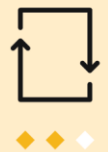




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Characteristics and survival of agrifood micro-, small and medium-sized enterprises in the Sudan's recent conflict

Exploring systemic challenges

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Abstract

The outbreak of violent conflict in the Sudan in April 2023 severely disrupted agrifood systems (AFS), markets and livelihoods. Micro-, small and medium-sized enterprises (MSMEs) are playing a critical role in sustaining food supply, employment and economic activity. This paper examines which firm-level characteristics are associated with higher levels of operational continuity among MSMEs that have continued operations during the ongoing conflict. The analysis uses nationally representative data from a survey of MSMEs in 2024 by IFPRI and the UNDP, conducted through computer-assisted telephone interviews across 13 states of the Sudan. It links firm-level outcomes with locality- or district-level conflict exposure data from the Armed Conflict Location & Event Data (ACLED). The empirical analysis focuses on 785 enterprises that were operating prior to the conflict and continued operations thereafter. Firms' post-conflict operational status is measured using an ordered categorical variable ranging from no operations to full operational capacity, and an ordered logit model is used to estimate how firm characteristics are associated with operational recovery.

Descriptive results indicate substantial disruption among surviving firms: 57 percent of enterprises relocated at least once, 62 percent experienced temporary closure, and only 19 percent were operating at full capacity at the time of the survey. Average monthly sales declined sharply, particularly for non-agricultural AFS enterprises, and permanent employment fell across all enterprise types. Econometric results show that sector affiliation and commodity type are not significant predictors of a firm's operational level. Instead, operational outcomes are strongly associated with value chain position, firm size, financial inclusion, formality, owner characteristics, and pre-conflict enterprise location. Input dealers display significantly higher odds of operating at higher capacity relative to producers, while firms in support services such as logistics, transport and packaging face significantly lower odds. Small and medium-sized firms, female-owned enterprises, firms with bank accounts, and enterprises that were not financially constrained prior to the conflict are more likely to be sustaining higher operational levels. In contrast, registered firms, those with multiple pre-conflict branches, and those located in high-intensity conflict areas, particularly Khartoum, are significantly less likely to be operating at higher capacity.

The findings highlight that enterprise resilience during conflict is shaped more by structural and institutional characteristics than by sector alone. Policy responses should therefore prioritize restoring midstream value chain functions, expanding access to conflict-adapted financial services, and supporting and protecting logistics and transport networks, particularly in relatively safer states that have become hubs for displaced firms. Strengthening these enterprises is essential, not only for firm survival, but also for maintaining AFS functioning and supporting broader economic stabilization in fragile and conflict-affected settings.

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Abbreviations

ACLED	Armed Conflict Location & Event Data
AFS	Agrifood systems
IFPRI	International Food Policy Research Institute
MSME(s)	micro-, small and medium-sized enterprise(s)
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OR	odds ratio
RSF	Rapid Support Forces
SAF	Sudanese Armed Forces
SDG	Sudanese pound
UNDP	United Nations Development Programme
UNHCR	United Nations High Commissioner for Refugees

1. Introduction

This report contributes to FAO's Analytical Support Mechanism for Agrifood System Country Programming and Evidence (SCOPE). The initiative strengthens countries' technical capacity in agrifood systems analysis by integrating FAO's specialized expertise with United Nations country-level programming, while informing policy dialogue and the prioritization of investments.

This report aims to generate evidence to explore and address key systemic challenges and thus strengthen resilient and adaptive agrifood system transformation in Sudan.

The Sudan's agrifood economy experienced an unprecedented shock following the outbreak of violent conflict in April 2023. Clashes between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) erupted in Khartoum and rapidly engulfed other key regions, displacing over 11.8 million people (FAO, 2024b; IFPRI and UNDP, 2026; Serwat and Kazemi, 2023; UNHCR, 2025) and severely disrupting agricultural production, food supply chains, market functioning, agroprocessing activities and access to agricultural inputs (Hoffmann, Mohamed and Van den Tempel, 2024; Ibrahim *et al.*, 2025; Kirui *et al.*, 2023a; Sarwar, 2024; Sidahmed and Mohamed, 2025). Agricultural input supply networks collapsed under the dual weight of infrastructure damage and insecurity, while the cost of transport and basic commodities surged as a result of fuel shortages and regional blockades (Hoffmann, Mohamed and Van den Tempel, 2024; Sidahmed and Mohamed, 2025). These disruptions have jeopardized livelihoods throughout the food system and exacerbated the fragility of the country's food security landscape (Ahmed *et al.*, 2024; Kirui *et al.*, 2025).

Micro-, small and medium-sized enterprises (MSMEs) in the agrifood sector are central to local livelihoods, providing employment, food security and income stability. Beyond primary production, post-farm gate activities performed by these MSMEs – such as processing, transport and retail – generate most of the sector's jobs and added value, creating critical pathways out of subsistence farming (Dolislager *et al.*, 2021; Kirui *et al.*, 2024; Reardon, 2015; Yi *et al.*, 2021). The resilience and continuity of MSMEs are therefore critical to preventing poverty and ensuring household food access for those engaged in these activities, as well as for the wider populations that rely on them for food and essential services, particularly during and after conflict. In the Sudan, MSMEs play a critical role in the agrifood sector (Kirui *et al.*, 2024). They serve as employment hubs, stabilize rural and urban markets, support household consumption, and provide key distribution and processing functions in the agricultural value chain (Kirui *et al.*, 2024). Importantly, many of these firms in the Sudan are owned or operated by women, underscoring the intersection of gender vulnerability and enterprise fragility in conflict contexts (Kirui *et al.*, 2024; Deininger *et al.*, 2023).

This paper examines how firm level characteristics are associated with the operational continuity of MSMEs during the Sudan's ongoing conflict. Using a nationally representative survey of MSMEs conducted in 2024 (IFPRI and UNDP, 2026), combined with locality-level conflict exposure data from the Armed Conflict Location & Event Data (ACLED) we empirically assess whether enterprises, particularly those operating in the midstream segments of value chains, have adapted under conditions of active violence. The study contributes new evidence on enterprise resilience and operational continuity in a highly fragile context and provides policy-relevant insights for supporting firms that are critical to food system functioning and economic stabilization.

Our findings indicate that MSME operations during the conflict are shaped primarily by firm size, access to finance and level of formality, position within the value chain, location prior to the conflict and intensity of conflict exposure, rather than by sectoral affiliation alone. Finally, we argue that designing effective interventions to safeguard viable enterprises in conflict-affected contexts – especially those in midstream value chain segments – based on their structural characteristics is essential for sustaining livelihoods and supporting economic recovery.

2. Micro-, small and medium-sized enterprises, conflict and agrifood value chain disruptions

MSMEs often act as economic anchors in fragile settings, with midstream actors in value chains as the "hidden middle" that links upstream producers to downstream markets (Hazell, Haggblade and Reardon, 2024). The resilience of these midstream actors – such as processors, traders and transporters – is critical not only for their own survival and that of the households they support (i.e. food security as a private good), but also for the stability of agrifood systems more broadly (i.e. food security as a public good). Their collapse or survival not only determines the wellbeing of the enterprise owners but affects food affordability, accessibility and resilience at the community level (Siddig *et al.*, 2025).

Disruptions at value chain nodes can severely affect food availability, affordability and nutritional quality at the population level. This is particularly evident in fragile and conflict-affected contexts, where violence and instability often disrupt both food production and distribution, leading to shortages and price spikes (Ahmed *et al.*, 2024; Kirui *et al.*, 2025). Maintaining functional agrifood value chains is therefore crucial to sustaining food security for consumers during and after conflict, as the sector remains a primary source of food for affected populations. Evidence shows that in conflict and post-conflict contexts, agrifood value chain activities are vital for stabilization and recovery, as they provide employment and income opportunities for affected populations, returnees, displaced persons and refugees (Dudwick and Srinivasan, 2013; Grossmann *et al.*, 2009). Post-conflict economic performance has also been argued to significantly affect the likelihood of a country maintaining peace after a conflict (Collier, Hoeffler and Söderbom, 2008; Ghani and Iyer, 2010). Further, employment has been identified as one of the main mechanisms by which economic growth reduces conflict risk (Collier, 2009).

