

## DETERMINANTS OF CASSAVA COMMERCIALIZATION AND LIVELIHOOD STATUS OF CASSAVA FARMERS IN BENUE STATE, NIGERIA.

**Alleuyanatha, E.**

National Root Crops Research Institute, Umudike, Abia state, Nigeria.

alleluyanatha@gmail.com

### Abstract

The pivot of development in Nigerian agricultural sector is to enhance the production of cassava from subsistence to commercial production for sustainable livelihood among farmers. However, literature has shown that the Nigerian cassava sector has been commercialized to an extent. Hence, this study determined that factors influencing cassava commercialization and compared the influence of the level of cassava commercialization on livelihood assets using a hexagon livelihood asset chart on 360 farmers randomly selected from 4 local government areas in Benue state. The results show that most of the farmers were below 0.5 of the cassava commercialization index. Also, out of the five livelihood assets used, commercialized farmers were better off in the social and human assets compared to the non-commercialized cassava farmers, whereas non-commercialized cassava farmers were better off in terms of resilience to vulnerability and shock than commercialized farmers. The regression results showed that sex of farmer, farm size and use of fertilizer were positively associated with cassava commercialization whereas marital status, years of schooling, household size, distance to market, and non-farm income had a negative relationship with cassava commercialization in Benue state. It was, therefore, recommended that adult education facilities be put in place to promote education among the farmers, markets should be developed and agricultural inputs such as credit and fertilizer be readily made available to cassava farmers to promote market participation, thus increasing the level of cassava commercialization in the study area.

### Introduction

Smallholder farming predominate agricultural production in Nigeria. Hence, the strong emphasize on the commercialization of agriculture to improve the livelihood of farmers. In this sense, linking smallholder farmers to agricultural output markets, whether domestic or global, constitutes a pivotal aspect of strategies to encourage agricultural growth in Nigeria. Commercialization is concerned with increased market participation, increased inputs and factors of production acquired from the market, using markets to hire labour and borrow funds for rent, and obtaining technical advice and market information (Wiggins *et al*, 2011). It is the production of more important farm excesses,

enlarged participation in the markets, and upturns in farmer earnings and living standards (Jayne *et al.*, 2011). Hence, the government and other agricultural stakeholders emphasize the commercialization of cassava, which is a staple food in Nigeria. Cassava has been tagged many names in research due to its qualities, such as its resistance to drought and disease, flexible planting and harvest cycle, and tolerance of low-quality soils. Cassava can remain in the ground for up to 18 months after reaching maturity (or more in the case of some varieties) and is well suited for a region that suffers both environmental and political hardships. The transformation from smallholder cassava farming to a commercialized farming is expected to increase the income level of farmers, thus improving the livelihood standard of farmers' households.

Goodrich (2001) drew from the work of Chambers and Conway (1992) and Swift (1989), among others, and stated that a livelihood comprises the capabilities, assets (both material and social resources), and activities required for a means of living. Livelihood is said to be sustainable when it can cope with and recuperate from stresses and shocks; maintain its abilities and assets as well as the natural resource base. These livelihood assets include:

**Natural assets** – natural resource stocks (soil, water, air, genetic resources, etc.) and environmental services (hydrological cycle, pollution sinks etc.) from which resource flows and services useful for livelihoods are derived.

**Economic or financial assets** – the capital base (cash, credit/debit, savings etc.), and other economic assets that are vital for the search of any livelihood strategy.

**Human assets**– skills, knowledge, the ability to work and good health are important for the successful pursuit of livelihood strategies.

**Social assets**– the social resources (networks, social relations, associations etc.) upon which people draw when pursuing different strategies.

**Physical assets**– the basic infrastructure that people need to make a living, such as transport and communication systems, shelter, water, sanitation systems, and energy. Farmer's abilities in combining these asset bases construct the level of their livelihood.

There have been studies of cassava commercialization on poverty reduction and food security (Mtunguja *et al.*, 2019, Opondo *et al.*, 2017, Nwachukwu and Eze, 2014)

but the relationship of cassava commercialization and livelihood asset had been given less attention. This study, therefore, sought to analyze the influence of the level of cassava commercialization on the livelihood status of cassava farmers. Specifically, the study analyzed the socioeconomic characteristics of farmers, identified the level of cassava commercialization, and compared livelihood assets of the farmers based on the level of cassava commercialization and determined the factors influencing cassava commercialization in the study area.

