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Gender, Climate, and Nutrition Integration Initiative (GCAN): Nigeria Mission Presentation

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PRESENTATION OUTLINE

- What is GCAN?
- Near-term climate change results
- Aflatoxin under climate change
- Why we need to be concerned about food prices
- GCAN checklist
- Qualitative fieldwork

WHY DO WE CARE ABOUT GENDER AND NUTRITION IN THE CONTEXT OF CLIMATE CHANGE?

- Ensure social inclusion and gender equality: *who is adopting and benefitting from CSA and who is not?*
- Mitigate potential harm: *how can we catch and reduce unintended negative consequences related to gender and nutrition?*
- Enhances CSA effectiveness and impact: *How can we maximize the contribution of both men and women?*
- Achieve co-benefits/other development outcomes: *how will CSA maximize nutrition benefits through health, diets, and care?*

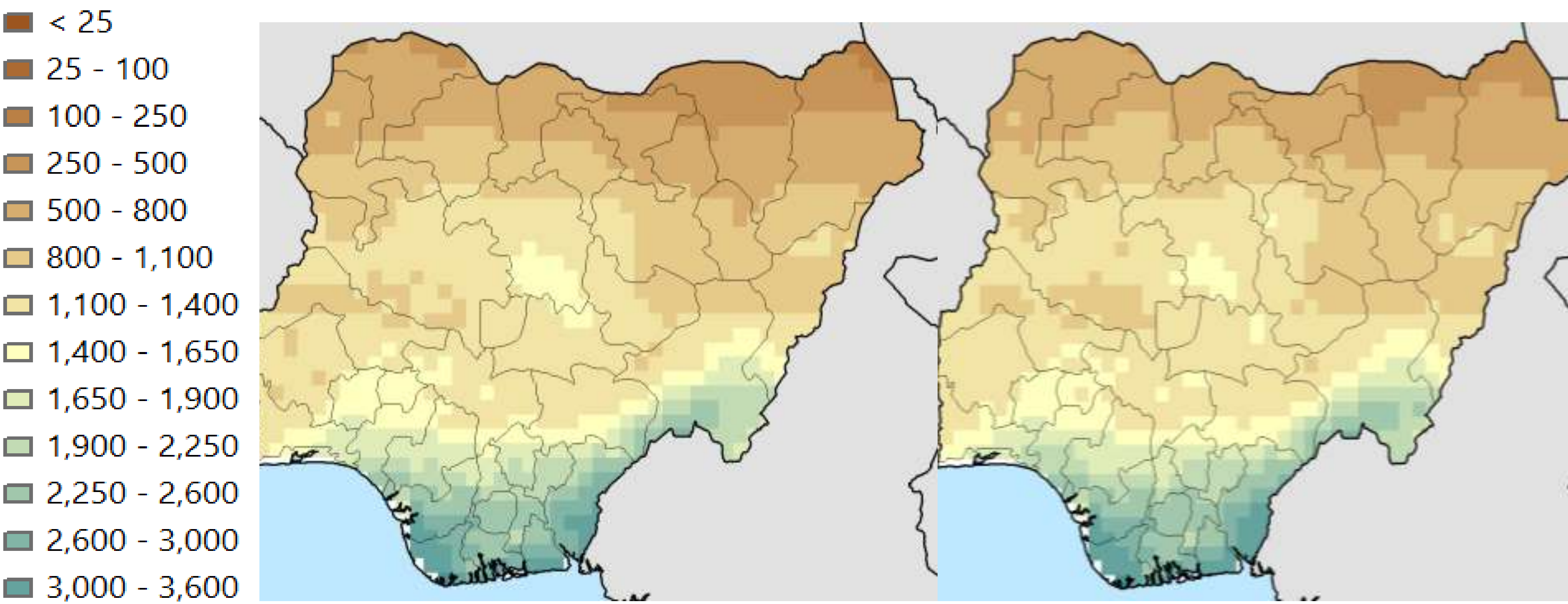
GCAN ACTIVITIES

- **Objective:** Support FTF focus countries to understand and use climate data for climate-smart agriculture (CSA) programming that integrates nutrition and gender for increased resilience under the Global Food Security Strategy
- **Activities include:**
  1. Framework and tools for understanding conceptually the structural connections among climate change, CSA, gender and nutrition.
  2. Research and knowledge management to help answer missions' priority questions related to climate, gender, and nutrition
  3. Enhanced use of FTF open data, including mapping

NEAR TERM CLIMATE CHANGE ASSESSMENT

- **Methodology:** regress pixel-level data of various rainfall statistics to determine whether rainfall patterns are shifting in Nigeria: a) change in annual rainfall levels; and b) change in variability, and c) assessment of onset date
- **Source:** CHIRPS data (historic: 1981-2017)
- **Projections:** Using regression analysis to project from mean 1981-2017 values to 2025

MEAN ANNUAL RAINFALL, 1981-2017 & PROJECTED 2025



Average 1981-2017

Projected 2025

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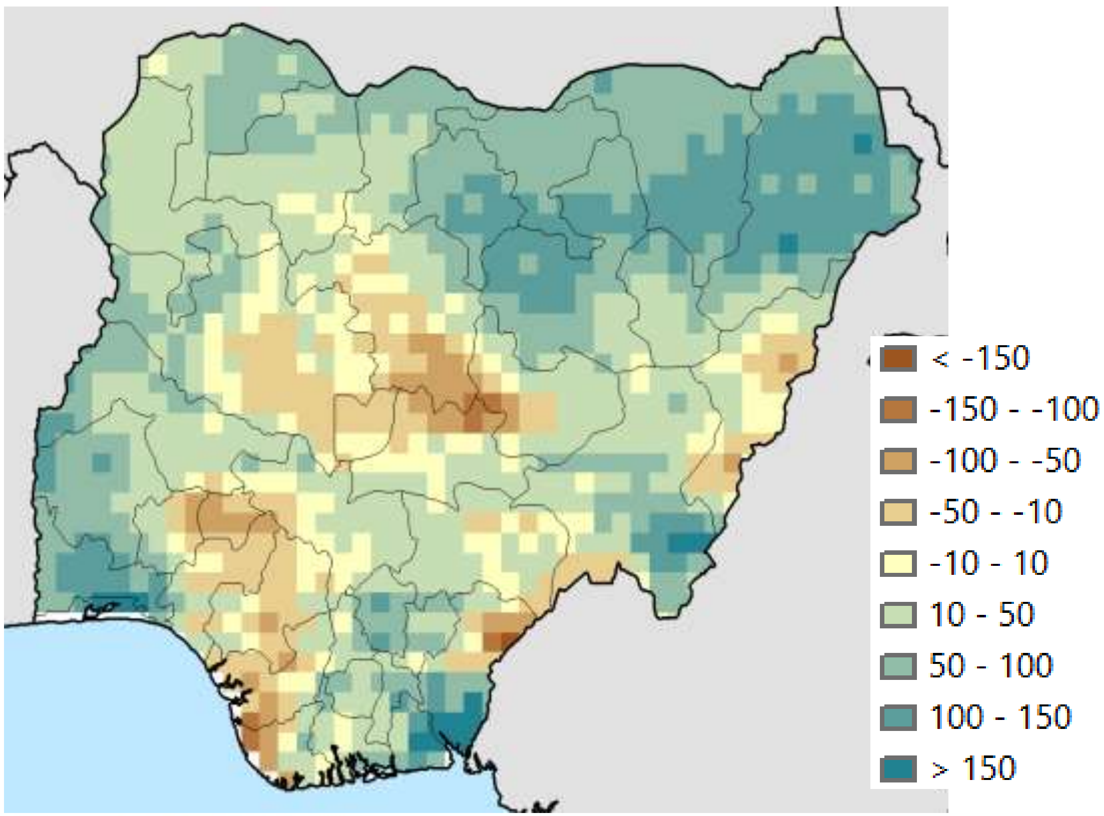
NEAR-TERM PROJECTED CHANGES IN ANNUAL RAINFALL, 1999-2025



The trend is particularly certain in the Northeast area (i.e. increased precipitation levels)

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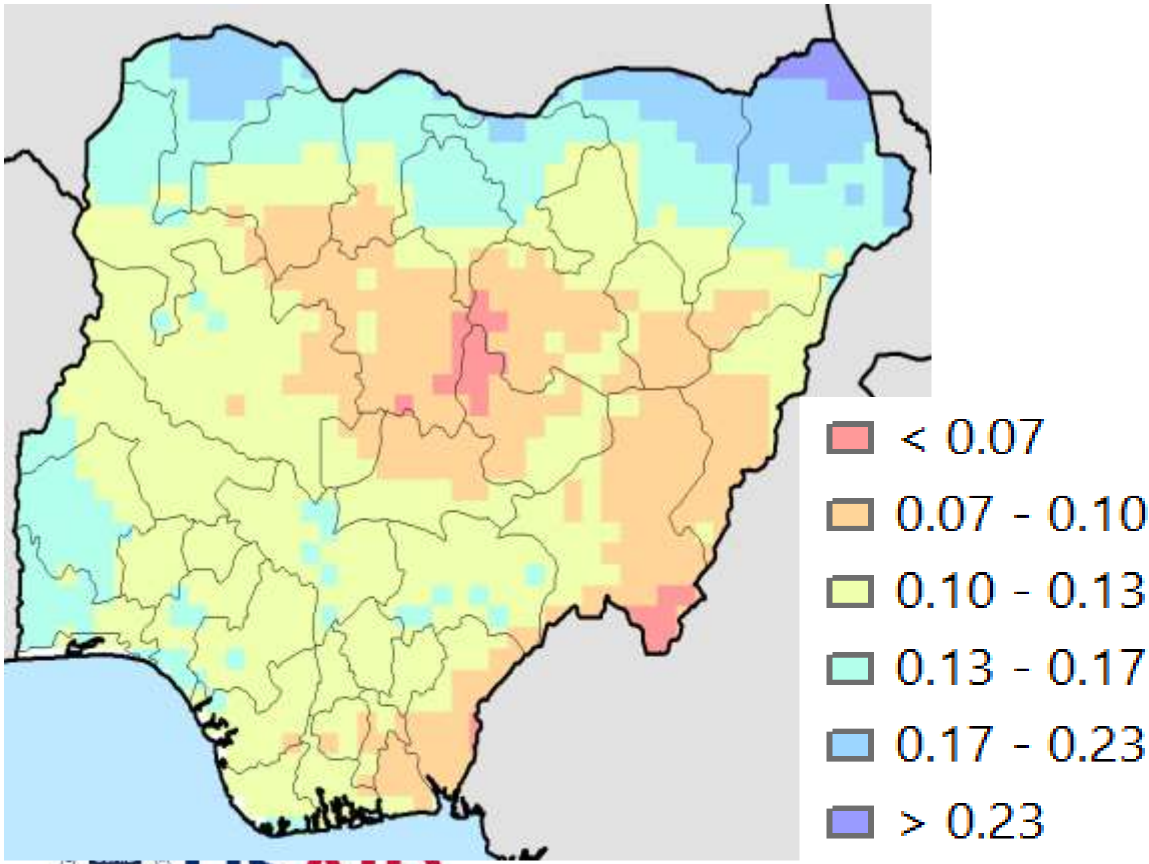
VARIABILITY OF RAINFALL, 1981-2017

