

Policy Note

Reducing smallholder farmers' risk through agricultural advisories and climate smart agriculture in Northern Ghana

Fred Kizito¹, Powell Mponela¹, Evan Girvertz¹

¹Alliance of Bioversity International & the International Centre for
Tropical Agriculture (CIAT)

Correct Citation to this document:

Kizito F., Mponela P. and Girvertz E., (2022). Reducing smallholder farmers' risk through agricultural advisories and climate smart agriculture in Northern Ghana. Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) Technical Report. Accra, Ghana.

About AICCRA Ghana Cluster

AICCRA-Ghana focuses on bridging the gap between the research institutes that produce improved technologies and the development organizations that promote the adoption of improved technologies including digital Climate advisories, for the purpose of enhancing the resilience of the country's agriculture and food systems in the face of climate change while improving livelihoods of thousands of farmers. AICCRA-Ghana mutualizes existing expertise to strengthen the technical, institutional, and human capacity needed to move CGIAR innovations off the shelf and achieve impacts in the country. The project also focuses on "One-health" where it addresses climate-driven pests and diseases. It is an advanced climate-informed One-health innovation that builds on CGIAR's track records in this area, framing the nexus of the crop, livestock, soil, and water health for improved human and ecosystem health, food safety and nutrition, and climate change as a complex public health issue. The project is anchored to CGIAR's multi-stakeholder platform of the Bio-risk Management Facility (BIMAF) hosted by IITA's station in Benin, West Africa. AICCRA-Ghana will use the CGIAR's Scaling Readiness Tool to undertake assessments of CSA options for accelerated uptake of innovations. The National Framework for Climate Services (NFCS) and innovation platforms including the private sector, Nourishing Africa network, and farmers will be empowered with the capacity towards identification, promotion and implementation of suitable CIS and best-bet CSA and One-health innovations. Media and mass-campaign awareness will be launched while developing business models and engaging champion women - and youth-led enterprises. Pilot sites have been identified and training is on-going to farmers for successful implementation of One-health and CSA technologies.

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1 Background

The diversity of technological interventions utilized to support women empowerment is infinite and there are interlinkages of information sources that defy the logic of how best to design and implement development programs (Nyamekye *et al.*, 2020). The cereal-root tuber-legume mixed farming system in Northern Ghana is characterized by unpredictable weather (drought spells & excess rain) resulting in frequent crop failures and low yields. The AICCRA project supports innovative ways of reducing farmers' vulnerability to weather-related shocks in collaboration with local and international partners. Recent studies conducted through the Africa RISING Program indicate that bundling index-based crop insurance and agronomy advisories reduces production risks and reduces gender inequity.

The Ministry of Food and Agriculture (MoFA) in Ghana collaborated with CGIAR's Research Program on Climate Change, Agriculture and Food Security (CCAFS/ West Africa) and undertook "A Situational Analysis Study on the Status of Agriculture in Ghana" (Essegbey and MacCarthy, 2020). Additionally, a collaboration with Food and Agriculture Organization (FAO) and the African Group of Negotiators Experts Support (AGNES) led to the development of a medium to long-term "Low Emission, Climate Resilient Development Pathway" (Agricultural LTS) document for Ghana's agriculture sector (Agnes, 2022). The technical Agricultural LTS builds on key on-going adaptation and mitigation initiative being undertaken by the Government of Ghana (GoG), development partners, private sector, and Civil Society Organizations (CSO) to strengthen the resilience of the country against critical climate change impacts. The Ministry of Agriculture in collaboration with the Alliance for Bioversity and CIAT (ABC) started the process for the development of the agriculture LTS in 2020, where a situational analysis of the agriculture sector as far as climate change is concern was undertaken and assessed future scenarios (2030, 2050, 2080 and 2100) in the face of climate change. The resulting analysis painted a gloomy picture of alteration of all agriculture dependent climatic factors; temperature will keep rising; changes in onset and cessation of rainfall and change in volumes of precipitation in various agroecological zones.

