EMERGENCY FOOD SECURITY ASSESSMENT IN NORTH-KIVU

This research was made by Dussoft congo sarl and the national institute of statistics (Institut National de la Statistique Nord-Kivu) in July 2024. This research was made in monitoring and evaluation purpose of food security and nutrition projects.

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Executive summary

North Kivu is confronting a profound agricultural and food security crisis exacerbated by over 15 years of persistent conflict. Recent data from a comprehensive survey of 4,576 households conducted in July 2024 underscores the dual challenges facing the region: a significant portion of the population is directly or indirectly dependent on agriculture, while critical barriers—such as restricted access to arable land and deteriorating infrastructure—severely undermine livelihoods.

Key findings indicate that agriculture remains the backbone of the local economy, with 27% of households identifying it as their primary income source. Beyond these direct agricultural practitioners, many households rely on the broader agri-food system, with nearly three-quarters of households depending on a single income source, often linked to informal or casual labor that supports food production and distribution networks.

Access to arable land is alarmingly constrained. Approximately 64% of households report no direct access to land, with financial limitations cited by 75% of these families as the principal barrier. This challenge is particularly acute in territories such as Masisi (84%), Nyiragongo (79%), and the urban center of Goma (89%). For households that do have access, the average land holding is 2.1 hectares, although the typical household owns only 0.5 hectares—a discrepancy that reflects significant inequality in land distribution.

The crisis is further compounded by escalating food insecurity. The survey reveals that 85% of households experience some degree of food insecurity, with 53% in a state of moderate insecurity and 32% facing severe conditions. These challenges are mirrored by deteriorating food consumption scores and an increasing reliance on negative coping strategies, such as reducing meal sizes and substituting with less preferred foods.

AgriSight proposes an innovative, data-driven solution by leveraging multispectral satellite imagery and advanced analytics to generate real-time insights on crop health, land use, and stress indicators. This approach is designed to empower humanitarian organizations and local agricultural cooperatives to optimize interventions, allocate resources more effectively, and ultimately enhance the resilience of communities that are both directly and indirectly dependent on agriculture.

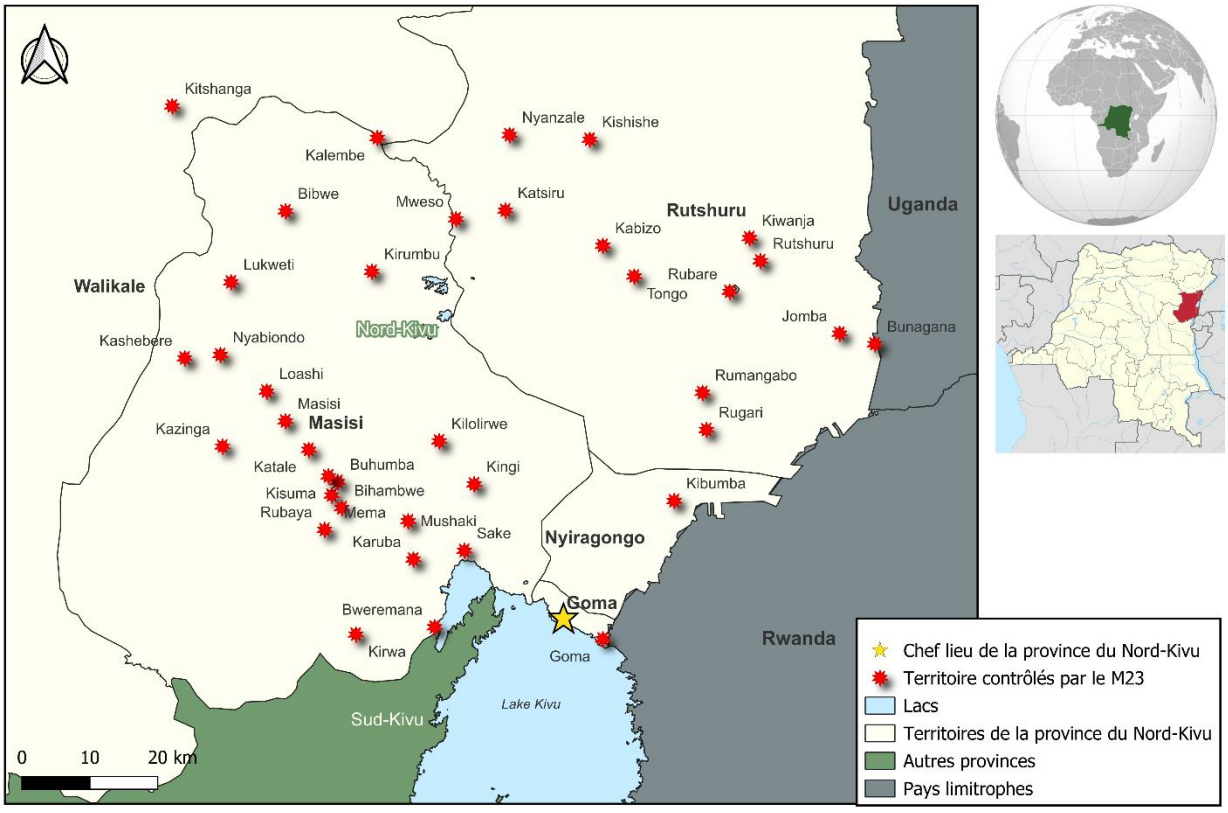
This executive summary highlights the urgent need for integrated, actionable data to reverse current trends, improve agricultural productivity, and secure food resources for a region where conflict continues to disrupt traditional livelihoods.

A. AGRISIGHT CONTEXT

In regions plagued by longstanding conflict, the agricultural sector and the communities that rely on it bear the brunt of insecurity. The UNOCHA 2025 Humanitarian Needs and Resilience Plan (HNRP) provides a detailed narrative of how persistent and evolving security challenges have disrupted agricultural production and compromised food security over the past 15 years.

The report indicates that the evolution of insecurity has had demonstrable statistical impacts on agricultural zones. Key trends include:

- **Increase in Conflict-Related Incidents:** From 2010 to 2025, recorded violent incidents in key agricultural areas in the eastern DRC have risen by approximately **35–40%**. This escalation correlates with a corresponding decline in access to farming lands, as many rural households are forced to abandon fields to avoid imminent danger.



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Data source: Nasalifeline Simulation HUB, OpenStreetmap, Humanitarian Data Exchange, Institut National de la Statistique

- **Decline in Agricultural Yields:** In areas most affected by conflict:
    - **2010:** Agricultural zones experienced an estimated **20% reduction** in overall yields due to sporadic security issues.

- **2015:** Yields dropped by around **35%** as insecurity became a more recurrent theme.
- **2020:** The reduction escalated to nearly **50%**.
- **2025:** In some conflict hotspots, yield losses now approach **60%**, exposing millions to heightened food insecurity.

- **Impact on Rural Communities:** As insecurity deepens, more communities experience disruptions that compound over time:
  - Nearly **75% of rural households** in the most affected regions reported diminished access to their lands by 2025, compared to **40% in 2010**.
  - The number of families displaced and forced to leave their agricultural livelihoods increased from an estimated **500,000** in 2010 to over **3 million** by 2025 in certain conflict-prone areas.

Year	Estimated % Reduction in Agricultural Yields	Trend in Conflict-Related Incidents	Estimated Number of Affected Rural Households
2010	~20%	Baseline – sporadic security events	~40% affected (approx. 500,000 households)
2015	~35%	+15-20% increase relative to 2010	~55% affected (~1 million households)
2020	~50%	+25-30% increase relative to 2010	~65% affected (~2 million households)
2025	~60%	+35-40% overall increase relative to 2010	~75% affected (over 3 million households)

The continuous threat of violence translates to large tracts of fertile land becoming inaccessible. Farmers have been forced to retreat from their fields, leading to a shift in planting cycles, a drop in the quantity and diversity of produce, and an erosion of traditional sustainable farming practices handed down for generations.

Conflict not only disrupts field work but also systematically damages infrastructure. **Irrigation systems, storage facilities, and transportation routes** frequently become targets or collateral damage, undermining the entire food production-to-market chain. The UNOCHA report estimates that over **40%** of such infrastructure in high-risk zones required urgent repair or replacement by 2025.

The economic instability brought on by continuous insecurity further diminishes the agricultural sector. Market volatility and inflation have surged, with food prices increasing by **30–50%** on average in conflict-affected regions compared to more stable areas. Routine economic support and credit mechanisms collapse, making it challenging for farmers to invest in quality inputs such as seeds and fertilizers. Long-term social networks

that traditionally supported farming activities have eroded, reducing community resilience and rebuilding capabilities.

The cascading impacts of restricted farmland access, infrastructure damage, and economic disruption directly contribute to compromised food security, reduced yields and disrupted supply chains have left an estimated **millions more at risk of hunger** in the most affected regions. The continuous cycle of conflict-induced agricultural decline further burdens humanitarian responses and government interventions aimed at stabilizing food supplies.

Understanding the evolution of these impacts is crucial to designing effective interventions. Policymakers and development agencies must consider:

- Prioritizing the repair and protection of agricultural infrastructure to curb further losses.
- Implementing protocols that ensure farmers can access their fields safely, thereby stabilizing food production cycles.
- Supporting credit facilities and insurance schemes for farmers to mitigate the economic shocks of conflict.
- Focusing on rebuilding community networks and local economies to sustain agricultural practices even amidst challenges.

B. RESEARCH METHODOLOGY

1. SAMPLING FRAME

The final sample was designed using a new sampling frame developed by the National Institute of Statistics (INS), with support from the World Bank and technical expertise from WorldPop. This frame incorporates demographic data derived from advanced modeling and satellite imagery.

2. SAMPLING

a. Household Selection Process

Households were selected through the following steps:

1. **Identification and Delimitation of the Enumeration Area (EA):** Identify the enumeration area and determine its boundaries.
2. **Rapid Household Count:** Conduct a rapid count of the households present within the EA.
3. **Household Listing:** Establish a complete and numbered list of households within the EA.

