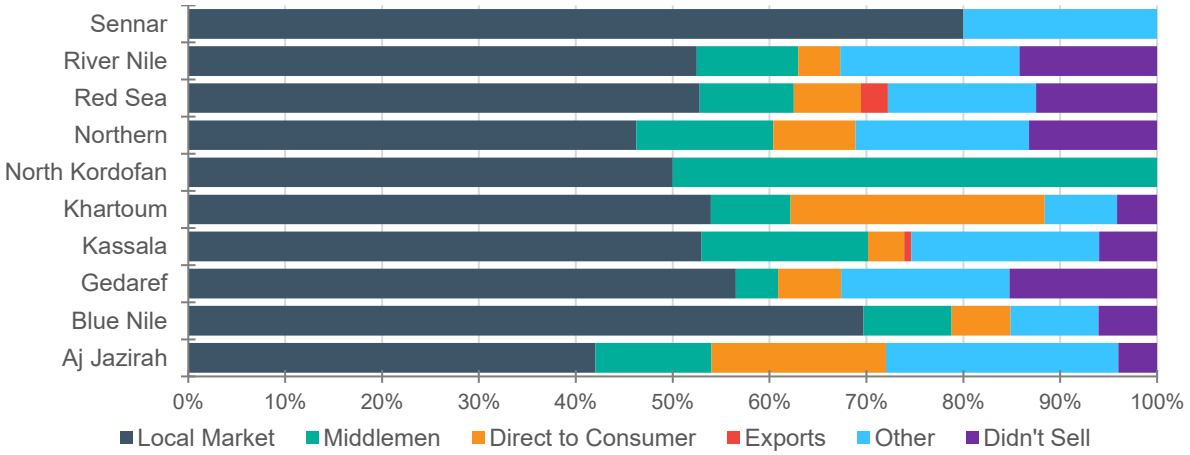
3.6.4 Sales and access to market for the 2023/24 winter season

The results on market accessibility from the farming household survey reveal that local markets remained the primary channel for agricultural sales in the 2023/24 winter season. Just over half of all households reported that local markets were their main point of sale. Direct-to-customer sales were the main point of sale for about 15 percent of the farming households, reflecting a moderate level of producer-consumer interaction. Middlemen play a smaller role. A small share of respondents reported they were not selling their produce, which may indicate some reversion to subsistence farming or market access constraints.

Export-oriented sales are minimal, underscoring limited integration into international markets. Overall, these findings suggest some improvement in market accessibility in 2024 compared to 2023, when nearly one-third of smallholder farmers surveyed reported that local markets in their areas were not operating as usual (Kirui et al. 2023b).

Figure 3-29 shows that across the surveyed states, local markets overwhelmingly serve as the primary sales channel for farming households. Blue Nile and White Nile reported the highest reliance on local markets. In contrast, South Kordofan stands out as an exception, where one-third of farming households reported that they did not sell their produce, suggesting significant market access challenges or a heavy reliance on subsistence farming and own-consumption of produce. Direct-to-consumer sales were most prominent in Khartoum, while middlemen played a substantial, if secondary, role in Kassala and Northern states. Export activity remained negligible across all states.

Figure 3-29: Where farming households sold their crop from the 2023/24 winter season, by state, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

3.6.5 Crop productivity in the 2023/24 winter season

The farming household survey data show that farmers experienced a notable decline in productivity across most major crops in the 2023/24 winter season compared to the 2022/23 winter cropping season. The largest reductions were recorded for vegetables and fruits, beans, and other pulses. In contrast, wheat and maize showed signs of recovery (Table 3-2). Despite these gains, Sudan's 2024 productivity levels for wheat and maize remain well below those of Egypt, on the order of two to five times lower.

Table 3-2: Productivity of selected winter season crops, regional comparisons, kg per feddan

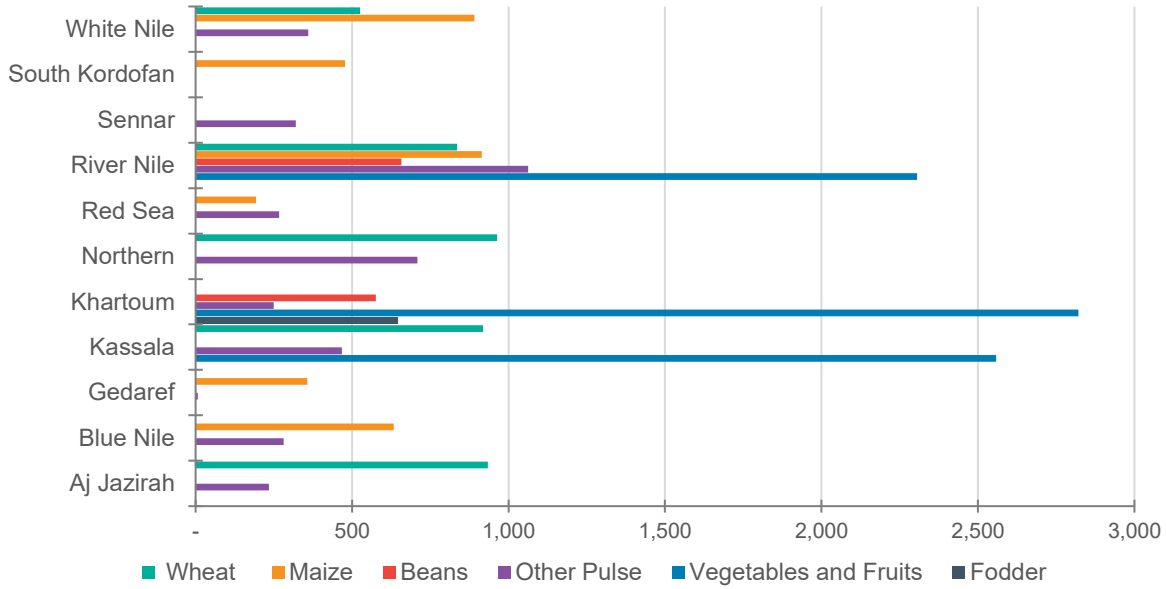
Item	Egypt (2023)[1]	Ethiopia (2023)[1]	LDCs (2023)[1]	Sudan (2023)[1]	Sudan (2024)[2]	Sudan change (%)
Wheat	3,019	1,310	1,099	567	908	60.1
Maize (corn)	3,153	1,648	820	420	745	77.4
Beans	3,026	1,194	1,328	1,983	656	-66.9
Other pulses	933	562	380	379	298	-21.5
Vegetables and fruits	10,712	3,174	4,976	5,377	2,180	-59.4

Source 1: FAOSAT
Source 2: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farm Household Survey. Productivity during the 2023/24 winter cropping season.
Note: 1.0 feddan = 0.42 hectares. LDCs = "Least developed countries".

One contributing factor to low crop yields in Sudan is the low application of agricultural inputs. Fertilizer use in Sudan remains among the lowest in the region. According to the World Development Indicators of the World Bank, fertilizer use in Sudan in 2022 was 3.0 kg per feddan. In contrast, average fertilizer application rates per feddan are 226 kg in Egypt, 115.9 kg in Ethiopia, 12.6 kg in less developed countries, and 7.6 kg in sub-Saharan Africa.

State-level analysis of crop productivity from our 2024 farming household survey data reveals disparities and identifies top performers by crop type (Figure 3-30). Northern state leads in wheat and bean productivity, River Nile in maize, and Khartoum in other pulses, vegetables and fruits, and fodder. Relative to the average productivity levels for all of the states surveyed, only a few states consistently outperform the national averages—three for wheat, other pulses, and vegetables and fruits, and just one for fodder. These patterns underscore a pattern of uneven agricultural productivity and suggest that targeted regional interventions specific to the productivity constraints of each state are needed to close productivity gaps and strengthen national food security.

Figure 3-30: 2023/24 winter season crops productivity, by state and primary crop, kg per feddan



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: 1.0 feddan = 0.42 hectares. The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Winter cropping was reported by fewer than ten farmers in North Kordofan, West Kordofan, and Sennar states, respectively. Results for the three states are not presented.

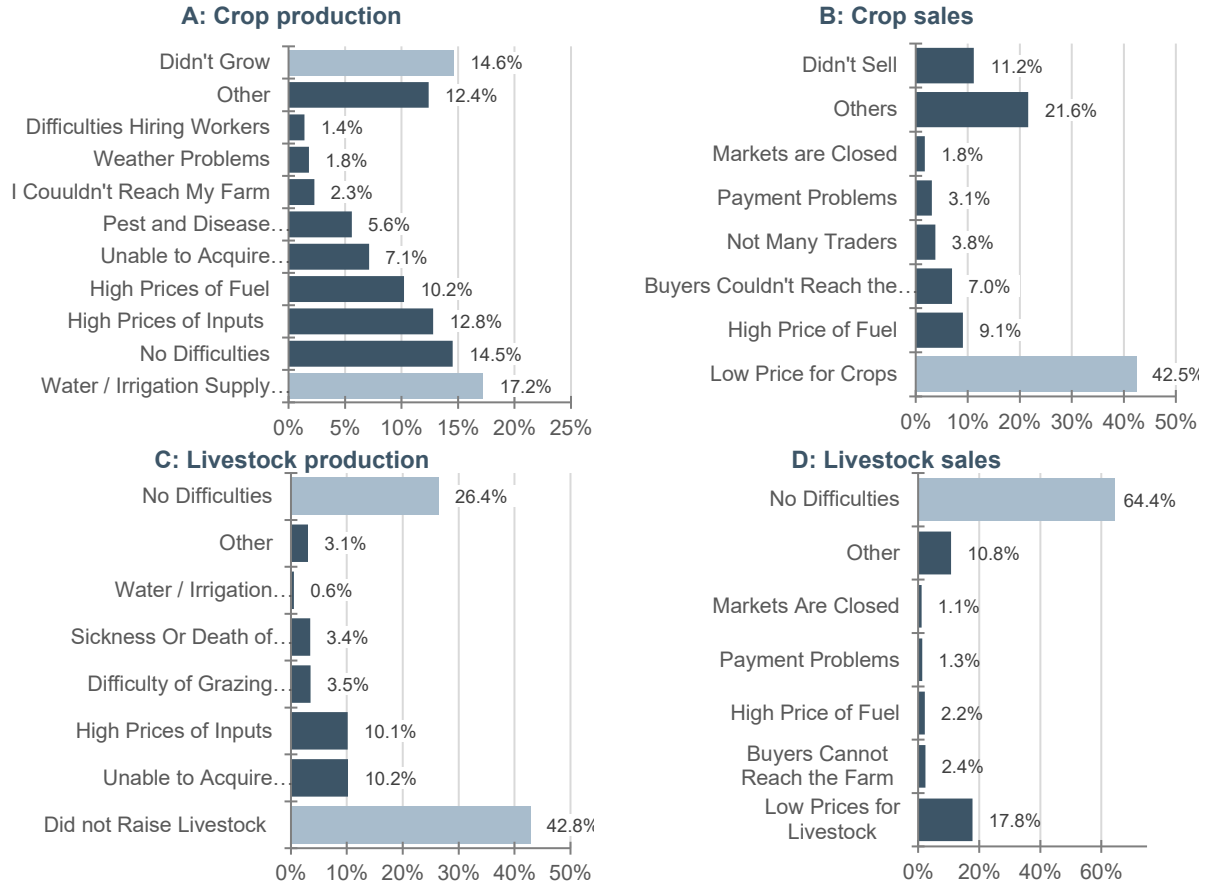
3.6.6 Challenges faced by farmers during the 2023/24 winter season

The continuing conflict in Sudan has disrupted farming operations and agricultural supply chains. As shown in panel A of Figure 3-31, water and irrigation constraints were the most frequently reported challenge by farming households for the 2023/24 winter cropping season. That this constraint dominates is particularly concerning, given the reliance on irrigation for most crop production during the winter season. High input or fuel prices were also commonly mentioned as important constraints to crop production during the season.