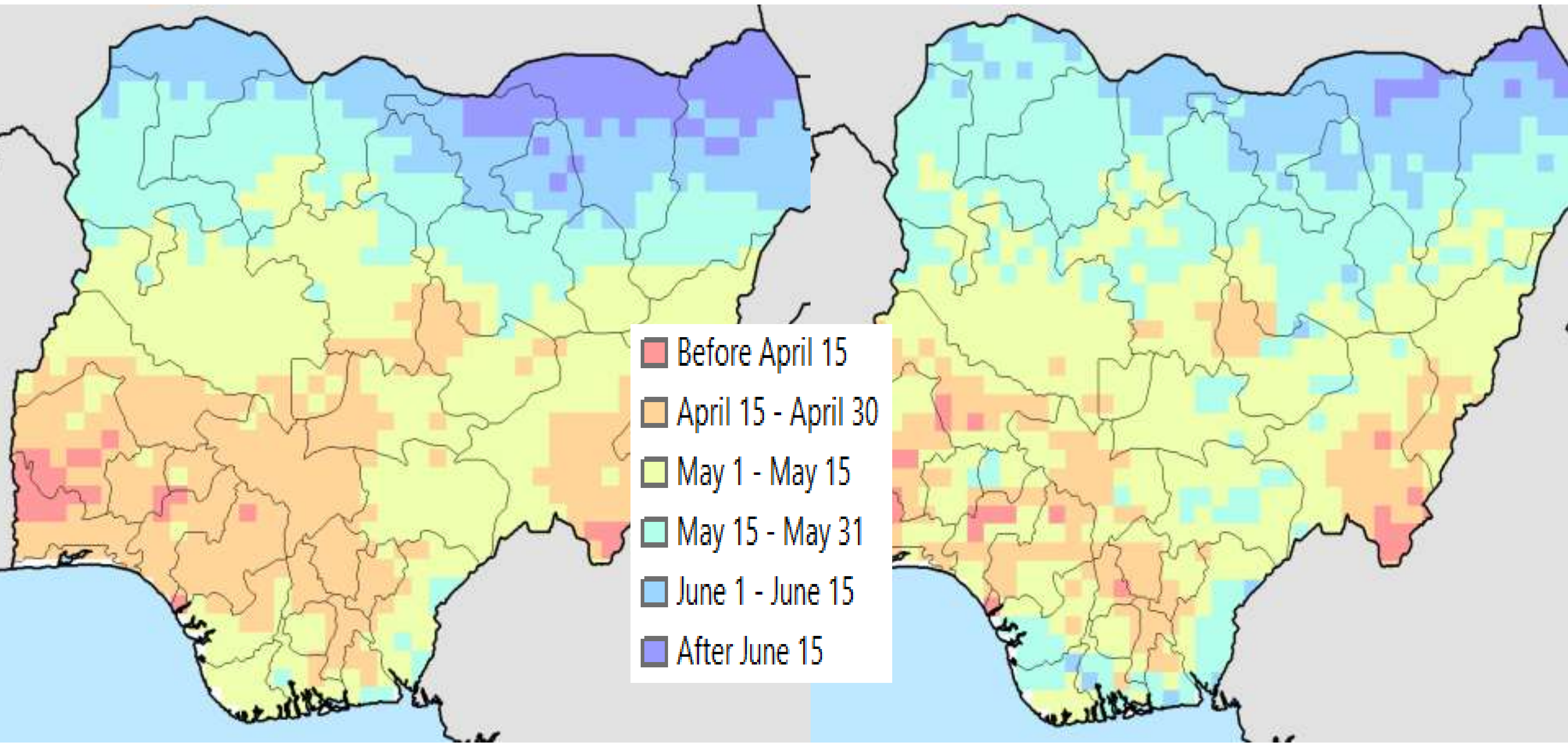


High variation in parts of the northeast, small variation in the center, some increase and some decrease in variance over time, not geographically consistent

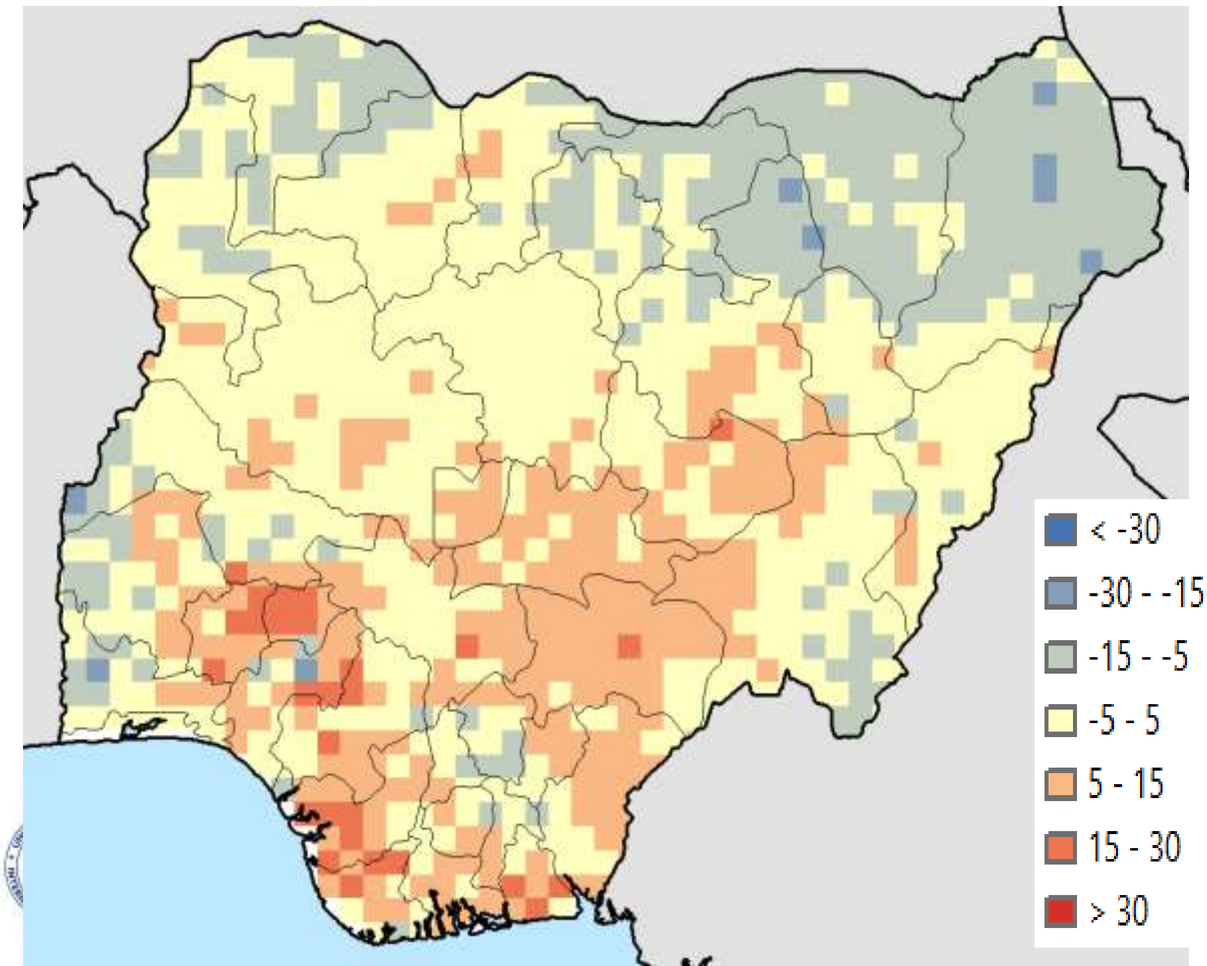
ONSET OF RAINFALL, 1981-2017 & PROJECTED 2025

