

**Original Article****THE ROLE OF URBAN VEGETABLE PRODUCTION IN JOS (NIGERIA) AS  
A SOURCE OF LIVELIHOOD****Wuyep SZ<sup>1</sup>, Rampedi IT<sup>1\*</sup> and AP Ifegbesan<sup>2</sup>****Solomon Wuyep**

\*Correspondence author email: [isaacr@uj.ac.za](mailto:isaacr@uj.ac.za)

<sup>1</sup>Department of Geography, Environmental Management and Energy Studies,  
University of Johannesburg, Auckland Park Kingsway (AK) Campus. P.O. Box 524,  
Auckland Park 2006, South Africa

<sup>2</sup>Department of Arts and Social Sciences, Faculty of Education, Olabisi Onabanjo  
University, Ago-Iwoye, Ogun State, Nigeria



## ABSTRACT

Many cities of developing countries experience widespread poverty due to accelerated migration of people from rural to urban areas as well as high population growth rates. The city of Jos in Plateau State is experiencing rapid population growth as well, with the attendant problems of food insecurity, insufficient income, unemployment and environmental degradation. This study assessed the role that urban vegetable production plays in providing a source of livelihood to small-scale farmers in Jos. The farmers were registered with the third Fadama Project in Nigeria. Such projects derive their name from the native Hausa word 'fadama' which means irrigable lands on flood-prone and low-lying plains. Forty percent (40%) of urban vegetable farmers were randomly selected to have a sample size of 94 participants. A mixed method approach was used and this involved questionnaire-administered interviews. The primary data obtained were transcribed and subjected to ANOVA and t-test analysis. From the results obtained, most of the vegetables farm plots are located predominantly in the southern part of the study area. Results indicated that vegetable farming is playing an important role in providing 84% part-time and 5% full-time employment opportunities as well as reducing food insecurity among the study participants. In addition, most farmers achieved an income of more than the minimum wage of ₦30, 000 (US\$ 72. 24) as approved by the Nigerian Government. The results also showed that lack of credit facilities, seasonal variations and the high cost of farm inputs and equipment are the most serious problems faced by participants. Other challenges associated with small-scale urban farming entailed the negative environmental impacts that may lead to the decline of environmental quality, thus undermining long term sustainability. Furthermore, there were no statistically significant differences among participants in terms of the relationship between the type of vegetables they produce, incomes generated, environmental impacts and their demographical attributes. These attributes are the age, gender, marital status, and educational background of participants. Based on these findings, and the socio-economic importance of vegetable farming in this study area, governments and financial institutions should establish better policies in order to solve the problems faced by small-scale vegetable farmers in urban areas.

**Key words:** Vegetable cultivation, urban farming, agriculture, Jos, employment, food security, income



## INTRODUCTION

It is widely recognised that most developing countries have the world's highest rates of poverty in urban areas. Moreover, the percentage of the urban poor in Africa is expected to increase from 30% in 2000 to about 50% by the year 2035 [1]. Such poverty has many causes and is possibly accentuated by the rural-to-urban migration process, deprivation, and food insecurity. Thus, the accessibility, affordability and availability of food are the three core aspects of food security that are particularly challenging to attain in urban areas [2]. However, urban agriculture is one of the sustainable strategies that can help urban residents to eradicate poverty by supporting and increasing family incomes while ensuring food security and adequate nutrition levels [3, 4]. Urban farming refers to the cultivation of crops and rearing of livestock, along with associated activities such as the production, processing, marketing and delivery of products [5, 6]. Such farming is expected to improve livelihoods by alleviating food insecurity and improved incomes, especially among the urban poor households [7].

In Nigeria, urban vegetable farming is an important economic activity and the resultant markets are located in many parts of the country [8]. Besides, the vegetables provide food rich in carbohydrates, vitamins, minerals and trace elements, thus contributing towards satisfying national dietary needs [9]. Meeting and satisfying such needs are beneficial for the maintenance of health and the prevention and treatment of various diseases [9]. The varieties of vegetables grown in Nigeria include the leafy green varieties, okra, tomato, pepper and carrots [10]. Despite the role that urban vegetable farming is playing in Nigeria, relatively little is known on the contribution of urban vegetable production towards the improvement of livelihoods, despite a growing urban population size where economic deprivation, poverty and food insecurity are widespread. Furthermore, the World Food Program maintains that small-scale farmers require support for achieving increased agricultural productivity. It is for these reasons that a series of interventions have been introduced under the auspices of the National Fadama Projects of the World Bank development programme in Nigeria. Unlike the previous projects, the Third National Fadama Project which is also carried out in co-operation with the national government seeks to promote further growth and agricultural diversification amongst small-scale rural farmers. Consequently, a number of studies have been conducted in Nigeria to assess the challenges, milestones, and successes achieved under both Fadama 1 and Fadama II projects which were mainly concerned with the provision of irrigation facilities for crop production in rural areas [11, 12]. However, there is relatively scarce literature about the impact of these development interventions in the urban areas of Nigeria where residents are confronted with high unemployment levels, abject poverty, food insecurity, and economic deprivation [13]. Therefore, the main goal of the present survey was to examine the viability and contribution of urban vegetable farming towards food security and livelihoods in Jos, the administrative capital of Plateau State, Nigeria. Based on this goal, this study was designed with the following five objectives: to characterize the spatial distribution of vegetable farming sites in the city of Jos, characterise their social and economic conditions, establish the existing vegetable farming practices and characteristics, summarize the employment patterns relevant to vegetable farming, as