Despite their centrality, MSMEs – particularly those involved in agrifood systems – remain understudied in the context of violent conflict. Much of the literature on conflict and enterprise dynamics is descriptive or macro level, lacking disaggregated insights into how different types of firms or value chain nodes respond to the shock (Ayal *et al.*, 2025). For instance, while we know that conflicts disrupt firm performance through displacement, supply chain fragmentation and capital loss (Mekonnen *et al.*, 2023), there is limited empirical evidence that identifies which enterprise types (such as agricultural vs. non-agricultural, in the agrifood system sector) and which segments of the value chain are most affected. Recent studies also note a lack of causal analyses that account for conflict exposure heterogeneity, or explore the nature of adaptive responses and coping strategies used by MSMEs in fragile states (Comola and Fafchamps, 2018; Del Prete, Di Maio and Rahman, 2023). Below we summarize the global evidence related to agrifood MSMEs and conflict settings that is relevant to the Sudan's current situation.

2.1 How does conflict affect firms?

Conflict has been shown to undermine enterprise performance in fragile and conflict-affected settings by disrupting markets, weakening institutions and reducing service delivery. Several impact pathways have been highlighted in the literature. First, supply chain disruptions are particularly severe across enterprises, as conflict often damages infrastructure and reduces access to inputs (Amodio and Di Maio, 2018; Del Prete, Di Maio and Rahman, 2023; Schuster and Diouf, 2025). Second, demand-side contractions occur as economic conditions deteriorate, reducing purchasing power and consumption (Béné, 2024; Justino, 2017). Third, market and competition distortions emerge, as conflict fosters market inefficiencies and alters competitive dynamics. For instance, studies have shown that enterprises in Libya and Palestine reported reduced input availability and lower output values, while in some cases surviving firms temporarily benefited from diminished competition (Amodio and Di Maio, 2018; Del Prete, Di Maio and Rahman, 2023). Additionally, institutional breakdown and weak property rights enforcement hinder business operations across sectors (Kolk and Lenfant, 2015). Further, disruptions to service provision reduce access to essential business services including inputs, credit and training (Ragasa and Golan, 2014). Agrifood firms in particular are frequently among the first to resume operations following disruptions (Hiller, Hilhorst and Weijs, 2014). However, the existing literature is uneven. While substantial research has examined the impacts of conflict on agrifood producers (Arias, Ibáñez and Zambrano, 2019; George, Adelaja and Weatherspoon, 2020; Koren and Bagozzi, 2017) and on

populations' nutrition and food security (Bar-Nahum *et al.*, 2020; Brück, d'Errico and Pietrelli, 2019; Dabalen and Paul, 2014; D'Souza and Jolliffe, 2013; Guerrero Serdan, 2009), far less attention has been paid to the middle segment of agrifood value chains – processors, transporters, retailers and vendors – despite their central role in connecting production to consumption (Dowd *et al.*, 2024).

2.2 How vulnerable and resilient are value chain nodes amid conflict situations?

Agrifood value chain nodes and actors can be affected differently by conflict-related shocks and stresses, depending on their position in the chain. Production nodes are particularly vulnerable, as conflicts reduce access to land and inputs, damage crops and decimate livestock herds (Cullis, 2021; Gates *et al.*, 2012; Schuster and Diouf, 2025; Teodosijević, 2003). Unsafe terrain and contamination from war residues further constrain productive capacity (Kah, 2017; Adelaja and George, 2019). Displacement, insecurity, and conscription campaigns reduce the availability of agricultural labour (von der Goltz *et al.*, 2020; Ksoll, Macchiavello and Morjaria, 2023). Meanwhile, input and credit markets collapse, extension services weaken, and financial institutions become ill-equipped to absorb the heightened risks (Van Dijkhorst, 2011; El-Zoghbi *et al.*, 2017; George, Adelaja and Weatherspoon, 2020; Kimenyi *et al.*, 2014). These vulnerabilities are further compounded by biological hazards, such as pest and disease outbreaks, which have historically amplified the destabilizing effects of conflict on agricultural production and food security (FAO, 2021).

Midstream nodes in agrifood value chains, which are made up of processors, traders and transporters, face a different set of challenges. Damage to transport and telecommunication infrastructure, combined with mobility restrictions, frequently undermines trade and credit markets, weakening linkages between rural and urban areas (Duggleby, Beauvy and Degnan, 2008; El-Zoghbi *et al.*, 2017; Van Dijkhorst, 2011; Adelaja and George, 2019; Schuster and Diouf, 2025). Recent evidence underscores these dynamics – amid conflict in Burkina Faso, food traders experienced a 40–50 percent contraction in activity (Béné, 2024; Maitre d'Hôtel *et al.*, 2023), illustrating how entire supply chains and the MSMEs operating within them can be disrupted. Transporters are forced to reroute, retailers to relocate, and enterprises to contend with rising transaction costs, heightened exposure to extortion and corruption, food safety risks from longer transit times and unreliable electricity, weakened market mechanisms, and the erosion of networks and information flows. Further, studies show that processors and traders often scale down or cease operations in response to insecurity, labour displacement, and lack of inputs, resulting in shortened agrifood value chains in which middle segments disappear and goods are traded largely in unprocessed form (Adelaja and George, 2019; von der Goltz *et al.*, 2020; Özerdem and Roberts, 2016; Schuster and Diouf, 2025; Raeymaekers, 2006).

The erosion of trust among actors aggravates these effects, fostering risk aversion, higher transaction costs, and reduced cooperation, which in turn hampers product quality upgrading and service provision (Hiller, Hilhorst and Weijs, 2014). Beyond the specific node of the value chain, the characteristics of the commodities themselves determine how they are affected by shocks and stresses. Evidence suggests that fruit and vegetable value chains are particularly vulnerable, as their dependence on manual labour and outdoor work renders them highly exposed to disruptions in mobility, security, and workforce availability (Van Hoyweghen *et al.*, 2021). Their perishable nature, coupled with the requirement for pre-consumption processing and cold storage, further amplifies sensitivity to disruptions to energy supply, transport infrastructure, and market access – which are recurrent in conflict-affected areas. In contrast, non-perishable commodities such as grains are less immediately affected by short-term disruptions to distribution. However, their long storage periods heighten vulnerability to conflict-related biophysical and biological hazards, including damage to storage facilities, infestations, and contamination.

2.3 How do firms cope in conflict situations?

Firms in conflict-affected settings adopt a variety of coping strategies to sustain operations and mitigate risks. These can range from labour shedding and temporary closures (Kirui *et al.*, 2023b) to sourcing inputs from alternative markets or changing business models (Del Prete, Di Maio and Rahman, 2023). Firms may also rely on informal networks or financial instruments, when available, to buffer losses. However, lack of access to formal credit, especially in rural and conflict-affected zones, remains a major constraint (Johnson, 2021).