**Methodology**

The study was carried out in Benue State. Multistage sampling technique was used to select four local government areas (LGA) and random sampling technique was used to select three communities from each LGA in Benue State. After that, 30 farmers each were randomly selected from each community, making a total sample size of 360. A structured questionnaire was used to collect the primary data. Descriptive statistics were used to analyze the socioeconomic characteristics of farmers. Von Braun *et al* (1994) cassava commercialization index was applied to get data for the level of cassava commercialization (LCC).Cassava commercialization index (CCI) is the ratio of total output sold and total output harvested, explicitly shown as:

$$CCI = \frac{\text{Total cassava output sold}}{\text{Total cassava output produced}}$$

CCI ranges from numbers 0 – 1, zero signifying total subsistence, while a value approaching 1 indicates higher degrees of commercialization i.e. a greater percentage of the crop produced was marketed. The commercialized and non-commercialized groups were subsequently developed by grouping cassava commercialization index of 0.5 and above as commercialized and those below 0.5 as non-commercialized. The range was chosen based on degrees of commercialization (56.1-60.4%) reported by Okezie *et al.* (2012) and Ele *et al.* (2013). A hexagon livelihood asset chart was used to compare the influence of cassava commercialization on commercialized and non-commercialized cassava farmers. Ordinary Least Square regression was used to determine the factors that affect of cassava commercialization in the study area. The model was specified thus:

$$Y = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, e) \quad (1)$$

Where:

Y = Cassava Commercialization index

X<sub>1</sub> = Sex of farmers (Male = 1 otherwise 0)

X<sub>2</sub> = Age of farmers (Years)

X<sub>3</sub> = Marital status (Married = 1 otherwise 0)

X<sub>4</sub> = Occupation (Full-time farmer = 1 otherwise 0)

X<sub>5</sub> = Educational level (Years)

X<sub>6</sub> = Household size (Number)

X<sub>7</sub> = Membership of a cooperative (Yes = 1 otherwise 0)

X<sub>8</sub> = Membership of a village meeting (Yes = 1 otherwise 0)

X<sub>9</sub> = Use of improved cassava variety (Yes = 1 otherwise 0)

X<sub>10</sub> = Years of planting cassava (Years)

X<sub>11</sub> = Farm size (Hectares)

X<sub>12</sub> = Distance to market (Kilometers)

X<sub>13</sub> = Use of fertilizer (Yes = 1 otherwise 0)

X<sub>14</sub> = Access to credit (Yes = 1 otherwise 0)

X<sub>15</sub> = Non-farm income (Yes = 1 otherwise 0)

e = Error term

**Results and Discussion**

**Socio-economic Characteristics of Farmers**

Table 1 shows the socioeconomic characteristics of the farmers. Male and female farmers comprise of 48.61% and 51.39% of respondents respectively. The majority of the farmers (61.67%) were married, while 15.0% were single and 23.33% widowed. The average value of household size, age, years of schooling, farm size, and years of farming experience were about 10 persons, 47.92yrs, 7.67yrs, 0.62ha and 20.37yrs respectively. The mean farm size for cassava implies that cassava farming was at its subsistence level in the study area and with the large household size; farmers would be using more of family labour. This is in line with Opondo *et al.* (2017). The mean age of about 48 indicates that the farmers in the study area were in their active and productive age. The majority (75.0%) of the farmers were full-time farmers compared to their part-time counterparts (25.0%). Majority of the farmers (65.28%) were members of a village meeting, while 29.17% were members of cooperatives. This could result from lack of incentives to the farmers from the cooperatives, which corresponds with Alleluyanatha and Mbanaso (2019).

**Level of Cassava Commercialization**

Figure 1 shows the level of cassava commercialization in the study area. Majority of the farmers were below 1 in density, implying that most of the farmers were below the 0.5 LCC. This is possible as some farmers who participate in the market do so to generate income to solve a pressing need in the family. This result conforms to Makhura *et al* (2001) that the decision to sell is preceded by consuming.

