



The vigorous of land access and management implication on crop production among smallholder farmers in the Southern Highlands, Tanzania

Brown Gwambene

Marian University College, Bagamoyo, Tanzania
gwambene@gmail.com

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Abstract

Among the major challenge in land use, smallholder farmers face over the years has been land fragmentation to accommodate family land requirements. They are straggling to increase land productivity, adapt to climate variability and access to adequate seeds, fertilizer and other inputs. Low uptake of new technology and the effect of changing climate stretched the problem and it becoming the grave of concern that posed formidable threats to smallholder farmers. These reverted smallholder farmers to the food purchaser contrary to producers who contribute to the food basket. To acquire reliable and valid information a combination of both qualitative and quantitative techniques deployed in data collection. Specifically, the study reviewed the existing literature and employed Questionnaire survey, focus group discussion (FGD), Key informant interview (KI) and field observation. The focus was on examining the land use dynamic and their implication on the food crop production among smallholder farmers. The results indicated the vulnerability of smallholder farmers to hovering food prices and high production cost resulting from land shortage/ exhaustion, increasing production cost and changing environment. It concluded that deteriorating in agricultural productivity and food crop production among smallholder farmers resulted in dependency on purchased food as food consumption is outpacing food production. Thus, recommends the need for tactical measures to ameliorate the divergent and dynamic factors responsible for and increase agricultural productivity and food crop production to cater for exceeding population demands. Investing in innovative and improved farming production practices to enhance the resilience and capacity of smallholder farmers to adapt to changing environment and sustaining land productivity recommended for addressing the challenges.

Keywords: Land access dynamic, Management challenges, Food crop production and Smallholder farms.

Introduction

Major changes occurred overtime on agricultural crop production, particularly on farming practices, inputs, land allocation, crop harvesting and processing, management practices, type and varieties of crops, marketing, outputs capital and public support¹⁻³. The agricultural sector dominated by the smallholder farmers with average farm sizes ranging from 0.2 to 3.0 acres, depending on the population pressure and location of land². The primary and main purpose of crop production in many small holder farmers' households has been own consumption, whereas sales of produce account for about 70% of household income⁴. The Tanzania national data indicate an increase in land allocated for agricultural crop production especially, for food crop production⁵. For example, food crop production has grown at a rate of 3%, which is about the rate of population growth and accounts for about 65% of agricultural GDP, with cash crops accounting for only about 10%⁴⁻⁷. It was argued that the yields of the main food crops were mostly stagnant for the last twenty years and agricultural productivity gains have been based more on the expansion of cultivated land, which is one of the major drivers of land degradation in the country^{2,8-10}. Availability of productive land affects agricultural

intensification that considered to be driven by population growth and its associated increase in density¹¹⁻¹³.

The productive land becoming more unproductive due to environmental changes resulted from land degradation and exhaustion described in the literature¹⁴. The effect augmented by deleterious effects of changing climate, anthropogenic activities and natural catastrophes on land resources and production. Thus increasing challenges on land productivity and crop production among small holder farmers. The decision to produce, allocation of investments and management strategies is influenced by the interaction of factors in the production process. Access to land and availability compounded by climate variability forced smallholder farmer to produce a certain type and variety of crops. More challenge and difficult are anticipated due to the increasing population that resulted in land fragmentations that affects diversification. Land fragmentation hinders intensification for practicing intensive agriculture on available land that affects diversification to reduce the impacts of changing environment. It is, therefore, important to enhance farmers' resilience and capacity to adapt through investing in the development of new innovative farming techniques, social inclusion and participatory approaches to reduce the negative impact of land-use dynamics and climate variability.

Methodology

Study area: The study was conducted in the multiple gradients of Rungwe District characterized by several ecological environments in the three zones namely highland, midland and lowlands zones. The highlands zone being enclosed by the Poroto Ridge and Mount Rungwe localized in the part of the Isongole ward. The midland zone occupied the part of Ukukwe, Pakati, and part of Busokelo divisions, whereas the lowland occupying the low reams of the southern district fragments. This area is located in the northern part of kyela district and the southern part of mountainous highlands of the Uporoto range, in Southern Highlands¹⁵. The southern part of the Uporoto ridge displays an interesting livelihood inclining in the high land to a lowlands environment¹⁵. The area is among the leading food crops producing areas known for being among the food basket area in the country.

Data collection: Secondary source of data: Wide ranges of literature were reviewed on land dynamic, crop production and climate change. The focus was on land use and management challenges, food crop production and strategies to improve farming community livelihood under the changing environment. It included gathering information on the implications of climate change and efforts to ameliorate the negative impacts. The main sources consulted include internets, government offices, universities documentation and districts departments.

