



# Large-scale agricultural land investments and food security in Nigeria

Oluwatosin D. Edafe<sup>a,b,\*</sup>, Evans Osabuohien<sup>a,b,c</sup>, Oluwatoyin Matthew<sup>a,b</sup>,  
Isaiah Olurinola<sup>b,d</sup>, Joel Edafe<sup>e</sup>, Romanus Osabohien<sup>a,b,c</sup>

<sup>a</sup> Department of Economics & Development Studies, Covenant University, Ota, Nigeria

<sup>b</sup> Centre for Economic Policy & Development Research (CEPDeR), Covenant University, Ota, Nigeria

<sup>c</sup> DePECOS Institutions and Development Research Centre (DIaDeRC), Nigeria

<sup>d</sup> Anchor University, Ayobo, Lagos State, Nigeria

<sup>e</sup> Adeyemi Federal University of Education, Ondo, Nigeria

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## ABSTRACT

The study examines how large-scale agricultural land investments (LIs) affect household food security in Nigeria. It is one of the few studies in Nigeria that offers new empirical insights into household food security. Precisely, it unravels how LIs affect the livelihood outcomes of households in communities where LIs operate compared to households in communities without such LIs. This study engages the mixed methods of analysis involving quantitative and qualitative techniques. The quantitative data is drawn from the Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) utilising the Logistic regression technique. The qualitative aspect of this study involved fieldwork conducted in two distinct Nigerian states: Kwara State, situated in the North-Central region, and Ogun State, located in the South-West region. The qualitative findings further enrich the quantitative findings. It also helped to investigate the nature of jobs households engaged in and also the employment density of the investors' farms which could not be done using the national representative data (LSMS). The results indicate that households in communities without land investments have 0.2% higher likelihood of being more food secure than households in communities with land investments and it is significant at 5%. The qualitative analysis reveals several key insights, including the observation that female headed households in communities with LIs are less likely to be food secure, receive less wages, and spend more time in communities with LIs. Government should put in place policies (for example, compensation policies) that will ensure that land deals are properly monitored and structured to benefit and protect the host communities. If the government fails to properly regulate land deals, rural people will always suffer. Also, they should monitor and control the activities, and the type of crops grown in investment farms so that land investments can bring about the desired benefits such as improvement in household livelihood and enhance food security in the communities where they exist.

\* Corresponding author. Department of Economics & Development Studies, Covenant University, Ota, Nigeria.  
E-mail address: [edafeoluwatosin11@gmail.com](mailto:edafeoluwatosin11@gmail.com) (O.D. Edafe).

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## 1. Introduction

Efforts have been made by governments across countries to address the challenge of food insecurity; however, the condition of undernourishment remains an issue of concern across the globe [1]. This arises as a result of the increasing number of hungry people globally [2]. The Food and Agricultural Organisation Report [3] shows that the number of undernourished people globally remains significantly high, witnessing an increase from 777 million in 2015 to 828 million in 2021 [3]. Food security requires that everyone, consistently, have physical, social, and economic access to enough and healthy food. Such food must satisfy the nutritional requirements and preferences of people. It describes the amount of food that is physically available in a given region or location [3]. In Nigeria, food security poses a significant challenge, where the country ranks 103rd position out of 121 countries on the 2022 Global Hunger Index. More than 9 million Nigerians face food insecurity, and the United Nations' Food and Agricultural Organisation (FAO) has issued a recent caution that unless effective policies are put in place or efforts to enhance resilience and provide humanitarian assistance are accelerated, a substantial number of Nigerians face the risk of suffering from famine, with some already experiencing its dire effects [4].

The state of food insecurity in Nigeria is worsened by socio-economic shocks such as the loss of jobs, business failure, rising input costs, declining output prices, and escalating prices of essential food items, among other factors [5]; and environmental issues such as land investments, crop loss due to fire, adverse weather conditions like droughts and floods, pest and disease invasion that cause harvest failure, conflicts and wars, among others, are listed as the major issues responsible for food insecurity [6–11]. This is complicated by a weak institutional framework required to time mitigate the aftermath impact [12–14]. Also, the information from Nigeria Meteorological Agency shows that the annual mean climatic conditions in Nigeria have witnessed huge variation [14,15], which has negative implications on food security.

Furthermore, there are forecasts indicating that the global population will expand to a minimum of 9 billion by 2050, with Nigeria's population expected to surpass 400 million people by the same year [16]. This demographic growth will effectively double the demand for food. Therefore, it becomes imperative to boost agricultural production in tandem with the increasing population, as this will help enhance the productive capacity of the agricultural sector.

Socio-economic activities within various sectors such as agriculture, manufacturing and services have witnessed significant changes in recent times [17]. Among others, the agricultural and manufacturing sectors are mostly affected by such problems [18]. The occurrence of the Coronavirus (COVID-19) pandemic and attendant socioeconomic challenges such as lockdown and restriction of movement and other socioeconomic activities have further affected food production and disrupted the entire food supply chain. Other burning issues in the Nigerian economy such as rising insecurity, farmer-herder conflicts, and youth unemployment among others have also culminated in food insecurity [19]. Food insecurity represents a significant concern within Nigeria. The primary drivers of food insecurity in the country are LIs that have triggered the displacement of small-scale farmers and loss of farmlands, conflicts, natural disasters, such as flooding and so on.

According to recent studies [20,21], large scale agricultural land investments (LIs)<sup>1</sup> could further affect food insecurity in Nigeria. Land investments increase land unavailability, a development that affects livelihood and food security. Additionally they lead to loss of land which has a severe negative impact on livelihoods. Loss of land leads to loss of agricultural production and thus reduces food security. When households lose their lands, it affects their income from cropping, consequently, experiencing declines in their food security status and standards of living.

The effects of LIs are controversial among researchers, international organisations and activists [22]. It has been argued in the literature that LIs are one of the subjects of intense controversy in recent years [23,24]. LIs could positively affect the livelihood of households in communities where they are situated or communities around such investments by creating job opportunities, offering contracting or outgrower schemes, enabling land rental markets, improving market access and stimulating infrastructure development [25,26]. In contrary, adverse social, economic, and environmental consequences may negatively affect the livelihoods and health of the communities [27]. The effects of land investments on the food security of the local community can vary, with outcomes being either positive or negative. These outcomes depend on the specific business models implemented, the contracts agreed upon, and the effectiveness of the land and investment governance systems and institutions in place. For instance, LIs investments, which generate cash and food crops for export, may jeopardise local land rights and access, as well as food security, that is, people's authority over food production and distribution. In the negotiation of these deals, governments and communities must carefully consider the positive and negative implications and outcomes of all land use.

Despite this interest, there are few studies [24,28,29] on the effects of LIs on household livelihood and food security in Nigeria. Existing studies in this area have mostly examined how LIs affect household income [30]; production efficiency and productivity [31]; livelihoods of the households [32], land tenure systems and governance [33] and environmental aspects [34], rather than food security. This paper, therefore, fills this observed gap by investigating the state of food security and how LIs affect household food security in Nigeria; to investigate the nature of jobs households engaged in, and also the employment density of the investors' farms households in communities with LIs.

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<sup>1</sup> In this paper, large-scale agricultural land investments and Land Investments are used almost synonymously for convenience of discussion, which is abbreviated as LIs.