Average 1981-2017

Projected 2025



PREDICTED CHANGE IN ONSET OF RAINFALL, TO 2025

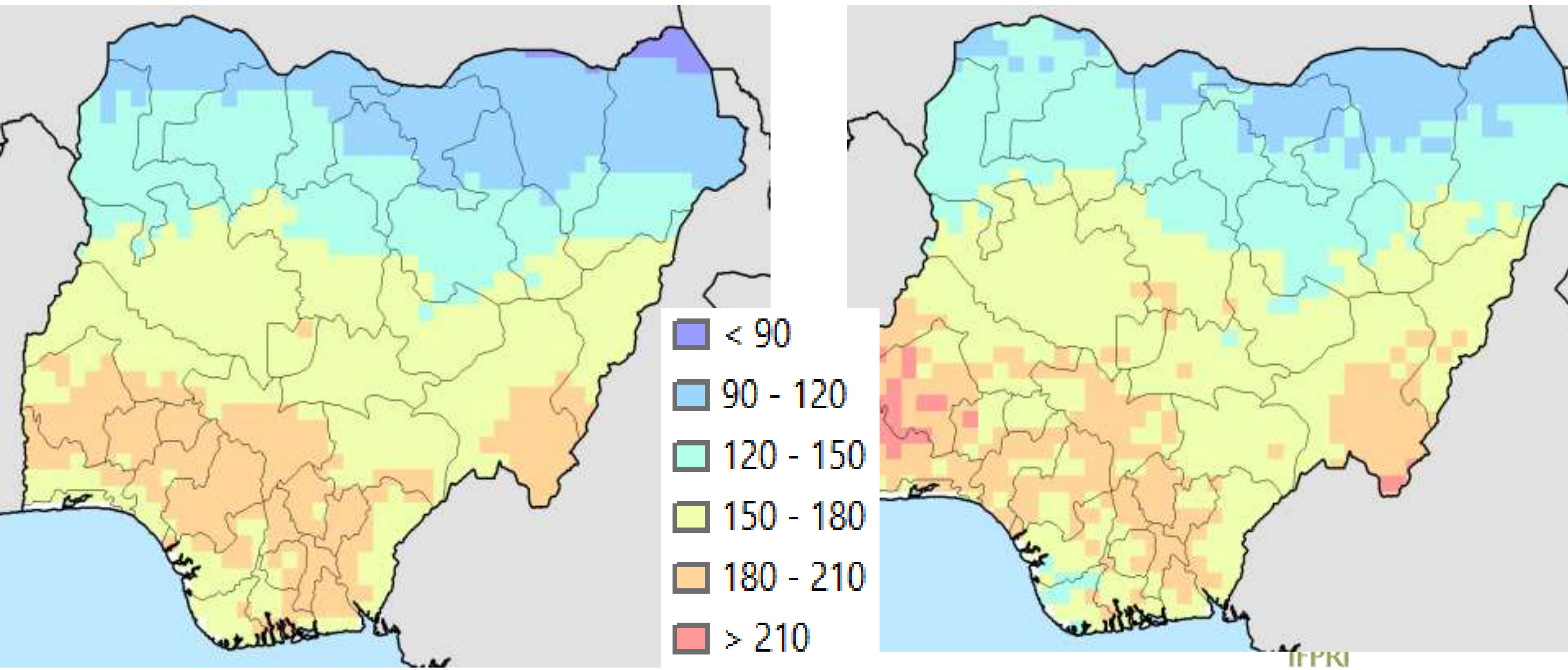


Change in predicted onset date—very low statistical significance

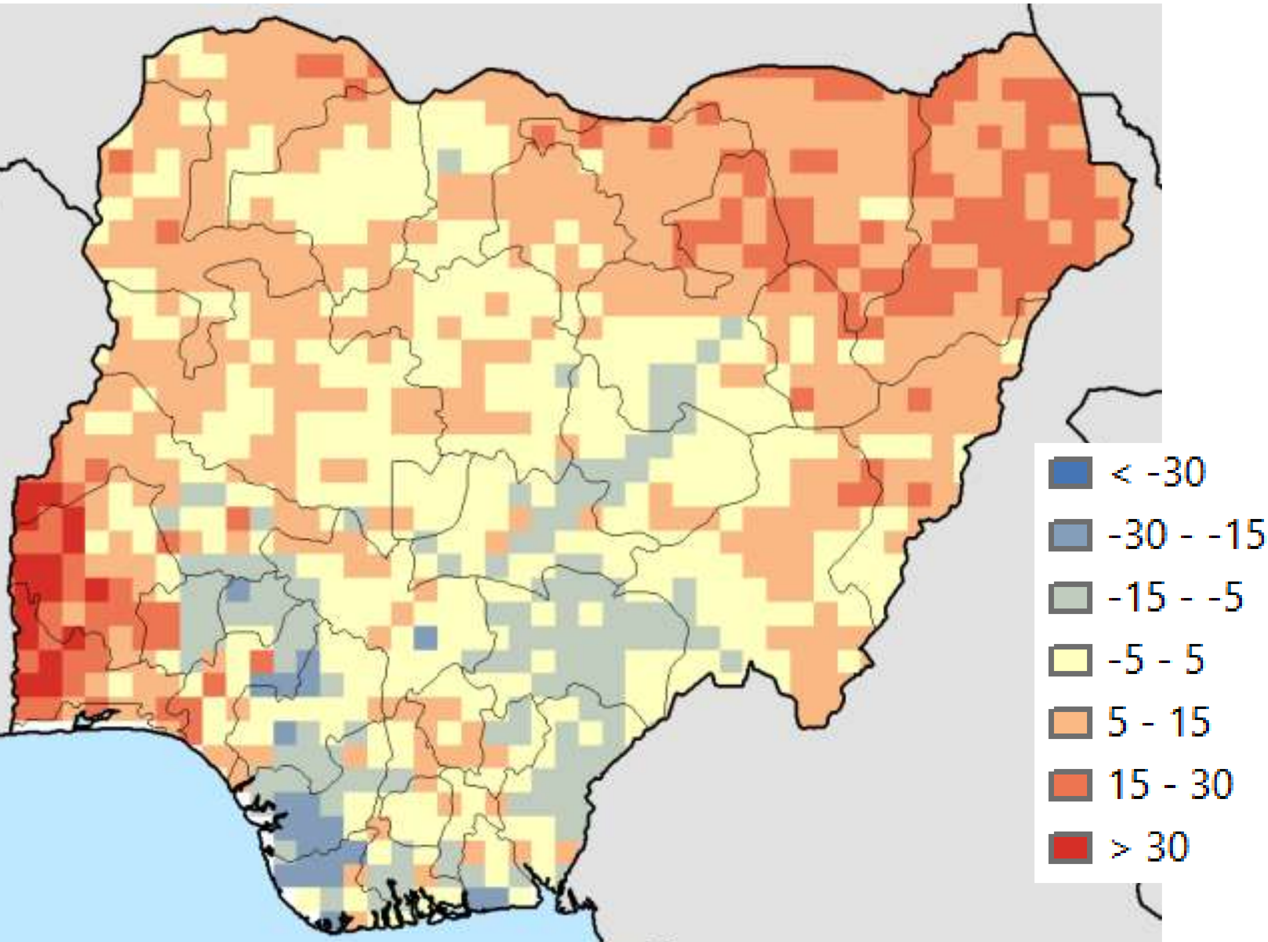
LENGTH OF GROWING SEASON, 1981-2017 & PROJECTED 2025

Average 1981-2017

Projected 2025



PREDICTED CHANGE IN LENGTH OF RAINY SEASON, TO 2025



Northeast and Southwest gain by 5-30 days, other parts stay the same or lose up to 5 days, statistically significant for NE

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SUMMARY

- Increase in precipitation levels in Northeast region
- Some reduction in variation in Northeast region
- Earlier onset and increased length of rainy season in Northeast
- Increased length of rainy season also in Southwest
- Need for appropriate crop selection for slightly wetter climates in Northeast and parts of Northwest
- Need for infrastructure review regarding a wetter future in the NE region

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Aflatoxins and Climate Change:
Preliminary Results from New Biophysical Model for Groundnut/Maize and Selected FTF Countries

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BASIC INFORMATION ON AFLATOXINS

- Aflatoxins are fungal metabolites mainly produced by Aspergillus flavus and Aspergillus parasiticus
- Regarding groundnuts, Sanders et al. (1985) reported that the conditions conducive to pre-harvest contamination of aflatoxins are 20 to 30 days of drought stress with soil temperatures between 28.0 and 30.5^{0}C
- In addition to dryness and heat, insect damage also causes higher levels of contamination

WHY WE CARE ABOUT AFLATOXINS -1

- High levels of aflatoxin contamination affect animal health, growth, and productivity
- Aflatoxin contamination keeps African farmers from exporting to the United States and Europe
- Aflatoxins are not destroyed in cooking processes or milk treatment processes

WHY WE CARE ABOUT AFLATOXINS - 2

- They contaminate foods (maize, groundnuts, and others) that make up a large share of a typical African diet
- Aflatoxin exposure has been associated with childhood stunting, which itself is linked with a host of adverse effects
- They increase the rate of liver cancer
- High levels of contamination lead to aflatoxin poisoning, which can cause death

ACTIVITIES

- IFPRI and the University of Florida have developed and tested 2 models (one for groundnuts and one for maize) which use weather to predict aflatoxin concentration levels
- Asked to focus on 5 countries: Niger, Burkina Faso, Nepal, Guatemala, and Honduras. *Added Nigeria*.
- Our immediate application is to anticipate how climate change will affect aflatoxin levels
- This could potentially be developed as an early warning tool for aflatoxin outbreaks, and could be used to identify hotspots

DSSAT CROP MODEL

- Simulates the growth of a given crop one day at a time
- Takes daily inputs of temperature, precipitation, and solar radiation
- Accounts for fertilizer input and farming methodologies including planting date, spacing and plant population
- Keeps track of soil temperature, soil nutrients, and moisture, at multiple layers
- Determines yield as well as weight of residue portion
- Calibrated for 30 different crops

NEW AFLATOXIN MODULES INSIDE DSSAT FOR PEANUT & MAIZE ONLY

- Run seamlessly with the DSSAT model
- Outputs aflatoxin concentration and share infection
- Peanut: Prediction of aflatoxin contamination is highly dependent on the prediction of **soil temperature, crop water stress, and pod-zone soil water status**
- Maize: Prediction of aflatoxin contamination is highly dependent on **air temperature and predicted crop water stress**

METHODOLOGY

- Using DSSAT, computed yields and aflatoxin concentrations for groundnuts and maize at each 5 minute pixel (approximately 9 kilometers)
- Simulated 30 different weather realizations under each climate
- Used the baseline of 1960-1990 and 5 CMIP5 GCMs from the AgMIP GGCMI under RCP8.5
- Computed changes at the pixel level
- Also aggregated pixel values to the national level using SPAM harvested area as weights
- Can aggregate to FTF Zones of Influence, if desired

SUMMARY OF RESULTS

GROUNDNUTS: SHARE OF HARVESTED AREA WITH AFLATOXIN CONCENTRATION OVER 4 PPB

Country	Baseline, 1960-1990	With climate change in 2050			Percentage point difference, baseline to 2050		
		Median	Min	Max	Median	Min	Max
Burkina Faso	38.8%	34.3%	3.8%	42.7%	-4.5%	-35.0%	3.9%
Niger	55.7%	60.6%	29.7%	85.4%	4.9%	-26.0%	29.7%
Nigeria	13.9%	15.7%	5.4%	25.8%	1.8%	-8.5%	11.9%

MAIZE: PERCENT OF HARVESTED AREA WITH AFLATOXIN CONCENTRATION OVER 4 PPB

Country	Base-line, 1960-1990	With climate change in 2050			Percentage point difference, baseline to 2050		
		Medi-an	Min	Max	Medi-an	Min	Max
Burkina Faso	7.6%	16.3%	2.3%	22.1%	8.7%	-5.3%	14.5%
Niger	42.8%	48.2%	1.5%	62.1%	5.4%	-41.3%	19.3%
Nigeria	10.9%	19.5%	12.3%	24.4%	8.6%	1.4%	13.5%
Guatemala	4.4%	15.9%	6.0%	28.8%	11.5%	1.6%	24.4%
Honduras	9.5%	41.8%	11.4%	46.1%	32.3%	1.9%	36.6%
Nepal	0.2%	1.0%	0.6%	7.2%	0.8%	0.4%	7.0%

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PERCENT CHANGE IN YIELD DUE TO CLIMATE CHANGE, 1960-1990 TO 2050, GROUNDNUTS AND MAIZE

Groundnuts

Country	Percentage change, baseline to 2050		
	Medi-an	Min	Max
Burkina Faso	-17.2%	-23.9%	8.6%
Niger	-21.1%	-41.9%	54.4%
Nigeria	-17.9%	-19.9%	-4.7%

Maize

Country	Percentage change, baseline to 2050		
	Medi-an	Min	Max
Burkina Faso	-17.4%	-22.9%	-2.6%
Niger	-29.1%	-35.5%	0.1%
Nigeria	-12.3%	-15.2%	-4.9%
Guatemala	-8.3%	-14.6%	-2.8%
Honduras	-23.4%	-34.3%	-12.5%
Nepal	-16.1%	-34.7%	-8.9%

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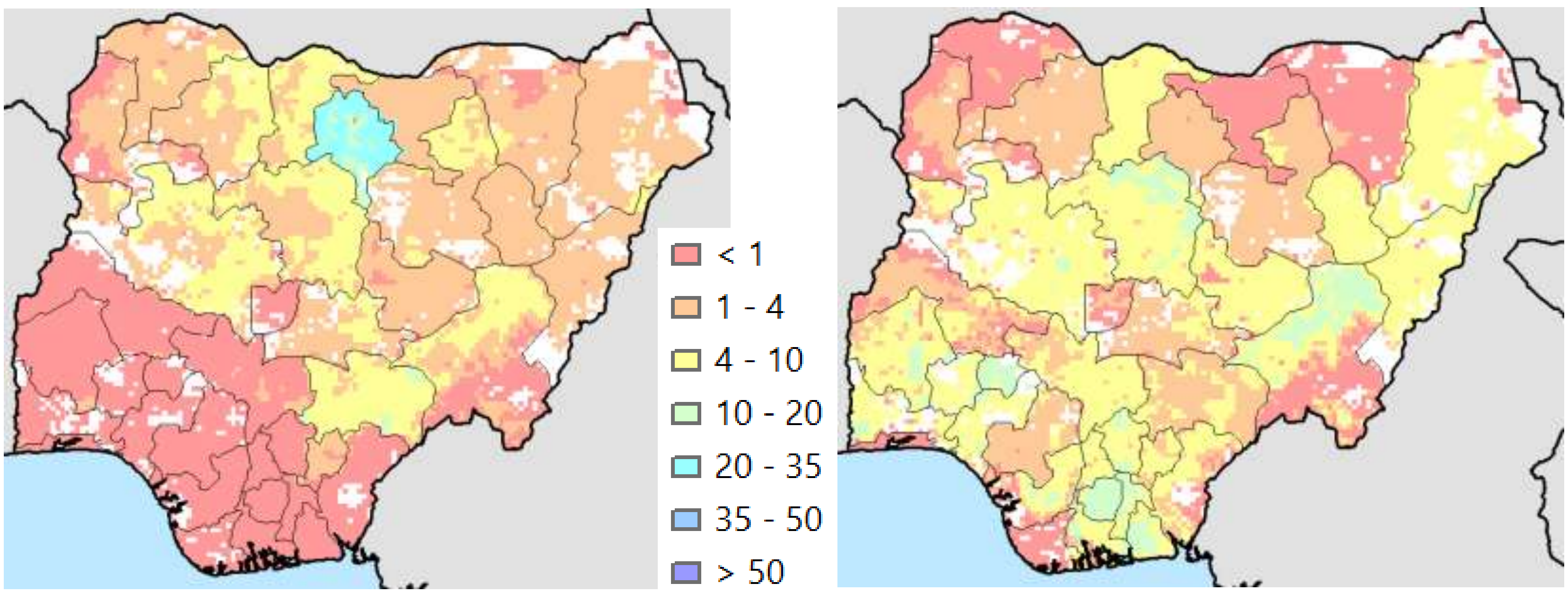
SHARE OF GROUNDNUTS AND MAIZE IN TOTAL LAND AREA

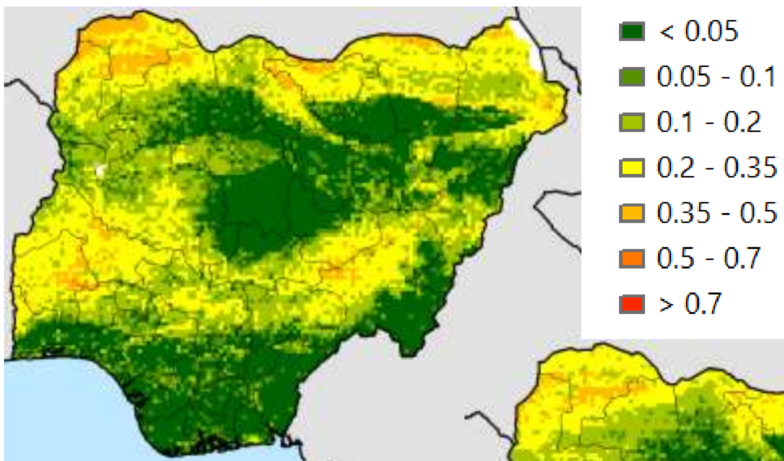
Groundnuts **Maize**



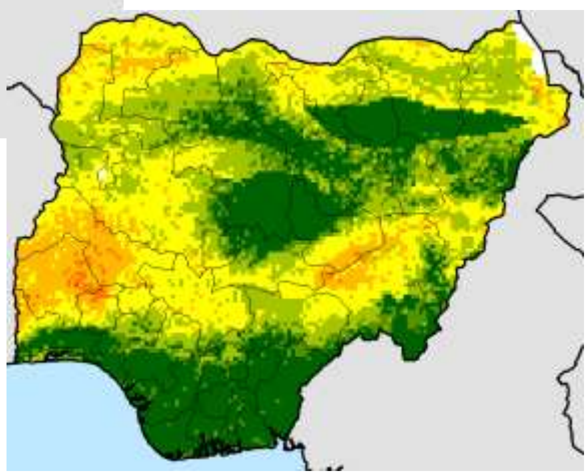
Source: SPAM (You et al. 2014).