Primary data sources: The primary data were collected through quantitative and qualitative methods. The quantitative methods deployed a questionnaire survey (HH) administered at the households of smallholder farmers. The qualitative methods used different techniques of data collection including Focus Group Discussions (FGD), Key Informant Interviews (KI) and Field Observation (FO). These techniques formed a basis for discussion through which qualitative and quantitative information was collected. Across level and scales within the targeted groups, face-to-face interviews guided by semi-structured questionnaire were conducted. This involved different key informants ranging from local government at the

district, wards and village governments, government officers including extension workers and knowledgeable persons. The data collected was triangulated to complement each other. Information collected during HH and KI were confirmed and validated through FGD and FO which, were conducted in each village. The FO was conducted and covered the important location and resources earmarked through other methods. FGDs were arranged in manners that involve a representation of all groups to capture their perceptions on the dynamic of land resources and environment, their implications on crop production, the challenges faced in bouncing back for improving production and livelihood activities. FO also was used to validate the KI, HH and FGDs information and assisted in gathering biophysical information.

Data processing and analysis: The data analyses were conducted during and after field data collection. The collected data were organised basing on their contents and trends, scrambled and edited for processing using different analysis methods. The quantitative data was compiled, coded, entered in software, cleaned and analysed by using Statistical Package for Social Sciences (SPSS 20) and Microsoft Excel software. The qualitative data were tabulated and compiled during and after data collection using content, scenario and trend analysis. The analysed data were presented in a description, figure and tabulations.

Results and discussion

Land ownership and allocation for crop production: There is an increase in land demand for agricultural production due to land degradation, climate variability, urbanization, demand food and increased human population. The increased land scarcity in the area aggregated the competition of land for crop production. The study revealed that smallholder Farmers own smaller pieces of land for agricultural crop production. The owned lands are fragmented into small pies of land within the vicinity and in a different location. Table-1 shows the size of the owned land per plot within the village.

Table-1: Size of land (acre) owned within the village per plot.

Size of land (acres)	Area A		Area B		Area C		Area D		Area E	
	N	%	N	%	N	%	N	%	N	%
Less than 1	30	20.4	22	15.0	06	4.1	03	2.1	03	2.1
1 to 2	65	44.2	24	16.4	09	6.1	01	0.7	01	0.7
2.1 to 4	21	14.4	07	04.7	01	0.7	01	0.7		
4.1 to 10	06	04.1								
Total	122	83.0	53	36.1	16	10.9	05	3.4	04	2.7

Table-1 shows the small size plots fragmented in a different location. Although land fragmentations in the different locality are due to issue related to land access, it serves as diversification among smallholder farmers. Among the main changes in land include acquisition and ownership of land, recently the ownership has been through inherited and purchased as opposed to the inherited and clearing the bush or given by friends/relatives in the past. Besides, ownership also changed to include personal and household ownership. In the past, most of the land was owned by a family or a clan on which they were being distributed among the family members either through inheritance or positioning a share. The increased population resulted in land fragmentations, where a household/ person own many small plots within the village that may be in a different location for diversification. Table-2 below indicates land acquisition within the village.

The results in Table-2 indicate that more households acquire land through inheritance (54%) and purchasing (24%). Land grabbing with the attractive package to smallholder farmers in the area increased pressure on land and changed land acquisition pattern. Selling and buying of land have increased in the past few years as opposed to inheriting land that was not easily sold as it was under and distributed among family members.

Land access and food crop production in smallholder farmers: The farmers within a study area do own and use land outside the village for diversification or due to shortage of land within the village. Table-3 indicates land acquisitions, size, number of plots and ownership outside the village. Access to productive land is becoming despicable challenge on food crop production that amasses less monetary value. Most farmers preferred high-value crops over food crops due to the shortage of land and increased production cost.

Land fragmentation to accommodate family land requirements is among the challenges faced by smallholder farmers over the years. Over the years the shortage of productive land deteriorates productivity and food crop production among smallholder farmers. Thus dependency on purchased food as food consumption is outpacing food production. Besides, the small size of owned land augmented the food crops production challenge among smallholder farmers (Figure-1). These will need to improve the ability of smallholder farmers to cope and adopt new technology to increase resilience to environmental changes through investing in developing new innovative farming techniques and approaches for livelihood diversification.

