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Impacts of the integrated rice-fish farming system technology on food and nutrition security of small-scale farmers in developing countries: An application of marginal treatment effect model

Aminou Arouna[1], Rachidi Aboudou[1], Inoussa Akintayo[2], Roger Ahouansou[2]

[1] *AfricaRice, Côte d'Ivoire*
[2] *AfricaRice, Liberia*

Abstract

Food insecurity and child malnutrition remain persistent problems in sub-Saharan Africa. In this study, we analyse the heterogeneity in the impacts of integrated rice-fish farming system technology (IRFFST) on welfare indicators such as the quantity of fish consumed in the household, food and nutrition security, and poverty reduction in Liberia. We employ the marginal treatment effects (MTE) approach to estimate the treatment effects heterogeneity and policy-relevant treatment effects (PRTE) on the cross-sectional survey data of 967 rice farmers in Liberia. The findings show substantial heterogeneity in the benefits from the adoption of IRFFST for both observed and unobserved household characteristics. Among the determinants of adoption, the key determinants are access to credit, access to irrigation in the lowlands, farm size, and access to extension services. The empirical results show that the adoption of the IRFFST significantly reduces household food insecurity, increases the quantity of fish consumed in the household, and increases household dietary diversity, but reduces the poverty headcount of households at the lower level of unobserved resistance to adoption. On average, a random farmer selected from among the rice farmers had their food consumption score increase by 8.28 units. In addition, on average, a random farmer selected among the rice farmers had increased the quantity of fish consumed in their household per month by 7.92 kg (equivalent to a 31 % increase) due to the adoption of IRFFST. Overall, promoting IRFFST technology is important to improve food and nutrition security and the welfare of rural people, especially for marginalised poor indigenous smallholder rural farm households.

Keywords: Adoption, Africa, food security, impact, integrated rice-fish farming System technology

Contact Address: Rachidi Aboudou, AfricaRice, Policy, Innovation Systems, and Impact Assessment Program (PII), Bouake, Côte d'Ivoire, e-mail: rachidiaboudou@gmail.com