Firms frequently adjust by relocating activities (Kirui *et al.*, 2023b), diversifying products, forming cross-sector partnerships or restructuring management practices to cope with volatile conditions (Fernández, Ibáñez and Peña, 2014; Menon and Van der Meulen Rodgers, 2015; Rockmore, 2020). However, these strategies often come at the cost of reduced productivity or a move into less formal modes of operation. Indeed, economic activity in conflict settings tends to become increasingly informal, with formal taxation declining while informal markets and revenue-raising mechanisms thrive (Arias, Ibáñez and Zambrano, 2019; Rakhy *et al.*, 2025). Such coping responses reveal the persistence of economic life in conflict zones, but also underscore the precariousness of firm performance. Enterprises may survive by scaling down, shifting product lines or moving into informal channels, however, these adaptations rarely foster longer-term resilience or upgrading. Studies from other conflict-affected regions emphasize the importance of location, gender, firm size and prior exposure to shocks in determining a firm's ability to adapt (Del Prete, Di Maio and Rahman, 2023). Yet, there is very limited research from the Sudan itself that links these factors to post-conflict firm performance and recovery strategies.

3. Data and methods

3.1 Data and sampling

This study draws on data from a survey of MSMEs in 2024, which was jointly implemented by the International Food Policy Research Institute (IFPRI) and the United Nations Development Programme (UNDP) (IFPRI and UNDP, 2026). The survey targeted micro-, small and medium-sized enterprises (MSMEs) operating in the Sudan. The definition of MSMEs used in the survey is based on the World Bank classification using the number of employees, whereby micro-enterprises employ fewer than 10 employees, small enterprises employ between 10 and 49 employees, and medium-sized enterprises employ between 50 and 249 employees, – with an adapted range of 50 to 99 employees applied to the Sudan as it is a low-income country (World Bank, 2019). Sampling quotas were determined based on three control variables: state, firm size and sector of activity, using the Sudan Labor Market Panel Survey (Krafft, Assaad and Cheung, 2023) as the reference framework. A contact list of approximately 20 000 firms was compiled through collaboration between data collection firms, GeoPoll and ConsulSat, as well as trusted local partners. A snowballing method was also used, where respondents referred up to four other enterprise owners, yielding 435 additional valid contacts.

Data collection occurred between July and November 2024, with a target sample size of 1 500 firms. Given the Sudan's security environment, the survey employed computer-assisted telephone interviews (CATI) to ensure safe and efficient data collection. Mobile telephone numbers were randomized before distribution to call centre managers and enumerators. Ultimately, 1 530 firms were successfully surveyed, slightly exceeding the initial target. The survey achieved partial or full coverage in 13 of the Sudan's 18 states. Insecurity, displacement and network failures limited access to several states, particularly the five states of the Greater Darfur region, Sennar, West Kordofan and South Kordofan. To correct for potential over- or under-representation across strata, sampling weights were constructed using a direct post-stratification method. These weights enable valid inference across firm characteristics, states, business sector and firm size (Table 1). While the survey achieved broad coverage across states and sectors, access limitations in high-conflict areas led to under-representation in those regions.

Table 1. Number of firms surveyed by state and sample representativeness, unweighted and weighted

State	Achieved sample (no. of firms)	Percent (%) unweighted	Percent (%) weighted
Al Jazirah	21	1.37	19.80
Blue Nile	13	0.85	1.37
Gedaref	179	11.70	8.10
Kassala	202	13.20	10.85
Khartoum	227	14.84	26.73
North Kordofan	24	1.57	4.84
Northern	297	19.41	3.97
Red Sea	306	20.00	10.20
River Nile	182	11.90	6.01
Sennar	2	0.13	1.70
South Kordofan	3	0.20	2.55
West Kordofan	1	0.07	0.20
White Nile	73	4.77	3.86
Total	1 530	100.00	100.00

Source: Authors' own elaboration, based on IFPRI (International Food Policy Research Institute) & UNDP (United Nations Development Programme). 2026. *Sudan's Armed Conflict Impact on the Private Sector: Evidence from MSMEs Survey*. Washington, DC, IFPRI and New York, USA, UNDP.

For the purpose of mapping conflict against changes in business operations, we compiled and used data on exposure to armed conflict from ACLED (Raleigh *et al.*, 2010). In this analysis, we focus on three events to capture the most prevalent forms of violence or conflict: battles, explosions and remote violence, and civilian violence. The analysis aggregates the number of fatalities resulting from these three types of conflict events, up to the time of data collection in the survey of MSMEs (30 November 2024). Given the lack of available GPS coordinates for MSME premises, we aggregated and merged these events at the locality or district level.

The survey of MSMEs was structured into multiple modules, covering topics including business characteristics, business operation levels, conflict exposure levels and coping strategies, providing a comprehensive dataset to examine the effects of conflict on enterprise performance and resilience. This modular design enables detailed analysis of firm-level attributes, operational disruptions and adaptive responses, making the survey ideally suited to address the research questions of this study. For this analysis, the total sample was divided into two groups: (i) firms that were operating prior to the conflict and continued operations after its outbreak (785 firms), and (ii) new firms that began operating after the conflict started (745 firms). This analysis focuses exclusively on the first group, as these enterprises provide critical insights into understanding firm-level characteristics that contribute to higher operational recovery levels amid an ongoing conflict.

The survey of MSMEs categorised enterprises operating in different business sectors based on the International Standard Industrial Classification of all Economic Activities (ISIC), Revision 4, codes at the two-digit level (United Nations, 2008). For this analysis, the 785 enterprises which continued operations were further categorised into agrifood system (AFS) and non-agrifood system (non-AFS) enterprises following the method used by Davis *et al.* (2023). Under this approach, AFS MSMEs were grouped into two categories: (i) agricultural AFS (ag. AFS) MSMEs, which are engaged in the primary production of agricultural commodities, and (ii) non-agricultural AFS (non-ag. AFS) MSMEs, which operate upstream or downstream within the AFS and are engaged in processing, support services, retail and wholesale activities. These enterprises constitute the middle segment of the agricultural value chain. A third category comprises non-AFS MSMEs, which include all MSMEs in other sectors, such as mining, construction, electricity and water supply, finance, real estate, education, health services, and related industries.

3.2 Analytical approach

To assess the characteristics of MSMEs that survived the recent conflict in the Sudan, an ordered logit regression is used. Firms are classified into five ordered categories based on their level of operations after the conflict started, ranging from not operational to fully operational. Given the ordinal nature of the dependent variable, a linear regression model would not be suitable. Hence, an ordered logit model is used to estimate the firm level characteristics associated with higher levels of operational recovery or continuity. Odds ratios (ORs) are reported, where an OR greater than one indicates higher odds of being in a higher operational category, while an OR less than one indicates lower odds.

The ordered logit model can be specified as follows:

$$y_i^* = X_i\beta + \varepsilon_i$$

where y_i^* is an unobserved variable representing the underlying level of operations of firm i , X_i is a vector of firm level characteristics, β is a vector of parameters to be estimated, and ε_i is an error term assumed to follow a logistic distribution.

The observed outcome y_i relates to the unobserved variable y_i^* through threshold parameters μ_j such that:

$$y_i = \begin{cases} 1 & \text{if } y_i^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < y_i^* \leq \mu_2 \\ 3 & \text{if } \mu_2 < y_i^* \leq \mu_3 \\ 4 & \text{if } \mu_3 < y_i^* \leq \mu_4 \\ 5 & \text{if } y_i^* > \mu_4 \end{cases}$$

