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The impact of violent conflict on smallholder agriculture: A scoping review

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Abstract

Conflict poses a significant threat to smallholder agriculture globally, undermining food security, livelihoods, and rural development, yet a robust synthesis of its specific impacts remains elusive. This scoping review addresses this gap, asking: How do the impacts of distinct conflict types and dynamics vary within and across different smallholder production systems; levels of commercialisation; and household characteristics?

The review is based on a comprehensive search of Scopus, Web of Science, and PubMed for the period 2000-2024, for which 85 studies met inclusion criteria. We come to four key findings: First, specific types and dynamics of conflict are relatively rarely analysed in depth, although there is more focus on civil conflicts than other types, and reasonably strong evidence that conflicts in which food systems and resources are targeted have particularly detrimental effects on smallholder agriculture. Second, production systems are most vulnerable to violent conflict when characterised by a high level of reliance on monoculture, external inputs, insecure land tenure and limited access to water and associated infrastructure, although reliance on long-standing practices that have traditionally be more diverse poses risks in highly dynamic, and rapidly changing, conflict environments. Third, we find contradictory evidence on commercialisation's role, with broad consensus that highly market-dependent models are particularly vulnerable, but a lack of clarity on what (lower) levels of commercialisation are desirable. Finally, a complex picture emerges in relation to household characteristics, whereby some features – such as limited labour resources – are widely considered to render households more vulnerable, while other research emphasises smallholders' agency, highlighting how adaptability through diversified incomes or shifts in production strategies can mitigate risk factors. We synthesise these findings and their implications for future research.

Introduction

Smallholder agriculture, characterised by small landholdings and family farming, serves as both a vital source of sustenance and an economic engine for millions worldwide, particularly in low-income contexts [1]. Beyond food production, it is deeply intertwined with the cultural fabric and economic structures of rural communities, providing jobs, supporting local food markets, and contributing to overall social well-being [2]. In regions prone to conflict, where resources are limited and peace is fragile, smallholder agriculture takes on added significance.

While it is well-established that conflict is a primary driver of food insecurity, including through its impacts on agricultural practices and production [3,4], several barriers persist to translating consensus on this broad relationship into action to improve agricultural outcomes. First, the relationship is under-specified with regards to conflict. Early analyses of conflict and agriculture often treated violent conflict as a single, homogeneous factor [6] [7]. While establishing important associations, this approach collapses important distinctions between types and dynamics of conflict. Recently, research has more thoroughly unpacked differences in conflict impacts in agricultural productivity in terms of direct exposure to violence [8]; intensity of violence [9,10]; geographic risk of violence [11], among other measures. However, much of this research continues to be case-specific, and comparability with findings across contexts is either difficult to discern or entirely unstated. For this reason, evidence on important questions remains largely un-synthesised, namely, whether 1) particular conflict types, and/or 2) particular conflict dynamics have distinct effects on agricultural livelihoods and outputs.

Second, the relationship between conflict and agriculture is under-specified with regards to smallholder agriculture, in particular. Just as research has tended to aggregate forms of conflict, existing scholarship has often failed to distinguish between different types of agricultural systems. Most research on conflict's effects on agriculture aggregate agricultural activity [16,17], often either collapsing differences in farm, market and labour characteristics, and/or failing to specify these features fully in context-specific studies.

There are strong theoretical reasons to expect that those engaged in smallholder agriculture – the most prevalent form of agriculture in the world, but widely recognised as concentrated among the poorest sections of the agricultural sector [1,18] – would experience conflict shocks differently to those engaged in large-scale highly commercial agriculture [19]. This specificity is essential if scholarship is to inform responses aimed at minimising conflict's disruptive effects. As such, key questions remain inadequately synthesised, including whether 1) particular production systems, 2) particular levels or patterns of commercialisation, and/or 3) smallholder households with particular characteristics, are more or less resilient to conflict.

To address these gaps, we undertake a structured scoping review designed to synthesise the complex ways in which violent conflict affects smallholder agriculture. The review finds a significant recent increase in scholarship on this topic, reflected in growing publications since 2018. Of these, studies on civil conflict, and on the African region, are the most prominent, pointing to empirical gaps in coverage in relation to other forms of violent conflict, and other regions.

The findings of the review are four-fold:

First, specific types and dynamics of conflict are relatively rarely analysed in depth, although there is more focus on civil conflicts than other types, and reasonably strong evidence that conflicts in which food systems and resources are targeted have particularly detrimental effects on smallholder agriculture.

Second, production systems are most vulnerable to violent conflict when characterised by a high level of reliance on monoculture, external inputs, insecure land tenure and limited access to water and associated infrastructure, although reliance on long-standing practices that have traditionally been more diverse poses risks in highly dynamic, and rapidly changing, conflict environments.

Third, we find contradictory evidence on commercialisation's role, with broad consensus that highly market-dependent models are particularly vulnerable, but a lack of clarity on precisely which lower levels of commercialisation, if any, are desirable.

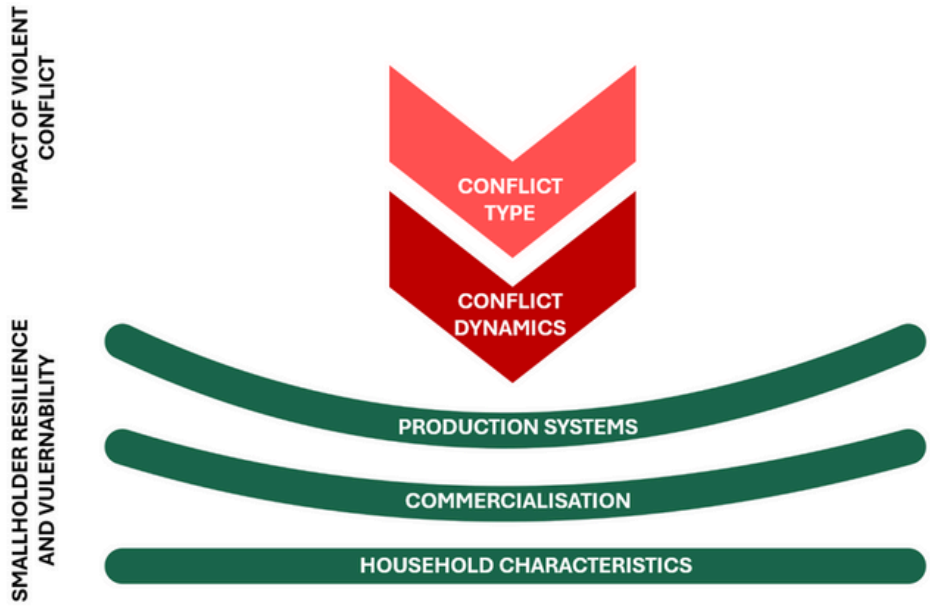
Finally, a complex picture emerges in relation to household characteristics, whereby some features – such as limited labour resources – are widely considered to render households more vulnerable, while other research emphasises smallholders' agency, highlighting how adaptability through diversified incomes or shifts in production strategies can mitigate risk factors.

