



## Can Organic Farming Be an Alternative to Improve Well-Being of Smallholder Farmers in Disadvantaged Areas? A Case Study of Morogoro Region, Tanzania

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**Abstract** This study assessed the contribution of organic farming to improvements in the well-being of smallholder farmers as measured by crop productivity, profit, and food security among smallholder farmers in Morogoro Region, Tanzania. The results showed that organic farmers had diversified crops and availability of water for irrigation, and they had better selling situation of their crop products. It also showed significant differences in profit and food security between organic and conventional/traditional farmers. Profit among organic farmers was revealed to be more than ten times of profit among conventional/traditional farmers, with less expenditure for farm activity and higher income from their crops. Food security was analysed using food consumption score and dietary energy consumed, and showed significantly better results among organic farmers. The factors that significantly influenced productivity included sex of the household head, number of household member, access to constant markets, and livestock keeping. The number of years of practising organic farming showed a significant association with profit, and livestock keeping and age of the household head had significant impacts on food security. It was revealed that there are challenges to organic farming, including difficulty of land preparation, access to markets, getting premium price for organic products, and contamination from other non-organic farms. In conclusion, organic farming has the potential to improve the well-being of smallholder farmers in disadvantaged areas, especially with regard to profit and food security. Therefore, it is recommended that more emphasis should be placed on the promotion of organic farming by agricultural stakeholders.

**Keywords** organic farming, smallholder farmers, disadvantaged area, alternative development

### INTRODUCTION

As countries develop, there are always people in the shade of that development who do not benefit, and are the ones who should actually be targeted. A country's development sometimes skips people at lower levels, allowing them to remain in poverty. There are approximately 2 billion smallholder farmers worldwide who depend on themselves for their livelihood. Rural poverty is a problem that has been discussed for decades (IFAD, 2011), and it is generally said that peasants have not benefitted from development efforts thrust upon them by governments, multinational corporations, and international agencies (Leonard, 2006). In terms of Gross Domestic Product (GDP), Tanzania is steadily developing by more than 7% as of 2014 (WB, 2015). However, this economic development does not appear to affect rural citizens, and they have not seen improvement in their lives with regard to economy and food security (NBS, 2014). Due to limited opportunities for agricultural modernization

and inactive public support, organic farming has been suggested as a possible alternative development method to improve smallholder farmers' well-being in agriculture-based countries.

Organic farming is defined as a system that relies on ecosystem management rather than external agricultural inputs (FAO, 2014). Although organic farming has the potential to help smallholder farmers improve their well-being, it has been minimally practised by smallholder farmers in disadvantaged areas in Tanzania (UN, 2008; Aher et al., 2012; Andersson et al., 2012). Therefore, the goal of this study was to assess the contribution of organic farming to improvements in the well-being, as measured by crop productivity, profitability, and food security, of smallholder farmers in disadvantaged areas. Specifically, we wanted to assess this in a non-conducive environment where farmers are geographically, politically and relationally limited to external advantages such as good markets, financial services and export contracts.

Specific objectives of this study were to examine how farmers implement farming practices and sell their products; compare productivity, profit, and food security between conventional/traditional farmers and organic farmers; determine factors affecting productivity, profit, and food security; and identify challenges of organic farming.

## **METHODOLOGY**

This study was conducted from September 2014 up to January 15 in Morogoro Region, Tanzania. The Morogoro Municipality, Morogoro Rural District and Mvomero District were purposively selected for the study as all have small-scale organic farmers conducting multi-crop organic farming for their local consumption. For quantitative data, a total of 324 farmers including 160 organic farmers and 164 conventional/traditional farmers were selected, and a face-to-face structured questionnaire survey was conducted. To collect qualitative data, 24 organic farmers from three villages with different environmental conditions were chosen purposively to participate in focus group discussions.