Based on this information, the development of the long-term low emission strategy for the agriculture sector will focus on crops and livestock. Although climate change is global, its impacts are localized and therefore actions to address the phenomenon needed be localized. As such there was a need to engage stakeholders at all levels across various regions. Yet, despite the technological advances in climate awareness in Ghana, there are concerns of gender disparity regarding access to climate information services, climate-smart agriculture technologies for one-health which hinders social inclusion in Ghana's food systems. National gender policy (Republic of Ghana, 2015) as a policy framework emphasizes an all-embracing aim that includes ensuring gender equality in access to productive resources such as land, labour, technology, capital/finance, and information. It also establishes efforts towards embarking on affirmative action to rectify errors of the past particularly, as they relate to discrimination against women and reducing gender and geographical disparities in the distribution of national resources. Attention is given to gender mainstreaming strategy, in creating a new order of social justice and equity premised on the inclusion of all hitherto excluded [the poor and persons with disability].

The study was conducted to explore how advisory services can contribute to inclusive gender dimensions around access to information, input and output markets and enablers towards decision making for equitable and inclusive food security and livelihood opportunities.

1.1 Approach

AICCRA baseline data was collected from target populations that were previously engaged in CCAFS and counterfactual communities from 6 regions of Ghana and 4 ecological zones namely: Transition, Coastal Savannah, Guinea Savannah, and Sudan Savannah (MAP). The counterfactual communities from 6 regions of Ghana included Greater Accra, Central, Upper East, Upper West, Bono East, and Northern Regions. Both Climate Information Services (CIS) and Climate Smart Agriculture (CSA) demands vary across different ecoregions with respect to variations in climatic suitability/limitations, farming systems, cultural norms, and livelihood strategies. The socio-ecological differences have strong bearing on men’s and women’s mitigation and adaptive responses.

The female representation in most sites ranged from 30-40%. The lowest number of female respondents was from the Greater Accra region while the highest number of female beneficiary respondents was from the Bono East respectively. In terms of age of the respondents, the lowest average beneficiary female age was 41 years for the Northern region while the highest average female respondent age was 62 years from the Greater Accra region. With Greater Accra being on the fringes of the capital city, most youth migrate to the urban centre leaving behind older farmers. Most beneficiary female farmers were members of an FBO in the Greater Accra, Upper East, and Bono East regions while the male counters were largely members of an FBO in the Upper East, Bono East, and Northern regions respectively. In terms of financing livelihood and agriculture activities in the 6 regions, the emphasis was on the Village Saving Loan Association (VSLA) since that is the main source of quick financing in both the beneficiary and non-beneficiary communities. Findings revealed that most female beneficiary farmers in the Northern, Upper West, and Bono East regions were members of a VSLA group while the majority of male beneficiary farmers in the Upper East, Upper West, and Northern regions were also members of VSLA groups except for Greater Accra region.

Region	Ecology, culture, and livelihood
Transition	Bi-modal 1200mm Soil is fragile – alternate flooding and drying with sandstone bedrocks near the surface.
Guinea and Sudan Savannah	Rainfall is major limiting factor: 500-700mm (April/May to Sept/Oct), dry spell of 3-5 weeks. Soil is shallow; Continuous with some short fallows decline carbon and fertility; 80% population in agriculture; use waste and manure, crop diversification, close to dwelling
Coastal Savannah	Vulnerable to salination, flooding, inundation, erosion, storm surges, high water table. Bi-modal 920mm (march- July; sept-Nov).

2 Access to climate information services

Climate Information Services (CIS) is a key driver of agricultural technology uptake and utilization among smallholder farmers. Data collected on a sex-disaggregated basis revealed that among the 5 climate change variables (temperature, rainfall onset, rainfall volume as well as first and second cessation), beneficiary female farmers mostly accessed rainfall onset information followed by temperature. The least CI accessed was cessation (first and second) by non-beneficiary farmers. Temperature, though of moderate concern to farmers of Bono East, it is considered most challenging climatic hazard in the hot-dry upper regions and hot-humid Greater Accra. Rainfall onset is considered a significant climatic factor by both men and women alike in most regions. However, rainfall volume and cessation are not given more weight. Atiah et al 2021 surmises that rainfall onset and cessation date greatly influence cropping calendar decisions in rain-fed agricultural systems and most farmers rely on traditional knowledge to forecast rainfall onsets yet adaptation measures applied by farmers were not always consistent with the rainfall seasonality. The use of climate information services as advisories is critical to complement existing local knowledge of forecasting rainfall seasonality.