The study proceeds as follows. Section 2 outlines our conceptual framework and key definitions; Section 3 presents our design and methods choices, including study selection; Section 4 outlines a descriptive overview of the resulting corpus before an in-depth qualitative analysis of the impacts documented; before concluding in Section with a discussion and implication for future research.

Conceptual Framework

To systematically trace the impact of conflict on smallholder agriculture, we outline a conceptual framework through which these effects can be differentiated and evaluated, summarised in Figure 1.

Figure 1. Conceptual framework for analysis of conflict impacts on smallholder agriculture



Turning first to conflict, for the purposes of this study, we distinguish between three key types of conflict, common in peace and conflict studies: 1) international, involving state-based conflict between two or more state parties; 2) civil, involving conflict within a state, typically between state forces and territory-seeking rebel forces; and 3) communal, involving conflict most often within a state [though can be cross-border] involving conflict between communally mobilised groups, such as ethnic militias [20,21]. Conflict types are significant because they capture the impacts of discrete conflict actors – including state and non-state armed groups – and represent conflict occurring at different scales (from international to local), both of which may be systematically associated with different types and degrees of impact on smallholder systems.

Second, we consider conflict dynamics. This relates to the profile of violence within each overarching conflict system. For this, we draw on a range of widely used metrics which distinguish between different conflict patterns or repertoires [14], differentiating between the 1) frequency of conflict, as measured by the number of violent incidents associated with a given conflict; 2) intensity of conflict, as measured by the number of fatalities and/or scale of destruction associated with a given conflict; and 3) targeting tactics whereby conflict is directed at particular individuals, groups and/or objects. Conflict dynamics are significant because they capture the impacts of different levels and of conflict – from more to less contained – as well as the impacts of particular tactical choices and decisions made by armed groups.

In understanding conflict's impacts on smallholder agriculture, we follow definitions common in the wider literature: smallholder agriculture, also referred to as family farming or small-scale farming, is a farming system characterized by the cultivation of land typically smaller than 10 hectares, which is predominantly managed and operated by family members, often relying on family labour. This form of agriculture plays a critical role in global food production, particularly in developing countries, where it substantially contributes to food security and supports rural livelihoods [22,23]. While the exact number of smallholder farms globally is debated, there is broad agreement that smallholder agriculture is the most prevalent form of agriculture worldwide, and is concentrated in the poorest countries, and among the poorest portions of those countries' populations [18].

Smallholder commercialisation is the gradual and uneven process through which smallholder farmers transition from primarily subsistence production toward greater participation in agricultural markets. This shift is often constrained by factors such as high food market costs and volatility, limited access to capital and information, leading many households to rely heavily on family labour to remain competitive [24–28].

Finally, we distinguish between different household characteristics of those engaged in smallholder farming, with particular attention to household size, members' age, and sex of the household head. Household characteristics encompass the demographic and socio-economic profiles of individuals residing under the same roof. This typically includes variables such as age distribution, gender composition, educational levels, household composition, income brackets, and types of living arrangements [29,30]. Not only do these features map onto distinct vulnerabilities within food and agricultural systems [23], but are also strongly associated with vulnerability to conflict shocks. Together, this makes analysis of the differential impacts of conflict on different types of smallholder households an important consideration.

Design and Methods

Aim

We undertook a scoping review, a form of structured evidence synthesis [24,25], to systematically identify relevant material with the aim of synthesising existing evidence regarding the impacts of violent conflict on smallholder agriculture. The specific objectives of the review include:

1. To identify and categorise the direct and indirect impacts of violent conflict on smallholder agricultural production.
2. To examine the effects of conflict on various dimensions of smallholder agriculture, including land access, labour, inputs, markets, and livelihoods.
3. To explore the variations in these impacts based on the type, intensity, and duration of conflict, and geographical/socioeconomic contexts.
4. To identify gaps in existing research and suggest potential areas for future studies.

Our review specifically sought to answer the following questions:

1. Do particular conflict types have distinct effects on smallholder agriculture?
2. Do particular conflict levels, intensities or patterns have distinct effects on smallholder agriculture
3. Are particular smallholder food production systems more vulnerable or resilient to conflict?
4. Are particular levels or patterns of commercialisation in smallholder agriculture more vulnerable or resilient to conflict?
5. Are smallholder households with particular characteristics more vulnerable or resilient to conflict?