well as describe the perceptions on the most important problems and environmental impacts confronting vegetable farmers.

## STUDY AREA AND METHODOLOGY

Jos is the capital city of Plateau State which covers an area of 249.9 km<sup>2</sup>. The population of Jos grew from a small town of less than 10,000 people in 1930 to over 600,000 by 1991 [8], while from the 2006 Population Census, it was estimated to have 736,016 people [14]. Jos has an altitude of around 1,290 meters above sea level [15]. The climate is influenced by altitude and position across the seasonal migration of the Inter-Tropical Discontinuity (ITD). The location of Jos is within the wet and dry types broadly classified as a Tropical Rainy (AW) climate by Köppen [16]. The city has a mean annual rainfall of 1,260 mm, with its peak between July and August and a mean annual temperature of about 22°C [17]. The soils in the area are classified as poorly drained and have sandy, clay, and loam surfaces [18]. In terms of chemical reaction, they are slightly to moderately acidic and have a high base saturation. Jos city owes its origin to the introduction of tin mining in the Jos Plateau and the development of railway lines that are linking it with several cities [19]. Consequently, the city has undergone marked transformation as a result of the tin mining industry which lasted for many decades. However, the decline and subsequent collapse of this industry in the 1960s led to many alternative economic activities, including urban farming practices as a vital source of livelihood for local inhabitants [20].

The target population for this study was urban vegetable farmers in Jos and a triangulated mixed-methods approach was used for data collection and analyses, the goal being to have a better understanding of the problem and yield more complete evidence. According to Leedy and Ormrod [21], surveys are designed to provide an understanding of the patterns or trends in the study population by selecting only a certain sample of that population to generate findings which can be generalized back to the whole population. However, selecting the sample depends on the population size and homogeneity, cost implications, and the level of precision required. For the purpose of the present research, the administrators of the Third Fadama Project in Jos were consulted for the latest database they had on participating farmers.

In order to select a sample that is representative of the population for easy generalisation of the research findings, the administrators of the Third Fadama Project in Jos were consulted for the latest database of farmers in this city. Two hundred and thirty-six (236) farmers were found on their register. One hundred and eighteen (118) farmers constituting 50% of the population were randomly selected. However, questionnaire-administered interviews were only conducted after obtaining their prior informed consent. Granting such consent meant that they understood the purpose and aim of the survey, their right to withdraw at any time without incurring any harm on their wellbeing and dignity, and the confidentiality of their personal data. Out of the 118 questionnaires that were administered to them, 108 were returned. However, it was only 94 questionnaires that were properly completed and were used for the analysis. This represented 40% of the population and 80% of the sample.

