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To cite this article: Shaher Abdullateef *et al* 2026 *Environ. Res.: Food Syst.* **3** 035017

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PAPER

OPEN ACCESS

RECEIVED

26 July 2025

REVISED

21 March 2026

ACCEPTED FOR PUBLICATION

27 May 2026

PUBLISHED

21 July 2026

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Enhancing the agricultural sector's contribution to food security: a case study of agricultural marketing in Northwest Syria

Shaher Abdullateef^{1,*} , Esraa Almashhour¹ , Rasim Ebish² , Cecilia Tortajada³ and Faical Akaichi⁴

¹ Food Security and Agriculture Development, Syrian Academic Expertise, Cara Syria program, Aleppo, Syria

² Business Administration and Quality Management, Sham University, Cara Syria program, Aleppo, Syria

³ School of Social & Environmental Sustainability, University of Glasgow, Dumfries, United Kingdom

⁴ School of Natural and Social Sciences, Scotland's Rural College, Edinburgh, United Kingdom

* Author to whom any correspondence should be addressed.

E-mail: shaher.a@sae-afs.org

Keywords: food security, agriculture, crop marketing, Northwest Syria

Supplementary material for this article is available [online](#)

Abstract

Before the onset of the conflict in Syria in 2011, agriculture was a major contributor to the country's GDP and livelihoods. However, conflict-related disruptions have hampered food production and crop marketing. Over 68% of the entire Syrian population is food insecure and relies heavily on international aid, which is increasingly facing geopolitical and logistical challenges alongside rising food demands in Northwest Syria. This study investigates the marketing landscape of key agricultural products. It is conducted in 2024 and identifies challenges and potential avenues for revitalising the agricultural sector as an economic driver, to enhance food security and livelihoods in Northwest Syria. The data were collected in nine districts in Northwest Syria using a mixed-methods approach, capturing both qualitative and quantitative data from 102 interviews with key stakeholders, including farmers, traders and retailers, local authorities, and consumers, and three focus group discussions with representatives of the same stakeholder groups. The study's findings reveal significant inefficiencies in the current marketing channels and mechanisms for local agricultural products. Key challenges include political fragmentation, instability, inadequate infrastructure, lack of regulatory frameworks, and farmers' poverty and financial constraints. Potential avenues to promote food production and improve the economic value of the agricultural sector were identified. These avenues include updating and developing comprehensive policies to regulate effective marketing and exports; establishing a central database for agricultural production and local food needs; investing in rebuilding the infrastructure such as irrigation systems, storage facilities and transportation networks; and supporting farmers' organisations and agricultural research centres.

1. Introduction

The agriculture sector has long been recognised as a key sector of the Syrian economy. Prior to the 2011 uprising, agriculture accounted for almost 25% of the country's gross domestic product and was the main livelihood for almost half the population living in rural areas (Rocchi *et al* 2013, FAO 2017, Mohammed *et al* 2020). According to the World Food Programme (WFP 2023), more than half of the Syrian population faced food insecurity at the time of the study, a situation that has resulted from years of conflict-related displacement, loss of livestock and agricultural labour, and widespread damage to infrastructure (World Bank 2022). These factors have led to a sharp decline in food production. Recognising the importance of supporting the sector's eventual stabilisation and recovery, the Food and Agriculture Organisation of the United Nations (FAO) has been urging EU member states to prioritise investment in Syrian agriculture (FAO 2018).

The fall of the Assad regime in December 2024 marked a significant turning point in Syria's political landscape, initiating a recovery phase after more than a decade of conflict and fragmentation. This shift has important implications for key economic sectors, particularly agriculture. Before 2011, the agricultural sector was highly centralised and heavily subsidised; however, these characteristics were progressively eroded as the conflict began.

Since 2011, the country has been divided among multiple local authorities that have introduced their own different policies, governance structures, and agricultural marketing systems. This decentralisation created inconsistencies, disrupted institutional coordination, and weakened market access. Although Syria is now entering a new phase of political transition and gradual reunification, the structural impacts of the prolonged crisis remain deeply embedded in the agriculture sector. Ongoing challenges such as damaged infrastructure, loss of skilled labour, disrupted value chains, and underinvestment in sustainable development continue to constrain agricultural productivity and marketing. Despite the recent political transition, these structural barriers to food production and marketing remain largely unresolved. This paper examines these enduring challenges and aims to inform the development of effective strategies and interventions to support both short-term recovery and long-term resilience within Syria's food and agriculture sector.

Before the 2011 uprising, Syria was self-sufficient in several strategic crops and animal products, including wheat, lentils, potatoes, tomatoes, apples, eggs, milk, chicken meat, and sheep meat, which formed the backbone of national food security (Hinnebusch *et al* 2013, Ibrahim *et al* 2024). After 14 years of devastating conflict, Syria has become a net importer of wheat, beans, lentils, beef and chicken meat, eggs, and potatoes (Tull 2017, FAOSTAT 2023). For bread, for example, only 10% of the flour in Northwest Syria in May 2020 was locally sourced, while 90% was imported from Turkey (Adleh and Duclos 2022).

Multiple additional factors, such as the 2010 and 2021 droughts, the war in Ukraine, the financial crisis in Lebanon, and the 2023 earthquakes in Turkey and Syria, have exacerbated the crisis. As a result, 12.1 million Syrians (68% of the total population) are food insecure, with another 2.9 million at risk of falling into hunger, who are heavily reliant on food and agriculture assistance (FAO 2023, WFP 2023, Alattar 2024, Ibrahim *et al* 2024). The EU and other major donors have provided sustained humanitarian support throughout the conflict. However, delivering aid has faced major obstacles, especially in Northwest Syria, such as the periodic renewal of the UN cross-border resolution to keep aid corridors open, competition for humanitarian assistance in new conflict-affected areas (e.g. Ukraine, Sudan, and Niger), and the ongoing political uncertainty regarding Syria's future (Richani 2016, BMZ 2023). It is increasingly evident that humanitarian assistance alone cannot address the root causes of food insecurity, and that more sustainable, development-oriented solutions are urgently required (Turkmani *et al* 2022, Wiggins *et al* 2023).

Agriculture remains among the most important sectors in Northwest Syria, both for household food security and income generation. In Northwest Syria, crop-based value chains, especially for strategic crops such as wheat and olives, face multiple interrelated challenges resulting from prolonged conflict, climate stress, covid-19 crisis, and institutional fragmentation. These include: (1) reduced access to certified seeds and essential agricultural inputs; (2) rising production costs linked to fuel, fertilisers, pesticides, etc; (3) recurrent droughts and declining water availability; (4) damage to irrigation, storage, and processing infrastructure; and (5) weak and poorly coordinated agricultural marketing systems characterised by limited market access and price volatility. As a result, many smallholder farmers are unable to market their produce effectively or recover production costs, which undermines incentives to sustain or expand cultivation (Boden *et al* 2019, 2020, Adleh and Duclos 2022, FAO 2023, WFP 2023, Alattar 2024, Ibrahim *et al* 2024, Taha 2025).

In Northwest Syria, in addition to fostering political stability, rebuilding a resilient agricultural system is critical to reducing food insecurity in Syria. Donors and international agencies, such as the FAO and the International Fund for Agricultural Development, initiated additional projects aiming to empower Syrian smallholder farmers to enhance productivity and promote self-reliance (IFAD 2021, FAO 2022). These interventions have primarily focused on providing technical solutions to improve food production, such as supplying agricultural inputs, farming tools, and livestock feed, and restoring and improving the irrigation infrastructures, as well as enhancing crop management. In addition, Syrian farmers have also received emergency support, including food, shelter, health services, and cash transfers. However, evidence on the effectiveness of these interventions, especially in terms of marketing support for smallholder farmers in Syria, remains limited (Doocy *et al* 2017, Kayaoglu *et al* 2023), with little attention and funding being directed toward improving agricultural marketing, a crucial link between production and consumption. While these measures have provided short-term relief, food insecurity remains high after more than a decade of assistance. This has prompted a shift toward longer-term

Table 1. Distribution of the interviewees across study areas and stakeholders.