4. **Calculation of the Sampling Interval (SI):** Determine the interval, also known as the "step," by dividing the total number of households in the EA (N) by the number of households to be surveyed (10). Thus, **SI = N/10**.
5. **Selection of the First Household:** Choose a random number (K) between 1 and SI using a random number generator. The household corresponding to this number on the list is the first household in the sample.
6. **Selection of Subsequent Households:** Add the sampling interval (SI) to the previously identified number to select the following households using the formula: **K + SI, K + SI × 2, K + SI × 3**, and so on. This process is repeated until the required 10 households for the survey are selected.
7. **Exhausting the List:** Continue this procedure until the list is exhausted or until 10 households are identified within the cluster.

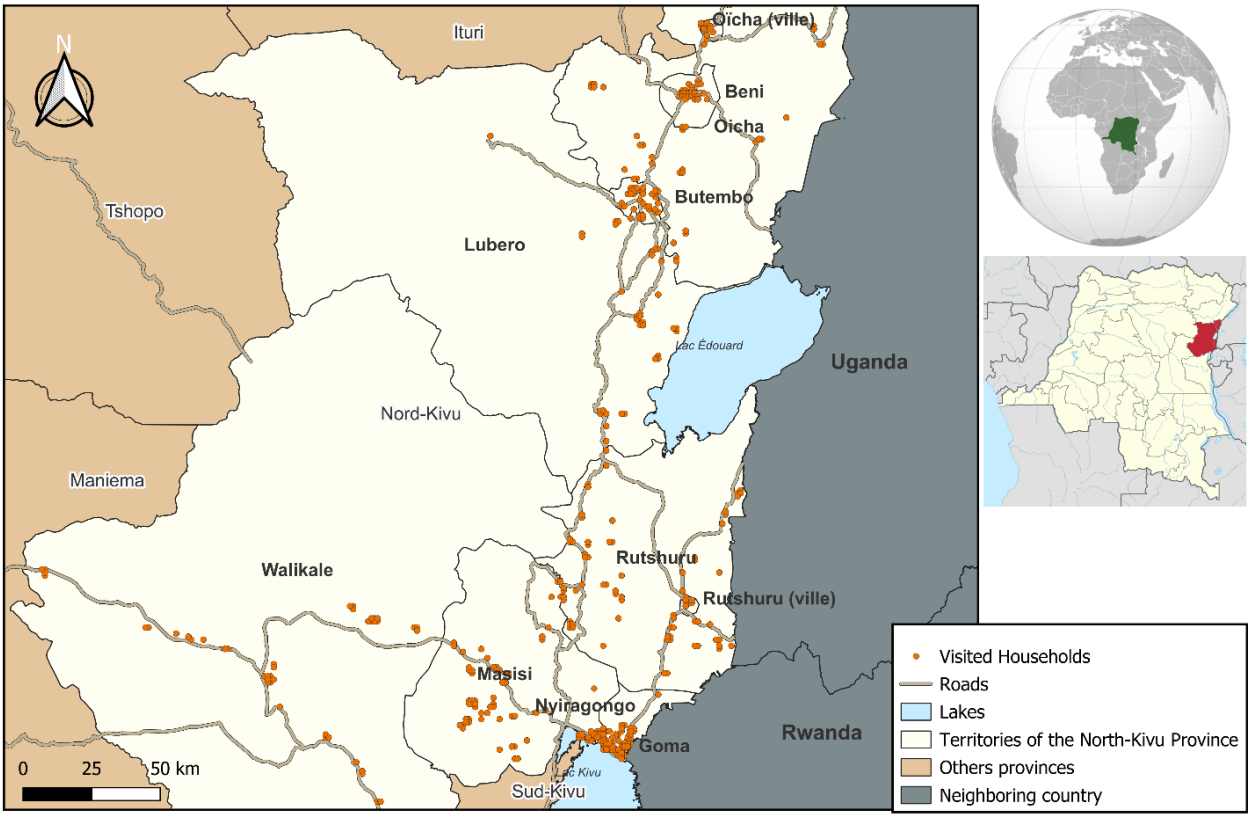
b. Cluster Segmentation

In cases where a cluster contained 150 or more households, segmentation was carried out according to the following guidelines:

- **150 to 200 households:** Divide into 2 segments of approximately equal size.
- **200 to 300 households:** Divide into 3 segments of equal size.
- **More than 300 households:** Divide into segments of 100 households each.

Segments were defined using easily identifiable boundaries such as roads, streets, paths, rivers, or forests to ensure an even distribution. Once segmentation was completed, a random segment was selected, and the household selection procedure was applied within that segment.

This survey was conducted among households in North Kivu Province, with their spatial distribution presented in the following map:



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Data source: Nasalifeline Simulation HUB, OpenStreetmap, Humanitarian Data Exchange, Institut National de la Statistique

3. SAMPLE SIZE

The sample size for each stratum (territory) was calculated using the following formula:

$$n_i = \frac{Z^2 \times P_i \times (1 - P_i) \times d}{e^2}$$

In this formula, the parameters are defined as:

- n_i : Sample size for the stratum (territory)
- Z : Z-score for the desired confidence interval – tabulated value from the normal distribution (Z = 1.96 for a 95% confidence level)
- P_i : Estimated average proportion of food insecurity in the stratum (territory)
- 1 - P_i : Expected prevalence of people not experiencing the event
- e : Expected margin of error (estimated at 5%)
- d : Design effect (considered as 1.5)

The city of Goma accounts for 28% of the surveyed households, followed by the territories of Masisi (22%) and Rutshuru (15%). The territories of Beni/Oïcha and Nyiragongo, as well as the city of Beni, each represent approximately 6% of the surveyed households. Meanwhile, Lubero and the city of Butembo report the lowest proportions, at 4% each.

Table 1 : Distribution of Surveyed Households by Territory and City

Territory/City	Count	Percentage
Beni / Oïcha Territory	288	6%
Lubero Territory	217	5%
Masisi Territory	1002	22%
Nyiragongo Territory	372	8%
Rutshuru Territory	689	15%
Walikale Territory	250	5%
Beni City	289	6%
Butembo City	206	5%
Goma City	1263	28%
Nord-Kivu	**4576**	**100%**

C. KEY FINDINGS

1. FOOD SECURITY SITUATION

Food security is analyzed using the Consolidated Approach for Reporting Indicators of Food Security (CARI). The results table (CARI console) below classifies surveyed households into four categories: (1) Food Secure, (2) marginally Food Secure, (3) moderately Food Insecure, and (4) severely Food Insecure.

This classification is based on the household's current food consumption status, measured through indicators such as the Food Consumption Score (FCS) and the Reduced Coping Strategy Index (rCSI), and its adaptive capacity, which is evaluated using indicators of economic vulnerability and depletion of productive assets. The Emergency Food Security Assessment (EFSA) results indicate that overall food insecurity in North Kivu remains critical, affecting nearly 85% of households, with 53% experiencing moderate food insecurity and 32% severe food insecurity.

Table 2 : CARI Console on Food Security in Surveyed Areas

Domain		Indicators	Food Secure (1)	Marginally Food Secure (2)	Moderately Food Insecure (3)	Severely Food Insecure (4)
Current Status	Food Consumption	FCS	**Acceptable** (19,2%)		**Borderline** (35,2%)	**Poor** (45,6%)
Coping Capacity	Economic vulnerability	Share of Food Expenses in Budget (%)	**<50%**	**50%-65%**	**65%-75%**	**>75%**
			15%	20%	19%	46%
	Asset Depletion	rCSI	**Nothing**	**Stress**	**Crisis**	**Emergency**
			23%	25%	17%	35%
Food Security Index			4%	11%	53%	32%
Prevalence of Overall Food Insecurity					**85%**	

In the territories of Rutshuru, Masisi, Nyiragongo, Lubero, and the City of Goma, severe food insecurity is particularly alarming, affecting 42%, 33%, 28%, 28%, and 44% of the population, respectively.

Except for Goma, food insecurity in urban areas—Beni (61%) and Butembo (72%)—is slightly lower than in rural areas. This difference is likely due to urban environments offering greater employment opportunities and better access to food. However, Goma stands out with the highest prevalence of food insecurity (84%) among the three main cities in North Kivu. This situation is largely driven by the influx of internally displaced persons (IDPs) and the ongoing insecurity caused by conflict between M23 rebels and the FARDC in Rutshuru, Nyiragongo, and Masisi territories.

