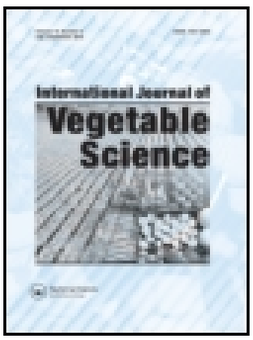

International Journal of Vegetable Science

ISSN: 1931-5260 (Print) 1931-5279 (Online) Journal homepage: http://www.tandfonline.com/loi/wijv20

# Commercialization of Urban Vegetable Farming

Roseline J. Akinlade, Olubunmi L. Balogun & Adekemi A. Obisesan

**To cite this article:** Roseline J. Akinlade, Olubunmi L. Balogun & Adekemi A. Obisesan (2014): Commercialization of Urban Vegetable Farming, International Journal of Vegetable Science, DOI: 10.1080/19315260.2014.921266

**To link to this article:** http://dx.doi.org/10.1080/19315260.2014.921266

Accepted author version posted online: 13 Aug 2014.
Published online: 13 Aug 2014.

INTERNATIONAL JOURNAL OF VEGETABLE SCIENCE
http://dx.doi.org/10.1080/19315260.2014.921266

Taylor & Francis
Taylor & Francis Group

# Commercialization of Urban Vegetable Farming

Roseline J. Akinlade[a], Olubunmi L. Balogun[b], and Adekemi A. Obisesan[c]

[a]Department of Entrepreneurship Studies, Osun State University, Osogbo, Nigeria; [b]Department of Agricultural Economics, Babcock University, Ilishan-Remo, Nigeria; [c]Department of Agricultural and Resource Economics, Federal University of Technology Akure, Nigeria

**ABSTRACT**

Markets and improved market access are critical for improving urban incomes, particularly in Africa. Despite this, participation of farmers in domestic and regional markets in southwest Nigeria remains low due to a range of constraints. One of the limiting constraints faced by farmers is linked to poor market access. Determinants of commercialization of urban vegetable farming in southwest Nigeria were analyzed. Two hundred and thirty vegetable farmers were randomly selected from Oyo and Lagos states. Data were analyzed using descriptive statistics and the Tobit model. The Tobit regression indicated that age, farm size, membership in associations, years of education, distance to market, heterogeneity index, cost of fertilizer, cost of chemicals, and decision-making index influenced extent of commercialization. With diminishing land area it would be more prudent to focus on improving productivity. Social capital enhanced commercialization and it becomes necessary to improve farmer business skills.

**KEYWORDS**

Market participation; social capital; smallholder farmer; southwest Nigeria



Agriculture has been subject to government interest and intervention perhaps more than any economic sector (Gardner, 1990). Agriculture continues to be a strategic sector in development of most low-income nations. It employs about 40% of the active labor force globally. In sub-Saharan Africa, Asia, and the Pacific, the agriculture-dependent population is over 60%; in Latin America and high-income economies, proportions are estimated at 18 and 4%, respectively (World Bank, 2006). Close to two thirds of the natural wealth in low-income countries is tied to crop and pasture land. The agricultural sector employs the majority of the labor force in developing nations through forward and backward industrial linkages and provides food and income.

In Nigeria the agricultural sector has been growing at a very low rate. Less than 50% of the country's arable land is under cultivation. Most of the land is cultivated by smallholder and traditional farmers who use rudimentary production techniques, with resultant low yields. Smallholder farmers are constrained by poor access to modern inputs and credit, poor infrastructure,

**CONTACT:** Roseline J. Akinlade Jummy120@yahoo.co.uk P.O. Box 6210, Agodi-Gate Ibadan, Oyo State, Nigeria.

inadequate access to markets, land and environmental degradation, and inadequate research and extension services. In response to the dwindling performance of agriculture in the country, governments have initiated policies and programs aimed at restoring the agricultural sector to its place in the economy. However, no significant success has been achieved due to several persistent constraints inhibiting performance (Manyong et al., 2005).