There is a digital gender gap on access of climate information services. Women's usage of mobile phones for CIS is comparatively much lower than men which is at a possession ratio of 30:70 respectively. Except in Central region, fewer women access CIS through TV. Most women rely on radio programming. The major source of CIS is radio followed by extension agents, social networks, and TV with two thirds of the population accessing radio CIS programs. Although mobile phone services are increasingly being developed, less than 10 % of women and 20 % of men access mobile based CIS information.

Respondents are of the view that being members of a VSLA group provides them with an opportunity to access climate information (Figure 3), farm inputs, share labour and access GAP training. Beneficiary female farmers had easier access to GAP training in the Greater Accra region and Bono East regions.

With higher literacy levels and emerging challenges, farmers reliance on recorded voice messaging has limitation that they do not get chance to provide feedback. However, the traditional extension service has a limited scope with a reach and relevance to a third of the population. This affects development and delivery of agricultural advisory as the views, experiences, and aspirations of 75% of the population are not captured. Recent advances in mobile agro-advisory are also still in infancy stages as less than 10% of farmers has affinity for text and video sources. This is despite studies showing the effectiveness and increased focus on digital advisory.

2.1 Willingness to pay for climate information services

Except among the AICCRA beneficiaries of Upper west, men are more willing to pay for CIS (**Fig. 1**). Communities of Greater Accra and Central regions are less willing: reflecting that the climate challenge is more pronounced in the semi-arid regions. There is correspondence in northern Ghana that majority of women and half of men were not willing to pay for climatic information due to differences in training, asset ownership, membership of social groups, and level of farming experience and the associated exposure to climate risks.

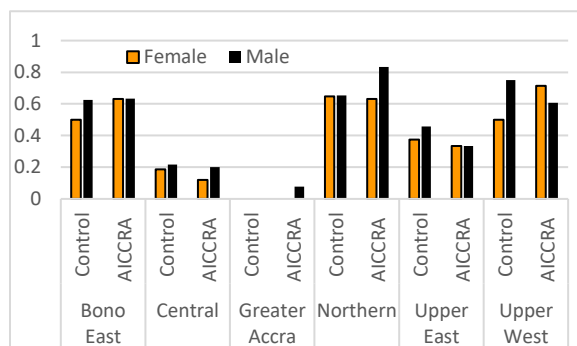


Figure 1 Proportion of respondents who are willing to pay for climate information services

2.2 Willingness to pay crop insurance, agro-advisory support and use bundled services for Northern Region

A comprehensive survey conducted among the Northern Region target group of women, men and youth provided critical feedback loop mechanisms with farmers to voice concerns and ask questions about current climate smart options, climate informative services and offered farmers with low literacy to understand the possible insurance product details while incorporating their preferences.

Study findings (See **Fig. 2.1**) showed that the willingness to pay is existent and the ability to pay is also existent among both the target intervention group and the control comparison group. This has been made possible through an intervention from input credit mechanisms such as Degas' bundled options of insurance and inputs. Farmers who did not access input credit bundling were willing to pay but did not have the ability to access improved seeds and fertilizers. Clearly both respondent groups had very low access to formal extension services, a niche that would be filled by agro-advisory support services from AICRRA's efforts with the National Framework for Climate Services (NFCS).

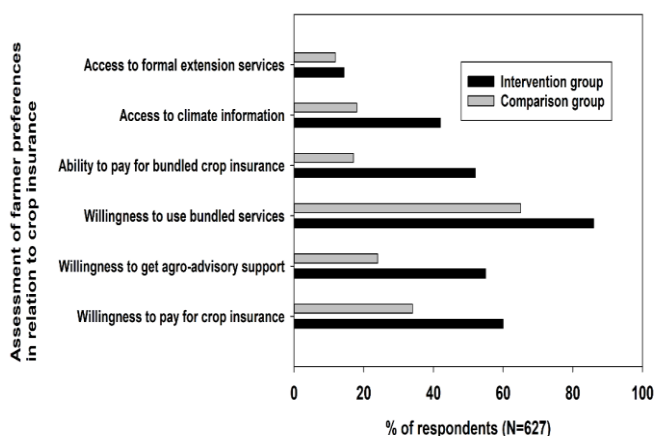


Figure 2.1 Proportion of respondents who are willing to pay for climate

3 Access to input and output markets

Household's ownership of productive resources was used to categorise them into four resource endowment groups based on expert opinion of the local context. Those who owned cattle and refrigerator were considered resource-rich, ownership of television, motorbike was moderate - resource, while ownership of small ruminants (goats and sheep), pigs and bicycle was considered low-resource. Households that lacked these productive resources were categorised as resource-poor.