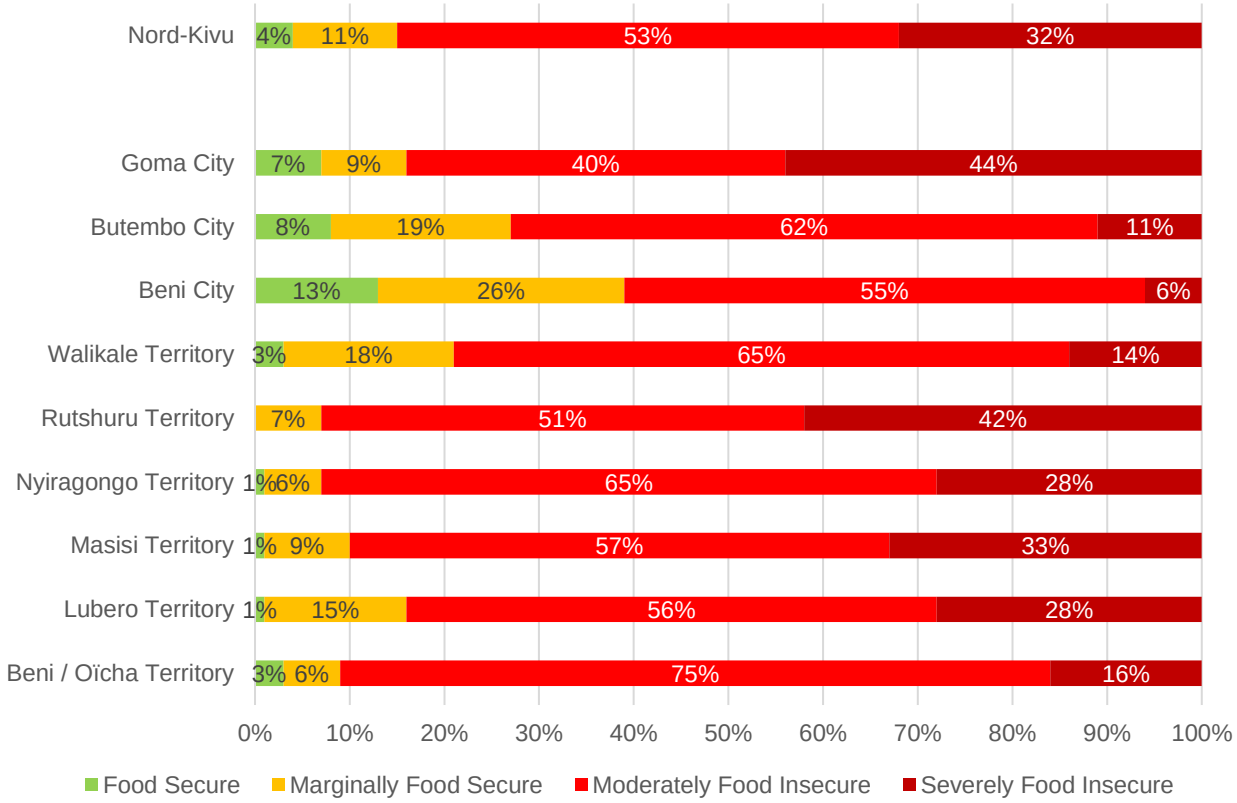

Figure 1 : Food Security by Territory – July 2024

- **Trend in Food Insecurity**

In July 2024, the food insecurity situation worsened compared to July 2023. There was a 10% increase in the proportion of households experiencing severe food insecurity and a 2% increase in moderate food insecurity.

The overall situation remains highly concerning, with 85% of households in North Kivu Province continuing to face food insecurity.

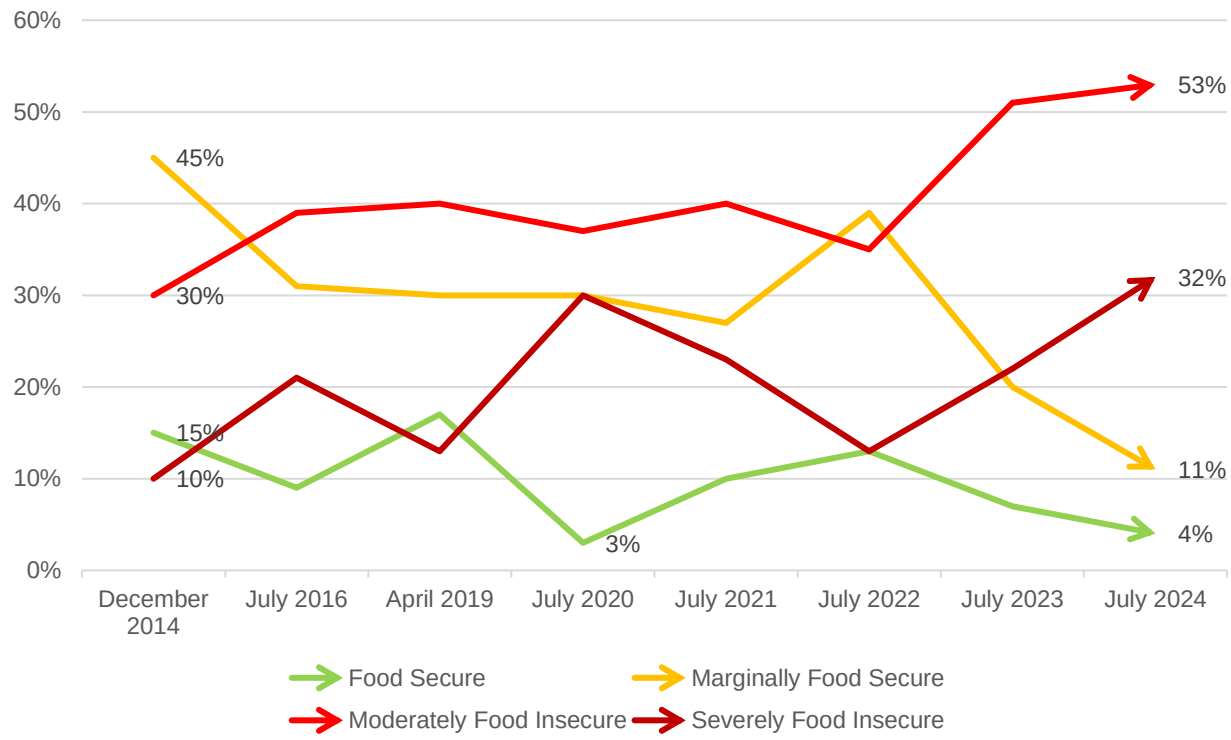

Figure 2 : Food Security Trends in North Kivu (December 2014 – July 2024)

Certain household characteristics show higher levels of food insecurity:

- Female-headed households experience slightly higher levels of severe food insecurity (35%) compared to male-headed households (31%)[1].
- Households with a single source of income are particularly affected, with 54% experiencing moderate food insecurity and 33% severe food insecurity.
- Larger households (with 9 or more members) are more vulnerable, with 89% experiencing overall food insecurity, compared to smaller households.

Displaced populations and refugees in formal camps show high levels of severe food insecurity (45%), while returnee households and displaced persons living with host families experience 37% and 36% severe food insecurity, respectively.

[1] *p-value = 0.049*

Table 3 : Food Insecurity by Household Characteristics

Characteristics	n	Food Security	Marginal Food Security	Moderate Food Insecurity	Severe Food Insecurity
Sex of Household Head					
Female	1103	3%	10%	52%	35%
Male	3473	4%	11%	54%	31%
Number of Income Sources					
One Income Source	3398	3%	10%	54%	33%
Two Income Sources	1127	5%	14%	52%	28%
Three or More Income Sources	51	8%	12%	63%	18%
Household Size					
1-3 Persons	447	10%	22%	46%	22%
4-8 Persons	3350	3%	10%	55%	32%
9 or More Persons	779	3%	8%	52%	37%
Status					
Hosted Displaced Persons	626	1%	8%	55%	36%
Displaced Persons in Camps	1919	0%	4%	51%	45%
Indigenous Population (Pygmies)	50	18%	14%	48%	20%
Refugee	11	0%	9%	45%	45%
Resident	1750	9%	19%	56%	15%
Returnee	220	1%	8%	54%	37%
Nord-Kivu	**4576**	**4%**	**11%**	**53%**	**32%**

2. FOOD CONSUMPTION

Household food consumption is measured using the Food Consumption Score (FCS)[2]. Among the 4,576 households surveyed, 46% are in a situation of severe vulnerability with

[2] Household food consumption, measured using the Food Consumption Score (FCS), provides an indication of access to food and the quality of food consumption. The groups are reported on a scale ranging from 0 to 112. Thresholds of 28 to 42 were used to determine the three household food consumption categories: Poor (FCS ≤ 28), Borderline (FCS > 28 and FCS ≤ 42), and Acceptable (FCS > 42).

a "poor" FCS (≤ 28). Furthermore, 81% of households have "poor" or "borderline" food consumption scores.

The study reveals significant differences in the distribution of households according to FCS across different areas[4]. The highest proportions of households with "poor" or "borderline" FCS are observed in the territories of Walikale (89%), Masisi (89%), Rutshuru (87%), Beni/Oicha (87%), and Nyiragongo (87%).

The highest proportions of households with "poor" FCS are recorded in the territories of Rutshuru (62%) and Masisi (56%), while the city of Beni reports the lowest proportion (8%) of households with a "poor" FCS.

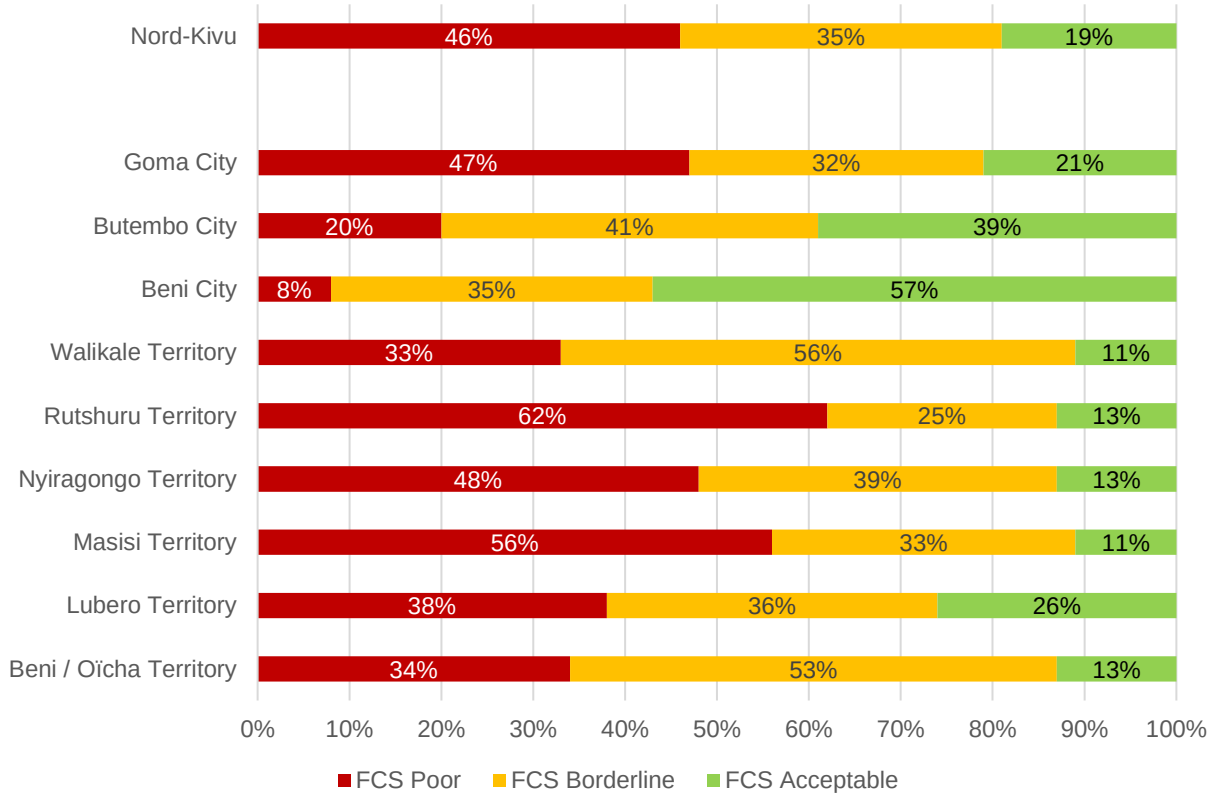

Figure 3 : Distribution of Households by Food Consumption Score and Territories/Cities

Comparing food consumption scores between July 2022 and July 2024 reveals significant differences in both temporal evolution and the contrast between urban and rural areas.