Rapid population growth and urbanization in Nigeria produce a high demand for food and require answers to problems to prevent famine, especially among low-income consumers (Pingali et al., 2006). Urban farming is the growing of plants and raising of animals for food and other uses within cities and peri-urban areas and includes activities like delivery of inputs and processing and marketing of products (Mougeot, 2000). The benefit of urban farming is associated with availability of productive land and water resources.

Vegetables are important for their contribution as income support to a large proportion of rural households. However, allowing vegetable farmers to reach markets and actively engage in the markets is a challenge influencing vegetable production in many African countries (Bongiwe and Masuku, 2012; Heinemann, 2002). A very effective way of enhancing urban consumers' food security is to improve the efficiency of all activities that bring food into cities. These activities are assembling, handling, sorting, packaging, storing, transporting, processing, wholesaling, retailing, and cooking for sale within urban areas. In southwest Nigeria (Lagos and Ibadan), local authorities enhancing market participation of low-income urban consumers can support development of efficient private sector food marketing system.

*Commercialization* is the movement from a subsistence production to a market-based system of production. It involves raising earnings of small-scale agricultural-related enterprises. Increasing units of output, raising the value added, and producing for domestic and foreign markets leads to commercialization. It can be conceptualized from both input and outputs. According to von Braun and Immink (1994), the degree of participation in the output market is a conventional way to measure commercialization. Commercialization is contingent upon the availability of input and output markets, agro-climatic conditions and risks, infrastructure, community and household resource and asset endowments; development of local commodities, input, laws, and institutions (Pender et al., 2006). It is a complex, dynamic process involving several dimensions related to technology, markets, finance, institutions, infrastructure, and social structure. Nonetheless, past efforts to improve smallholder farmer access to markets through market reforms have largely been ineffective. Consequently, the majority of African smallholder farmers still produce largely at subsistence levels, with small marketable surpluses. The markets they sell to are characterized by low activity, low volumes, and noncompetitiveness (Obare et al., 2006). Farmers face difficulties in transporting produce to markets, which often forces them to sell at the farm

gate. Similarly, lack of coordination among smallholder farmers limits their ability to bargain for higher prices, have access to information and credit, and have low incentives to commercialize and expand production (Dorward et al., 2009; Kydd and Dorward, 2003; Makhura et al., 2001; Pender and Alemu, 2007; Poulton et al., 2006; World Bank, 2002).

Marketing of vegetables requires care in harvesting, processing, sorting, packaging, packing, transportation, and sale of the commodity to ensure quality. It is necessary to improve information on marketing of vegetables and how collective action could influence market participation. The study was undertaken to analyze determinants of commercialization among urban vegetable farmers.

## Materials and methods

The southwestern part of Nigeria lies between 40–60° N and 40° W and 60° E latitude and is composed of the states Ekiti, Oyo, Osun, Ogun, Ondo, and Lagos. Agriculture is the dominant economic activity and main source of employment. The people are predominantly farmers. Women engage in food processing and trading in addition to farming. The region has distinct wet and dry seasons, which characterize the humid tropical climate, with the dry season extending from November to March. Mean annual rainfall is 1480 mm with a mean monthly temperature range of 18–24°C during the rainy season and 30–35°C during the dry season. The climate favors cultivation of vegetables (National Population Commission, 2006).

### *Sources of data and sampling procedure*

Primary data were collected using a structured questionnaire. Data were collected on socioeconomic characteristics, membership of associations, participation in the local-level institution activities, vegetable production and marketing, and costs and returns to vegetable production. The three prominent vegetable crops planted by these vegetable farmers are Amaranth (*Amaranthus cruentus* Thell), jute mallow (*Corchorus olitorus* Blanco), and Okra [*Abelmoschus esculentus* (L.) Moench].

A multistage sampling technique was used in selecting respondents in Oyo and Lagos states. There was random selection of two urban local governmental areas from each state. A total of 230 vegetable farmers were randomly selected.

### *Analytical tools and models*

Frequencies, means, and percentages were used to determine socioeconomic and social capital variables.

### Tobit model

The Tobit model (1958) was used to determine factors influencing the degree of commercialization among vegetable farmers in southwest Nigeria.