Table-2: Land acquisitions and number of plots owned within the village.

land owned acquisition	Area A		Area B		Area C		Area D		Area E	
	N	%	N	%	N	N	N	%	N	%
Inherited	80	54.4	31	21.1	11	7.5	04	2.7	04	2.7
Purchased	35	23.8	17	11.6	2	1.4	01	0.7		
Cleared the bush/ forest	08	5.4	03	2.0	03	2.0				
Given by relative/ friends	01	0.7	03	2.0						
Total	124	84.4	54	36.7	16	10.9	05	3.4	04	2.7

Table-3: Land acquisitions, size, number of plots and ownership outside the village.

Total acres owned			Number of plot			land ownership	
Total acres	n	%	Plot	N	%	Ownership	%
Less than 1	7	4.8	1.00	23	15.6	Inherited	70
1.1 to 2.0	14	9.6	2.00	2	1.4	Purchased	30
2.1 to 4.0	4	2.8	3.00	1	.7		
4.1 to 7.0	1	.7	Total	26	17.7		
Total	26	17.7					

The small size of owned land indicated as indicated in Figure-1 affects the mechanization of agricultural production. Although the sometimes agriculture mechanization depends on the terrain of the land especially on the rough hilly lands that may require surmountable investments on agricultural machinery^{8,12,16}. However, in the scarcity productive area with high pressure on agricultural land, the slopes of mountains may be terraced for agricultural crop production^{14,17}. It is important to note that improve land productivity and crop production, land management through good agronomic practices both traditional and improved knowledge is prerequisite. This includes the rehabilitation of degraded land and increases productivity in the small piece of land.

Socio-political and land access for crop production: Social and political factors influence crop production through crop preferences, gender aspect, and policy guidance on the crop production process, the influence of political leadership, markets and land tenure, cultural aspects on production especially on the adoption of new technology. For example, gender as a typical stereotype at household level assigned a different role between man and women. It is obvious that women, who are the main producer of food crops, have less access and or do not own the land they use for crop production¹⁸. In other hand males who have access and primarily own the land, they accentuate production in favour of 'cash crop', with partial consideration to food crop production to enhance household food security¹⁹⁻²¹. Cash crops entitled more household agricultural land and attained a bigger share of household investment capital. Although some crops serve as food and at the same time sold for cash. For example, rice, banana, maize and round potatoes were used for food and sold for cash. Figure-2 shows various crops produced for food and cash.

Figure-2 indicates that crops that serve both food and cash acquire greater attention and allocated a large investment capital. Maize produced across the gradients together with other main food crop produced in each zone. The crops types and

variety to a great extent were determined by social-cultural, land availability and political/ institutional arrangement. The political and institutional affects crop production through access to land, and the availability of services that include the provision of good and services. The value of crops determined by market demand and existing policy and Government vision also play a greater role than prompt farmers to adjust their farming activities.

Social political factors are important in addressing the main challenges faced in crop production. This requires innovative strategies that increase land productivity and enhance the resilience and farmers' ability to copy and adapt to the impact caused by environmental changes. For example, through creativity and farmers experienced in the highland zone, smallholder farmers opted to grow trees as an alternative to cash crops. Thus, investing in creativity, land management and development of farming techniques and practices forms an important role in crop production among the smallholder farmers and enhancing food security.

Land fragmentations and crop production: Several factors can alter land productivity and agricultural production across the levels and scales. The effects exerted by land factors, specifically, fragmentations of land into small plots appear crucial in crop production and managing agricultural land. It was apparent that land exhaustion aggregated with population pressure resulted in fragmentations of land in small pieces of plots among smallholder farmers (Figure-3). Land fragmentations and exhausted amplified with climate variability affect the yields of crops. For example, land exhaustion and fragmentation affect mechanization, diversification and crop yield and ruin crops and bring land productivity down^{12,22,23}. Therefore, it is noticeable that productivity and agricultural production is dealt within the context of a set of factors that include the land, socio-economic, technical and environmental to realize a significant agricultural production, productivity and developments.

