## CARI Methodology

The CARI is a multi-dimensional composite indicator that incorporates four sub-indicators: the Food Consumption Score (FCS), Reduced Coping Strategy Index (rCSI), Economic Capacity to Meet Essential Needs (ECMEN), and Livelihoods Coping Strategy Index (LCS). The [TECHNICAL GUIDANCE FOR WFP CARI, 3rd edition](https://docs.wfp.org/api/documents/WFP-0000134704/download/) was followed in constructing the CARI, with minor adjustments.

### Food Consumption Score (FCS)

The Food Consumption Score (FCS) is a proxy measure of a household’s access to food and is a key indicator used by the WFP to classify households based on the adequacy of food consumed in the week prior to the survey. In the 2024 MSNA data, the [standard guidance for calculating FSC](https://resources.vam.wfp.org/data-analysis/quantitative/food-security/food-consumption-score) was applied. The FCS was calculated by multiplying the frequency of consumption for each food group by its respective weight, then summing the results to produce a total score. The food group and weights are:

1. Cereals, grains, and tubers (FCSStap) – weight: 2,
2. Pulses (FCSPulse) – weight: 3,
3. Dairy products (FSCDairy) – weight: 4,
4. Meat, fish, and eggs (FCSPr) – weight: 4,
5. Vegetables (FCSVeg) – weight: 1,
6. Fruits (FCSFruit) – weight: 1,
7. Fat and oil (FCSFat) – weight: 0.5,
8. Sugar or sweets (FSCSugar) – weight: 0.5,
9. Condiments or spices (FCSCond) – weight: 0 (not included in the calculation due to its zero weight).

Households were then categorized based on the following FCS thresholds:

* Poor food consumption: Scores of 28 or below,
* Borderline food consumption: Scores between 28 and 42,
* Acceptable food consumption: Scores above 42.

### Reduced Coping Strategy Index (RCSI)

TheReduced Coping Strategy Index (RCSI) measures the stress households face due to food shortages by assessing how often they use different coping strategies. In the RCSI module, there were 1,097 instances which had missing values for these coping indicators. These missing values were imputed using a Generalized Linear Model (GLM), with household size, number of children, respondent’s gender and age, presence of a household member with a disability, whether the household is rural or urban, ownership of productive assets or land, income per capita, and the region (oblast) as explanatory variables.

In [the standard RCSI calculation](https://resources.vam.wfp.org/data-analysis/quantitative/food-security/reduced-coping-strategies-index), the weights assigned to each coping behavior are:

1. Relying on less preferred or cheaper food (rCSILessQlty) – weight: 1,
2. Borrowing food or seeking help from friends or family (rCSIBorrow) ­­– weight: 2,
3. Reducing the number of meals per day (rCSIMealNb) – weight: 1,
4. Reducing the portion size of meals (rCSIMealSize) – weight: 1,
5. Limiting adult consumption so children can eat (rCSIMealAdult) – weight: 3.

However, this standard method tends to underestimate the coping strategies used by households without children. Since reducing adult meals to prioritize children’s meals carries the highest weight (3), households without children are less likely to be seen as using significant coping strategies. This is a particular concern in the 2024 MSNA data for Ukraine, where over 65% of households surveyed do not have children. After receiving the necessary approval, the rCSI was recalculated with adjusted weights. The new weights were based on how frequently each coping strategy was used, assigning the highest weight (3) to the most common strategy, the next highest weight (2) to the second most common, and a weight of 1 to the others. This adjustment increased the average rCSI from 4.38 to 7.95.

The adjusted rCSI formula has the following weight rCSILessQlty (weight = 3), rCSIBorrow (weight = 1), rCSIMealNb (weight = 1), rCSIMealSize (weight = 2), rCSIMealAdult (weight = 1).

The adjusted rCSI scores were then grouped into three categories:

* Scores of 3 or less indicate "Low coping level",
* Scores between 4 and 18 indicate "Medium coping level",
* Scores above 18 indicate "High coping level."