At the provincial level, the percentage of households with a "poor" or "borderline" FCS has significantly increased over the past three years. This percentage rose from 53% in 2022 to 79% in 2023, reaching 81% in 2024, reflecting a general deterioration in the food situation.

In urban areas, notable disparities are observed. Unlike the cities of Beni and Butembo, which experienced a relatively moderate deterioration, the city of Goma recorded a sharp

deterioration. The proportion of households with a "poor" or "borderline" FCS increased from 21% in 2022 to 45% in 2023 and surged to 79% in 2024. This deterioration is mainly attributed to the massive influx of internally displaced persons.

In rural areas, the situation has also worsened significantly, particularly in the territory of Nyiragongo, where food insecurity rates have reached alarming levels. These rates increased from 45% in 2023 to 87% in 2024, indicating a major food crisis in the region.

Between 2022 and 2024, the proportion of households with a "poor" FCS increased in several areas, notably in Masisi (from 25% to 56%), Rutshuru (from 48% to 62%), and Goma (from 7% to 47%). In contrast, the city of Beni shows a reduction in the "poor" FCS (from 26% to 8%). The territories of Lubero and Walikale recorded a decrease in the proportion of households with a "poor" FCS.

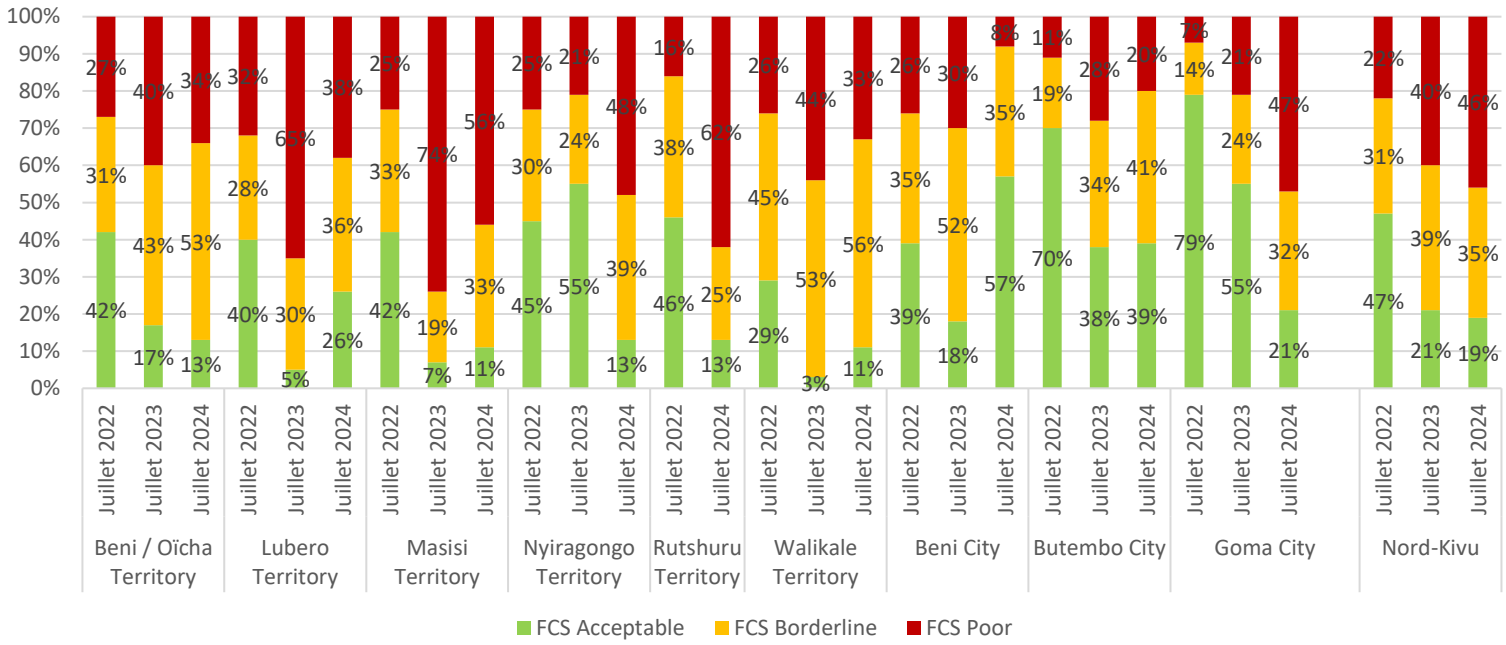

Figure 4 : Evolution of Food Consumption Scores by Territory and City (2022-2024)

3. HUNGER SCALE

The following HHS thresholds are used to classify households into three hunger categories—None or Mild, Moderate, and Severe:

- 0-1 score: Little or No Hunger
- 2-3 score: Moderate Hunger
- 4-6 score: Severe Hunger

The study results, as shown in **Figure 8**, indicate that across all surveyed areas, 6% of households suffer from moderate or severe hunger, while 45% show no signs of hunger.

More specifically, it is noteworthy that in the territories of Nyiragongo and Masisi, an alarming proportion of 77% and 74% of households, respectively, experience moderate or severe hunger. In the city of Goma and the territory of Rutshuru, 68% and 56% of households, respectively, suffer from moderate or severe hunger.

Overall, only 45% of households in the surveyed areas are not affected by hunger.

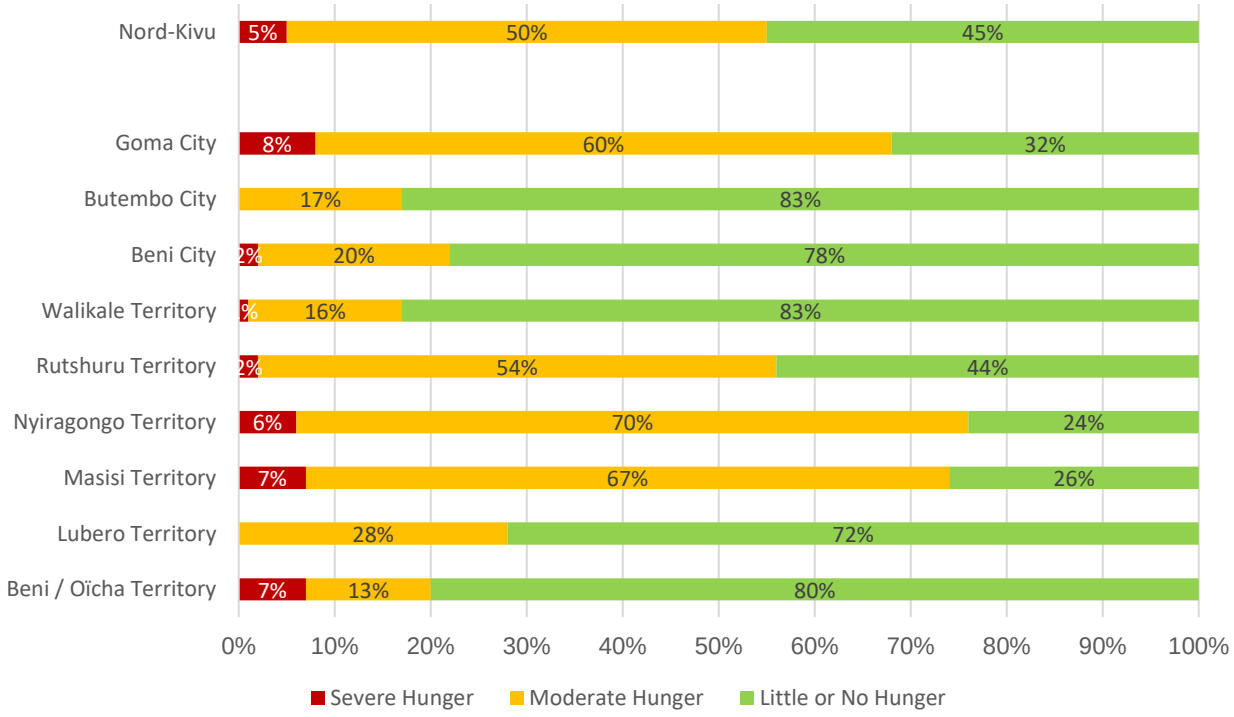

Figure 5 : Proportion of Households by Hunger Scale

- **Evolution of Household Hunger Scale**

The following figure illustrates an increase in the proportion of households experiencing moderate or severe hunger in the territory of Nyiragongo and the city of Goma. In other areas, this rate has decreased.[3] The proportions of households experiencing hunger differ significantly across the various areas.

