



Crop Diversification Increases Household Diets and Improves Child Growth in Ethiopia

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The context

Despite some progress to reduce the prevalence of malnutrition in Sub-Saharan Africa (SSA), recent evidence shows that high risks of nutrition insecurity and staggering levels of child malnutrition remain ubiquitous particularly in rural areas of the region. Rural households are plagued by undernutrition and chronic deficiency of micronutrients or essential vitamins and minerals –“hidden hunger”– that often coexist in the same household or individuals. Children pay the heaviest toll as malnutrition due to undernutrition or nutrient deficiency is the cause for about 45% of all deaths of children under 5 years of

age. Childhood malnutrition has an adverse effect on the child's future potential during adulthood due to its negative impact on physical stature, educational and cognitive development and productivity. Thus, malnutrition might take children and communities into a cycle of intergenerational poverty and entrench inequalities. Reducing the burden of malnutrition would, therefore, have crucial implications for economic development. Given that many of the undernourished people are smallholder farmers and majority of the malnourished children are from rural areas, the question remains how to leverage the benefit of agriculture to improve nutrition.

Due to its dual role as both the source of income and diverse foods for consumption, agriculture remains the most important sector to improve nutrition and break the generational cycle of malnutrition. Despite this potential, for many years, nutrition policies have been aligned with the health sector with less or no equal push to align them with the agriculture sector. As a result, agriculture has been slow to respond to the persistent problem of malnutrition. The capacity of agricultural policies to achieve better nutritional outcomes is also constrained due to a bias towards improving the productivity of a few staple crops as a strategy to spur agricultural productivity and improve welfare. Although increased farm specialization has contributed to poverty reduction in developing countries, reliance on a few staple crops has led to a decrease in agricultural and dietary diversity, low agricultural productivity, and exposes farmers to production and price shocks. As the challenges of malnutrition and climate change come together as an opportunity in agriculture, there seems to be a growing consensus that the solution to tackle them lies on identifying climate-smart agricultural practices that could also improve nutrition.

In the current policy discourse, crop diversification is promoted and preferred over monocropping as it is deemed important to increase agricultural production, enhance nutrition security, and aid sustainable agricultural transformation. This is also echoed in recent agricultural development policies that aim to spur agricultural development and improve human health and nutrition through increasing investment on agriculture. The United Nation's Sustainable Development Goals (SDGs) accentuate that increasing crop diversity is of paramount importance to simultaneously improve agricultural production and nutrition in a sustainable manner. Crop diversification is among the productive agricultural adaptation approaches available to farmers in SSA who face liquidity, asset, or other constraints. As such, crop diversification is one of the several climate-smart agricultural practices that would help to improve nutrition among low income households.

Background

This brief is based on a study that illuminates the link between agriculture and nutrition in the small farm sector in a developing country context using Ethiopia as a case study. Ethiopia is largely an agricultural country. The agriculture sector employs about 70% of the labour force. Because the sector is predominantly rain-fed and vulnerable to climate variability and extremes, climate change is a challenge for food security and nutrition in the country. Malnutrition is also a long-standing pressing issue in Ethiopia despite improvements in the last two decades as it is evident from the unacceptably high rates of stunted growth among children under 5 years of age and micronutrient deficiencies.

The Government of Ethiopia has made a firm commitment to combat malnutrition. Although the food and agriculture sector has fuelled economic growth in the country, there is now an increasing interest to leverage agriculture to improve nutrition. This is emphasized in the National Nutrition Plan (NNP) that engages agriculture for improving nutrition, and the Growth and Transformation Plan II (GTP) that emphasizes addressing malnutrition. The country has also established various strategies and programmes to mainstream nutrition into agriculture. Agricultural diversification has been recognized as a strategy to improve nutrition and human health, in addition to its benefit as a climate risk coping strategy. However, very little empirical evidence exists regarding its impact on nutrition. This brief provides insights into the policy discourse surrounding the role of agricultural diversification in improving nutrition outcomes.

The problem

While assessment of the economics of crop diversification has a long story in the development and agricultural economics literature, its impact on diets and nutrition receives interest only in contemporary work. Although the existing few studies are informative of the agriculture nutrition linkage, empirical work on this topic is still sparse to assist policy making. To fill in the knowledge gap, the current study analyzes the impact of crop diversification on child growth outcomes, and household diets and nutrient production. Given the high costs and challenges of micronutrient deficiencies and increased prevalence of diet-related disease in resource poor economies such as Ethiopia, investigating the link between crop diversification and nutrition outcomes helps to design policies and strategies that could improve nutrition in these areas. Moreover, there is need to investigate the impact of diversification on nutrition in agriculture-based economies characterized by repeated exposure to shocks and limited access to markets.

Key findings

This brief is based on a study that utilizes rich panel survey data combined with historical weather data to assess the impact of crop diversity on different nutrition outcome indicators that include child growth, household nutrient production gaps, diet quality, food intake, and diet diversity. The brief also presents the heterogeneous effect of crop diversity on child growth by gender of the child, market access and exposure to drought shocks.

