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Determinants of peri-urban and urban agricultural locational choice behaviour in Lagos, Nigeria

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ABSTRACT

This article quantitatively assessed factors that shape locational choice behaviour of urban farmers. Three hundred questionnaires were randomly administered to farmers in ten localities with a view to identifying factors that shape their locational choice behaviour. The average number of farmers per locality was designated as the index of attractiveness and was correlated with six broad categories of factors identified by farmers as influential in urban agricultural site selection. These broad factors are proximity to water, proximity to residence, access to land, proximity to market, suitable fertile soils, and availability of labour. These factors were subsequently broken down to sixteen categories. Almost all the variables exhibited negatively significant correlations with the index of attractiveness. Urban farmers prefer sites which were closer to water, free with minimal lease and rental cost, and also sites with fertile soil that is closer to farmer's residence, where aggregate costs of production is minimal and labour relatively available. The results obtained can be used in mainstreaming urban agriculture into city planning while at the same time provide avenue for increased urban agricultural productivity.

Introduction

Urban agriculture comprises the production, processing and distribution of a diversity of foods, including vegetables and animal products within or on the fringe of an urban area, with the motive of food production or income generation (Baumgartner and Belevi, 2001; Zezza and Tasciotti, 2010). It has therefore become an important land use to city dwellers globally (Smit and Nasr, 1992) and a major source of livelihood. This is because it contributes to household food security and income generation especially for the urban poor in cities (Islam and Siwar, 2012; Lynch et al., 2013; Zasada, 2011). Additional benefits from urban agriculture include; provision of security against hunger and malnutrition, poverty alleviation, improved urban environment, pollution reduction, and strengthening of cities economic base (Smit and Nasr, 1992; Zasada, 2011). Despite these benefits, multiple challenges arise from shortage of land, land tenure, vagaries of weather, household and industrial pollution, inaccessibility to basic factors of production, and inputs such as fertilizers limits the potential benefits of urban agriculture (De Bon et al., 2009; Islam and Siwar, 2012; Lynch et al., 2013; Van Veenhuizen, 2006). These challenges in addition to the rapid urbanization can limit the amount of land available for urban agriculture. This might likely worsen food challenge confronting cities, while at the same time, inhibits the attainment of the United Nations Millennium Development Goals (MDG) of eradicating extreme poverty and hunger by 2015.

Overcoming threats of food insecurity and expanding urban agricultural frontiers with a view to achieving food security, food sovereignty, and sustainable urbanization require a conscious identification of factors considered by farmers in the choice of farmlands especially in cities. This could pave ways for increased productivity and consequently increase income, improve urban food security and reduce urban poverty. However, the quantification of factors that shape locational choice behaviour of urban farmers has not been deeply research (Zezza and Tasciotti, 2010). Hence, the available information on the processes and mechanisms that determine where agricultural activities take place in urban and peri-urban localities is lean. A good understanding of these factors will help urban planners to mainstream urban agriculture into city planning, and would likely prevent the usual conflict between urban agricultural activities and city development, since the identified factors can provide the basis for designating some areas of the city as urban agricultural zones. Moreover, the outcome of this study has potential to inform international donor agencies about pertinent factors for planning and ensuring urban food security. This paper therefore contributes to the growing debate on locational choice behaviour of urban farmers with a view to unravel factors that influence the locational choice behaviour of urban and peri-urban farmers.

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Study area

Lagos State is one of the World's emerging megacities with the lowest urban living standard (Linden, 1996; Oduwaye, 2005). It was the seat of the Federal Government of Nigeria (FGN) prior to 1986 after which Abuja became the new Federal Capital Territory (FCT). Despite this relocation, Lagos State remains the commercial and industrial nerve of the country. The perceived opportunities for improved living standard have been the singular force attracting people from both within and outside Africa into the city. The state has an areal extent of 3671 km^2 with a population of 9,113,605 in the 2006 census. Its projected population for the year 2010 was 10,578,000 and this is expected to rise to an estimated population of 12,427,000 by 2015, 14,162,000 in 2020 and 15,810,000 in 2025 (Un-Habitat, 2010). Thus, it is the second fastest growing state in Nigeria, with an estimated growth rate of 3.2% and population density of 2725 per km^2 (Lagos State Government, 2013). The implication of these increasing population pressure arising from continuous migration not only increases the demand for food, but also indirectly reduces its supply through building development, environmental degradation and marginalization of food production.