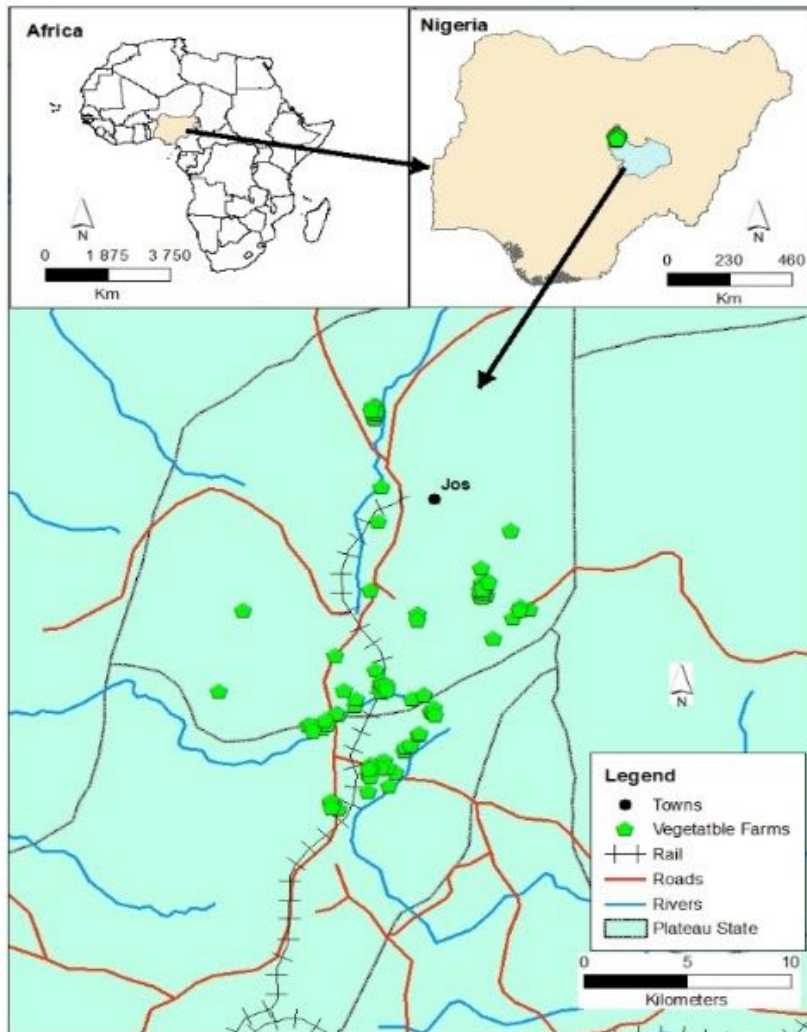


The questionnaires had close-ended (structured) and open-ended (unstructured) questions. Structured questionnaires with close-ended sections were administered by means of interviews during the October 2015-February 2016 period and some of the questions were graded according to a Likert scale. For example, the responses from study participants about their perceptions regarding the socio-economic contribution of urban vegetable farming in Jos were based on a continuum that ranged from strongly agreed (SA); agreed (A); neutral (N); disagreed (D) and strongly disagreed (SD). All of the collected data from close-ended questions were analysed by means of descriptive and inferential statistics. Furthermore, by applying ANOVA and the t-test statistics, it was possible to determine if there were any statistically significant differences ( $p < 0.05$ ) in the types of vegetables grown in the study area, incomes generated and the environmental impacts of such farming in terms of the demographical attributes of participants. On the other hand, unstructured questionnaires were used for interviews which happened during January 2017. The data collected were mainly textual and were analysed by means of systematic content analyses so that different themes and ideas in it could be distilled.

## RESULTS AND DISCUSSION

### **Spatial distribution of farms and socio-economic characteristics**

Figure 1 shows the spatial distribution of 94 urban farming stands or cultivated plots, of which the majority are located in the southern part of Jos city. Whereas the northern part of Jos had only 14 plots, the eastern part had 22. The majority (53) of such stands were found in the southern areas of Jos. The low number of cultivated plots in the north may be ascribed to the existing rocky terrain whereas the southern area has a relatively flat terrain, therefore conducive to farming operations especially from an irrigation viewpoint. In terms of size, most of the plots are small-scale farms ranging from 1 to 2 hectares in size. In fact, 63% of study participants indicated that their farms ranged from 0.5-1 hectares in size. Types of vegetables being planted included cucumbers, tomatoes, green beans, potatoes, carrots, cabbage and pepper (Figure 2). In the study area, farmers used the furrow irrigation method because water could easily be directed to the crops. In the southern part of the study area, irrigation water was obtained from the remaining water ponds, especially during the dry season.



**Figure 1: Spatial distribution of vegetable farms**

The socio-economic characteristics of urban vegetable farmers are presented in Table 1. Women constituted the majority (58.5%) of participants while men accounted for nearly 40%. Furthermore, 42% of participants were in the 41-50 years age category with 57.4% conducted their farming activities on a part-time basis. The number of years in small-scale farming practice were also relatively high. For example, those who had spent 16-20 years in crop production were about 25% meanwhile those who spent 6-10 years amounted to nearly 45% of the total. Coupled with relatively higher incomes derived from the vegetable farming (Table 1), it can be seen that most participants were economically active, their prime aim being to increase their food security and income levels for their families. Nearly 37% of their families ranged from 5-6 members.