Location		Participants					
Governorate	District	Farmers	Local authorities	Traders	Food processors	Consumers	Total
Aleppo	Afrin	6	1	2	2	2	13
	Al-Bab	6	0	2	2	2	12
	A'zaz	9	1	3	2	4	19
	Jarablus	6	1	1	1	2	11
	^a Jabal-Saman	6	0	1	0	2	9
Idlib	Harim	5	1	3	1	2	12
	Idlib	9	1	2	1	2	15
	Jisr-Ash-Shugur	4	0	1	1	2	8
	Ariha	1	0	0	0	2	3
Total		52	5	15	10	20	102

^a Jabal Samaan was considered part of Idlib in the data analysis, as it was under the administration of the Salvation Government during the study period.

support, including agricultural and livestock development programs aimed at achieving more sustainable outcomes. In the absence of structured marketing systems, farmers often rely on informal traders, cross-border markets, or distress sales at harvest time, which further weakens producers' price bargaining power and reduces profitability (Syria Cross Border 2021, FAO 2023, FAOSTAT 2023, WFP 2023, Taha, 2025). These constraints highlight the need for improved market linkages, storage facilities, processing capacity, and coordinated sustainable agricultural policies.

This study seeks to fill that gap by exploring sustainable and effective approaches to enhance the marketing of agricultural products in Northwest Syria. It aims to develop a comprehensive understanding of the drivers of, and challenges facing, agricultural marketing in the region. The specific objectives of this study are (a) to identify mechanisms and channels used to market key local agricultural products, i.e. wheat, lentils, and olives; (b) to identify key challenges associated with the marketing of raw and processed strategic crops; and (c) to propose actionable recommendations aimed at improving the marketing of the key crops and stimulating agricultural sector growth.

2. Methodology & methods

2.1. Geographical scope

The study, undertaken in 2024, covered nine districts (Afrin, A'zaz, Al-Bab, Jarablus, Jebel Saman, Harim, Idlib, Jisr-Ash-Shugur, and Ariha) within Aleppo and Idlib governorates in Northwest Syria (table 1). These were chosen to represent areas relevant to the production and marketing of the three targeted crops, and their comparative vulnerability to the enduring repercussions of the Syrian conflict. At the time of the study, Northwest Syria had an estimated population of 5.1 million, including 3.5 million internally displaced peoples (IDPs), with 3.6 million deemed to be experiencing acute food insecurity (OCHA 2024).

2.2. Study sample

A cross range of stakeholders was selected to provide a comprehensive and multidimensional understanding of the subject matter: 52 farmers identified by their primary crop, i.e. 17 wheat, 19 olive and 16 lentil; 15 traders and retailers; 5 local authority representatives; 10 Food processors; and 20 consumers. The recruitment of interviewees was facilitated by the research team's existing networks and relations, established during previous research.

The criteria used to select and recruit farmers sought to achieve a sample of both female and male heads of household. In this instance, a head of household was defined as the person responsible for key livelihood decisions, especially in agricultural production and income management.

While the study's field researchers made a considerable effort to engage both male and female heads of household, prevailing security and cultural constraints limited the involvement of females to 6% of respondents, with the average age across interviewees of 47. The proportion of female respondents was not predetermined at the design stage; the observed participation rate (6%) reflects constraints encountered during field data collection and does not reflect women's actual involvement in agricultural production and marketing activities in northwest Syria. To provide contextual grounding, we now clarify in

the manuscript that comparable estimates from displacement settings indicate similar proportions, with approximately 5%–7% of households in NW Syria displacement camps being female-headed (UNICEF & GiHA 2023).

Data collection

Between March and July 2024, 102 key informant interviews (KIIs) and three focus group discussions (FGDs) were conducted to collect both quantitative and qualitative data. Ethics approval was received from Scotland's Rural College before the start of the interviews and FGDs.

KIIs: the interviews were conducted in each of the study areas (see table 1) by six research assistants drawn from among agriculture students and engineers with prior experience, who also received training in qualitative interview techniques from the core study team. The four interview instruments, each tailored to a particular respondent group, were designed to include both closed and open-ended questions.

- Farmers were asked about farm size and agricultural production, storage and transport methods, marketing strategies and channels, challenges faced in production and marketing, and food availability and access.
- Consumers were asked about volumes of food consumption, sources of agricultural products, food availability and quality, price dynamics and their impact, and preference for imported or local products.
- Traders and food processors were asked about types and volumes of trading and manufacturing, marketing channels, marketing policies and regulations, operational challenges, and transport and storage infrastructure.
- Local authorities were asked about agricultural statistics, services to support the agricultural sector and its marketing, challenges in developing the agricultural sector, roles in marketing and policy-making, and available infrastructure.

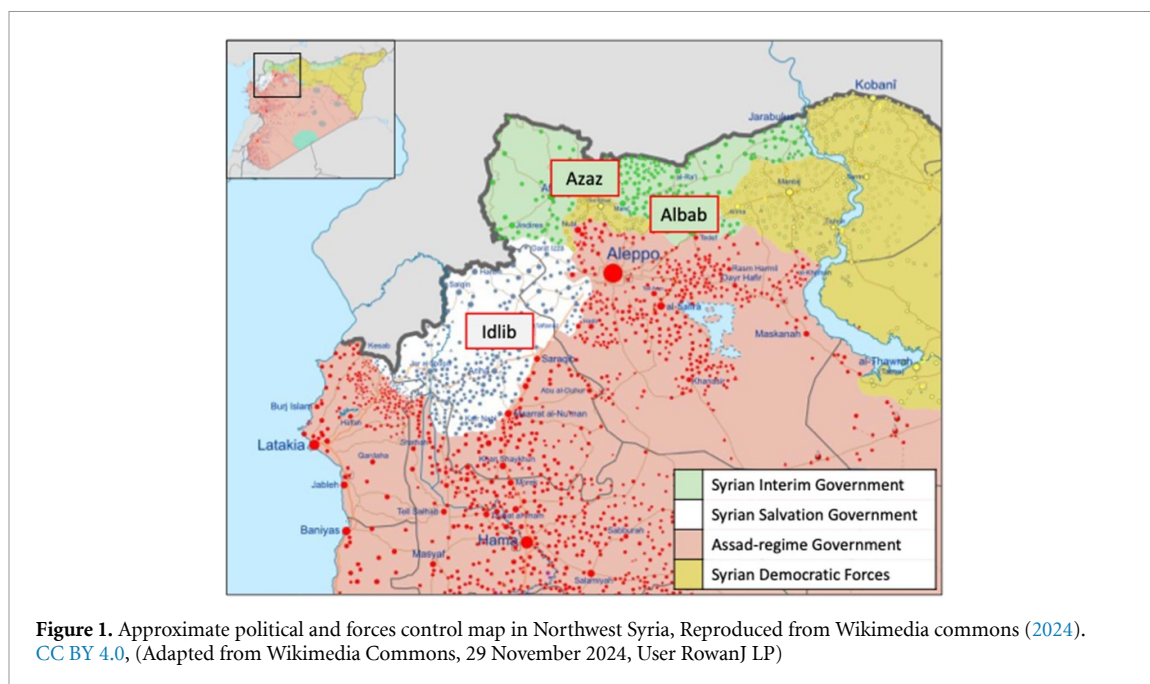
Each of the four interview instruments was piloted with a subset of 12 individuals, i.e. four from each of the study sample groups, with pilot responses and feedback used to amend or refine the instruments. Before the interviews, participants were informed of the study's main objective, the topics to be discussed, their right to withdraw at any point and without reason before data analysis, and how their data would be handled in terms of security and confidentiality. Informed consent, including to record the interviews, was obtained from all study participants—interviewees and FGD participants. The Interview data was stored on encrypted hard drives accessible only to the research team. Transcripts were produced, and audio recordings were deleted within two weeks. All data was anonymised and not shared outside the team.