SHARE OF YEARS FOR WHICH GROUNDNUT AFLATOXIN LEVELS ARE OVER 4 PPB UNDER BASELINE CLIMATE AND 2050 CLIMATE

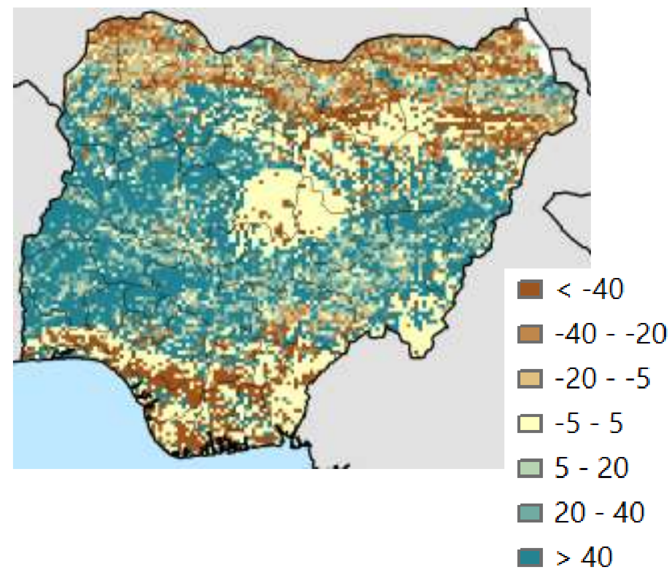
Baseline (1960-1990)



Median of 5 GCMs in 2050

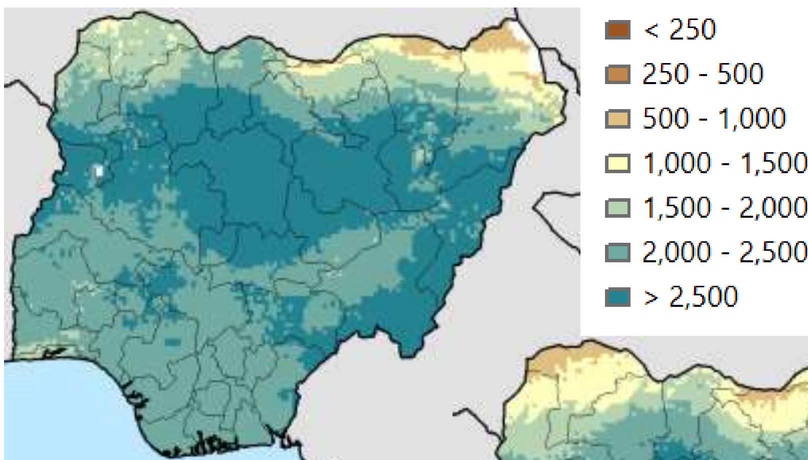


Percent change between baseline and 2050

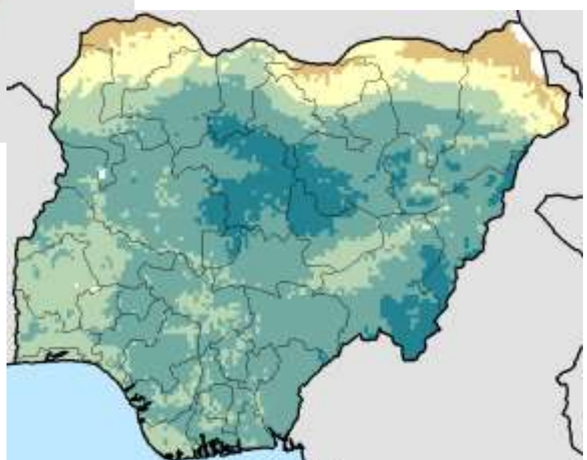


GROUNDNUT YIELD UNDER BASELINE CLIMATE AND 2050 CLIMATE

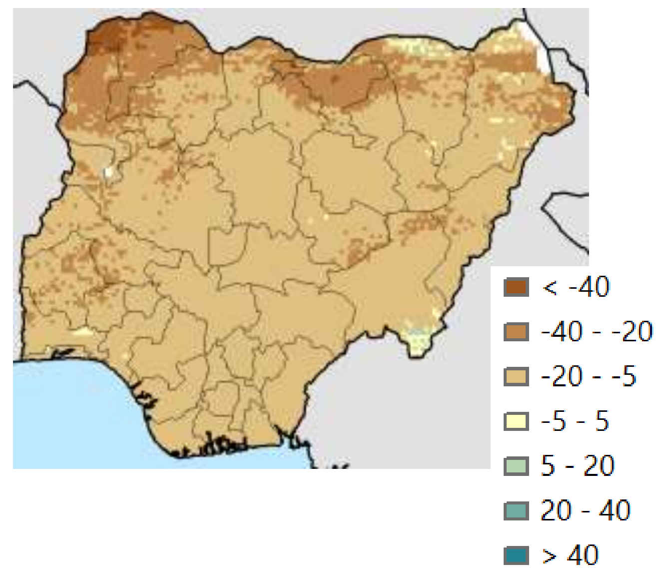
Baseline yield, 1960-1990 (kg/hect)



Median of 5 GCMs in 2050



Percent change between baseline and 2050



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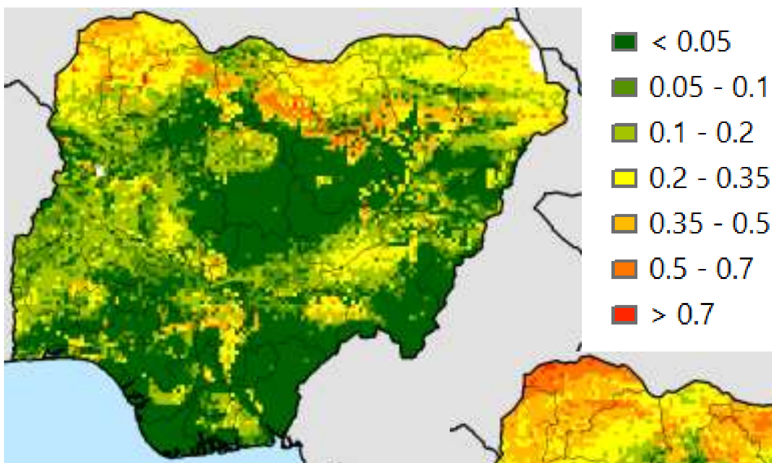
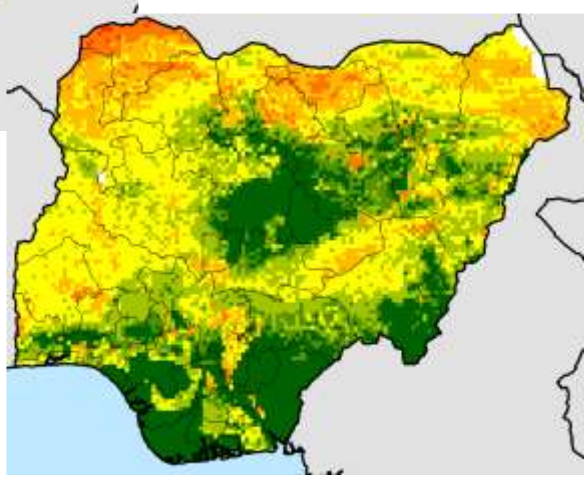
SHARE OF YEARS FOR WHICH MAIZE AFLATOXIN LEVELS ARE OVER 4 PPB UNDER BASELINE CLIMATE AND 2050 CLIMATE

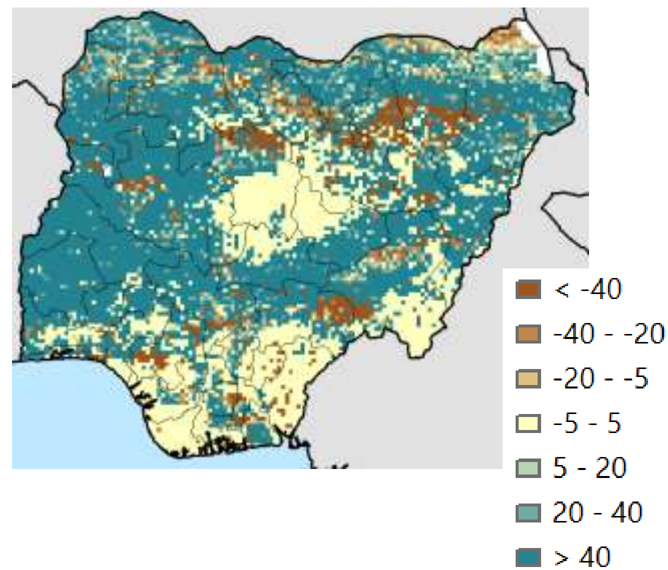
Baseline (1960-1990)



Median of 5 GCMs in 2050



Percent change between baseline and 2050



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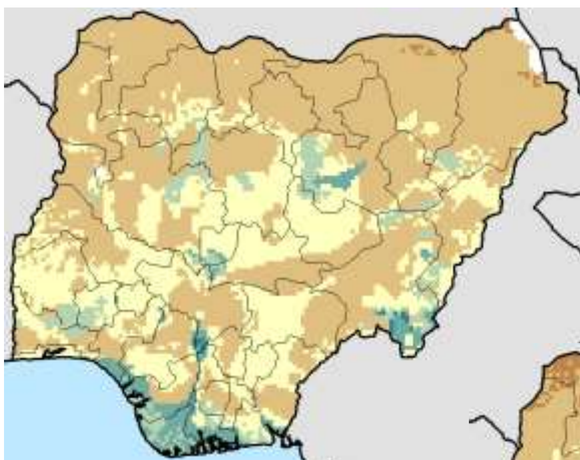
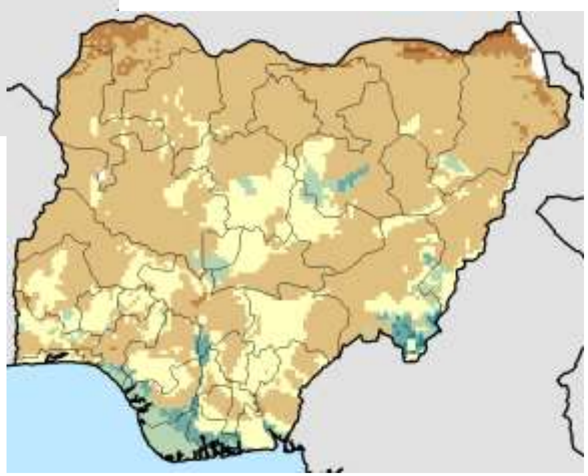
MAIZE YIELD UNDER BASELINE CLIMATE AND 2050 CLIMATE