Figure 3 Resource distribution among women and men across AICCRA communities and regions

Land as a valuable resource for both livelihood and agricultural activities has varied holding statuses ranging from rent, temporal offer, sharecropping, outright ownership, family inheritance and communal ownership. The various forms of ownership as presented in **Figure 3** were sex aggregated and the dominant land-holding status was outright ownership for both males and females where 170 males outrightly owned land compared to 61 females. The family passed on ownership was the next highest and this was dominated by 42 males to 22 females.

Financing of agricultural activities comes in different forms and from different sources based on accessibility, availability, and appropriateness. Agricultural financing is faced with challenges due to the risk associated with it and the educational level of farmers engaged in agriculture. Across regions, female farmers requested and were granted 27% less credit among control communities and 74% less credit among beneficiary communities compared to men.

4 Knowledge and usage of climate smart agriculture practices for one-health

Climate change is projected to have significant impacts on crop yields, with 10–25 per cent global yield reduction per degree of global mean surface warming and more crop losses are expected where warming increases both population growth and the metabolic rates of pests. Adaptation to climate change is happening on several fronts ranging from genetic innovations, biological measures, structural practices, to organic inputs. Genetic innovations have focused on pest resistance, low nutrient tolerance and enhanced uptake, nutrition enhancement and diversification and drought tolerance. Biological pest control

and nitrogen fixation reduce the use of synthetic chemicals thereby contributing to one-health in terms of safeguarding environmental, human, and animal health.

4.1 Biological pest control

Unfortunately, the efforts to protect plant health are still low, especially in regions where crop pests are not considered major constraints. Most farmers use chemical pesticides that are detrimental to human health, the environment, and animals. However, there is increasing awareness of sticky traps and pheromones by 25 - 55% of women in Greater Accra and usage is 9-15%. Knowledge on biopesticides in the central region by 16% of women and 19% of women presents an opportunity for piloting.

4.2 Genetic innovations

Plant breeding and improved management options have made remarkable progress in increasing crop yields during the past century. However, climate change projections suggest that large yield losses will be occurring in many regions, particularly within sub-Saharan Africa with maize, the staple crop projected to decline by 24%. Modern improved maize varieties bred for resistance to the most problematic weeds associated with low fertility soils, the Striga and for tolerance to inherent low-N of these soils are known by more than 50% of both males and females though usage varies across genders and regions (**Fig. 4**).

More men than women use Striga and low N-tolerant maize varieties in Bono East and Northern region while in Upper East and West, more women than men use these varieties.