Regarding the challenges faced by farmers in selling crops in the 2023/24 winter season, low prices for crops were the most reported challenge, which reflects weak demand or limited access to more profitable urban markets (panel B of Figure 3-31). High fuel prices and transportation costs were the second-highest reported constraint on crop sales, reflecting fuel scarcity and possibly security hazards along transportation routes. A smaller share of farmers selling crops reported that buyers or traders did not manage to reach their farms due to insecurity-related disruptions.

Livestock production similarly faced significant disruptions during the 2023/24 winter season. Over 40 percent of farmers reported not raising livestock, which is inferred to reflect past animal losses, increased specialization in crops for subsistence consumption, or a shift towards off-farm economic activities (panel C of Figure 3-31).. Among those farmers still engaged in livestock production, the main barriers to production were input-related constraints—insufficient inputs and high animal feed prices. However, over a quarter of livestock producers reported no difficulties, suggesting varied coping capacities among livestock farmers.

Figure 3-31: Challenges faced by farming households during the 2023/24 winter season, share of farming households reporting



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

With regards to the marketing of livestock, almost two-thirds of livestock producers in the 2023/24 winter season reported no difficulties in trying to sell their animals, indicating relatively functional livestock markets amid the ongoing conflict (panel D of Figure 3-31). Among those households that faced any difficulties, the most reported issue was low prices for livestock or livestock products. This suggests that, while some markets remained accessible, they were not profitable.

3.7 2024 summer season farming in conflict-affected Sudan

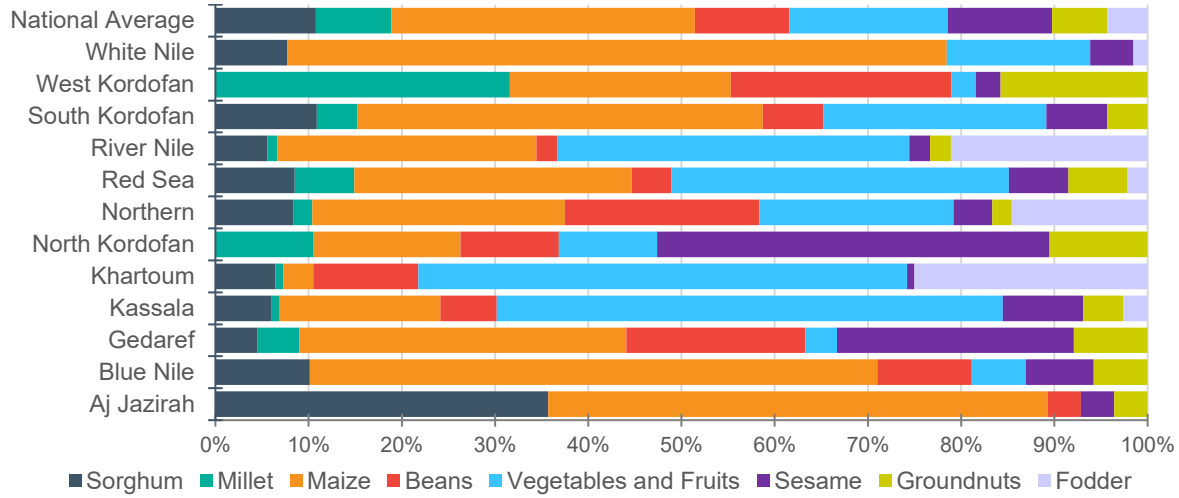
3.7.1 Crop patterns in the 2024 summer season

The Sudan 2024 Smallholder Farmers Survey administration period captured part of the preparations for the 2024 summer cropping season (June to November 2024). Information was obtained on what farmers intended to plant during the season. Over one-third of the farming households identified maize as the primary crop they planned to cultivate in the 2024 summer season, while just under 20 percent reported planning to plant vegetables and fruits, indicating a notable emphasis on horticultural production. Sesame, beans, and sorghum each accounted for about 10 percent of responses. In contrast, millet, groundnut, and fodder were infrequently reported, collectively comprising less than 20 percent of total responses.

Building on these crop choices, state-level patterns reveal distinct farmers' preferences for the crops they intended to produce in the 2024 summer cropping season (Figure 3-32).

Unsurprisingly, maize was the dominant crop in half of the surveyed states, underscoring its central role in summer cultivation. Vegetables and fruits also featured prominently, particularly in Khartoum, Kassala, and River Nile. Sesame and millet were the leading crops in only one state each, North Kordofan and West Kordofan, respectively. Nonetheless, the fact that some farming households across several states continue to prioritize the two crops highlights the continued relevance of sesame and millet in traditional farming systems. Several states, including North Kordofan, Northern, and West Kordofan, exhibited high crop diversity, with several crops having a substantial share of farming households intending to cultivate them as their main crop in the 2024 summer cropping season.

Figure 3-32: Main crops planned to be planted by farming households who were intending to produce crops during the 2024 summer season, share of farming households

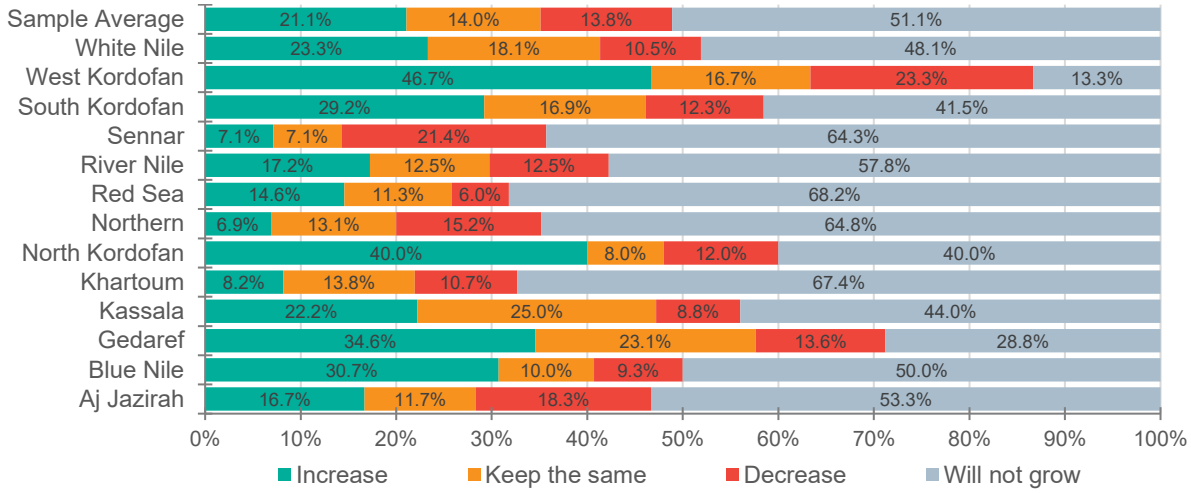


Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Summer cropping information was incomplete for Sennar state.

3.7.2 Production plans for the 2024 summer season

For the 2024 summer season, just over half of the surveyed farming households reported that they did not plan to grow any crops during the season (Figure 3-33). Meanwhile, 21 percent stated that they intended to increase their cultivated area, while just under 14 percent planned to decrease it, and 14 percent aimed to maintain the same level of cultivation. The high proportion of farmers opting not to cultivate during the 2024 summer season raises serious food security concerns, given the compounding effects of conflict, economic instability, and climate-related shocks on overall food availability and access.

Figure 3-33: Crop production plans for the 2024 summer season, by state, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

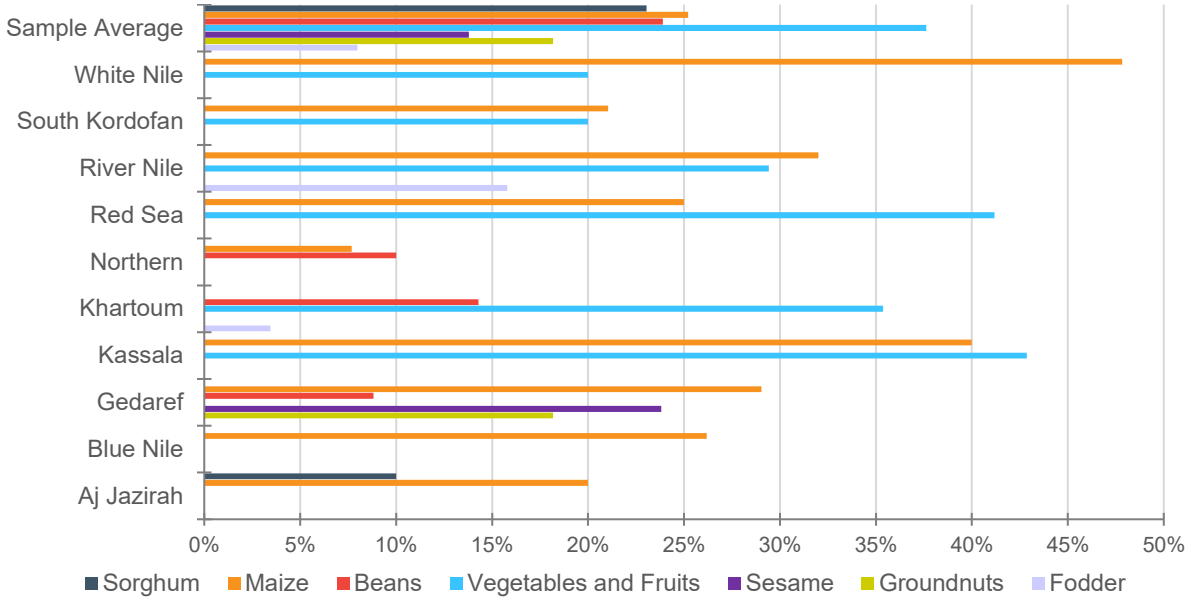
Figure 3-33 shows stark state-level differences with regard to the plans of farming households to produce crops in the 2024 summer season. West Kordofan stands out with the highest share of farmers planning to expand cultivation and the lowest share reporting that they would not be planting any crops, suggesting a relatively optimistic outlook there. In contrast, Red Sea, Khartoum, and Sennar recorded the highest proportions of farmers not planning to cultivate crops, likely reflecting the direct impacts of conflict and farmers' uncertainty about the prospects for profitable crop cultivation. Alarmingly, even in relatively stable states such as River Nile, Northern, and Red Sea, most farmers reported no plans to cultivate crops during the 2024 summer cropping season. This pattern points to broader systemic challenges, including input shortages, water scarcity, constrained access to finance, and market disruptions, which discourage production even outside of active conflict zones.