**Figure 2: Examples of vegetable farms in Jos**

### **Vegetable farming practices and other characteristics**

Regarding land tenure, some of the farmers are faced with difficult challenges. For example, about 43% of participants are growing their vegetables on rented land and this is financially challenging. A farmer summed this challenge on January 08<sup>th</sup>, 2017 in the following manner:

*“This issue of land has been an important challenge in this farming, I have been paying for this plot of land since I started my operations. The landlord keeps on increasing rent every two years and this is unbearable. Government should set aside land mainly for vegetable farming due to the importance of this industry in terms of raising many employment opportunities and the supply of exotic fruits and vegetables”.*

The implication of this finding is that farmers are discouraged from making long term infrastructural investments on the farms since they do not own them, thus running the risk of losing them if the landlords decide to take the land away from them. This risk is negatively affecting farm productivity and consequently, food security as well as their income streams. Subsequent analysis revealed that the majority (83%) of the farmers

produced their vegetables in a different location away from their homes and, therefore, had to travel on a daily basis to reach these farms. In fact, 43% of participants mentioned that their farms were located at a distance ranging between 3-4 km away from their homes (Table 2). Such travelling requires additional financial costs which erode farm incomes. Furthermore, in various farms it was found that farmers used both indigenous or home-saved and certified seeds, and both intercropping and crop rotation were widely practiced. In terms of maintaining soil fertility, both composite manure and mineral fertilizers were used. As far as pests and crop diseases are concerned, potato crops were the ones that were negatively affected, especially by early blight (*Alternaria solani*) and late blight (*Phytophthora infestans*). Thus, chemical control was undertaken by spraying fungicides in the affected areas to help reduce these problems.

### Employment patterns relevant to vegetable farming

The majority (70%) of participants employed  $\geq 5$  workers on their farms and 84% reported that they employed workers on a part-time basis (Table 3). Sixty eight percent (68%) of participants paid their employees monthly wages of more than ₦20,000 (US\$ 63.5) (Table 3), of which some of them may reach the new minimum wage of ₦30,000 (US\$ 72.24) recommended by the National Salaries, Income and Wages Commission of Nigeria. These findings are in line with the results of many related studies conducted in cities such as Yaounde (Cameroon), Oyo (Nigeria) and Mbabane (Swaziland), which point out that vegetables are high value crops that provide employment opportunities, thus helping to reduce poverty within urban populations [22, 23, 24, 25, 26]. Similarly, a study by Drechsel *et al.* [27] in Tamela (Ghana) and by Lagerkvist [28] concluded that vegetable production provides employment opportunities for a number of recipients such as farmers, sellers and suppliers of agricultural inputs, thus demonstrating how they are contributing positively to the livelihoods of participants in the present study area.

### Perceptions towards urban vegetable farming

As shown in Table 4, 67% and 69% of the participants strongly agreed that vegetable farming has improved their standard of living and is contributing to local economic development, respectively. By nearly the same proportion, 69% of participants strongly agreed that it is also a source of income to urban farmers. Furthermore, those who agreed that vegetable production serves as a source of employment constituted 61%. Similarly, a very high proportion (71%) of participants strongly agreed that vegetable farming has enhanced food supply in the city of Jos.

In an interview with one of the study participants on January 08<sup>th</sup>, 2017, the following points were made on the extent to which small-scale vegetable farming was making towards the improvement of livelihoods:

*“Vegetable farming has been my parents’ source of income. I was trained from secondary school to Ordinary Diploma level of education from the proceeds of kayan lambu (vegetable farming). Even as I am in Jos, I could not stop vegetable production because of the income it was generating for me. I do give this farming special priority, in fact the income I am generating is more than my*





wife's monthly salary as a primary school teacher with Jos South local Government Education Authority”.

With these results, it can be seen that vegetable farming is considered by the participants to be an important source of livelihood in the study area, thus reducing their food insecurity and poverty levels, whilst providing employment opportunities for some of the unemployed residents.

### **Perceptions of important problems faced by urban vegetable farmers**

Nearly 79% of participants experienced serious problems in terms of obtaining credit facilities in Jos (Figure 3). This finding is similar with previous results reported by Negasi and Mebrahatom [15]. Also, seasonal variations constituted a serious problem to most (76%) participants in Jos. This constraint has also been documented in South-western Nigeria where delayed rains are leading to decreases in the growing periods for vegetables [29]. From the current survey, most (73%) participants agreed that the lack of necessary farm inputs and equipment was a major constraint. This is seen in their average spending on farm inputs which can be summarised as follows: ₦10,496 (US\$ 33.3) (seeds); ₦9,805 (US\$ 31.1) (insecticide); ₦18,420 (US\$ 58.5) (fertilizer); and ₦2,220 (US\$ 7) (on miscellaneous items). In a personal communication with another participant on the 10<sup>th</sup>, January 2017 the following points were made:

*“Fertilizer has been one of our major concerns in our vegetable farming. Government should make fertilizer readily available at the appropriate time and to the real farmers and not the fake farmers and politicians who later sell it to us at an expensive prize. This is really hampering the effective production of our vegetables”.*

Furthermore, about 60% of participants are faced with the problem of water scarcity during the dry season (October and March). Also, 55% are constrained by lack of access to storage facilities. A similar percentage of participants mentioned access to markets as a major constraint, while 52% reported inadequate access to extension services for vegetable production.