### Explanatory variables

The variables examined were gender; age of household head; years of formal education of household head; marital status; household size; farm size; costs of planting materials, fertilizer, labor, and chemicals; distance to the nearest market; price in the nearest market; membership in associations; meeting attendance index of households to associations; decision-making index; and heterogeneity index of associations. The dependent variable in the model, the commercialization index, is defined as the summation of the proportion of the value of crop sales to total value of crop production.

### Definition of some variables used in the empirical models

- *Meeting attendance index*: Measured by the number of times members of the association actually met as a group over time. This was obtained by summing attendance of household members at meetings divided by the number of scheduled meetings of the association multiplied by 100.
- *Decision making index*: It has been argued that associations, which follow a democratic pattern of decision making, are more effective than others (Okunmadewa et al., 2007). The questionnaire asked association members to evaluate subjectively whether they were "very active," "active,""not very active," "passive," "very passive," or "not participating" in group decision making. The response was averaged across the three most important groups in each household. The sum was calculated from subjective responses from household members on the rating of participation in decision making in three associations important to them. Responses were averaged across the three associations and multiplied by 100 for each household.
- *Heterogeneity index*: The questionnaire identified the three most important associations for each household. For those associations, a number of supplementary questions were asked about the internal homogeneity of the group. This was rated according to the criteria—neighborhood, kin group, occupation, economic status, religion, political ideas, gender, age, education level, cultural practices, beliefs, and trust—and coded following Lawal et al. (2009). A maximum score of 24 for each association represents the highest level of heterogeneity. The scores of the three associations were averaged for each household by dividing by a maximum score 72 to obtain the index and multiplied by 100; a zero value

**Table 1.** Expectation of exogenous variables affecting extent of participation of urban vegetable farmers.

| Variable | Description | Expected sign | Reference |
|---|---|---|---|
| Sex | Dummy | + | Cunningham et al. (2008) |
| Age of household head | Continuous | − | Ehui et al. (2009) |
| Age of household head squared | Continuous | + | Ehui et al. (2009) |
| Year of education | Continuous | + | Gebremedhin and Jaleta (2010); Makhura et al. (2001) |
| Marital status | Dummy | ± | Makhura et al. (2001) |
| Household size | Continuous | − | Alene et al. (2008) |
| Farm size | Continuous | + | Straberg et al. (1999); Gebremedhin and Jaleta (2010); Martey et al. (2012) |
| Cost of planting materials | Continuous | − | |
| Fertilizer cost | Continuous | − | |
| Labor cost | Continuous | − | Dyer et al. (2006) |
| Chemical cost | Continuous | − | |
| Membership of association | Dummy | + | Wambugu et al. (2009) |
| Meeting attendance index of households to associations | Continuous | + | Wambugu et al. (2009) |
| Decision-making index | Continuous | + | Grootaert (1999); Wambugu et al. (2009) |
| Heterogeneity index of associations | Continuous | − | Nagarajan et al. (1999) |

represents complete homogeneity and 100 corresponds to the highest heterogeneity.

## Results and discussion

### *Socioeconomic/demographic characteristics of respondents*

Socioeconomic characteristics affect commercialization, social capital, and welfare of households. Descriptive analysis of selected socioeconomic and demographic variables varied (Table 2). Male respondents constitute the larger percentage in vegetable farming. Age of household heads was below 51 years and the mean age was younger (42 years), indicating that the population was active and able to be productive. Average household size was six. Most respondents were married. Average farm size indicated that vegetable farmers are smallholders. Not quite half of household heads had secondary education; the remainder had no formal, primary, or tertiary education. Mean commercialization index implies that participation is very high among urban vegetable farmers. Almost all farmers sold the output at the farm gate.

