

Documentation for the Food Insecurity Hotspots Data Set

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Abstract

This document outlines the methodology and data sets used to construct the Food Insecurity Hotspots Data Set, along with use cases, limitations, and use constraints. The Food Insecurity Hotspots Data Set, Version 1 (2009-2019) consists of grids at 250 meter (~7.2 arc seconds) resolution that identify the level of intensity and frequency of food insecurity over the 10 years between 2009 and 2019, as well as hotspot areas that have experienced consecutive food insecurity events. The gridded data are based on sub-national food security analysis provided by FEWS NET (Famine Early Warning Systems Network) in five (5) regions, including Central America and the Caribbean, Central Asia, East Africa, Southern Africa, and West Africa. Based on the Integrated Food Security Phase Classification (IPC), food insecurity is defined as Minimal, Stressed, Crisis, Emergency, and Famine.

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We appreciate feedback regarding this data set, such as suggestions, discovery of errors, difficulties in using the data, and format preferences. Please contact:

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I. Introduction

The Food Insecurity Hotspots Data Set, Version 1 (2009-2019) consists of grids that identify the level of intensity and frequency of food insecurity over the 10 years between 2009 and 2019, as well as hotspot areas that have experienced consecutive food insecurity events. The gridded data are based on sub-national food security analysis provided by FEWS NET (Famine Early Warning Systems Network) in five (5) regions, including Central America and the Caribbean, Central Asia, East Africa, Southern Africa, and West Africa (see Table 1 for a list of countries included). Based on the Integrated Food Security Phase Classification (IPC), food insecurity is defined as Minimal, Stressed, Crisis, Emergency, and Famine.

The Famine Early Warning Systems Network (FEWS NET) is a leading provider of early warning and analysis on acute food insecurity. FEWS NET analysts, working in more than 35 countries, continuously gather evidence of the current food security situation in areas of concern. Data are collected from a variety of sources, including U.S. science agencies, national ministries of trade and agriculture, international organizations, and NGOs. In some countries, FEWS NET also employs networks of monitors to report localized data such as staple food prices and rainfall. Periodically, CIESIN staff members collaborate with partners on household surveys as well as joint assessments on issues ranging from crop production to livelihood zoning to market functioning.

FEWS NET has 20 “presence” countries, where locally based analysts work full time from a national office. In addition, FEWS NET monitors nine countries remotely, typically from a nearby country office. In these “non-presence” countries, analysis centers identify anomalies and spotlight deteriorating conditions. Based on a lighter, scalable version of FEWS NET's traditional methodology, remote monitoring reports may offer less depth and detail than those from presence countries, where at least one full-time analyst is devoted to data collection and analysis.

To describe the anticipated severity of acute food insecurity, FEWS NET analysts use the Integrated Food Security Phase Classification (IPC 2.0). Widely accepted by the humanitarian relief community around the world, this five-level scale uses common language and standards. It is intended to help governments and other humanitarian actors quickly understand a crisis (or potential crisis) and take action.

II. Data and Methodology

Input data

Vector data was downloaded from FEWS NET (<https://fews.net/fews-data/333>) for the historical and current situation (non-projection) corresponding to food security between 2009 and 2019 (for more information, see Appendix 3. FEWS NET Readme). Data are reported for five (5) regions, including Central America and the Caribbean, Central Asia, East Africa, Southern Africa, and West Africa (see Table 1 for a list of countries included).

Table 1: Countries monitored as part of FEWS NET

West Africa	East Africa	Southern Africa	Central Asia	Central America and Caribbean
Burkina Faso	Burundi	Angola	*Afghanistan	El Salvador
Central Africa Republic	Djibouti	*Democratic Republic of the Congo	Tajikistan	*Guatemala
*Chad	*Ethiopia	Lesotho		*Haiti
Cameroon	*Kenya	*Madagascar		Honduras
*Guinea	Rwanda	*Malawi		Nicaragua
Liberia	*Somalia	*Mozambique		
*Mali	*South Sudan	*Zambia		
Mauritania	*Sudan	*Zimbabwe		
*Niger	Tanzania			
*Nigeria	*Uganda			
Senegal	Yemen			
Sierra Leone				

*Presence countries

Data are reported for the monitored regions from 1 to 4 times per year.¹ A total of thirty-seven (37) reporting time periods were obtained; FEWS NET had no data for Central Asia in December 2018, and for Central America and the Caribbean in October 2018 (see Table 2 for more details). For each country, reporting units are based on FEWS NET Livelihood Zones.

