

Table 1 HouseholdGeovariables\_Y4

Theme	Source	Dataset Title	Variable Name	Variable Type	Reference Period	Resolution	Description	Web
Distance	OSM	IHPS GPS Coordinates and Malawi Roads	dist_road	Continuous	N/A	N/A	Household distance to nearest major road (trunk and primary network)	
Distance	World Gazetteer CityPopulation.de	IHPS GPS Coordinates and Towns	dist_popcenter	Continuous	N/A	N/A	Household distance to nearest town of > 20,000 pop	
Distance	MoAFS Tech Sec	IHPS GPS Coordinates and ADMARC Location	dist_admarc	Continuous	N/A	N/A	Household distance to nearest ADMARC location	
Distance	World Gazetteer	IHPS GPS Coordinates and Tobacco Auction Floors	dist_auction	Continuous	N/A	N/A	Household distance to nearest tobacco auction	
Distance	IFPRI	IHPS GPS Coordinates and Border Posts	dist_borderpost	Continuous	N/A	N/A	Household distance to nearest border post	
Distance	World Gazetteer	IHPS GPS Coordinates and Towns	dist_boma	Continuous	N/A	N/A	Household distance to the boma of the district of residence	
Distance	FEWSNET	IHPS GPS Coordinates and Major Agricultural Markets	dist_agmrkt	Continuous	N/A	N/A	HH Distance to nearest agricultural market	
Climatology	UC Berkeley	WorldClim Bioclimatic Variables	af_bio_1	Continuous	1960-1990	0.008333 dd	Average annual temperature calculated from monthly climatology, multiplied by 10 (°C)	<a href="http://www.worldclim.org/bioclim">http://www.worldclim.org/bioclim</a>

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Climatology	UC Berkeley	WorldClim Bioclimatic Variables	af_bio_8	Continuous	1960-1990	0.008333 dd	Average temperature of the wettest quarter, from monthly climatology, multiplied by 10. (°C)	<a href="http://www.worldclim.org/bioclim">http://www.worldclim.org/bioclim</a>
Climatology	UC Berkeley	WorldClim Bioclimatic Variables	af_bio_12	Continuous	1960-1990	0.008333 dd	Total annual precipitation, from monthly climatology (mm)	<a href="http://www.worldclim.org/bioclim">http://www.worldclim.org/bioclim</a>
Climatology	UC Berkeley	WorldClim Bioclimatic Variables	af_bio_13	Continuous	1960-1990	0.008333 dd	Precipitation of wettest month, from monthly climatology (mm)	<a href="http://www.worldclim.org/bioclim">http://www.worldclim.org/bioclim</a>
Climatology	UC Berkeley	WorldClim Bioclimatic Variables	af_bio_16	Continuous	1960-1990	0.008333 dd	Precipitation of wettest quarter, from monthly climatology (mm)	<a href="http://www.worldclim.org/bioclim">http://www.worldclim.org/bioclim</a>
Landscape Typology	Copernicus Global Land Service	Crops_CoverFraction	cropshare	Continuous	2018	0.00099 dd	Percentage cropland within local area (anonymizing region)	<a href="https://zenodo.org/record/3518038">zenodo.org/record/3518038</a>
Landscape Typology	WorldPop	WorldPop	popdensity	Categorical	2018	0.00083 dd	2018 Population Density (people per km <sup>2</sup> ), derived from Global High-resolution Population Denominators Project.	<a href="https://www.worldpop.org">https://www.worldpop.org</a>
Landscape Typology	IFPRI	IFPRI standardized AEZ based on elevation, climatology	ssa_aez09	Categorical		0.008333 dd	Agro-ecological zones created using WorldClim climate data and 0.0833dd resolution LGP data from IIASA.	<a href="http://harvestchoice.org/production/biophysical/agroecology">http://harvestchoice.org/production/biophysical/agroecology</a>

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Soil & Terrain	Slope (percent)	Slope (percent)	slopepct	Continuous		0.00833 dd	Derived from 90m SRTM, aggregated to 1km block	<a href="http://pubs.usgs.gov/of/2007/1188/">http://pubs.usgs.gov/of/2007/1188/</a> , data provided by USGS upon request
Soil & Terrain	NASA, USGS	SRTM 90m	srtm_1k	Continuous		0.00833 dd	Average elevation (m) within 1 km block	<a href="ftp://xftp.jrc.it/pub/srtmV4/arc_ascii/">ftp://xftp.jrc.it/pub/srtmV4/arc_ascii/</a>
Soil & Terrain	AfSIS	Topographic Wetness Index	twi	Continuous		0.000833 dd	Local upslope contributing area and slope are combined to determine the potential wetness index (see documentation for detail)	<a href="http://www.ciesin.columbia.edu/afsis/bafsis_fullmap.htm#">http://www.ciesin.columbia.edu/afsis/bafsis_fullmap.htm#</a>
Soil & Terrain	FAO	Harmonized World Soil Database	sq1	Categorical		0.083333 dd	Nutrient availability	<a href="http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/">http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/</a>
Soil & Terrain	FAO	Harmonized World Soil Database	sq2	Categorical		0.083333 dd	Nutrient retention capacity	<a href="http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/">http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/</a>
Soil & Terrain	FAO	Harmonized World Soil Database	sq3	Categorical		0.083333 dd	Rooting conditions	<a href="http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/">http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/</a>
Soil & Terrain	FAO	Harmonized World Soil Database	sq4	Categorical		0.083333 dd	Oxygen availability to roots	<a href="http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/">http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/</a>
Soil & Terrain	FAO	Harmonized World Soil Database	sq5	Categorical		0.083333 dd	Excess salts	<a href="http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/">http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/</a>
Soil & Terrain	FAO	Harmonized World Soil Database	sq6	Categorical		0.083333 dd	Toxicity	<a href="http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/">http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/</a>
Soil & Terrain	FAO	Harmonized World Soil Database	sq7	Categorical		0.083333 dd	Workability (constraining field management)	<a href="http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/">http://www.iiasa.ac.at/Research/LUC/External-World-soildatabase/HTML/</a>
Crop Season Parameters	NOAA CPC	ARC 2	anntot_avg	Continuous	1983-2019	0.1 dd	Average 12-month total rainfall (mm) for July-June	<a href="ftp://ftp.cpc.ncep.noaa.gov/fews/fews_data/africa/arc2">ftp://ftp.cpc.ncep.noaa.gov/fews/fews_data/africa/arc2</a>