3.7.3 Use of inputs during the 2024 summer season

Survey results show limited but uneven adoption (actual or intended) of modern inputs in the 2024 summer cropping season. Across the survey sample, just under one-quarter of farming households reported using or planned to use improved seeds, just over one-third planned to use fertilizers, 40 percent planned to irrigate, 43 percent planned to use pesticides or herbicides, and 53 percent planned to use agricultural machinery.

Figure 3-34 illustrates the intentions of farmers to use improved seeds in the 2024 summer season. By crop type, vegetables and fruits lead in the intended adoption of improved seeds, followed by maize and beans. At the state level, farming households in White Nile reported the highest planned use of improved maize seeds, while Khartoum led in beans, and Kassala and Red Sea in vegetables and fruits. In contrast, the planned adoption of improved seeds for sesame and fodder remains relatively low. Notably, farming households in Gedaref stand out for their adoption of several crops.

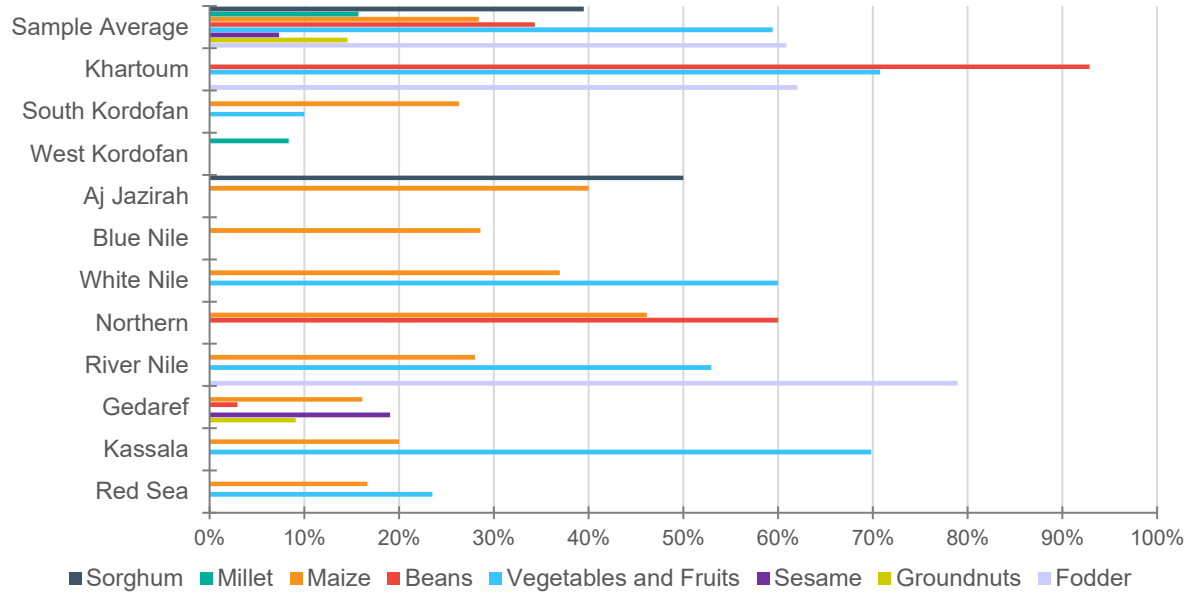
Figure 3-34: Use or planned use of improved seed during the 2024 summer season, by state and primary crop, share of farming households using or planning to



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Information on seed use for summer cropping was incomplete for North Kordofan, West Kordofan, and Sennar states.

The survey results on intended fertilizer use during the 2024 summer cropping season indicate relatively high planned adoption rates for certain crops, particularly fodder and vegetables and fruits. Sorghum, beans, and maize show moderate levels of intended adoption, while sesame and groundnuts lag behind in terms of fertilizer adoption. Figure 3-35 illustrates state-level intentions to use fertilizer in the 2024 summer season by crop. At the state level, Khartoum reported the highest intended use of fertilizer for beans and vegetables and fruits. Aj Jazirah stands out for its planned use of fertilizers on sorghum, while Northern leads in plans to utilize fertilizers for maize production. River Nile reports the highest intended fertilizer use for fodder crops.

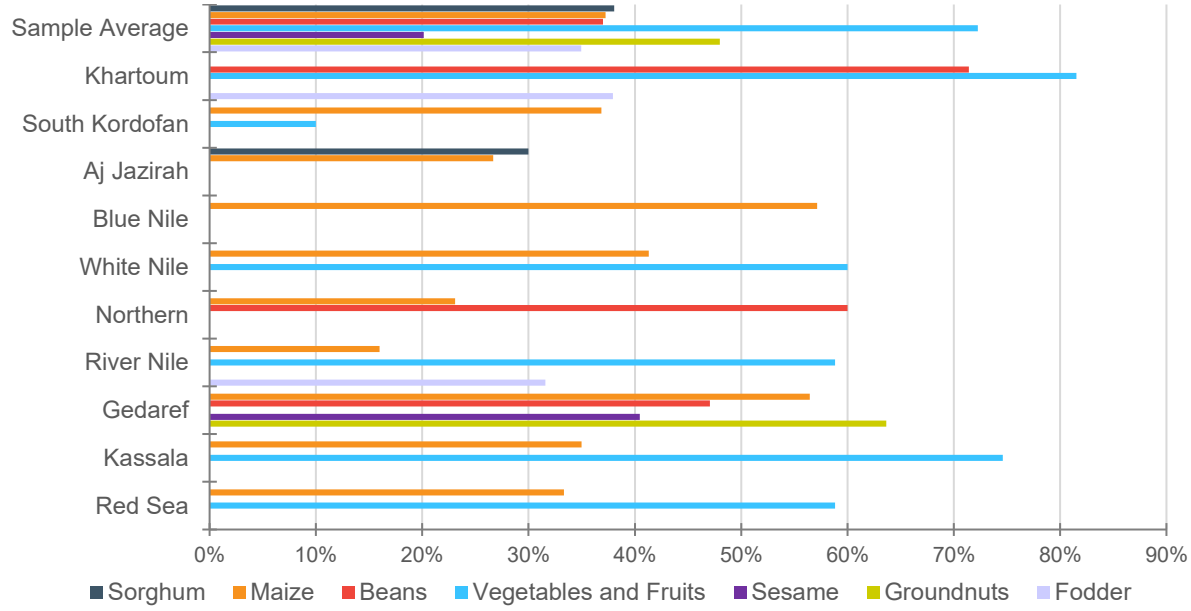
Figure 3-35: Use or planned use of chemical fertilizers for the 2024 summer season, by state and main crop, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Information on fertilizer use for summer cropping was incomplete for North Kordofan and Sennar states.

Survey data on intended pesticide or herbicide use during the 2024 summer season show substantial variation across crops and states. Among the farming households surveyed, vegetables and fruits recorded the highest planned pesticide or herbicide usage rates, followed by groundnuts—indicating a strong reliance on chemical protection for high-value crops (Figure 3-36). In contrast, sesame had the lowest reported planned usage, suggesting either limited access to pesticides or herbicides or a lower perceived need for pest control.

Figure 3-36: Use and planned use of pesticide or herbicide during the 2024 summer season, by state and primary crop, share of farming households



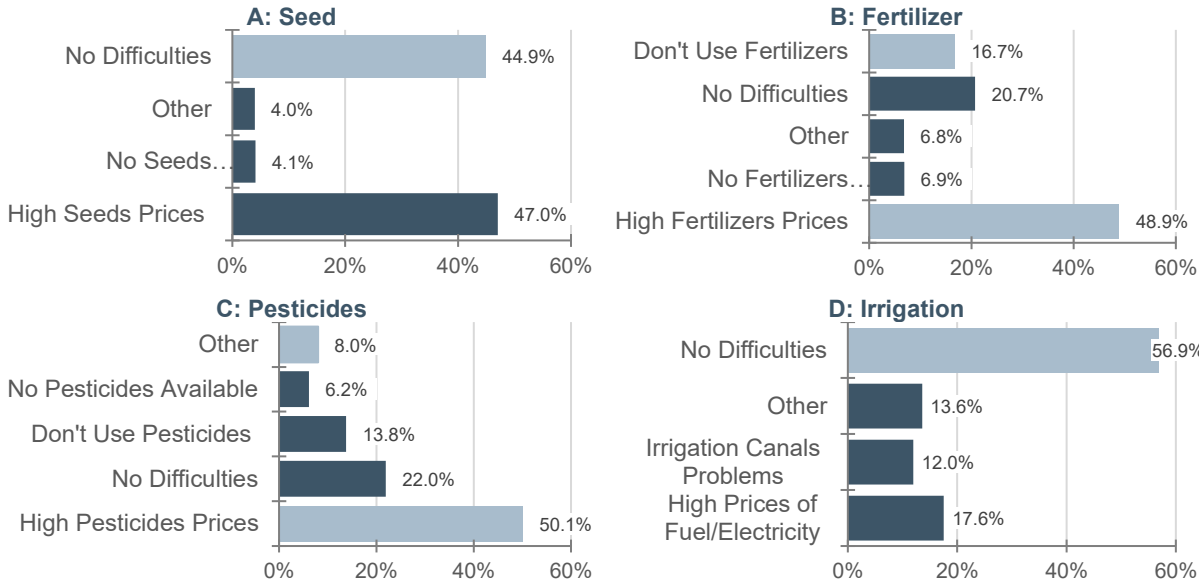
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur. Information on pesticide or herbicide use for summer cropping was incomplete for North Kordofan, West Kordofan, and Sennar states.

