MODELLING EARLY RISK INDICATORS TO ANTICIPATE MALNUTRITION (MERIAM)

GLOBAL NUTRITION CLUSTER PREDICTIVE ANALYTICS WORKSHOP

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THE GRADUATE INSTITUTE GENEVA

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ACTION AGAINST HUNGER

AGENDA

1. Motivations & Aims
2. Methodology
3. Data
4. Results
5. Summary of Key Findings
6. Strengths and Limitations
7. Next Steps and Future Extensions

MERIAM

Modelling Early Risk Indicators to Anticipate Malnutrition

MOTIVATIONS & AIMS

- Decision-makers lack **timely, evidence-based** information on acute malnutrition that would allow them to act ahead of a crisis
- MERIAM's goal is to **identify, test, and scale up cost-effective means to improve the prediction and monitoring of acute malnutrition**, using open access secondary data
- Focus on climate- and conflict-affected regions
- MERIAM's methodology, employing two separate but complementary modelling approaches with different points of emphasis and levels of granularity, provides a **state-of-the-art way to account for sub-national variation and temporal dynamics**

METHODOLOGY

Literature Review and Needs Assessments

Validation of Existing State-of-the-Art (FEWS NET)

Computational Modelling

Evidence-driven model

- Seeded and calibrated with empirical data, with specific focus on household-level decisions on acute malnutrition
- Accounts for variation in household characteristics and local, contextual factors, as well as aggregate covariates at macro level
- Prototypes for: Karamoja, Uganda; West Pokot, Kenya; Hawd, Somalia; and Turkana, Kenya

Econometric Modelling

Subnational regional analysis

- Focus on GAM prevalence
- Aggregate regional-level factors
- Single model covering 29 countries

Multilevel analysis

- Focus on risk of individual child
- Select factors evaluated as leading indicators, alongside characteristics at multiple levels that are largely fixed
- Separate models for Kenya, Uganda, Mali, and Nigeria

Engagement, Dissemination, and Outreach

Scenario-Based Interactive Tool

DATA

Computational Modelling

Prototype	Data Source	Period	Frequency	Sample Size (Children)	Spatial Information	Malnutrition Measure	Relevance of Variables
Karamoja (Uganda)	ACF, 2013	2010-2012	8 rounds (every 3 months)	13,455 (17,696)	Parish level	WHZ MUAC	Malnutrition; behavioral; household characteristics
West Pokot (Kenya)	NDMA, 2017-2019	2016-2019	33 rounds (every month)	9,875 (10,199)	Ward level	MUAC	Malnutrition; behavioral; household characteristics
Hawd (Somalia)	FSNAU, 2019	2014-2018	10 rounds (twice a year)	8,390	District level	MUAC	Malnutrition; behavioral; household characteristics
Turkana (Kenya)	NDMA 2017-2019	2016-2019	33 rounds (every month)	10,548 (11,568)	Ward level	MUAC	Malnutrition; behavioral; household characteristics

Econometric Modelling

Subnational Regional Analysis

Variable	Data Source
Wasting prevalence	DHS, MICS, SMART
Precipitation	CHIRPS
Temperature	CHIRTS
Conflict	ACLED, GTD, SCAD, UCDP-GED
Vegetation	NDVI

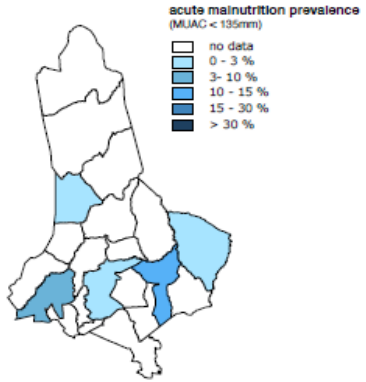
Multilevel Analysis

Variable	Data Source
WHZ	DHS
Precipitation	CHIRPS
Temperature	GMF
Conflict	ACLED, GTD, SCAD, UCDP-GED

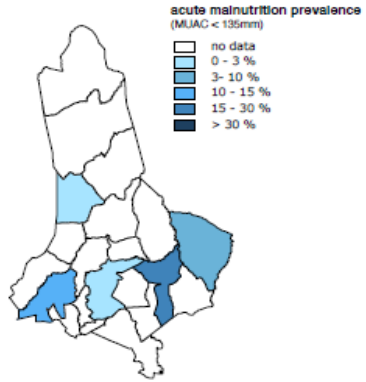
RESULTS

Computational Modelling

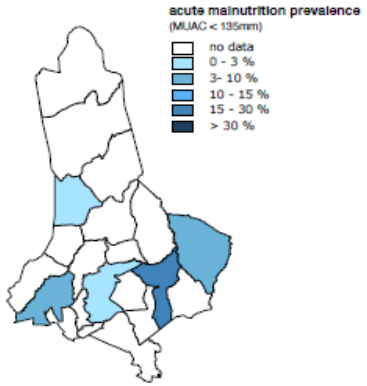
Baseline (June-September 2020)



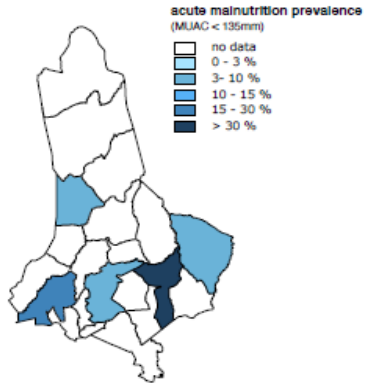
Climate Shock (June-September 2020)



