

StatE0

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CLIMATE EXTREMES AND FOOD SECURITY IN MALAWI



Climate Extremes and Food Security in Malawi

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NORWEGIAN SPACE AGENCY

MAY 2026



Statistisk sentralbyrå
Statistics Norway

SDG 2: Zero Hunger



Food Security Statistics Project

Food consumption data from Household Consumption and Expenditure Surveys (HCESs) for Food Security Statistics

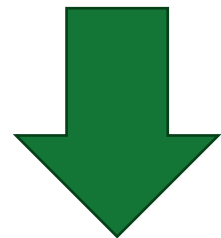


13 National Statistical Offices in Africa

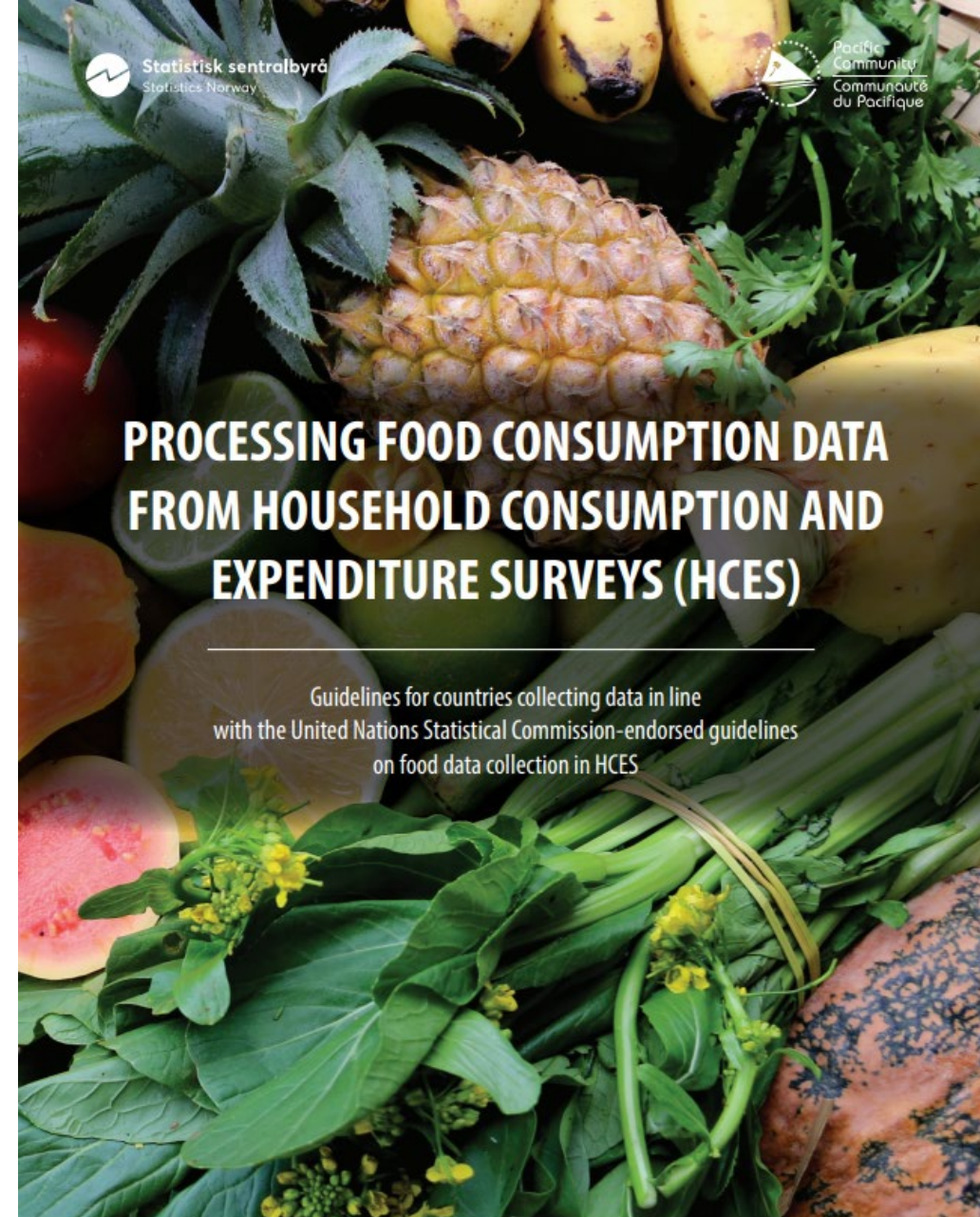


NSO Malawi