At the state level, Khartoum leads in planned pesticide or herbicide use across multiple crops for the 2024 summer cropping season, including for beans, vegetables and fruits, and fodder. Gedaref also shows high intended usage of herbicides and pesticides, particularly for sesame and groundnuts, and demonstrates relatively broad planned adoption across several crop types. Meanwhile, Blue Nile stands out for the high share of farming households there planning to use pesticides and herbicides on maize.

3.7.4 Challenges in accessing inputs during the 2024 summer season

Figure 3-37 highlights the challenges farmers faced in accessing inputs for the 2024 summer cropping season. With regards to accessing seed, the most commonly reported challenge was the high price of seeds, reported by 47 percent of farmers, reflecting overall increases in price levels and market fluctuations due to the ensuing conflict (panel A of Figure 3-37). Despite these constraints. Almost 45 percent of farmers reported no difficulties in accessing improved seed. Little variation was seen across states with regards to the degree of access to seed, suggesting few trade route blockages.

Figure 3-37: Challenges in accessing inputs and irrigation water during the 2024 summer season, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

The survey data also show that high prices were the most commonly reported constraint to farming households accessing sufficient fertilizer (Panel B of Figure 3-37). Twenty percent of respondents reported no difficulties with regard to accessing fertilizers, which suggests that fertilizer markets faced more constraints to their efficient operation than did seed markets for the 2024 summer cropping season.

As shown in Panel C of Figure 3-37, the dominant challenge faced by the surveyed farming households with regard to accessing pesticides or herbicides was the high price, mentioned by 50 percent of respondents. This reflects significant cost inflation, which could be linked to disrupted supply chains, import difficulties, and logistical constraints due to the conflict. Only about one-quarter of farmers reported no difficulties in accessing pesticides or herbicides, indicating lower access relative to seeds but slightly better than fertilizers.

Access to irrigation was generally not a major constraint for most farming households during the 2024 summer season. Fifty-seven percent of the surveyed households reported no challenges in accessing irrigation during the summer season (Panel D of Figure 3-37). Most farmers either had access to functional irrigation systems or benefited from adequate rainfall, since the summer season in most areas of Sudan primarily depends on rainfed agriculture. Among those who faced constraints, the most reported challenge was the high price of fuel or electricity. Additionally, problems related to irrigation canals were reported, likely reflecting blockages, siltation, or infrastructural damage.

3.8 Food insecurity and coping strategies

3.8.1 Food insecurity among farming households—the Food Insecurity Experience Scale

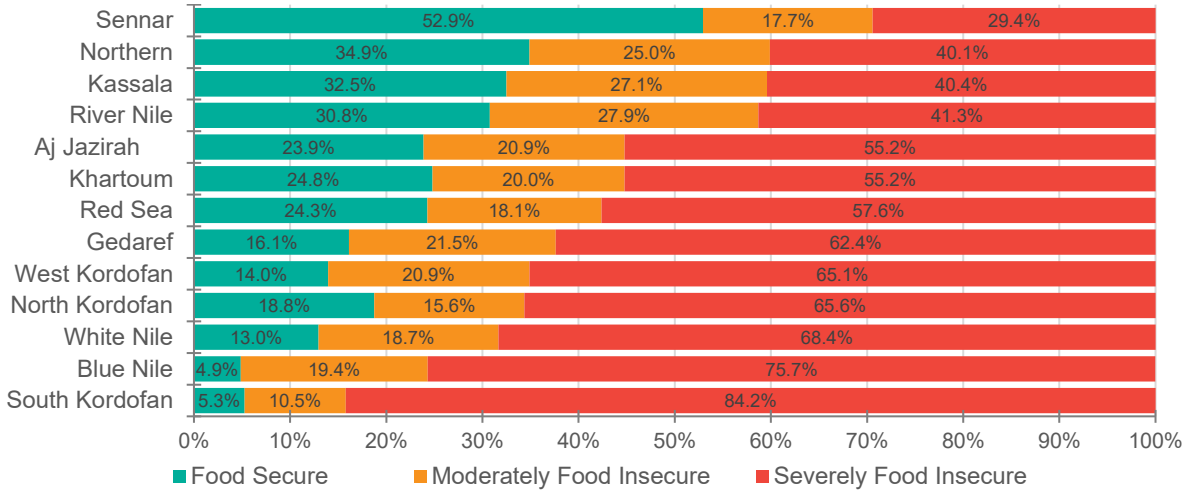
This section examines the prevalence of food insecurity across farming households using the Food Insecurity Experience Scale (FIES).[1] The survey data enable an assessment to be made of the severity of food insecurity among the farming households, thereby allowing us to gauge the impact of the ongoing conflict on food consumption levels. Only about 23 percent of farming households are estimated to be food secure—less than one in four farming households have reliable access to sufficient food. Nearly 20 percent are moderately food insecure, while the majority, about 57 percent, are classified as severely food insecure. These findings underscore the deepening food crisis in conflict-affected areas, where more than half of the population struggles with acute food deprivation. and points to the devastating consequences of the conflict on rural livelihoods and agricultural production. The predominance of severe food insecurity among farming households in Sudan signals an urgent need for targeted humanitarian assistance, resilience-building interventions, and the restoration of agricultural and food systems to prevent further deterioration in household welfare.

Figure 3-38 shows striking geographic variations in food security.

- In Sennar, Northern, Kassala, and River Nile states, 60 to 70 percent of households are either food secure or only moderately insecure, whereas less than 40 percent of households face severe food insecurity. These patterns in the incidence of food insecurity suggest stronger resilience or better access to coping mechanisms and assistance for farming households in those states relative to more conflict-affected states.
- In contrast, South Kordofan, Blue Nile, White Nile, and North Kordofan are shown to have extremely high levels of food insecurity, with between 65 and 80 percent of farming households classified as severely food insecure. In Blue Nile and South Kordofan, food insecurity at either moderate or severe levels is almost universal. The high levels of food insecurity in these states reflect the combined impacts of conflict, displacement, and economic collapse.
- States such as Aj Jazirah, Khartoum, and Red Sea fall in the middle range, with around 55 percent of households experiencing severe food insecurity and the rest falling into moderate or secure categories.

[1] FIES is a standardized metric developed by the FAO to assess people's access to adequate food. It is based on an eight-question survey module that examines individuals' experiences and associated difficulties in accessing adequate and nutritious food over the last 30 days.

Figure 3-38: Food security status of farming households, by state, share of farming households



Source: Authors' compilation using the Food Insecurity Experience Scale (FIES) based on data from the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

Overall, the data on the food security status of farming households highlights the need for state-specific responses to address the food consumption needs of those that are food insecure. While emergency food assistance remains essential, long-term strategies are equally critical. These include restoring agricultural livelihoods, improving market functionality, and strengthening social protection systems to enhance household and community resilience in the face of ongoing shocks.

Table 3-3 presents information on the food insecurity status of farming households across the surveyed states, combining both raw scores from the FIES and probabilistic estimates from the Rasch model.[2]. The raw FIES score reflects the number of affirmative responses to standardized questions on food access, with higher scores indicating more severe insecurity. In contrast, the Rasch model refines these results to enable probabilistic comparisons across populations.

[2] The Rasch model is a statistical approach used to analyze survey responses, such as those in the Food Insecurity Experience Scale (FIES). It estimates the severity and prevalence of food insecurity by assigning probabilities to responses. The model ensures data consistency with theoretical assumptions, producing reliable estimates.

Table 3-3: Food insecurity status of farming households in Sudan in 2024 based on raw Food Insecurity Experience Scale score and the Rasch model, by state

States	Raw Scores	Rasch Model	
	Food Insecurity Experience Score	Probability of Severe Food Insecurity, % of households	Probability of Moderate to Severe Food Insecurity, % of households
National Average	**3.56**	**10.4**	**54.4**
Khartoum	3.37	5.4	50.1
North Kordofan	4.53	20.1	64.2
South Kordofan	5.53	28.4	78.8
West Kordofan	4.28	14.4	60.7
Sennar	2.65	11.6	35.4
Aj Jazirah	3.67	8.7	54.3
Blue Nile	4.72	12.7	70.2
White Nile	4.34	12.2	64.1
Northern	2.59	3.1	36.9
River Nile	2.88	5.0	41.4
Gedaref	4.08	11.8	59.2
Kassala	2.73	5.0	38.2
Red Sea	3.45	7.3	51.3

Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

The findings reveal substantial variation across states. South Kordofan emerges as the most food-insecure state, with the highest raw score (5.53) and a probability that 28 percent of farming households in the state are experiencing severe food insecurity—more than three-quarters of farming households in South Kordofan face at least moderate-to-severe food insecurity. Similarly, North Kordofan, Blue Nile, White Nile, and West Kordofan have high raw scores above 4.2, with probabilities of severe food insecurity exceeding 12 percent and more than 60 percent of households in the four states experiencing moderate-to-severe food insecurity.

In contrast, Northern and Kassala states show the lowest raw scores and the smallest probabilities of severe food insecurity at between 3 and 5 percent. In these states, less than 40 percent of households face moderate-to-severe food insecurity, reflecting comparatively better food access and consumption. Sennar and River Nile are also relatively food secure among the surveyed states, with raw scores also below 3.0.

Across all surveyed states, the average raw FIES score is 3.56, which corresponds to a 10 percent probability of severe food insecurity and a 54 percent probability of moderate-to-severe food insecurity. This means that more than half of Sudanese farming households face significant challenges in securing adequate food, with particularly acute food crises concentrated in conflict-affected and economically disadvantaged states.

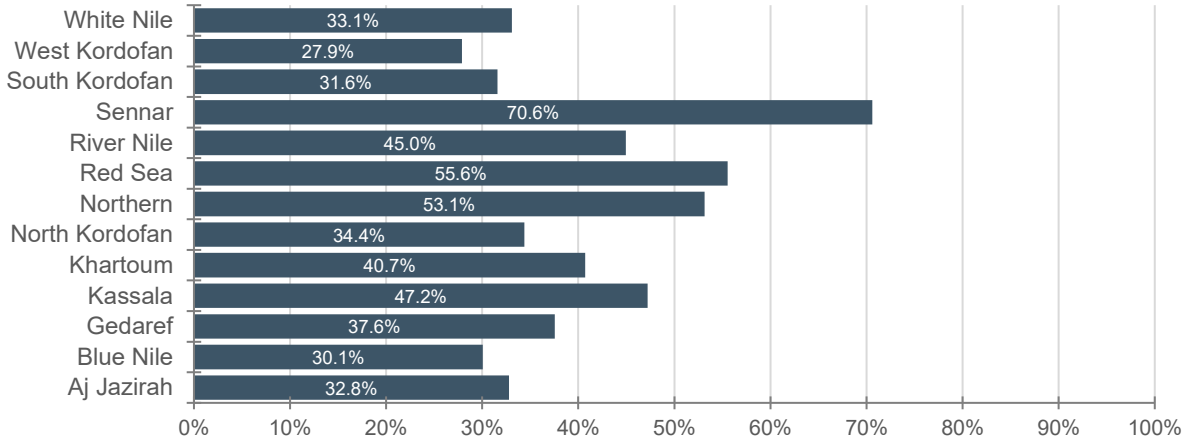
3.8.2 Coping strategies among farming households

During the ongoing conflict and in the absence of stable income sources and reliable markets, many farming households have been forced to adopt a range of coping strategies to meet their most basic needs, particularly food. These strategies often involve difficult trade-offs, such as reducing agricultural production capacity, selling assets, or depleting household resources. While such measures may provide short-term relief, they can also weaken future income-generating potential and increase vulnerability to future shocks. This subsection

documents the prevalence and nature of these coping mechanisms, highlighting regional variation and the depth of livelihood distress facing rural communities.