FGDs: one FGD was conducted in each of the following study areas: Al-Bab, Azaz, and Idlib, with 15–20 participants in each, locations chosen to cover the political and climatic diversity within the overall study area (figure 1).

At the time of the study fieldwork, Al-Bab, ostensibly under Syrian Interim Government (SIG) control although overseen by the Turkish government, offered insights into cross-line trading activities with the Syrian Democratic Forces (SDF) in the northeast of Syria, as well as with Assad-regime areas; Azaz, bordered by Turkey and Idlib governorate and also under the ostensible control of the SIG, provided a unique perspective on cross-border trade, on agricultural practices influenced by Turkish policies and market access, as well as cross-line trade with Idlib governorate; and Idlib, under the control of the Salvation government, also bordering Turkey, was critical to our gaining an understanding of the impact of the different governing entities, as well as cross-border and cross-line interactions.

2.3. Data analysis

The study team adopted a 'Grounded Theory' method, i.e. a research strategy focused on an inductive approach for data analysis whereby dominant and overlapping themes are deduced from the data collected. Cycles of analysis were repeated until no new insights were gained from the data (Heath and Cowley 2004, Khan 2014). Following transcription of the interview recordings and entry of data into MAXQDA, the analysis involved:



- (1) Data coding and identification of possible themes and emerging comparable or overlapping themes;
- (2) Analysis of themes and thematic links;
- (3) Classification of the themes into the following key categories: marketing channels, crop transport and storage, conflict and political context, marketing policies, intervention scope, economic and environmental factors, and farmer financial capacity.
- (4) Cross-referencing with FGD data.

Through the FGDs, we sought to deepen understanding of the challenges and opportunities facing the marketing of key agricultural products in the northwest. The FGDs addressed key thematic areas identified through the KIIs, including agricultural marketing channels, major economic and institutional constraints, and the influence of political and climatic conditions. They were designed to generate qualitative data and served to interpret and contextualise the KII findings. In addition, KII results were shared and discussed during the FGDs to elicit participants' feedback and insights on potential short- and medium-term interventions. Interviews with local authorities were systematically reviewed to identify key result categories and to corroborate or contextualise findings emerging from farmer interviews. Quantitative data were analysed and visualised using Microsoft Excel. This descriptive analysis provided preliminary insight into the relationships between the various identified agricultural marketing drivers.

3. Results

The results of the interviews and FGDs are presented in the next four subsections. The first of these outlines the key characteristics of the farmers and farming practices in Northwest Syria, providing insights into the actors and activities involved in agricultural production. The second reveals marketing methods with a particular focus on marketing channels, crop transport and storage. The third examines the key challenges of crop production and marketing, which include the roles and services of the local authorities institutions (SIG and Salvation authorities), interventions by local and international NGOs, environmental factors, and farmer capacity. The fourth links crop production and marketing to food security, by comparing perspectives from both farmers and consumers, with particular attention to differences in food availability and access.

3.1. Characteristics of farmers and farming systems in Northwest Syria

The average farm size of the farmers who were interviewed was 3.9 ha, with 72% ownership and 5% shared ownership. The remaining 23% cultivated rented land was mainly amongst farmers displaced from regions that had been more severely affected by the conflict. The average farm household size was

Table 2. Farmer interviewee data.

Variable	Data	
HH head	Male	94%
	Female	6%
HH head average age		47 years
Household size		8.3 members
	Male children under 18	28%
	Female children under 18	25%
	Male adults over 18	25%
	Female adults over 18	19%
	Male adults over 65	1%
	Female adults over 65	2%
Residency status	Host	83%
	IDP	17%
Land size average	Total farm size	3.9 ha
	Cereals	2.2 ha
	Vegetable	0.4 ha
	Fruit trees	1.3 ha
Land ownership	Owned farm	72%
	Rented farm	23%
	Shared farm	5%
Household Income Sources (multiple choice)	Agriculture	100%
	Trading	19%
	Daily worker	29%
	Employee	10%
	Industry	4%
Farming labour (multiple choice)	Farmer family	94%
	Partner family	6%
	Permanent paid worker	2%
	Seasonal paid worker	87%
Farming activities (multiple choice)	Cereals	83%
	Vegetables	54%
	Fruit trees	52%
	Livestock	10%
	Food manufacturing	17%
Percentage of the farm products used by the family		9.2%

Data source: study data analysis (2024), $n = 52$ farmers.

8.3 members, reflecting the cultural norm of larger family units among farming communities with 94% of the farmers interviewed using family members as their main source of agricultural labor. Most of those interviewed said that farming represented their main source of food and income.

Agricultural inputs: availability and quality in the local markets

The results in figure 2 show that farmers rely primarily on locally sourced seeds, saved from previous harvests (69%), and/or local seeds obtained from local markets (46%) or neighbouring farmers (29%), in the case of olives, from locally-sourced seedlings.

Local seeds, commonly sourced from neighbouring farmers and other informal channels, are uncertified and generally linked to lower crop productivity. Farmers' continued dependence on these seeds is mainly attributed to the high cost of certified improved seeds, whether locally produced or imported. The essential agricultural inputs, such as seeds, fertilisers and pesticides, were also reported by 83% as only available at high prices, in addition to 44% stating that the agricultural inputs that were available were of low quality (figure 2). The results indicate that many farmers rely on lower-cost inputs. Qualitative evidence from interviews and FGDs suggests that this often includes the use of non-certified seeds, such as those saved from farmers' own production or obtained through informal exchange

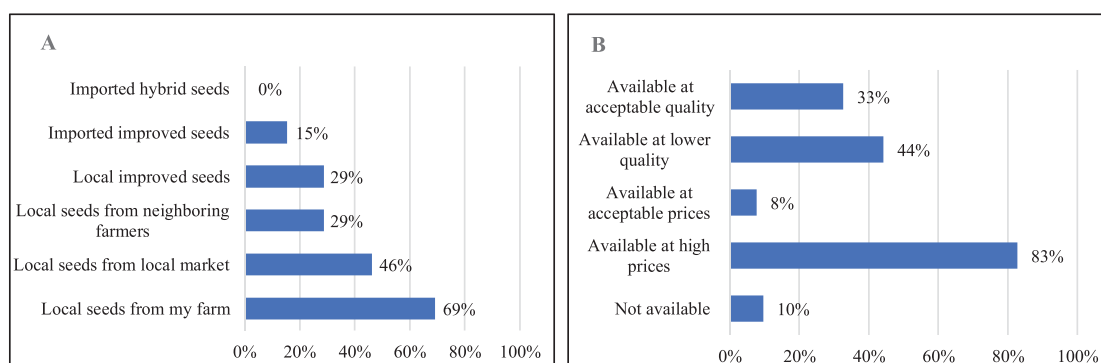


Figure 2. Source of seeds used by farmers (A) and availability of essential agricultural inputs, including seeds, fertilisers and pesticides (B). Data source: study data analysis (2024), $n = 52$ farmers.

