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CLIMATE CHANGE, GENDER, AND NUTRITION
Support to USAID Programs in Nigeria

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Increasing temperature, erratic rainfall, and other extreme events, such as floods and droughts, pose severe threats to development in Nigeria. Climate change will have significant adverse impacts on crop production and livelihoods, making the country's poor and disadvantaged people even more vulnerable. It is imperative that the impact of relevant climate science on agricultural production be considered, together with important cross-cutting issues that influence agricultural growth, poverty alleviation, and climate resilience—especially gender and nutrition—if the goals of Feed the Future and the Global Food Security Strategy are to be achieved. This policy note summarizes assessments of these interlinkages in the Nigerian context under the Gender, Climate Change, and Nutrition Integration Initiative (GCAN).

Changes in Climate

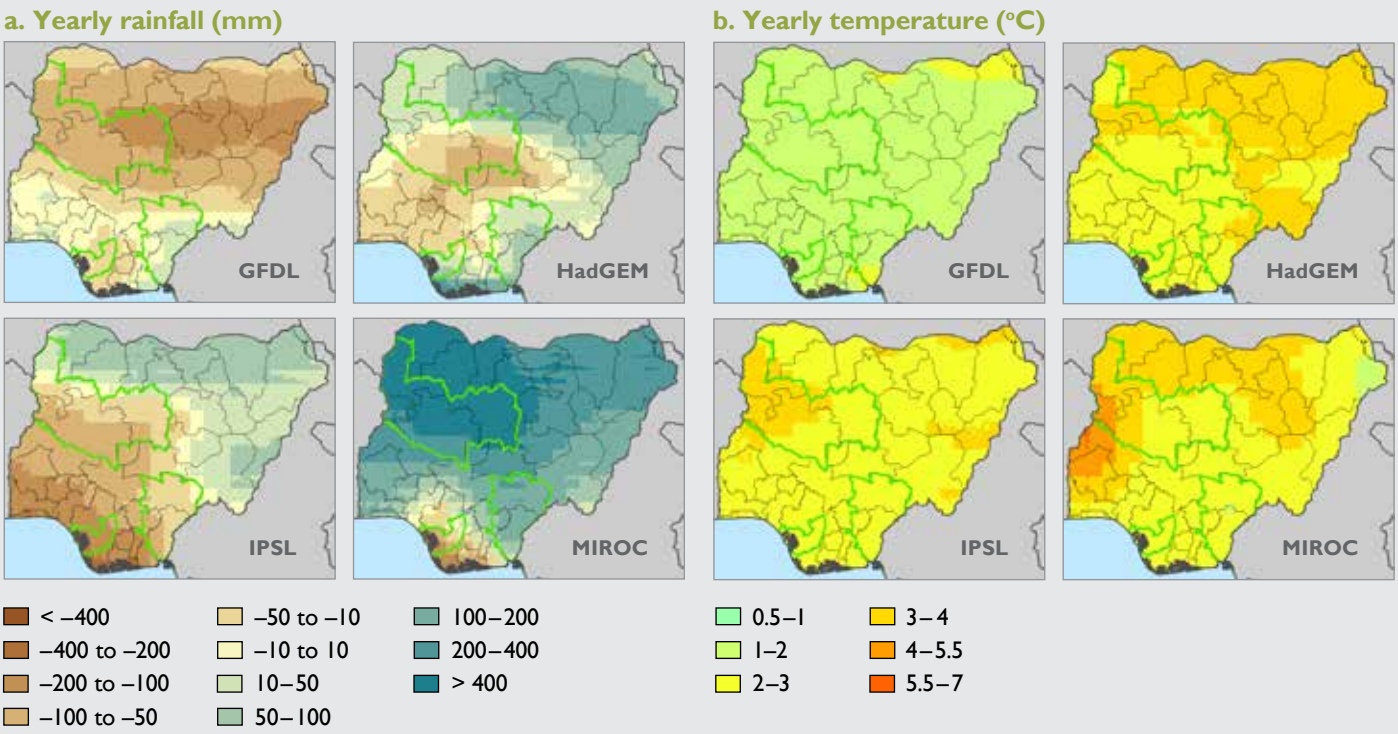
Between 1941 and 2000, yearly rainfall fell by 2mm to 8mm across most of Nigeria, but rose 2mm to 4mm in a few places, most significantly around the southeast coast. Average temperatures in the northeast, northwest, and southwest of the country rose by 1.4 to 1.9°C (Chinedum, Emmanuel, and Solomon 2015). Simulation results from four global circulation models, varying by location and model, suggest that average temperatures will further increase within the 2000–2050 timeframe. National average mean daily changes in the maximum temperature of the warmest month—the standard indicator of potential heat stress for agriculture—are projected to range from 1.5 to 2.9°C nationally, and from 1.4 to 2.9°C in the zone of influence (ZOI). Mean yearly rainfall changes are projected to range from –56mm to 280mm for Nigeria, and from –56mm to 356mm for the ZOI. Rainfall changes, even within individual climate models, have much geographic variation (Figure 1).