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Crop Season Parameters	NOAA CPC	ARC 2	wetQ_avg	Continuous	1983-2019	0.1 dd	Average total rainfall in wettest quarter (mm) within 12month periods from July-June	<a href="ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2">ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2</a>
Crop Season Parameters	NOAA CPC	ARC 2	wetQ_avgstart	Continuous	1983-2019	0.1 dd	Average start of wettest quarter in dekads 1 to 36, where first dekad of July =1	<a href="ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2">ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2</a>
Crop Season Parameters	NOAA CPC	ARC 2	h2019_tot	Continuous	2018-2019	0.1 dd	12-month total rainfall (mm) in July-June, starting July 2018	<a href="ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2">ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2</a>
Crop Season Parameters	NOAA CPC	ARC 2	h2019_wetQ	Continuous	2018-2019	0.1 dd	Total rainfall in wettest quarter (mm) within 12-month periods starting July 2018	<a href="ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2">ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2</a>
Crop Season Parameters	NOAA CPC	ARC 2	h2019_wetQstart	Continuous	2018-2019	0.1 dd	Start of wettest quarter in dekads 1 to 36, where first dekad of July 2018 =1	<a href="ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2">ftp://ftp.cpc.ncep.noaa.gov/fews/fews data/africa/arc2</a>
Crop Season Parameters	NOAA CDR	NDVI v4	ndvi_avg	Continuous	1983-2019	0.05 dd	Long-term average NDVI value in primary growing season (highest quarter)	<a href="https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access">https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access</a>
Crop Season Parameters	NOAA CDR	NDVI v4	ndvi_max	Continuous	1983-2019	0.05 dd	Long-term maximum dekadal NDVI value in primary growing season (highest quarter)	<a href="https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access">https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access</a>
Crop Season Parameters	NOAA CDR	NDVI v4	h2019_ndvi_avg	Continuous	2018-2019	0.05 dd	Average NDVI value in primary growing season (highest quarter) in 2018-19	<a href="https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access">https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access</a>

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Crop Season Parameters	NOAA CDR	NDVI v4	h2019_ndvi_max	Continuous	2018-2019	0.05 dd	Maximum dekadal NDVI value in primary growing season (highest quarter) in 2018-19	<a href="https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access">https://www.ncei.noaa.gov/data/avhrr-land-normalized-difference-vegetation-index/access</a>
Coordinates	LSMS-ISA	GPS Latitude Modified	lat_mod	Continuous	2019		Coordinates of location, modified to preserve anonymity	
Coordinates	LSMS-ISA	GPS Longitude Modified	lon_mod	Continuous	2019		Coordinates of location, modified to preserve anonymity	
Coordinates	LSMS-ISA	IHPS GPS Coordinates	d_ihs3	Continuous	2019		Distance to baseline location (km)	

Table 2 PlotGeovariables\_Y4

Theme	Source	Dataset Title	Variable Name	Variable Type	Reference Period	Resolution	Description	Web
Plot Distance	LSMS-ISA	Plot Distance to household	dist_hh	Continuous		N/A	Plot distance to household in km	
Plot Soil & Terrain	USGS	Plot Slope (percent)	srtmslp_mwi	Continuous		0.000833 dd	Average slope, derived from 90m SRTM	<a href="http://pubs.usgs.gov/of/2007/1188/">http://pubs.usgs.gov/of/2007/1188/</a> , data provided by USGS upon request
Plot Soil & Terrain	USGS	Plot Elevation (m)	srtm_mwi	Continuous		0.000833 dd	Average elevation, derived from 90m SRTM	<a href="http://pubs.usgs.gov/of/2007/1188/">http://pubs.usgs.gov/of/2007/1188/</a> , data provided by USGS upon request
Plot Soil & Terrain	AfSIS	Plot Potential Wetness Index	twi_mwi	Continuous		0.000833 dd	Local upslope contributing area and slope are combined to determine the potential wetness index (see documentation for detail)	<a href="http://www.ciesin.columbia.edu/afsis/bafsis_fullmap.htm#">http://www.ciesin.columbia.edu/afsis/bafsis_fullmap.htm#</a>