### *Social capital dimensions of the respondents*

Activities of households in local-level institutions varied (Table 3). The majority belong to farmer associations. A great majority had a heterogeneity index of

**Table 2.** Socioeconomic characteristics of respondents.

| Variable | Frequency | Percentage |
|---|---|---|
| Gender | | |
| Male | 150 | |
| Female | 80 | 34.78 |
| Age | | |
| 0–30 | 48 | 20.87 |
| 31–40 | 70 | 30.43 |
| 41–50 | 64 | 27.83 |
| 51–60 | 28 | 12.17 |
| >60 | 20 | 8.70 |
| Mean 41.9 | | |
| SD 12.46 | | |
| Marital status | | |
| Married | 183 | 79.57 |
| Single | 47 | 20.43 |
| Level of education | | |
| No formal | 46 | 20.00 |
| Primary | 59 | 25.65 |
| Secondary | 103 | 44.78 |
| Postsecondary | 22 | 9.57 |
| Household size | | |
| 1–5 | 110 | 47.83 |
| 6–10 | 100 | 43.48 |
| >10 | 20 | 8.70 |
| Mean 5.86 | | |
| SD 2.57 | | |
| Farm size (ha) | | |
| <0.01 | 40 | 17.39 |
| 0.01–0.09 | 157 | 68.26 |
| >0.09 | 33 | 14.35 |
| Mean 0.053524 | | |
| SD 0.036146 | | |
| Commercialization[a] index | | |
| Mean | 0.73 | |
| SD | 0.32 | |
| Output market type | | |
| Farm gate | 219 | 95.22 |
| Urban market | 11 | 4.78 |
| Regional market | 0 | 0 |

[a]In the Tobit model, the commercialization index is defined as the proportion of the value of crop sales to total value of crop production; $s_{ik}$ is quantity of output $k$ sold by household $i$ evaluated at an average price ($P_k$), $Q_{ik}$ is total quantity of output $k$ produced by household $i$ (von Braun and Immink, 1994); $\beta_i$ is the vector of parameters to be estimated; $X_i$ is the set of explanatory variables; and μ is the error term. A zero value of $Y_{i*}$ is observed when a household has no surplus to sell but has excess demand on the commodity. See note to Table 4.

household in associations and fell within the 21%–40% heterogeneity subgroup; 8.70%, 6.96%, and 25.22% were in 41%–60%, 61%–80% and greater than 80% subgroups, respectively. The average heterogeneity index was 50.96%, implying that associations are moderately diverse. Most households had 1%–20% meeting attendance and lower values for 21%–40%, 41%–60%,

**Table 3.** Social capital dimensions of respondents.

| Social capital variable | Frequency | Percentage |
|---|---|---|
| Membership of association | | |
| Member | 176 | 76.5 |
| Not a member | 54 | 23.5 |
| Heterogeneity index (%) | | |
| 21–40 | 20 | 8.70 |
| 41–60 | 16 | 6.96 |
| 61–80 | 136 | 59.13 |
| >80 | 58 | 25.22 |
| Mean | 50.96 | |
| SD | 15.50 | |
| Meeting index (%) | | |
| 1–20 | 21 | 9.13 |
| 21–40 | 14 | 6.09 |
| 41–60 | 48 | 20.87 |
| >60 | 147 | 63.91 |
| Mean | 80.29 | |
| SD | 27.05 | |
| Decision-making index (%) | | |
| 1–20 | 22 | 9.57 |
| 21–40 | 67 | 29.13 |
| 41–60 | 71 | 30.87 |
| 61–80 | 54 | 23.48 |
| >80 | 16 | 6.96 |
| Mean | 50.44 | |
| SD | 21.97 | |



and 61%–80% meeting attendance. Mean meeting attendance indicated that farmers attend meetings frequently.

Decision-making index was moderate among vegetable farming households. This implies that farmers participate in one of two decisions affecting associations. Distribution of households into various decision-making categories that 7% to ~31% of households were within the 1%–20%, 21%–40%, 41%–60%, and greater than 60% decision-making index.

## *Determinants of commercialization of urban vegetable farming*

The determinants of level of commercialization by vegetable farming households varied (Table 4). The Tobit regression model indicated that the log likelihood is significant, indicating that the model has a good fit to the data. Of 16 explanatory variables included in the model, age, sex, years of education, farm size, costs of fertilizer and chemicals, distance to market, membership of association, heterogeneity index, and decision-making index influenced the level of commercialization.