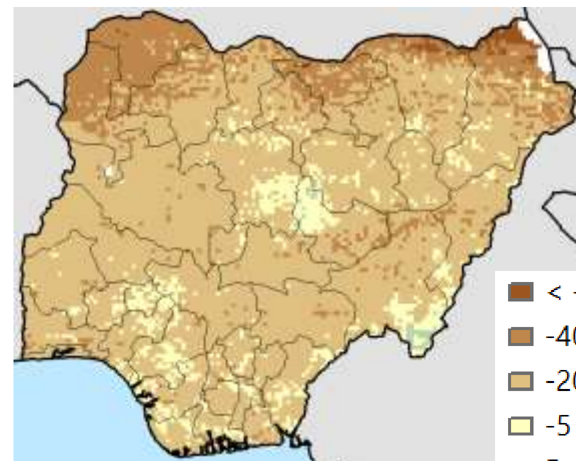
Baseline yield, 1960-1990 (kg/hect)



Median of 5 GCMs in 2050



Percent change between baseline and 2050



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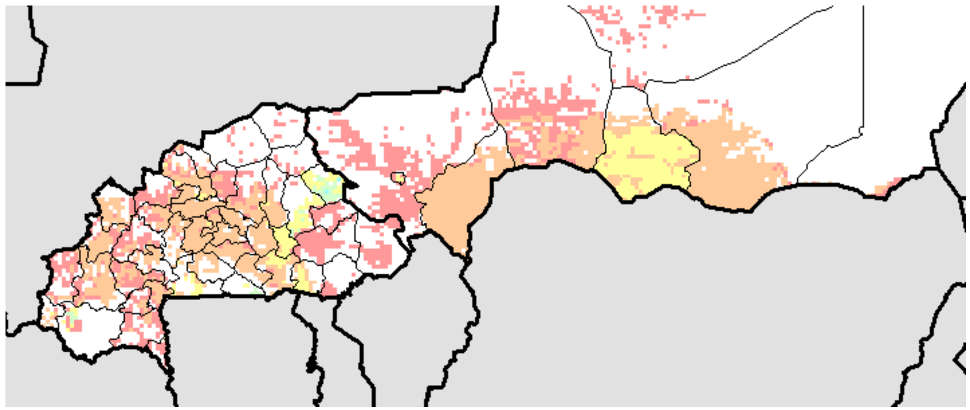
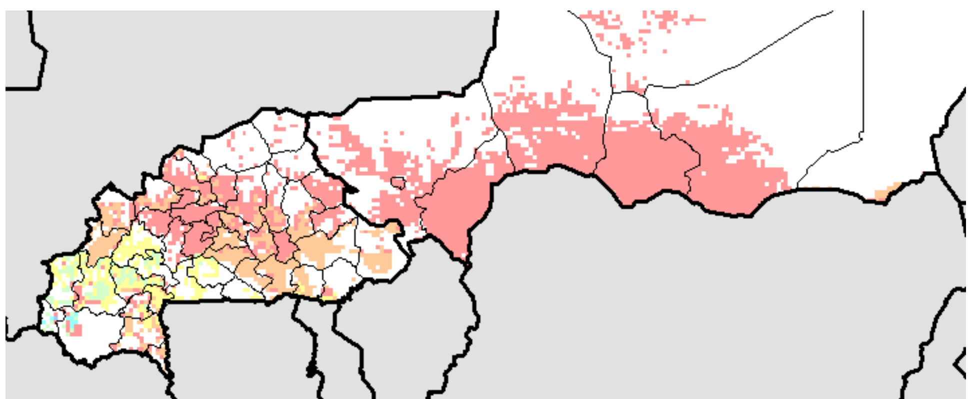
PERCENT OF GROUNDNUTS AND MAIZE IN TOTAL LAND AREA

Groundnuts



Maize



- < 1
- 1 - 4
- 4 - 10
- 10 - 20
- 20 - 35
- 35 - 50
- > 50

Source: SPAM (You et al. 2014).

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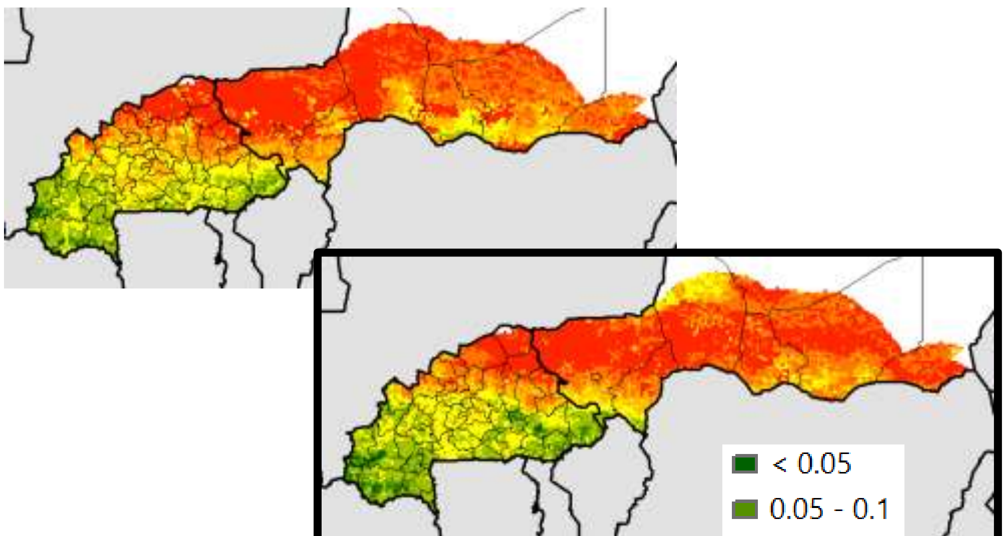
SHARE OF YEARS FOR WHICH GROUNDNUT AFLATOXIN LEVELS ARE OVER 4 PPB UNDER BASELINE CLIMATE AND 2050 CLIMATE

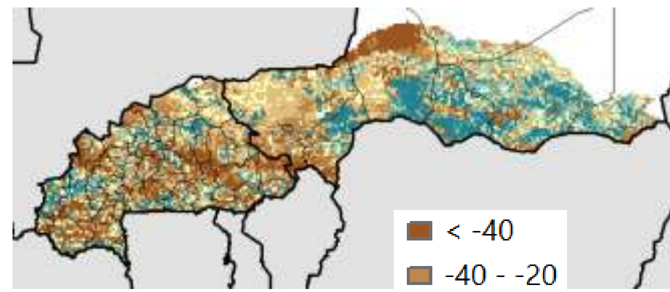
Baseline (1960-1990)



Median of 5 GCMs in 2050

- < 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- 0.2 - 0.35
- 0.35 - 0.5
- 0.5 - 0.7
- > 0.7

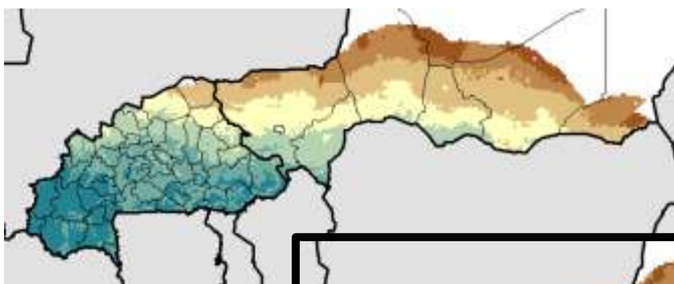
Percent change between baseline and 2050

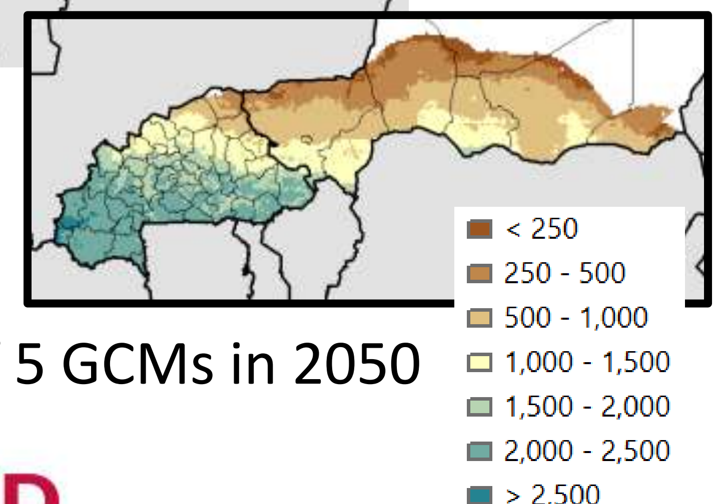


- < -40
- -40 - -20
- -20 - -5
- -5 - 5
- 5 - 20
- 20 - 40
- > 40

GROUNDNUT YIELD UNDER BASELINE CLIMATE AND 2050 CLIMATE

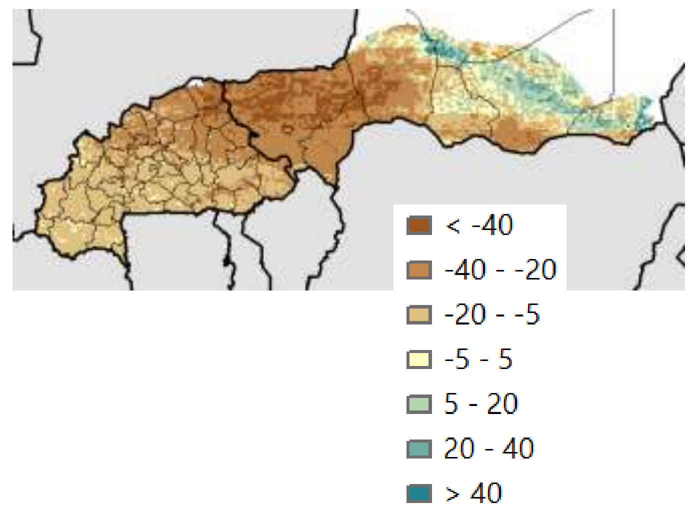
Baseline yield, 1960-1990 (kg/hect)





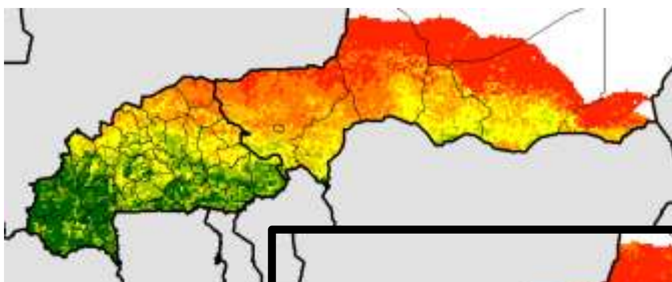
Median of 5 GCMs in 2050

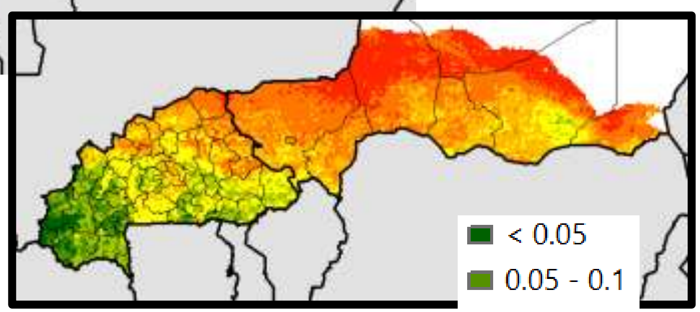
Percent change between baseline and 2050