## 2. Literature review

Bruentrup [35] defined large-scale agricultural land investments (LIs) as investments that exceed 200 ha. Osabuohien [36] described foreign large-scale land investment as individuals and entities buying/leasing land in another country. Desalegn [37] in a study described land investments as a type of foreign direct investment, such as contracting large parcels of land for commercial agriculture by local or foreign companies or government or individuals. Land investment is when investors acquire large land areas which are used for different purposes [38,39]. Aigbokhan and Ola [40] defined land investments as obtaining a large area of land and that these large land areas are purposely used for agricultural activities most of the time. It is difficult to give the phenomenon a generally agreed definition because it occurs differently in terms of the critical drivers, their sizes, and resulting outcomes in different regions where it occurs [41,42]. Many studies [20,43,44] that have endeavoured to analyse the concept of LIs have adopted a critical perspective, casting doubt on the potential advantages these investments might bring to the economies of the countries hosting the investments and the livelihoods of local communities. These studies argue that the phenomenon might not have the prospective to accelerate development and ends up harming them.

Some studies [45–47] that were conducted in sub-Saharan Africa have reported that land investments have had some adverse effects on investment-hosting countries and communities such as the dispossession of local people from their ancestral lands and lack of compensations to those who lost their lands. According to some studies there are concerns such as food insecurity, farmers' displacement, water shortages, and long-term land acquisition consequences on future land use plans [48–50]. When it comes to food security, foreign investors occupying large tracts of land to carry out farming activities, with the products typically being exported back to their home countries. This reduces the host country's ability to carry out its own farming activities, lowering the amount needed to feed its population. As a result, the host country's food security is jeopardized [51].

A key example is in Ethiopia which receives foreign food; however, it has huge tracts of farmland that have been sold or leased to foreign investors. This land is primarily utilised for exporting food rather than meeting the dietary needs of the local population [52, 53]. In Gambella, South West, Ethiopia, the presence of LIs impacted negatively on the local household's income, livestock holding and cultivable land size. Promised benefits made by these investors such as the creation of jobs and improved welfare were not fulfilled [54]. Presco industries in Edo State, Nigeria, (a particular land investment deal in Nigeria) did not succeed in enhancing the livelihood of the local communities through employment opportunities [40]. Land investments negatively affect the food security of households residing in such communities. For instance, land investments, which generate cash and food crops for export, may jeopardise local land rights and access, as well as food security, that is, people's authority over food production and distribution.

Many developing countries are now making concerted efforts to attract foreign and domestic investments primarily in agriculture, with the hope that this will contribute to higher productivity, spur economic growth, alleviate poverty, and bolster food security through transfer of technology, employment generation, providing access to capital and markets, and driving infrastructure development. Besides, other countries with high populations and food security issues such as China and India, have also pursued strategies to increase foreign investments in agriculture. However, these agricultural land investments have resulted to a number of negative outcomes, including the loss of ancestral lands, diminished households' livelihood, displacement of agricultural activities, poverty, food insecurity, poor compensations, environmental pollution, among others [55]. This is because the majority of the food produced from LIs are earmarked for export to regions and countries outside the host areas [56,57]. The circumstance has exacerbated the local population's food insecurity. This is because they no longer have access to land and its resources. In such situations, foreign investors and their home countries end up being the main beneficiaries at the host country's expense. Bekele et al. [28], examined the effects of LIs-induced household displacement on land degradation in semi-arid agro-pastoral regions of Ethiopia. The study also included a survey of 866 households from two agro-pastoral locations in Ethiopia in 2019, and employed a two-stage stratified random sampling technique. The results indicate that 75% of the households surveyed have encountered varying degrees of land degradation, ranging from moderate to severe.

Also, the expansion of land investment areas occurs through the displacement of households and the restriction of access to pastures and other resources in the research area. This worsened the paucity of pasture areas and, as a result, caused land degradation. Land investments directly exacerbated land degradation through actions such as clearing vegetation and grass in favour of plantation development, as well as by displacing grazing land and intensifying overgrazing. Similar to this study is [58] that explored the effects of LIs on household food security. The findings revealed that households residing in communities without LIs have significantly greater levels of food security, economic security, sanitation security, water security, health security, shelter security, and social security indexes than those residing in communities with LIs. The findings also showed that land investments have a major detrimental impact on household livelihoods.

Utilising Binary Probit Estimator [40], investigated the effect of LIs on the livelihood of the host communities in Edo State, Nigeria and found that company's presence (Presco Industries) in these communities had no significant effect on the people's livelihood. On the contrary, a few case studies have demonstrated how large-scale agricultural land investments (LIs) have benefited the local community's employment, income and enhanced their food security position. For example, Lavers and Boamah [59], Fitawek and Hendriks [29], reported that land investments did generate employment opportunities in Ghana and Madagascar, although these opportunities were not deemed to be sustainable in the long term. Similarly, Ahlerup and Tengstam [60] discovered that land investments had positive impacts on income, specifically benefiting households facing land scarcity in Zambia. Additionally, several studies have documented that LIs have a beneficial impact on food security in SSA [60–63]. This suggests that the findings of prior studies are varied and do not have a clear consensus.

### 2.1. Theoretical underpinnings

The theoretical framework guiding this study is based on the land enclosed theory. The land enclosed theory advocates that when a society moves from a communal land ownership system to private property land ownership, it can result in the displacement of smallholders. The displacement of smallholders would result in decreased welfare, increased labour migration away from agriculture, diminished access to water and food resources, which subsequently lowers the smallholders' standard of living and job opportunities. Theories of "enclosure" assert that the expropriation of people with customary rights is a common consequence of LIs [64]. The use of responsive actions against the host country's citizens, particularly when the local authority is prone to corruption, greatly exacerbates the issue of the expropriation of customary rights, according to the qualitative literature on LIs (for instance, Karakara et al. [24]), which has found a lot of support for enclosure-type arguments. The land enclosed theory presumed that large-scale land investments led to peasant displacement, a decline in living standards, an increase in rent and surplus, a shift towards less labour-intensive agricultural practices compared to communal management, increases in national income, and a net outflow of labour from the sector, among other effects. As emphasised by enclosure theories, there is a significant risk that the large-scale land investments can negatively impact smallholders, especially when their property rights are fragile at the moment of acquisition.

### 3. Method of analysis

This study employed the mixed method research approach which includes quantitative and qualitative analytical techniques. The qualitative analysis further enriches the quantitative analysis as the qualitative analysis helped to investigate the nature of jobs households engaged in and also the employment density of the investors' farms which could not be done using the national representative data (LSMS). The quantitative data is from the LSMS-ISA dataset utilising the Logistic regression approach. The rationale for this is the dichotomous nature of the data that makes Logistic regression appropriate. This enabled the researcher to investigate the probability of households in communities with land investments being food secure or food insecure. The qualitative aspect of this study involved fieldwork conducted in two Nigerian states: Kwara State in the North-Central region and Ogun State in the South-West region. The fieldwork was conducted through two primary methods, namely Focus Group Discussions (FGDs) and In-depth Interviews (IDIs). The selection of the land investments (LIs) for the study was done using a purposeful and stratified sampling approach. These States are recipients of land investments. Kwara State was selected because it exhibits the highest concentration of land investments in Nigeria, particularly with a notable presence of foreign investors [65]. The decision to include Ogun State in the study was made due to the increasing prevalence of domestically owned land investments.