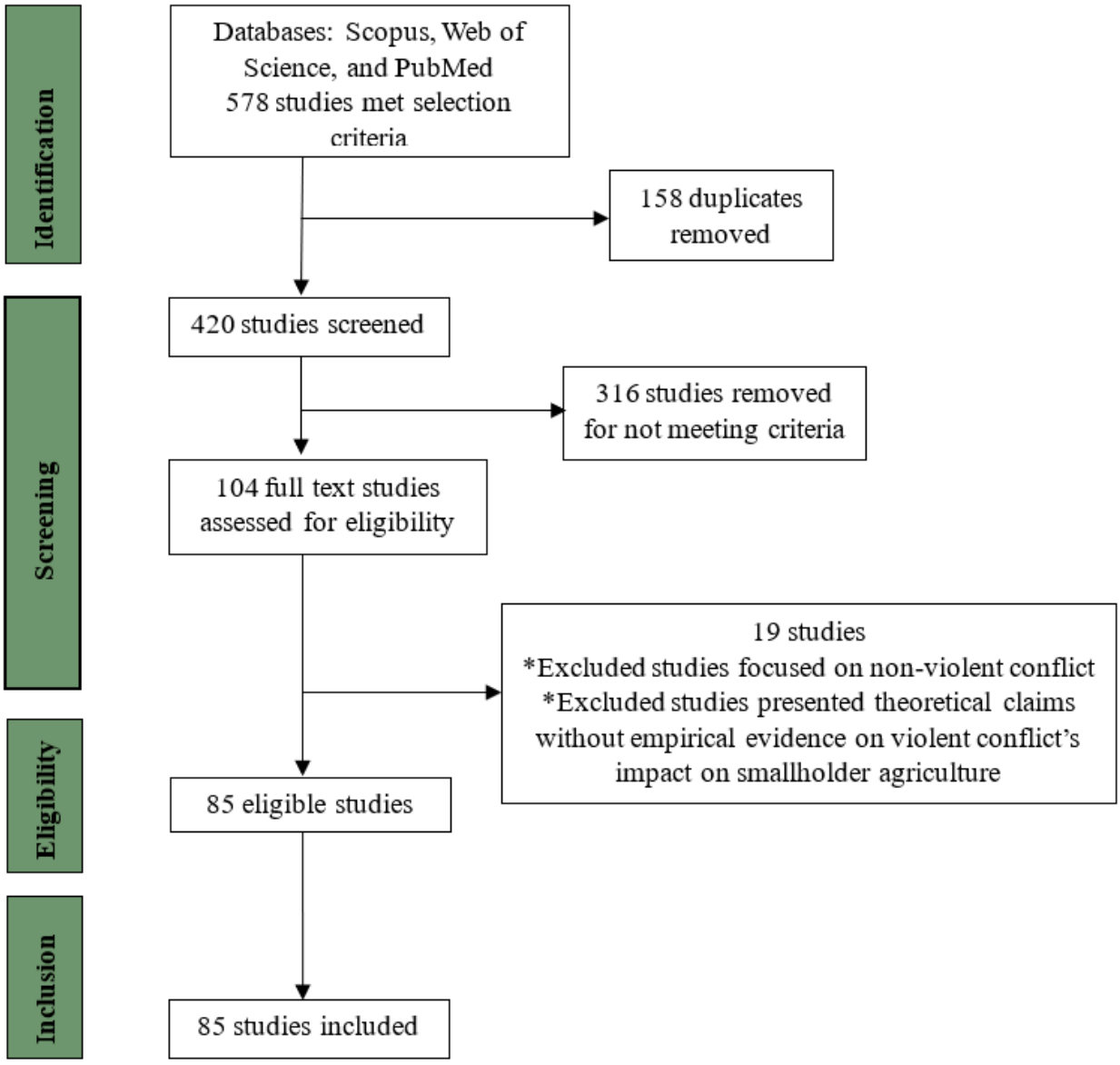
Selection criteria

We undertook a scoping review, a form of structured evidence synthesis [24,25], to systematically identify relevant material with the aim of synthesising existing evidence regarding the impacts of violent conflict on smallholder agriculture. The specific objectives of the review include:

(Conflict OR "civil war" OR insurgen* OR violen* OR warring OR wartime OR terror* OR "post-conflict" OR postconflict) AND ("smallholder agriculture" OR "smallholder farming" OR "small-scale agriculture" OR "smallscale agriculture" OR "subsistence farming" OR "subsistence agriculture" OR "family farming" OR "peasant farming" OR "peasant agriculture" OR "household farming" OR "traditional agriculture" OR "mixed farming" OR "agro-pastoralism")

A total of 578 articles were identified through the initial search. After removing 158 duplicate records, the remaining articles (n = 420) underwent a two-stage screening process based on title and abstract review to determine relevance. Articles focusing on non-violent conflict, operationalized as conflicting organisational priorities in some cases, and articles lacking empirical support for claims regarding the impact of violent conflict on smallholder agriculture were excluded. The final dataset included 85 publications (Figure 2).

Figure 2. Flowchart fo study selection process and included studies



Analytic strategy

Our analysis proceeds in two stages. First, we present a descriptive overview of the corpus, identifying key patterns and trends in areas of concentration, and areas of relative neglect, through a combination of meta-data and substantive content analysis. Second, we undertake an in-depth qualitative review that addresses our analytical questions.

Results

Overview

In total, 85 publications meeting the criteria for this review were published between 2000 and 2024, inclusive. Temporally, there has been a significant increase in publications since 2019: 52 of 85 publications (61%) were published post-2018. Prior to this, four or fewer publications were recorded each year, with four years registering none at all. From 2019 onwards, an average of 8.6 articles were published per year, peaking at 13 in 2024. The time periods substantively analysed in the corresponding publications is somewhat more diverse: 15 (18%) and 14 (17%) publications, respectively, are focused on conflict impacts in the 2020s and 2010s; while 20 (24%) publications focus on conflict impacts in the early 2000s; 17 (20%) in the 1990s; and 8 (9%) in the 1980s.

Africa dominated the geographical focus of the publications (n = 40; 47%), significantly exceeding the number of studies focused on Central and South America (n = 18; 21%), Asia (n = 12; 14%), and Europe (n = 10; 12%). Studies focusing on multiple regions were minimal (n = 1). Colombia (n = 7) was the most represented country, followed by Ukraine (n = 5), Ethiopia (n = 5), the Democratic Republic of Congo (n = 4), and Nigeria (n = 4). Studies spanning multiple countries were also notable (n = 6), while all other countries were represented in three or fewer publications.

Substantively, text analysis reveals several trends and patterns in concentration within the corpus. Notably, among the top 20 keywords identified , only one relates directly to conflict, 'conflict' itself, and associated stemmed words. All 19 other words in the most frequent 20 key terms related to different aspects of smallholder systems (see Annex I for full list). Just under two-thirds of studies in the corpus (n=55) expressly refer to 'conflict,' and of these, 32 make 10 or more references to conflict, indicating substantive engagement with the topic. However, deeper analysis reveals a tendency to over-aggregate and neglect important distinctions. For example, 38 studies (45%) refer to civil war or related terms, but only 10 do so extensively, and almost twice as many (n=17) include only one or two references, suggestive of relatively superficial engagement. Similarly, interstate conflict and associated key terms appear explicitly in only two studies; and inter-communal conflict appears in only three. Figure 3 plots common collocates of keywords, further illustrating the dearth of references to conflict. Taken together, we conclude that while a number of studies are attentive to smallholder agriculture in conflict systems, =precise features of conflict are only rarely distinguished.

Aspects of smallholder agriculture of interest to us also receive variable treatment. Commercialisation is mentioned in fewer than one-in-five studies (n=16), of which, no study makes 10 or more references, indicating relatively limited treatment overall. Gender, a cross-cutting characteristic of smallholder households that may shape conflict impacts in diverse ways is referenced in 64 studies, but extensively so in only 14 (compared to 22 which make one or two references to gender-related keywords).

Figure 3. Collocates graph showing network of higher frequency terms that appear in proximity in the corpus.

Conflict

Conflict type

As suggested by the content analysis above, overall, studies on international conflict's effects on smallholder agriculture are the least extensive, represented by only six studies in the corpus. Communal conflict is the focus of 26 studies; while almost half (40) relate to civil conflict.

The studies sampled for this review contain very few comparative studies, and/or studies that leverage variability in conflict type to systematically identify differential effects of conflict by type on smallholder agriculture. One notable exception is a study by Kibriya et al. [26] on the role of conflict in farmers' crop choices in North Kivu, Democratic Republic of Congo, which directly correlates, and systematically compares, two types of conflict: "community-level," referring to "conflict with neighbours or family members", or conflict "attributed to rebel groups."[26] The study considers three distinct sites in North Kivu: Beni, where community-level conflict is not highly correlated with rebel activity; Rutshuru, where both types are generally correlated; and Lubero, where there is a high level of correlation between the two.

Despite this initial disaggregation, the study finds that across the locations, higher rates of both types of conflict are generally associated with increased crop theft, and subsequent results reported are largely aggregated at the level of 'conflict,' without further distinction. The study reports that self-reported exposure to conflict incidences in the preceding six months are positively and statistically significantly associated with the adoption of conflict-resistant food crops, conflict-resistant cash crops, and crop diversification. The full potential of the study's initial disaggregation is not entirely realised, in that subsequent conflict exposure is not distinguished by type to estimate differential effects [if any] on cropping. This points to a gap in literature on conflict's impacts that could be usefully addressed in future scholarship.