On average across the sample, the most common coping strategy reported by farming households was reducing spending on agricultural inputs to free up resources for food and other essential needs. This approach was adopted by more than 60 percent of households in most states (Figure 3-39). The highest reliance on this measure is observed in West Kordofan, Blue Nile, and South Kordofan, where roughly 70 percent of households reported cutting back on input spending. In contrast, farming households in Sennar, but also Red Sea and Northern, reported considerably lower reliance on this coping mechanism. This may reflect limited use of agricultural inputs by farming households in these states to begin with, or fewer options available to reduce such expenses.

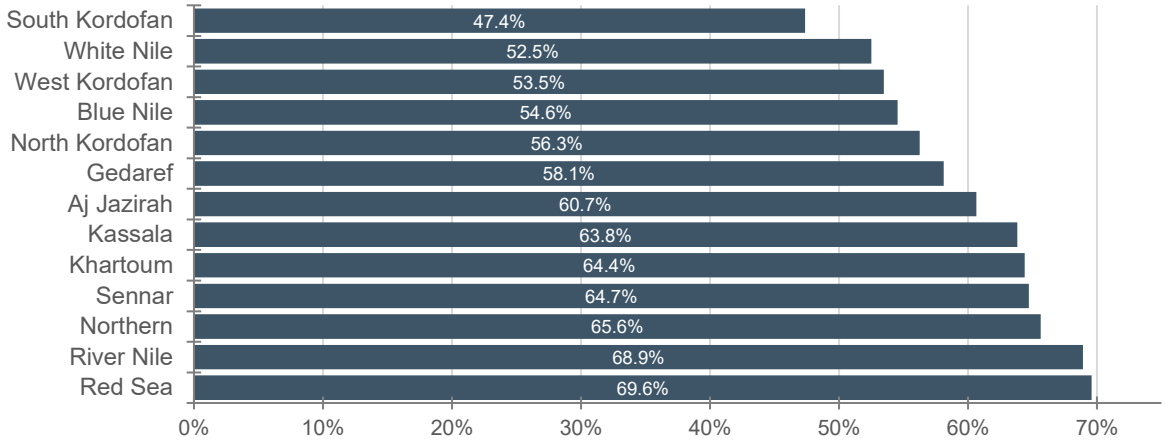
Figure 3-39: Share of farming households that reported reducing expenses on agricultural inputs, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

Another common strategy is the sale of household assets, often non-productive assets, to generate income for food and other essentials (Figure 3-40). This practice is particularly widespread in South Kordofan and White Nile, where about 50 percent of farming households resorted to selling household assets. However, fewer than one-third of households reported adopting this coping mechanism in some other states, including Red Sea, River Nile, and Northern. The heavy reliance on sales of household assets and reductions in agricultural investment illustrate how households in conflict-affected regions in Sudan are prioritizing immediate survival at the expense of long-term resilience.

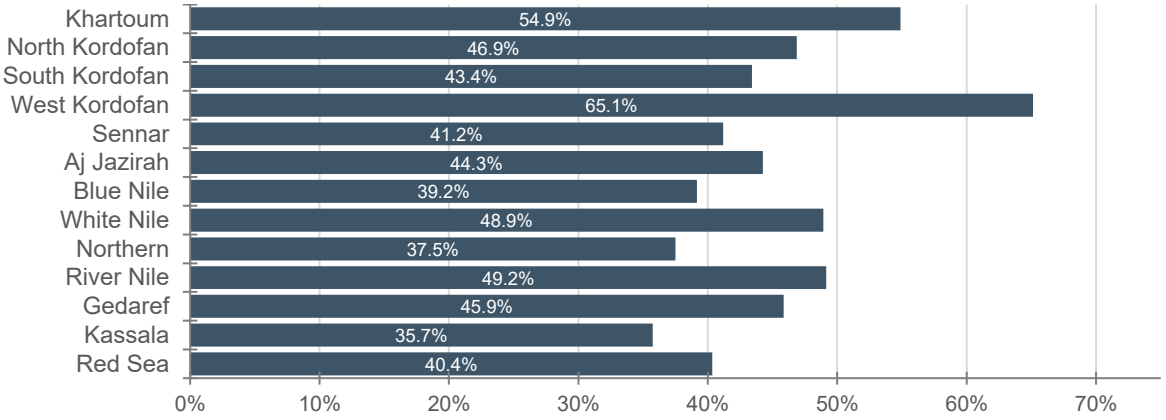
Figure 3-40: Share of farming households that reported selling household assets to buy food, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

Figure 3-41 focuses on the sale by farming households of their productive assets or means of transport, a more severe and potentially irreversible coping strategy that can undermine long-term investments and household livelihoods. Adoption of this coping measure is most prevalent in West Kordofan and Khartoum states, where more than half of households engaged in asset liquidation to meet their basic needs. In contrast, fewer than 40 percent of households in Kassala, Northern, and Blue Nile resorted to this strategy, suggesting differences in either asset ownership levels or the availability of alternative coping options.

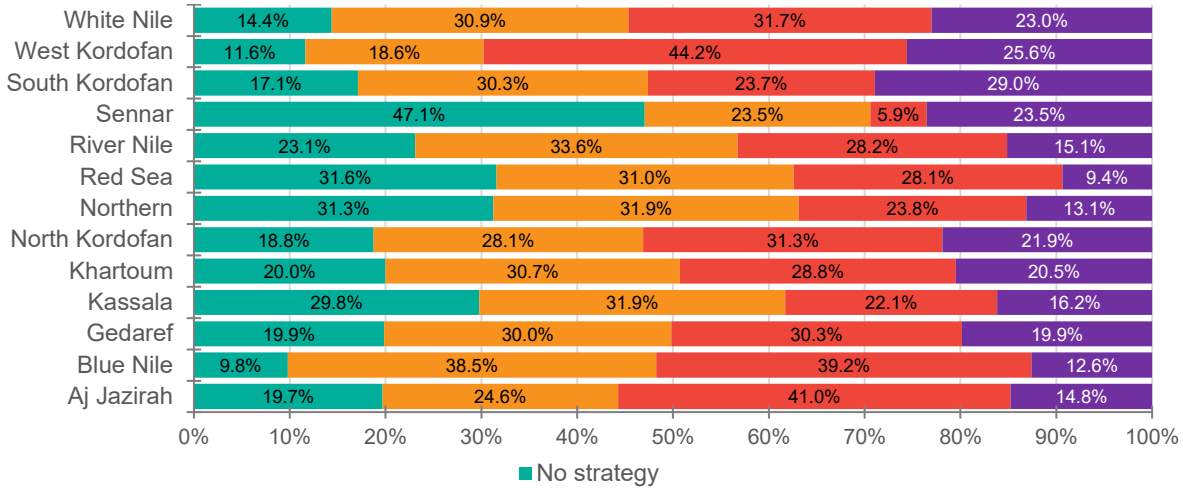
Figure 3-41: Share of farming households that reported selling productive assets or means of transport to buy food or meet basic needs, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

Finally, the analysis examines the number of coping strategies adopted by farming households (Figure 3-42). While about 30 percent relied on a single strategy, a significant proportion—particularly in states in the Kordofan region, as well as in White Nile and Aj Jazirah—reported adopting two or even all three coping strategies, underscoring the intensity of livelihood stress in these regions.

Figure 3-42: Number of coping strategies reported being applied by farming households, by state



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farm Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

In contrast, 30 percent or more of farming households in Sennar, Red Sea, and Northern reported no employing any coping strategies at all. This may signal relatively better resilience for farming households in some areas of those states. Alternatively, it may reflect the absence of assets for the households to liquidate or inputs to reduce, leaving households with few or no options by which to respond to and cope with shocks.

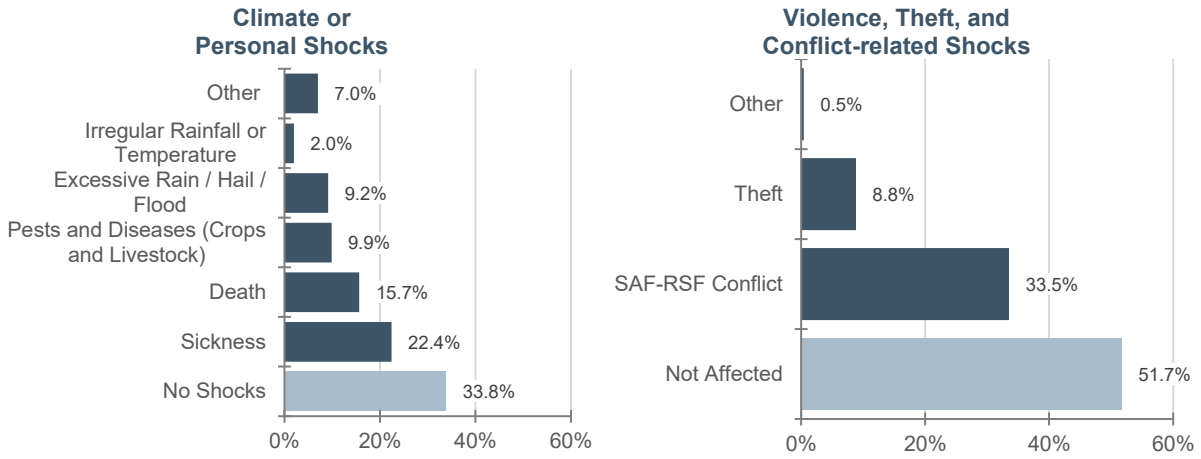
Overall, these findings point to widespread and multi-dimensional coping responses to conflict-induced hardship, with marked variation across states. The reliance on severe measures such as the sale of productive assets is particularly concerning (Figure 3-41), as such coping strategies, while helpful to manage a crisis in the short term, may generate long-term adverse consequences and hinder post-conflict recovery for the households that sell some of their means of economic production.