The regression indicated that the coefficient was significant and positive for age. At intermediate ages, market participation increases with age. An additional year of age of the household head increases likelihood of

**Table 4.** Estimates of Tobit[a] regression for determinants of level of commercialization.

| Variable | Coefficient | Standard error | *T*-Value | Marginal effect |
|---|---|---|---|---|
| Age | 0.2693 | 0.1521 | 1.77* | 0.26925 |
| Sex | 0.16764 | 0.0388 | 4.33*** | 0.16764 |
| Marital status | 0.05967 | 0.04510 | 1.32 | 0.05998 |
| Household size | −0.00314 | 0.00708 | −0.44 | −0.00313 |
| Years of education | −0.40766 | 0.21637 | 1.88* | 0.40766 |
| Farm size | 0.65558 | 0.06956 | 9.42*** | 0.65558 |
| Cost of planting material | 0.00248 | 0.00651 | 0.38 | 0.00248 |
| Cost of labor | 0.00331 | 0.00829 | 0.40 | 0.00331 |
| Cost of fertilizer | −0.00006 | 0.000017 | 3.50*** | −0.00006 |
| Cost of chemical | −0.22152 | 0.05262 | 4.21*** | −0.22152 |
| Price in the nearest market | 0.00299 | 0.00518 | 0.58 | 0.002993 |
| Distance to nearest market | −0.0396 | 0.0127 | −3.12*** | −0.00396 |
| Membership of association | −0.16784 | 0.040997 | −4.09*** | −0.167844 |
| Heterogeneity index | −0.001394 | 0.000419 | 3.3*** | −0.00139 |
| Meeting index | 0.000891 | 0.000616 | 1.45 | 0.00089 |
| Decision index | −0.00176 | 0.000780 | 2.26* | −0.00176 |
| Constant | 0.15844 | 0.121006 | 1.31 | |
| Sigma | 0.2337 | 0.012281 | | |
| Prob > $\chi^2$ | 0.0000 | | | |
| Pseudo $R^2$ | 0.7798 | | | |
| Log likelihood | −28.107 | | | |

[a]The Tobit model is $Y^* = \beta_i X_i + \mu_i$, where, $Y_{i^*} = CI = \frac{\sum_{k=1}^{k} \bar{P}_k s_{ik}}{\sum_{k=1}^{k} \bar{P}_k Q_{ik}}$.

commercialization by 0.26%. It could be that older households may have acquired better experience in crop selection and market interactions. According to Simonyan et al. (2010) education significantly enhances farmers' abilities to make accurate and meaningful decisions. Years of education positively influenced market participation. A unit increase in years of education of vegetable farmers increased commercialization of their farm produce. The implication is that as household head increases years of education, participation in markets increases, which invariably increases commercialization. Educated urban vegetable farmers are in a better position to know different market channels where their produce can be sold at a better price to increase income. Gebremedhin and Jaleta (2010) and Ogbe (2009) stated that level of education raises human capital and increases level of managerial abilities, which is an incentive for commercialization.

Farm size affected level of commercialization. As urban vegetable households increased farm holdings, level of commercialization increased. A unit increase in farm size increased the level of commercialization. Martey et al. (2012) stated that farm size influences level of agricultural commercialization. Distance of the urban vegetable farm to the market significantly but negatively influenced level of commercialization (Gani and Adeoti, 2011; Gebremedhin and Jaleta, 2010). With a unit increase in distance, the

probability to sell or participate in the market is reduced. A 1% increase in market distance reduces commercialization by 0.03%.

The influence of social capital indices on market participation is both negative and positive. Membership in farmer organizations/groups positively and significantly affected commercialization. Farmers who are members of a local institution had a small increase in commercialization. A unit increase in index of diversity of producer organization decreased the level of commercialization by a small amount. The heterogeneity index of the urban farming household heads had a small likelihood of market participation. Nagarajan et al. (1999) found that homogeneous producer organizations were more likely to perform better. Membership heterogeneity increases information problems which can lead to members having conflict of interest. A unit increase in household participation in decision making in their association increases commercialization. Active participation in decision making increases commercialization (Grootaert, 1999; Shiferaw et al., 2006; Wambugu et al., 2009). Cost of chemical and fertilizer negatively and significanly affected commercialization. The low levels of adoption of productivity enhancing inputs of fertilizers and chemicals and improving seed limits the ability to produce surpluses for the market.