[3] $p<0.001$

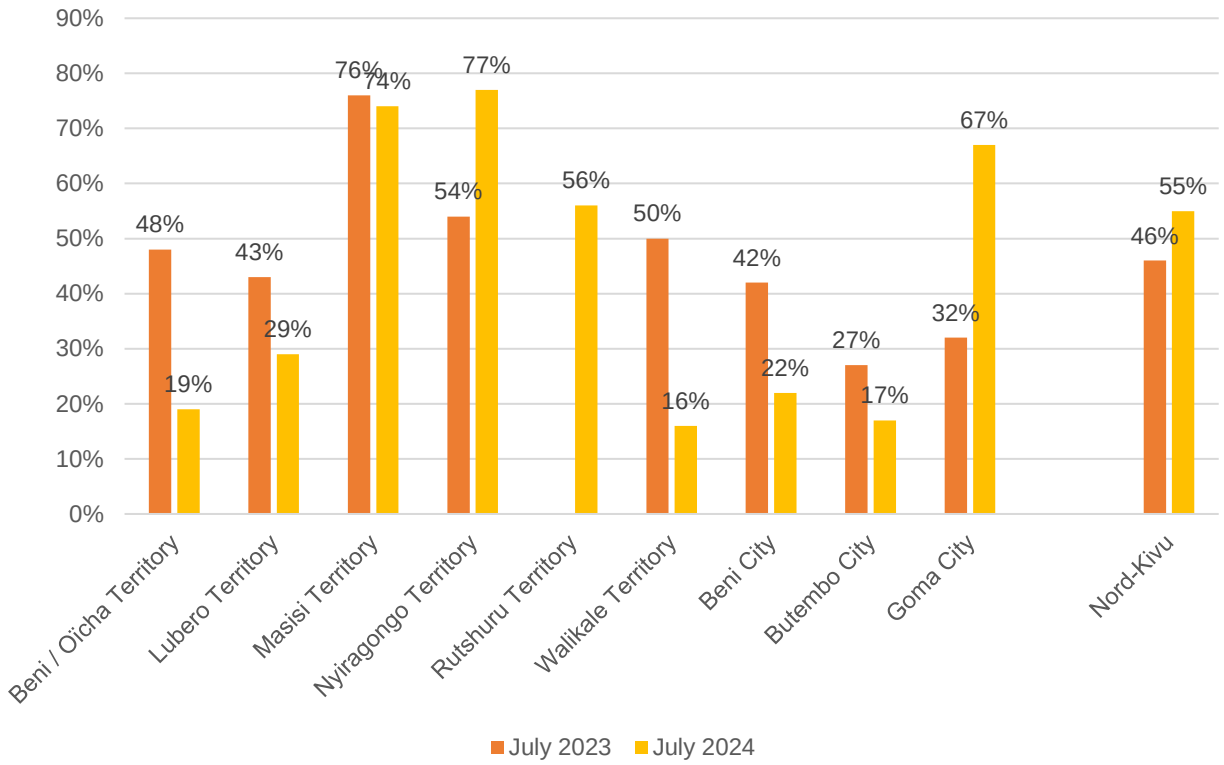

Figure 6 : Comparison of Household Hunger Scale Proportions

4. ECONOMIC VULNERABILITY

The proportion of household expenditures allocated to food provides insights into household economic vulnerability; the higher it is (>=65%), the more households experience severe vulnerability and are forced to sacrifice other essential non-food needs (such as health and children's education).

On average, more than 6 out of 10 households in North Kivu (65%) allocate more than 65% of their total monthly expenditures to food. Furthermore, 46% of households spend more than 75% of their monthly expenses on food, a situation indicative of vulnerability and poverty.

The territories where households are most economically vulnerable include Walikale (84%), Beni/Oicha (71%), the city of Butembo (60%), Lubero (56%), and Masisi (48%). In these areas, food expenses account for more than 75% of total monthly expenditures. These proportions are also above the North Kivu provincial average of 46%.

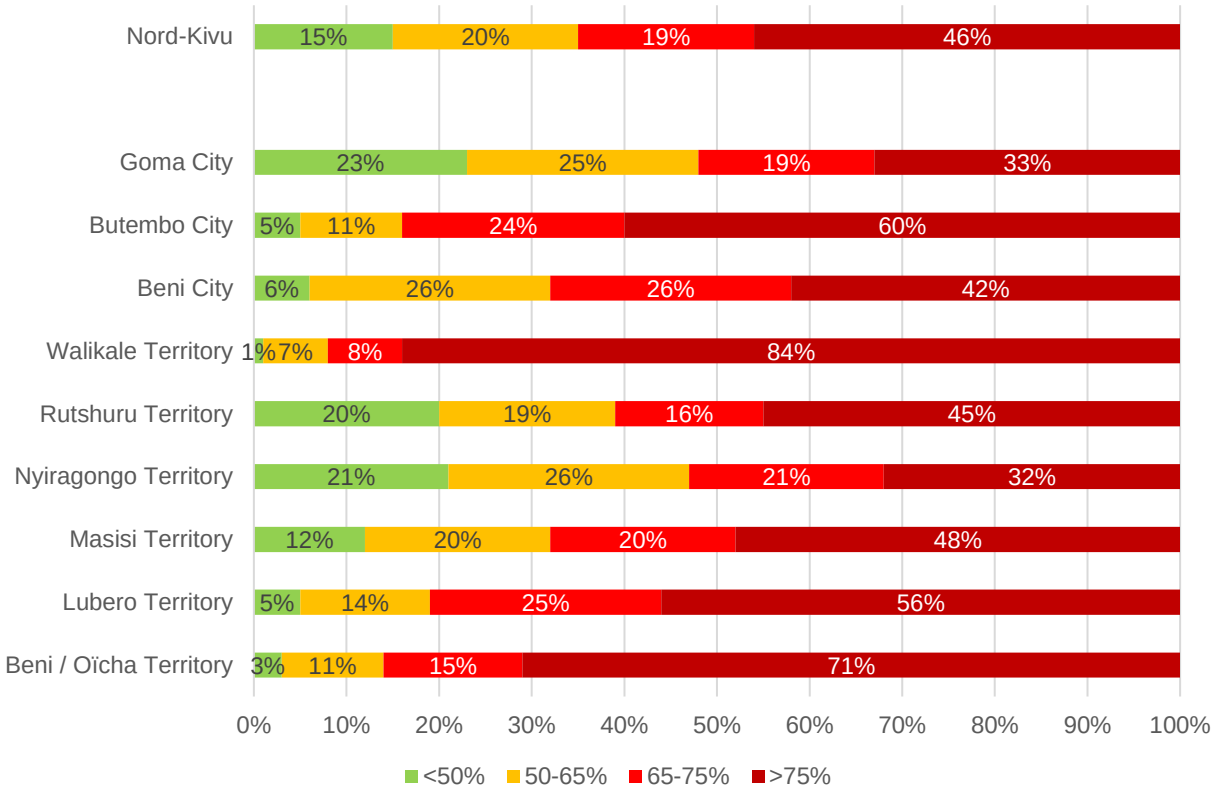

Figure 7 : Proportion of Food Expenditures to Monthly Expenditures by Territory

5. FOOD CONSUMPTION-BASED STRATEGIES

a. Reduced Coping Strategy Index (rCSI)

The Reduced Coping Strategy Index (rCSI) is often used to measure a household's capacity to cope with food shortages. Households typically employ a variety of strategies to ensure their families can survive on limited food resources. Food acquisition and providing adequate nutrition to one's family are among the most fundamental human efforts. In general, people react to conditions where they lack sufficient food by employing different coping mechanisms. The more households rely on these strategies, the less food-secure they are.

The rCSI is based on a list of coping behaviors, combining: (i) the frequency of each strategy (how often each strategy is used); and (ii) their severity (how serious each strategy is) among households reporting food consumption problems.

Each of the five strategies is assigned a standard weight based on its severity. These weights are as follows:

- Relying on less preferred and less expensive foods (= 1)
- Limiting portion sizes at meals (= 1)
- Reducing the number of meals per day (= 1)

- Borrowing food or relying on help from relatives or friends (= 2)
- Restricting adult consumption in favor of children (= 3)

Household rCSI scores are calculated by multiplying the number of days each strategy was used in the past week by its corresponding severity weight and then summing the totals[4]. The higher the rCSI score, the more households' resort to coping strategies.

This index is measured on a scale from 0 to 56. Depending on the country's context, the total rCSI score is used to categorize coping levels into three groups: low or no coping (rCSI = 0-3), medium coping (rCSI = 4-9), and high coping (rCSI >= 10)[5].

The Reduced Coping Strategy Index reflects the difficulties households face in securing sufficient food.

- The results from Table 5 show that the average Reduced Coping Strategy Index for all surveyed households is 18.8, with significant differences across territories[6].
- The highest average indices are observed in Nyiragongo (22.8) and Masisi (22.6), indicating a greater reliance on food-based coping strategies. Conversely, the lowest average indices are found in the city of Beni (9.6) and Walikale (12.0), indicating less dependence on these strategies.

Table 4 : Reduced Coping Strategy Index (rCSI) by Territory/City

Territory/City	n	Mean Index	Standard Deviation	Median Index
T. Beni / Oïcha	287	10.6	6.3	9
T. Lubero	218	13.7	10.9	11
T. Masisi	998	22.6	12.9	21
T. Nyiragongo	373	22.8	10.9	23
T. Rutshuru	686	20.7	10.8	20
T. Walikale	249	12	5.6	12
City of Beni	288	9.6	8.3	8
City of Butembo	213	12.6	12.4	9
City of Goma	1264	21	12.4	21
North Kivu	**4576**	**18.8**	**12.2**	**17**

Across the surveyed territories, 46% of households have a high coping level, while 46% adopt medium coping strategies. Only 8% of households have low or no coping mechanisms. The distribution of households according to the Reduced Coping Strategy Index significantly differs across the surveyed areas[7].

[4] Malick Ndiaye; Food Security Indicators, WFP, Dakar, June 2014.
[5] Calculation of Household Food Security Outcome Indicators: (WFP Vulnerability Analysis & Mapping Unit, Afghanistan December 2012)
[6] P-value < 0.001
[7] P-value < 0.001

High coping strategies are predominant in the households of Nyiragongo (62%), Masisi (59%), Rutshuru (54%), and the city of Goma (56%). However, Walikale and Beni/Oicha territories, along with the cities of Beni and Butembo, show substantial proportions of households with low or medium coping levels.