Malawi is especially vulnerable to climate extremes



Collaboration between **Statistics Norway** and
Norwegian Space Agency



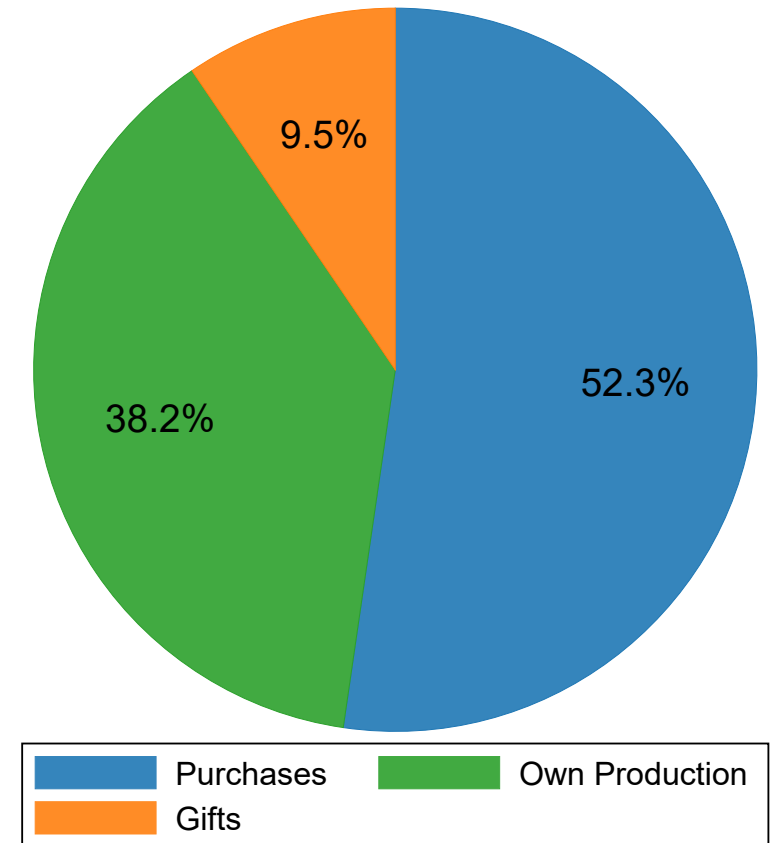
With the technical support of:



Food Security Data

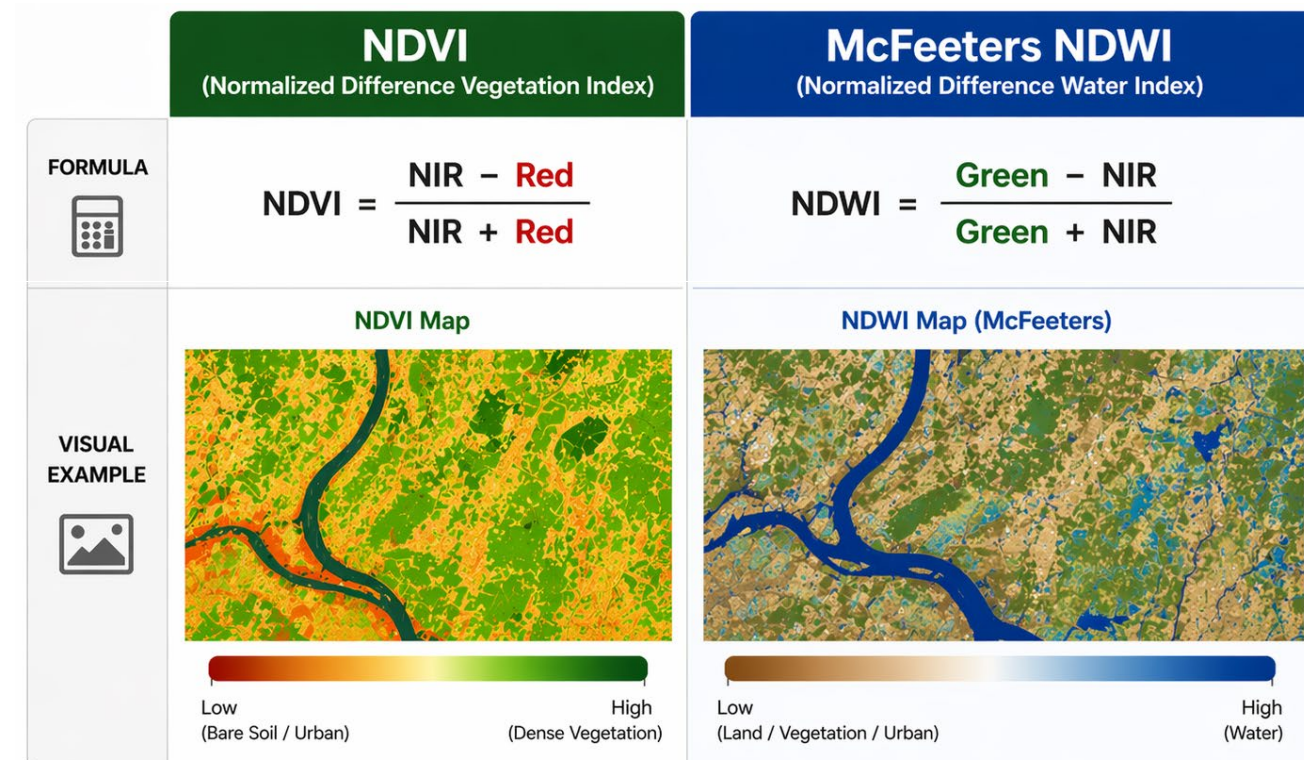
- Malawi Fifth Integrated Household Survey (IHS5)
 - Rural: 9,342 HHs across 586 Enumeration Areas (EA)
 - Data collected between April 2019 – April 2020
- Household data
 - Unknown distribution within households
 - Unknown waste and animal food
- Dependent variables
 - Share of total calories from own production
 - Share of total calories from purchase