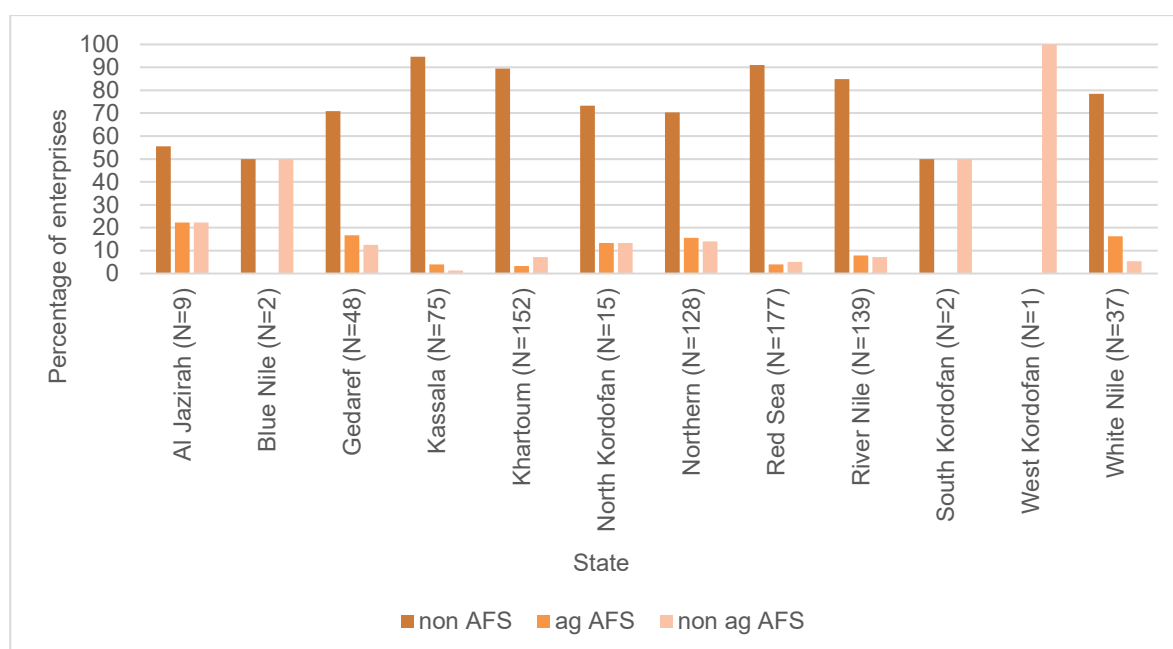
where the μ_j thresholds are estimated cut-off points that divide the unobserved variable into the observed ordered response categories as follows: 1 = 0 percent operations, 2 = more than 25 and less than 50 percent operations, 3 = more than 50 and less than 75 percent operations, 4 = more than 75 and less than 100 percent

operations, and 5 = 100 percent operations. Firms operating at more than 0 and up to 25 percent are not represented as a separate category in the outcome variable, because the survey instrument did not include this range as a standalone response option. Hence, even though the distance between the values of the outcome variable are not equal, an ordered logit model is appropriate because the outcome variable is ordinal in nature and does not require the assumption of equal distance between categories (Kikulwe, Falck-Zepeda and Wessler, 2014).

4. Results and discussion

The conflict has yielded dire effects on business operations in the Sudan. At its onset in 2023 in particular, considerable losses in input materials and available workforce were yielded, and business operations were halted (Kirui *et al.*, 2023b). This analysis reveals distinct patterns in continuity of business operations following the eruption of the recent episode of conflict. The variation in continuity levels among businesses depends on several factors including a business' state of origin and infrastructure in its current state of operation.

Figure 1. Location of micro-, small and medium-sized enterprises that continued operations in the Sudan after the conflict started on 15 April 2023



Notes: AFS = agrifood system; ag = agricultural; non ag = non agricultural.

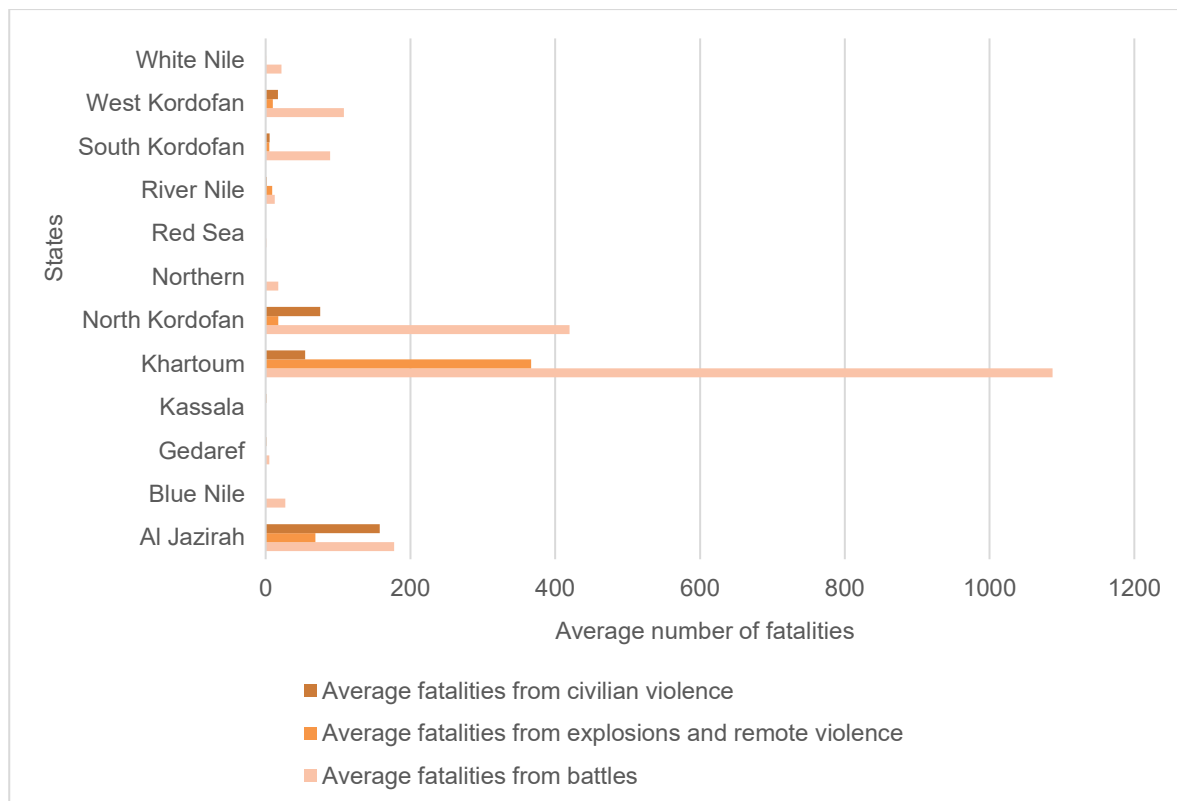
Source: Authors' own elaboration, based on IFPRI (International Food Policy Research Institute) & UNDP (United Nations Development Programme). 2026. *Sudan's Armed Conflict Impact on the Private Sector: Evidence from MSMEs Survey*. Washington, DC, IFPRI and New York, USA, UNDP.

Figure 1 illustrates the state-level distribution of enterprises that continued operations after the conflict started across the Sudan. For each state, the shares of the three enterprise types sum to 100 percent. Most of the enterprises interviewed were based in Red Sea, Khartoum, River Nile and Northern states at the time of data collection, and account for a large share of the 785 enterprises that continued operations. Enterprises in these states were more accessible given the telephone-based nature of the survey and considering the network and telecommunication challenges at the time of data collection. Among enterprises that continued operations, non-AFS enterprises dominate across all states, indicating a strong service sector presence. Agricultural AFS enterprises are sparsely distributed, with higher representation in more agrarian states such as Al Jazirah, Gedaref, Northern and White Nile. Meanwhile, non-agricultural AFS enterprises appear only in a few states, most notably in Blue Nile, South and West Kordofan. The predominance of non-AFS enterprises across states in the Sudan is consistent with existing evidence on the country's enterprise structure and informal economy, and hence cannot be considered a unique feature of its post-conflict landscape. Moreover, studies on informal enterprises show that trade and service sectors dominate, with agriculture representing only a small share of enterprises in urban and peri-urban areas (Mohammad, Idris and Gabbani, 1991; UNDP, 2022; World Bank, 2022).