SHARE OF YEARS FOR WHICH MAIZE AFLATOXIN LEVELS ARE OVER 4 PPB UNDER BASELINE CLIMATE AND 2050 CLIMATE

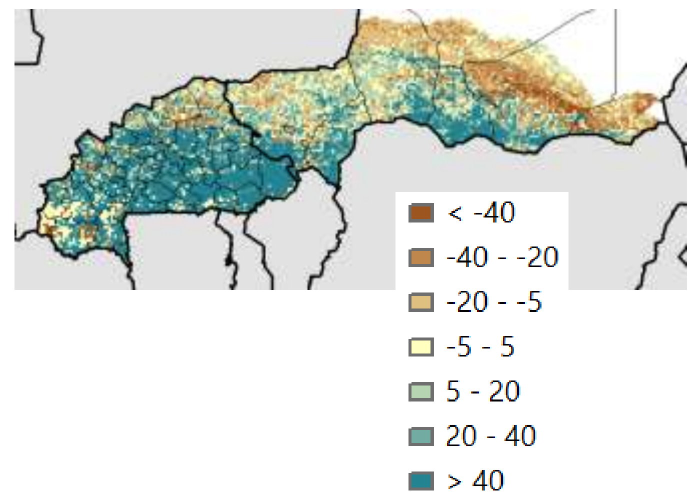
Baseline (1960-1990)





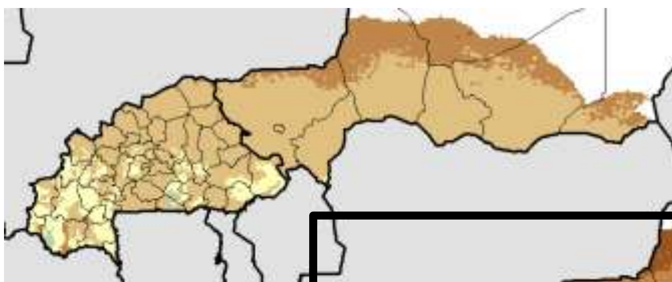
Median of 5 GCMs in 2050

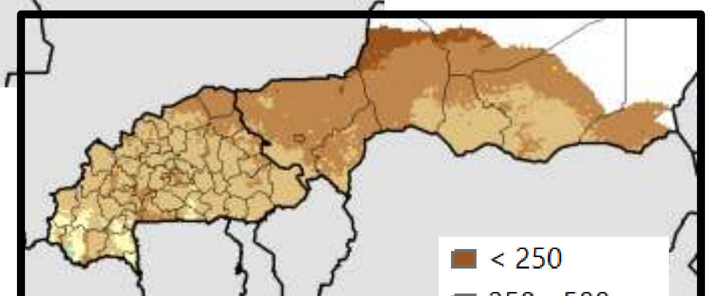
Percent change between baseline and 2050



MAIZE YIELD UNDER BASELINE CLIMATE AND 2050 CLIMATE

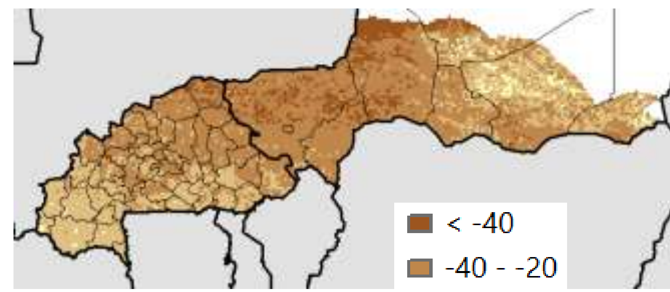
Baseline yield, 1960-1990 (kg/hect)





Median of 5 GCMs in 2050

Percent change between baseline and 2050



SUMMARY

- Climate change might have vastly different effects on aflatoxin levels, with some improving and some getting worse
- Planting month is an important determinant of aflatoxin concentrations
- Concentration of aflatoxin varies across locations
- The climate effect on aflatoxins varies across locations

POTENTIAL INTERVENTIONS

- Irrigation and improving soil water retention (reducing water stress reduces aflatoxin contamination).
- Biocontrol (introduce non-harmful fungi to out-compete bad aflatoxins. The effect lingers for more than one season and potentially helps neighbors.)
- Develop aflatoxin resistant varieties
- Switch to crops that have less problems with aflatoxins
- Use insecticides to reduce insect damage which facilitates aflatoxin infection

POTENTIAL INTERVENTIONS - 2

- Liming of soils
- Identify higher concentrations of aflatoxins through monitoring and divert crops to other uses:
  - Infected peanuts can still be used in peanut oil, since filtration removes most of the contamination
  - Use infected crops in livestock feed that are treated with binding agents or decontaminated with ammoniation.
- Improve harvesting, processing, and storage practices

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Why we need to be concerned about food prices in Nigeria (supported by BMGF)

Derek Headey

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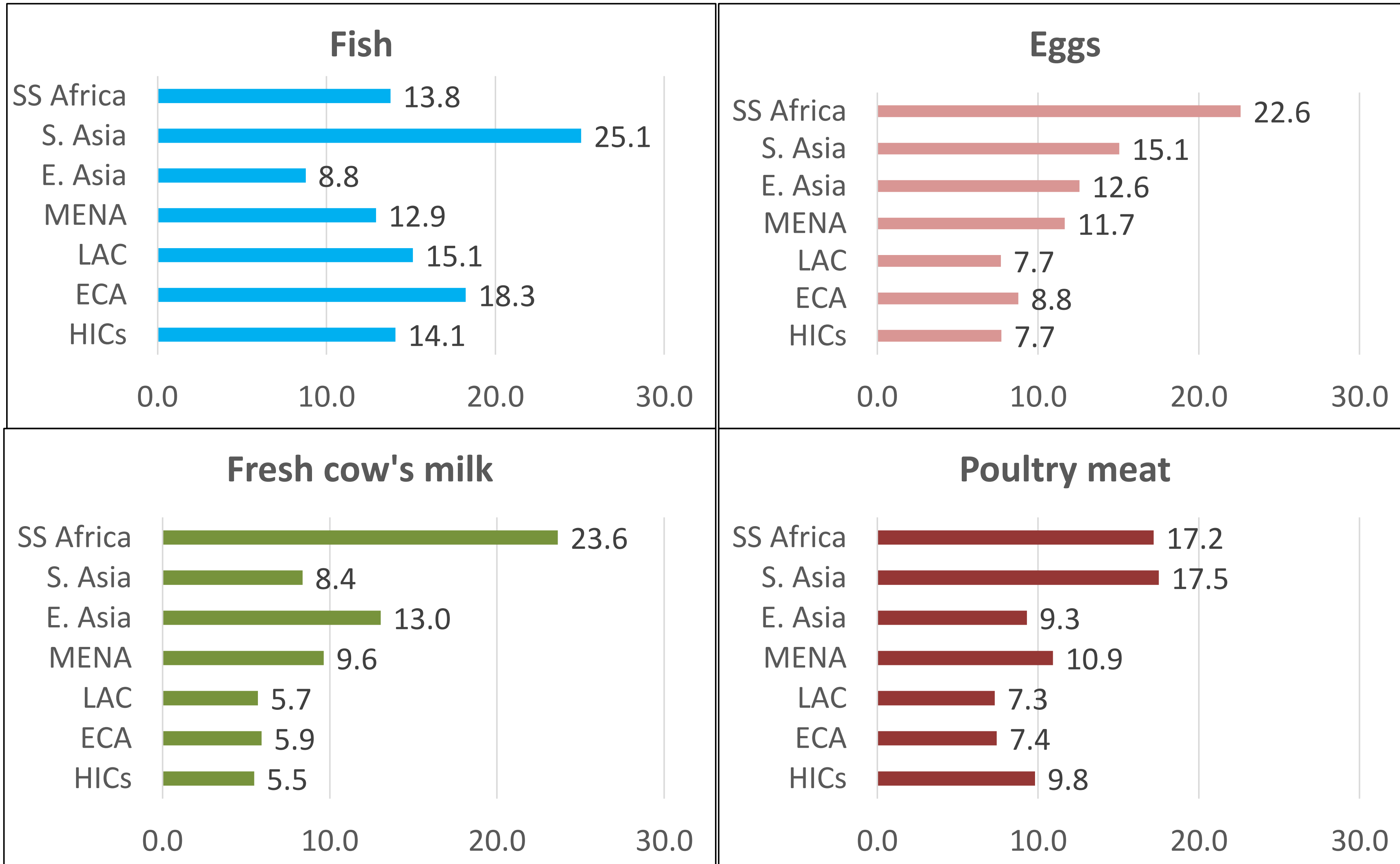
CALORIE PRICE RATIOS



Data: ICP, consumer price surveys

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CALORIE PRICE RATIOS

	Nigeria	Vietnam	South Africa
vA-rich fruit/veg	4.5	7.4	4.1
Dark green leafy veg	8.4	23.3	32.6
Other fruit/veg	3.8	5.9	2.2
Pulses	1.6	2.5	1.7
Nuts	3.8	1.7	7.4
Fortified infant cereals	8.9	9.7	2.7
Eggs	10.9	9.2	3.5
Meat	3.4	5.0	1.6
Fish	6.6	6.6	4.6
Milk	8.3	9.4	2.3
Fats/oils	0.8	0.8	0.6
Sugar	1.4	1.2	0.4
Sweets	3.9	4.2	1.5
Soft drinks	4.9	7.5	3.7
Savories	3.6	3.4	2.3

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CALORIE PRICE RATIOS

country	white meat	red meat, fresh	red meat, processed
Nigeria	9.5	3.4	24.1
South Africa	3.0	1.7	5.9
Vietnam	8.2	5.0	18.4

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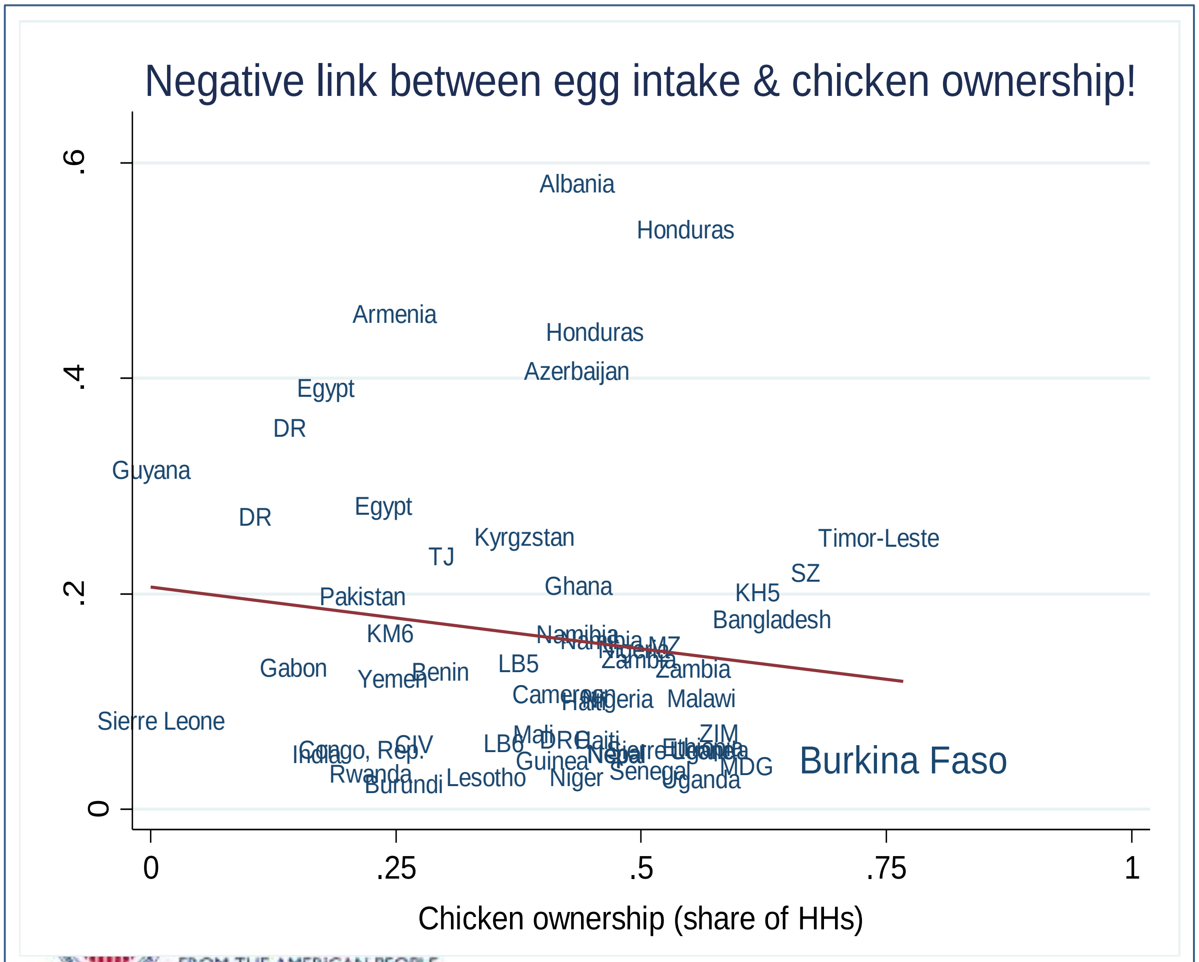
POULTRY