3.9 Different types of shocks affecting farming households

3.9.1 Exposure to climate, personal, and conflict-related shocks

Despite Sudan's turbulent economic and security situation, the magnitude of exposure to shocks varied by shock type and region, signaling disproportionate and multilayered shock implications for farming households. Figure 3-43 shows that about one-third of farming households reported experiencing no shocks in 2023. This finding highlights considerable variation in shock exposure across Sudan. The remaining two-thirds of farming households faced a range of both idiosyncratic and covariate shocks, all of which have the potential to undermine their farm productivity, consumption levels, and well-being. The most commonly reported personal shocks were sickness and death in the household. These shocks underscore the persistent burden of health risks in a context of weakened health systems and displacement.

Figure 3-43: Exposure to shocks, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

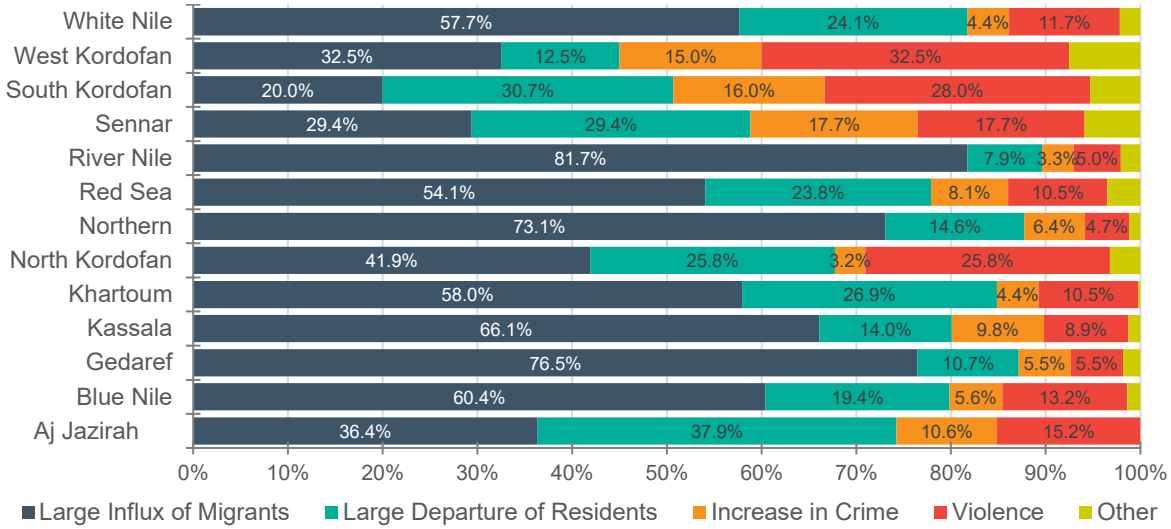
On the production side, pests and diseases affecting crops and livestock were reported by about 10 percent of the farming households, while an almost equal share of households experienced excessive rain, hail, or flooding. These climate-related shocks likely had localized but serious impacts on food security, especially in rainfed cropping areas. In contrast, irregular rainfall or temperature fluctuations were less frequently reported.

Insecurity has been a defining feature of rural life since the outbreak of conflict. While the right panel of Figure 3-43 shows that more than half of the households surveyed reported not being directly affected by violence, theft, or conflict, one-third of the farming households surveyed reported negative impacts from the ongoing SAF–RSF conflict. In addition, about 10 percent of households reported experiencing theft, which ranged from the looting of stored grain to the theft of livestock, equipment, and other productive assets.

3.9.2 Community-level disruptions since the onset of the conflict in Sudan

Households also reported widespread community-level disruptions since the conflict began in April 2023. Figure 3-44 shows that the most frequently reported community-level change was a large influx of migrants, reflecting mass internal displacement from conflict zones to safer regions. This trend was especially pronounced in River Nile, Gedaref, and Northern states, which became major destinations for displaced populations from conflict-affected states or from conflict-affected regions within those states. Concurrently, several states reported a large departure of residents, particularly Aj Jazirah, South Kordofan, Sennar, and Khartoum, indicating significant outward migration with escalating conflict and violent incidents in those states.

Figure 3-44: Perceptions of changes in levels of migration, crime, and violence in the community in the past year, by state, share of farming households reporting



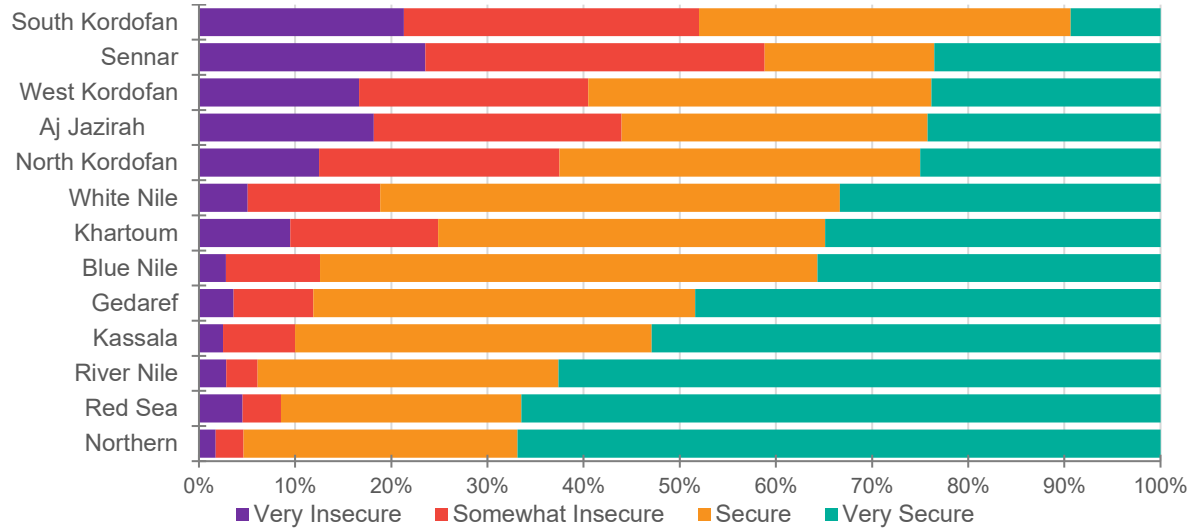
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

Farming households in Sennar, South Kordofan, and West Kordofan reported heightened crime levels, namely increased insecurity, theft, and looting. Reports of violence were highest among farming households in the survey sample in all three Kordofan states. Agriculture is a key source of income and livelihoods in the Kordofan region, so this finding confirms that conflict directly threatens rural production.

3.9.3 Perceptions of physical security

Figure 3-45 shows a wide variation in the perceptions of farming households on the overall level of physical security, revealing a divide between relatively stable areas and those directly affected by conflict. The highest sense of security was reported in Northern state, Red Sea, River Nile, Kassala, and Gedaref. Farming households in parts of Blue Nile, White Nile, and even some areas of Khartoum also described themselves as feeling "very secure". In contrast, the highest levels of insecurity were reported in South Kordofan, Sennar, and Aj Jazirah. In these states, few farming households reported feeling very secure, with a significant share describing their overall physical security state as being somewhat insecure.

Figure 3-45: Perceptions of current physical security, by state, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

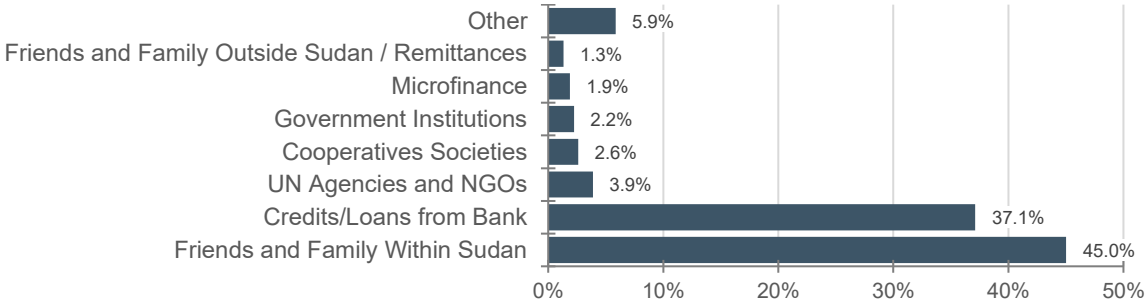
3.10 Access to finance by farming households

The conflict has placed severe constraints on farmers' ability to access the finance they require to purchase and use agricultural inputs. The survey data show that less than 15 percent of farming households applied for loans or credit to support their farming activities in 2024. This low level of engagement with formal credit institutions reflects multiple challenges. First, the widespread disruption of banking services across Sudan has limited farmers' access to agricultural banks and specialized financial institutions compared to pre-conflict conditions. Second, even before the conflict, farmers' access to credit was limited. It has since contracted further in the face of Sudan's broader macroeconomic and financial crises. Third, uncertainty about the availability of financing opportunities has discouraged many farmers from seeking loans.

Among the small proportion of farmers who did apply for credit, about two-thirds were successful. The most commonly reported barrier to accessing credit was the lack of collateral—about one-quarter of unsuccessful applicants identified this as the main obstacle they faced.

Those who did receive loans or credit obtained them from a range of sources. Figure 3-46 shows that 45 percent of borrowers relied on friends and family within Sudan, while only 37 percent secured loans from banking institutions. This pattern underscores the reduced availability of formal credit services and the growing reliance on informal networks for financing farm activities. Non-governmental organizations, cooperatives, and government institutions play only a marginal role in providing agricultural credit.

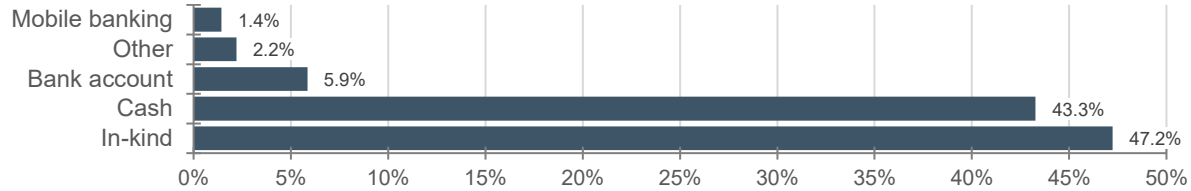
Figure 3-46: Sources of credit and loans received by farming households, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

The form of credit farming households received also varied, being almost evenly split between in-kind credit, often in the form of agricultural inputs, or in the form of cash (Figure 3-47). Obtaining credit through digital or other formal banking channels remains limited. These findings highlight the low level of financial inclusion among Sudanese farming households and their continuing dependence on informal systems of exchange.