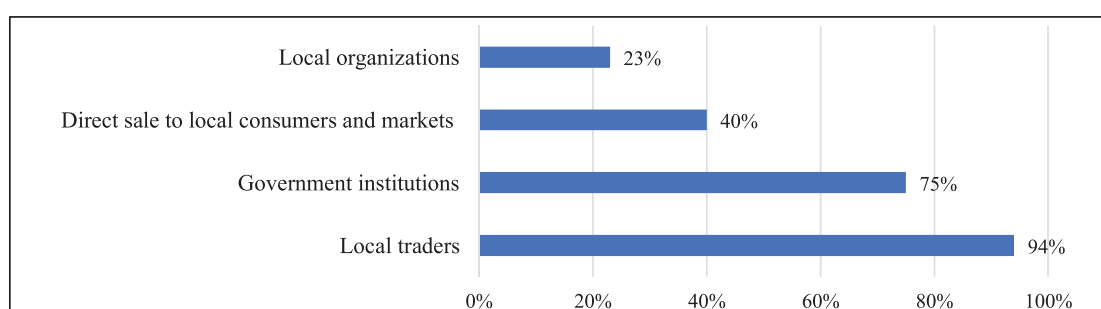


Figure 3. Key crop marketing channels in Northwest Syria. Data source: study data analysis (2024), $n = 82$ interviews: farmers, traders and food processors.

with other farmers. However, it is also acknowledged that some farmers use certified seeds, including improved and imported varieties (15%). While cost emerged as a prominent factor in the qualitative data, other considerations influencing input choice, such as availability, familiarity with local seed varieties, risk perceptions associated with new cultivars, and access constraints, also emerged from the FGDs.

3.2. Agricultural marketing methods

Marketing channels

The study data revealed four legal marketing channels: local traders (94%), local authorities (23%), government institutions (75%), and direct sales to consumers and local markets (40%) (figure 3). The interviewees reported that marketing channels are generally unstable and heavily reliant on individual marketing networks. Their functionality is shaped by factors such as political conditions, conflicts, demand, and crop availability. Market channels change with shifts in power and the movement of traders, making them largely short-term in nature. As a result, there are relatively few stable channels that consistently connect producers, traders, and consumers along the entire value chain.

In addition, some agricultural products, such as olive oil, were being marketed through smuggling routes to areas which, at the time of the study, were controlled by the Assad-regime and the SDF. Yet other crops were being smuggled to Turkey, and mixed with local produce and repackaged to obtain certificates of origin, prior to export to neighbouring countries and European markets. This illegal export of crops to both domestic and international markets takes place due to the lack of legal trading channels and trade agreements, for tax evasion purposes and financial gain, mostly facilitated by groups with military influence or by military groups in return for payment (Source: FGDs). Farmers in A'zaz and Al-Bab reported limited access to government-linked marketing channels, citing a lack of clarity, institutional capacity, and purchasing mechanisms for buying crops from farmers. In contrast, farmers in Idlib

Table 3. Crop marketing challenges associated with the conflict and political context in Northwest Syria.

Key statements	Respondents
Crop transport using paid transport services	77%
Crop transport through traders or customers directly from the farm	67%
Crop Transport using owned transport means	26%

Data source: study data analysis (2024), $n = 82$ interviews: farmers, traders and food processors.

reported comparatively greater opportunities to market their produce, including access to a more established and stable government-supported marketing system (FGDs). Local authority representatives participating in the FGDs confirmed these observations, noting the presence of initial marketing regulations and institutional capacity in Idlib compared to A'zaz and Al-Bab.

Crop transport methods

Farmers used a combination of means to transport their crops. For instance, 77% of the farmers interviewed mentioned that they relied on paid transport services to move their crops from the field or home storage to the market, and only 26% of them used their own transport means; 67% sold their crops to traders or intermediaries directly at the farm gate to avoid transport costs; and 62% used their vehicles to transport crops from the field to their homes.

The FGDs discussion showed that the route of transport used depended on the type of crop. For example, olives were transported directly from the fields to presses for oil extraction. However, such transport is very expensive due to factors such as elevated fuel prices, the need to use small vehicles requiring multiple trips and diversions due to damaged roads. These challenges often compel farmers to sell their crops directly from the field rather than transporting them to market or home storage. FGD participants across al-Bab, Idlib, and Azaz repeatedly emphasised that transport expenses often exceed potential margins. This is exemplified by an Al-Bab farmer who remarked, 'Sometimes the transportation cost is higher than the profit itself, so selling at the farm gate becomes the only option' (Al-Bab Focus Group 2024). The local authority representatives at the FGDs explained that the inability to transport crops to other areas under alternative control, such as Assad-regime or SDF-controlled areas, significantly undermines the effectiveness and flexibility of farmers' marketing strategies. However, no differences were observed between the three areas in Aleppo and Idlib.

Crop storage

While 62% of farmers reported that they did not store their crops, selling them shortly after harvest, 19% used their homes for storage, with the remaining 19% renting storage. Home storage was primarily used in the case of olive oil and typically involved keeping such products in a room in their homes for security reasons or the lack of proper storage facilities. Wheat and lentil crops were usually sold immediately following harvest or briefly stored in heaps around their house. While traders and food processors had warehouses for storing and packaging products prior to sale, local authority institutions only had storage facilities such as silos or covered stacks of sacks for wheat, not for lentils or olives.

The storage facilities owned by traders and governmental institutions had suffered significant damage from the ongoing conflict (FAO 2017, Boden *et al* 2019). Sixty seven percent of the farmers interviewed pointed to a lack of adequate storage in general, particularly during harvest time, as a critical issue. Although some conflict-damaged storage facilities had been rehabilitated, their capacity still fell short of overall storage needs. Qualitative evidence from FGDs indicated that the protracted conflict, combined with limited financial resources, has been a key factor discouraging farmers from investing in post-harvest activities and improved marketing practices. FGD participants explained that the damage to storage and transport infrastructure, and the lack of capital, have constrained their ability to bear the risks associated with storing or transporting crops to more distant markets, forcing them to sell their crops to traders immediately following harvest, to cover production costs and avoid post-harvest losses.

FGD local authority.

3.3. Key crop marketing challenges

Conflict and political context

The study highlights several critical challenges facing the agricultural sector in Northwest Syria. The most urgent issue, identified by all respondents (100%), was the lack of coordination in planning and implementation among key actors, including local authorities, international and local non-government

Table 4. Crop marketing challenges associated with the conflict and political context in Northwest Syria.

Key statements	Respondents
Lack of coordination between key actors in the agricultural sector	100%
Lack of agricultural planning within the study areas	96%
Weak government services and projects	77%
Lack of food processing facilities hindering agricultural expansion	76%
Lack of quality impactful development interventions and projects	75%
Inadequate local markets for local products	71%
Lack of food manufacturing industries limiting the expansion and cultivation of industrial crops	67%
Absence of accreditation and certification to support export	65%
Inability to market cross-line and cross-border due to the conflict	65%

Data source: study data analysis (2024), $n = 82$ interviews: farmers, traders and food processors.

organisations (I/NGOs) and donors (table 3). Ninety six percent of farmers also reported the absence of a comprehensive agricultural development plan to address needs across the entire Northwest of Syria, as a major obstacle to crop marketing.

Agricultural planning in Syria had traditionally been structured around five-year strategic plans, however, conflict and political instability had resulted in a shift toward short-term emergency responses. In addition, 77% of respondents cited weak government services and projects as another major barrier, attributed primarily to its lack of financial resources. Despite supposed expertise, 75% of the farmers interviewed reported that development interventions by I/NGOs were often poorly implemented, reflecting inefficiencies within the humanitarian response system, and limited impact. FGD participants, including local authorities, confirmed that the absence of product certification and export trade agreements is a significant hurdle. This stems from the collapse of central government certification processes, alongside a lack of alternative accreditation agreements required for global market access. Consequently, restricted market access remains a primary barrier to the recovery and commercialisation of the Syrian agricultural sector.