From these findings (Figure 3) seasonal variations exhibited the highest mean of 4.76 and is, therefore, ranked first on a scale of 5. The next factors in descending order are as follows: credit facilities (4.62) ranked second, water availability (4.54) third, and farm input/equipment with a mean of (4.52) fourth. All these factors are the most serious problems among others that hampered the effective and efficient production of vegetable farming in the study area, thus affecting their source of livelihood in a negative manner.



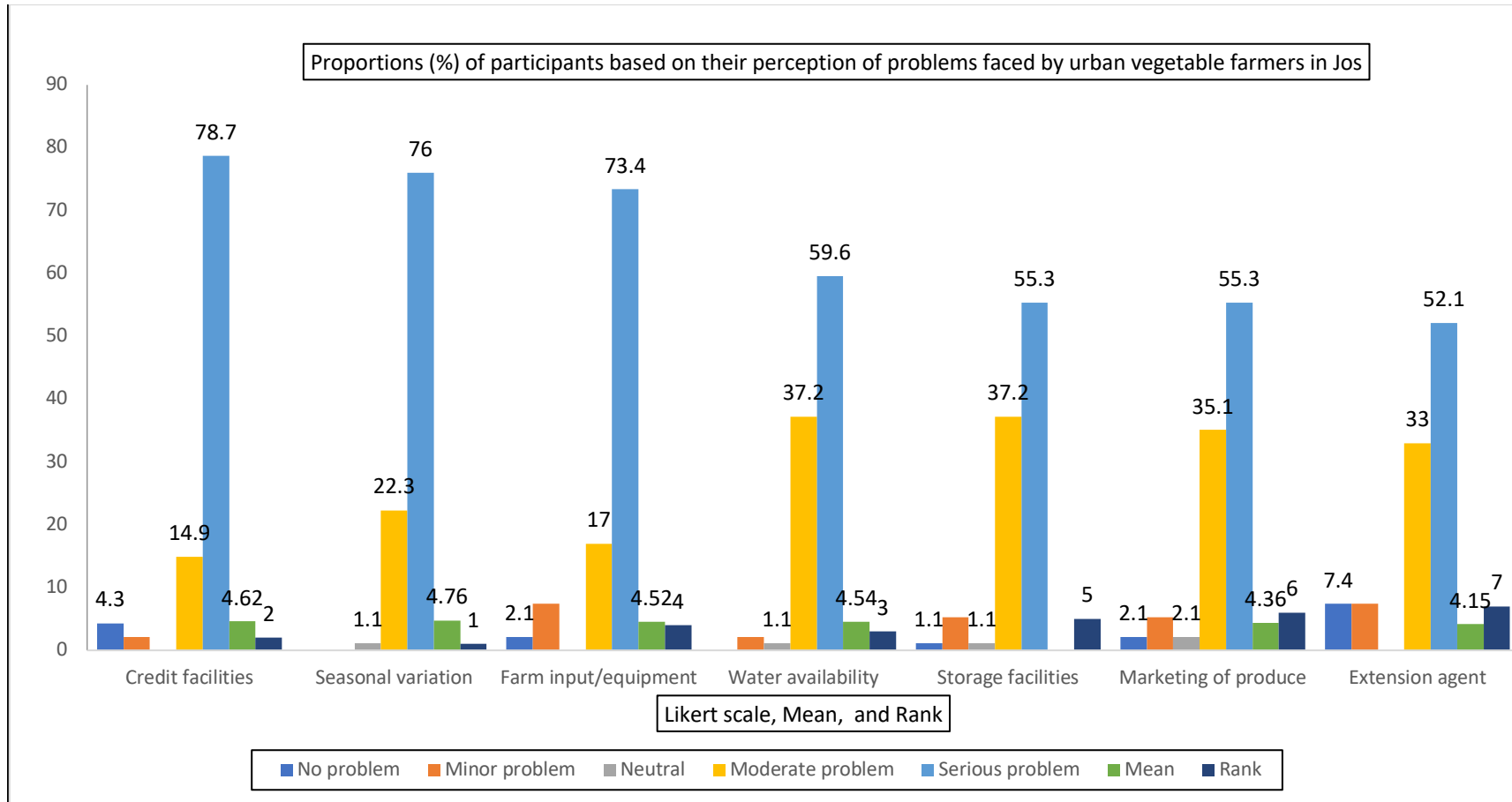
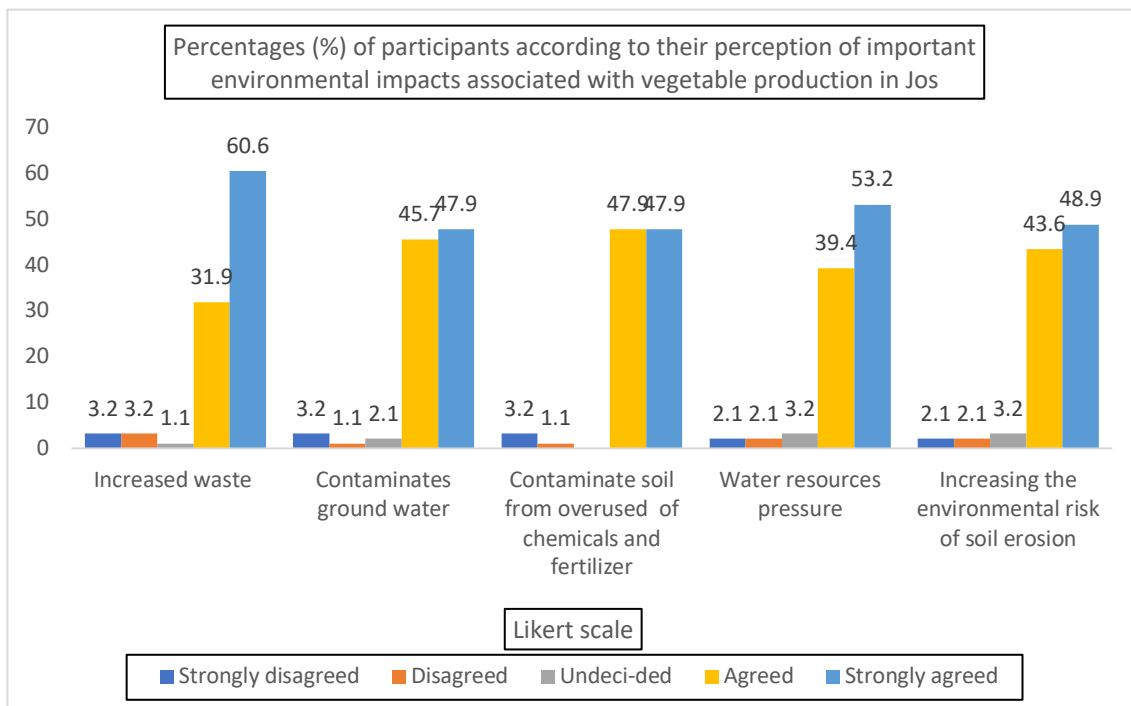