**Table 1: Distribution of the socioeconomic characteristics of farmers**

	Freq.	Percent	Mean
<b>Gender</b>			
Male	175	48.61	

Female	185	51.39	
<b>Total</b>	<b>360</b>	<b>100</b>	
<b>Marriage</b>			
Married	222	61.67	
Single	54	15.0	
Widowed	84	23.33	
<b>Total</b>	<b>360</b>	<b>100</b>	
<b>Household size</b>			9.75
<b>Age</b>			47.92
<b>Years of schooling</b>			7.67
<b>Farm size</b>			0.62
<b>Years of farming experience</b>			20.37
<b>Occupation</b>			
Full-time farmer	270	75.00	
Part-time farmer	90	25.00	
<b>Total</b>	<b>360</b>	<b>100</b>	
Member of a village meeting			
No	125	34.72	
Yes	235	65.28	
<b>Total</b>	<b>360</b>	<b>100</b>	
Member of a cooperation			
No	255	70.83	
Yes	105	29.17	
<b>Total</b>	<b>360</b>	<b>100</b>	

Source: Field survey 2015

### Relationship between Commercialized and Non-Commercialized Cassava Farmers and Livelihood Assets

Fig. 2 shows the hexagonal representation of the relationship between commercialized and non-commercialized cassava farmers in terms of livelihood assets. Out of the five livelihood assets, commercialized farmers were favoured more in the social and human assets than the non-commercialized cassava farmers. This finding could be attributed to improved access to the extension agents who link them up to current agricultural and market information and the formation of cooperative societies. This finding agrees with Abenakyo *et al.* (2008) that households with high and medium social capital develop enhanced problem solving and bargaining skills, do research and empower more individuals to participate in decision making about mechanisms in the cassava market. This result also conforms to Nodoro *et al.* (2014) that farmers capitalize on the information networks when deciding the level of commercialization. This finding indicates the contention

that what matters for positive economic outcomes among the poor is not membership in groups but the quality and quantity of resources (information) flowing within those networks (Kirsten *et al.*, 2009). The results equally show the variations in natural, physical and financial assets among the commercialized and non-commercialized cassava farmers, suggesting that the level of cassava commercialization in the study area does not improve access to the assets as mentioned earlier. This finding could be attributed to a good number of respondents being a member of their village meeting, which may enhance their saving ability and access to credit. In the village meetings, contributions are made by the members weekly which encourages savings, and members can easily borrow money from there, thus improving access to credit facilities. This finding corresponds with Nodoro *et al.* (2014) that participation in saving groups turns out to be a major predictor of the decision to participate as a cattle seller on a household's financial capital. They argued that smallholder farmers belonging to saving groups have access to credit that enables them to increase their herd's productivity and market value. It could be opined from this result that being a member of a village meeting closes the gap between commercialized and non-commercialized farmers, since members come together to achieve a particular purpose, hence closing the gap between commercialized and non-commercialized cassava farmers in terms of financial, physical and natural assets in the study area. The influence of the level of commercialization on farmers' resilience to vulnerability and shock were also shown in Fig 2. Variables captured underexposure and shock were: coping with illness (i.e., access to health care), coping with a natural disaster like flooding and drought, coping with climate change, death of someone who sends remittances to the household, illness of income-earning member of the household, job loss, nonfarm business failure, theft of crops, cash, livestock or other property, destruction of harvest by fire, dwelling damaged/demolished, loss of property due to fire or flood or herdsmen, loss of land, increase in price of inputs, fall in the price of output and increase in price of food items consumed. The fig shows that non-commercialized cassava farmers were more resilient to vulnerability and shock than commercialized cassava farmers. This could be credited to large cassava output that may lead to a surplus supply resulting in low prices. This is in line with Hailua (2015) findings that agricultural input