Absence of centralised marketing policies

The findings emphasise the critical need for structured policies to better protect local markets, pricing mechanisms, and smallholder-support systems (table 4). All of the farmers, traders, and food processors interviewed cite the inability to enforce desirable marketing policies to protect local products and markets as a major issue.

This situation is primarily the result of the loss of central government control in northwest Syria and the emergence of local governing structures, including the SIG and the Salvation Government, marked by the emergence of parallel local authorities such as the SIG and the Salvation Government. At the same time, the presence of multiple NGOs, military actors, and other local power holders, together with conflict-related restrictions, has significantly constrained internal movement within northwest Syria and access to external border crossings.

Another significant issue, reported by 92% of the interviewees, was the absence of comprehensive price-setting policies to enhance the economic viability of strategic crops, such as wheat and olives. Eighty five percent of respondents highlighted the lack of policies encouraging the export of agricultural products and 83% raised the absence of an 'agricultural calendar' around which to organise import and export activities according to the local crop production seasons, to limit the adverse effects of agricultural imports on local crop marketing, as another major policy-related marketing challenge. This last point was also highlighted by focus group participants pointing to the need to prohibit the import of products during their local production season, through the adoption of an agricultural calendar. Yet a further concern raised by 81% of farmers, traders and food processors, in addition to the design and implementation of agricultural projects, was the criteria used to identify project beneficiaries.

Type and scope of interventions

Local authority authorised I/NGO implemented projects were described by respondents as only providing temporary relief. The study findings highlight significant challenges in agricultural development and support for farmers in Northwest Syria (table 5). Ninety six percent of the 52 farmers interviewed, emphasised the lack of development and sustainable projects, including training, pointing out that most interventions focused on short-term solutions rather than addressing longer term needs. Ninety two percent of farmers also noted that projects were insufficient to meet the needs of all farmers, which

Table 5. The crop marketing challenges in Northwest Syria due to the loss of centralised policies.

Key statements	Respondents
Loss of central government control and marketing policies	100%
Lack of comprehensive price-setting policies enhancing crop economic viability	92%
Lack of policies facilitating the export of agricultural products	85%
Lack of an agricultural calendar to protect local markets from imports	83%
Inappropriate criteria used to identify agricultural project beneficiaries	81%
Limited understanding of marketing practices within the conflict-affected context	63%
Absence of policies supporting and encouraging traders to purchase local agricultural products	48%

Data source: study data analysis (2024), $n = 82$ interviews: farmers, traders and food processors.

was increasingly the case at the time of the study in 2024, due to an overall decrease in humanitarian funding. Another notable issue raised by 79% of the farmers was the distribution of free food baskets containing imported food items. While these food baskets provided immediate relief, FGD participants across all three study areas reported that they undermined local food production by reducing demand for, and market access of, locally produced agricultural products (FGDs).

Efforts to distribute agricultural inputs, such as seeds or tools, were acknowledged by 56% of the farmers interviewed; however, these interventions were deemed to be insufficient in both scope and effectiveness. Only half of the respondents reported receiving cash vouchers, which would allow farmers the flexibility to address their specific, individual needs. In addition, FGDs across the three study areas referred to several positive interventions, including value chain enhancement, particularly for wheat and olives, the distribution of irrigation systems, support to food processing activities, and the establishment of cooperatives for farmers, water users, and women engaged in food processing. However, participants emphasised that major infrastructure investments and longer-term development interventions remain largely absent. These findings underscore the urgent need for comprehensive, sustainable, and inclusive agricultural interventions to support local farmers and effective crop marketing.

FGD local authority.

Economic, contextual and environmental factors

The study data highlighted significant farming and environmental challenges impacting crop marketing (table 6). One adaptation observed by all farmers (100%) was a shift toward cultivating low-water and low-cost crops, such as cumin and medical plants, as a way to cope with water scarcity and climate change. Ninety percent of farmers reported changes in specific areas favoured for the different study crops, due to soil suitability and the changing climate. A significant 81% of farmers indicated a lack of modern agricultural practices due to weak agricultural extension services, training and research. However, limited knowledge, low-incomes and the conflict context were key factors in the limited use of modern farming systems and technologies. Environmental stressors, including drought, heatwaves, and limited water for irrigation, were reported by 71% of farmers, in addition to which, loss of agricultural land due to urban expansion and the establishment of both formal and informal IDP camps.

Data from Idlib, Azaz, and al-Bab suggest that the synergy of security risks and limited financial liquidity discourages long-term agricultural investment. High input costs, combined with the absence of formal marketing mechanisms, force farmers to prioritise risk mitigation over production growth. This trend is evidenced by a participant in Azaz who reported that farmers are opting to 'reduce their acreage or cease cultivation' due to unaffordable costs and security fears (Azaz Focus Group 2024).

FGDs in Al-Bab and A'zaz identified climate change and water scarcity as major constraints on agricultural production. In Al-Bab, participants reported a sharp decline in groundwater levels, reaching depths of up to 600 metres, which has significantly increased extraction costs and pushed farmers toward rainfed crops due to limited financial resources. In A'zaz, participants highlighted climate-related challenges alongside proposed mitigation options, such as diverting water from the Euphrates River. Local authority representatives in both locations acknowledged the absence of government-led projects to rehabilitate irrigation infrastructure, citing limited financial capacity and ongoing conflict. In contrast, participants in Idlib referred to government-supported interventions to rehabilitate irrigation channels in the Al-Rouj Plain, which have contributed to improved water availability and agricultural production (FGDs).

Table 6. Limitations of implemented interventions affecting crop marketing in Northwest Syria.

Key statements	Respondents
Lack of longer-term development and sustainable projects	96%
Insufficient projects to support all farmers in need	92%
Negative impact of free food baskets containing imported food items	79%
Distribution of agricultural inputs to farmers	56%
Limited distribution of cash vouchers to farmers to enhance flexibility	50%
Lack of training and agricultural extension services	33%

Data source: study data analysis (2024), $n = 52$ farmers.

Table 7. The crop marketing environmental challenges in Northwest Syria.

Key statements	Respondents
Shifting crop cultivation patterns towards low-water and low-cost crops.	100%
Climate change impacting on traditional crops previously cultivated.	90%
Lack of climate smart agricultural practices due poor training, extension services and research.	81%
Environmental conditions, e.g. drought, heatwaves, limiting availability of water for irrigation.	71%
Shrinking of agricultural land due to camps and urban expansion.	62%
Limited adoption of modern agricultural technologies.	62%
Increasing reliance on rainfall rather than irrigation.	60%
Absence of crop rotation reducing soil fertility.	60%
Increased prevalence of plant disease and pests due to climate change and reduced use and quality of pesticides.	48%
Reduced 'recycling' of agricultural by-products, e.g. wheat straw and lentil residues as animal feed, or olive residues for heating materials.	31%

Data source: study data analysis (2024), $n = 52$ farmers.

Farmers' financial capacity

The findings showed an urgent need to improve financial access, reduce input costs, strengthen farmer organisations, and enhance income levels, particularly for women as vital contributors to agricultural livelihoods. The data underscores the socio-economic challenges faced by the agricultural sector in the study region (table 7).

Agriculture remains the primary livelihood for 88% of farmers and workers, with a significant emphasis on the role of women. However, 87% of farmers highlighted the absence of financing institutions, such as banks, to provide essential loans for farmers, exacerbating financial constraints (table 8). Eighty five percent of farmers highlighted a decline in the farming economy and their spending power due to the increasing cost of all agricultural inputs, including fuel, an essential in relation to transport and irrigation. Seventy three percent also noted the ineffectiveness or absence of farmer associations, limiting collective action and purchasing power, and financial support, as well as 71% noting the fall in agricultural workers' income, further illustrating the economic vulnerabilities within the sector.