Share of Calories by Source (rural)



Climate data based on Earth Observation

- **Source:** Copernicus Sentinel -2 Level 2A
- Normalized Difference Vegetation Index (-1/1): higher values healthier vegetation
- Normalized Difference Water Index (-1/1): positive values usually correspond to either high water content or a water surface
- Method: **one output** for each EA and quarter averaged in:
 - time (over all available images in each quarter with <40% cloud cover)
 - space (over all pixels in the EA)



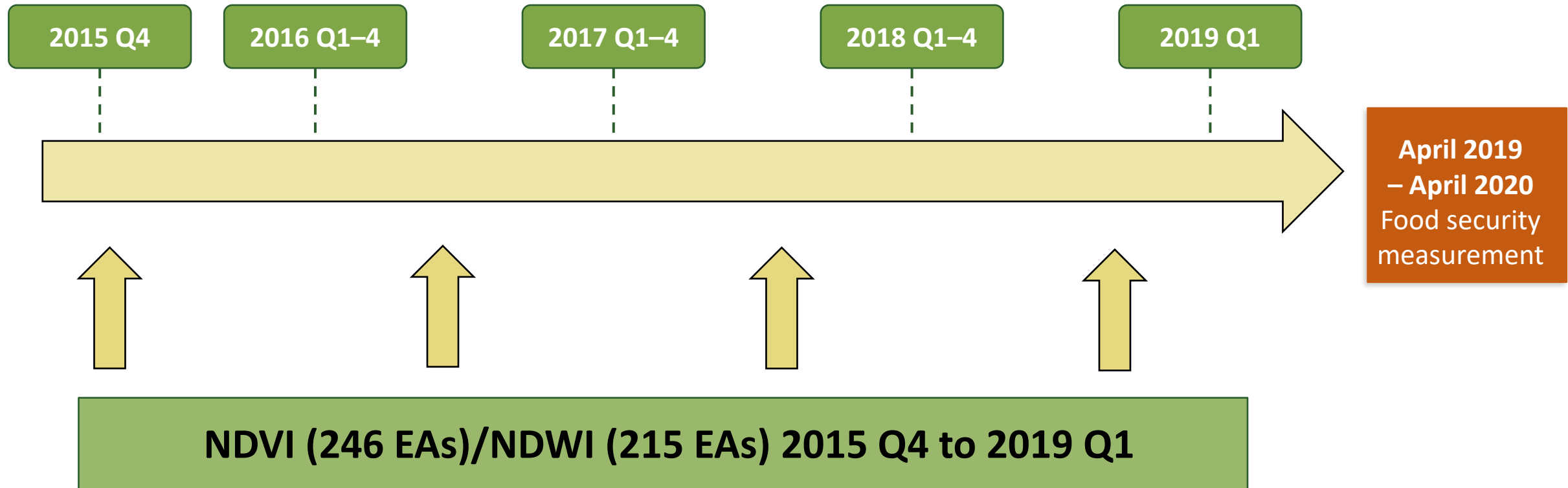
Sentinel-2 imagery
showing before and
during the 2019 flood in
Malawi

Observations during
flood:

- lower NDVI (less green)
- higher NDWI (more water)

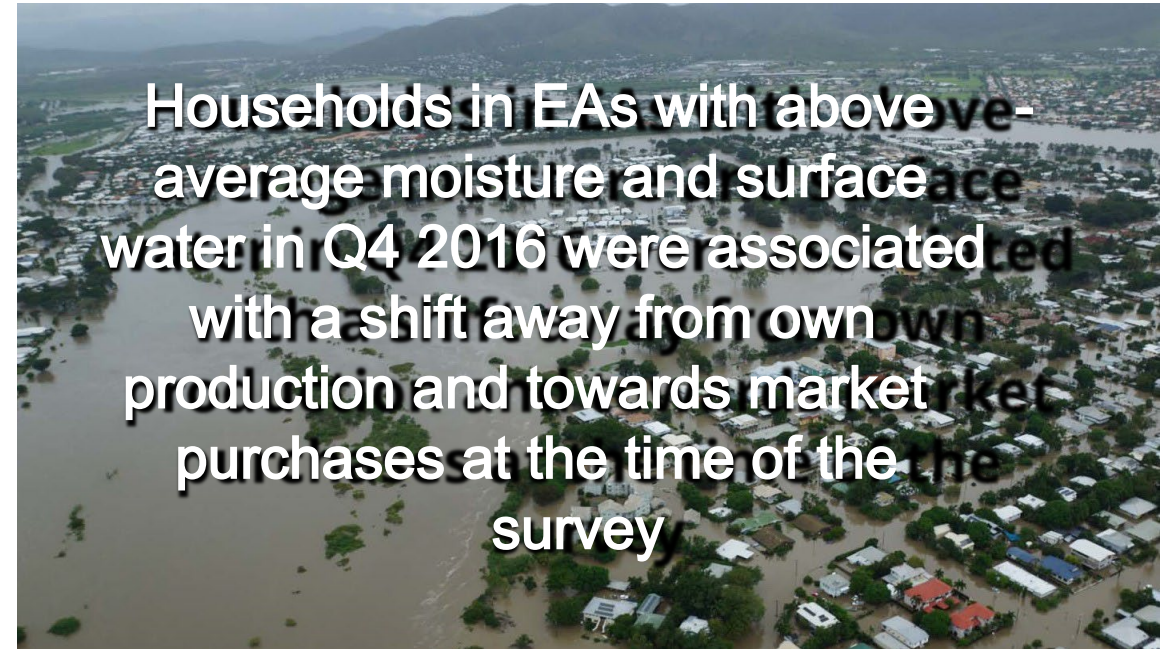
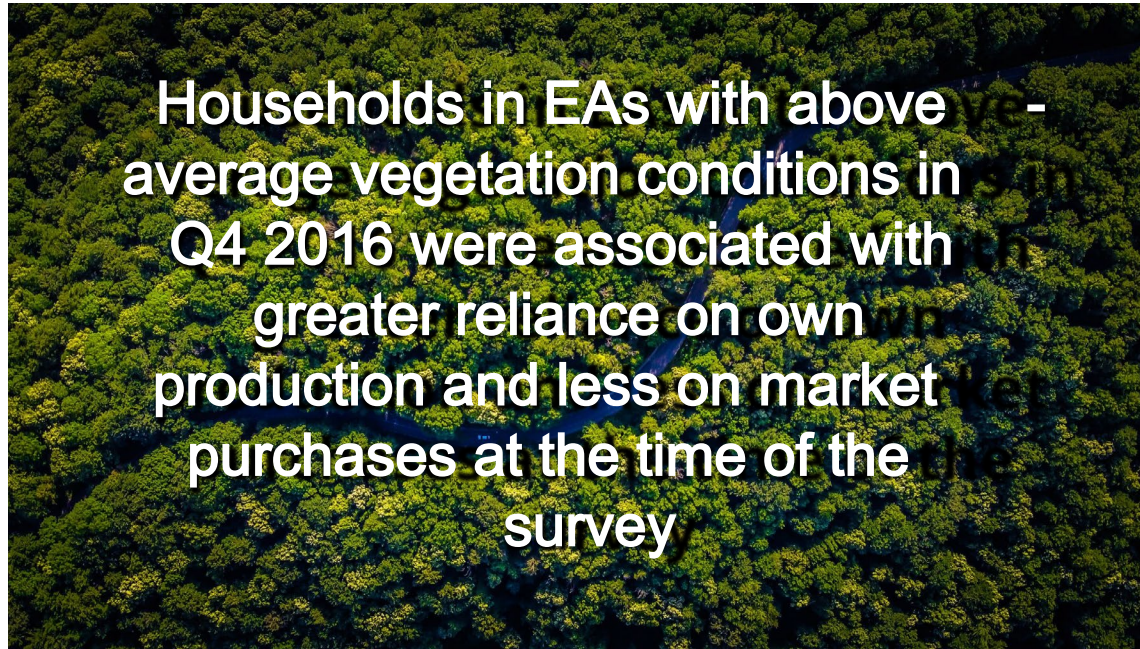