Although market participation of respondents was high, quantity of outputs in urban areas was low. Because land plays a significant role in commercialization, with diminishing land area it would be more prudent to focus on improving productivity of land. Social capital affected how well urban farmers participate in markets. It appears that it is necessary to enhance farmers' business skills by training and encouraging them to sell vegetables in organized groups. This would provide them with economies of scale for better access to markets, reduce operational costs, and increase profit.



## Acknowledgment

We appreciate African Growth and Development Policy Modelling Consortium (AGRODEP) for the financial support to present this research study at 4th International African Association of Agricultural Economists (IAAAE) conference, 22-25 September 2013, Hammamet, Tunisia. As well as at AGRODEP Annual meeting and member's Workshop 18-20 November 2013, Dakar Senegal. You have contributed to the robustness and success of this study.

## References

Alene, A.D., Manyong, V.M., Omanya, G., Mignouma, H.D., Bokanga, M., and Odhiambo, G. 2008. Smallholder market participation under transaction costs: Maize supply and fertilizer demand in Kenya. Food policy. 33(4): 318–28.

Bongiwe, G.X. and M.B. Masuku. 2012. Factors affecting the choice of marketing channel by vegetable farmers in Swaziland. Sustain. Agr. Res. 2(1):112–123.

Cunningham, L.T., B.W. Brown, K.B. Anderson, and E. Tostao. 2008. Gender differences in marketing styles. Agricultural Economics. 38(1):1–7.

Dorward, A.R., J.F. Kirsten, S.W. Omamo, C. Poulton, and N. Vink. 2009. Institutions and the agricultural development challenge in Africa, pp. 3–34. In: J.F. Kirsten, A.R. Dorward, C. Poulton, and N. Vink (eds.). Institutional economics perspectives on African agricultural development. International Food Policy Research Institute, Washington, D.C.

Ehui, S., S. Benin, and A. Paulos. 2009. Policy options for improving market participation and sales of smallholder livestock producers: A case of Ethiopia. http:// academic.research.microsoft.com/publication/5715697

Gani, B.S. and A.I. Adeoti. 2011. Analysis of market participation and rural poverty among farmers in northern part of Taraba State. Nigeria J. Econ. 2(1):23–36.

Gardner, B.L. 1990. The economics of agricultural policies. Farm and food policies and their consequences. McGraw-Hill, Toronto.

Gebremedhin, B. and M. Jaleta. 2010. Commercialization of smallholders: Is market participation enough? Being a contributed paper presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa, September 19–23, 2010.

Grootaert, C. 1999. Social capital, household welfare and poverty in Indonesia. Local Level Institutions Working Paper No. 6, The World Bank, Washington, D.C.

Heinemann, E. 2002. The role and limitations of producer associations. European Forum for Rural Development Cooperation, Montpellier, France.

Kydd, J. and A. Dorward. 2003. Implications of market coordination failure for rural development in least developed countries. Centre for Development and Poverty Reduction, Wye Campus, Imperial College London, Wye, Ashford, Kent, U.K.

Lawal J.O, B.T Omonona, O.I.Y Ajani, and A.O Oni. 2009. Effects of social capital on credit access among cocoa farming households in Osun State, Nigeria. Agricultural Journal. 4 (4):184–191.

Makhura, M.N., J. Kirsten, and C. Delgado. 2001. Transaction costs and smallholder participation in the maize market in the Northern province of South Africa. Seventh Eastern and Southern Africa Regional Maize Conf., Nairobi, Kenya, 11–15 Feb. 2001.

Manyong, V.M., A. Ikpi, J.K. Olayemi, S.A. Yusuf, B.T. Omonona, V. Okoruwa, and F.S. Idachaba. 2005. Agriculture in Nigeria: identifying opportunities for increased commercialization and investment. IITA, Ibadan, Nigeria.