Figure 2 illustrates the intensity of conflict exposure after 15 April 2023, measured by the average number of fatalities and disaggregated by type of violence, using ACLED data. Khartoum experienced by far the highest levels of conflict-related fatalities, particularly from battles and explosions and remote violence, making it the

epicentre of violent confrontation in 2023. This is to be expected, as the conflict initially broke out in Khartoum before spreading to other regions, most notably Al Jazirah, Sennar, the Greater Darfur region and North Kordofan (FAO, 2024b; IFPRI and UNDP, 2026; Serwat and Kazemi, 2023).

Figure 2. Location of fatalities in the Sudan after the conflict started on 15 April 2023



Source: Authors' own elaboration, based on ACLED (Armed Conflict Location & Event Data Project). 2025. ACLED. [Accessed on 20 December 2025]. <https://acleddata.com>

The survey data shows that among all the enterprises that continued operations, 57.3 percent relocated to other states. Enterprises originating in Khartoum account for the largest share of these relocations (74.4 percent). These enterprises mainly relocated to Red Sea (30.8 percent), River Nile (26 percent), Northern (19.3 percent) and Kassala (12.2 percent), all of which reported less conflict intensity in terms of the number of fatalities (see Table A1, Appendix). Red Sea, River Nile and Northern states, which host a large share of enterprises (see Figure 1), show low exposure to conflict events (see Figure 2), indicating that these areas may serve as relatively safer zones for potential business relocations and continuity.

Table 2 provides an overview of the characteristics of the 785 enterprises from the survey data that continued operations after the conflict started on 15 April 2023. These are disaggregated into non-AFS, agricultural AFS and non-agricultural AFS enterprises. Non-AFS enterprises form the largest share, while agricultural and non-agricultural AFS enterprises each account for a small share. In terms of gender composition, most enterprises that continued business operations following conflict are male-owned (73.1 percent), with male ownership being highest among agricultural AFS firms (87.5 percent). The average age of business owners is around 39 years. Most enterprises are micro-enterprises employing fewer than five workers (62.0 percent), followed by small (31.2 percent) and medium-sized (6.8 percent) enterprises, reflecting a small-scale business environment. The average number of business branches declined from around two before 15 April 2023 to around one afterwards, indicating contraction and possible closures as a result of the ongoing conflict.

Table 2. Characteristics of micro-, small and medium-sized enterprises that continued operations in the Sudan after the conflict started on 15 April 2023

Enterprise characteristics	Non-AFS	Agricultural AFS	Non-agricultural AFS	Total observations (%)
Frequency (%)	657 (68.7)	64 (8.2)	64 (8.2)	785
Relationship with business owner (%)				
Owner/co-owner	53.6	70.3	57.8	434 (55.3)
Chief accountant/financial director/financial manager/accountant	7.9	4.7	9.4	61 (7.8)
General director/executive director/deputy director/managing director	7.0	4.7	6.2	53 (6.7)
Worker or employee who can provide answers on behalf of the business	31.5	20.3	26.7	237 (30.2)
Gender of owner (%)				
Male	71.4	87.5	76.6	574 (73.1)
Female	28.6	12.5	23.4	211 (26.9)
Age of owner				
Average age	39	40	40	39
Firm size (%)				
Micro (fewer than 5 employees)	63.0	60.9	53.1	487 (62.0)
Small (5–19 employees)	30.6	29.7	37.5	245 (31.2)
Medium (20–99 employees)	6.2	9.4	9.4	53 (6.8)
Number of branches				
Average number of branches before 15 April 2023	1.5	2.0	2.0	1.6
Average number of branches at time of survey	1.1	1.5	1.2	1.1
Location of business before 15 April 2023 (%)				
Village	6.7	35.9	12.5	75 (9.6)
Town	91.2	64.1	85.9	695 (88.5)
Location of business at present (%)				
Village	7.5	48.4	21.9	94 (12.0)
Town	92.1	51.6	75.0	686 (87.4)
Registration status (%)				
Yes	79.9	81.0	95.3	636 (81.2)
No	19.5	15.9	4.7	141 (18.0)
Registered firms	0.6	3.2	0.0	6 (0.8)
Organizational status (%)				
Individual business/sole proprietor/partnership with members of household	72.9	72.6	60.7	456 (71.7)
Joint venture	14.3	15.7	14.8	92 (14.5)
Others	12.8	11.8	24.6	88 (13.8)
Bank account (%)				
Yes	58.6	54.7	65.6	462 (58.9)

Enterprise characteristics	Non-AFS	Agricultural AFS	Non-agricultural AFS	Total observations (%)
No	41.2	45.3	34.4	322 (41.0)
Enterprises in need for financing (%)				
Before 15 April 2023	16.6	28.1	22.9	141 (18.0)
At time of survey	35.0	40.6	29.7	275 (35.0)
Facing challenging rules/regulation (%)				
Before 15 April 2023	26.5	14.1	20.3	196 (25.0)
At time of survey	25.7	17.2	20.3	193 (24.6)
Value chain node (%)				
Input dealer	10.5	0.0	10.9	76 (9.7)
Production (crops/livestock/goods and services)	20.9	100.0	0.0	201 (25.6)
Processing	3.4	0.0	3.1	24 (3.06)
Support services (logistics/packaging/transport)	10.8	0.0	9.4	77 (9.8)
Trading (wholesale)	11.7	0.0	45.3	106 (13.5)
Trading (retail)	18.1	0.0	17.2	130 (16.6)
Export	1.5	0.0	6.3	14 (1.8)
Import	2.3	0.0	4.7	18 (2.3)
Others	3.5	0.0	0.0	23 (2.9)
Refused to answer	1.2	0.0	3.1	10 (1.3)
Commodity (%)				
Non-agricultural commodity	81.4	0.0	0.0	535 (68.2)
Cereal and rice	0.0	37.5	21.9	38 (4.8)
Sugar cane and tobacco	0.0	1.6	0.0	1 (0.1)
Legumes	0.0	10.9	17.2	18 (2.3)
Fruits	0.0	7.8	4.7	8 (1.0)
Vegetables	0.0	9.4	6.3	10 (1.3)
Livestock	0.0	12.5	4.7	11 (1.4)
Forestry and logging	0.0	1.6	0.0	1 (0.1)
Fishing and aquaculture	0.0	3.1	3.1	4 (0.5)
Don't know	0.5	15.6	29.7	37 (4.7)
Refused to answer	5.6	0.0	0.0	55 (7.0)
Others	8.4	0.0	0.0	32 (4.1)

Notes: AFS = agrifood system.

Source: Authors' own elaboration, based on IFPRI (International Food Policy Research Institute) & UNDP (United Nations Development Programme). 2026. *Sudan's Armed Conflict Impact on the Private Sector: Evidence from MSMEs Survey*. Washington, DC, IFPRI and New York, USA, UNDP.

The survey data also shows that before April 2023, nearly nine out of ten firms (88.5 percent) were located in towns, with only 9.6 percent located in villages. The urban nature of the ensuing conflict in many regions has led to a shift in the location of some businesses, whereby the share of firms in villages increased to 12 percent, suggesting potential relocation from urban to rural areas. This shift is possibly for the purpose of seeking safety, since the conflict has predominantly been concentrated in densely populated urban centres, with two-thirds of the fighting between SAF and RSF taking place in cities of over 100 000 people (IFPRI and UNDP,

2026; Kirui *et al.*, 2023b; OCHA, 2023a, 2023b; Serwat and Kazemi, 2023). In terms of management and organizational structure, most survey respondents were owners or co-owners of businesses (55.3 percent), and around 72 percent of firms operated as individual or family-based businesses, highlighting the dominance of small, owner-managed enterprises. Among the sampled firms that continued operations after the conflict began, 81.2 percent were formally registered. Additionally, about 58.9 percent of firms had a bank account, reflecting limited access to formal financial systems among those surveyed. Among the different types of MSMEs, the following had bank accounts: 58.6 percent of non-AFS firms, 54.7 percent of agricultural AFS firms and 65.6 percent of non-agricultural AFS firms. These results reflect a considerable gap in access to finance for agrifood production. This indicates higher vulnerability of these firms to economic shocks in the absence of structured financing streams. Around 25 percent of firms found rules and regulations by states and local authorities challenging, both before and after the conflict started. These challenges include bureaucracy, registration processes and high fees, among other regulatory issues faced by small businesses.