3.4. Food security

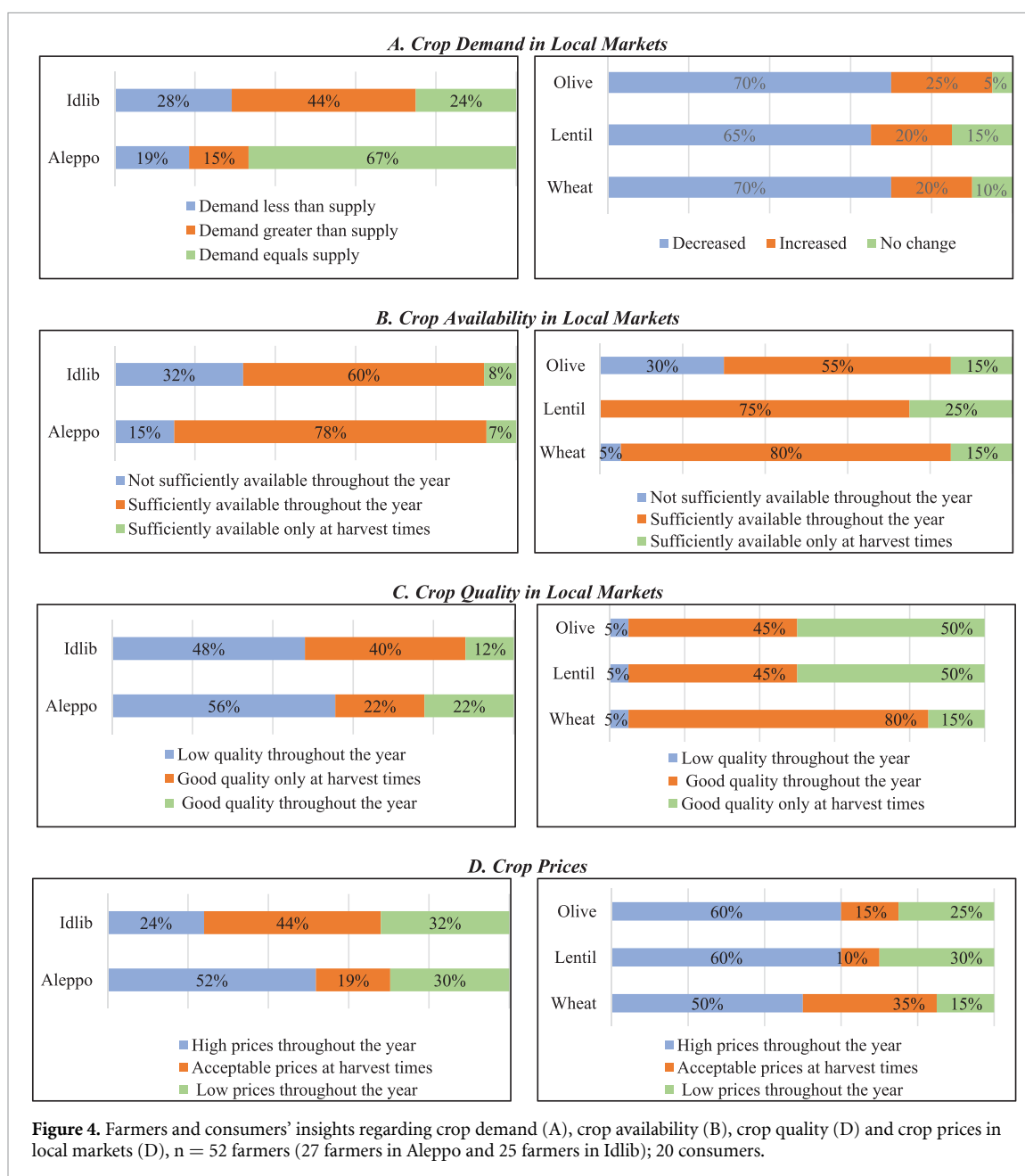
Farmers reported noticeable variations in crop demand across Northwest Syria (figure 4). Amongst the 25 farmers interviewed in Idlib, 44% indicated that crop demand was greater than supply, while 67 of the 27 interviewed farmers in Aleppo reported a balance between crop demand and supply, indicating that crop demand in Idlib was higher than in Aleppo. From the consumer perspective, demand exhibited significant fluctuations across the three study crops, with a marked decline reported for olives (70%), lentils (65%), and wheat (70%). These findings underscore the seasonal nature of agricultural markets and point to constraints in crop marketing and transportation between Aleppo and Idlib, and potential deficiencies in maintaining consistent year-round supply chains.

The majority of farmers (60% in Idlib; 78% in Aleppo) and consumers (55% olives; 75% lentils; 80% wheat) rated crop availability in local markets as sufficient throughout the year, although with greater variation between the two groups relative to the question of its quality. Regarding the quality of produce throughout the year, farmers in both Aleppo and Idlib tend to assess crop quality as low, compared to 5% of consumers for olives, lentils, and wheat. However, again in terms of quality, 50% of the consumers rated the quality of both olives and lentils as only good at harvest time, with the biggest

Table 8. Crop marketing challenges associated with farmers' financial capacities.

Key statements	Respondents
Agriculture is the primary livelihood for farmers and workers, and female farmers/workers in particular	88%
Absence of financing institutions, such as banks, to provide loans to farmers	87%
Depleted agriculture economy, and returns for farmers, due to high costs of inputs	85%
Ineffectiveness or lack of farmers associations	73%
Poor income for workers in the agricultural sector	71%
Limited availability of agricultural supplies in local markets creating an import dependence	62%
Limited capacity of farmers to self-market and store crops due to reduced finances	60%
Decreased consumer purchasing power	58%
Lack of support for local agricultural industry and absence of investment in agriculture	13%

Data source: study data analysis (2024), $n = 52$ farmers.



variation in views between the two groups relating to the quality throughout the year (figure 4). These findings underline the need for better storage and processing facilities.

The study results indicated that crop prices were clearly variable between Idlib and Aleppo: 52% of the farmers in Aleppo considered the prices high throughout the year, only 24% of the farmers in Idlib agreed, and 44% of them evaluated the prices as acceptable at harvest time. On the other hand, the consumers agree also that the crop prices were high throughout the year.

These results suggest economic inefficiencies in marketing and distribution systems, particularly for staple crops like wheat, and confirm the challenges facing farmers in marketing their crops within Northwest Syria.

4. Discussion

This study identified key factors, both challenges and opportunities, impacting the effective marketing, i.e. distribution and sale, of agricultural produce and products in Northwest Syria since the onset of the conflict. It focuses on the complex interplay between political, economic, and environmental factors in a region characterised by ongoing conflict and instability. These include disrupted, fragmented and unorganised marketing channels, inadequate legislative frameworks and monitoring and enforcement capacities, poor transport and storage infrastructure, lack of food processing facilities, limited financial capacity, and poor marketing expertise. FGDs in Idlib, Azaz, and al-Bab reveal that while agricultural challenges are broadly shared across Northwest Syria, their primary drivers differ by location. While all regions face systemic instability, the local focus shifts significantly: Idlib contends with a lack of quality standards and marketing for olive oil; Azaz struggles with price volatility linked to border imports; and al-Bab is most affected by water scarcity. These nuances suggest that while broad sectoral support is necessary, interventions must be tailored to address the specific economic and environmental constraints unique to each district. The UNOCHA report 'Humanitarian Needs Overview for Syria' highlights the severe humanitarian situation resulting from the conflict, economic instability, and natural disasters such as drought (OCHA 2024b).