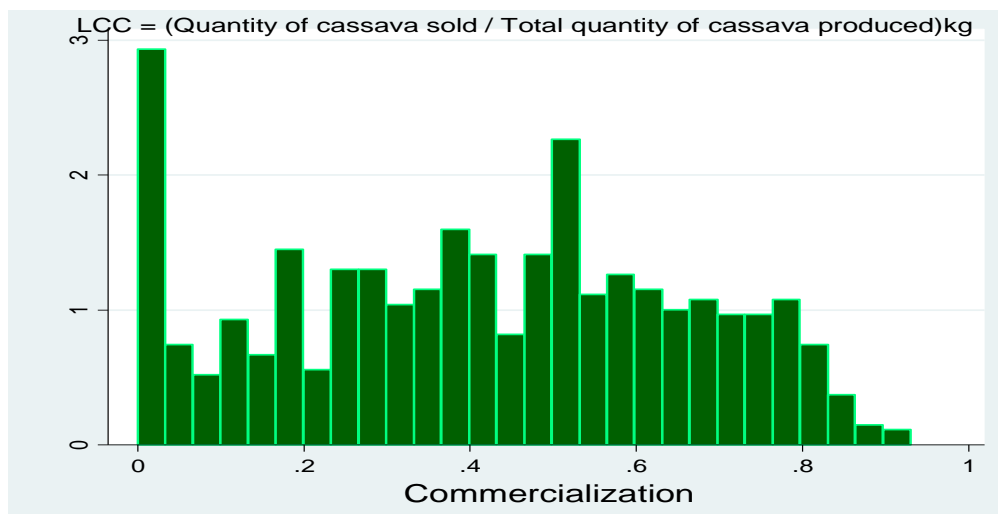


Fig 1: Level of cassava commercialization

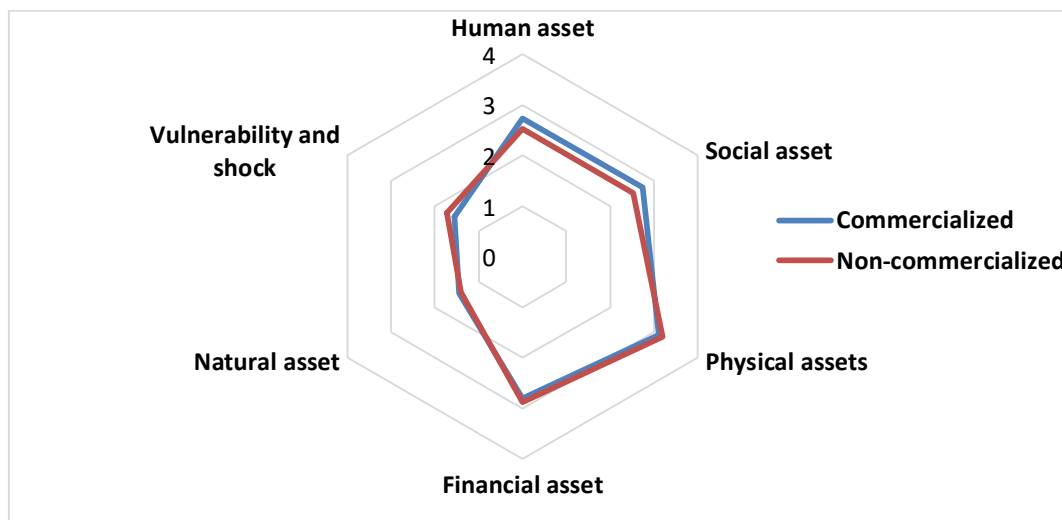


Fig 2: Livelihood asset comparison of commercialized and non-commercialized cassava farmers

and output market related problems were among the other major constraints to crop commercialization. In this regard, absence of market for the produce (inability of the local market to absorb the quantity produced, particularly for vegetables and fruits), fall in price and high input prices(improved seeds), were mentioned as bottlenecks to crop commercialization as these factors have an impact on agricultural productivity. A fall in the price of crops occurs during the harvesting season as most farmers take their produce to the market during the same period, creating market surplus and reduced prices with an eventual fall in household income. In such situations, mostly affected will be the commercial farmers who have surplus harvest with the intentions to sell.

**Determinants of cassava commercialization in Benue State**

Sex of farmer, farm size and use of fertilizer were positively associated with cassava commercialization whereas marital status, years of schooling, household size, distance to market, and non-farm income had a negative relationship with cassava commercialization in Benue state.

Sex of farmer was significant at 1% implying that cassava commercialization increases as sex of farmer was male. Commercialization is associated with the intensive use of purchased inputs, adoption of improved technologies and better access to farm inputs such as credit and land. Women are known to be increasingly disadvantaged when it comes to accessing agricultural inputs, thus giving the men a comparative advantage over the women in cassava commercialization. This is in line with Ugwu and Alimba (2018) that being a male

farmer increases with cassava commercialization index. Again, the findings of Forsythe et al. (2016) in Nigeria showed that men are mainly involved in marketing of cassava, which is the major criteria for commercialization, even though both men and women actively participate in cassava commercialization. The findings of Sebatta et al. (2014) and Abdullah et al. (2019) also support the result of this study. However, this does not correspond with Opondo et al. (2017) and Ogundele (2020). Furthermore, farm size was significant at 1% indicating that additional one hectare of land to farm size increases predicted cassava commercialization index by 8.6%. Otekunrin et al.