The selection of respondents for the FGDs and IDIs was carried out using a non-probability sampling technique. This approach was chosen because it was not feasible to determine the probability of other stakeholder groups' participation [66]. Therefore, individuals were provided with the option to decide whether they wished to participate in the process or not. The respondents encompassed various categories, including the actual farmworkers who directly work on the farm, their supervisors, farm managers, and other staff such as cooks, drivers, cashiers, and accountants. Additionally, female groups within the community were also included. The respondents were asked a range of questions, covering topics like demographics, educational background, household information, employment details, wages, hours devoted to farm work, and other inquiries about the farm. The researcher obtained consent from the participants and assured them that their identities would remain confidential, emphasising that their responses were solely for research purposes. FGDs were conducted with farmworkers in small groups, typically comprising 5–6 workers, as well as with women's groups within the communities. Notes from the qualitative data from these discussions were transcribed, categorised, and analysed based on thematic content. The main focus of the analysis was to understand the respondents' perspectives on how land investments contributed to households.

In this study, the Food Consumption Score (FCS) is utilised as a proxy measure to assess current food security. It was established by the World Food Programme (WFP) back in 1996. The FCS is a comprehensive score that considers factors such as dietary frequency, food consumption frequency, and the nutritional value relative to different food groups.

Data on variety and frequency of food groups consumed during the last seven days is gathered and analysed at the household level. Then, this is weighted based on the relative nutritional value of the food types consumed. The researcher calculated the FCS using the standard 7-day food frequency data and grouped all the various food items into some specific food groups. With the aid of a questionnaire from the LSMS-ISA, NGHS Panel Wave 4, respondents were asked how often their household had eaten eight different types of food in the past week. The FCS was then calculated from these results by grouping the food items into the designated food groups. The standardized food group weight was multiplied by the total of consumption frequencies of food items within the same group. FCS was then calculated by adding the weighted food group scores. After then, the household food consumption status was determined based on these thresholds: 0–21 – Poor, 21.5–35 – Borderline, > 35 – Acceptable. The researcher further classified the food consumption score as households above the borderline (Acceptable) as food secure (1) or otherwise food insecure (0). This method is used because, in Nigeria, according to the Food and Agriculture Organisation [3], the FCS better reflects the attainment of a specific level of welfare and livelihood by a household, which is a good measure of food security [67].

In a binary outcome, let  $P_i$  represent the chances of a household being food secure and the chances of a household being food insecure is given as  $1 - P_i$ . The study observes the outcome  $Y = 1$  if the household is food secure and  $Y = 0$  if the household is food insecure. Then the model specification is:

$$P_r(Y_i = 1) = P_i$$

$$Pr(Y_i = 0) = 1 - P_i$$

The probability of a household being food secure is given as:

$$P_i = E(Y = 1|X) = \frac{1}{1 + e^{(\beta_0 + \beta'xi)}} \tag{1}$$

Where X is a vector of independent variables, and β is a vector of their respective coefficients. For ease of expression and understanding, equation (1) is simplified as

$$P_i = E(Y = 1|X) = \frac{e^{(\beta_0 + \beta'xi)}}{1 + e^{(\beta_0 + \beta'xi)}} \tag{2}$$

The probability of a household being food insecure =

$$(1 - P_i) = E(Y = 0|X) = \frac{1}{1 + e^{(\beta_0 + \beta'xi)}} \tag{3}$$

From equations (2) and (3), P<sub>i</sub> ranges from 0 to 1 and has a non-linear relationship with both the regressors and the parameters, which can lead to estimation issues when utilising the Ordinary Least Squares (OLS) estimation technique.

It is indeed feasible to express these equations in terms of the odds ratio, representing the probability of a household being food secure in relation to the probability of households being food insecure, as indicated in equation (4):

$$\left[ \frac{P_i}{1 - P_i} \right] = \frac{1 + e^{(\beta_0 + \beta'xi)}}{1 + e^{-(\beta_0 + \beta'xi)}} \tag{4}$$

$$\frac{P_i}{1 - P_i}$$

P<sub>i</sub> is simply the odds ratio in favour of a household being food secure and can therefore be.

1 P<sub>i</sub> simplified as follow:

$$\left[ \frac{P_i}{1 - P_i} \right] = e^{(\beta_0 + \beta'xi)} \tag{5}$$

A Logit model can be generated by taking the natural logs of equation (5) and making sure that the logarithm of the odds ratio, denoted as “L,” exhibits linearity with respect to both X and the model parameters. This characteristic gives rise to the term “Logit” model as shown in equation (6).

$$\text{Ln} \left[ \frac{P_i}{1 - P_i} \right] = L_i = (\beta_0 + \beta'xi) \tag{6}$$

**Table 1**  
The description of the households' socio-economic characteristics.

Variable	Description	Mean	Std. Dev.	Min.	Max.
Location	Urban/Rural. Urban = 0 (51.27%), Rural = 1 (48.73%)	0.487	0.499	0	1
Age	Age of household heads.	25.82	20.6	0	97
Household size (number)	Total number of members in the household	5.116	2.893	1	46
Education	Highest qualification attained 0 – no education (39.97%) 1 – Nursery & Primary education (20.98%) 2 – Secondary education (30.11%) 3 – Tertiary education (7.79%) 4 – Others (1.16%)	1.092	1.053	0	4
Health	Has consulted health practitioner in the last 4 weeks? 1 = Yes (32.95%), 0 = No (67.05%).	0.330	0.470	0	1
Household Cultivate Plot of Land	Household Cultivate Plot of Land. 1 = Yes (70.92%), 0 = No (29.08%).	0.7091	0.454	0	1
Household own Farm Land	Household own Farm Land 1 = Yes (16.64%), 0 = No (83.36%)	0.166	0.373	0	1

Source: The Authors' Computation

## 4. Results and discussion

### 4.1. Socio-economic characteristics of the households

Table 1 provides a comprehensive overview of the socioeconomic attributes of the sampled household. The data indicates that the location's mean value is 0.487 and its standard deviation is 0.499. The min and max values are 0 and 1. This implies that 48.7% of households are situated in the rural areas while about 51.3% households are found in the urban areas. Households in urban are coded as 0 while households in the rural areas are coded as 1.

The sample as a whole had a mean age of 25 for household heads. This suggests that the heads of households are relatively young and in their productive years. The average age of female heads (50) is greater than that of the male heads, the min and max values being 0 and 97 respectively. The mean of the household size is 5.11 indicating that there are 5 persons in a household. The households headed by male tended to be larger than the households headed by female. The proportion of households that have no education is 39% while 20.98% have primary school education, 30.11% have secondary school education, 7.79% have tertiary education and others forms of education are 1.16%. The mean value of health is 0.330 which implies that the number of households that consulted health practitioners in the past 4 weeks is 33% while those that did not are 67%. The proportion of households that own farm lands are lower (16.64%) compared to households who do not own farmlands (83.36%) while households that cultivate plot of lands are 29.08%.

### 4.2. Logistic regression for the total household heads

The dependent variable is whether a household is food secure or not. To capture the dependent variable which is food security, the FCS was computed. The results of the Logistic regression for the total are displayed in Table 2. The household characteristics employed are the household heads' location (whether rural or urban), the age of the household heads, the total number of household members, health, educational qualification, their access to land, specifically, whether the household cultivates plot of land or owns farm lands. The location of the household exhibits a positive and statistically significant correlation with household food security. According to the findings, urban households have a 0.2% higher likelihood of being food secure than their rural counterparts. The age of the heads of the entire household is positive and significant at 5%. This demonstrates a positive correlation between the age of the household heads and household food security. The results reveal that older household heads have 0.4% more likelihood of experiencing food security. The chances of being food secure increases because older household heads are more experienced and productive. Also, the older household heads have reduced migration unlike the younger ones who can migrate at any time. This is in line with the study of Aboaba, Fadiji, and Hussayn [68], who also found that age and household food security are positively related. The older household heads have more extensive knowledge of their physical and social environments, along with greater experience in agricultural activities.