Agriculture in Northwest Syria is mostly practised by family-owned and -run farms, with an average farm household size of 8.3 (table 2). These farms play an important role in providing food security and job opportunities to family members. These are small farms in terms of area and production volume, with little ability to invest in technology or to build private infrastructure, such as storage facilities. Although up-to-date and reliable population data are not available for northwest Syria due to prolonged conflict and security constraints, similar characteristics of the farming system identified in this study have also been documented in several assessments and annual reports produced by UN agencies and humanitarian actors, including (FAO 2017, 2022, Food Security and Livelihood Cluster (FSL) 2023, WFP 2023, Taha *et al* 2025).

The protracted conflict has hit farmers hard, depleting their pre-conflict savings and agricultural assets. The study finds that the prolonged conflict has worsened the challenges faced by these farmers most of whom are unable adopt innovative agricultural practices to boost their productivity, in the conflict-affected context. Their lack of access to high-quality agricultural inputs and lack of crop rotation, has led to suboptimal crop yields and declining soil fertility (FGDs). A major constraint identified by this study were similar to those identified by previous research such as high input costs, limited financial capacity, and restricted access to land, which likewise constrain farmers' ability to fully cultivate their land in Northwest Syria. (FAO 2017, Abdullateef *et al* 2020, Atik *et al* 2024). Ibrahim *et al* highlighted similar challenges facing farmers in Syria, including in the study area. These challenges included limited ownership of production assets—only 24% of male farmers owned agricultural machinery—along with constrained land cultivation, as 39.6% of respondents were unable to cultivate their entire landholdings during the 2016–2017 season. The main reasons cited were lack of financial resources (65.5%), unavailability of agricultural inputs (59.8%), and conflict-related safety conditions (53%).

Comparable impacts have been observed in other conflict-affected contexts, as Jongerden *et al* (2019) found in their study on Iraq, which documented similar outcomes. Once a self-sufficient smallholder agricultural system, it has become increasingly dependent on food imports. The authors emphasise that years of conflict, neglect, and mismanagement had severely undermined the sustainability of Iraq's agricultural sector, further exacerbated by limited access to government extension services and a lack of adequate skills among farmers, significantly reducing the capacity of smallholders to sustain production.

The three study FGDs, run in Al-Bab, Azaz, and Idlib, also provided valuable insights into the issues and challenges faced, underscoring the need for targeted interventions to address local needs. Our study also allowed us to observe changing farmers' behaviours and a clear shift in crop patterns away from

strategic crops, like wheat and olives, to medicinal and aromatic crops with lower production costs and water needs, while offering higher economic returns. In respect of wheat, farmers will usually favour selling their crop to the local authorities given a guaranteed, favourable price, with which traders are forced to compete, whereas most of their olive and lentil production are marketed locally due to the absence of formal export channels to international markets. This study also identified smuggling routes for certain agricultural products, particularly olives and medicinal and aromatic crops, by traders and influential military groups, either to local markets controlled by the Assad-regime and the SDF or through Turkey to global markets (FGDs). Hatahet and Aldassouky (2022) note that smuggling goods in and out of Syria to Turkey and Iraq has long played a significant role. Before 2011, smuggling was predominantly controlled by affiliates of the Assad-regime, but new actors have since emerged. The Syrian conflict has increased smuggling activities, driven by various factors. This illegal trafficking has taken on diverse forms, shaped by the degree of collusion and cooperation among different actors. These activities have given rise to complex patronage networks, with even adversaries collaborating to further their interests (Hatahet and Aldassouky 2022).

Lack of storage infrastructure among farmers forces them to sell their produce shortly after harvest. The FGDs in Northwest Syria highlight storage degradation as a critical market bottleneck, with spatial variations in severity. While storage facilities in Azaz have sustained less extensive damage, those in Idlib and al-Bab face severe disruption due to bombardment and proximity to conflict zones. In Idlib, participants noted that reliance on inadequate alternatives forces traders to 'sell quickly, even at a loss' (Idlib Focus Group 2024). Similarly, the lack of functional infrastructure in al-Bab compels farmers to sell immediately post-harvest to avoid spoilage (al-Bab Focus Group 2024). This systemic deficiency across all regions remains a primary driver of market price volatility and reduced agricultural margins. In 2017, the FAO conducted the first comprehensive nationwide assessment of the impact of the Syrian conflict on the agriculture sector. The FAO estimated that the losses amounted to approximately USD 16 billion in both lost production and the widespread destruction of assets and infrastructure. These include industrial zones where food processing factories were often located, as well as agricultural facilities, greenhouses, irrigation systems and pumps, olive presses/mills, etc, all severely damaged in conflict-affected areas. The FAO report projected that initiating the recovery of the sector would require an investment of between USD11billion and USD17 billion, depending on the recovery scenario (FAO 2017). This devastation has led to a dramatic decline in Syria's food and agricultural productivity and its ability to meet future food requirements (FAO 2017, Boden *et al* 2019, Bayram 2020).

The study also noted significant disparities in crop productivity and resource availability across the study areas primarily as a result of the region's fragmented political landscape. For instance, Al-Bab and Azaz, the two study areas under the control of the SIG, exhibit different agricultural dynamics from those governed by the Salvation Government in Idlib, where regulatory frameworks, access to financial resources, and the overall efficiency of agricultural marketing channels have been introduced, as well as initiatives to support agricultural irrigation, the growing of cash crops and fruit trees, the introduction of inputs subsidies, in particular for wheat farmers (FGDs). In addition, it has adopted agricultural policies based on the local agriculture calendar to regulate crop marketing and imports and protect Idlib's local market.

The political situation also directly impacts coordination and collaboration between various stakeholders in the agricultural sector, especially between internationally unrecognised, so-called 'government' institutions in the Northwest and UN agencies and I/NGOs, as the main donors and implementors of agricultural projects within the study areas. Turkmani *et al* (2022) reported that political dynamics, across international, national, and local levels in Syria, represent a major obstacle to resilience. They emphasised that effective resilience programming, particularly in key sectors such as agriculture, requires coordination with the authorities in control. However, such coordination is often complicated by issues of legitimacy, fragmented governance structures, and conflicting political agendas, all of which can undermine access and long-term impact (Turkmani *et al* 2022). International donor policies, including the UN Food Security and Livelihoods Cluster, explicitly prohibit coordination with these institutions. This creates a significant barrier to agricultural planning and equitable distribution of agricultural projects supporting farmers, and prevents the design and implementation of longer-term, sustainable agriculture-related projects. The fragmented political control in Northwest Syria hinders the development of effective, coordinated five-year medium-term agricultural plans and the establishment of centralised agricultural databases that would aid the formulation of strategies to stimulate agricultural production

and marketing, including the import and export of agricultural products. In their review of the agricultural sector in Syria, Almohamed and Sheikh (2019) highlighted that multiple administrative and regulatory organisations oversee agriculture, which remained the case in 2024. However, overlap in responsibilities and poor coordination mechanisms among all actors have led to avoidable inefficiencies in the management of agricultural and natural resources.

In addition to the conflict and environmental factors, such as climate change-induced droughts and resulting depletion of water resources, other agricultural production challenges, have seen a decrease in overall crop production and yields, as well as in economic returns for farmers (FGDs). Ibrahim *et al* (2024) reported that farmers have shift their production from high-maintenance crops such as cotton and sugar beet, two common industrial crops, to short-term or low-cost crops such as cereals, olive trees, and vegetables. Climate change impacts, coupled with the other outlined constraints, discourage farmers from producing certain crops, including wheat, which is a critical crop in Syria, both nutritionally and economically, forming the basis of the national diet and ensuring food security for millions. Before the conflict, Syria was nearly self-sufficient in wheat production, with the northeast contributing a substantial share of the national output. However, in recent years, wheat production has dramatically declined due to a combination of protracted conflict, economic instability, and severe climatic stress. Recurrent droughts, especially between 2021 and 2023, have intensified water scarcity at a time when reliance on rain-fed cultivation has increased, leading to one of the worst wheat harvests in decades (OCHA 2023). Studies show that climate change, unsustainable water management practices, and limited access to inputs have lowered yields (Özdem *et al* 2012, De Châtel 2014, Kelley *et al* 2015), increasing Syria's reliance on costly imports amid ongoing economic hardship (Selby *et al* 2017, FAO 2019, WFP 2023). Addressing these challenges is crucial for restoring the domestic wheat supply and reducing food insecurity vulnerability.