Most commonly owned livestock, egg prices high and eggs seldom fed to children in rural areas, huge economies of scale

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
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DAIRY

	Children taking dairy	Low Incomes?	High prices?	Piped water?
	%	$ PPP	CPRs	%
Central Africa	15.7	1,670	21.9	26.8
West Africa	25.0	3,766	21.4	19.6
Southern Africa	18.0	1,814	9.5	27.2
Eastern Africa	34.4	1,685	23.3	28.9
South-East Asia	19.2	3,725	12.8	11.0
South Asia	52.7	4,357	8.5	34.6
M East & N. Africa	70.9	8,139	7.9	74.2
E. Europe & C. Asia	67.1	9,587	6.1	71.7
Latin America	58.2	12,451	5.6	68.7

DAIRY

- Price of fresh milk too high
- Lack of refrigeration and safe water
- Lack of nutrition education

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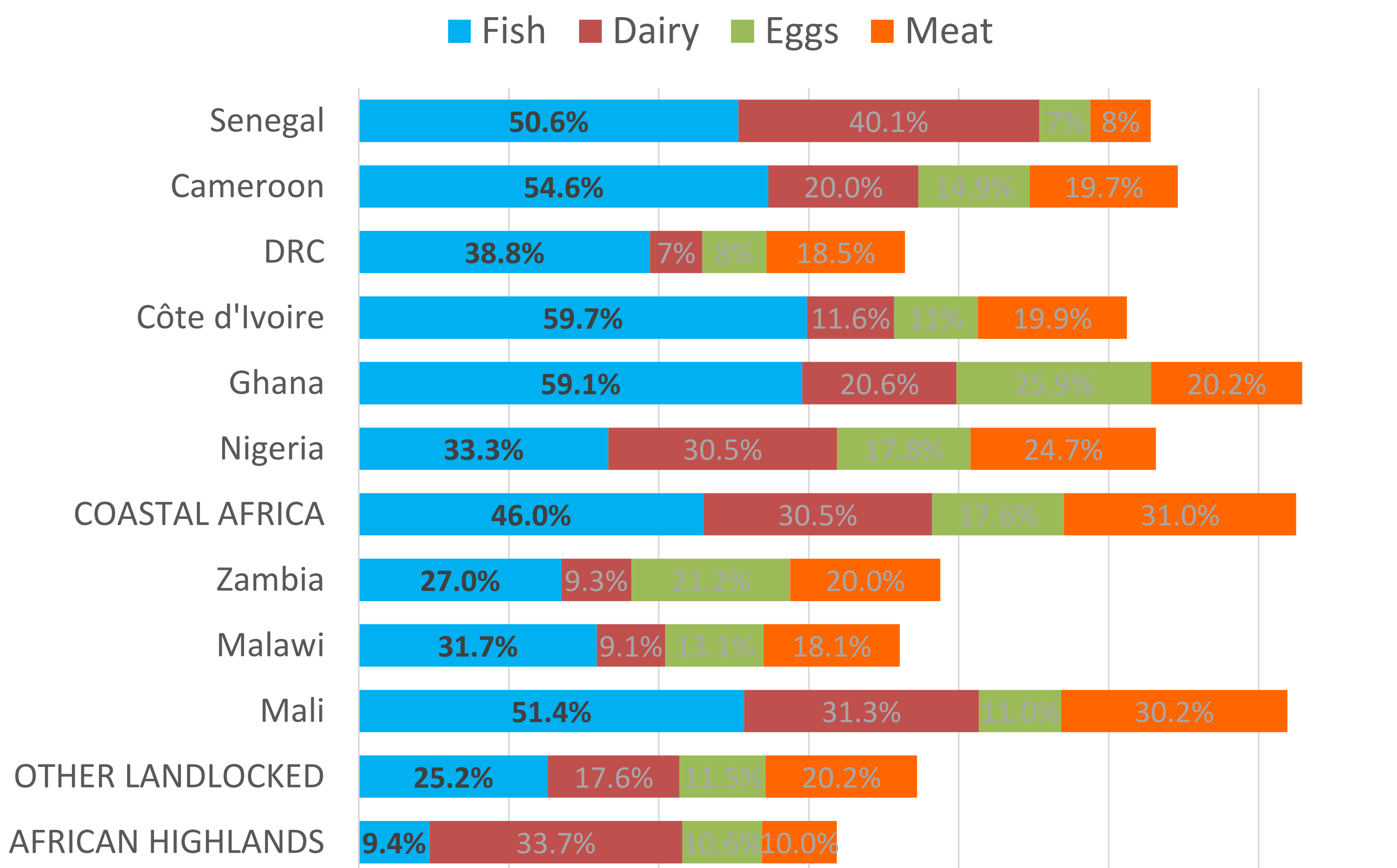
CHILD FISH CONSUMPTION: high!



SUMMARY

- In poorer countries, cost of nutritious diets beyond average food expenditures
- Cost of ASF too high
- Diets cheaper in less remote areas and those with electricity access

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GCAN Checklist: To ensure that gender and nutrition are anchored in climate resilience programming & projects

Claudia Ringler and Elizabeth Bryan

International Food Policy Research Institute

May 2019

USAID FROM THE AMERICAN PEOPLE

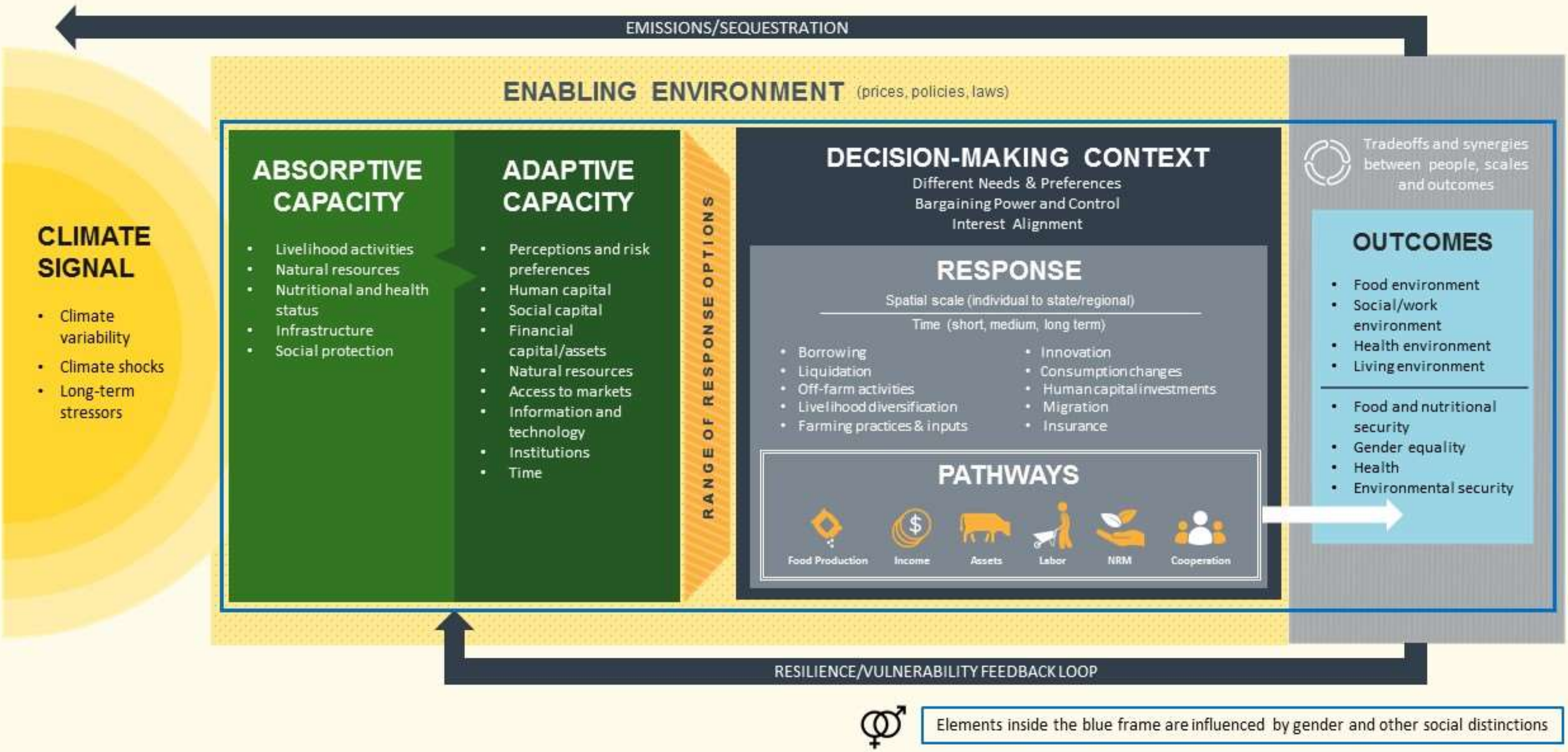
CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security CCAFS