At 1% significance level, the household size has a negative and significant relationship with food security. The marginal effects of the coefficient of the household size showed that if household size increases by one member, it reduces the household food security likelihood by 0.1%. As the size of the household increases, there is greater pressure on consumption rather than on the labour force contributing to production. Households with a smaller number of members have a higher likelihood of securing food compared to households with a larger number of members. A larger household size typically entails a greater demand for food. If this demand is not met, the probability of the household achieving food security is significantly reduced. This is consistent with the study of Muhammad and Sidique [69]. As food requirements rise in proportion to household size, a negative relationship between household size and food security is therefore anticipated.

The marginal effect of health showed that households that are healthy (who do not consult physicians more often) are more likely to be food secure by 3.1%. Also, for education, there is a positive relationship between education and household food security.

**Table 2**  
Logistic model result (food security).

Variables	Total Household Head	Average Marginal Effect (dy/dx)
Location	0.021* (0.071)	0.002* (0.071)
Age	0.003 ** (0.034)	0.004** (0.034)
Household size	-0.128*** (0.005)	-0.001*** (0.005)
Health	0.243** (0.042)	0.031** (0.042)
Education	0.099*(0.066)	0.012* (0.066)
HH_ ownfarmland	0.054 (0.722)	0.007 (0.722)
HH_ cultivateplot	0.051 (0.765)	0.0066 (0.765)
lli (Communities without = 0; Communities with = 1)	0.018*** (0.005)	0.002*** (0.005)
Constant	-1.864 (0.000)	-
LR chi2	13.85	-
P-value	0.086	-
Pseudo R <sup>2</sup>	0.0066	-
Log likelihood	-1047.61	-

Note: Probability values are in parentheses, \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.10.

The dependent variable is whether a household is food secured or not.

Source: The Authors' Computation.

Households that are more educated have 1.2% likelihood to be food secure than those with low educational level. The higher the level of one's education, the higher his/her access to obtaining information. Also, people with higher education choose foods that are healthy and good for them, which help achieve food security in the household. So, a rise in the level of education of the household head results in an improvement in the food security status. This is in sync with the studies of [39,70]. Households who own farmlands and cultivate farmlands have 0.7% and 0.6% more probability of being food secure than households who do not. Households in communities without land investments have 0.2% more chances of being food secure than households in communities with land investments. This result suggests that the presence of LIs in communities where they are located have worsened the food insecurity status of such communities. These investments have decreased the local population's access to, utilisation of, and availability of food and have raised their susceptibility to food insecurity. These findings align with the results of [20,21,71].

The results revealed that the households residing in communities without land investments are more likely to be food secure by 0.2% than households in communities with. These findings concur with those of Guyalo et al. [20] that found that land investments negatively impact the livelihoods and food security of the households in the communities that they exist; but contrary to that of Fitawek and Hendrick [29] who found a positive relationship between land investments and household food security. The reason for the adverse effect could be attributed to the following reasons. In rural Nigeria, households depend solely on communal assets. Their lands are vital to them because these are their means of livelihood. So, they are often disproportionately affected by the loss of their communal lands. If these households in the local communities lose their lands which are their source of livelihood, without any proper form of compensation and alternative livelihood opportunities, especially for the female heads that are usually not part of the negotiation process, then, such household heads in these communities will be worse off and become more food insecure. The loss of communal lands by households in Nigerian communities with land investments has an adverse effect on their food production, consumption, and related income. Since foods produced by those in communities with land investments are usually transported to other places, such communities would be less food secure.

### 4.3. Results from qualitative analysis

To provide further evidence that helped enrich the quantitative analysis, two cases of large-scale land investments were observed from a field survey conducted at Shonga farms in Kwara State, and Xtralarge farms in Ogun State, Nigeria. Also, the qualitative analysis helped to investigate the nature of jobs households engaged in and also the employment density of the investors' farms which could not be done using the national representative data (LSMS).

#### 4.3.1. Shonga Farms, Kwara State

Shonga farm is situated in the Edu Local Government Area (LGA) in Kwara State. The predominant ethnic group in Shonga District comprises members of the Nupe community, which also dominates the entirety of the Edu and Patigi LGAs in Kwara State. The Nupe are mainly smallholder farmers. Every year, each farmer cultivates between one and 2 ha of land [72], and plants a variety of crops, including cowpeas, rice, yams, cassava, sorghum, and maize, employing mostly family labour. Shonga farms comprise thirteen commercial farmers who were invited by the government of Kwara State, Nigeria to revolutionise agriculture in the state as well as promote employment generation, improve productivity and enhance food security. In contrast, XtraLarge farms is a private domestic investment that is into crop and animal farming. It is located at Sango Ota, Ogun State. It has 14 other farms at different locations in and outside Ogun State.

**4.3.1.1. Large-scale land investments employment in Shonga Farms and XtraLarge farms.** On the average, Shonga farms in Kwara State, employs about 2500 workers off (low) peak and 4000 workers during peak period. There are a higher number of females compared to males, with approximately 66.7% (8 out of every 12) of females being employed. On the other hand, Xtralarge farms employ about 200 workers. The results from the IDIs and FGDs reveal that within XtraLarge farms, there is a higher proportion of females in comparison to males. Specifically, approximately 58.33% (7 out of every 12) of females are employed in this context. In general, there is a higher proportion of females when it comes to tasks that involve soft skills such as harvesting vegetables, peeling cassava, and working in poultry sections. Conversely, a greater number of males are engaged in tedious tasks such as clearing bushes and harvesting crops compared to females. This concurs with investigations conducted by Ahlerup and Tengstam [60] which suggested that, on average, farming households lacking access to land benefit more from LIs, especially in terms of job opportunities.

Furthermore, the outcomes of this qualitative study indicate that females are employed as both permanent and casual staff, with the level of education being a determining factor. Tenured staff typically require a certain education level, while casual staff do not have the same educational requirements. Therefore, often, this creates opportunities for females that are uneducated to secure employment in large-scale land investment farms, similar to their educated counterparts. The investigations from IDIs and FGDs also brought to light that some females choose to work on large-scale land investment farms because they do not possess their own land or have access to it. As a result, the wages earned from such employment opportunities play a crucial role in providing for their families. Females typically dedicate more time to farm activities such as peeling cassavas, producing garri (commonly known as cassava flakes), harvesting vegetables, and collecting eggs from poultry, among other soft-skilled tasks. However, they tend to earn less compared to males who engage in tedious work and consequently earn more, despite investing less time. Furthermore, many men own their own land, so they prefer to work on their farms and generate income from their produce. They may choose to work for a few hours on large-scale land investment farms when opportunities arise, allowing them to earn additional wages. The age of the workers in Xtralarge farm ranges from 25 to 60. The employment ratio of male to female is about 35:65. Most of Xtralarge farm workers live on the farm with very

comfortable accommodation. There are several cows in the dairy section. What they feed their animals (cows, fish, birds) with are gotten from the farms and are purely organic.

## 5. Household total consumption of communities in large-scale land investment farms

The outcomes from the IDIs and FGDs reveal that women working in land investment farms have lower total consumption compared to those who do not work in land investment farms. This trend applies to the FHH working on these farms. They tend to have a lower consumption compared to those who are not working on the farms. For instance, most of the farm workers interviewed revealed that they preferred to have their land, plant, harvest, and sell proceeds from their farms and have enough to eat rather than work on the large-scale investment farms where they do not earn much, spend all their time and the money earned is not enough to feed their families. For instance, some female workers interviewed said that the abattoir section of Shonga farms is fully automated, so they are only employed to do some petty jobs and are not well paid. They also complained about the exorbitant prices of food items in these communities. They explained that most of the crops grown in these large-scale farms are for export or sold to other communities.