### Livelihoods Coping Strategy Index (LCS)

The Livelihoods Coping Strategy Index (LCS) for food security indicator is used in the CARI as a descriptor of a household’s Coping Capacity. The Livelihood Coping Strategies – Food Security (LCS-FS) is derived from a series of questions related to households’ experiences with livelihood strategies due to lack of food during the 30 days prior to survey. However, the 2024 MSNA data collected the Livelihood Coping Strategies - Essential Needs (LCS-EN) module, with following coping strategies:

* Stress: Sell household non-productive asset; Spend savings or consumed stocks for a rainy day; Purchase food on credit or borrowed food; Get an additional job.
* Crises: Sell productive assets or means of transport (sewing machine, bicycle, car, etc.); Reduce essential health expenditures (including drugs, etc.); Reduce essential education expenditures.
* Emergency: Sell housing or land; Use degrading sources of income, illegal work, or high risk jobs; Have to ask strangers for money.

According to standard guidance for calculating [the standard guidance for calculating LCS-EN](https://resources.vam.wfp.org/data-analysis/quantitative/essential-needs/livelihood-coping-strategies-essential-needs) households are considered to be using a coping strategy if they answered "Yes" to having used it or if they responded "No, because we have already exhausted this strategy and can no longer use it." This approach accounts for households that have depleted certain strategies due to prolonged food insecurity. At the analysis stage, the LCS-FS was calculated by considering the severity of the coping strategies, but only for households that indicated they used these strategies specifically ‘to buy food.’

A categorical variable was created to represent the severity level of the most extreme coping strategy a household adopted. This variable ranges from 1 to 4, with households classified into one of four groups: (1) no use of stress, crisis, or emergency strategies, (2) use of stress strategies, (3) use of crisis strategies, and (4) use of emergency strategies.

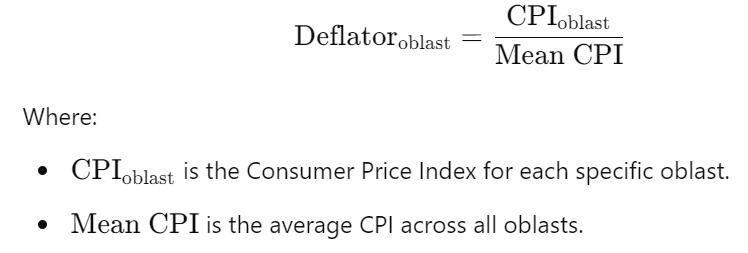
### Economic Capacity to Meet Essential Needs (ECMEN)

The Economic Capacity to Meet Essential Needs (ECMEN**)** indicator assesses whether households can meet essential needs or at least their most critical needs. It captures the percentage of households whose expenditures fall below the Survival Minimum Expenditure Basket (SMEB) or the Minimum Expenditure Basket (MEB). These baskets represent the cost of the minimum culturally appropriate items a household needs to survive for one month while maintaining basic standards for nutrition, water, and hygiene. In Ukraine, the MEB is set by humanitarian actors to guide the calculation of multipurpose/multisectoral cash transfer amounts, while the SMEB is defined by the government. For 2024, the SMEB is set at 3,250 UAH per person per month, and the MEB at 6,621 UAH per person per month. The original MEB value of 6,318 UAH, set in 2023, was adjusted for inflation in 2024.

The ECMEN calculation followed [standard guidance](https://resources.vam.wfp.org/TagView?tag=Expenditure%20analysis). The ECMEN module included a list of food and non-food expenditures, where households were asked if they produced, purchased, or received any items in the 30 days prior to the survey. Households with access to these items were then asked if they knew the monetary value. If the household could not provide a value, an imputation method was applied to estimate it, helping to distinguish missing values from zero expenditures. This imputation was conducted using a Generalized Linear Model (GLM) and included explanatory variables such as household size, number of children, respondent’s gender and age, presence of a household member with a disability, whether the household is rural or urban, ownership of productive assets or land, income per capita, and the oblast in which the household is located. Outliers were adjusted by replacing values above 99.5 percentile or below 0.5 percentile with the median value.

To adjust calculated food and non-food items for the cost of living, the government-provided Consumer Price Index (CPI) for each oblast was used. A cost-of-living adjustment is needed to account for regional differences in prices, ensuring fair comparisons of household economic capacity across various oblasts. In Ukraine, as in many countries, the cost of goods and services varies significantly by oblast due to factors such as availability, transportation costs, and local demand. Without adjusting for these differences, households in high-cost oblasts may appear less economically secure simply because they face higher prices, not necessarily because they have fewer resources. The cost-of-living adjustment standardizes expenditures across oblasts, allowing us to more accurately assess and compare the real purchasing power of households, their ability to meet essential needs, and the level of support they may require.