Figure 3: Perceptions of problems faced by urban vegetable farmers in Jos

**Perceptions of the environmental impacts of urban vegetable production**

About sixty-one percent (61%) of participants strongly agreed that vegetable production in the city of Jos increased waste generation (Figure 4). This finding supports the assertion by Smit *et al.* [30] that poorly disposed vegetable remains are creating a waste problem that affect the local environmental quality. About 48% of participants strongly agreed that vegetable production in Jos contaminates ground water resources (Figure 4). Similarly, Jago *et al.* [ 31] made a similar finding in Asia that the application of chemicals pollutes groundwater and surface water resources. Furthermore, most (96%) participants agreed to strongly agreed that vegetable farming contaminated soil due to chemicals and fertilizers used to enhance crop yields (Figure 4). This environmental impact is widely recognised in many studies [32, 33, 34]. In addition, Figure 4 indicates that 53% of urban vegetable farmers strongly agreed that vegetable production has increased pressure on water resources. In the same light, vegetable farming has increased the risk of soil erosion as noted by 49% of participants. In an interview with one participant on January 10<sup>th</sup>, 2017, the following points were made:

*“To be honest with you, vegetable farming is consuming a lot of water, and by March if you come to this farm, you would not find any drop of water from this mining pond because we use everything to irrigate our ‘lambu’ (vegetable farm). We had to drain water last year from another mining pond to irrigate our cabbage, thus you can see why I said they consume a lot of water”.*



**Figure 4: Perceptions on the most important environmental impacts associated with vegetable production**

### Statistical differences amongst urban vegetable farmers

The results on the analyses of variance (ANOVA) among urban vegetable farmers in Jos are indicated in Table 5. There were no statistically significant differences between types of vegetables grown, incomes generated and the environmental impacts of such farming according to the age, marital status, and educational background of participants. This means that the farmers were not different to one another in terms of specific types of vegetable grown and their perceptions of incomes generated and as well as the environmental impacts of such farming. To examine differences between male and female participants in terms of types of vegetable grown, incomes generated and the environmental impacts of urban farming, an independent t-test was conducted. Based on these results, there were no significant differences between male and female participants in the three variables tested. These findings imply that the types of vegetables grown are similar across gender (Table 6). Likewise, there were no significant differences among the views expressed by participants in terms of incomes generated and the environmental impacts of farming activities.