The women leader in Ota further corroborated this; she reiterated that there is a very large-scale farm at Ilogbo, a community in Ota but that the community members do not benefit from the investments. The investment is capital-intensive and exports most of its crops. Sometimes, they only see loads of trailers moving out of the community loading off the farm's produce to sell in other communities or for export. Some of the men interviewed in Shonga community claimed that Shonga farms improved their livelihood even though they would still have preferred to own their farms. They revealed that before Shonga farms came, they owned their lands which they cultivated and most of them also work with their motorcycles to earn a living. They also explained that they are mostly into fish farming. So, when Shonga Farms came, some of them refused to give out their lands, even though, those who gave their lands were compensated. Some were given, bicycles, motorcycles, cash, and so on. They claimed when Shonga farms came initially, they were not happy with the government, but when they began to see some developments in the communities such as enjoying health schemes where they have to pay a thousand naira per year to enjoy free medical facilities.

The farmers explained that they work for a particular period on Shonga farms, unlike the women who work full time. The men still work on their farms and work as Outgrowers. They supply there produce to Shonga Farms and get paid in return. Shonga Farms has a poultry section where they also buy chicken intestines from to feed their fish. They now have multiple streams of income. So, they claimed they benefitted from them even though some of them would have still preferred their lands. Also, they learnt some planting skills from the white farmers and replicated them on their personal farms. They complained that they do not earn much because they

**Table 3**  
Summary of the discoveries stemming from Large-scale Land Investments (LIs).

Location	Shonga Farm, Kwara State	Xtra Large Farms, Ogun State
Geopolitical Zone	North-Central, Nigeria.	South-West, Nigeria.
Estimated size of operational Large-scale Land Investments (LIs) in hectares.	13,000	3000
Main LIs operative areas	Crops- Maize, rice, cassava, Soya bean, sorghum, pineapple & banana Poultry farming; Fish farming;	Crops; Poultry farming; Fish farming; Processing of produce
Level of crop production in a year	2500 tonnes of cassava production 10,000 tonnes of maize production per year Large quantities of banana and pineapples	200 tonnes of cassava production 700 tonnes of maize production per year
Poultry production	Over 300,000 chicks are hatched every week 25,000 chickens sold out on daily basis Over 100,000 eggs are supplied per week	Not available at the time of visit
Infrastructural facilities	Government repairs roads and electricity 200 ha are allocated to local farmers in between 1000 ha used by the commercial farmers	Electricity Provision of pipe born water
Average number of workers.	2500	200
Age range of females in the LIs employment (years).	21 to 52	25 to 50
Percentage of females to total employment (%).	66.7	58.33
<sup>a</sup> Number of hours of the females LIs	8	9
<sup>b</sup> Wage range per month (in Naira)	30,000–110,000	15,000–100,000
<sup>c</sup> Employment Density	0.19	0.015
Activities engaged by the Females in the LIs.	Poultry, Harvesting, processing (e.g. making plantain chips, drying fish), working in the factory, and marketing	Harvesting, processing maize, rice, cassava, okra, vegetables, animal farming such as fish and poultry farming, working in the factory, marketing
Major challenges	Bad roads, lack of electricity	Bad roads, lack of electricity

**Notes:** <sup>a</sup>The work hours span from 7 a.m. to 6 p.m., while for the LIs in XtraLarge and Shonga farms, it's 8 a.m. to 6 p.m., both with a 1-h break. Nevertheless, when there are specific targets, especially in tasks like cassava peeling, the break is often not observed. <sup>b</sup>The average exchange rate during the fieldwork was N413 to US\$1. <sup>c</sup>Employment density is computed by dividing the current employment by the current size of land in operations.

**Source:** The Authors' Compilation using data from fieldwork



are unskilled workers and they are paid according to their jobs and qualifications, so, some of them migrant completely. They also complained about the exorbitant prices of food in those communities despite having different commercial farms such as Olam Farms, Shonga farms, and so on. They reiterated the problem of land encroachment where foreign farmers try to encroach on their lands but the government has been intervening.

The researcher spoke with one of the youth leaders, Mr XC; he said the government allocated 1000 ha to the youth as a practical farm where they would replicate what the white farmers were doing on these practical farms but that the land given for practical is not functional. When the researcher visited XtraLarge farms and enquired from the Director if they provided infrastructural facilities for the communities around them. The Director, Mrs. XD, explained that the land they acquired was an outright purchase and so they do not owe anybody any obligation but that they still render community services to the people. That they dug a bore hole which the community benefits from and most times, they grade the roads to the farms which make those roads more accessible.

Shonga Farms on the other hand is on a 25-year lease not on outright purchase. The government provides amenities for the people in that community. One of the white farmers in Shonga said most of them have leased their farms to Investors who can get loans from banks and operate these farms effectively. He explained that the government has stopped funding them. He reiterated that some of them even work for these investors and get paid.

Table 3 provides a summary of the sampled Land Investments for this study, along with information regarding Livelihood and Food Security Outcomes.

Findings from the qualitative study indicate that even though FHH devote more time to agricultural activities than the MHH, they earn lower incomes. It was revealed that the majority of these females do not have access to land, therefore, when they have investors in the community, they opt for wage employment to make some earnings and devote more time to work even though they earn less than their male counterparts. The findings demonstrate that, despite females working longer hours than their male counterparts, they continue to earn lower wages. This observation aligns with the prevailing situation in Nigeria, where there is a widespread belief that men undertake more physically demanding tasks than women, resulting in men receiving higher pay. Furthermore, gender-based income disparities persist, with males generally earning more than females.

Hence, it is imperative to implement effective measures aimed at safeguarding the welfare of women in rural Nigerian communities as it is being done in some other African countries, as they are more disadvantaged. For instance, in a maize farm situated in a rural Mozambican community in Africa, females receive equal pay to their male counterparts, and, in fact, females have enhanced employment opportunities compared to males [73].

## 6. Discussion of qualitative results

The fieldwork was conducted in Shonga and XtraLarge farms in Kwara and Ogun States, respectively.

## 7. Provision of employment in Shonga and XtraLarge farms

### 7.1. Shonga Farms

The average number of workers in Shonga Farms are 2500 workforce in which about 66.78%, (that is 8 out of every 12) of female are employed. This also signifies that a greater number of females are employed in Shonga Farms compared to males. Females are involved in a variety of activities in Shonga Farms, including harvesting and processing maize, cassava, okra, rice, and vegetables. They are also engaged in animal farming, including fish and poultry. Additionally, they contribute to factory operations and participate in marketing the farm's products.

### 7.2. XtraLarge farms

The results from the IDIs and FGDs suggest that XtraLarge Farms maintain an average workforce of 200 individuals, with approximately 58.33% (or 7 out of every 12) being females. This signifies a higher employment rate for females compared to males in XtraLarge Farms. The primary tasks performed by these female workers include harvesting, processing (e.g., making plantain chips and drying fish), factory work, and marketing agricultural produce.

Shonga farms have a higher employment density which is about 12 times more than that of Xtralarge farms. This is because Shonga Farms has more variety of products compared to XtraLarge farms. The Interviews with participants in these large-scale land investment communities and FGDs with female groups revealed that females seek employment in land investment farms more than males. This could be attributed to the fact that many females do not possess their own land for cultivation or have limited access to land resources. Consequently, they seek wage employment as a means to support their families and bolster their self-esteem. The male on the other hand, occasionally carried out specific tasks when they care called upon. This might be because they own their land and have other sources of income. These individuals opt to cultivate their own lands and sell their agricultural produce. Additionally, they engage in specific hours of work on land investment farms, allowing them to earn supplementary wages.