Beyond this study, further insights can be gleaned from comparing findings across non-comparative studies. In relation to international conflicts, or those with an international dimension, the few studies captured typically document high levels of conflict-related destruction, resulting of very significant disruption to agricultural activities. For example, in Pylypenko et al.'s [27] study, the authors cite estimated decreases in Ukraine's production across key agricultural outputs of up to 45%. Similarly, Malik et al. [27] note how such large-scale disruption as accompanied the Russian invasion of Ukraine has affected every facet of the agricultural system – from inputs and production costs, to supply chains and distribution – in a way not always found in civil and/or communal conflicts of a lower intensity and scale.

As the corpus contains numerous studies on the war in Ukraine, one important nuance to the findings above pertains to potential and unexpected positive impacts of conflict in highly industrialised agro-economies on the re-invigoration of smallholder, or family, farming. Mamonova [28] documents growing interest among Ukrainians in sustainable smallholder farming in the wake of the Euromaidan uprising and war in Eastern Ukraine, tracing interconnections between nationalism and pro-European sentiment, and the adoption of alternatives to highly industrialised farming. Mincyte and Blumberg [29] find similar patterns in the wider Baltic, noting how armed conflict can simultaneously have destructive effects on agricultural systems, while creating windows of opportunity for re-structuring former large, aggregated systems in alternatives to capital-intensive farming (see also [30]). Taken together, these studies suggest potential contradictory effects on agriculture in certain conditions: namely, that in large, highly centralised and industrialised agricultural systems, large-scale conflict that disrupts these systems' functioning can spur increased smallholder agriculture.

Turning to communal conflict, in a study on agricultural land-use change in Benue State, Nigeria, Ihemezie and Dallimer [31] find that inter-communal conflicts in the form of farmer-herder clashes were identified by research participants from non-herder communities as the primary driver of a reduction in agricultural land in the preceding five years. The authors do not report estimates of the scale of land use change. However, they share qualitative accounts from [non-herder] participants who reported cropland abandonment due to experience of, fear of, or desire to avoid, conflict with herder groups; as well as destruction of crops when cattle move through the area. Madin et al. [32] report similar findings from a study in Ghana, where they note that even relatively low-intensity communal conflict undermines household seed security, either through consumption by livestock, or intentional destruction by conflict parties.

Other documented impacts of inter-communal conflict include disruption of agricultural practices, particularly traditional practices among indigenous or minoritised groups, where these are already under strain. Gonda et al. [33] document this in Nicaragua, where indigenous farmers have been displaced by land conflicts, whereas Collins et al. [34] find a similar pattern in Argentina. Lastly, Mkutu [35] notes how inter-communal conflict in the Karamoja region of Uganda can drive the abandonment of smallholder livestock activities altogether by some communities, households and/or household members. The study specifically focuses on pastoralist women's adoption of alternative livelihoods, such as brewing and trade, but the pattern of livelihood abandonment can be seen more widely beyond women alone.

Finally, turning to civil conflicts, impacts documented vary greatly. For instance, studies on the war in Tigray note high levels of agricultural destruction [detailed further below] resulting in the decimation of smallholder agriculture [36]. In other contexts, studies note similar effects of civil conflict to those of inter-communal conflict, detailed above. For example, Steinberg and Taylor [37] note that the civil war in Guatemala disrupted traditional agricultural practices and led to a decline in crop diversity in a previously extremely diverse agricultural area, due to conflict-driven displacement.

The temporal legacy of conflicts is also a key consideration: Schneibel et al. [38] note how post-conflict population growth contributed to resettlement in formerly forested areas, by households employing slash-and-burn agricultural techniques. The result in the case of the study's focus in Angola was a tripling of deforestation after the war concluded in 2002. Shams and Ahmed [39] note a similar pattern of post-war population growth, coupled with market transformation and related pressures, resulting in negatively impactful agricultural practices in Cambodia.

Conflict dynamics

As found in the case of conflict types, very few studies directly compare conflict levels, intensities or patterns in terms of their differential effects on smallholder agriculture. However, a review of the corpus highlights a number of key findings that warrant further investigation.

In a study employing disaggregated conflict data of violence involving the group commonly known as 'Boko Haram,' to robustly test the effect on agricultural outcomes, Adelaja and George [40] find that conflict intensity [as measured by reported fatalities] is statistically significantly associated with a number of key changes in smallholder agriculture. First, conflict intensity is found to be positively associated with the percentage of agricultural land left fallow by households, consistent with expectations that conflict negatively affects productivity. However, perhaps more surprisingly, conflict intensity is also positively associated with the size of land owned, and the average size of plots, as the average distance to plots from households and value of land both decline. The authors suggest this may be attributable to 'economies of scale from using larger plots [that] may help households to cushion the negative impacts of conflict-related shocks.' [40] Intensity is also associated with changes in cropping practices, with monocropping and intercropping both statistically significantly negatively associated with conflict intensity, while relay cropping and mixed cropping are both found to be statistically significantly, positively associated with conflict intensity.

Conflict tactics that involve the destruction of agricultural assets, as documented by multiple scholars in the context of the war in Tigray, Ethiopia, are associated with particularly devastating effects on smallholder agriculture. Manaye et al. [36] and Nyssen et al. [41] both identify the destruction of agricultural assets through 'looting, burning and destruction' [36] as a key contributing factor in the scale of destruction. Manaye et al. [36] find that the self-reported average war damage to crop production was just under 15 quintals, of which, almost half [44%] was crop damage before harvesting, and 41% was to crops in home storage. In addition, one-in-four households reported burning of straw / fodder, and one-in-eight households reported perennial fruits were cut down or uprooted. Nyssen et al. [41], and to a lesser extent Weldegebriel et al. [42], note the same important role this tactic played, highlighting destruction of farm tools and inputs, which have longer-reaching consequences than destruction of outputs alone. In a lower-intensity conflict context, Madin et al. [32] show how inter-communal clashes in Northern Ghana disrupt food systems by intentionally targeting seeds and crops, exacerbating seed insecurity.

Relatedly, conflict systems in which widespread predation of agricultural assets – including looting of crops and theft of livestock – become commonplace, have deep and far-reaching consequences for the transformation of food systems. Cox [43] and Maass et al. [44] both highlight the impact of armed actors preying on livestock populations in Eastern Democratic Republic of Congo. Cox [43] reports the findings of a survey in Burhale, South Kivu, where nearly one-third of cattle-owning households reported cattle being plundered in the conflict. One of the many consequences of this plunder was that mixed farming, which relied on manure availability, became less feasible, as soil quality suffered. "For farmers, who hold a broad view of soil fertility, the casualties of war were not only people and cattle but also the land itself, which has enduring scars." [43] In a separate study in South Kivu, Klapwijk et al. [45] find similar evidence of the impact of livestock predation on theft on smallholder practices: specifically, they find increasing reliance on micro-livestock, such as cavies, which they argue can be an effective survival strategy, but limits productivity in the longer term.