Table 2: Data availability by region and frequency of reports for each year

Reporting Time Period	Central Asia (CA)	Central America and the Caribbean (LAC)	East Africa (EA)	West Africa (WA)	Southern Africa (SA)
2009					
July	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2010					
January	✓	✓	✓	✓	✓
April	✓	✓	✓	✓	✓
July	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2011					
January	✓	✓	✓	✓	✓
April	✓	✓	✓	✓	✓
July	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2012					
January	✓	✓	✓	✓	✓
April	✓	✓	✓	✓	✓
July	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2013					
January	✓	✓	✓	✓	✓
April	✓	✓	✓	✓	✓
July	✓	✓	✓	✓	✓

¹ Reporting went from quarterly in 2012 to once a trimester in 2013.

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Reporting Time Period	Central Asia (CA)	Central America and the Caribbean (LAC)	East Africa (EA)	West Africa (WA)	Southern Africa (SA)
October	✓	✓	✓	✓	✓
2014					
January	✓	✓	✓	✓	✓
April	✓	✓	✓	✓	✓
July	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2015					
January	✓	✓	✓	✓	✓
April	✓	✓	✓	✓	✓
July	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2016					
February	✓	✓	✓	✓	✓
June	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2017					
February	✓	✓	✓	✓	✓
June	✓	✓	✓	✓	✓
October	✓	✓	✓	✓	✓
2018					
February	✓	✓	✓	✓	✓
June	✓	✓	✓	✓	✓
October	✓	*	✓	✓	✓
December	*	✓	✓	✓	✓
2019					
February	✓	✓	✓	✓	✓






*FEWS NET had no data for Central Asia in December 2018, and for Central America and the Caribbean in October 2018.

Within the obtained data, the food security attribute value ranges from 1 to 5, which represent the food insecurity level for the reporting period. Only some of the reporting periods include three additional attribute values that represent areas of water, parks, forests, reserves, no data or missing data.

For data reported after March 2011, the food security phases refer to the scale using the IPC. Data from before March 2011 uses FEWS NET Food Insecurity Severity Scale (FNFIS), a scale similar to the IPC, but with different classification criteria (see Table 3). Table 4 provides details on the IPC Acute Food Insecurity Phase Descriptions (see VI. Limitations for further information about assumptions and limited documentation about phase classifications).

The FNFIS and IPC classifications systems both use scales ranging from 1 to 5. The IPC describes the severity of food emergencies and is widely accepted by the international community. Based on common standards and language, this five-phase scale is intended to help governments and other humanitarian actors quickly understand a crisis (or potential crisis) and take action. The IPC allows analysts to classify households and areas according to a five-phase scale. The essence of each phase is captured in the phase descriptions, described in Table 4. The classification is based on a convergence of available data and evidence, including indicators related to food consumption, livelihoods, malnutrition, and mortality. With this evidence, analysts use the IPC reference tables, which provide illustrative thresholds for each of the five phases, to classify the severity of the current or projected food security situation.

Table 3: FEWS NET Food Insecurity Severity Scale Descriptions

	Generally food secure	Nearly all households have adequate access to sufficient food to maintain an active and healthy life, without depending on external assistance. This means that there is adequate food available; that households have adequate resources to obtain sufficient food; and that they are healthy enough to receive the nutritional value of the food.
	Moderately food insecure	Some or all households are barely able to meet their basic food requirements on their own. To meet their requirements, they are relying on external assistance and/or coping strategies that begin to erode their asset base.
	Highly food insecure	Some or all households face shortfalls in meeting their basic food requirements. Negative household response strategies are prominent, including reduction in the quantity and/or quality of meals, and/or increased depletion or liquidation of assets. Rates of acute malnutrition are above normal.
	Extremely food insecure	Some or all households face a severe shortfall in their basic food requirements. Reduced food intake is widespread, resulting in significantly increased rates of acute malnutrition and gradual destitution.
	Famine	Destitution and starvation become prominent, and populations face high mortality risk, due to an extreme lack of access to food and other basic needs.