Typically, cost-of-living adjustments use the Paasche index, which is a composite price index that compares location specific prices to those of national price, weighted by quantities. However, since the 2024 MSNA expenditure module lacked unit price and quantity data, the cost of living was adjusted using oblast-level CPI values. Each oblast was assigned a CPI based on the CPI data at the time of data collection—for example, Cherkaska has a CPI of 102.7, while Kyiv has a slightly lower CPI of 101.5. After assigning each oblast’s CPI, the national average CPI was calculated. The deflator for each oblast was then created by dividing each oblast’s CPI by the national average CPI. This deflator formula is shown below:



To determine a household's economic capacity, all consumption expenditures were aggregated and then calculated on a per capita basis. Only expenditures representing a household’s own economic means were included, such as regular food and non-food items purchased with cash or credit and the value of food from the household's own production. The value of food and non-food items received as in-kind assistance or gifts was excluded, as it does not represent the household's independent economic capacity. Similarly, any cash assistance from WFP or partner humanitarian organizations was also deducted from the household’s economic capacity total.

After calculating the ECMEN, households were categorized based on their total expenditures relative to the SMEB and MEB, resulting in three levels:

Level 1: Households whose ECMEN total is below the SMEB.

Level 2: Households whose ECMEN total falls between the SMEB and MEB.

Level 3: Households whose ECMEN total exceeds the MEB.

### CARI classification and Unadjusted PIN

The following steps were taken to calculate each household's overall food security classification using the above food security indicators:

1. Convert Indicators to a 4-Point Scale: All food security indicators were standardized to a 4-point scale to enable consistent comparison.
2. Calculate the ‘Summary Indicator of Current Status (CS)’: The "Current Status" domain, comprising the Food Consumption Score (FCS) and Reduced Coping Strategy Index (RCSI), was used to evaluate immediate food security conditions. For each household, an average score was calculated based on its 4-point scale ratings for these indicators.
3. Calculate the ‘Summary Indicator of Coping Capacity (CC)’: The "Coping Capacity" domain, encompassing the Livelihood Coping Strategy – Food Security (LCS-FS) and the Economic Capacity to Meet Essential Needs (ECMEN), reflects a household’s ability to manage food insecurity over time. An average score was calculated for each household based on its 4-point scale ratings for these indicators.
4. Compute the Overall Food Security Score: The final food security classification was obtained by averaging the CS and CC scores for each household: (CS+CC)/2
5. Round to the Nearest Whole Number: The resulting score was rounded to the nearest integer, producing a final value between 1 and 4, which represents the household’s overall food security classification.

The final stage of the CARI process involves converting each core indicator into a standardized 4-point classification scale. This scale assigns a score to each category as follows: 1 - Food Secure, 2 - Marginally Food Secure, 3 - Moderately Food Insecure, and 4 - Severely Food Insecure.

# Key tables

Table 1: Final Adjustment Results for Cost-of-Living Deflator by Oblast:

|  |  |
| --- | --- |
| Oblast | Mean Deflator |
| Cherkaska | 1.0045 |
| Chernihivska | 1.0006 |
| Chernivetska | 0.9996 |
| Dnipropetrovska | 1.0025 |
| Donetska | 0.9986 |
| Ivano-Frankivska | 1.0025 |
| Kharkivska | 0.9927 |
| Khersonska | 0.9967 |
| Khmelnytska | 0.9986 |
| Kirovohradska | 1.0035 |
| Kyiv | 0.9927 |
| Kyivska | 0.9996 |
| Lvivska | 0.9986 |
| Mykolaivska | 1.0064 |
| Odeska | 1.0025 |
| Poltavska | 0.9957 |
| Rivnenska | 1.0006 |
| Sumska | 0.9996 |
| Ternopilska | 0.9986 |
| Vinnytska | 0.9986 |
| Volynska | 0.9986 |
| Zakarpatska | 1.0055 |
| Zaporizka | 1.0045 |
| Zhytomyrska | 0.9996 |

*Note: Due to security concerns, no household-level survey data was collected in Luhanska.*