Agriculture

Smallholder production systems

Across multiple studies, a consistent picture emerges of how conflict disrupts and transforms smallholder production systems in contexts of conflict, and how certain factors contribute to resilience. Ultimately, these studies converge on the vital role of local resources, traditional knowledge, diversified income streams, and robust community networks in fostering resilience and mitigating the effects of conflict on smallholder farming systems.

Research in African countries including Nigeria, Chad, Sudan, and the Democratic Republic of Congo [46] shows that rain-fed agriculture, monoculture, limited resources, insecure land tenure, and communication barriers increase smallholder vulnerability to conflict. Conversely, diversification, irrigation, climate-smart practices, secure land rights, effective communication, integrated farming, and social safety nets enhance resilience, emphasizing the need for inclusive innovations that promote equitable resource access and decision-making.

Focusing first on the central role of water, Bozzoli and Brück's [47] work in Northern Mozambique illustrates how conflict forces a reliance on self-sufficiency as trade networks collapse. They highlight the importance of traditional drought-resistant crops, diversified livelihoods, and strong social networks in navigating post-war recovery. Similarly, Nyssen et al. [41] document the systematic disruption of smallholder farming in Tigray, Ethiopia, with disrupted supply chains and the destruction of irrigation infrastructure disproportionately impacting farmers reliant on cash crops and external inputs. In a similar vein, Manaye et al. [36] find that in Tigray, farmers reliant on irrigation, market access, and external inputs experienced disproportionate hardship owing to the deliberate targeting of irrigation infrastructure and farm inputs, whereby the destruction of tools and infrastructure has created long-

term challenges for food production. In contrast, Weldegebriel et al. [42] found that armed conflict in the Tigray region of Ethiopia had a devastating and indiscriminate impact on all smallholder food production systems, causing a significant reduction in cultivated land due to widespread disruptions, displacement, and damaged infrastructure, but without notable differences across systems.

Considering cropping systems, a study in Guatemala [48] found that reliance on monoculture, alongside factors including external inputs, land insecurity, and unsupported market integration increases vulnerability, while agroecological practices, diversified livelihoods, strong local seed systems, and traditional ecological knowledge build resilience against both environmental stress and conflict. Steinberg and Taylor's [37] analysis of maize cultivation in Guatemala comes to similar conclusions, finding that cultural, biological, and social structures shape smallholder resilience to conflict. Systems rooted in traditional practices, diverse maize landraces, and local seed networks are more resilient than those relying on external inputs and modernized methods, which are easily disrupted by conflict-induced market collapses and loss of support. Rincón et al. [50] indirectly identify similar vulnerabilities in Central Mexico, where smallholder systems heavily dependent on specific resources, lacking secure land tenure or political influence, and facing economic pressure from urban expansion, are at greater risk of displacement. Limited crop and livelihood diversification further diminishes adaptability and amplifies this risk. However, reliance on traditionally utilised resources can also bring challenges when wider social and economic systems are in flux: in Uganda's West Nile Sub-region, Bernard et al. [49] demonstrate that reliance on traditionally-accessed common resources makes smallholder systems highly vulnerable to refugee settlements, leading to overexploitation and degradation, compounded by limited access to alternative techniques, diversification, and secure land tenure.

Importantly, much of the research highlights how agricultural decisions – such as crop selection and production systems – are not undertaken in isolation, but are part of a wider set of complex, social factors. For example, in Mexico, Hernández et al. [51] found that the Zapatista uprising in Chiapas spurred farmers to embrace agroecological practices as a means of achieving food sovereignty. Prior to the uprising, government initiatives promoting monoculture and external inputs increased vulnerability by diminishing agrobiodiversity and self-reliance. The Zapatista movement fostered resilience by promoting diversified farming practices featuring local crops, prioritizing seed sovereignty, and implementing collective farming, thereby reducing reliance on external inputs, enhancing food security, and strengthening community solidarity. Further highlighting these vulnerabilities, Tamariz [52] discovered that in Mexico, smallholders specializing in illicit drug cultivation experience increased violence and displacement. However, those maintaining agrobiodiversity and robust community organization showed greater resilience. In Guatemala's Polochic Valley, Mingorría [53] found that the expansion of flex-crops like oil palm and sugarcane leads to land dispossession, undermining traditional maize and bean cultivation, though indigenous communities demonstrate resilience through collective mobilization, land occupations, and peasant organizations.

Challenging simple vulnerability narratives, Richards [54] revealed that smallholders in Sierra Leone adapt through "escape agriculture," autonomously reorganizing around local knowledge and social networks, effectively creating alternative authority structures and demonstrating resilience amidst disrupted markets and dysfunctional state systems. Also with a focus on agency and mobilisation, Mamonova's [28] study of the Euromaidan period in Ukraine demonstrates the mediating effect of social mobilization in a very different context, showing how a strengthened national identity tied to food production bolstered the resilience of diversified, localized systems rooted in food sovereignty, which proved more adept at navigating instability compared to globally integrated models.

From the social to the political forces that condition conflict's impacts on smallholder agriculture, a range of smallholder food production systems face increasing destabilization from state-led enclosures and the disruption of support networks, ultimately undermining their resilience. Dressler and Guieb [55] highlight how in the Philippines, customary land tenure and diversified subsistence practices are destabilized by state and military territorial enclosures, disrupting community-based land

management and eroding the ecological diversity and resilience inherent in traditional farming. Though communities employ adaptive strategies using solidarity and indigenous knowledge, these efforts are often negated by the overwhelming scale of military and environmental territorial practices, leading to displacement and weakened social networks. Diepart and Dupuis [56] similarly reveal that Northwest Cambodia's smallholder systems, once resilient through flexible land tenure and community-based practices, were drastically weakened by the Khmer Rouge's forced collectivization. Although traditional systems incorporated risk management strategies, the regime's policies dismantled them, but deep-rooted social networks and collective practices enabled some communities to navigate or resist state control. Gutiérrez-Sanín [57] illustrates a distinct vulnerability to state-led efforts in Colombia, where the war on drugs and insurgency drives displacement and coca cultivation, leading to the "total loss" of both illicit and legal crops due to displacement and fumigation, further devastating livestock, the environment, and local food economies.

Smallholder commercialisation

Commercialisation's impact on smallholder resilience in conflict zones is complex and context-dependent. Studies exploring smallholder resilience in conflict highlight the complex and sometimes contradictory role of commercialisation.