Source: https://www.fews.net/sites/default/files/documents/reports/FEWS_NET_Poster_2009_03_final.pdf

Table 4: IPC Acute Food Insecurity Phase Descriptions

PHASE 1 Minimal	Households are able to meet essential food and non-food needs without engaging in atypical and unsustainable strategies to access food and income.
PHASE 2 Stressed	Households have minimally adequate food consumption but are unable to afford some essential non-food expenditures without engaging in stress-coping strategies.
PHASE 3 Crisis	Households either: - Have food consumption gaps that are reflected by high or above-usual acute malnutrition; OR - Are marginally able to meet minimum food needs but only by depleting essential livelihood assets or through crisis-coping strategies.
PHASE 4 Emergency	Households either: - Have large food consumption gaps which are reflected in very high acute malnutrition and excess mortality; OR - Are able to mitigate large food consumption gaps but only by employing emergency livelihood strategies and asset liquidation.
PHASE 5 Famine	Households have an extreme lack of food and/or other basic needs even after full employment of coping strategies. Starvation, death, destitution, and extremely critical acute malnutrition levels are evident. (For Famine Classification, area needs to have extreme critical levels of acute malnutrition and mortality.)

Source: <https://fews.net/IPC>

Methods

The input data were obtained in vector form, specifically one shapefile for each reporting time period per region, in geographic coordinate system WGS 1984. The data were converted to Mollweide projection and the regions were merged to produce a globally gridded raster data layer per reporting time period.

Not all regions are included for each reporting time period. In order to have a consistent spatial extent, each data layer was edited to include a feature with an attribute value of 0, where no data existed. Because no data existed for Central Asia and Central America and the Caribbean in December 2018 and October 2018 respectively, these areas were assigned features with an attribute value of 0.

The original FEWS NET data were filtered to maintain only areas representing a phase of food insecurity; areas of water, parks, forests, and reserves were removed. Thus, the final attribute values were integrated phase classifications (IPC) ranging from 1 to 5, with 1: Minimal, 2: Stressed, 3: Crisis, 4: Emergency, and 5: Famine. The original shapefiles and grid versions of the

quarterly (or trimesterly) reports are provided as inputs. The data layers were combined to calculate the frequency of each IPC class (one layer for each class) as well as the duration. The duration grids report, for each IPC class separately, the longest consecutive duration in terms of number of reporting periods over the 10-year period. In other words, if the maximum duration of Phase 2 (Stressed) lasted for 16 consecutive reporting periods, then the grid value for that IPC class and location will report 16. Similarly, if Phase 3 (Crisis) lasted for 7 consecutive reporting periods, then the value of the grid cell is 7. Finally, the statistics grids provide the average and standard deviation of quarterly/trimesterly IPC reported classes over the 10 years.

III. Data Set Description(s)

Data set description:

The Food Insecurity Hotspots Data Set, Version 1 (2009-2019) consists of grids that identify the level of intensity and frequency of food insecurity over the 10 years between 2009 and 2019, as well as hotspot areas that have experienced consecutive food insecurity events. The gridded data are based on sub-national food security analysis provided by FEWS NET (Famine Early Warning Systems Network) in five (5) regions, including Central America and the Caribbean, Central Asia, East Africa, Southern Africa, and West Africa. Based on the Integrated Food Security Phase Classification (IPC), food insecurity is defined as Minimal, Stressed, Crisis, Emergency, and Famine.

Data set web page:

SEDAC URL: <https://sedac.ciesin.columbia.edu/data/set/food-food-insecurity-hotspots>

Permanent URL: <https://doi.org/10.7927/cx02-2587>

Data set format:

The data are available in GeoTIFF format and vector feature classes in Shapefile (.SHP) format. The downloadables are compressed zip files containing: 1) GeoTIFF or Shapefile, and 2) PDF documentation