Aggregated simulation results from the four climate models project that yields of all major crops will be negatively affected (Figure 2). Yields of wheat and sugarcane are expected to be the most affected, with median losses of 40 percent for rainfed sugarcane and 62 percent for rainfed wheat. Groundnuts are the most negatively affected among the major crops of Nigeria, with a 23 percent median yield reduction due to climate change.

Nigeria's Take on Climate-Smart Agriculture

Climate-Smart Agriculture (CSA) involves practices to increase productivity sustainably; enhance resilience through adaptation; reduce or remove greenhouse gas (GHG) emissions through mitigation, where possible; and enhance the achievement of national food security and development goals. CSA is an umbrella term encompassing a multitude of location-specific solutions and approaches, and is recognized, albeit with limits, as a potential means of contributing to the achievement of the United Nations' Sustainable Development Goals. CSA is not prescriptive, but rather is an approach that addresses climatic risks at the intersection of productivity, resilience, and climate mitigation. The government has articulated its commitment to agriculture, including

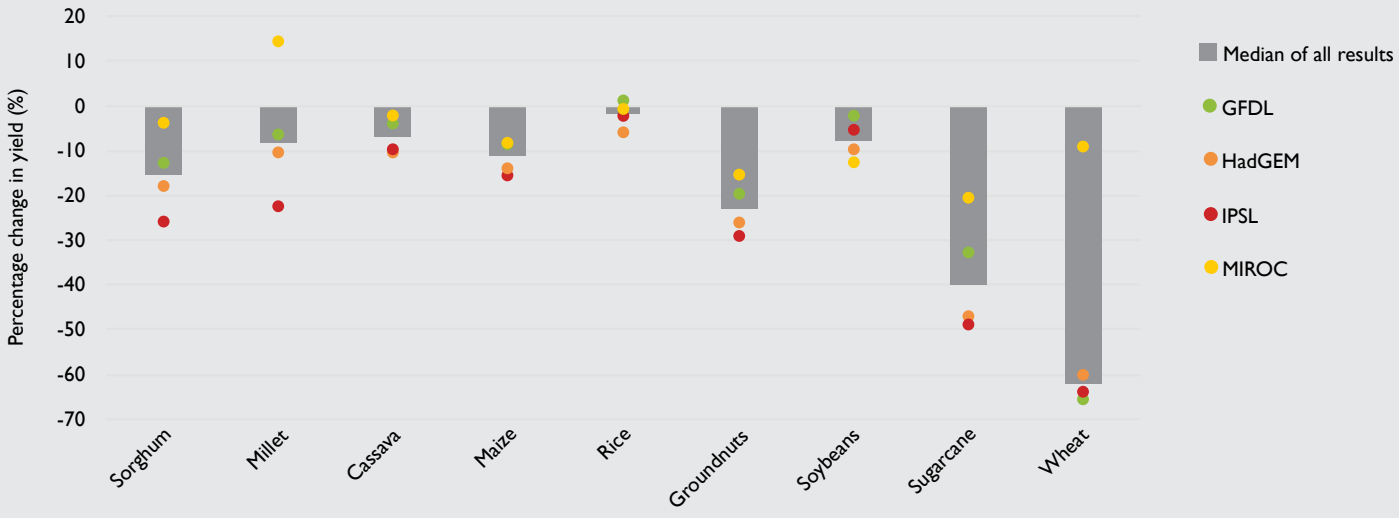
FIGURE 1. Predicted change in rainfall and temperature based on four climate models, 2000–2050



Source: Authors based on Müller and Robertson (2014).

Notes: GFDL = Geophysical Fluid Dynamics Laboratory; HadGEM = Hadley Centre Global Environmental Model; IPSL = L'Institut Pierre-Simon Laplace; MIROC = Model for Interdisciplinary Research on Climate. Simulations are based on Representative Concentration Pathway 8.5. The zone of influence is delineated by the green lines.