IFPRI INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

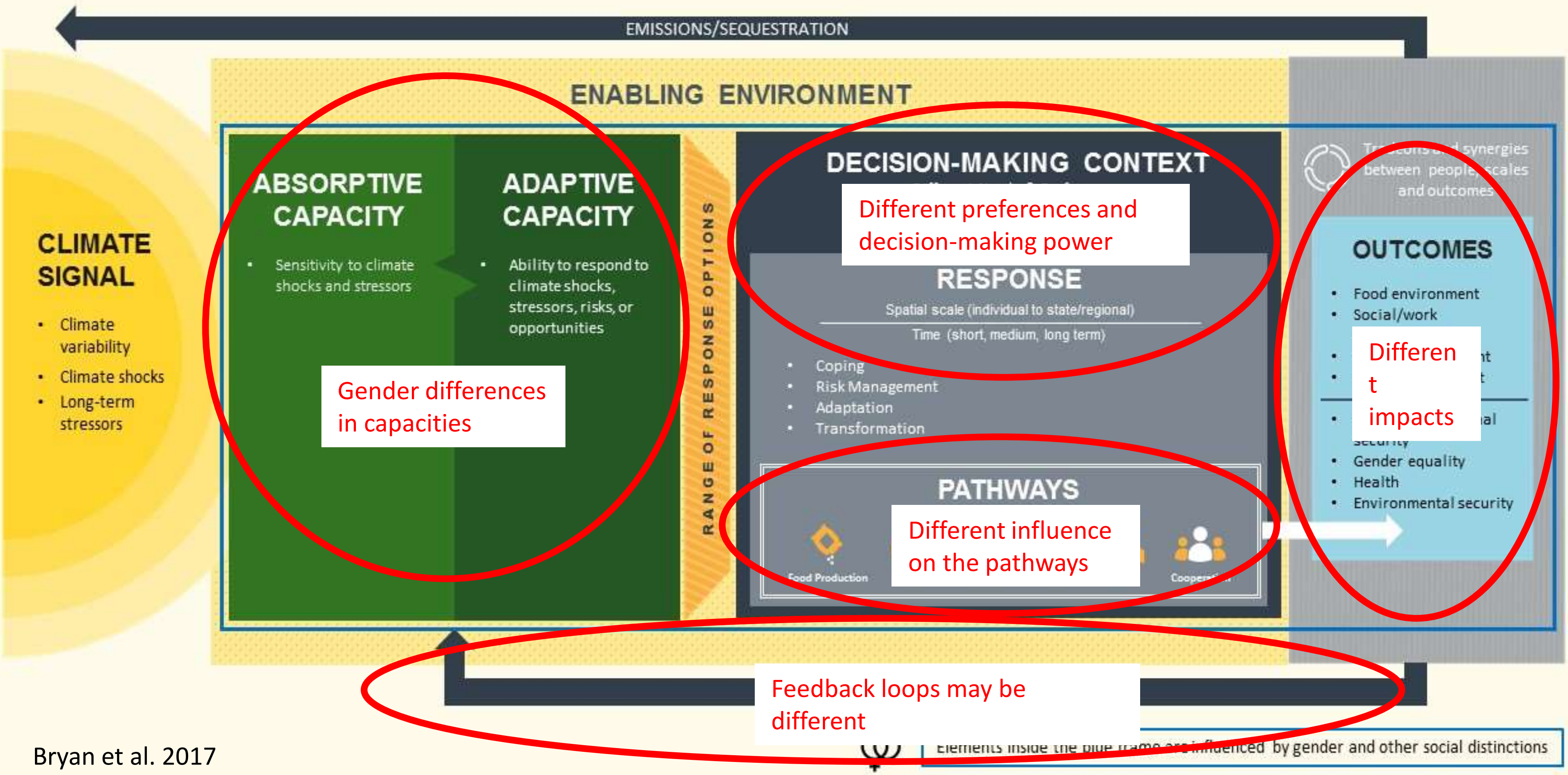
OBJECTIVE

- Highlight **key relationships** between elements of complex systems
- Develop **common ground** for different disciplines and bodies of literature
- Synthesize **state of evidence** and assess evidence gaps
- Identify **potential impact pathways** and entry points for projects, policies
- Basis for **data and indicators** that should be collected for M&E
- Existing frameworks did not illustrate the key elements and connections between **climate change, gender and nutrition**

Framework for Climate, Gender, and Nutrition- Household Level



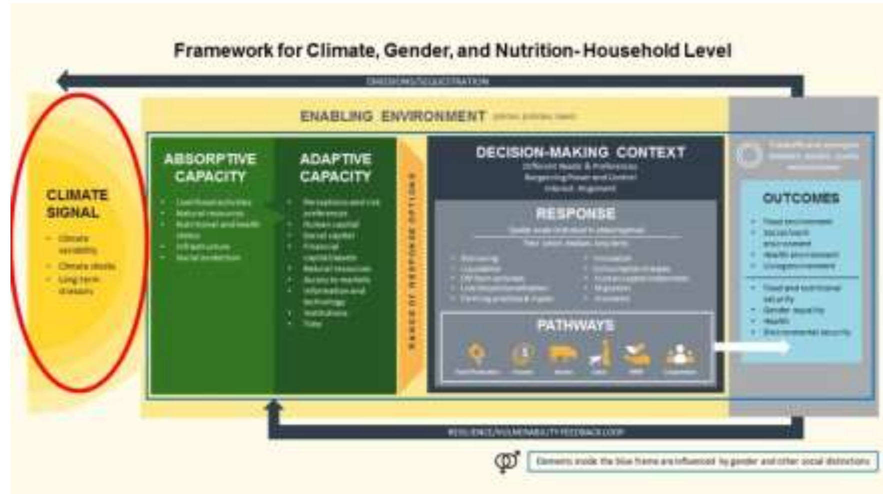
Framework for Climate, Gender, and Nutrition



Bryan et al. 2017

CLIMATE SIGNAL: KEY QUESTIONS

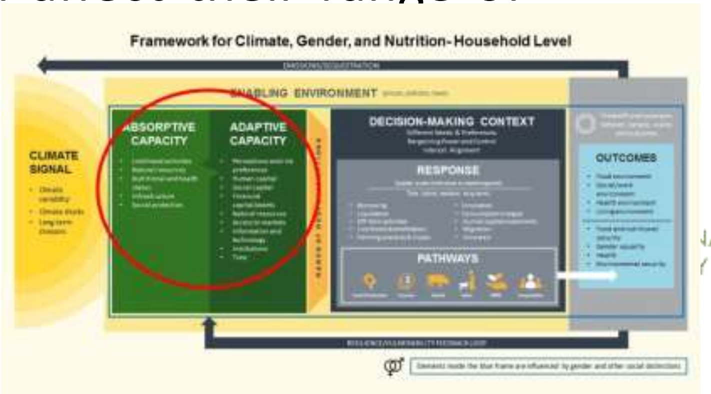
- What historical climate trends have been observed (e.g. changes in average temperature, changes in precipitation, changes in variability such as the frequency of droughts, floods, and seasonal shifts)?



- What are the projected climate changes? (consider time scale and spatial scale of changes)
- What is the impact of climate change on key crops, livestock or other livelihood activities?
- What is the magnitude of the event or change?
- What is the degree of uncertainty in projections?
- To what risks, shocks, and stresses are different social groups exposed?

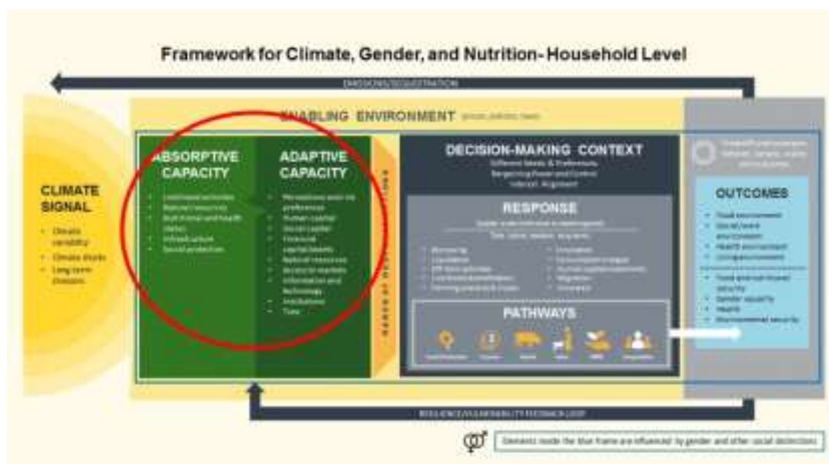
ABSORPTIVE AND ADAPTIVE CAPACITIES

- Are there differences in exposure and sensitivity to shocks and stresses for different groups of people based on:
  - Livelihood activities
  - Reliance on natural resources
  - Infrastructure
  - Access to social protection programs
  - Health and nutritional status
- What factors influence men's and women's *ability to respond* to shocks and stressors? How does this then affect their range of available response options?



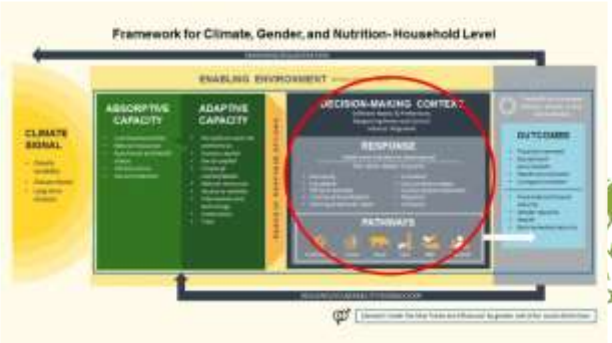
ABSORPTIVE AND ADAPTIVE CAPACITIES

- What factors influence men's and women's *ability to respond* to shocks and stressors? How does this then affect their range of available response options?
    - Perceptions of climate change and risk
    - Access to and control over assets and resources
    - Access to information and technology
    - Labor/time
    - Institutions (e.g. groups, social norms and land tenure)

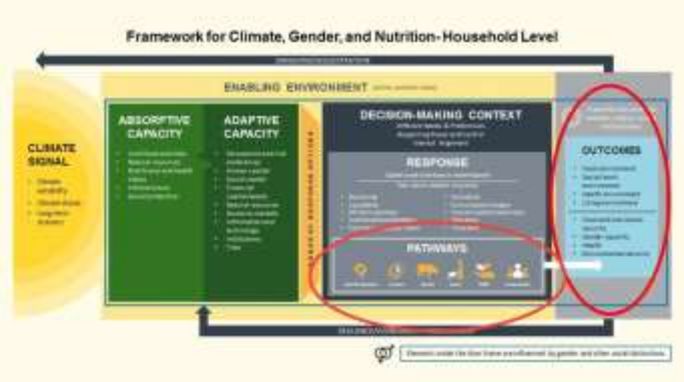


Decision-Making Context and Responses: Key Questions

- Do men and women have different preferences for how to respond to climate stressors/shocks based on their gender norms/roles?
- How well do the interests of different household members align?
- Do men and women have different bargaining power to influence response decisions at the household, community, policy levels?
- What are common responses observed in response to climate change and which groups of people choose which responses? (coping responses, risk management, adaptation, transformative responses)
- What are the nutrition and gender implications of chosen responses?



PATHWAYS AND OUTCOMES: KEY QUESTIONS



- How do responses to climate shocks and stressors have different impacts on well-being outcomes of men and women?
- What are the implications of household decisions, institutional arrangements, policy choices and social discourse for the livelihood of young people?
- What are the pathways that mediate these outcomes?
  - Assets and resources
  - Labor
  - Income
  - Human capital, etc.
- What are the tradeoffs and synergies across different outcomes and time scales?

CONCLUSIONS

- Some evidence suggests that paying attention to gender and nutrition is important for more effective climate change programs
- Integration is challenging for many reasons including
  - Accounting for the different ways in which climate change, gender and nutrition interact across different contexts--evidence is usually case specific
  - Need for staff capacity across all cross-cutting areas
- Positive trends
  - More, better data collection to support decisionmaking
  - Growing recognition of the importance of integration

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Rural Youths in Nigeria:
Agriculture and non-agriculture constraints, opportunities and aspirations

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International Food Policy Research Institute

May 2019

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OBJECTIVE

- To incorporate youth into the GCAN framework
- To identify suitable approaches to include and empower youth in Nigeria's Feed the Future (FTF) zone
  - Inform and tailor future USAID resilience programming towards youth-specific needs
- Targeted to youth to understand their climate, water variability, and employment constraints, and what is needed for them to thrive in rural areas
  - Gender-sensitive (including both young men and women) to capture differences in constraints, opportunities and experiences.

FIELD SITES

Northwest

- Kaduna
  - North West agro-ecological zone (woodland and tall grass savanna)
- Ungwan Galadima community (Giwa LGA, Maigana Zone) and Samaru community (Zango Kataf LGA, Samaru Kataf Zone)

(farm and non farm)

South-South

- Cross River
  - South East agro-ecological zone (mangrove)
- Oduyama community (Odukpani LGA, Calabar Zone) and Nkarasi community (Ikom LGA in Ikom Zone)

(farm and non farm)

RESEARCH QUESTONS

- What are the constraints young women and men (ages 18-30) face with regards to participation in agricultural value chains in different regions of Nigeria?
- How does climate change and climate risk affect participation in agriculture for youth?
- What constraints do they face when pursuing their potential in and outside of agriculture?
- What are some of the interventions that young men and women would value and find useful to increase their resilience and help them find suitable employment?

NEXT STEPS

- Meet with local collaborator to finalize training plan and field plan details
- 2 full-days training for Cross River and Kaduna field teams on project objectives, protocols and qualitative methods (May 20-22).
- Kaduna team fieldwork (May 23-31):
  - Pre-test of protocols - Zaria, Kaduna
  - Interviews and FGDs
  - Transcript writing and translation
- Cross River team fieldwork (June 3-14):
  - Pre-test of protocols
  - Interviews and FGDs
  - Transcript writing and translation
- Analysis and report writing