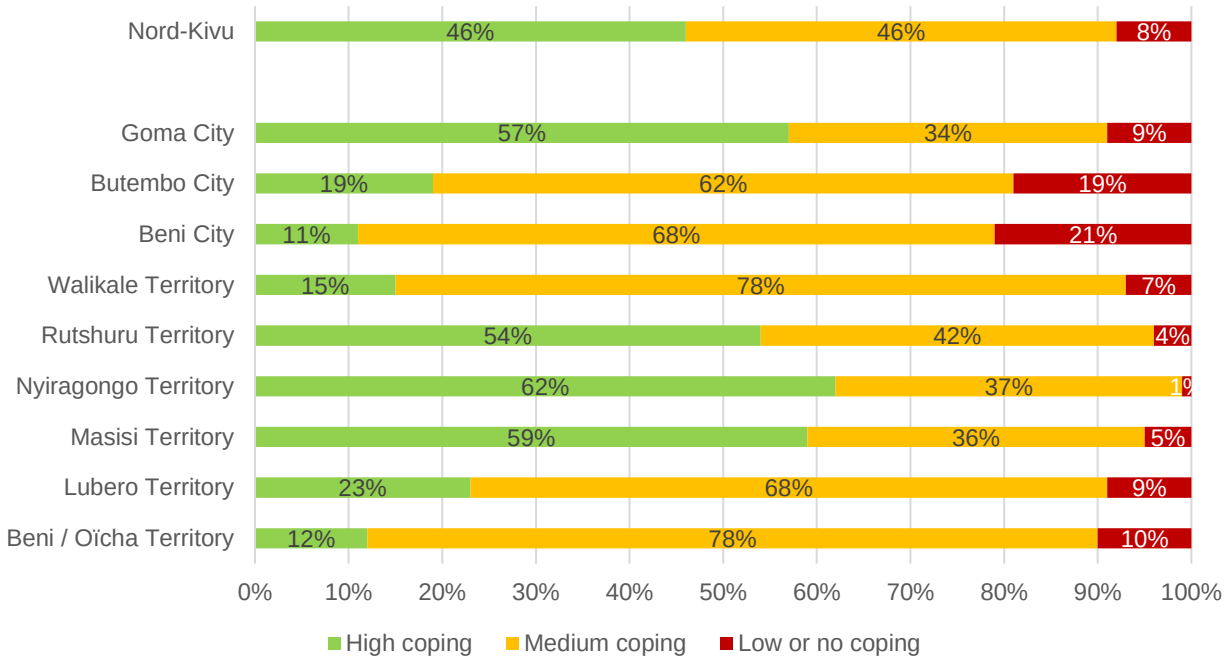

Figure 8 : Reduced Coping Strategy Index by Territory in North Kivu

b. Main Coping Strategies Used by Households

As illustrated in the following figure:

- In July 2024, relying on less preferred or less expensive foods remains the most commonly used strategy, adopted by 95% of households. This is also the least severe strategy.
- However, a significant proportion of the population (86%) reported reducing the quantity of food consumed during meals.
- Reducing the number of meals per day and borrowing food are also widely used strategies, reported by 83% and 71% of households, respectively.
- Restricting adult consumption in favor of children is another harmful strategy adopted by 55% of households.

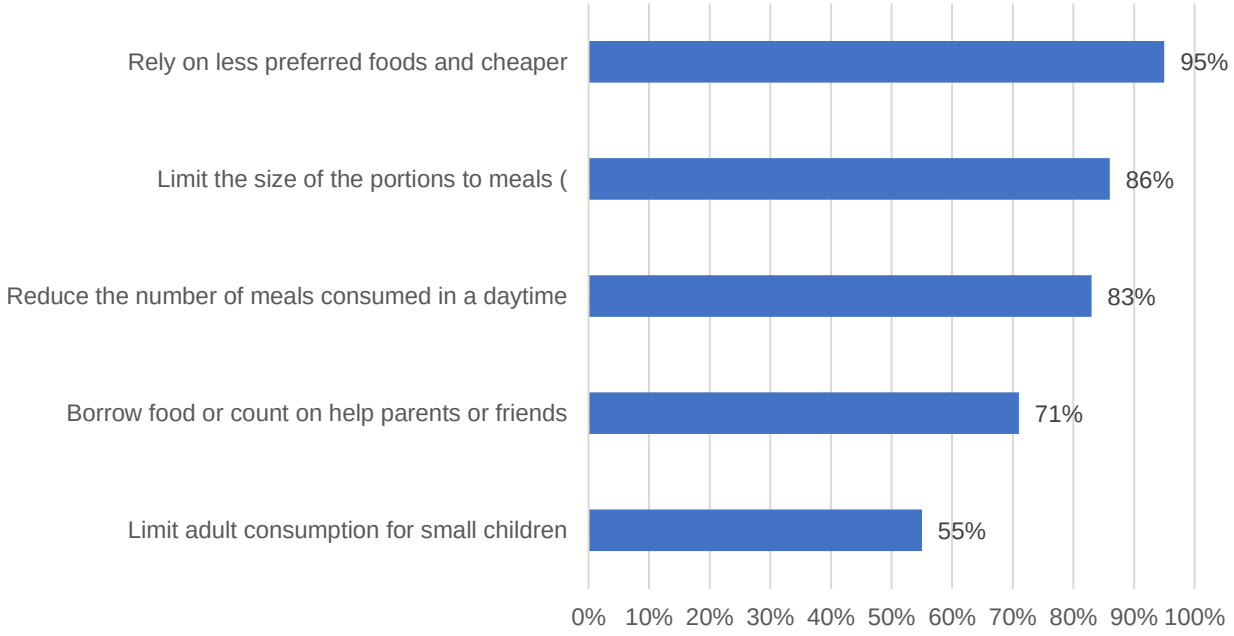

Figure 9 : Proportion of Households Using at Least One Coping Strategy

6. CAUSES OF FOOD INSECURITY

- **Shocks**

As illustrated in the following figure, households reporting one or more shocks during the six months preceding the survey are more frequently found in the territories of Rutshuru (82%), Masisi (68%), and Lubero (55%).

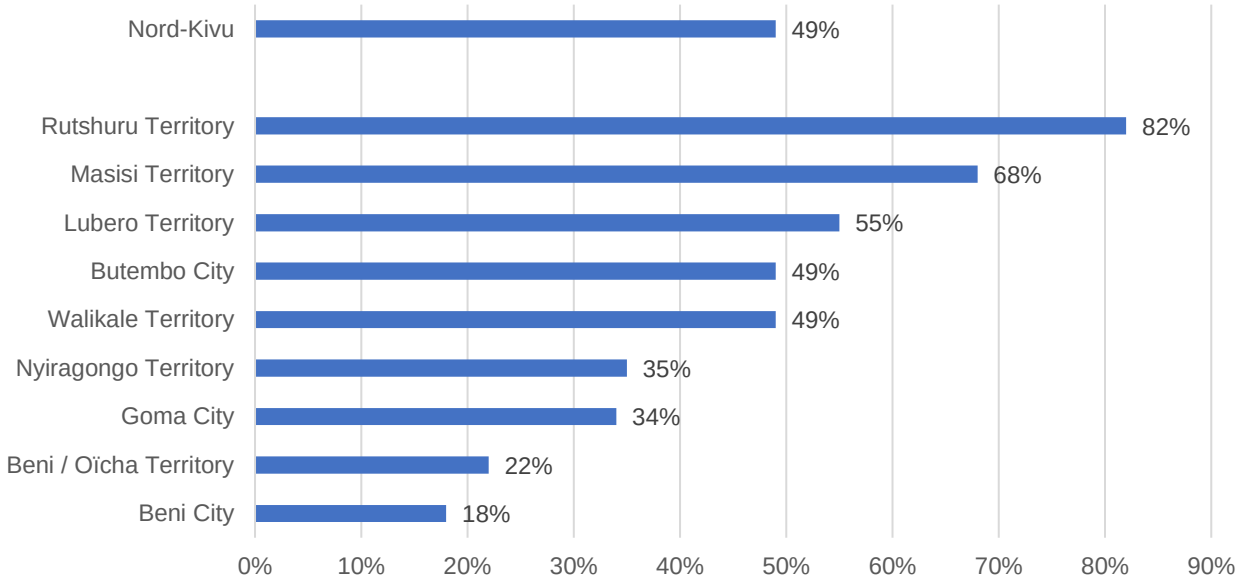

Figure 10 : Distribution of Households Experiencing Shocks in the Past Six Months

7. HOUSEHOLD INCOME

a. Sources of Income

An analysis of the income sources of surveyed households reveals the economic diversity of the region. Here is an overview of the main income sources:

- **Casual Labor:** Practiced by 42% of individuals, casual labor (agricultural and non-agricultural) is a common income source, providing a viable option for those with limited resources.
- **Agriculture:** For 27% of surveyed households, agriculture remains the cornerstone of their income. It is the main subsistence source, emphasizing the importance of agriculture in the region. This includes small-scale agricultural production, including livestock (11%), unskilled labor in agriculture (11%), and medium/large-scale agricultural production, including livestock on owned land (5%).
- **Commerce:** Commerce is the third most significant income source, with 15% of households engaged in commercial activities. This reflects the vibrancy of the local economy.
- **Skilled Workers, Professionals, and Entrepreneurs:** Although less common, these groups account for approximately 6% of household incomes.
- **Small Trades and Other Sources:** Representing 10% of surveyed households, small trades and miscellaneous activities contribute to household incomes.

A closer examination of local specificities reveals variations in income sources across different areas:

- **City of Goma and the Territories of Masisi, Nyiragongo, and Rutshuru:** In these areas, casual labor predominates as the main income source. The inclusion of displaced households in the sample reveals a significant shift in Goma, where last year, commerce and small trade were the primary sources of income. Similarly, a shift is observed in Nyiragongo territory, where small trades were previously a major income source alongside agriculture. Currently, casual labor is the dominant income source.
- **Cities of Beni and Butembo and Adjacent Territories (Walikale, Lubero, Beni/Oïcha):** Agriculture remains the principal source of income, highlighting its significance in these predominantly rural areas.