Frequencies and percentages were used to summarise farming practices and products selling. Productivity, profit and food security were compared between organic farmers and conventional/traditional farmers by using independent samples T test. Food security was analysed with indicators of food consumption score and dietary energy consumed, and compared between two farming groups by using independent samples T test. Each respondent was asked about food items consumed at home over a period of previous 7 days. Multiple linear regression was used to determine impacts of some variables on productivity, profit and food security. Content analysis was used to analyse the challenges of organic farming

## **RESULTS AND DISCUSSION**

### **Implemented Farming Practices and Selling Situation**

The average number of different crops grown by organic farmers was 8.54 while that of crops grown by conventional/traditional farmers was 4.70. More than 70% of organic farmers had water available for their farms because many were living in mountainous areas with rivers, whereas, more than 80% of conventional/traditional farmers depended on rain. Mountainous areas are disadvantaged with regard to transportation and marketing. However, the geographic situation provided the benefit of water availability for irrigation in organic farming. Out of a total number of conventional/traditional farmers, 21.3% used chemical fertilizers and pesticides. The low percentage of farmers using agrochemicals showed that there were many traditional farmers who did not utilize synthetic fertilizers and pesticides. For this reason farmers were categorized into organic farmers and “conventional/traditional farmers” in this study.

Constant markets were more available to organic farmers. More than two-fifths (43.1%) of organic farmers had constant markets, compared to only 8.5% of conventional/traditional farmers. This situation may result from a trend in crops grown and the farmers' motivation to sell crop products. Specifically, because conventional/traditional farmers grow fewer crops in comparison with organic farmers, they do not have much crop variety available to sell. Furthermore, since starting organic farming, organic farmers seemed to be more motivated to sell their crop products specifically as organic products. Of the organic farmers, 38.1% sold at least some of their crop products as organic products, and other organic farmers sold their crop products without mentioning that they are organic. Among those who sold their crop products as organic, 18.1% sold their crop products, or at least a portion of them, for a higher, premium price. This implies difficulty in gaining customer attention with regard to crop status, and connecting that attention to a premium price.

### Comparison of Productivity, Profit and Food Security between Organic Farmers and Conventional/Traditional Farmers

Maize, cow peas, and pumpkins were the most grown crops in both farming groups. These crops showed higher levels of productivity among organic farmers, but the differences between organic farmers and conventional/traditional farmers' outputs were not significant, as shown in Table 1 ( $p > 0.05$ ). Significant differences were seen in some other crops such as tomato, Chinese cabbage, and amaranth, but these crops did not have enough samples. Those three crops are often said that they can show immediate changes along with organic farming practice such as organic fertilizers and pesticides, and they are often used in organic farming training sessions (University of Kentucky, 2007). Therefore, those results imply that crops that farmers are taught on how to grow more likely show higher productivity. There are two possible reasons for the higher productivity of organic farms. First, organic farming practices promote high productivity by creating a richer environment for crops. Second, farming techniques learned in organic farming training, such as how to arrange crops in a farm promote high productivity. One farmer in Bamba explained that they did not know how to arrange crops in a farm, and used to plant crops very roughly. After training on organic farming, they got to know the necessary length between crops in a seed bed, and many of them had feelings that productivity had increased.

**Table 1 Crop yields' mean productivity per ha**

Crops	Farming style	n	Mean (kg)	F	Sig.
Maize	Organic	141	1156.30	1.251	0.264
	Conventional/traditional	162	1039.44		
Cow peas	Organic	80	207.77	0.250	0.875
	Conventional/traditional	92	186.31		
Pumpkins	Organic	95	409.62	2.436	0.120
	Conventional/traditional	81	261.83		

The mean profit among organic farmers was significantly higher than that among conventional/traditional farmers, with a smaller minimum amount and larger maximum amount as shown in Table 2 ( $F = 13.652$ ,  $p \leq 0.001$ ). In 2013, the mean profit of conventional/traditional farmers was less than one-tenth that of organic farmers. This large difference was due to a large proportion of conventional/traditional farmers experiencing an income deficit. Among conventional/traditional farmers, 44.5% had no income from their crop production, and 58.5% had a deficit. By contrast, only 13.1% of organic farmers had a deficit, because organic farmers can lower farm by taking advantages of hand-made organic fertilizers and pesticides, and can bring higher income by making farmers

connected to markets with more crop varieties. The mean income among organic farmers was more than four times that of conventional/traditional farmers. This combination of lower expenditures and higher income for organic farming is supported by several studies that showed a reduction in input costs and an increase in income in organic systems (Peramaiyan et al., 2009).

