Bundesministerium
für Ernährung
und Landwirtschaft

NUTRITION

Nutrition – Diversified Agriculture for a balanced nutrition in Sub-Saharan Africa

ADDA: Agriculture and Dietary Diversity in Africa

Country	Kenya (secondary data analysis also for Ethiopia, Malawi, and Uganda)
Funding Agency	Bundesministerium für Ernährung und Landwirtschaft – BMEL
Project executing Agency	Bundesanstalt für Landwirtschaft und Ernährung – BLE
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Project Budget	849.989,60 €
Project Duration	01.01.2015 – 31.12.2017 (extended to mid-2018)
Key Words	Nutrition-sensitive agriculture; dietary diversity; agricultural extension; nutrition training; randomized controlled trial
Background	Hunger and micronutrient malnutrition remain widespread problems, especially in Africa. A large proportion of the people affected are smallholder farmers. Hence, a key question is how smallholder systems can be made more nutrition-sensitive. The multifaceted linkages between agriculture and nutrition are not yet fully understood. In particular, it remains unclear under what conditions agricultural diversification can contribute to higher dietary quality. Moreover, the role of markets for smallholder nutrition remains ambiguous. Finally, while certain technologies could also help improve nutrition, the uptake of pro-nutrition technologies by smallholder farmers is sometimes slow, due to limited knowledge and awareness of nutrition problems and their underlying causes. New agricultural extension approaches have to be developed that build on local knowledge and combine agricultural training with nutrition awareness creation.

Objectives	The overall aim of the ADDA project was to improve the knowledge on agriculture-nutrition linkages in the African small farm sector and develop approaches how the uptake of pro-nutrition innovations can be promoted. Two concrete objectives were pursued: 1. To better understand the relationship between agricultural production diversity and nutritional quality well as factors that influence this relationship. 2. To develop and test new agricultural extension models suitable to promote the uptake of pro-nutrition technologies. Objective 1 was pursued by analyzing household data from four countries in Africa, namely Ethiopia, Kenya, Malawi, and Uganda. Objective 2 was pursued through a randomized controlled trial (RCT) carried out in Kenya.
Results	**What influences diets and nutrition in small farm households?** The analysis of data from various countries in Africa (Ethiopia, Kenya, Malawi, Uganda) shows that farm production diversity is positively associated with dietary diversity in some situations, but not in all. Especially when production diversity is already high, the association is not significant, or it even turn negative when diverse production entails lower cash incomes due to foregone benefits from specialization. Markets seem to be more important for dietary diversity than subsistence production. These results were also confirmed in a meta-analysis that we carried out including additional studies from other countries. The mean marginal effect of production diversity on dietary diversity is positive but small. On average, farms would have to produce 16 additional crop or livestock species to increase dietary diversity by one food group. The primary data collected in Kenya were used to analyze the role of markets for farm household nutrition more explicitly. Commercialization, meaning a shift from subsistence farming towards higher levels of market orientation, significantly increases the consumption of calories and micronutrients, mainly channeled through income gains and thus better access to nutritious foods from the market. Commercialization does not reduce the consumption of nutrients from own-produced foods. Yet, stronger market orientation can lead to a loss of female autonomy, which could be prevented through gender-sensitive approaches. **How can agricultural extension be made more nutrition-sensitive?** We analyzed how agricultural extension can be made more effective in terms of increasing smallholder farmers' adoption of pro-nutrition technologies. In an RCT with farmers in Kenya, we implemented several extension treatments and evaluated their effects on the adoption of beans biofortified with iron and zinc and an improved breed of chicken. The experimental results show that intensive agricultural training tailored to local conditions can increase technology adoption considerably. Within less than one year, adoption of biofortified beans increased from almost zero to more than 20%. Providing additional nutrition training further increased adoption by another 10-12 percentage points, as this has helped farmers to better appreciate the technology's nutritional benefits. These results suggest that effective nutrition training through agricultural extension services is possible. Providing marketing training did not lead to additional adoption effects, although the study period may have been too short to

	measure these effects properly. We also used the RCT data to analyze the informal flows of agricultural and nutrition information and how these informal information flows can be used to improve the effectiveness of extension services. The analyses reveal that group dynamics play an important role. The technology adoption behavior of other farmers in the social network significantly influences the individual's adoption decision: the higher the number and share of farmers in the group that adopt the new technologies, the higher is the likelihood for the individual to also adopt. These results clearly underline the advantages of offering training to farmer groups. Group training is not only less costly than individual training, but can also trigger positive social dynamics. Joint learning in the group and exchange of knowledge and experience can speed up the successful uptake of pro-nutrition technologies.
Photo	 Project consortium and partners at the final conference in Nairobi
Recommendations	• While local conditions matter, there is little evidence to support the assumption that further increasing farm production diversity is a highly effective strategy to improve smallholder diets in Africa. • Strengthening market functioning and improving market access are important policies to improve dietary quality and nutrition of smallholders. • The development and spread of pro-nutrition technologies, such as biofortified crops, is also a promising strategy, but requires improved agricultural extension approaches. • Combining agricultural training and nutrition training as part of the agricultural extension service seems possible and effective to promote the adoption of pro-nutrition technologies. • More generally, closer coordination and cooperation between agricultural and nutrition programs will be useful to harness synergies and develop more cost-effective outreach models.