On the one hand, several studies recognise negative effects of specific forms of commercialisation. Analysing several African nations, Song et al. [46] suggest that commercialisation practices that are exclusive, market-dependent, promote specialisation, cause displacement, or increase inequality exacerbate vulnerability, especially during climate shocks. Conversely, inclusive commercialisation that diversifies income, improves access to technology and information, and strengthens collective action enhances resilience. Similarly, in conflict-affected Guatemala, Hellin et al. [48] find that exploitative commercialisation – characterised by unfair prices, disrupted access to credit and infrastructure, and limited market information – amplifies vulnerability, particularly during conflict, while diversified market access, value-added processing, fair trade participation, cooperative marketing, and agroecological practices enhance resilience. Lambardi and Palacios [58] in Colombia suggest that intensified agricultural use with high-value, market-oriented crops correlates with higher rates of forced displacement, while subsistence or diversified systems are generally less prone to displacement, though factors like secure land tenure and location also play a role. Malik et al. [30] in Ukraine find that the impact of commercialisation on resilience during wartime depends on the nature of market integration: deeply integrated systems are more exposed, while those with moderate, locally embedded commercialisation are more resilient, further shaped by the socio-political context. Similarly, Mamonova's [28] study in Ukraine reveals that commercialised systems dependent on market integration and external inputs are more exposed to conflict-related disruptions, while less intensively commercialised, traditional systems emphasising local autonomy and diversified production demonstrate greater adaptability, further bolstered by framing farming as a patriotic act. Examining urban expansion conflicts in Central Mexico, Rincón et al. [50] find that partially commercialised smallholder systems with low profitability are particularly vulnerable due to economic pressures driving land sales. While highly commercialised systems reliant on fragile supply chains face risks, profitable commercial operations and subsistence-oriented systems with strong community bonds may exhibit greater resilience.

On the other hand, some studies find that smallholders with the flexibility to reduce commercial reliance, or withdraw from commercial networks and markets altogether, showed greater resilience in specific contexts. During conflict, smallholder responses often involve a "retreat to subsistence" and a re-evaluation of commercialisation strategies. Cox [43] argues in South Kivu, DR Congo, that commercial agriculture becomes a liability in conflict zones as farmers with visible wealth face increased risks of looting and violence, leading to diversification and reduced market dependence. Hernández et al. [51] also maintain that lower commercialisation, coupled with a strong focus on agrobiodiversity and seed sovereignty, enhanced resilience among Zapatista communities in Chiapas, Mexico, who actively resisted the state's commercial agriculture model.

More fundamentally, in Sierra Leone, Richards [54] problematizes commercialisation as a linear path to resilience, arguing that "escape agriculture," a deliberate disengagement from commercial structures towards self-reliance and localised practices, can be a more resilient strategy by mitigating market shocks and relying on community networks. In line with these studies, in the Central Niger Delta of Mali, Pona and Ouedrago [59] maintain that increased commercialisation in smallholder agriculture could potentially intensify competition for natural resources and exacerbate conflicts if inclusive institutions are absent. Conversely, lower levels of commercialisation might offer some protection from market disruptions during periods of instability. Similarly, Nygren and Myatt-Hirvonen [60] highlight the role of livelihood diversification and social networks in buffering Honduran peasant households against economic precarity, suggesting that less market-dependent strategies may reduce volatility.

Complicating this narrative somewhat, in Ethiopia's Tigray region, Manaye et al. [36] find that smallholders responded to conflict by reducing commercial activities and prioritising subsistence farming, which provided some resilience against market disruptions, although the war's pervasive impact made accessing inputs and selling produce difficult regardless of previous market involvement (see also Nyssen et al. [41]).The Ethiopian evidence suggests that while pre-existing low commercialisation may have initially offered a buffer, it may also ultimately hamper recovery.

The timing and phasing of commercialisation is also a key consideration in numerous studies, with many highlighting continuities and disjunctures between pre-, active- and post-conflict conditions. In Mozambique, Bozzoli and Bruck [47] argue that pre-conflict market access was a critical determinant of post-war recovery, suggesting that low levels of pre-conflict commercialisation increased vulnerability to the conflict's long-term effects. Market access, facilitated by robust infrastructure, secure land tenure, and strong institutions, enables farmers to invest and diversify, mitigating the vulnerability of less commercialised smallholders. During conflict, Adelaja and George [40] find that Boko Haram's terrorism in Nigeria caused widespread agricultural disruption, affecting all farmers regardless of prior commercialisation, with subsistence farmers facing vulnerability due to limited resources to cope with displacement and food insecurity. At the post-conflict stage, Ahn et al. [61] emphasise that female-headed households in Liberia prioritise subsistence agriculture and food security as a key survival strategy in the post-conflict environment, facing vulnerability due to limited resources, gender inequalities, and the lingering effects of conflict. In considering the effect of conflict on future commericalisation, Madin et al. [32] find that conflict in Northern Ghana indirectly impedes agricultural commercialisation by restricting farmers' market access and input acquisition, particularly seeds, disrupting their access to crucial information and external seed markets.

Studies increasingly suggest that broader political, historical, and social forces often outweigh the direct influence of agricultural commercialisation on conflict and resilience in smallholder agriculture. Several studies argue that wider political, economic and security factors determine whether commericalisation can mediate or mitigate conflict's impacts on smallholders. For example, in Colombia, Gutiérrez-Sanín [57] notes that many farmers cultivate coca as a survival strategy due to poverty and lack of land access, exposing them to violence, extortion, and state repression, while the study suggests, even though a commercialised crop, state crop substitution programmes fail to address the root causes of coca cultivation. Similarly, in Argentina's Chaco Salteño, Collins et al. [34] argue that security of land tenure is a more salient factor than specific levels of commercial engagement in determining vulnerability, with insecure land rights, climate change, and volatile commodity prices posing key stressors, while informal institutions and social networks provide crucial support. Similarly, Diepart and Dupuis [56] emphasise the impact of state intervention and historical legacies in Cambodia, shaping peasant livelihoods more significantly than agricultural commercialisation patterns during and after the Khmer Rouge era. Reinforcing this perspective, Dressler and Guieb [55] argue that "violent enclosures" in the Philippines, driven by state and military interests, create widespread vulnerability irrespective of smallholder commercialisation strategies. Furthermore, Poole [62] reveals how conflict and border restrictions in Eritrea disrupt regional trade, limiting market access for farmers, while simultaneously exacerbating socio-economic disparities as wealthier community members capitalise on local market opportunities.

Smallholder household characteristics

Several studies underscore the significant influence of smallholder household characteristics on vulnerability and resilience in conflict zones, often highlighting the disproportionate challenges faced by specific household types.

The size of a household, or more specifically, the size of its available labour, is a key consideration in numerous studies. Examining political turmoil in highland Guatemala, Steinberg and Taylor [37] find that reduced labour availability undermined traditional maize cultivation, while strong kinship and community networks fostered resilience through labour sharing and knowledge transfer. Ultimately, community integration, regardless of gender, proved crucial for preserving agricultural diversity and cultural identity, contrasting with the increased susceptibility of isolated or commercially-oriented households. Echoing these findings, Song et al. [46] find that households with limited labour capacity are more susceptible to climate-related demands, while reliance on migrant labour introduces vulnerabilities related to disrupted labour flows.