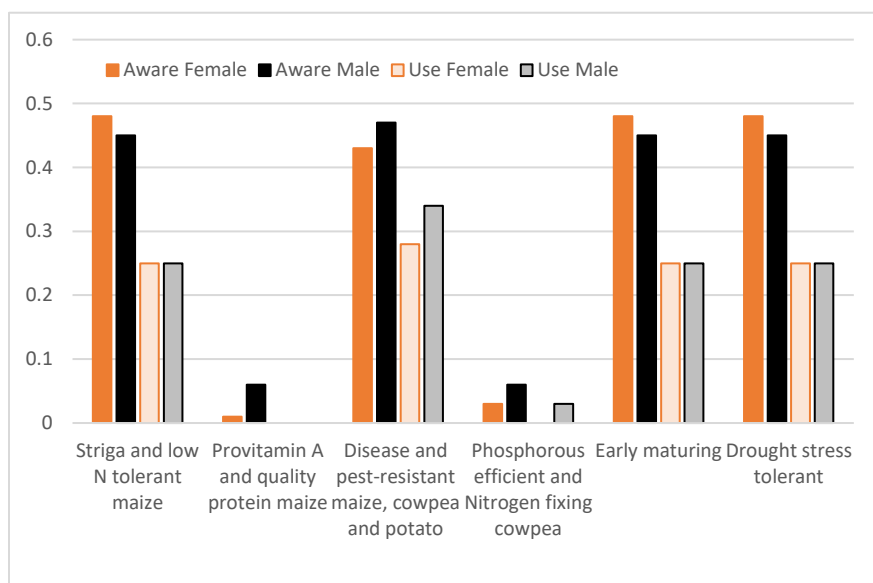


Figure 4 Genetic climatic smart agricultural innovations for pest, soil fertility, nutrition, diversification, early maturity, and drought.

Provitamin A and quality protein maize varieties are moderately known in all regions but, reportedly, only used in Upper East region. Knowledge of varieties bred for pest resistance is wide among women of UW and a third of Central Region. However, usage is highest among women of Bono East. Cowpea varieties bred for Phosphorus use efficiency and nitrogen

fixation were known but men and not reported by women suggesting a knowledge gap. There is a wide knowledge and usage of early maturing varieties that fit short rainfall durations due to late rainfall onset and terminal droughts.

4.3 Soil structural stability

Tillage practices and the use of chemical fertilizers present challenges of soil loss through erosion and reduced soil health due to the depletion of soil material, soil nutrients, and organic matter. Mulching - leaving crop residues to cover the soil from raindrops and conserve soil moisture - is promoted as one of the three pillars of conservation agriculture. The knowledge and use are relatively higher in UE and UW, much lower in Bono East and higher among men than women. Minimum tillage- another pillar of CA that is aimed at minimizing soil disturbance thereby reducing erosion risk and damage to soil habitat – is widely known and most used in Bono East, UE and UW. Although farmers in Greater Accra did not indicate awareness but responded that they practice it during the follow-up question on usage. In the Northern Region, 29-50% of farmers indicated that they are aware but only men use (8% control and 13% AICCRA beneficiaries).

4.4 Organic fertility inputs

The general practice of incorporating organic substances for improving soil health ranging from farm and household wastes, and animal manure, to crop residues are widely known and used in Central and Northern regions. Usage levels are higher in the Northern region. Knowledge of composting animal manure and household wastes is higher in Central and Greater Accra regions, but usage was only reported in Greater Accra, where a larger number (33-69%) practice it. Twenty-five (25%) of AICRAA beneficiary women in GA who indicated that they are aware, were not practising composting.

5 Policy implications

The goal of the Paris Agreement is to reduce global temperature rise well below 2°C by 2050 and if possible, keep temperature rises even lower at 1.5°C above pre-industrial levels. Therefore, in accordance to Article 4, paragraph 9, of the Agreement, the commitment requirements of the Parties culminated into the development of the Intended Nationally Determined Contributions (INDC's) towards the achievement of the goal. Ghana submitted its INDC in 2015, with an emission reduction goal to unconditionally lower its GHG emissions by 15 percent relative to a business-as-usual (BAU) scenario emission of 73.95 MtCO₂e by 2030. In addition, the country communicated an additional 30% emission reduction subject to external support (finance, technology transfer, capacity building) to Ghana to cover the full cost of implementing the mitigation action.

Article 4 paragraph 19 of the Paris Agreement and decision 1/CP.21 paragraph 35, requires Country Parties to formulate and communicate to the UNFCCC Secretariat, their respective “Mid-century long-term low GHG emissions climate resilient development strategies by 2020”. This long-term strategy will provide a road map to inform both short and long-term developments that would trigger economic growth and build climate resilience in the country as well as contribute to the goal of the Paris Agreement. The Ministry of Environment, Science, Technology, and Innovation (MESTI) had initiated a process of updating Ghana’s NDC. AICCRA’s efforts in Ghana through engagement with the NFCS and work on advisory services helps to support this process and in particular the revision of the agriculture component of the NDC. The Ministry of Food and Agriculture (MoFA) continues to collaborate with the CGIAR on AICCRA related issues and will be very influential to ensure that policy-related solutions are implemented within different areas of Ghana. This study, through various stakeholder interactions at the ministerial level, district level and smallholder farmer level has proposed policy-related insights as highlighted below.



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