Our analysis of value chain nodes shows some differences across sectors. Given the Sudanese economy's reliance on agricultural production, our findings show that 100 percent of agricultural AFS firms are concentrated entirely in production activities, as expected. On the other hand, the findings show that non-agricultural AFS firms have notable participation in wholesale trading (45.3 percent). Non-AFS firms – in contrast with AFS (both agricultural and non-agricultural) firms – are more diversified in nature, whereby 18.1 percent are in retail, 11.7 percent are in wholesale, 10.8 percent are in support services and 10.5 percent are involved in supplying inputs. When disaggregated by commodity type, 68.2 percent of firms trade non-agricultural commodities, thus indicating strong concentration of service-driven firms in the Sudan. Meanwhile, the majority of agricultural AFS firms trade in cereals and rice (37.5 percent), livestock (12.5 percent), and vegetables and legumes (9–11 percent).

Table 3 summarizes the operational status of enterprises that continued operating during the conflict, disaggregated by sector. Our results show that only 18.7 percent of the enterprises continued to operate at their full capacity after the conflict started, while the majority were functioning at below 75 percent of their pre-conflict-level capacity. About 27.8 percent were operating at a level between 50 and 75 percent of their capacity and 24.1 percent were operating at a level between 25 and 50 percent of their capacity, demonstrating widespread operational slowdown across all sectors and firm types. Around 10.1 percent of enterprises have ceased operations entirely, reflecting the direct impact of conflict on business continuity. Overall, 62.2 percent of enterprises have closed down their operations at some point since the conflict began. Despite this, the majority (58 percent) said that they were planning to be fully operational within 6 months, while 28.1 percent expected such recovery within a year. Only a small fraction (2.1 percent) had no plans to reopen, implying that while the business environment remains fragile, most firms retained some degree of optimism about their future.

Table 3. Operations of micro-, small and medium-sized enterprises that remained operational in the Sudan after the conflict started on 15 April 2023

	Non-AFS	Agricultural AFS	Non-agricultural AFS	Total number of firms (%)
Level of operations (%)				
Not operational – 0%	9.9	9.4	12.5	79 (10.1)
More than 25% and less than 50%	25.1	21.9	15.6	189 (24.1)
More than 50% and less than 75%	26.8	29.7	35.9	218 (27.8)
More than 75% and less than 100%	19.5	20.3	17.2	152 (19.4)
Fully operational – 100%	18.7	18.8	18.8	147 (18.7)
Enterprises that have been closed at least once since the conflict started (%)	65.1	54.7	39.1	488 (62.2)
Enterprises with plans to fully reopen (%)				
Less than 6 months from now	58.9	51.4	52.0	283 (58.0)
Within 1 year from now	26.6	37.1	40.0	137 (28.1)
More than 1 year from now	6.5	5.7	8.0	32 (6.6)
No	1.9	5.7	0.0	10 (2.1)
Average number of times a business had to relocate	2.0	4.0	13.0	3.0
Enterprises that relocated from village to town (%)	3.0	1.6	3.1	23 (2.9)
Enterprises that relocated from town to village (%)	3.5	14.1	12.5	40 (5.1)
Change in sales since the conflict started (%)				
Increased	23.7	35.9	14.1	188 (24.0)
Decreased	63.8	46.9	56.3	485 (61.8)
Stayed the same	7.0	10.9	18.8	65 (8.3)
Change in production since the conflict started (%)				
Increased	23.8	25.0	21.9	186 (23.7)
Decreased	57.5	54.7	42.2	439 (56.0)
Stayed the same	10.2	10.9	23.4	89 (11.4)

Source: Authors' own elaboration, based on IFPRI (International Food Policy Research Institute) & UNDP (United Nations Development Programme). 2026. *Sudan's Armed Conflict Impact on the Private Sector: Evidence from MSMEs Survey*. Washington, DC, IFPRI and New York, USA, UNDP.

Given the geographical spread of conflict, the location of enterprises has also shifted. On average, enterprises have had to relocate three times since the conflict started, with non-agricultural AFS enterprises relocating on average 13 times. This indicates instability and displacement pressures, particularly for firms in the middle segments of agricultural value chains, such as processors, wholesalers and traders. Relocation from towns to villages is more common compared to relocation from villages to towns, particularly among agricultural AFS (14.1 percent) and non-agricultural AFS (12.5 percent) firms. This contrasts sharply with the relatively low rates of relocation from towns to villages observed among non-AFS firms (3.5 percent) and on average for all firms surveyed (5.1 percent). The stronger tendency for AFS firms to relocate back to villages may be a consequence of the urban-centric nature of the conflict when it started on 15 April 2023 (OCHA, 2023a, 2023b), and the associated damage to agricultural production and the middle segments of the agricultural value chains in urban areas.

The majority of enterprises also reported decreases in both sales and production levels since the start of the conflict. Overall, 61.8 percent of enterprises reported decreases in sales, while 24 percent experienced an increase. Non-agricultural AFS enterprises, which form the middle segment of the value chain, recorded the lowest increases in sales (14.1 percent) and substantial decreases in sales (56.3 percent), indicating considerable disruptions in supply chains. These disruptions had an impact on various segments of productive value chains, both in non-AFS and AFS sectors, whereby road blockages, risks of theft and looting, and active combat in city entrance areas exacerbated the crisis (Abushama *et al.*, 2023). Similarly, more than half of all enterprises (56 percent) experienced decreases in production levels, with non-agricultural AFS enterprises reporting relatively lower decreases in production. Out of all enterprises surveyed, only 23.7 percent reported increases in production levels, with agricultural AFS enterprises reporting increases more commonly than other enterprise types. Although similar trends in sales and production levels emerge across the different enterprise types, the agricultural AFS sector shows higher sales and production, thus inferring increased demand for food commodities and other agricultural products, compared to non-AFS and non-agricultural AFS firms.

Table 4 presents the changes in sales performance and employment levels among 785 enterprises that continued operations, comparing outcomes before and after the conflict started. The findings reveal a decline in economic activity, reflected in both sales revenue and employment indicators across all enterprise types. In terms of sales performance, average monthly sales revenue for non-AFS enterprises declined significantly by 36.9 percent. Similarly, non-agricultural AFS enterprises experienced a significant decline of 60.2 percent. By contrast, agricultural AFS enterprises show a smaller and statistically insignificant decline of 24.8 percent, suggesting that agricultural enterprises may have been relatively insulated from the shocks generated by the conflict. Notably, the overall economic downturn following the conflict further depreciated the Sudanese pound (SDG), thus the declines in sales revenue are even greater in real terms (World Bank, 2025).