### CONCLUSION

In this study, the role of small-scale vegetable farming in Jos, in alleviating food insecurity and poverty has been surveyed. More specifically, the survey was based on the farmers who were registered with the Third National Fadama Project in Nigeria, thus adding further insights to some of the researches that are evaluating the performance of this project throughout the country [11, 12, 13]. The present survey has revealed that most farm plots are located in the southern part of Jos due to the absence of rocky terrain, thus demonstrating the suitability of such land for cultivation but also the importance of water accessibility from the remaining mining water ponds. Whereas these ponds are currently being exploited to augment water supply during the dry seasons, they are not suitable for sustainable farming due to the presence of previous mining impurities, thus raising the need for the availability of water with optimum quality. While the majority of study participants indicated that vegetable farming has improved local employment opportunities, standards of living as well as local economic development, their effectiveness is hampered by many operational problems such as unaffordable rented land, lack of adequate access to credit facilities and farming inputs as well as the adverse effects of seasonal droughts. These problems need redress if the current small-scale farming activities are to attain long term productivity and profitability for the participants. Furthermore, the farming activities generate a number of negative environmental impacts which require adequate mitigation for their minimization because the quality of the available land must be improved not only for the present generation of farmers but also for future ones.

### ACKNOWLEDGEMENTS

We would like to immensely thank the small-scale farmers in the city of Jos who consented to our survey and primary data collection.

### CONFLICT OF INTEREST

The authors declare no conflict of interest in the research they have undertaken.



**Table 1: Socio-economic characteristics of urban vegetable farmers**

| Variables                                 | Frequency | Percentage |
|---|-----------|------------|
| Gender of participants                    |           |            |
| Female                                    | 55        | 58.5       |
| Male                                      | 39        | 41.5       |
| Age of farmers                            |           |            |
| ≤ 30 years                                | 9         | 9.6        |
| 31-40 years                               | 23        | 24.4       |
| 41-50 years                               | 39        | 41.5       |
| 51-60 years                               | 12        | 12.8       |
| >60 years                                 | 11        | 11.7       |
| Household size                            |           |            |
| ≥2  | 8         | 8.5        |
| 3-4                                       | 27        | 28.7       |
| 5-6                                       | 35        | 37.2       |
| >7  | 24        | 25.5       |
| Educational level of participants         |           |            |
| No formal education                       | 29        | 30.9       |
| Secondary education                       | 40        | 42.6       |
| Tertiary education                        | 25        | 26.6       |
| Occupation of participants                |           |            |
| Full time farmers                         | 40        | 42.6       |
| Part time farmers                         | 54        | 57.4       |
| Farming experience of participants        |           |            |
| ≤ 5 years                                 | 10        | 10.6       |
| 6-10 years                                | 42        | 44.7       |
| 11-15 years                               | 18        | 19.2       |
| 16-20 years                               | 24        | 25.5       |
| Monthly income from vegetable farming (₦) |           |            |
| ≤ 6001 to 20000                           |           |            |
| 20 000 and above                          | 94        | 100        |

**Table 2: Vegetable farming practices and other characteristics**

| Variables                  | Frequency | Percentage |
|----------------------------|-----------|------------|
| Land tenure                |           |            |
| Own land                   | 28        | 29.8       |
| Rented land                | 40        | 42.6       |
| Family own land            | 26        | 27.7       |
| Produce                    |           |            |
| At home                    | 16        | 17.0       |
| Other location             | 78.0      | 83.0       |
| Distance to vegetable farm |           |            |
| 0km                        | 13        | 13.8       |
| 1-2 km                     | 34        | 36.1       |
| 3- 4 km                    | 40        | 42.6       |
| ≥ 5 km                     | 7         | 7.5        |
| Total area                 |           |            |
| < 0.5 ha                   | 28        | 29.8       |
| 0.5 - 1 ha                 | 59        | 62.8       |
| > 1 ha                     | 7         | 7.4        |
| Days per week              |           |            |
| ≤ 2 days                   | 8         | 8.5        |
| 3-4 days                   | 32        | 34.0       |
| 5-6 days                   | 46        | 48.9       |
| ≥ 7 days                   | 8         | 8.5        |