Martey, E., R.M. Al-Hassan, and J.K.M. Kuwornu. 2012. Commercialization of smallholder agriculture in Ghana: A Tobit regression analysis. African Journal of Agricultural Research. 7(14):2131–2141. doi:10.5897/AJAR11.1743

Mougeot, L.J.A. 2000. Urban agriculture: concept and definition. Urban Agr. Mag. 11(1). (http://www.ruaf.org/ua-magazine-no-1-maiden-issue)

Nagarajan, G., R.L. Meyer, and D.H. Graham. 1999. Does membership homogeneity matter for group based financial services? Evidence from Gambia. African Development Bank. Blackwell Publishers, Oxford, U.K.

National Population Commission. 2006. Nigerian census report. (http://www.qtsnigeria.com/)

Obare, G.A., A.B. Shiferaw, and G. Muricho. 2006. Leveraging rural Institutions for collective action to improve markets for the poor: lessons and policy options. ICRISAT Policy Brief No.8. Intl. Crops Res. Inst. Semi-Arid Tropics, Patancheru, Hyderabad, Andhra Pradesh, India.

Ogbe, S.E. 2010. Determinants of microcredit and microfinance outreach to farmers in Abia State: A case study of national special programme on food security. MS Thesis, Dept. Agr. Econ., Michael Okpara Univ. Agr., Umudike, Nigeria.

Okunmadewa, F.Y., S.A. Yusuf, and B.T. Omonona. 2007. Effects of social capital on rural poverty in Nigeria. Pakistan J. Soc. Sci. 4(3):331–339.

Pender, J. and D. Alemu. 2007. Determinants of smallholder commercialization of food crops: theory and evidence from Ethiopia. Discussion Paper No. 75. IFPRI, Washington, D.C.

Pender, J., S. Ehui, and F. Place. 2006. Conceptual framework and hypothesis, p. 31–58. In: J. Pender, F. Place, and S. Ehui (eds.). Strategies for sustainable land management in the East African highlands. IFPRI (International Food Policy Research Institute), Washington, DC.

Pingali, P., K. Stamoulis, and R. Stringer. 2006. Eradicating extreme poverty and hunger: towards coherent policy agenda. Food and Agriculture Organization, Rome.

Poulton, C., J. Kydd, and A. Doward. 2006. Overcoming market constraints on pro-poor agricultural growth in sub-Saharan Africa. Dev. Policy Rev. 24(3):243–277.

Shiferaw, B., C. Bantilan, and S. P. Wani. 2006. Policy and institutional issues and impacts of integrated watershed management: Experience and lessons from Asia, p. 37–52. In: Shiferaw, B. and Rao, K.P.C (eds.). Integrated Management of Watersheds for Agricultural Diversification and Sustainable Livelihoods: Lessons and Experiences from Semi-arid South Asia. International Crops Research Institute for the SemiArid Tropics (ICRISAT), Patancheru, India.

Simonyan, J.B., J.O. Olukosi, and R.A. Omolehin. 2010. Socio-economic determinants of farmer's participation in Fadama II project in Kaduna state, Nigeria. J. Food Fiber Prod. 1:592–601.

Strasberg P.J, T.S. Jayne, T. Yamano, J. Nyoro, D. Karanja, and Strauss, J. 1999. Effects of agricultural commercialization on food crop input use and productivity in Kenya. Michigan State University International Development Working Papers No. 71. Michigan, USA.

Tobin, J. 1958. Estimation of relationship for limited dependent variables. Econometrica. 26:26–36.

von Braun, J. and M.D.C. Immink. 1994. Non-traditional vegetable crops and food security among smallholder farmers in Guatemala, p. 189–203. In: J. von Braun and E. Kennedy (eds.). Agricultural commercialization, economic development, and nutrition. Johns Hopkins University Press, Baltimore, Md.

Wambugu S.N., J.J. Okello, and R.A. Yikal. 2009. Effect of social capital on performance of smallholder producer organizations: the case of groundnut growers in western Kenya. Intl. Assoc. Agr. Econ. Conf., Beijing, China, 16–22 Aug. 2009.

World Bank. 2002. From action to impact: the Africa region's rural strategy. The World Bank, Rural Development Operations, the Africa Region, Washington, D.C.

World Bank. 2006. Where is the wealth of nations? Measuring capital for the 21st century. World Bank, Washington, D.C.