Data set downloads:

food-food-insecurity-hotspots-duration-geographic-geotiff.zip
food-food-insecurity-hotspots-duration-mollweide-geotiff.zip
food-food-insecurity-hotspots-frequency-geographic-geotiff.zip
food-food-insecurity-hotspots-frequency-mollweide-geotiff.zip
food-food-insecurity-hotspots-inputs-geographic-geotiff.zip
food-food-insecurity-hotspots-inputs-geographic-shp.zip
food-food-insecurity-hotspots-inputs-mollweide-geotiff.zip
food-food-insecurity-hotspots-inputs-mollweide-shp.zip
food-food-insecurity-hotspots-statistics-geographic-geotiff.zip
food-food-insecurity-hotspots-statistics-mollweide-geotiff.zip

IV. How To Use the Data

The raster data in GeoTIFF format and vector data in Shapefile format, can be used in any standard Geographic Information System (GIS) and software package for direct mapping and geospatial analysis.

V. Potential Use Cases

The Food Insecurity Hotspots Data Set, Version 1 (2009-2019) has many potential applications. For example, a researcher wanting to understand the frequency and severity of food security crises in regions that are food insecure (or a given country) could use this data set to understand the spatial patterns and potential driving-forces such as conflict, crop failures, and/or poor governance. Researchers could also examine how climate variability contributes to food security crises.

VI. Limitations

As discussed above, a decision was made to use the IPC classifications for the entire 10-year hotspot data set even though the first 3 years were classified using a different FEWS NET classification schema. The data set also has limits in terms of the spatial resolution of the reporting units, which are inherited from the original FEWS NET reporting units.


VII. Acknowledgments

Funding for development and dissemination of this data set was provided under the U.S. National Aeronautics and Space Administration (NASA) contract 80GSFC18C0111 for the continued operation of the Socioeconomic Data and Applications Center (SEDAC), which is operated by the Center for International Earth Science Information Network (CIESIN) of Columbia University. The original FEWS NET data are developed with funding from the U.S. Agency for International Development (USAID).

VIII. Disclaimer

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IX. Use Constraints

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X. Recommended Citation(s)

Data set(s):

Center for International Earth Science Information Network (CIESIN), Columbia University. 2020. Food Insecurity Hotspots Data Set. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). <https://doi.org/10.7927/cx02-2587>. Accessed DAY MONTH YEAR.

XI. Source Code

No source code is provided for this data set.

XII. References

FEWS NET Data Center, Food Security Classification Data, <https://www.fews.net/fews-data/333> (downloaded on April 19, 2019).

XIII. Documentation Copyright and License

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Appendix 1. Data Revision History

No revisions have been made to this data set

Appendix 2. Contributing Authors & Documentation Revision History

Revision Date	ORCID	Contributors	Revisions
July 22, 2020	0000-0002-8875-4864	Dara Mendeloff, A. de Sherbinin	This document is the 1 st instance of documentation.

Appendix 3. FEWS NET Readme

This folder contains historical FEWS NET and current situation (non-projection) Shapefiles. The content is divided into regional folders, which each contain data dating back to July 2009. The Shapefiles use the following naming format: XXYYYYZZ_CS. XX refers to the region, YYYY refers to the four-digit year, and ZZ to the month. Thus, a file named WA201602_CS would include the February 2016 current situation data for West Africa.

Within the Shapefiles, the CS column contains the phase classification for the month. For Shapefiles dated after March 2011 this refers to the phase using Integrated Phase Classification (<https://www.fews.net/IPC>), Data from before March 2011 uses FEWS NET Food Insecurity Severity Scale (FNFIS), a scale similar to the IPC, but with differing classification criteria.

Starting in March 2011, FEWS NET began implementing the IPC humanitarian assistance protocol in maps and data. This is captured in the HA0 column. If HA0 = 1, then the phase classification would likely be at least one phase worse without current or programmed humanitarian assistance. In FEWS NET and IPC maps, this is represented by an exclamation mark (!).

Three layer files are also included for reference:

1. IPC_Legend: official IPC color scheme
2. IPC_HumanitarianAssistance: Official IPC symbology (!) for humanitarian assistance
3. FEWS NET_Legend: Standard color scheme for the FNFIS scale

For additional details on our food security data please click here (https://shapefiles.fews.net.s3.amazonaws.com/HFIC/FEWS_NET_Food_Security_Data.pdf).

Additional FEWS NET data is available at: <https://www.fews.net/fews-data/333>.