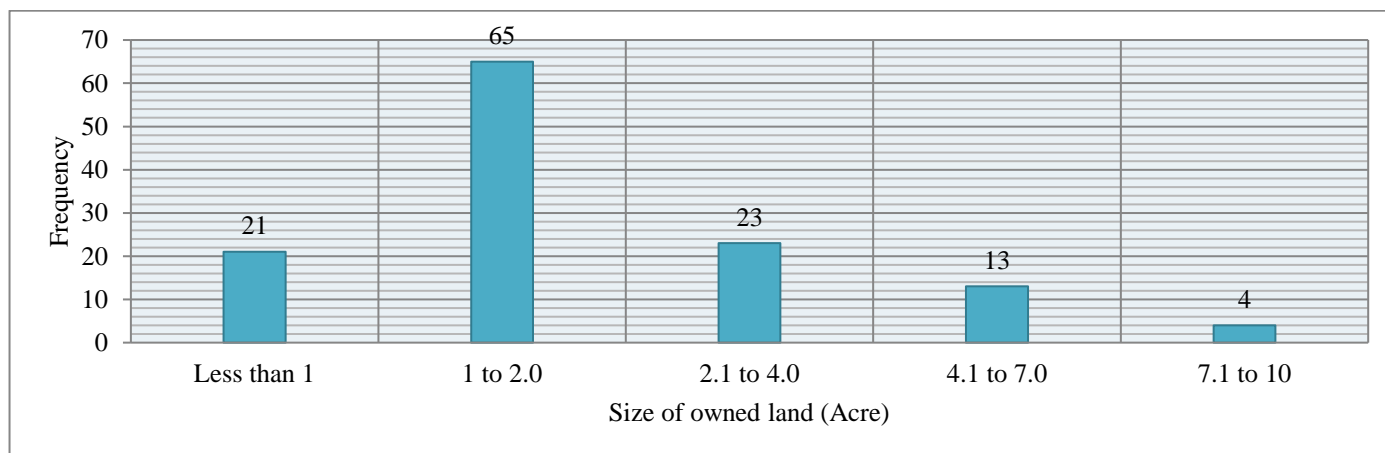


Figure-1: Total Land (acre) owned within the village.