Labour availability is in part, associated with gender. In conflict-affected Guatemala, Hellin et al. [48] suggest that female-headed households face intensified labour constraints, alongside land insecurity and social exclusion, all compounded by disrupted agricultural production. They highlight how limited labour or a lack of agroecological skills exacerbates food shortages and economic hardship. Manaye et al. [36] further corroborate these trends in Northern Ethiopia, where female-headed households experienced significantly lower agricultural income compared to households with larger labour pools, particularly adult men, that showed greater resilience due to improved access to inputs. Moreover, households relying on off-farm labour were particularly affected by labour market disruptions during the conflict. Song et al. [46] imply that similar household characteristics heighten vulnerability to conflict in select African countries amidst climate shocks and farmer-herder tensions, particularly for female-headed households facing systemic disadvantages in labour, resources, and decision-making power.

Independent of gendered effects on labour supply, several studies highlight the distinct challenges faced by female-headed households in conflict-affected areas. Ahn et al. [61] directly investigate female-headed households in Liberia, revealing their heightened vulnerability due to limited access to land, resources, lower education levels, domestic burdens, and discriminatory norms. Social support networks, however, contribute to resilience, with regional variations in land availability, infrastructure, and market access impacting livelihood options. Bamidele and Pikirayi [63] find that female-headed households and those with limited labour capacity in Abuja, Nigeria, are particularly vulnerable to conflict and displacement, experiencing loss of land and livelihoods, economic insecurity, and gender-based barriers to recovery, highlighting the need for gender-sensitive policies. In South Kivu, DR Congo, Cox [43] employs an ethnographic approach to examine the vulnerability of women, who often headed households facing limited access to land, resources, and security, emphasising the central role of cattle ownership in livelihood resilience and the influence of ethnic identity and social networks.

In Ukraine, Malik et al. [2023] similarly note the heightened vulnerability of female-headed households due to limited access to credit, market power, and land, but also acknowledge their adaptive capacity through micro-entrepreneurial activities. Households with larger, more diverse labour pools exhibit a resilience advantage, while those with a balanced mix of subsistence and market-oriented assets are better positioned to adapt to conflict-driven shocks. Challenging conventional wisdom, Madin et al. [32] in Ghana found that female-headed households cultivating easily stored crops like groundnuts actually demonstrated greater seed security compared to male-headed households reliant on inter-community seed acquisition, which became a vulnerability due to conflict-related restrictions. Diversified income sources, livestock ownership, and access to agricultural services were also associated with increased resilience, while village location and conflict history significantly impacted seed security, emphasizing the need for tailored interventions.

In other studies, the vulnerability of other specific household members, groups and communities is highlighting, emphasising in particular the impacts of conflict-driven dispossession, discrimination, and limited access to resources. Mingorría [53] finds that indigenous Q'eqchi' communities in Guatemala's Polochic Valley are most vulnerable to land grabbing, displacement, and violence due to expanding plantations, with strong social organisation and diversified livelihoods enhancing resilience amidst impunity. Similarly, Diepart and Dupuis [56] emphasise the uneven distribution of vulnerability during the Khmer Rouge regime in Cambodia, with "new people" enduring harsh conditions due to unfamiliarity with farming and systematic discrimination, suggesting that female-headed households likely faced additional challenges, while some leveraged existing social networks for survival. Dressler and Guieb [55] further reveal that female-headed households and those dependent on undiversified labour are more vulnerable in a Philippine frontier, but emphasise that adaptive strategies like diversifying income streams and building social networks can foster resilience, showcasing the interplay between inherent household traits and external dynamics in shaping vulnerability and resilience.

Across diverse contexts, studies converge on the understanding that specific household vulnerabilities are exacerbated by insecure access to resources and volatile livelihoods, while resilience is bolstered by strong social networks, income diversification, and collective action. In other words, in place of an understanding of specific household features being associated with vulnerability, an understanding of pre-existing assets, access to resources, and social structures proves more useful in analysing resilience and vulnerability. For instance, Richards [54] cautions that household characteristics alone don't determine a household's fate in Sierra Leone, arguing that the capacity to adopt "escape agriculture," restructure local networks, and establish decentralized authority are key to fostering resilience, suggesting that adaptability, rather than static characteristics, ultimately defines vulnerability in a conflict-altered landscape. Thus, while specific vulnerabilities associated with household characteristics exist, particularly for female-headed households, the ability to adapt and leverage local resources, networks, and innovative strategies significantly impacts resilience outcomes. Similarly, Bozzoli and Bruck [47] find that secure land tenure, access to inputs, and pre-war asset holdings significantly influenced post-war agricultural productivity in Northern Mozambique, emphasizing resource access and pre-war economic status as key determinants.

Challenging simplistic notions of vulnerability, several studies emphasize the importance of adaptive strategies and social connections in shaping resilience, while highlighting the continued vulnerability of resource-poor households in conflict-affected areas. Nygren and Myatt-Hirvonen [60] argue that resilience in Honduras is not predetermined by household characteristics like female-headedness or limited labour, but rather shaped by diverse livelihood strategies and strong social networks, reflecting the complex interplay of gender, labour, livelihood, and social connection. Nyssen et al. [42] similarly note that households with greater labour availability and access to inputs were more resilient in Tigray, Ethiopia, while labour shortages and resource depletion exacerbated vulnerability, although a direct comparison between female- and male-headed households was not conducted. In Colombia, Gutiérrez-Sanín [57] identifies coca-dependent households, those with allegiances to armed groups, and those lacking secure land tenure as particularly at risk, noting the disproportionate challenges faced by female-headed households, while recognising adaptive strategies as primarily survival tactics in a flawed system. Similarly, Collins et al. [34] highlights the vulnerability of indigenous communities in Argentina lacking formal land titles, with resilience stemming from strong social organisation and diversified livelihoods.

Discussion and Conclusion

The impact of different conflict types and dynamics on discrete dimensions of smallholder agriculture presents a complex and often contradictory picture of resilience and vulnerability, necessitating nuanced investigation.

The review identified a sharp increase in studies since 2019, indicating a growing field of increasing importance. Geographically, the corpus is dominated by studies on Africa, followed by Latin America, Asia and Europe. Prominent individual countries include Colombia, DR Congo, Ukraine, Ethiopia and Nigeria. Substantively, and consistent with our in-depth qualitative analysis detailed further below, content analysis revealed a relatively limited consideration of violent conflict. Although it is widely referenced in the corpus, specific types and dynamics of conflict are relatively rarely analysed in any depth; while other key concepts of interest to this review including commercialisation and gender are treated in a limited way, if at all.

Through in-depth qualitative analysis, the review contributes the following key findings. First, very few studies systematically compare effects across conflict types and/or dynamics [cf. 26], necessitating synthesis of evidence and comparison across diverse studies, approaches and even disciplines. Civil conflicts are the most extensively studied, while communal and international conflicts are comparatively neglected. This is significant given key trends highlighted in recent peace and conflict research, including increasing internationalisation of violent conflict globally, and the many diffuse forms insecurity and violence take in conflict-affected contexts [21,64,65].