#### 7.2.1. Wages and hours worked in Shonga Farms and XtraLarge

The workers in Shonga Farms earn between 30,000.00 (72.64USD) and 110,000.00 (266.34USD). The wages earned by farm workers range from 15,000.00 (36.31USD) to 70,000.00 (169.49USD) in XtraLarge Farms. These wage disparities are influenced by the qualifications and roles of the workers. Supervisors receive higher pay compared to labourers, while female workers generally earn less

than their male counterparts. This discrepancy may be attributed to the fact that male workers typically undertake more strenuous tasks, justifying their higher earnings. Female workers engaged in softer skills such as cassava peeling and *garri* production often spend more time working on the farm than their male counterparts. In many cases, male workers explore multiple income streams to meet their financial needs, as they find wages from LIs insufficient. Sometimes, their decision to remain in their communities or migrate to urban areas in search of better economic prospects is influenced by their level of education.

### 7.2.2. The communities perception on LSAs household livelihood and food security

LIs have not really impacted the household livelihood and food security status of the community. The women leaders acknowledge that while the communities have enjoyed and benefited from LIs through the employment opportunities they provide, particularly for women, which has made them a vital source of support for their families and has instilled a sense of belonging, they also express concern that most times, these LIs are capital intensive and when they intend to employ, they prefer hiring individuals from outside the community who possess enhanced skills and can operate their machines; also, that food is expensive in such communities. It would be reasonable to assume that since the large-scale farms in that community produce food, food would be cheaper but the truth is that the food is not readily available and it is expensive. One of the women gave an example that four pieces of okro were sold for a hundred naira and they could hardly see tomatoes for N100, So, what they earned could not buy what they needed.

In addition, the findings clearly indicate that despite females investing more time in their work compared to their male counterparts, they consistently earn lower wages than their male counterparts. This situation can be justified in the context of Nigeria, where there is a prevailing belief that men undertake more physically demanding tasks than women, leading to higher wages for men. Additionally, gender-based income disparities persist, with males generally earning more than females. The study findings also showed that females in communities without land investments earned more than females in communities with land investments. This indicates that FHH in communities without land investments are better off than those in communities with land investments.

When the researcher asked whether the investment farms created employment for the local community, One of the participants in the in-depth interview (Mrs. XG) responded:

*“Ha! Ise ke? Se won fun wa ni ise ni bayii tabi won gba ise lowo wa, ti won ko wa leru? Se nigbati ijoba le wa kuro lori ile baba nla baba wa, ti won si san owo kinkinni fun awon oko wa, se ise niyen? Se keke tabi okoda ti won ko fun wa to ile ti won gba lo wo wa? Ile wa ni a fi n dako, inu re ni a tin jeun, ta tu ma ta fi toju ile ati omo. Pupo ninu wa ni ko kawe, nitori naa awon oyinbo naa ko gba wa sise, a fi ise kekeke, won ko de san owo pupo fun wa. Koda won ko kin je ki a sumo awon ikan won. Nitimi o, nko ri ise ti won fun awon eniyan wa se o. Ijoba kan fi ya je wa ni, nitori a ko kawe. Ti ijoba baa fe ranwalowo, ki won ya wa lowo lati dako, ki won sii ra ero igbalode fun wa, yara ti won fii ko awon akata wa”.*

7.2.2.1. *The interpretation of the above is.* Ha! What job? “Did they employ us or rather they took away our means of livelihood. They only enslaved us. When government displaced us and collected our ancestral lands from us, our husbands were compensated with a meagre amount. Should we call that a job? Is it the bicycles or motorcycles they gave some of us that can be equal to our ancestral land? Our land is our means of livelihood; we feed from there and sell proceeds to take care of our families. The white men did not employ some of us because we are not educated. The ones employed are only given menial jobs. They even restrict some of our movements; we are not allowed to go near some places. As for me, I cannot really see the job they claimed to have offered. The government just cheated us because we are illiterates. If government wants to help us, they should give us loans and equip us instead of bringing foreign farmers”.

However, when one of the managers (Mr. XZ) was interviewed, *he said the workers were well paid and that they employed both skilled and unskilled labour. He reiterated that the workers were paid according to their qualifications and the jobs done.*

Evidence from the field work shows that land investments have adverse effect especially on the women in such communities. In rural communities in Nigeria, contract farming might be advantageous for women. Evidence from Shonga farms, however, suggests that the predominant practice of contract farming is rooted in established power dynamics within households, often led by MHH. In many instances, the investment models embraced by investors involve collaborating with local farmers. Rural women typically lose out since they are not recognised as potential farmers. Due to their dominance in land ownership, contract farmers for many crops tend to be men. Investors employ a standardized system of households with a male household head as the basis for their contract model. Women put in a significant amount of labour, but the contract model does not take that into account.

Concerning the advantages stemming from land payment or leasing, observations from fieldwork reveal that women disproportionately bear the negative consequences of LIs. In the research areas, women are often excluded from and not consulted during any land deal negotiation processes. This exclusion occurs because women are typically not integrated into local governance structures in many rural communities due to their lower social status. The available evidence gathered from fieldwork suggests that when compensation is provided for land acquisition, since land is typically managed by men, the primary beneficiaries tend to be MHH. In some cases, communities are offered smallholder plots in exchange; nevertheless, the majority of communities have not yet received the promised plots. In Shonga, plots for smallholder farmers were distributed; however, this was done in accordance with patriarchal traditions by relying primarily on men in the community. Women in this society claimed that their names were not actually listed individually but rather that their distribution followed the pattern of unified households run by male household heads. The real-life experiences of rural women in the studied communities provide compelling evidence that women bear the disproportionate burden of negative consequences resulting from large-scale land investments. Instead of creating sustainable advantages, these investments have exacerbated the loss of land and resources, leaving rural women, who already have limited access to these resources, in a worse

position.

## 8. Conclusion and recommendations

This study investigated the effects of LIs on livelihood and food security outcomes especially of female-headed households in Nigeria. Both the logistic regression analysis and the findings from fieldwork collectively suggest that land investments have adverse effects on food security. The results obtained from the findings in this study can be evaluated in these perspectives. First, the activities of the investors are not controlled. Policies that can protect the vulnerable populations, particularly against potential exploitation by investors should be implemented. For instance, the Nigerian land use act does not sufficiently uphold landowners' rights particularly the customary rights of smallholders in these rural areas.

The results indicate that there is the potential for expropriation of land from customary landowners by influential political leaders to accommodate these investors' projects. As a result of this, the income and consumption patterns of the people in the locations with large scale land investments will differ compared to those in other locations. This in turn reduces the income and consumption levels of these vulnerable groups, primarily because they lose their primary economic activities. An argument frequently made in support of increased investment in agriculture is its job creation potential. Nonetheless, the role of LIs in generating employment is typically limited, primarily because of the seasonal nature of jobs, slow project implementation, and low wage rates. The positive impact of LIs on income generation via employment only grows when there is a connection between large-scale and small-scale farmers, often facilitated through contract farming arrangements. Also, most jobs available for local people are not usually sustainable as most investment companies gradually replace labour-intensive work with capital-intensive technology. This transition tends to keep wages low, similar to the situation observed in Shonga Farms.

The empirical findings presented in this study lead us to propose several recommendations to stakeholders, namely: government, investors and communities.