Our proposed strategic interventions include the adoption of harmonised legal and regulatory frameworks to regulate local crop marketing across Northwest Syria, as well as agricultural imports through key border areas such as Azaz and Idlib. These frameworks could build on existing practices in Idlib, particularly the application of the agricultural calendar. In parallel, infrastructure development, especially for crop purchasing, transportation, and storage, should be tailored to the fragmented governance and market conditions prevailing in Northwest Syria. In areas with relatively better market access, such as parts of northern Aleppo, priority should be given to improving transport corridors and storage facilities. In more isolated areas of Idlib, interventions should focus on strengthening local supply chains and reducing post-harvest losses. Given the absence of formal financial institutions in Northwest Syria, financial and technical support mechanisms for farmers, traders, food processors, and small-scale manufacturers should be developed in line with local institutional capacities. These mechanisms may include support through farmer associations, cooperatives, and locally active NGOs, as well as the provision of microloans and subsidies. Lessons learned from pilot initiatives in Idlib that offer simplified loan schemes for farmers should be scaled up where feasible. Clear and locally applicable policies to support agricultural production, marketing, and export-related processes, such as quality assurance and origin certification, are essential for regulating agricultural operations and improving economic efficiency under existing governance arrangements. This is particularly relevant for olive exports from Aleppo and Idlib to Turkey and international markets. Investment in irrigation and water infrastructure, including irrigation channels and rainwater-harvesting systems, is especially critical in water-scarce and climate-vulnerable areas. Improving water-use efficiency can significantly enhance farmers' resilience by increasing crop productivity and reducing production costs. In addition, strengthening locally operating agricultural research centres, such as the research centre in Idlib, and implementing context-specific training and extension programs can facilitate the dissemination of climate-smart agricultural practices.

Together, these targeted interventions can improve agricultural production in both quality and quantity, enhance food security, and gradually reduce dependence on imports and humanitarian aid in Northwest Syria. Addressing the challenges identified in this study through coordinated yet locally adapted efforts is therefore crucial for strengthening the contribution of the agricultural sector to food security and economic stability in the region.

5. Conclusion and recommendations

The agricultural sector in Northwest Syria is a pivotal yet underused driver of food security and economic stabilisation. Despite its inherent potential, this sector is significantly constrained by structural

inefficiencies, including disjointed marketing channels, inadequate infrastructural capacity, restricted financial mechanisms, and the absence of a robust regulatory framework. These systemic deficits have been compounded by the confluence of the protracted conflict, political instability, and environmental stressors, which collectively erode the resilience of the smallholder farmers that make up the agricultural sector in the Northwest, and exacerbate food insecurity. To capitalise on the sector's latent potential, it is imperative to implement comprehensive, sustainable, and context-specific interventions designed to address these multilayered challenges.

A foundational step involves the development of an integrated, centralised legal and regulatory framework to mitigate the fragmentation of agricultural markets and exports. Enhancing the capacity of local authorities to establish regulatory oversight is critical, particularly in the domains of pricing strategies, quality assurance, and the certification of origin and quality for exportable products. This framework should prioritise strengthening market governance, stabilising price fluctuations, and safeguarding fair market access for local producers.

Strategic planning must emphasise the creation of centralised, data-driven systems to monitor agricultural production patterns, resource availability, and local food demands. Such systems would facilitate evidence-based decision-making, and the formulation of long-term strategies tailored to the region's socio-political and environmental context. Collaborative efforts involving local councils, administrative authorities, and development actors are essential to foster coherence in agricultural policy and implementation.

Targeted financial and technical interventions are essential to enhance the productive capacity of smallholder farmers. Strengthening farmer cooperatives and associations will bolster collective bargaining power, while access to quality subsidised inputs and financial instruments, including microcredit and revolving funds, will mitigate liquidity constraints. Empowering farmers with technological support and training in climate-resilient agricultural practices can further enhance productivity and adaptive capacity.

Investments in agricultural infrastructure, such as advanced irrigation networks, quality storage facilities, and rehabilitated transport corridors, are critical to addressing logistical inefficiencies and minimising post-harvest losses. Expanding food processing capabilities will add value to primary agricultural products, enabling producers to penetrate both local and international markets more effectively.

Bolstering the role of agricultural research institutions is vital for generating innovative solutions to production challenges, including the development of certified, high-yield, and climate-resilient crop varieties. Training and extension programs should be scaled up to disseminate best practices, eliminate knowledge gaps and foster the adoption of modern, sustainable farming techniques.

Lastly, inclusive agricultural policies must be prioritised to ensure equitable access to resources and opportunities across the sector. Coordination among stakeholders should be streamlined to minimise redundancies and inefficiencies in project implementation. The introduction of an 'agricultural calendar' to regulate import and export activities based on local production cycles would align supply chains with market demand while protecting domestic producers from external market disruptions.

Addressing these multifaceted challenges through synergistic and evidence-based approaches will unlock the agricultural sector's full potential, transforming it into a cornerstone of food security and economic resilience in Northwest Syria. By fostering structural and operational reforms, the sector can transition from subsistence to sustainability, promoting long-term stability and prosperity for the region.

Despite the current challenges faced, the fall of the Assad-regime in late 2024 and the potential reunification of the country provide a context in which such strategies could be introduced to empower the agricultural sector and improve food security in Syria over time.

However, this study has several limitations. Financial and time constraints limited the sample size, geographic coverage, and depth of analysis. Ongoing conflict, insecurity, and access restrictions in Northwest Syria also affected data collection and may have influenced the representativeness of the findings. Female participation was limited due to cultural and security constraints, potentially underrepresenting women's perspectives. In addition, the study relies primarily on qualitative and perception-based data, which restricts statistical analysis. Finally, the scarcity of existing studies on the economic dimensions of agriculture in conflict-affected contexts constrained comparative analysis.

Acknowledgments

The authors express their deep gratitude to Cara (Council for At-Risk Academics, United Kingdom) for funding and supporting this study. We also extend our heartfelt thanks to the field staff from the Syrian Academic Expertise Organisation and Sham University for their essential support in data collection, and to the local authorities and study participants for their invaluable cooperation and participation.

Data availability statement

The data that supports the findings of this study are openly available in the supplementary files of this article.

Supplementary data available at: <https://doi.org/10.1088/2976-601X/ae7375/data1>.

Author contributions

Shaher Abdullateef  0000-0002-0024-9151

Conceptualization (equal), Data curation (equal), Formal analysis (equal), Investigation (equal), Methodology (equal), Writing – original draft (equal), Writing – review & editing (equal)

Esraa Almashhour  0009-0002-2112-3475

Conceptualization (equal), Data curation (equal), Formal analysis (equal), Methodology (equal), Writing – original draft (equal), Writing – review & editing (equal)

Rasim Ebish  0000-0001-7123-6377

Conceptualization (equal), Data curation (equal), Formal analysis (equal), Investigation (equal), Methodology (equal), Writing – original draft (equal), Writing – review & editing (equal)

Cecilia Tortajada  0000-0001-6308-4924

Conceptualization (equal), Formal analysis (equal), Methodology (equal), Supervision (equal), Writing – original draft (equal), Writing – review & editing (equal)

Faical Akaichi  0000-0003-0395-2368

Conceptualization (equal), Formal analysis (equal), Methodology (equal), Supervision (equal), Writing – original draft (equal), Writing – review & editing (equal)

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