Table 4. Sales and employment of micro-, small and medium-sized enterprises that continued operations in the Sudan after the conflict started on 15 April 2023

	Non-AFS	Agricultural AFS	Non-agricultural AFS	Total number of firms
Monthly sales revenue ('000 SDG)				
Average monthly sales revenue 3 months before the conflict started	4 290.2***	3 723.0	4 308.2***	559
Average monthly sales revenue prior to survey	2 708.2***	2 798.8	1 716.0***	614
Percentage change	-36.9%	-24.8%	-60.2%	
Permanent workers				
Average number of workers before the conflict started	10.1***	15.0**	14.7**	777
Average number of workers at time of survey	6.2***	8.1**	7.5**	785
Percentage change	-38.6%	-46.0%	-49.0%	
Average number of female workers before the conflict started	4***	5	6	738
Average number of female workers at time of survey	3***	3	3	734
Percentage change	-35.0%	-49.0%	-51.8%	

Temporary workers				
Average number of workers before the conflict started	3.7***	4.8	8.6	733
Average number of workers at time of survey	1.8***	4.2	7.5	769
Percentage change	-51.4%	-12.5%	-12.8%	
Average number of female workers before the conflict started	2.7***	3.9	5.0	359
Average number of female workers at time of survey	1.6***	2.7	4.7	320
Percentage change	-40.7%	-30.8%	-6.0%	
Unpaid workers				
Average number of workers before the conflict started	1.0	1.3*	2.4***	758
Average number of workers at time of survey	0.9	1.1*	2.5***	774
Percentage change	-10.0%	-15.4%	4.2%	

Note: AFS = agrifood systems. Results from the comparison of mean values (using a t-test) for sales and employment before and after the conflict started are reported for each enterprise type.

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' own elaboration, based on IFPRI (International Food Policy Research Institute) & UNDP (United Nations Development Programme). 2026. *Sudan's Armed Conflict Impact on the Private Sector: Evidence from MSMEs Survey*. Washington, DC, IFPRI and New York, USA, UNDP.

The shift in employment levels mirrors the decline in sales. The average number of permanent workers decreased significantly across all sectors – by 38.6 percent in non-AFS firms, and by 46 and 49 percent in agricultural and non-agricultural AFS firms respectively. These reductions are statistically significant, indicating widespread job losses and downsizing (Kirui *et al.*, 2023b). With regards to gender, the number of female permanent workers in non-AFS enterprises decreased significantly (by 35 percent), whereas in AFS enterprises (both agricultural and non-agricultural), decreases in the number of female workers were not statistically significant. This implies that conflict-related employment losses disproportionately affected women in non-AFS enterprises, while the employment of women in AFS enterprises (both agricultural and non-agricultural) remained relatively stable. These results suggest that women play a core role in AFS production. The number of temporary workers also declined significantly (by 51.4 percent) in non-AFS firms. Regarding labour without remuneration, the number of unpaid workers decreased slightly (by 15.4 percent) in agricultural AFS firms and increased marginally (by 4.2 percent) for non-agricultural AFS firms. Finally, it should be noted that decreases in paid employment in AFS firms can also be explained by the seasonal nature of agriculture in the Sudan. There are two agricultural seasons in the Sudan – summer season (June/July to November/December) and winter season (November/December to March/April). The conflict broke out at the end of the 2022/2023 winter harvest season and disrupted cropping activities in the subsequent summer 2023 season. This was also followed by a decline in labour availability, increases in input prices and significant declines in cultivated area resulting from displacement, looting and destruction of agricultural infrastructure (FAO, 2024a).

Table 5 reports the results of the ordered logit regression analysing the characteristics of MSMEs that continued operations in the Sudan following the outbreak of conflict on 15 April 2023. The findings provide insight into how firm-level characteristics are associated with the extent to which these enterprises continued their operations despite the conflict. The outcome variable in this analysis captures firms' level of operations after the start of the conflict, i.e. between July and November 2024 (the period of data collection).

Table 5. Results of ordered logit regression – assessing characteristics of micro-, small and medium-sized enterprises that continued operations in the Sudan after the conflict

	Odds ratio	Standard error
Enterprise type (reference = non-AFS)		
Agricultural AFS	1.414	1.454
Non-agricultural AFS	1.211	1.198
Value chain node (reference = production)		
Input dealer	2.207**	0.590
Processing	0.956	0.397
Support services (logistics/packaging/transport)	0.481**	0.138
Trading (wholesale)	0.943	0.246
Trading (retail)	0.852	0.208
Others	0.392***	0.126
Commodity (reference = non-agricultural commodity)		
Crops	0.824	0.837
Livestock and fishery	0.609	0.682
Others	1.061	0.959
Age of owner	0.978***	0.007
Gender of owner (reference = male)		
Female	2.065***	0.379
Firm size (reference = micro [fewer than 5])		
5–19 employees (small)	3.284***	0.587
20–99 employees (medium)	2.879***	0.871
Bank account ownership (reference = yes)		
No	0.675**	0.115
Formal registration of business (reference = yes)		
No	0.935	0.205
Registered firms	0.198**	0.154
Number of branches pre-conflict	0.835***	0.036
Location of business pre-conflict (reference = village)		
Town	0.630*	0.171
In need of finance pre-conflict (reference = yes)		
No	1.876***	0.378
Challenging rules/regulation by authorities pre-conflict (reference = yes)		
No	0.782	0.144
Location of enterprise pre-conflict (reference = Khartoum)		
Al Jazirah	0.872	0.637
Blue Nile	5.283	8.210
Gedaref	3.787***	1.335
Kassala	4.907***	1.554
North Kordofan	3.218*	1.962

	Odds ratio	Standard error
Northern	4.631***	1.258
Red Sea	4.322***	1.083
River Nile	2.820***	0.748
South Kordofan	0.000	0.000
West Kordofan	2.272	3.592
White Nile	3.753***	1.480
cut1	-2.375	0.535
cut2	-0.517	0.525
cut3	0.872	0.523
cut4	2.064	0.527
Number of observations	614	

Notes: AFS = agrifood system. Outcome variable is divided into five ordered categories ranging from not operational to fully operational, where: 1 = 0 percent, 2 = more than 25 and less than 50 percent, 3 = more than 50 and less than 75 percent, 4 = more than 75 and less than 100 percent, and 5 = 100 percent operational. Cut values represent threshold parameters in the ordered logit model separating adjacent outcome categories and are not directly interpretable as odds ratios.

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' own elaboration, based on IFPRI (International Food Policy Research Institute) & UNDP (United Nations Development Programme). 2026. *Sudan's Armed Conflict Impact on the Private Sector: Evidence from MSMEs Survey*. Washington, DC, IFPRI and New York, USA, UNDP.

The ordered logit results indicate that enterprise type (AFS or non-AFS) and commodity type have no significant effect on firms' levels of operations. By contrast, a firm's position in the value chain has a significant effect on its level of operations. Input dealers have an OR of 2.207, implying that they have about 120 percent higher odds of operating at higher levels, compared to agricultural producers. While firms in support services like logistics, packaging and transport have around 52 percent (OR = 0.481) lower odds of operating at a higher level, compared to producers. This is expected as the conflict has had a considerable impact on transport routes and infrastructure, which has directly limited the functioning of support service enterprises (Abushama *et al.*, 2023). The location of these firms is another key factor that contributes to business continuity. In our sample, the majority of the support service enterprises (28 percent) were based in Khartoum, which is a high conflict zone, compared to producers who were mostly in Red Sea (25 percent), which has comparatively less exposure to conflict. Notably, processing, wholesale and retail trading firms did not differ significantly from producers in terms of operational recovery.

Firms' ownership and characteristics are significantly associated with post-conflict operational levels. Older owners' firms have slightly lower odds of operating at higher levels (OR = 0.978), whereas female-owned firms have about 107 percent higher odds of operating at higher levels (OR = 2.065), compared to male-owned firms. This suggests greater resilience among female owners across sectors. Regarding firm size, compared to micro-enterprises, both small (OR = 3.284) and medium-sized firms (OR = 2.879) have higher odds of operating at higher levels, signifying that microenterprises are more vulnerable to the conflict. Financial and institutional factors also have a significant effect on firms' operational levels. Firms without a bank account have about 33 percent lower odds of operating at higher levels (OR = 0.675), and those that registered have about 80 percent lower odds of reaching higher operational levels (OR = 0.198), compared to firms that are fully registered and functioning in conjunction with the banking sector. Firms that did not need financing before the conflict started have about 88 percent higher odds of operating at higher levels (OR = 1.876). This indicates that financial access is important for operational recovery, and financial assets or other forms of capital can promote business continuity amid conflict.