- (i) Government and community stakeholders should ensure that land deals are properly monitored and structured to benefit the host communities while taking into consideration the gender impact. If the government fails to properly regulate land deals, rural people will always suffer. Also, they should monitor and control the activities, and the type of crops grown in investment farms so that land investments can bring about the desired benefits such as improvement in household livelihood and enhance food security in the communities where they exist. The government should actively pursue more precise and enforceable commitments from investors regarding their investments, job creation, infrastructure development, and contributions to public revenue. These commitments should be backed by effective mechanisms that empower the host government to impose penalties or terminate agreements if investors fail to comply. Considering that some communities already face food insecurity, it is crucial that any agreements protect local food security, especially during food crises, rather than exacerbating the problem. Government or community stakeholders should provide schemes (Outgrowers scheme or contract farming) or legally enforceable contractual agreements. These measures would ensure the protection of small-scale farmers' interests and provide clear guidelines on employment, payment terms, and address issues related to land dispossession and low wages. This approach will not only safeguard the well-being of small-scale farmers but also provide a framework for fair and transparent interactions between investors and local communities.
- (ii) Land alliance mechanisms should be put in place where both parties (land investors and host community) can be represented in the negotiation process. Such mechanisms do not exist in Nigeria, apart from the farmer's association. Most times, the leaders in these associations do not possess enough knowledge of issues relating to land investments. If these mechanisms are not put in place, investors may fail in their promises, especially when it comes to employment opportunities. This alliance will ensure that rural dwellers whose lands are acquired are properly compensated, issues like resettlement and employments are also settled.
- (iii) Female farmers should have access to credits and farm inputs. Extension services should be given to them, empowerment programmes should also be provided to these women especially. Public Investments should be targeted at the poor, smallholder farmers and especially women. Wage policies that can protect the earnings of the workers and prevent exploitation should be put in place. Female groups and organisations should emerge. Smallholders can grow crops for the LI farms on their lands and receive payments based on the yield obtained. Inputs can be supplied and sometimes, extension services can also be provided. Such groups like Female Farmers' Advancement Network, and Women in Agriculture that mobilise and train rural women on information management and various ways of communicating and disseminating agricultural innovations. Some of these groups are operational in the northern part of Nigeria.
- (iv) There should be linkages between the investors and the Local farmers where inputs can be provided to local farmers and direct purchases can be done. This will ensure a win-win situation.
- (v) Policies (for example, compensation policies) to protect the host communities by granting them equity participation in land deals should be put in place.

One of the limitations of the study is that it employed one Wave of the LSMS\_ISA dataset. To address this limitation in future research, it would be valuable to complement the quantitative analysis with multiple waves of LSMS-ISA data. This would enable the use of other impact evaluation techniques, such as difference-in-difference and Endogenous Switching Regression Models. Additionally, the fieldwork for this study was conducted in two states with LIs. It would be beneficial to expand the fieldwork to include other states where LIs are prevalent. These states could include Abia, Anambra, Benue, Edo, Kogi, Kaduna, Niger, Ondo, Oyo, and Rivers. Furthermore, future research could also explore emerging issues like flooding, banditry, and insurgency and their impact on

food security.

### Ethical statement

The study received ethical clearance (CU/HREC/EOD/199/23) from the Covenant Health Research Ethics Committee (CHREC) in accordance with their regulations. Personal information was not recorded to maintain anonymity, and culturally and socially influenced consents were obtained. Findings were reported while safeguarding data confidentiality and respondent anonymity.

### Author contribution statement

Oluwatosin Edafe, Evans Osabuohien & Isaiah Olurinola: Conceived and designed the experiments. Oluwatosin Edafe, Evans Osabuohien: Performed the experiments. Wrote the paper. Oluwatosin Edafe, Evans Osabuohien, Isaiah Olurinola & Oluwatoyin Matthew: Analysed and interpreted the data. Oluwatosin Edafe, Evans Osabuohien, Isaiah Olurinola, Oluwatoyin Matthew, & Joel Edafe: Contributed reagents, materials, analysis or data. Oluwatosin Edafe, Evans Osabuohien, Isaiah Olurinola, Oluwatoyin Matthew, Joel Edafe & Romanus Osabuohien: Wrote the paper.

### Data availability statement

Data will be made available on request.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### References

- [1] FAO, The State of Food Security and Nutrition in the World 2018: Building Climate Resilience for Food Security and Nutrition, Food & Agriculture Org, 2018. <http://www.fao.org/3/19553EN/i9553en.pdf>.
- [2] O.A. Matthew, R. Osabohien, T.O. Ogunlusi, O. Edafe, Agriculture and social protection for poverty reduction in ECOWAS, *Cogent Arts & Humanities* 6 (1) (2019), 1682107, <https://doi.org/10.1080/23311983.2019.1682107>.
- [3] FAO, The State of Food Agriculture: Agriculture Food Systems Transformation: from Strategy to Action, 2021. FAO conference - forty-second sessions 14-18 June, 2021 (also available at: [www.fao.org/3/nf243en/nf243en.pdf](http://www.fao.org/3/nf243en/nf243en.pdf)).
- [4] I.F.A.D. Fao, W.F.P. Unicef, Who, The State of Food Security and Nutrition in the World 2021, Transforming Food Systems for Food Security, Improved Nutrition and Affordable Healthy Diets for All, SOFI Working Paper, Italy, Rome, 2021, <https://doi.org/10.4060/cb447en>. #240pp.
- [5] E. Osabuohien, G. Odularu, D. Ufua, D. Augustine, R. Osabohien, Socioeconomic shocks, inequality and food systems in the Global South: an introduction, *Contemporary Social Science* 17 (2) (2022) 77–83, <https://doi.org/10.1080/21582041.2022.2059549>.
- [6] F.P. Oyawole, A.O. Dipeolu, A.M. Shittu, A.E. Obayelu, T.O. Fabunmi, Adoption of agricultural practices with climate-smart agriculture potentials and food security among farm households in northern Nigeria, *Open Agriculture* 5 (1) (2020) 751–760, <https://doi.org/10.1515/opag-2020-0071>.
- [7] M.K. Anser, R. Osabohien, O. Olonade, A.A. Karakara, I.B. Olalekan, J. Ashraf, A. Igbinoba, Impact of ICT adoption and governance interaction on food security in west Africa, *Sustainability* 13 (10) (2021) 5570, <https://doi.org/10.3390/su13105570>.
- [8] F.F. Adedoyin, N. Nwulu, F.V. Bekun, Environmental degradation, energy consumption and sustainable development: accounting for the role of economic complexities with evidence from World Bank income clusters, *Bus. Strat. Environ.* 30 (5) (2021) 2727–2740, <https://doi.org/10.1002/bse.2774>.
- [9] S.S. Akadiri, T.S. Adebayo, M. Nakorji, W. Mwakapwa, E.M. Inusa, O.O. Izuchukwu, Impacts of globalization and energy consumption on environmental degradation: what is the way forward to achieving environmental sustainability targets in Nigeria? *Environ. Sci. Pollut. Control Ser.* (2022) 1–14, <https://doi.org/10.1007/s11356-022-20180-7>.
- [10] J.I. Okringbo, O. Chukuigwe, E.E. Sikpi, Effectiveness of shell petroleum development company's communication strategies in promotion of environmental degradation management in Niger delta, Nigeria, *Journal of Agripreneurship and Sustainable Development* 5 (1) (2022) 180–189. Retrieved from, <http://njaat.atbu.edu.ng/index.php/jasd/article/view/300>.
- [11] C.E. Yameogo, R.O. Dauda, The effect of income inequality and economic growth on environmental quality: a comparative analysis between Burkina Faso and Nigeria, *Journal of Public Affairs* 22 (3) (2022), e2566, <https://doi.org/10.1002/pa.2566>.
- [12] B.N. Adeleye, P. Daramola, A. Onabote, R. Osabohien, Agro-productivity amidst environmental degradation and energy usage in Nigeria, *Scientific Reports* 11 (1) (2021) 1–9, <https://doi.org/10.1038/s41598-021-98250-y>.
- [13] S. Egbetokun, E.S. Osabuohien, T. Akinbobola, Feasible environmental kuznets and institutional quality in North and southern african sub-regions, *International Journal of Energy Economics and Policy* 8 (1) (2018) 104–115. <https://www.econjournals.com/index.php/ijeep/article/view/5948>.
- [14] S. Egbetokun, E. Osabuohien, O. Onanuga, T. Akinbobola, O. Gershon, V. Okafor, Environmental pollution, economic growth and institutional quality: exploring the nexus in Nigeria, *Management of Environmental Quality* 31 (1) (2020) 18–31, <https://doi.org/10.1108/MEQ-02-2019-0050>.
- [15] NIMET-Nigeria Meteorological Agency, Weather Forecast (2020). <https://www.nimet.gov.ng/>.