**Table 3: Employment characteristics of vegetable farming in Jos**

| Variables                  | Frequency | Percentage |
|----------------------------|-----------|------------|
| Number of workers          |           |            |
| 0 people                   | 7         | 7.5        |
| 1-2 people                 | 5         | 5.3        |
| 3- 4 people                | 16        | 17.0       |
| ≥ 5                        | 66        | 70.2       |
| Type of employment         |           |            |
| Part-time                  | 79        | 84.0       |
| Full time                  | 4         | 4.3        |
| Volunteers- family members | 11        | 11.7       |
| Wages of employees         |           |            |
| ₦0                         | 7         | 7.5        |
| ₦1- 6 000                  | 16        | 17.0       |
| ₦6 001 - 10 000            | 4         | 4.3        |
| ₦10 001 - 15 000           | 3         | 3.2        |
| ₦20 000 and above          | 64        | 68         |

**Table 4: Perceptions of participants towards urban vegetable farming**

| Perceptions about the contribution of urban vegetable farming towards improved livelihoods | disagree | Strongly | Disagree | Neutral | Agree | disagrees | Strongly |
|--|----------|----------|----------|---------|-------|-----------|----------|
| Improves living standards  | -        | -        | -        | -       | 33%   | 67%       |          |
| Provides economic development  | -        | -        | 1.1%     | 29.8%   | 69.1% |           |          |
| Provides a source of income  | -        | -        | -        | 30.9%   | 69.1% |           |          |
| Provides employment opportunities  | -        | -        | 1.1%     | 37.2%   | 61.7% |           |          |
| Enhances food supplies   | -        | -        | 1.1%     | 27.7%   | 71.2% |           |          |

**Table 5: Analysis of variance (ANOVA) between types of vegetables, generated incomes and environmental impacts and the socio-economic attributes of farmers**

| Age                                     |                | Sum of Squares | Df | Mean Square | F     | Sig. |
|---|----------------|----------------|----|-------------|-------|------|
| Type of vegetables grown                | Between Groups | 22.172         | 4  | 5.543       | .751  | .560 |
|   | Within Groups  | 657.317        | 89 | 7.386       |       |      |
|   | <b>Total</b>   | 679.489        | 93 |             |       |      |
| Contribution of urban vegetable farming | Between Groups | 12.849         | 4  | 3.212       | .420  | .794 |
|   | Within Groups  | 680.768        | 89 | 7.649       |       |      |
|   | <b>Total</b>   | 693.617        | 93 |             |       |      |
| Environmental impact                    | Between Groups | 51.524         | 4  | 12.881      | .512  | .727 |
|   | Within Groups  | 2239.635       | 89 | 25.164      |       |      |
|   | <b>Total</b>   | 2291.160       | 93 |             |       |      |
| Marital status                          | Between Groups | 82.970         | 5  | 16.594      | 2.448 | .040 |
|   | Within Groups  | 596.520        | 88 | 6.779       |       |      |
|   | <b>Total</b>   | 679.489        | 93 |             |       |      |
| Contribution of urban vegetable farming | Between Groups | 16.828         | 5  | 3.366       | .438  | .821 |
|   | Within Groups  | 676.789        | 88 | 7.691       |       |      |
|   | <b>Total</b>   | 693.617        | 93 |             |       |      |
| Environmental impact                    | Between Groups | 41.569         | 5  | 8.314       | .325  | .897 |
|   | Within Groups  | 2249.591       | 88 | 25.564      |       |      |
|   | <b>Total</b>   | 2291.160       | 93 |             |       |      |
| Educational background                  | Between Groups | 18.215         | 3  | 6.072       | .826  | .483 |
|   | Within Groups  | 661.274        | 90 | 7.347       |       |      |
|   | <b>Total</b>   | 679.489        | 93 |             |       |      |
| Contribution of urban vegetable farming | Between Groups | 12.623         | 3  | 4.208       | .556  | .645 |
|   | Within Groups  | 680.994        | 90 | 7.567       |       |      |
|   | <b>Total</b>   | 693.617        | 93 |             |       |      |
| Environmental impact                    | Between Groups | 42.558         | 3  | 14.186      | .568  | .638 |
|   | Within Groups  | 2248.602       | 90 | 24.984      |       |      |
|   | <b>Total</b>   | 2291.160       | 93 |             |       |      |

**Table 6: Independent t-test on types of vegetable grown, incomes generated and environmental impact of urban farming by gender**

|                          | Gender | N  | Mean    | Std. Deviation | T      | Sig. |
|--------------------------|--------|----|---------|----------------|--------|------|
| Type of vegetables grown | Male   | 39 | 9.8718  | 3.10500        | -1.891 | .062 |
|                          | Female | 55 | 10.9273 | 2.30823        |        |      |
| Incomes generated        | Male   | 39 | 42.2821 | 2.50209        | 1.034  | .304 |
|                          | Female | 55 | 41.6909 | 2.87951        |        |      |
| Environmental impacts    | Male   | 39 | 31.5128 | 5.33051        | -.467  | .642 |
|                          | Female | 55 | 32.0000 | 4.72582        |        |      |



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