Tactically, violent conflicts involving the targeted destruction of agricultural assets are recorded as having the most damaging effects on smallholder agriculture. While the association of greater disruption with targeted destruction may not be surprising in isolation, it is important in the wider context of debates over the deliberate, strategic and/or tactical leveraging of food resource and systems in conflict. As numerous scholars have documented, conflict's impacts on food security were traditionally dismissed as tragic, yet seemingly inevitable, by-products of the waging of wars [66,67]. Only in recent years, and through concerted efforts particularly by legal scholars, have famines, food crises and wider agricultural disruptions been re-cast as often intentional and functional features of warfare, that have distinct and outsized effects on food systems [68–71]. Against this backdrop, consistent evidence that conflicts in which agricultural resources are targeted are particularly disruptive for smallholder agriculture is important evidence of the salience of this tactic in contemporary conflict and the particular barrier it presents to progress towards stronger agricultural systems.

Turning to the features of smallholder agriculture that render it either particularly vulnerable or, conversely, resilient, to violent conflict, we begin with production systems. The synthesis generally finds that production systems are most vulnerable to violent conflict when characterised by a high level of reliance on monoculture, external inputs, insecure land tenure and limited access to water and associated infrastructure. Notably, input-dependent systems are particularly affected when infrastructure is destroyed and/or targeted in conflict, as documented extensively in Tigray, Ethiopia. By contrast, systems exhibiting greater diversity, and higher reliance on traditional knowledge, as well as integration in wider social networks, demonstrate greater resilience. However, reliance on 'traditional' or longstanding knowledge or practices is not a guarantee of resilience. It is worth recalling that wider research on conflict has consistently highlighted how conflict is a highly dynamic process that transforms wider social, economic, political and governance structures [72]. Against this backdrop, reliance on some long-standing practices, such as dependence on common land, in an era where land is being contested and large-scale population movements are underway, can render households more – not less – vulnerable [35].

An equally complex picture emerges in considering the role of commercialisation in shaping smallholder resilience or vulnerability in conflict, as commercialisation can either enhance or undermine resilience depending on its specific dimensions. There is broad consensus that highly market-dependent models are particularly vulnerable to violent conflict, given the often-wide-ranging macro-economic disruption conflict generates [e.g. 46]. However, beyond this, it is not clear that low-levels of commercialisation are desirable: moderate or locally-embedded commercialisation, and/or approaches to commercialisation that facilitate pivoting to or from subsistence farming, can be more important for resilience. Some studies are more critical of commercialisation altogether, problematising claims that it represents a linear path towards development and sustainability [54], and highlighting unintended consequences such as competition over resources that may, indeed, fuel further conflict [59]. These varied results underscore that successful strategies for strengthening smallholder resilience must account for the complex interplay between commercialisation, resource access, and the prevailing socio-political dynamics, acknowledging that both engagement and disengagement with commercial systems can contribute to resilience depending on the context.

Third, household characteristics – such as size, sex of household head, and access to resources – also significantly influence vulnerability of smallholders to violent conflict. Research is particularly extensive on the impact of limited labour resources – both independent of, and as a function of female-headed households status – as rendering households more vulnerable in times of crisis. Female-headed households also face other barriers, including discriminatory norms in relation to resources, land and markets [61]. However, while some characteristics are identified as strongly associated with vulnerability, most research emphasises smallholders' agency, highlighting how adaptability through diversified incomes or shifts in production strategies can mitigate vulnerability and enhance resilience in key ways. Ultimately, this body of research challenges conventional, static views of vulnerability, emphasising that resilience is not a fixed trait but an actively constructed process, rooted in household agency, strategic adaptation, and the ability to harness social and economic networks in dynamic and often unpredictable environments. Collectively, these findings emphasize the need for multi-faceted interventions addressing both material resource gaps and systemic inequalities to bolster household resilience in conflict-affected regions.

Finally, a cross-cutting theme that emerges across all three features of smallholder agriculture is the social and political contexts in which smallholder systems operate. In contrast to approaches to the study of agricultural productivity and sustainability that view these systems as the concern of narrowly defined agricultural research and policy alone, numerous studies across multiple features of enquiry highlight the importance of social networks and integration to enhance resilience and adaptability in production and commercialisation, and in mitigating individual characteristics that might otherwise be associated with risk and vulnerability. Equally, the role of economic or broader political and security policy is emphasised in several studies to spotlight the constraining environment in which many smallholders operate, and the barriers that both state and non-state actors can create for them.

These findings underscore that while context-specific vulnerabilities vary, effective resilience building hinges on inclusive governance and the ability to adapt to changing circumstances. Furthermore, they highlight the devastating long-term impacts of policies that disrupt existing social structures and undermine local control over resources.

Taken together, collectively, these findings underscore the crucial need to address both the immediate and long-term impacts of conflict, alongside the underlying vulnerabilities that make smallholder systems susceptible to shocks. Effective strategies for building resilience should prioritise diversified livelihoods; secure resource tenure; and protected access to essential inputs and infrastructure, including protection from conflict parties who might target it directly. While the devastating nature of certain conflicts can overwhelm even the most resilient systems, strategies including fostering inclusive market access, strengthening local seed systems, and diversifying income sources can be important buffers in crisis.

The findings have several implications for future research. First, future scholarship would benefit from more systematic comparative analysis of the differential impacts of diverse types and dynamics of conflict, particularly where multiple forms of violent conflict co-occur within a single agricultural system. Research of this kind could provide a robust evidence base documenting the relative impacts of different features of violent conflict, and suggest areas to prioritise in terms of both conflict prevention and management, as well as broader protection, security and development policy and practice. Acknowledging that where conflict types and dynamics co-occur, they also often interact and have cascade and wider system effects, we propose that only once impacts have been disentangled by key features of violence and meaningfully compared, can their interactive effects be more fully understood.

Second, qualitative research is essential to understand the lived experiences of smallholder farmers, particularly women and marginalized groups, as they navigate the challenges of conflict. Much of the research attentive to gender emphasises its association with labour shortages, but the smaller body of research on wider discriminatory norms and experiences of female smallholder farmers indicates a much richer understanding of the challenges, vulnerabilities and resiliencies of these households would be valuable. Such research should delve into specific coping strategies, the influence of social norms and power dynamics on access to resources, and the often-overlooked impacts of conflict on mental health and its subsequent effect on agricultural practices.

Finally, rigorous intervention research is necessary to evaluate the effectiveness of various support strategies, from peacebuilding initiatives to adapted agricultural extension services and targeted social protection programmes.

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About the Network on Conflict-Affected Agriculture in Nigeria (ConAg)

The ConAg project brings together partners from the **Centre for Peace and Conflict Research** at **University College Dublin** and the **Innovation Lab for Policy Leadership in Agriculture and Food Security (PiLAF)** at the **University of Ibadan**. The network seeks to identify research gaps and priorities for future collaboration, with the ultimate aim of developing and pilot innovative solutions to address, mitigate, and prevent conflict's negative impacts on smallholder agriculture in Nigeria and beyond.

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