**Table 2 Profit (Tanzanian Shillings\*) among farmers**

Farming group	n	Min	Max	Mean	F	Sig.
Organic farmers	160	-391,000	5,4736,000	1,636,608.14	13.652	0.000
Conventional/traditional farmers	164	-1,879,000	16,625,500	146,970.55		

\* US \$ 1.00 = Tanzanian Shillings (TZS) 2,165.02 in September, 2015

The mean food consumption score of organic farmers was 51.17, higher than that of conventional/traditional farmers (49.45). Scores were calculated for three categories: poor (1), borderline (2), and acceptable (3). Scores were compared between the two farming groups, and the comparison showed higher means among organic farmers with a significant difference ( $F = 6.514$ ,  $p \leq 0.05$ ). With regard to dietary energy consumed, households of organic farmers had a higher mean for dietary energy consumed (2,976.53 kCal per adult equivalent per day) than the households of conventional/traditional farmers (2,912.25 kCal per adult equivalent per day). Households were classified as food-insecure and food-secure based on a cut-point of 2,200 kCal, the national caloric poverty line per adult equivalent per day in Tanzania (NBS, 2014). Among households of conventional/traditional farmers, 24.4% were below the cut-point, whereas only 19.4% of the households of organic farmers fell below the cut-point. The score of the food-insecure group, which consumed below 2,200 kCal (1), and the score of the food-secure group, which consumed more than 2,200 kCal (2) were compared, and the difference between organic farmers and conventional/traditional farmers was significant ( $F = 4.793$ ,  $p \leq 0.05$ ). From a food security perspective, organic farmers had better scores. Therefore, it could be said that organic farming contributes to food security at the household level. There are two possible reasons for this better household food security. First, increased quantities of crops in organic farms provided increased access to food. Second, the higher income of organic farmers increased their purchasing power.

**Table 3 Independent sample T test comparing food security**

Variable compared	n	Mean	F	Sig.
Food consumption score of organic farmers	160	2.77	6.514	0.011
Food consumption score of conventional/traditional farmers	164	2.70		
Scores of dietary energy consumed of organic farmers	160	1.81	4.793	0.029
Scores of dietary energy consumed of conventional/traditional farmers	164	1.76		

### Factors Influencing Crop Productivity, Profit and Food Security

Multiple linear regression was performed to determine impacts of several independent variables on crop productivity, profit, and food security (Table 4). For maize, results showed that female-led households had higher maize productivity. This is in contrast to a number of previous studies (Koru and Holden, 2010). These results imply that female-led households no longer suffer from the traditional disadvantages that have previously led to lower productivity than male-led households. This could be explained by women's high commitment to maize production activities. Results also showed

that those households with more household members had higher maize productivity. We suggest that a large number of household members leads to a bigger labour force. Results also indicate that having a constant market leads to higher maize productivity. Households with constant markets may have more motivation to sell and therefore care more about their farms.

For pumpkins, the results revealed that livestock owners tended to have higher productivity. Total income from livestock keeping was found to have a significant impact on productivity of maize in regression ( $p \leq 0.05$ ). The income from livestock may help farmers purchase farm inputs and equipment and allow them to prepare a separate farm for pumpkins. Many households did not have a separate farm of pumpkins, because maize, cow pea and pumpkins are the crops used most for intercropping. It may cause lower productivity of pumpkins in this study, since the study did not consider whether they intercropped or not when calculating productivity. In addition, farm yard manure from the livestock could be utilized to help the pumpkin crop thrive.

Profit was influenced by the number of years practising organic farming. This implies that more experienced organic farmers tend to have higher profits. One possible reason for this is that experienced organic farmers easily take advantage of organic fertilizers and pesticides by utilizing local materials instead of purchasing them, whereas some new organic farmers have not yet found a reasonably priced source of animal manure. Moreover, experienced organic farmers could achieve higher incomes by establishing markets to sell their crop products.

Factors affecting food security were analysed using aspects of the food consumption score and dietary energy consumed. Multiple linear regression of food consumption scores showed that scores were affected by whether the farmer owned livestock and age of the household head. Specifically, households with livestock had a higher food consumption score, as did households headed by an elder. The higher food consumption scores for households with livestock could be related to additional income associated with livestock ownership. In 2013, about half of the livestock keepers received income from selling their livestock or livestock products such as eggs and milk. The additional earnings from crop production may have improved the economic situation of those households and led to better food security. The age of the household head may have a positive effect on food security because of their richer experiences. Multiple linear regression did not show a significant effect of any of the variables with regard to dietary energy consumed.