In terms of climate, two dominant air masses affect the distribution of rainfall in the State and these are the moist tropical maritime air mass, and the dry tropical continental air mass. Rainfall is typically double maxima with the first peak occurring between June and July, and the second peak between September and October each year (Ayoade, 1983). Temperature is relatively high and stable with high relative humidity throughout the year (Ayoade, 1983). In Lagos, urban agriculture is practiced either as primary or secondary occupation. As primary occupation, it provides a means of livelihood for farmers, while as a secondary occupation; it complements the meager income from other income generating activities. Urban agriculture in Lagos includes poultry keeping, artisanal fishing in coastal villages; roadside horticulturists; market gardens at flood plains; and free-range herds on coastal grasslands (Adedeji and Ademiluyi, 2009). Typically, urban agriculture is practiced on public land along roads, power lines, drains and streams, and on privately or institutionally owned land (Drechsel et al., 2006).

Although land remains a scarce resource for urban agricultural expansion, the numerous creeks, rivers and lagoons provide water needed for urban agricultural production all year round in the State. Crops typically grown include vegetable, maize and cassava; in addition, vegetables are widely grown because of their high demand especially in dry season (Gockowski et al., 2003; Van Veenhuizen and Danso, 2007). Vegetables include African spinach, waterleaf, fluted pumpkin, lettuce, and cabbage that contribute to a balanced diet particularly among the urban poor (Premanandh, 2011). Despite the potential for the urban agriculture in Lagos State, there are clusters of urban farmers in certain locations that necessitate the need to understand the locational attraction of such sites to farmers. Some of the prominent Local Government Areas (LGAs) where urban agriculture is practiced include Ojoo, Amuwo Odofin, Ikorodu and Surulere.

Methodology

Von Thünen's agricultural location theory provides the theoretical underpinning for this study. The theory, which was propounded in 1826 and was translated into English in 1966, is concerned with the process of location and allocation of land as well as the spatial organization of agricultural landuse. Von Thünen posited that economic rent is a major determinant of agricultural land use and that transportation cost is a major determinant of economic rent (Kennedy et al., 2011). The physical distance between farm and market, transportation costs, market prices, yield, and production cost thus, determine urban agricultural rent (Fujita, 2012; O'Kelly and Bryan, 1996). Based on his model, agricultural activities are organized in a concentric manner around the city with the inner ring being zone of dairy and intensive farming (Fujita, 2012). Perishable products such as milk and vegetables that must get to market quickly occupied the inner ring. These produce correspond with the major specialty of urban farmers in the present day. Although, the theory has been criticized for using numerous unrealistic assumptions in envisaging an extremely simple situation, nevertheless, the model remains valid, and its variations are still widely used in economic geography and other allied disciplines such as urban economics, and regional science (Mäki, 2011). The economic version of this theory enunciated by Ricardo emphasized the physical qualities of land and urban demand as a major determinant of rent rather than transportation cost (Kellerman, 1989). The model has also been modified to explain the spatial organization of land use in cities (Dicken and Loyd, 1990).

Data collection for the study relied on the use of Focus Group Discussions (FGDs) and open-ended structured questionnaires. The study posited that, the choice of urban agricultural site is a product of several intuitive iterations of factors that influence farmer's locational choice decision. However, at individual level, there might be factor trade-off in the site selection process. Questionnaire drafting for the study was based on the results of the Focus Group Discussions (FGDs) held with farmers at different urban agricultural sites in Lagos State. Farmers identified various factors that influence their site selection choice. These factors were broadly synthesized into six categories namely; proximity to water, proximity to residence, access to land, proximity to market, suitable fertile soils, and availability of labour. Measuring these factors objectively using suitable indicators was one of the major challenges in the study. The identified factors were disaggregated into measurable indicators that permit an assessment of their contribution to farmers' locational choice decision. Indicators used in measuring proximity to farmer's residence for example included; the average travel time, average cost of transportation and average physical distance between residence and farm site. Proximity to market was assessed using the average travel time, average cost of transportation and average physical distance between farm and market. Indicators used in measuring access to water include, average physical distance to water source, average amount spent on purchase of water and average time distance to water source. Availability and accessibility to land was measured using average cost spent on land lease, and average amount paid as annual rent by farmers. Indicators of soil fertility include, the cost incurred in the purchase of manures, and fertilizers for soil enrichments. Labour availability was measured using the average number of labour employed per plot per annum and the average cost of labour per plot per annum.

Subsequently, an open-ended questionnaire containing measurable indicators of farmer's locational choice factors, together with socio-economic characteristics of farmers, and challenges of urban agricultural production, most especially those related to vagaries of weather and transportation was developed and administered to the farmers. The questionnaire administration took place in ten purposively selected localities where urban agriculture takes place in Lagos State. These sites are in Iyana Iba, Ojoo-Badagry Expressway, Iyana Iba neighbourhood, Sabon gari Volkswagen area, Vniger along Lagos-Badagry expressway, Alakija along Lagos-Badagry, Laspotech area also along Lagos-Sagamu expressway, Idi Araba around the Lagos State University Teaching Hospital, Dantata along Lagos-Badagry road (Fig. 1). Thirty (30) farmers were randomly selected in each of the ten (10) urban agricultural sites. In order to avoid farm sites with disproportionate number of farmers,