Figure 3-47: Modality of credit or loans received by farming households, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

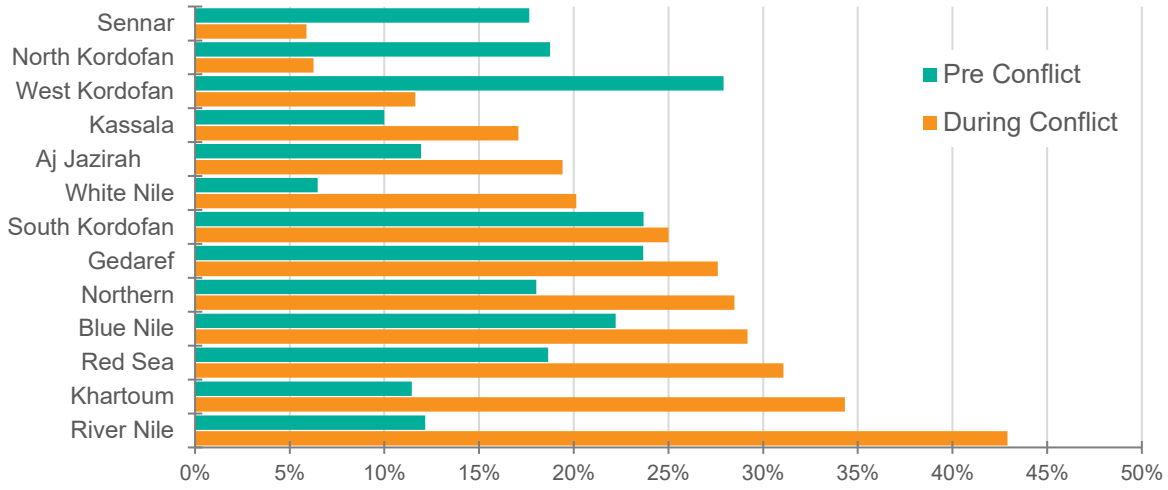
3.11 Assistance and needs of farming households

3.11.1 Assistance received by farming households before and during the conflict

Farming households in Sudan, like other rural households, have continued to receive limited assistance during the conflict. The survey data show that the proportion of farming households receiving assistance increased somewhat compared to pre-conflict levels, rising from 16 percent before the conflict to 23 percent in 2024. However, more than three-quarters reported not receiving any assistance, underscoring the urgent need for expanded humanitarian assistance and agricultural input support.

Figure 3-48 shows state-level variation in the share of farming households receiving assistance before and during conflict. The largest increases were observed in River Nile and Khartoum, where the proportion of households receiving assistance rose by 31 and 23 percentage points, respectively. Other states that also saw increases in assistance received by farming households include Red Sea, Blue Nile, Northern, Gedaref, Aj Jazirah, White Nile, Kassala, and South Kordofan. Notably, the increases did not always align with conflict intensity, as both conflict-affected and somewhat safer states reported higher shares of households receiving assistance.

Figure 3-48: Share of farming households receiving assistance before and during conflict, by state, share of farming households

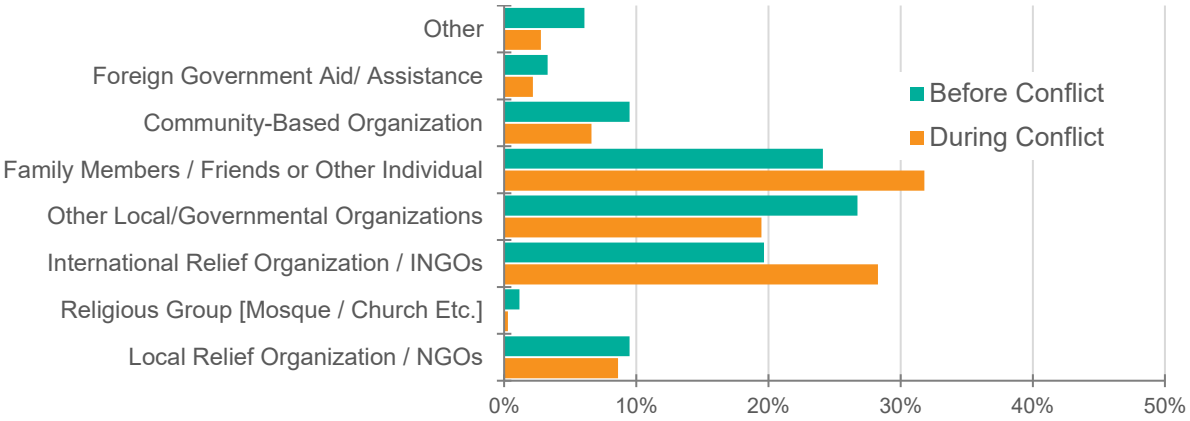


Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

In contrast, the share of farming households receiving assistance in West Kordofan, North Kordofan, and Sennar declined since the conflict began. These decreases highlight challenges assistance providers have in accessing households in these areas, possibly due to conflict escalation and limited infrastructure for alternative delivery mechanisms. More targeted interventions are required to ensure that vulnerable farming households in these states are not denied assistance.

Farming households reported various assistance sources (Figure 3-49). The share of households receiving assistance from international relief organizations rose from 20 percent before the conflict to 28 percent during the conflict. Similarly, support from family and friends increased from 24 percent to 32 percent over the same period. In contrast, assistance from government programs, cooperatives, and local organizations fell sharply, reflecting major disruptions in the social protection system, supply chains, targeting mechanisms, and delivery systems during the conflict. These patterns highlight the important role of informal networks and international actors in sustaining rural households and the collapse of other support structures, whether traditional or formal.

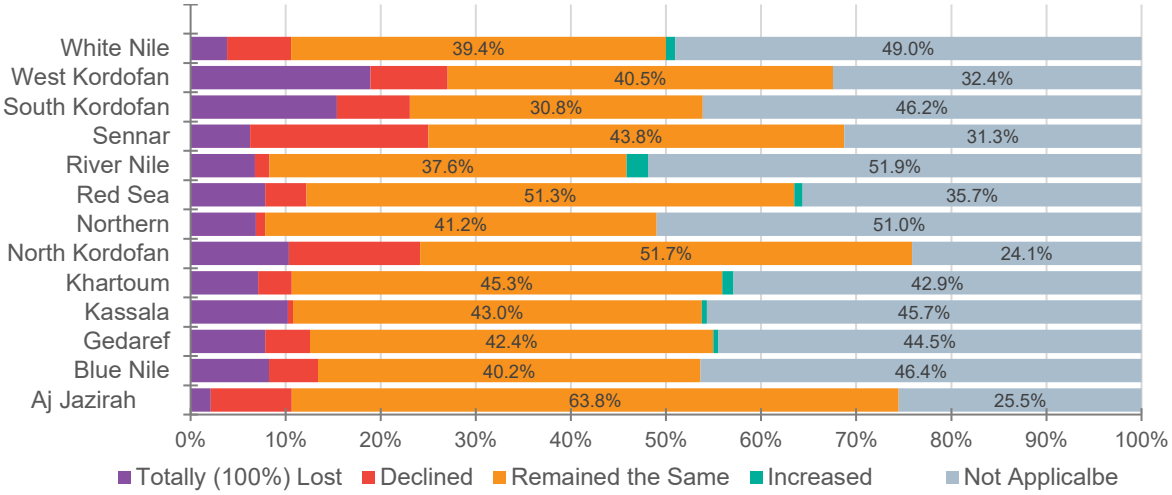
Figure 3-49: Sources of assistance received by farming households before and during conflict, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.

Compared to the pre-conflict period (2023), nearly half of farming households surveyed reported that the level of assistance they received remained the same (Figure 3-50). A small share of about 7 percent noted a deterioration in the levels of assistance they received, while a similar share reported a total loss of assistance. Notably, over one-third of the farming households surveyed stated that this question was not applicable, likely reflecting the fact that they had not received assistance in either 2023 or 2024.

Figure 3-50: Change in assistance received by farming households compared to one year earlier, by state, share of farming households



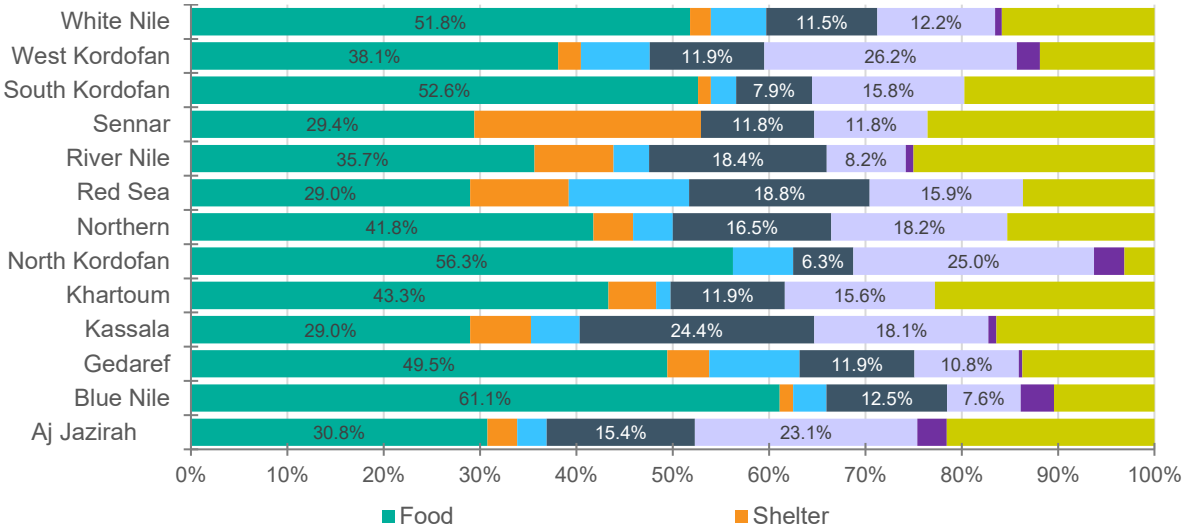
Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

By state, very modest increases in assistance were reported in River Nile, Gedaref, Kassala, Red Sea, and White Nile (Figure 3-50). Although small, these results suggest that safer, non-conflict-affected regions are more likely to see incremental improvements in aid delivery than conflict-affected areas. Additionally, several states reported significant declines. Sennar and North Kordofan comprise the highest proportions of households reporting reduced assistance, reflecting the major delivery challenges linked to sieges, blocked trade routes, and conflict-induced insecurity in those states. In West and South Kordofan, both highly conflict-affected states, the share of households experiencing a complete loss of assistance reached 19 percent and 15 percent, respectively. These patterns underscore the urgent need for more effective targeting of vulnerable households in conflict-affected areas, where delivery constraints remain acute.