COVID (June-September 2020)



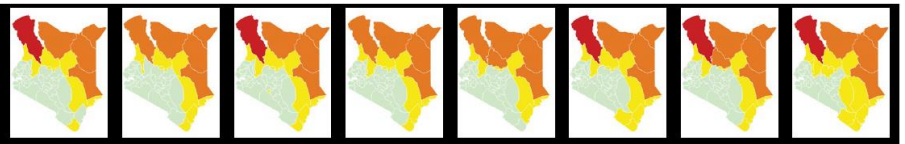
Climate + COVID (June-September 2020)



Econometric Modelling

KENYA

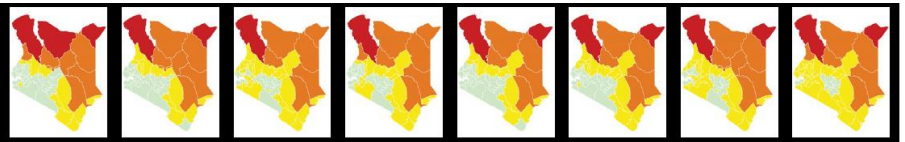
MERIAM BASELINE FORECASTS OF CHILD ACUTE MALNUTRITION PREVALENCE RATES (6-59 MONTHS)



County	Region	Forecast	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21
		High	9.7	7.2	7.2	9.4	7.7	7.1	10.6	10.2
Kisii	Nyanza	Best Estimate	4.3	3.8	4.1	4.1	3.9	3.8	3.9	3.9
		Low	1.9	1.7	2.2	2.1	1.7	1.8	1.7	1.7

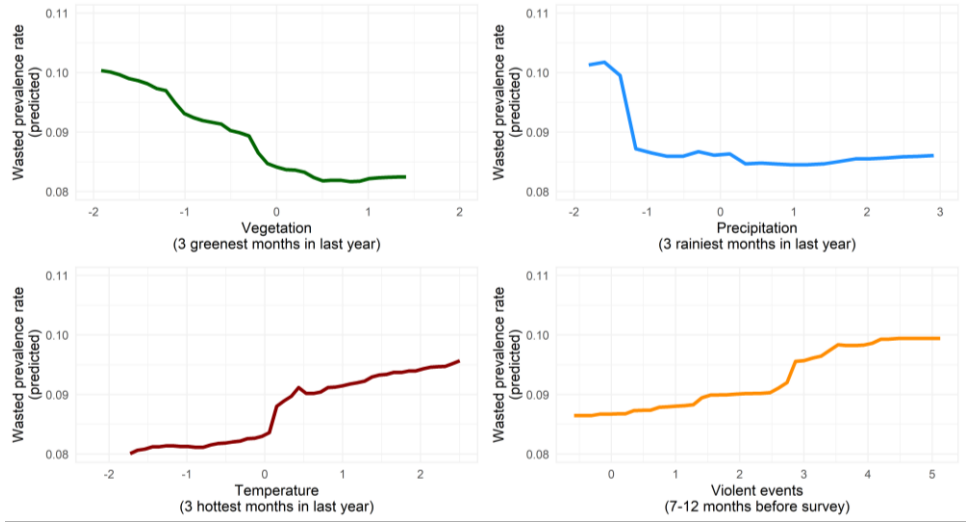
KENYA

MERIAM SCENARIO-BASED FORECASTS OF CHILD ACUTE MALNUTRITION PREVALENCE RATES (6-59 MONTHS)



County	Region	Forecast	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21
		High	10.2	10.0	10.6	10.2	9.5	10.3	10.6	10.5
Kisii	Nyanza	Best Estimate	5.2	4.8	5.3	5.4	4.8	5.2	5.3	5.6
		Low	1.6	2.0	1.9	2.2	1.8	1.9	1.7	2.1

(b) 6 month lead



SUMMARY OF KEY FINDINGS

Open-source data can be used to predict acute malnutrition
Solid, consistent performance achieved vis-à-vis diagnostic metrics and state-of-the-art benchmarks
Results are robust across methodologies and models
Early warning can be extended from 1 month up to 6-8 months with minor loss of performance
Climate and conflict factors established as leading indicators
Analytical frameworks apply effectively to multiple priority countries (and beyond)
Results translatable to practical tools
Results meet needs of stakeholders
Further validation remains ongoing

STRENGTHS AND LIMITATIONS

STRENGTHS
Focus on acute malnutrition
Prediction → early warning applications
Assessment of leading indicators
Multiple modelling methodologies
Multiple levels of analysis
Strong, consistent, robust performance
Reliance on existing data
User-centered design

LIMITATIONS
Data: availability, coverage, resolution, accuracy
Restricted to countries in sub-Saharan Africa
Not all findings link to specific practical interventions

NEXT STEPS AND FUTURE EXTENSIONS

NEXT STEPS

- Finish analyses
- Complete development of tools
- Publication of findings
- Iterations of engagement with stakeholders
- Build out strategies for sustainability

FUTURE EXTENSIONS

- Broaden and deepen scope of analysis and validation
- Enhance elements of decision-making support
- Develop protocol and technologies of low-cost data collection
- Institutionalization of MERIAM products into existing early warning systems

THANK YOU

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