A firm's number of branches before the conflict has a significant OR of 0.835, indicating that firms with a greater number of branches before the conflict have lower odds of operating at higher levels. It is possible that the additional costs of running multiple branches may be a factor in determining operational levels (Abushama *et*

al., 2023; IFPRI and UNDP, 2026; Kirui *et al.*, 2023b; OCHA, 2023a, 2023b; Serwat and Kazemi, 2023). Meanwhile, firms' pre-conflict experiences with challenging rules and regulations did not have a significant effect on their operational levels. Regarding firms' locations, those located in Kassala, Northern, Red Sea, White Nile, Gedaref and River Nile before the conflict started had higher odds of operating at higher levels, compared to those that were located in Khartoum. As these areas were less exposed to the conflict than Khartoum, this validates the notion that conflict intensity has a major impact on firms' operational capacities.

Overall, the findings indicate that post-conflict business recovery is influenced primarily by firm size, financial access, level of formality, gender of ownership, pre-conflict location and value chain position. This analysis shows that smaller and more informal firms, especially those in support services, were significantly less likely to resume operations at a higher capacity, while female-owned, financially stronger and larger firms exhibit markedly greater operational recovery.

5. Limitations and further research

This study provides evidence on how firm level characteristics are associated with the extent to which MSMEs continued operating despite the ongoing conflict, however, its limitations must be acknowledged. First, the dataset relies on telephone-based sampling, which inherently excludes enterprises in areas without functioning telecommunications networks and those most affected by displacement, insecurity or infrastructure collapse. High-intensity conflict regions, particularly parts of Darfur and Kordofan, are therefore under-represented, meaning the findings likely underestimate the full scale of business disruption, especially for firms that closed permanently or became unreachable. Additionally, telephone-based interviewing eliminates those without a telephone, who may be among the most vulnerable firm owners.

Second, the analysis focuses solely on firms that continued operating, creating a ‘survivor bias’ toward relatively more resilient enterprises. Survey participants’ self-reported retrospective data on pre-conflict sales and employment may also be subject to recall error. Methodologically, while the combination of ACLED conflict exposure data and quasi-experimental models improves inference, unobserved heterogeneity and non-random exposure to violence limit the causal interpretation of results.

Future analysis should prioritise panel tracking of MSMEs to capture longer-term recovery and exit dynamics and should incorporate firms in inaccessible or high-intensity conflict areas through complementary qualitative approaches or remote data collection methods. Linking enterprise outcomes to household welfare, food security and employment would deepen understanding of how disruptions in the middle segment of the value chains affect broader livelihoods. Comparative studies across conflict-affected countries and rigorous evaluations of support interventions (e.g. financial, logistic or market restoration-focused) are also needed to identify scalable policies that strengthen MSME resilience and food system recovery in fragile contexts.

6. Conclusions and policy implications

This paper examines the characteristics associated with varying levels of operational continuity among Sudanese MSMEs that continued operating following the outbreak of conflict on 15 April 2023. Using nationally representative data from a survey of MSMEs conducted between July and November 2024, linked to locality-level conflict exposure data from ACLED, the study identifies which enterprises were able to sustain various levels of operation amid ongoing violence and analyses their key characteristics.

The descriptive statistics indicate that among the 785 enterprises that continued operations, 57.3 percent relocated at least once to a different state. Those based in Khartoum, which was the epicentre of the conflict, accounted for 74.4 percent of relocations, with most moving to the comparatively lower-intensity states of Red Sea (30.8 percent), River Nile (26.0 percent), Northern (19.3 percent) and Kassala (12.2 percent). Overall, operational capacity remained low, with only 18.7 percent of enterprises being operational at full capacity, while most operated at below 75 percent of their capacity, and 62.2 percent reported being closed at least once since the conflict began. Enterprise performance also deteriorated due to the conflict. Average monthly sales declined by 36.9 percent for non-AFS firms and 60.2 percent for non-agricultural AFS firms, while agricultural AFS firms showed a smaller, statistically insignificant decline (24.8 percent). Employment losses were large across all sectors, with permanent workers declining by 38.6 percent (non-AFS), 46.0 percent (agricultural AFS), and 49.0 percent (non-agricultural AFS) respectively, alongside reductions in female employment levels in non-AFS firms.

The ordered logit results provide insights into which firm characteristics are associated with various operational levels. Enterprise type (AFS or non-AFS) and commodity type were not significant predictors of operational level, but value chain position, firm size, location, owner characteristics and financial access and level of formality were. Relative to producers, input dealers had significantly higher odds of operating at higher levels (OR=2.207). In contrast, firms in support services (e.g. logistics, packaging and transport) had substantially lower odds of operating at higher levels (OR=0.481), reflecting the conflict's disruption of transport corridors, infrastructure and mobility. Firm size was a strong predictor – compared to micro firms, small firms (5–19 workers) and medium-sized firms (20–99 workers) also had higher odds of operating at higher levels, indicating that a relatively larger scale of operations supported business continuity. Enterprise location and conflict exposure influenced operational recovery. Relative to Khartoum, firms that were located (prior to the conflict) in Red Sea, Northern, Kassala, River Nile, Gedaref and White Nile had significantly higher odds of operating at higher capacity. Financial access and formality were also important. Firms without a bank account had lower odds of operating at higher levels (OR=0.675) and registered firms were far less likely to be doing so (OR=0.198). Interestingly, female-owned firms also had higher odds of operating at higher levels (OR=2.065), while older owners had slightly lower odds (OR=0.978 per year), pointing to differences in adaptability or risk management, and this warrants a deeper investigation.

The results indicate that the resilience and operational recovery of MSMEs in the Sudan during the conflict is primarily influenced by firm size, financial access, value chain position, location of the enterprises prior to the conflict and exposure to conflict intensity, rather than by the sector in which they operate. Policy mechanisms should therefore focus on maintaining operational continuity among viable firms. Priority should be given to restoring midstream functions in agrifood value chains, particularly support services such as logistics, transport and packaging, which exhibit significantly lower operating levels despite their central role in connecting producers to markets. Facilitating secure movement of goods and reducing operational risks can generate benefits for the entire value chain.

Access to finance, formality and firm size are also crucial determinants. Firms lacking bank accounts, operating informally (without registration) and micro-enterprises are less likely to sustain higher operational levels, hence they are especially vulnerable. Conflict-adapted financial mechanisms that provide short-term liquidity and enable financial inclusion are essential to prevent further economic contraction. Supporting relatively safer states as hubs for relocated firms and easing re-establishment of businesses can help to preserve and enable functioning of enterprises in these places. The stronger performance of female-owned firms further highlights the need for targeted support to women who own businesses in conflict-affected contexts.

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Annexes

Annex 1. Relocation of enterprises

Table A1. States where the enterprises that continued operations relocated after the conflict started on 15 April 2023

Origin state	Destination state of relocated enterprise (%)										Total (%)
	Al Jairah	Gedaref	Kassala	Khartoum	North Kordofan	Northern	Red Sea	River Nile	West Kordofan	White Nile	
Al Jazirah	0.0	18.2	18.2	9.1	0.0	18.2	9.1	27.3	0.0	0.0	11 (57.9)
Gedaref	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1 (5.6)
Khartoum	0.2	6.7	12.2	0.0	0.2	19.3	30.8	26.0	0.2	4.4	435 (74.4)
North Darfur	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	1 (100)
North Kordofan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	1 (6.7)
Northern	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	1 (2.4)

Source: Authors' own elaboration, based on IFPRI (International Food Policy Research Institute) & UNDP (United Nations Development Programme). 2026. *Sudan's Armed Conflict Impact on the Private Sector: Evidence from MSMEs Survey*. Washington, DC, IFPRI and New York, USA, UNDP.

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