(2022) opined that farmers with larger farmer size are privileged to attaining a very high level of commercialization and Kalu and Okwusi (2018) reported that larger land size results to increased yield leading to surplus for the market. Use of fertilizer was another important variable that increases cassava commercialization. It was significant at 1% implying that addition one kg of fertilizer will increase cassava commercialization index by 20.3%. It's obvious that use of fertilizer increases yield (Adekanye et al., 2020 and Tafesse et al., 2021), thus increasing the likelihood of cassava commercialization. This corresponds with Tesfay (2020).

**Table 2: Regression results for the determinants of cassava commercialization**

Variables	Coefficient	Std. Err.	t-Test	P>t
Sex of farmers	0.043	0.016	2.64	0.009
Age of farmers	-0.001	0.001	-0.81	0.42
Marital status	-0.052	0.029	-1.8	0.073
Occupation	-0.016	0.014	-1.17	0.242
Educational level	-0.004	0.002	-2.48	0.014
Household size	-0.023	0.002	-10.51	0
Membership of a cooperative	0.013	0.019	0.67	0.506
Membership of a village meeting	0.023	0.017	1.39	0.167
Use of improved cassava variety	0.003	0.007	0.42	0.673
Years of planting cassava	0.001	0.001	0.9	0.369
Farm size	0.086	0.005	17.59	0
Distance to market	-0.002	0.001	-2.55	0.011
Use of fertilizer	0.203	0.014	14.39	0
Access to credit	-0.018	0.016	-1.15	0.251
Non-farm income	-0.039	0.017	-2.36	0.019
Constant	0.460	0.053	8.66	0
<hr/>				
R-squared	0.6596			
Adj R-squared	0.6448			
F(16, 343)	44.45			0.0000
Number of observation	360			

**Source: Field survey 2015**

Marital status of farmer was significant at 10% implying that marrying reduces commercialization index by 5.2%. Marital status leads to large household size which is negatively related to cassava commercialization and significant at 1% suggesting that an additional increase in the number of household size reduces commercialization index by 2.3%. Although married household tends to significantly influence cassava output for commercialization, excessive expansion in household size may increase the proportion of output reserved for household consumption thereby reducing the quantity for the market (Ogundele, 2020). This corresponds with Ele et al. (2013) and Nwachukwu and Ezeh (2018). This finding on the other hand, contradicts Kalu and Okwusi (2018) suggestion that large household are more likely to engage in commercialization since households with higher

number of adults will serve as a form of family labour for increase output and sales. Educational level was surprisingly negative and significant at 5% signifying that a unit increase in years of schooling reduces commercialization index by 0.4%. This result could be linked to the average years of schooling in the study area (7.67 years) indicating that majority of the farmers did not complete their secondary education. This educational status may have a negative effect on farmer's level of awareness and adoption of improved technologies and innovations that could boost cassava commercialization in Benue state. This study is in conformity with Abdullah et al. (2019) and Musah et al. (2014), who reported that increase in year of schooling, had a negative effect on market participation for maize product. Once more, distance to market was significant at 5% depicting that an addition kilometer to distance

from home to market reduces cassava commercialization index by 0.2%. Long distance to market is associated with high transaction cost hence reduces market participation among farmers (Jagwe, 2011). Invariably, the more the distance to market from the homestead, cassava commercialization index reduces due to high transaction cost. This result is in line with Otekunrin et al. (2022), Tufa et al. (2014) and Agwu et al. (2018). Non-farm income was another important variable that was significant at 5% indicating that a unit increase in non-farm income reduces cassava commercialization index by 3.9%. Farmers who participate in non-farming activities earn more income as compared to farm income may not have incentive to participate in the agricultural market reducing level of cassava commercialization. This conforms to the findings of Opondo et al. (2017), Muricho (2015) and Sebatta et al. (2014).