3.11.2 Priority needs identified by farming households

The results from the Sudan 2024 Smallholder Farmers Survey highlight the pressing needs of farming households across Sudan. While households reported a variety of priorities, food assistance emerged overwhelmingly as the most important need, cited by 42 percent of farmers. Security and healthcare were also identified as critical. These needs are shown in Figure 3-51.

Figure 3-51: Most important needs identified by farming households, by state, share of farming households



Source: Authors' compilation based on the SSSP Sudan 2024 Smallholder Farmer Household Survey.
Note: The survey was not conducted in the five states of Darfur—Central, East, North, South, and West Darfur.

Variation in priority needs is seen across the states in ways that reflect both the local intensity of the conflict and the dynamics of population displacement in local communities. For example, in Blue Nile, a majority of households reported food as their most pressing need, followed by healthcare. In contrast, in Sennar, where conflict escalation in 2024 led to widespread violence and displacement, shelter is noted by the largest share of farming households as their most urgent requirement. In Red Sea, 13 percent of households prioritized water access—a much higher share prioritizing this need than in any other state—reflecting heightened pressure on limited water resources in one of the country's largest host states for internally displaced persons.

Healthcare needs were most strongly emphasized in relatively safer states that host large numbers of displaced populations—Kassala, Red Sea, River Nile, and Northern—pointing to increased demand on already strained health systems. Security concerns were most prominent in conflict-affected areas, such as Aj Jazirah and North Kordofan. The importance given to security and safety underscores how access to basic services is inseparable from broader concerns about physical protection.

4. CONCLUSION AND RECOMMENDATIONS

4.1 Summary of survey findings

The results of the Sudan 2024 Smallholder Farmers Survey provide a sobering account of the state of farming livelihoods in Sudan under the combined strain of conflict, economic crisis, and climate-related shocks. Agriculture has historically been the cornerstone of both rural livelihoods and Sudan's national economic performance, yet the conflict has profoundly disrupted production, shrunk household incomes, and undermined household resilience. The survey shows that while the agricultural sector remains central to livelihoods, its capacity to sustain households has been drastically weakened, leaving millions of farming households dependent on fragile coping strategies, smaller incomes, and uncertain external support.

The conflict has led to a restructuring of livelihoods. Once reliant on farming and agricultural income, farming households have increasingly resorted to non-agricultural income sources such as self-employment, wage work, or reliance on humanitarian aid. However, these alternatives provide limited economic resilience for the households. Alarmingly, the share of households reporting no income or employment has risen sharply, pointing to deepening poverty and heightened vulnerability. This economic stress is reflected in widespread income declines across all states. Some states, such as Sennar and those in the Kordofan region, report near-universal losses. More modest income declines are observed in relatively stable regions. However, price inflation, market disruptions, and restricted access to agricultural inputs are amplifying the hardships brought about by lowered incomes.

There has been significant displacement of rural populations across Sudan due to the conflict. These population movements have reshaped household structures, labor availability, and social networks. In addition to these shifts, asset losses have been severe. Livestock holdings, a critical form of wealth and resilience for farming households, have declined sharply due to forced sales, theft, looting, and disease. While agricultural landownership remains widespread, the land area that is cultivated has contracted, particularly in conflict-intense areas. This erosion of productive assets underscores how conflict undermines both immediate food availability and likely the longer-term ability of households to recover once peace is restored. The reduction of livestock herds and limited use of land also reflects how insecurity, market breakdowns, and displacement limit farmers' capacity to effectively utilize the assets they still formally own.

Agricultural production during the 2023/24 winter season showed signs of recovery compared to findings from the 2023 IFPRI Farmers' Household Survey, especially in terms of access to farm inputs and market functionality. However, these modest positive developments varied across states, with notable differences in outcomes. More worrying was that productivity declined relative to 2023. The most significant reductions were observed in vegetables and fruits, beans, and other pulses. In contrast, maize and wheat showed modest signs of improvement. Water and irrigation challenges emerged as the most significant production constraints reported by farmers during the 2023/24 winter cropping season. In terms of market-related challenges, the low prices received for harvested crops were highlighted by many of the surveyed farming households, as this undermined their profitability. Additionally, nearly half of farming households reported not raising livestock, indicating limited livelihood diversification among a substantial portion of farming households.

In planning for the 2024 summer season, maize was cited by the highest share of farmers as their primary crop. However, more than half of the farmers surveyed reported that they did not plan to cultivate during the season. This reluctance to plant is not limited to conflict-affected areas—alarmingly, even in relatively stable states such as River Nile, Northern, and Red Sea, a majority of farmers indicated no intention to farm in the 2024 summer season.

Food insecurity among farming households in Sudan has reached critical levels. Using the Food Insecurity Experience Scale, the survey found that fewer than one-quarter of farming households are food secure, while more than half face severe food insecurity. State-level variations are sharp: in relatively stable states, such as Northern and Kassala, food access is comparatively better, though still fragile, while in conflict-affected areas, like South Kordofan, food insecurity is nearly universal. These disparities highlight how the intensity of conflict

interacts with broader vulnerabilities—such as displacement, market disruption, and weak service provision—to produce localized crises within a national emergency.

The coping strategies farming households employ in conditions of crisis reflect both their depth of distress and the limits of their household resilience. Many families reported reducing agricultural investment, selling household goods, or even liquidating productive assets, such as livestock. While such strategies provide temporary relief, they erode the long-term recovery potential of households by reducing their productive base. Some households reported adopting multiple coping strategies simultaneously, underscoring the intensity of the stress they were experiencing. Others reported that they did not need to rely on any coping strategies, which may reflect either exceptional economic resilience or their having no assets to fall back on. In either case, the overall picture is one of households making difficult trade-offs that will shape their recovery trajectories long after the conflict ends.

Access to finance and assistance remains inadequate. Only a small fraction of households applied for loans or credit in 2024, and those that did often faced barriers such as a lack of collateral. Most households relied on informal credit from family or friends rather than formal banking institutions, reflecting both the collapse of formal financial services and the limited financial inclusion of rural populations. Assistance levels have increased modestly in some states, particularly the safer ones, but remain extremely limited overall, with more than three-quarters of households receiving no assistance in 2024. Even where assistance is available, delivery challenges, insecurity, and inequities in targeting undermine its reach.

Finally, the survey highlights the compounding role of shocks beyond direct conflict. Illness, death of household members, pests, floods, and crime all add to the economic burdens facing farming households. Community-level disruptions, such as mass displacement and heightened violence, further constrain their access to markets and services. Perceptions of insecurity vary across states, but in many conflict-affected areas, the majority of households feel unsafe. These layers of risk reinforce one another, leaving households caught in a cycle of vulnerability that threatens both their immediate survival and long-term resilience.

4.2 Limitations of the study

Several challenges significantly shaped the implementation and outcomes of the Sudan 2024 Smallholder Farmers Survey. Cellular network disruptions were the most serious obstacle, leaving entire regions, especially Darfur, unreachable by telephone. The validity of telephone contacts also posed a major difficulty, with many unreachable or inactive numbers, particularly in Blue Nile and South Kordofan—Blue Nile alone recorded 5,613 failed activation attempts. Security risks further constrained the survey—on-the-ground operations and follow-ups were not feasible in insecure areas. Gender imbalance was another concern, as only 3.5 percent of respondents were women. This reflects underlying disparities between men and women in mobile telephone ownership and access. This limited the value of the survey for capturing women's perspectives on agriculture production and household coping strategies, despite the crucial role women play in household food production.

Despite these limitations, the survey produced a robust dataset offering valuable insights into the state of Sudan's agricultural communities during an extraordinary period of upheaval. The use of CATI, coupled with flexible rescheduling and quality-assurance mechanisms, such as callbacks, validation protocols, and real-time monitoring, enabled the team to maintain data quality and achieve broad coverage under adverse conditions.

4.3 Recommendations

Despite emerging signs of recovery in agricultural input access and market functionality, the survey findings underscore that Sudan's rural sector remains under considerable strain during the ongoing conflict. Farming households continue to face a complex mix of challenges that threaten their ability to sustain their livelihoods, protect their assets, and ensure their food security. The persistence of the conflict, compounded by economic instability, climate-related shocks, and limited livelihood diversification, has left rural communities highly vulnerable. Without urgent, targeted, and sustained interventions, these fragile gains risk being reversed, and both household resilience and national food security will remain at risk. Based on these findings, we propose the following recommendations:

1. **Strengthen humanitarian assistance and social protection**: Immediate expansion of food aid, cash transfers, and livelihood assistance is critical, especially in conflict-affected states such as South and West Kordofan and Sennar. Ensure that assistance programs are designed to reach both displaced households and host communities to avoid deepening inequalities.
2. **Revitalize agricultural input and finance systems**: Restoring access to quality seed, fertilizer, pesticides, and irrigation is essential to boost productivity. Expanding agricultural finance mechanisms—through targeted subsidies, microfinance, and partnerships with non-governmental organizations—can reduce reliance on informal credit and help farmers sustain their operations.
3. **Protect livestock and livelihood assets**: Livestock losses due to theft, forced sales, and disease highlight the need for interventions that combine restocking programs with veterinary support, feed provision, and protection of grazing routes. Safeguarding these assets is central to the economic recovery and resilience of farming households.
4. **Target state-specific interventions**: Wide disparities in economic conditions and the sustainability of household livelihoods across states suggest that interventions must be tailored to local conditions. For example, food assistance and security measures are most urgent for South and North Kordofan, water and health services are critical for Red Sea and Kassala, and agricultural inputs remain a priority in Aj Jazirah and River Nile.
5. **Enhance market access and trade routes**: Restoring safe and functional market systems will improve farmer incomes and strengthen resilience. This requires investment in rural infrastructure, the reopening of trade routes, and efforts to stabilize prices in both local and urban markets.
6. **Integrate conflict-sensitivity and security measures**: Given farmers' widespread concerns about insecurity, interventions must incorporate protection measures—such as safe access to fields, livestock routes, and markets—and conflict-sensitive approaches that build trust and minimize the risks of exclusion for specific types of farming households.
7. **Invest in climate adaptation and resilience**: The overlap of climate shocks and conflict disruptions underscores the need for expanding the adoption of climate-smart agricultural production techniques. Investments in drought-tolerant crops, efficient irrigation technologies, and community-based resource management will help reduce vulnerability to future shocks.

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