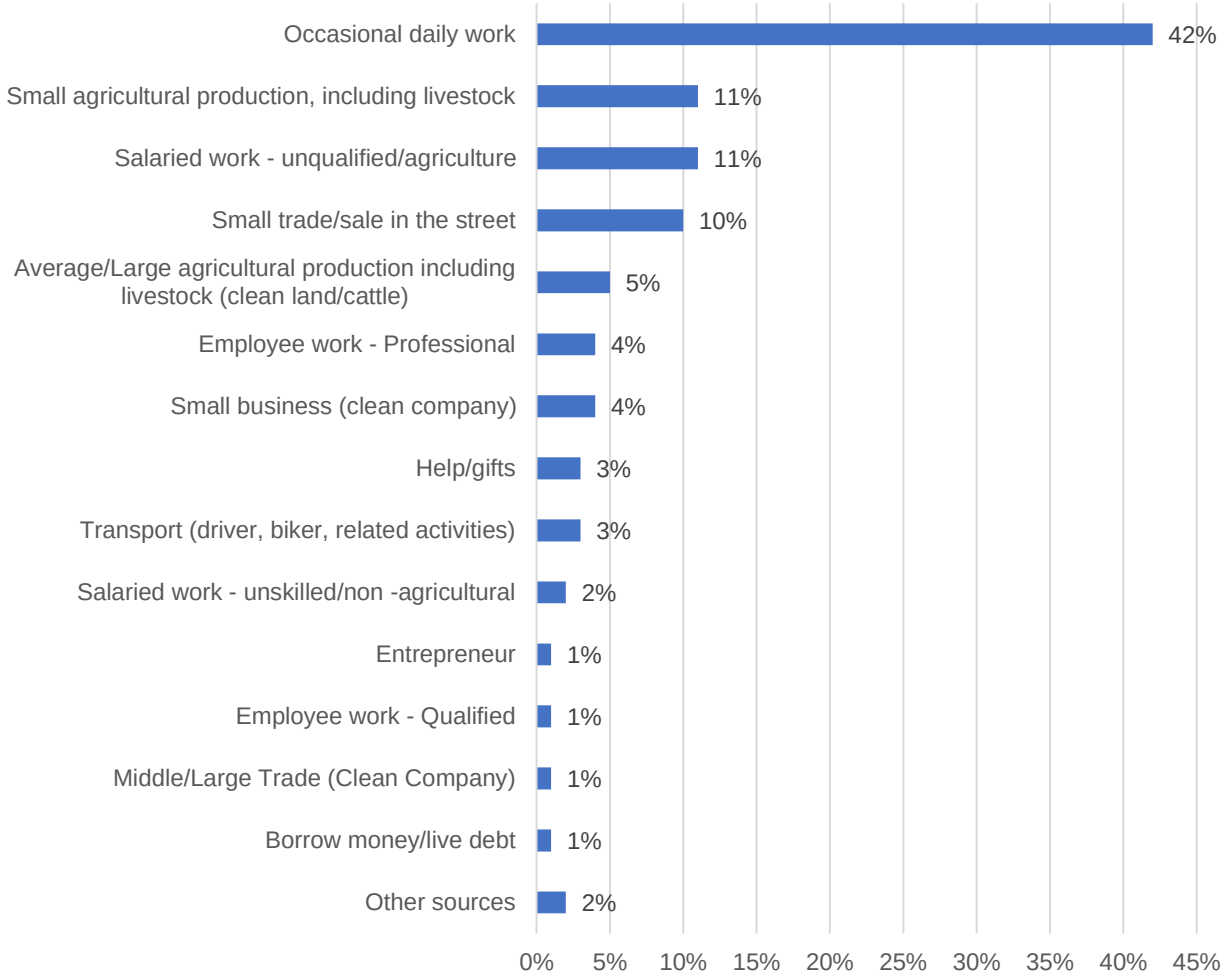

Figure 11 : Main Sources of Household Income

b. Number of Income Sources

Nearly three-quarters of the surveyed households (74%) rely on a single income source, 25% have two sources of income, and only 1% have at least three sources of income. The proportion of households by the number of income sources varies significantly across entities.11

In the territories of Nyiragongo, Beni/Oïcha, Masisi, and the city of Goma, 8 out of 10 households rely on a single income source.

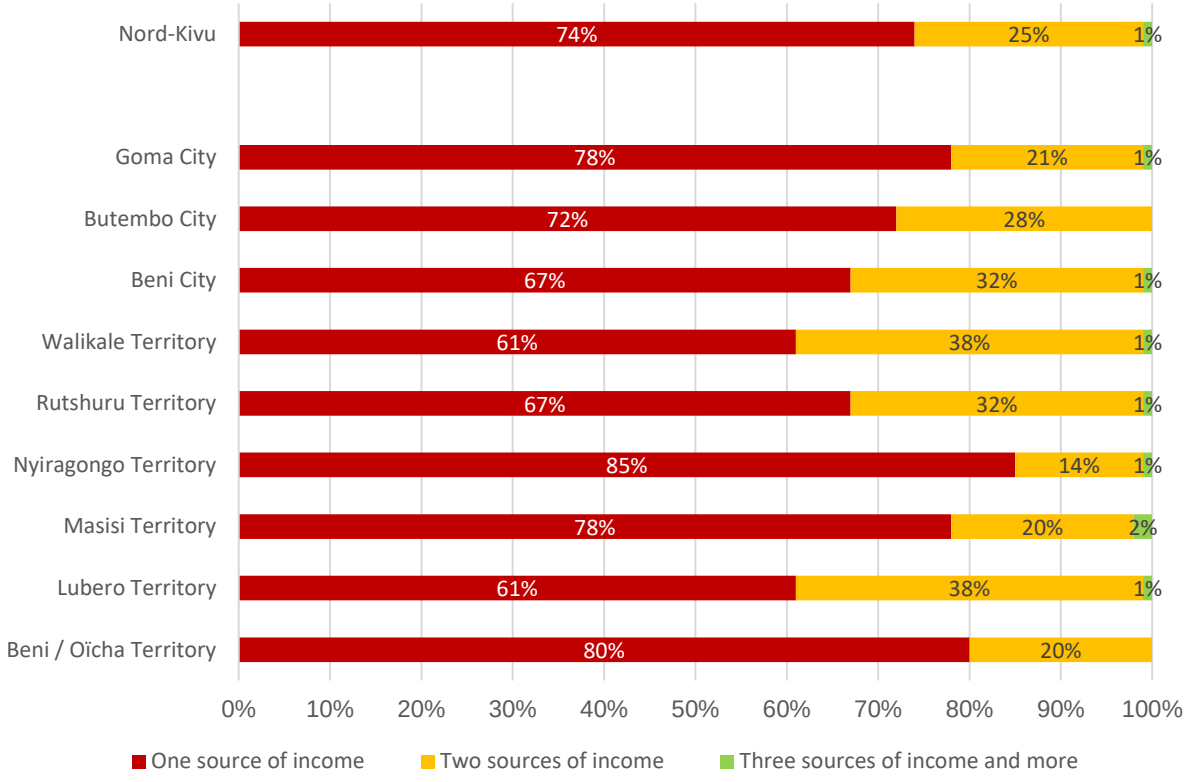

Figure 12 : proportion of households according to the number of household income sources

c. Household Characteristics and Income Sources

The 2024 EFSA survey reveals that male-headed households exhibit a higher proportion of multiple income sources, with 26% having at least two sources of income, compared to 21% among female-headed households.

Additionally, only 22% of households with a poor FCS (Food Consumption Score) have at least two income sources, whereas this proportion rises to 35% for those with an acceptable FCS. Similarly, 36% of food-secure households have at least two income sources, while this proportion drops to only 23% among households classified as severely food insecure.

Table 5 : Number of Income Sources by Household Characteristics

Characteristic	One Income Source	Two Income Sources	Three or More Income Sources
Overall	74%	25%	1%
Household Head Gender			
Female	79%	20%	1%
Male	73%	26%	1%
FCS Classification			
Acceptable	65%	34%	1%
Borderline	74%	25%	2%
Poor	79%	21%	1%
CARI Classification			
Food Secure	64%	34%	2%
Marginal Food Security	66%	32%	1%
Moderate Food Insecurity	75%	24%	1%
Severe Food Insecurity	78%	22%	1%

8. AGRICULTURE

a. Access to Arable Land

In North Kivu, 64% of households report not having access to arable land, a situation particularly pronounced in the territories of Masisi (84%), Nyiragongo (79%), and logically in the city of Goma (89%).

However, a majority of households have access to arable land in territories such as Walikale (88%), Beni/Oïcha (83%), and Lubero (71%).

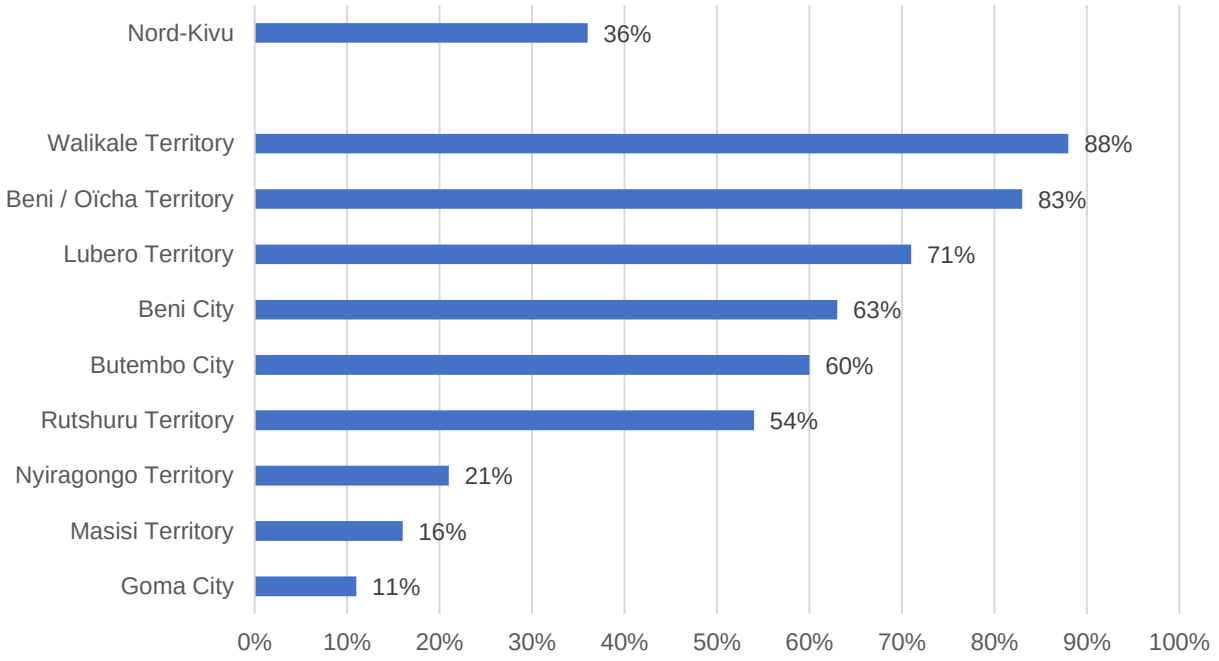

Figure 13 : Distribution of Households by Access to Arable Land

b. Reasons Given by Those Without Access to Arable Land

The lack of financial means to rent or purchase land is the main obstacle in most areas, affecting 75% of landless households at the provincial level. This problem is particularly acute in Masisi (90%) and Rutshuru (92%). In Goma, 31% of households mention the lack of available land in the region, a dominant issue in this urban context. Other main reasons include the insufficiency of available land in the area (16%) and the allocation of certain plots exclusively to customary families (6%).