Crop diversification has positive but modest effect on child growth

The results show that child height-for-age z-score (HAZ score) is positively associated with crop diversity. Cultivating one more crop increases the HAZ score by 0.085, which is equivalent to 4.3% of a standard deviation or 8.7% of the within-child variation. The effect of one additional crop group on the WHZ score is found to be 0.403 (29.3% a standard deviation or 63.2% of within-child standard deviation). Crop diversity has a positive effect on reducing child stunting. Increase in equitable allocation of land across crops cultivated by the household decreases the risk of child wasting. Overall, the results show that rural households can achieve reduction in child malnutrition by cultivating more crops and equitably allocating their land across all the crops they cultivate. More important, more equitable allocation of cultivated land across crops is associated with higher child health impacts than expanding the crop production portfolio by cultivating more number of crops. The magnitude of the estimated impacts is found to be small. This is not surprising given high persistence in childhood anthropometric measures, which implies that changes in crop choices are less likely to generate large effects on child nutrition over time.

Crop diversification generates more child health benefits in areas with limited access to markets

Crop diversification does not reduce child stunting in areas that experience drought shock. Descriptive statistics results show that stunting appears to be higher for boys and girls under shock exposure than in periods where no shock are experienced. However, the results do not provide evidence regarding the impact of drought shocks on child growth. This could explain the limited effect of crop diversification in child growth under conditions of drought shock. Crop diversification generates positive child growth benefits (by reducing stunting) among households that live in villages with limited access to (local) markets. This suggests that market access mediates the effects of crop diversification on child growth.

Crop diversification also improves household diets

The results in this brief show that greater crop diversification is beneficial for children health as it is associated with an increase in HAZ and WHZ and a decrease in stunting and wasting. One of the mechanisms that can explain the relationship between crop diversification and child growth is household diet diversity or nutrient production effect. Given that smallholder farmers typically consume a sizable part of what they produce, increasing production diversity on the farms through introducing additional crops, or reallocating their land to new crops, could improve household diets and nutrition. As subsistence households produce mainly for own consumption, the choice of agricultural outputs largely determine the diversity and quality of their diets and production of nutrients. As shown above, this mechanism or pathway is likely to be more effective when households are isolated from markets and exposed to climate variability and extremes.

Household diet diversity is positively associated with the number of crops cultivated by the household. One additional crop cultivated by the household is associated with an increase in the diet diversity of 0.10. The results suggest that households with a higher crop diversity display greater dietary or nutritional diversity. As in previous studies, however, the magnitude of the impact is small. Moreover, diet quality is strongly correlated with crop diversity. This indicates that the share of quality diets in households calorie production increases with crop diversification. The effect appears to be higher with more equitable allocation of land across the crops cultivated by the household. This result suggests that reallocation of land among crops would improve diet quality than the mere addition of crops in the portfolio or allocating more land to few crops.

Finally, the results show that crop diversification has the potential to close nutrient production gaps. Calorie and nutrient production gaps are found to be significantly correlated with the number of crops cultivated by the household. However, the effect of crop diversity on calorie and nutrient production seems to be achieved by adding more crops to the production portfolio, not necessarily by equitably allocating farm land among existing crops. The results, to some extent, suggest that farmer innovations that motivate production of new crops would help to improve household nutrition.

Implications for policy makers

Overall, crop diversification has a positive but small impact on child growth. The child growth benefits are achieved through its positive impacts on child height-for-age (HAZ) and weight-for-height (WHZ) z-scores and reducing the risk of stunting and wasting. The positive impact of crop diversification on child growth suggests that agricultural policies should have a greater focus on agricultural diversification in general, and on crop diversification and nutritional quality of the production in particular. There is

no evidence that household's exposure to drought shock translates to catastrophe in terms of child stunting or wasting. Although crop diversification exerts positive child health effects, the study does not find evidence that crop diversification mitigates the negative impact of drought shocks on child health. Furthermore, the study highlights that crop diversification has stronger child growth benefits (reduced child stunting) in areas with limited access to local markets.

Rural Ethiopians' diet is diversified; however, their diet seems to be dominated by non-nutritious staples. The results of the study show that crop diversity has positive and significant impact on diet diversity. However, the magnitude of the impact is small. The results further suggest that crop diversification, particularly increasing the number of crops cultivated by the household, has a positive impact on diet quality. Moreover, increase in the number of crops cultivated is associated with increase in nutrient production and reducing nutrient production gap. The positive and significant impacts of crop diversification on nutrient production, diet diversity and diet quality is reassuring that crop diversification would improve child growth.

However, there could be other mechanisms at play through which agricultural production influences human nutrition.

From policy perspectives, the findings suggest that policies that target achieving nutritional gains should focus on promoting crop diversification to improve the quality and variety of the products from own production. This needs supporting farmers through alleviating resource constraints and providing access to reliable price information and inputs. Integrating diversification strategies into the extension system of the country could also help promote diverse production systems that feature cereals, cash crops, and legumes. Given the possibly high opportunity cost of crop diversification, further research is required to compare the nutrition impacts of crop diversification with other agricultural policies and interventions. This would help to identify complementary strategies that would improve the contribution of crop diversification to human nutrition. The results further suggest that policies that target crop diversification as a nutrition enhancing strategy need to take into account the economic and agroecological conditions that mediate the nutrition impacts of crop diversification.



Mission

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