FIGURE 2. Percentage change in yields due to climate change based on four climate models, 2000–2050



Source: Devised by authors based on Rosenzweig et al. (2014) using weights from MapSPAM harvested area (You et al. 2014).

Notes: GFDL = Geophysical Fluid Dynamics Laboratory; HadGEM = Hadley Centre Global Environmental Model; IPSL = L'Institut Pierre-Simon Laplace; and MIROC = Model for Interdisciplinary Research on Climate.

Box 1. Nigeria's plans to address climate change through agriculture

The key activities on agriculture proposed in Nigeria's (intended) nationally determined contribution document comprise (GON 2015):

1. the adoption of improved agricultural systems for both crops and livestock, including
   - diversifying livestock and improving range management,
   - increasing access to drought-resistant crops and livestock feeds,
   - adopting better soil-management practices, and
   - providing early warning and meteorological forecasts and related information;
2. the implementation of strategies to improve resource management, including
   - increasing use of irrigation systems that use low amounts of water,
   - increasing rainwater and sustainable groundwater harvesting in agriculture,
   - increasing planting of native vegetation cover,
   - promoting re-greening efforts, and
   - intensifying crop and livestock production in place of slash and burn agriculture; and
3. the enhancement of artisanal fisheries and encouragement of sustainable aquaculture as adaptation options for fishing communities.

CSA, as a long-term strategic approach to driving economic growth (FMARD 2016). Plans include increasing awareness of CSA through targeted research on climate-smart crops, strengthening multistakeholder coordination and policy analysis on CSA, and expanding agricultural insurance. In addition, Nigeria's nationally determined contribution document recognizes CSA as a mitigation strategy to reduce GHG emissions (Box 1), the potential of which is estimated to be 74 million tons per year. Estimates of the benefits from agroforestry range from total (lifetime) emissions reductions of 158 to 712 million tons (GON 2015).

CSA practices in Nigeria currently in use include conservation agriculture; integrated crop management; use of crop rotation, cover crops, high-yielding seed varieties, and mixed farming practices; agroforestry; adjusting planting dates; and water harvesting. Farmers also implement nitrogen management and the use of nitrogen-fixing crops like groundnuts. They also use high-yielding, drought-tolerant, pest- and disease-tolerant, and salt-tolerant varieties of cereals, grain legumes, and roots and tubers developed nationally in partnership with CGIAR centers. Examples include NERICA, a drought-tolerant variety of upland rice; drought-tolerant maize varieties; and Ex-Dakar, a salt-tolerant groundnut cultivar.

The National Program for Food Security of Nigeria is supporting the promotion and development of urea deep placement in several of the country's states (FAO 2013); deep placement can increase yields, while also reducing the cost of fertilizer. In the livestock sector, some communities are switching to improved livestock breeds and species. Adopting CSA practices aids in increasing productivity, enhancing resilience, and reducing GHG emissions. However, such factors as lack of education, low incomes, insufficient access to extension services, and limited farming experience constrain the adoption of these practices in Nigeria (Onyeneke et al. 2017).

Gender and Social Inclusion

Gender issues intersect with climate risk and nutrition in important ways that should be taken into consideration when designing and implementing programs to increase resilience to climate change and improve nutrition outcomes. Women tend to have lower capacity to respond to climate challenges, different preferences for how they respond, and less control over decisionmaking processes. As a result, women are differentially affected by climate shocks and stressors, and may not equally share the benefits of risk-mitigating responses. However, increasing women's involvement in climate risk management may increase gains in nutrition and health, given women's caregiving roles within households. Ensuring that women benefit from and contribute to interventions designed to increase resilience to climate change and shocks, while maximizing nutrition and health benefits, requires an understanding of gender-differentiated roles, capacities, and preferences in a given context.

Gender roles in Nigeria, including the ways in which women participate in agricultural production, vary widely across the country due to differences in culture and religion, among other factors (Peterman et al. 2011; Oloukoi et al. 2014). In northern Nigeria, women are generally excluded from farming outside the homestead, whereas in western, southern, and central Nigeria, women play a larger and, in some cases, dominant role in agricultural production, with clearly defined responsibilities for particular plots, crops, or tasks. Understanding gender roles is important because men's and women's sensitivity to climate change largely depends on these roles. Consideration must be given, for

example, to the extent to which crops produced by men and women are harmed by climate change impacts, or the extent to which certain livelihood activities, such as water collection, are affected.