Table 6 : Proportion of Households by Reasons for Lack of Access to Arable Land

Territory/City	n	Lack of Financial Means to Rent or Buy	Insufficient Land in the Area	Land Reserved for Customary Families	Insecurity in the Area	We Are Displaced	Not Interested in Agriculture	Other Reasons
T. Beni/Oïcha	48	88%	4%	4%	0%	0%	2%	2%
T. Lubero	64	69%	9%	0%	9%	8%	0%	5%
T. Masisi	846	90%	3%	7%	0%	0%	0%	0%
T. Nyiragongo	293	72%	18%	8%	0%	0%	0%	0%
T. Rutshuru	316	92%	2%	1%	1%	3%	0%	1%
T. Walikale	31	45%	10%	35%	0%	0%	3%	6%

Territory/City	n	Lack of Financial Means to Rent or Buy	Insufficient Land in the Area	Land Reserved for Customary Families	Insecurity in the Area	We Are Displaced	Not Interested in Agriculture	Other Reasons
City of Beni	107	78%	6%	2%	7%	2%	2%	3%
City of Butembo	83	71%	2%	1%	5%	4%	5%	7%
City of Goma	1126	61%	31%	6%	0%	0%	1%	0%
North Kivu	**2914**	**75%**	**16%**	**6%**	**1%**	**1%**	**1%**	**1%**

Comments:

Economic factors, such as the lack of financial means to rent or purchase land, are the main reasons cited by households in the territories of Masisi (90%), Rutshuru (92%), Beni/Oïcha (88%), the city of Beni (78%), and Nyiragongo (72%). Security concerns are also a significant issue in certain territories, being most prominent in Lubero (9%), the city of Beni (7%), and the city of Butembo (5%).

c. Modes of Access to Land

Personal or family ownership is the primary mode of land access throughout the province (60%). This mode is predominant in territories such as Walikale (82%) and Beni/Oïcha (77%). The second most common mode of access is renting, which applies to 33% of households with access to land. However, renting is particularly significant in the territories of Masisi (52%) and Rutshuru (55%), where land pressure is likely higher.

Table 7 : Modes of Access to Arable Land

Territory/City	n	Personal or Family Ownership	Renting	Borrowing	Share cropping	Gift or Donation	Other Modes
T. Beni/Oïcha	240	77%	18%	1%	1%	2%	1%
T. Lubero	153	57%	31%	3%	7%	2%	0%
T. Masisi	156	45%	52%	1%	1%	1%	0%
T. Nyiragongo	79	59%	30%	9%	0%	1%	0%
T. Rutshuru	373	36%	55%	2%	3%	2%	1%
T. Walikale	219	82%	12%	5%	0%	0%	0%
City of Beni	182	70%	25%	1%	1%	2%	1%
City of Butembo	123	63%	27%	2%	6%	1%	1%
City of Goma	137	64%	26%	6%	0%	2%	1%
North Kivu	**1662**	**60%**	**33%**	**3%**	**2%**	**2%**	**1%**

d. Average Land Area Owned

Overall, a household owns an average of 2.1 hectares of land (SD = 9.1). A typical household owns 0.5 hectares[8]. There is a significant difference in the average land areas owned across the various entities[9]. Households in the Walikale territory possess the largest average land area (2.5 ha).

Table 8 : Average and Median Land Area Owned by Households

Territory/City	n	Total in ha	Average in ha	Standard Deviation in ha	Median in ha
T. Beni/Oïcha	240	301.2	1.3	3	0.5
T. Lubero	153	57.2	0.4	0.9	0.1
T. Masisi	156	403	2.6	13.7	0.5
T. Nyiragongo	79	845.1	10.7	27.2	1
T. Rutshuru	373	387.4	1	7	0.3
T. Walikale	219	655.5	3	1.9	2.5
City of Beni	182	253.3	1.4	2.4	1
City of Butembo	123	75.6	0.6	0.9	0.2
City of Goma	137	450.3	3.3	12.5	1
North Kivu	**1662**	**3428.6**	**2.1**	**9.1**	**0.5**

e. Cultivation During Season A

The study shows that nearly 2 out of 10 households (19%) cultivated during Season A of the 2023-2024 agricultural campaign. The proportion of households that farmed during this season is higher in the territories of Lubero (53%) and Walikale (50%).

The cultivated area for a typical household during Season A is 0.3 hectares. However, the average cultivated area varies significantly between territories[10]. Given the high relative variation coefficients for all entities[11], we interpret the median cultivated areas. Thus, a typical household in the territories of Nyiragongo and Walikale cultivated 1 hectare, compared to only 0.1 hectares in the territory of Lubero and the city of Butembo.

[8] This value corresponds to the median value

[9] P-value<0,001

[10] P-value<0,001

[11] The relative variation coefficient is the ratio of the standard deviation by the average. When it exceeds 25%, it means that dispersion is very strong. In this case, we will interpret the median which is a robust estimator not influenced by extreme values

Table 9 : Average and Median Cultivated Land Area by Households

Territory/City	n	Households Cultivating During Season A of the 2023-2024 Campaign	Average Cultivated Area (ha)	Standard Deviation (ha)	Median Cultivated Area (ha)
T. Beni/Oïcha	288	140 (49%)	0.5	1	0.1
T. Lubero	217	114 (53%)	0.2	0.9	0.1
T. Masisi	1002	87 (9%)	2.8	15	0.5
T. Nyiragongo	372	44 (12%)	10.7	26.4	1
T. Rutshuru	689	214 (31%)	1	6.3	0.3
T. Walikale	250	125 (50%)	1	0.4	1
City of Beni	289	83 (29%)	0.5	0.6	0.2
City of Butembo	206	62 (30%)	0.2	0.3	0.1
City of Goma	1263	20 (2%)	13.4	29.2	0.8
North Kivu	**4576**	**889 (19%)**	**1.7**	**9.6**	**0.3**

Additionally, 73.1% of households that cultivated during Season A of the 2023-2024 campaign did not cultivate more than 0.50 hectares.

- **Main Crops Grown During Season A**

The following figure illustrates the different crops grown by households in the various entities covered by the study. The survey results indicate that beans are the most commonly grown crop, cultivated by 53% of households that farmed. This is followed by cassava (44%), maize (32%), and sweet potatoes (10%). Other crops are grown by fewer than 10% of agricultural households.

- **Agricultural Production Constraints During the 2023-2024 Campaign**

During the 2023-2024 agricultural campaign, farming households faced several challenges. The main constraints for the three primary crops include soil fertility issues, lack of land or small arable plots, insecurity in the area, plant diseases, and pests, which significantly limited production. (See detailed breakdown in the following table).

Table 10 : Agricultural Production Constraints

Agricultural Constraint	Maize (n=281)	Beans (n=470)	Cassava (n=393)
Soil fertility issues	12%	17%	19%
Lack of land/small arable plots	13%	15%	12%
Lack of seeds	5%	12%	2%
Insecurity in the area	18%	12%	17%
Insufficient rainfall	6%	9%	3%
Plant diseases/pests	16%	9%	16%
Excessive rainfall	3%	9%	1%
Other	5%	4%	4%
No constraints or other unspecified issues	7%	4%	8%
Lack of labor	3%	2%	7%
Hail, strong winds, flooding	1%	2%	0%
Irrigation issues	1%	2%	1%
Lack of investment capital	1%	1%	1%
Lack of tools/machinery	6%	1%	2%
Poor market access for produce	4%	0%	7%
Lack of storage facilities for harvested crops	0%	0%	1%

D. CONCLUSION

The findings of this preliminary research paint a stark picture of the escalating challenges in North Kivu, where prolonged conflict has significantly disrupted agricultural production and undermined food security. Over the past 15 years, the steady rise in conflict-related incidents has directly correlated with severe reductions in agricultural yields and widespread displacement of rural households. The deterioration in food consumption scores, heightened economic vulnerability, and the pervasive reliance on coping strategies underscore the deep-rooted food insecurity that now affects approximately 85% of households in the region.

The analysis reveals that not only have infrastructural damages and restricted access to arable land compounded these challenges, but the changing dynamics of income sources and shifts in agricultural practices further exacerbate the crisis. As communities struggle to cope with the loss of fertile land and dwindling agricultural productivity, the need for reliable, timely data becomes more critical than ever.

AgriSight is poised to address this urgent need by leveraging multispectral satellite imagery and advanced data analysis to provide real-time insights into crop health, land use changes, and stress indicators. This data-driven approach can enable humanitarian

organizations and local cooperatives to tailor interventions more effectively, ensuring that limited resources are allocated to the most vulnerable populations and regions. Ultimately, integrating satellite-based assessments into food security strategies offers a promising pathway to mitigate the cascading impacts of conflict on agriculture, foster resilience among rural communities, and support long-term recovery and sustainable development in North Kivu.