Analysis: Two Level Multilevel Regression Model



Are quarterly average variations in vegetation and moisture conditions across rural EAs up to three years prior to data collection associated with household food sourcing behaviour?

Preliminary Findings with a focus on Q4 2016

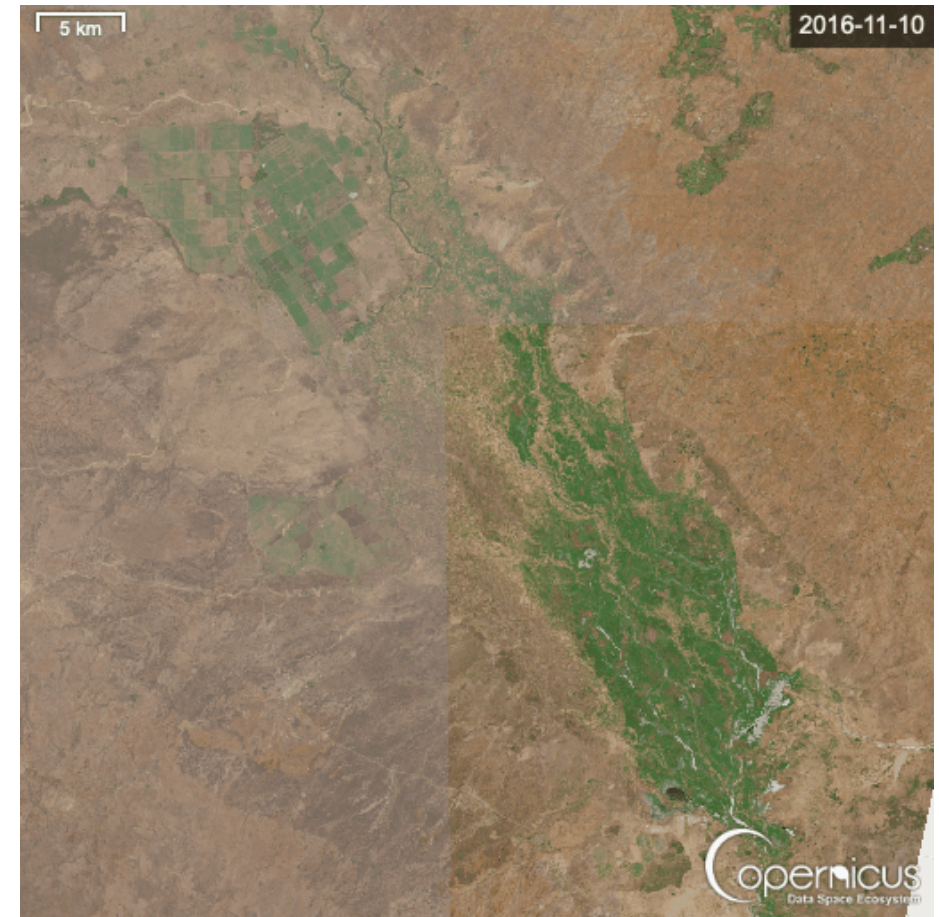


Opposing NDVI and NDWI results are not contradictory, they capture different conditions across EAs, suggesting notable climate variability in Q4 2016 with lasting impacts on household food sourcing behaviour.



Careful interpretation of results

- The observed associations do not necessarily imply causality
 - Confounders such as rainfall may drive both vegetation conditions and food sourcing behaviour simultaneously
 - Long observation period allows for other intervening factors to influence food sourcing behaviour
- The analysis captures quarterly climate variations through standardised deviations from average conditions, rather than explicitly targeting climate extremes



Future Work and Recommendations

- **Future work**

- Adjust models and apply robustness checks (e.g. longer time -series, incl. precipitation data, other household indicators)
- Discuss results with colleagues from NSO Malawi
- Finalise research article and publish in scientific journal

- **Recommendations**

- Importance of exploring the long -term impact of climate extremes and natural hazards on food security
- Importance and opportunities with combining data from various sources to inform policy and ensure targeted programmes to improve food security

Thank you!

Questions?

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