The  $R^2$  value of 0.6596 indicates that 66% variation of the dependent variable is explained by the explanatory variables and the F-statistics of 44.45 at 1% significant level shows that the fitness of the model.

### Conclusion

Livelihood status among commercialized farmers is not significantly different from the non-commercialized cassava farmers in the study area, implying that cassava farmers need to be encouraged by providing them with the required agricultural inputs, market and these needs to be done within the seasons when farmers require them. Also, Sex of farmer, farm size and use of fertilizer were factors that positively associated with cassava commercialization whereas marital status, years of schooling, household size, distance to market, and non-farm income had a negative relationship with cassava commercialization in Benue state.

### References

- Abdullah, F.R., Riaz Ahamad, S.A., Abbas, A.C., Waqar, A., Aasir, I., Izhar U.D. (2019). Determinants of commercialization and its impact on the welfare of smallholder rice farmers by using Heckman's two-stage approach. *Journal of the Saudi Society of Agricultural Sciences*, 18(2): 224-233, <https://doi.org/10.1016/j.jssas.2017.06.001>.
- Abenakyo, A., Sanginga, P., Njuki, J. M., Kaaria, S. & Delve, R. J. (2008). Relationship between Social Capital and Livelihood Enhancing Capitals among Smallholder Farmers in Uganda. Second international conference, August 20-22, 2007, Accra, Ghana 52191, African Association of Agricultural Economists (AAAE).
- Adekanye, T. A., Oni, K.C., Alhassan, E.A., Adekiya, A.O. and Olayanju A. (2020). Analysis of energy use in cassava production in North-Central Nigeria. *Agricultural Engineering International: CIGR Journal*, 22(2): 98-104
- Agwu, N.M., Anyanwu, C.I. and Mendie, E.I. (2013). Socio-Economic Determinants of Commercialization Among Smallholder Farmers in Abia State, Nigeria. Invited paper presented at the 4<sup>th</sup> International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia. DOI: 10.22004/ag.econ.161518
- Alleluyanatha E. and Mbanaso, E.O. (2019). Impact of increased cassava production and export programme on rural poverty reduction in Nigeria. *International Journal of Agriculture and Rural Development (IJARD)*, 22(1): 3884-3890
- Chambers, R. And Conway, G. (1992). sustainable livelihoods practical concepts for the 21st century IDS discussion paper 296, Institute of Development Studies, Brighton, UK.
- Ele, I.E., Omini, G.E. and Adinya, B.I. (2013). Assessing the Extent of Commercialization of Smallholding Farming Households in Cross River State, Nigeria. *Journal of Agriculture and Veterinary Science*, 4(2): 49-55
- Goodrich R. (2001). Sustainable rural livelihoods: a summary of research in Mali and Ethiopia Institute of Development Studies. <https://agris.fao.org/agris-search/search.do?recordID=GB2013202090>
- Hailua, G., Manjireb, K. and Aymut, K. (2015). Crop commercialization and smallholder farmers' livelihood in Tigray region, Ethiopia. *Journal of Development and Agricultural Economics*, 7(9): 314-322, DOI: 10.5897/JDAE2015.0649
- Jagwe, J.N. (2011). The impact of transaction costs on the participation of smallholder farmers and intermediaries in the banana markets of Burundi, Democratic Republic of Congo and Rwanda. Unpublished PhD thesis, University of Pretoria, South Africa. <http://hdl.handle.net/2263/25567>
- Jayne, T.S., N.M. Mason, W.J. Burke, A.M. Shipekesa, A. Chapoto, and C. Kabaghe. (2011). Mountains of maize, persistent poverty. Working paper No. 48, Indaba Agricultural Policy Research Institute, IAPRI, Lusaka, Zambia.
- Kalu, C.A. and Okwusi, M.C. (2018). Determinants of Cassava Commercialization for Export Development among Farmers in Abia State. *Nigerian Agricultural Journal*, 49(2): 175-179.
- Kirsten, J.F., Doward, A.R., Poulton, C., Vink, N. (Eds.) (2009). *Institutional Economics Perspectives*