Even in areas where women are more involved in agriculture, a large gender gap in production outcomes exists, largely due to women's lack of access to productive resources (Phillip et al. 2009; Peterman et al. 2011; Oseni et al. 2015). The large gender gap in agriculture suggests that men and women have different capacities to respond to climate shocks and stressors, and that women ultimately have fewer—and worse—options (Babatunde et al. 2008). Women also tend to have less access to information and land, and some may be more restricted in terms of their response options due to cultural norms that limit their mobility or participation in groups, for instance (Lahai, Goldey, and Jones 1999; Ogunlela and Mukhtar 2009). Data show that men also tend to dominate decisionmaking even over matters concerning women, such as their own healthcare (National Population Commission and ICF International 2013). Consequently, women's limited bargaining power within the household presents a significant barrier to their ability to influence decisions about how to respond to climate challenges and risks, and may result in decisions that benefit men more than they do women. Women's limited ability to influence decisions, for example, on how income is spent, may also have negative implications for nutrition outcomes, as women tend to prioritize investing in children.

Nigeria's Nutrition Profile

Nigeria's nutrition profile indicates the double burden of malnutrition at both the individual and household levels (Table 1). In addition to the prevention and treatment of overweight, obesity, and diabetes in adults, high levels of stunting in under five-year olds and anemia in women of reproductive age should be priority areas for policy and interventions. A large gap exists in the prevalence of childhood stunting between the lowest (53 percent) and highest (18 percent) wealth quintiles, and between rural (43 percent) and urban (26 percent) residence (National Population Commission and ICF International 2013). Moreover, Nigeria's 2016 Global Hunger Index score (at 25.5) classifies the country's hunger level as serious (von Grebmer et al. 2016).

Dietary diversity is generally low in Nigeria, with differences across states (Ajani 2010). An exploration of the different pathways by which agriculture could improve dietary diversity and nutrition is crucial to inform programs and policy. Dillon, McGee, and Oseni (2015) show the potential for increasing dietary diversity through increased crop diversity and agricultural revenues. They found that a 10 percent increase in agricultural revenues increased the likelihood of household vegetable consumption by 7.2 percent, of fish consumption by 3.5 percent, and of tuber consumption by 5.2 percent. Increased dietary diversity in Nigeria has the potential to address nutritional inadequacies, but other household-level characteristics—such as access to education and income improvement—also play a role (Akerele et al. 2017). It is

TABLE 1. Nigeria's Nutrition Profile

Indicator	National prevalence (%)	Rank
Wasting in under five-years olds	7.9	93/130
Stunting in under five-year olds	32.9	98/132
Anemia in preschool-aged children	71.0	Not available
Anemia in women of reproductive age	48.5	724/185
Exclusive breastfeeding	17.4	117/141
Adult overweight and obesity	7.9	54/190
Adult obesity	11.0	56/190
Adult diabetes	7.9	53/190

Source: Compiled by authors from IFPRI (2016). Data on anemia in preschool-aged children are from National Population Commission and ICF International (2013).

therefore crucial to combine nutrition-specific and nutrition-sensitive approaches to address the multiple burdens of malnutrition in Nigeria.

Suggested Priorities for Integrated Programming

Nigeria is a highly diverse country in terms of gender roles and gaps as they relate to agriculture and nutrition challenges, so research questions moving forward would need to be further specified for specific regions. Nevertheless, the following short- and longer-term activities are suggested to strengthen insights across the climate, gender, and nutrition nexus, and to advance evidence-based research programming that integrates these themes in Nigeria:

- A study of recent trends and future projections for rainfall intensity, given it could lead to floods, significant erosion, damage to infrastructure, and destruction of crops
- A study of recent trends and future projections of the date of onset of rains, and the sustainability of rains after onset, as these factors have a critical impact on planting dates, crop rotations, drought, crop losses, and the need for replanting, and could also influence the type of adaptive response national agricultural research system and CGIAR researchers need to build into new climate-adapted crop varieties
- Research on gender differences in adaptive capacity and preferences for adaptive responses to climate change across the different sociocultural contexts
- An examination of the differential impacts of agricultural interventions and climate risk-management strategies on women and men
- Further exploration of the pathways from agriculture to nutrition across different Nigerian states to inform program design and policy
- Collection of in-depth information on food consumption in the different states, with a particular focus on the northern states, including an assessment of how consumption is affected by weather shocks and change
- An exploration of approaches to reaching women with agricultural and nutrition information and inputs across the country's various sociocultural settings

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