**Table 4 Impact of some of the independent variables to productivity, profit, and food security**

Dependent variable	Independent variable	n	B Coefficients	Beta	T	Sig.
Productivity of maize	Sex of a household head*	324	-0.337	-0.296	-3.105	0.002
	Number of people in a household	324	0.061	0.248	2.599	0.011
	Whether they had a constant market	324	-0.203	-0.216	-2.287	0.024
Productivity of pumpkins	Whether they owned livestock	324	-0.937	-0.380	-3.384	0.001
Profit	Years of practising organic farming	324	337206.131	0.375	3.839	0.000
Food consumption score	Whether they owned livestock	324	-6.377	-0.244	-2.831	0.005
	Age of a household head	324	0.169	0.226	2.622	0.010

\* This table only shows the independent variables which showed significant impacts on the dependent variable

### Challenges of Organic Farming

Challenges of organic farming were grouped into categories using content analysis (See Box 1).

**Box 1: Difficulties of conducting organic farming**

Below are some quotations from farmers with regard to difficulties in conducting organic farming.

**1. Difficulty of farm land preparation**

“If you have a farm of 1.5 ha, you cannot make terraces by yourself. Hiring a temporary worker for making one terrace costs TZS 5,000\*. It is expensive.” (Old woman in Ruvuma)

**2. No market place**

“There is nowhere to sell the products. Sometimes amaranths stay at farm until they get rotten.” (Young girl in Kireka)

**3. Difficulty of selling for a premium price**

“Prices of our organic products should be the same as those of neighbours.” (Old woman in Kauzeni)

“People know organic farming, but they do not know values of health. You can tell a customer that your one bunch of carrots is for TZS 1,500. She/he goes for carrots of TZS 600 which are grown with agrochemicals.” (Old man in Ruvuma)

**4. Contamination of soil by conventional farmers**

“Some neighbours are using chemicals. Our crops get contaminated on farm.” (Old woman in Kauzeni)

**5. Water requirements**

“When you grow vegetables, it is necessary to have water.” (Old woman in Ruvuma)

\* US \$ 1.00 = Tanzanian Shillings (TZS) 2,165.02 in September, 2015

It was revealed that land preparation was a big burden on organic farmers. With regard to the market place, there were organic farming groups which could access the organic shop for selling and some which could not. In addition to this accessibility issue, meagre scale of the organic shop was also a constraint. One farmer mentioned that, “If you order for only five crop products, others get rotten in a big farm”. The issue of premium price is important to consider when promoting organic farming. One farmer in Ruvuma explained that when they promote organic farming to other farmers, some farmers are not attracted because the selling price is the same. Contamination of soil by nearby conventional farmers is a difficult issue. Even though there were not many conventional farmers using agrochemicals during the time of this research, according to the country’s trend, the number of users of agro-chemicals will increase in the future. Especially in mountainous areas where no efficient coping strategies against soil erosion are used, soil is likely to suffer serious damage. The availability of water is important. Organic farming organizations provided hose pipes or sprinklers to farmers when beginning organic farming training. One traditional farmer in Lukobe mentioned, “If I buy water for TZS 200 per bucket for growing vegetables and sell one bunch of them for TZS 200, can I really get profit?” This water issue is an essential concern for conventional/traditional farmers considering beginning organic farming.

## CONCLUSION

This study found that organic farmers take advantage of organic farming practices including crop varieties and water availability. Organic farmers had a more beneficial market situation for their crop products, but there were still difficulties in being able to sell their crop products as organic and receive a premium price due to low awareness of the value of organic products. Therefore, increased awareness of organic branding is a key to the practice of organic farming. It was also revealed that organic farming may be an avenue for higher profit by balancing expenditure and income, and also an avenue to better food security in terms of food consumption scores and dietary energy consumed. As access to a constant market significantly influenced productivity of maize, construction of additional market places would help smallholder farmers achieve higher crop productivity. The number of years practising organic farming showed significant association to profits and supported the contribution of

organic farming to profitability. Because food consumption scores showed that livestock keeping was a significant determinant of food security, livestock keeping is an important factor to be taught in farm training for improvement in socio-economic well-being. For smallholder farmers to conduct organic farming smoothly, solutions for challenges of land preparation in mountainous areas that need terraces are required. Moreover, further support is required to address the soil contamination problem.

This research demonstrates that organic farming can be an alternative to improving the well-being of smallholder farmers with respect to profit and food security. It could be said that organic farming, which is enhanced by accessible local resources, can replace former development efforts as a sustainable rural development approach.

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