- on African Agricultural Development. Washington: International Food Policy Research Institution.
- Makhura, M., Kirsten, J. and Delgado, C. (2001). Transaction Costs and Smallholder participation in the maize market in the Northern Province of South Africa. Seventh Eastern and Southern Africa regional Conference, February 2001, pp.463-467.
- Muricho, G. S. (2015). Determinants of Agricultural Commercialization and Its Impacts on Welfare among Smallholder Farmers in Kenya. Unpublished PhD thesis, University of Nairobi, Nairobi.
- Mtunguja M.K., Beckles D.M., Laswai H.S., Ndunguru J.C. and Sinha N.J. (2019). Opportunities to Commercialize Cassava Production for Poverty Alleviation and Improved Food Security in Tanzania. *African Journal for Food Agriculture and Nutritional Development*, 19(1):13928-13946, DOI: 10.18697/ajfand.84.BLFB1037
- Ndoro, J.T., Mudhara, M. and Chimonyo, M. (2014). Cattle Commercialization in Rural South Africa: Livelihood Drivers and Implications for Livestock Marketing Extension. *Journal of Human Ecology*, 45(3): 207-221
- Nwachukwu, C.N. and Ezeh, C.I. (2014). Influence of commercialization on food security status of cassava producing households in Abia State, Nigeria.
- Nwachukwu, C.N., Ezeh, C.I., and Nwachukwu, I.N. (2018). Determinants of Commercialization and Food Security of Cassava Producing Households in Abia State, Nigeria. *Nigerian Agricultural Journal*, 49(2): 136-142
- Ogundele, F. (2020). Factors influencing output commercialization among small scale farmers in Nigeria. *African Journal of Agricultural Marketing*, 8 (10): 001-009.
- Okezie, C.A., Sulaiman, J. and Nwosu, A.C. 2012. Farm – Level Determinants of Agricultural Commercialization. *International Journal of Agriculture and Forestry*, 2(2): 1-5
- Opondo, F.A., Dannenberg, P., Willkomm, M. (2017). Characterization of the levels of cassava Commercialization among smallholder farmers in Kenya: A multinomial regression approach. *African Journal of Agricultural Research*, 12(41), 3024-3036. Doi:10.5897/AJAR2917.12634
- Otekunrin, O. A., Ayinde, I. A., Sanusi, R. A., and Otekunrin, O. A. (2022). Assessing the determinants of agricultural commercialization and challenges confronting cassava farmers in Oyo State, Nigeria. *Journal of Socioeconomics and Development*, 5(1): 76-87. <https://doi.org/10.31328/jсед.v5i1.3483>
- Sebatta, C. , Mugisha, J. , Katungi, E. , Kashaaru, A. and Kyomugisha, H. (2014). Smallholder Farmers' Decision and Level of Participation in the Potato Market in Uganda. *Modern Economy*, 5: 895-906. doi: [10.4236/me.2014.58082](https://doi.org/10.4236/me.2014.58082).
- Tafesse, A., Mena, B., Belay, A., Aynekulu, E., Recha, J.W., Osano, P.M., Darr, D., Demissie, T.D., Endalamaw, T.B., Solomon, D. (2021). Cassava Production Efficiency in Southern Ethiopia: The Parametric Model Analysis Frontiers. *Sustainable Food Systems*, 5. DOI:10.3389/fsufs.2021.758951.
- Tesfay, M.G. (2020). Does fertilizer adoption enhance smallholders' commercialization? An endogenous switching regression model from northern Ethiopia. *Agriculture and Food Security*, 9(3). <https://doi.org/10.1186/s40066-020-0256-y>.
- Tufa, A., Bekele, A. and Zemedu, L. (2014). Determinants of smallholder commercialization of horticultural crops in Gemechis District, West Hararghe Zone, Ethiopia. *African Journal of Agricultural Research*, 9(3): 310-319.
- Ugwu, J. N. and Alimba, J. O. (2018). Determinants of Commercialization of Staple Crops among Small-holder Farmers in South East Nigeria. *Asian Journal of Advances in Agricultural Research*, 8(3): 1-7. <https://doi.org/10.9734/AJAAR/2018/45177>.
- Von Braun, J. and Kennedy, E. (1994). Agricultural Commercialization, Economic Development, and Nutrition. International Food Policy Research Institute.
- Wiggins, S., Argwings-Kodhek, G., Leavy, J. and Poulton, C. (2011). Small farm commercialization in Africa: Reviewing the issues. Research Paper 023. [www.future-agricultures.org](http://www.future-agricultures.org).