

ClimapAfrica

Policy Brief Series

October 2020

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Adoption of climate-smart agricultural practices among smallholder farmers: The role of human capital development

The existential threat of climate change to humanity is uncontested. Climate change poses cross-sectoral and irreversible impacts on global agri-food production systems and ecosystems. Countries in Africa, south of the Sahara are the most vulnerable to the effects of climate change although the region emits the least of global greenhouse gases concentration. Indeed, Africa's vulnerability to the brunt of climate change was established in the 2007 IPCC report, and further reinforced in the Fifth Assessment Report (AR5) of IPCC. The latter report projected that food supply in south Saharan Africa will worsen beyond the initially predicted 50% level reported in the 2007 report – with most of the countries liable to climate-related shocks due to their agrarian economic base.

Over time, stakeholders, led by notable research institutions and multinational Non-Governmental Organisations (NGOs) have collaborated in designing and promoting locally-adapted technologies (i.e. Climate-Smart Technologies) and practices to farmers.

The objective of these efforts is to enable farmers to adapt their production systems to the current climate situation through the adoption of technologies to enhance agricultural productivity and also to ensure food security. These practices are collectively known as climate-smart agricultural practices. Adoption of climate-smart agricultural practices can contribute to the growth of the national GDP by resolving critical problems like food insecurity and low labour employment under agri-production systems. In spite of this, the effect of human capital development on adoption of climate-smart agricultural practices has not been extensively discussed. Particularly, studies on the role of training in promoting the adoption of climate-smart agricultural practices in developing countries is lacking. Also, smallholder farmers may self-select into NGO-backed programmes or projects. This can introduce endogenous biases when evaluating the outcomes of farmers' training participation decisions. Hence, it is important to understand how participation in farmer training programmes affects



the adoption of climate-smart agricultural practices, and the extent of adoption of such practices by farmers.

What drives the adoption of climate-smart agricultural practices among smallholders?

Empirical results show that the drivers of farmers' participation in climate change capacity building programmes are the reception of agricultural extension service and membership of farmer-based organisations. Conversely, farmers operating irrigated plots have lower likelihood of participating in climate-smart capacity building trainings compared to their counterpart rainfed farmers. Registration in agricultural insurance programmes, participation in capacity building programmes, and employing family labour increased farmers' intensity of adopting climate-smart agricultural practices by about 23%, 19%, and 4% respectively. Meanwhile, longer distance to potable water source, high off-farm income, and longer distance to health facilities diminished farmers' intensity of adopting climate-smart agricultural practices by about 0.9%, 1.8% and 2.3% respectively.

Training on climate-smart agricultural to bring concomitant welfare effect for farm households

Development projects should incorporate farmer training on climate-smart agricultural practices in their programming in order to guide the adoption of multiple climate change adaptation practices that have concomitant welfare effect for farm households. Here, extension agents and farmer-based organisations should be targeted to disseminate information to farmers. Agricultural insurance is purchased by producers to protect against crop loss due to natural disasters such as drought and floods, or the loss of revenue due to declines in the prices of agricultural commodities. Agricultural insurance is mostly subsidised by NGOs and promoted along with other climate adaptation strategies for farm households – making it relevant towards the adoption of climate-smart agricultural practices. Farm insurance reduces the risk of investing in climate adaptation and mitigation practices for smallholder farmers, and for that matter, national agricultural policies should facilitate farmers' subscription to agricultural insurance programmes as a means to increase their resilience to climate risks and shocks.

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Based on Journal Article: "Adoption of climate-smart agricultural practices among farm households in Ghana: The role of farmer participation in training programmes"
Published: 4 August 2020 in Technology in Society. [Access the Journal Article](#)