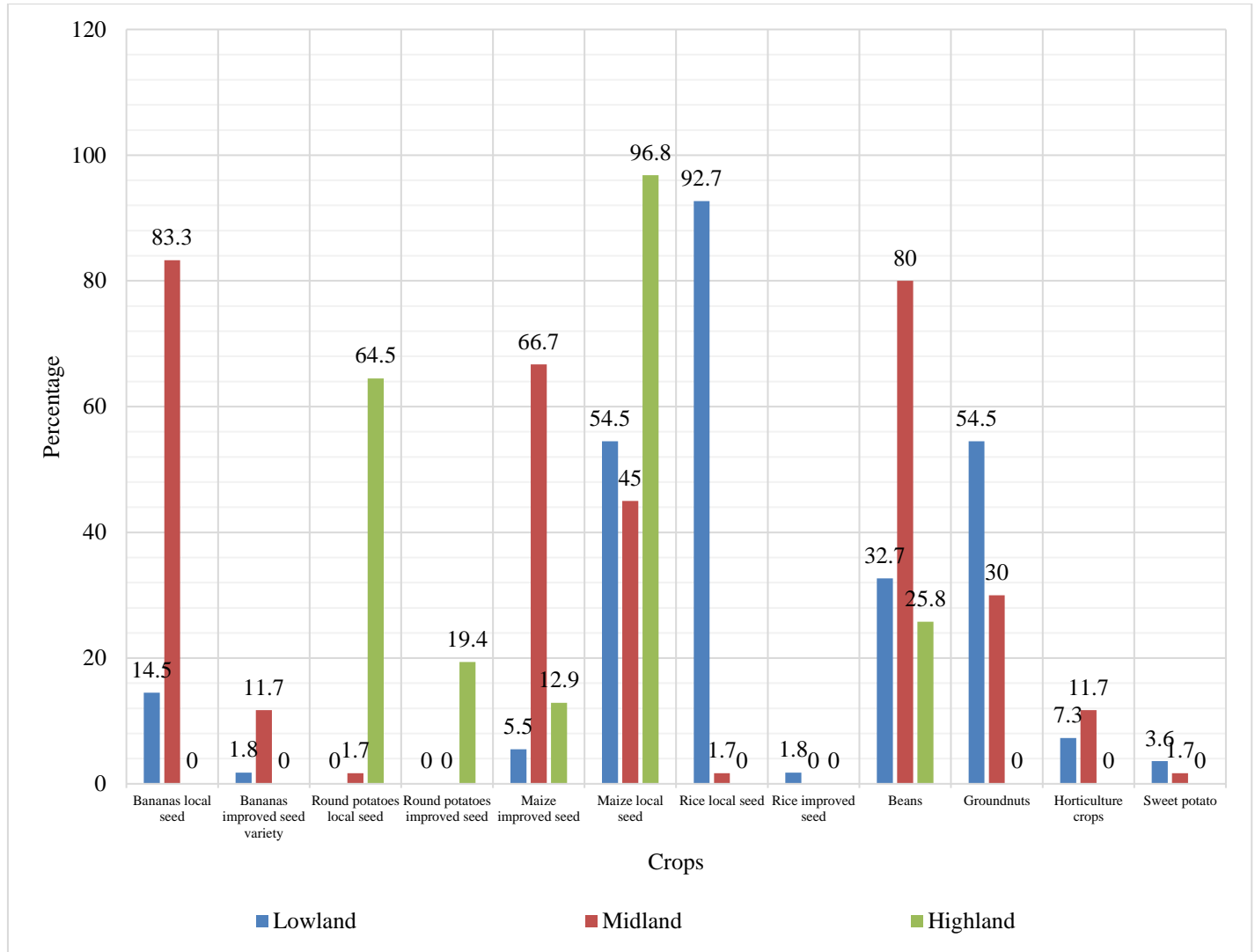


Figure-2: Various crops produced for food and cash across zones.



Figure-3: Size of the owned and borrowed for agricultural production.

The access to productive land, tenure system and land exhaustion compounded by truncated farm machinery and technology low access to mechanized farm equipment resulted in low agricultural production. In smallholder farms where crops are handled primarily by hand tools that involve an investment of more time, energy and money in the production process. The limits access and capacity of the land to produce food crops forms an important factor in agricultural production, and it exemplifies the human pressure on land. Productive land is required in agricultural production to appreciate the subtle relations with production factors. In ensuring better return land is an important factor, especially in smallholder farmers' communities. It is imperative therefore to invest in land management and mechanized farming that has become capital-intensive to a large extent, especially, for buying agricultural inputs²⁴. Such factor together with market and invested production cost may cause farmers to modify their farming process to meet their consumption and market demands that may alter agricultural production.

Policy issues and crop production and land management:

Awareness of policy, government development visions, strategies and directives on land, water, environment, market and agricultural activities forms an important part in the production process. In the study area because of low awareness on the current government policies, most farmers expect inputs subsidy from the government. Less effort in dissemination, enforcement and implementation of government policies, plans and strategies contributed its awareness at the local level. At a local level, policy interventions need to focus on implementation mechanisms, improving land management, agricultural crop production and guide awareness creation on policy issues. In literature, the need for supporting the supervision, planning, standard setting, quality assurance, monitoring and providing guidance suggested for improving crop production^{2,25}. Policy and regulation were expected to have an impact on agricultural crop production and improving the livelihood of smallholder farmers. Thus, the need for change from paper policies plans and strategies to participatory action institution tools across levels and scales.

The identified low awareness of policies and poor access to productive land at a local level increased vulnerability to a changing environment. The farming situation and important measures for improving crop production and household income have been identified in the government documents. Though, the mechanism for instituting measures to address the acknowledged situation and strategies for improving agricultural production remains a silence potential to invent at a local level. The analysed agricultural policy measures lack dissemination strategies that form an important part in implementation. This affects awareness on the institutional arrangements, especially for smallholder farmers at a local level. Thus, the need for developing a clear implementation strategy/ plan in agricultural production to facilitated the process and increase awareness. Land ownership affects land management strategies. Thus, the

need for slanting policy, regulations and by-laws to enforce better and sustainable management strategies of land under tenure systems. Policy interventions are imperative in providing direction to land utilization and land use planning. The failure to adhere to the standard should be punished as per stated by-laws and regulations. The policy is very important in designing and guiding long run land uses and management strategies.

Concussion

Farmers are straggling to increase land productivity, adapt to climate variability and access to adequate seeds, fertilizer and other inputs. Low uptake of new technology and the effect of climate variability deepened the problem among and becoming the grave of concern that present formidable threats to smallholder farmers. Besides population growth and low agricultural productivities are escalating smallholder farmers' food insecurity and dependence on buying food as food consumption is outpacing food production. These factors increased vulnerability among smallholder farmers to hovering food prices and high production cost resulting from land shortage/ exhaustion, the high price of inputs and changing environment. Thus, the tactical measures to ameliorate the divergent and dynamic factors responsible for are prerequisite in increasing agricultural productivity and food crop production to meet the growing population demands. This requires the rational utilization of the land to suit and respond to changes and the increased dynamic demands. Smallholder farmers need to exploit the scarce resource and land for crop production within and in other areas to meet their economic needs. These also require diverse strategies, including the use of the array of available land resources management strategies. Adoption of innovative and improved production strategies, land management technologies through various techniques, some of these techniques include the use of fertilizers, use of improved seeds, a forestation/ tree planting and soil management measures.

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