- [16] U.N. United Nation, Bringing Youth Back to Agriculture in Southern Africa, United Nations, Washington D.C, 2022. <https://www.un.org/africarenewal/news/bringing-youth-back-agriculture-southern-africa>.
- [17] E. Osabuohien, G. Odularu, D. Ufua, R. Osabohien, Socioeconomic Shocks and Africa's Development Agenda: Lessons and Policy Directions in a Post-COVID-19 Era, Routledge, New York, 2023. <https://doi.org/10.4324/9781003208358>.
- [18] N. Adeleye, E. Osabuohien, S. Adeogun, S. Fashola, O. Tasi, G. Adeyemi, Access to land and food security: analysis of 'priority crops' production in Ogun state, Nigeria, in: E. Osabuohien (Ed.), The Palgrave Handbook of Agricultural and Rural Development in Africa, Palgrave Macmillan, Cham-Switzerland, 2020, pp. 291–311. [https://doi.org/10.1007/978-3-030-41513-6\\_14](https://doi.org/10.1007/978-3-030-41513-6_14).
- [19] E. Osabuohien, G. Odularu, D. Ufua, D. Augustine, R. Osabohien, Socioeconomic shocks, inequality and food systems in the Global South: an introduction, *Contemporary Social Science* 17 (2) (2022) 77–83. <https://doi.org/10.1080/21582041.2022.2059549>.
- [20] A.K. Guyalo, E.A. Alemu, D.T. Degaga, Impact of large-scale agricultural investments on the food security status of local community in Gambella region, Ethiopia, *Agriculture & Food Security* 11 (1) (2022) 1–28. <https://doi.org/10.1186/s40066-022-00381-6>.
- [21] M. Shete, M. Rutten, Impacts of large-scale farming on local communities' food security and income levels—Empirical evidence from Oromia Region, Ethiopia, *Land Use Policy* 47 (2015) 282–292. <https://doi.org/10.1016/j.landusepol.2015.01.034>.
- [22] O. Edafe, E. Osabuohien, R. Osabohien, Large-scale agricultural investments and female employment in Nigerian communities. IOP Conference Series, Earth Environmental Science 655 (1) (2021), 012068. <https://doi.org/10.1016/j.landusepol.2023.106579>.
- [23] O.D. Edafe, E. Osabuohien, O. Matthew, R. Osabohien, R. Khatoon, Large-scale agricultural investment and female employment in African communities: quantitative and qualitative insights from Nigeria, *Land Use Policy* 127 (2023), 106579. <https://doi.org/10.1016/j.landusepol.2023.106579>.
- [24] A. Karakara, U. Efobi, I. Beecroft, F. Olokoyo, E. Osabuohien, Youth employment and large-scale agricultural land investments in Africa, *Africa Development/ Afrique et Développement* 46 (4) (2021) 175–199. [https://archive.uneca.org/sites/default/files/uploaded-documents/CLPA/2019/Papers/Empowerment-of-youth/clpa\\_2019\\_paper\\_lali\\_0amp\\_youth\\_employment\\_in\\_africa.pdf](https://archive.uneca.org/sites/default/files/uploaded-documents/CLPA/2019/Papers/Empowerment-of-youth/clpa_2019_paper_lali_0amp_youth_employment_in_africa.pdf).
- [25] J. Keeley, W.M. Seide, A. Eid, A.L. Kidewa, Large-scale Land Deals in Ethiopia, International Institute for Environment and Development, London, UK, 2014. <https://www.iied.org/inclusive-investment>.
- [26] J. Von Braun, R.S. Meinzen-Dick, Land Grabbing" by Foreign Investors in Developing Countries: Risks and Opportunities, 2009. <http://www.ifpri.org/sites/default/files/publications/bp013all.pdf>.
- [27] D.A. Ali, K. Deininger, Does title increase large farm productivity? Institutional Determinants of Large Land-Based Investments' Performance in Zambia (2021). <https://documents1.worldbank.org/curated/en/334231624025654988/pdf/Does-Title-Increase-Large-Farm-Productivity-Institutional-Determinants-of-Large-Land-Based-Investments-Performance-in-Zambia.pdf>.
- [28] A.E. Bekele, D. Drabik, L. Dries, W. Heijman, Large-scale land investments, household displacement, and the effect on land degradation in semiarid agro-pastoral areas of Ethiopia, *Land Degradation & Development* 32 (2) (2021) 777–791. <https://doi.org/10.1002/ldr.3756>.
- [29] W. Fitawek, S.L. Hendriks, Evaluating the impact of large-scale agricultural investments on household food security using an endogenous switching regression model, *Land* 10 (3) (2021) 323. <https://doi.org/10.3390/land10030323>.
- [30] P. Burnod, H. Rakotomalala, P. Rasolofo, A. Brès, July). Large-scale plantation and contract farming effects: qualitative and quantitative assessment in Madagascar, in: Proceedings of the LANDac International Conference on Land Governance for Equitable and Sustainable Development, 2015, pp. 8–10. <http://www.landgovernance.org/registration-2015-landac-conference/>.
- [31] F. Di Matteo, G.C. Schoneveld, Agricultural investments in Mozambique: an analysis of investment trends, CIFOR, business models and social and environmental conduct 201 (2016). <https://doi.org/10.17528/cifor/005958>.
- [32] E. Aabø, T. Kring, The Political Economy of Large-Scale Agricultural Land Acquisitions: Implications for Food Security and Livelihoods/employment Creation in Rural Mozambique, United Nations Development Programme Working Paper, 4, 2012, pp. 1–61. <http://web.undp.org/africa/knowledge/WP-2012-004-Aabo-Kring-Mozambique.pdf>.
- [33] A.K. Garcia, G. Baltissen, G. Betsema, J. Schuurman, Food Security and Land Governance Factsheet Kenya, LANDac, Utrecht, The Netherlands, 2015. <http://hdl.handle.net/1887/40945>.
- [34] J.G. Zaehring, G. Wambugu, B. Kiteme, S. Eckert, How do large-scale agricultural investments affect land use and the environment on the western slopes of Mount Kenya? Empirical evidence based on small-scale farmers' perceptions and remote sensing, *Journal of environmental management* 213 (2018) 79–89. <https://doi.org/10.1016/j.jenvman.2018.02.019>.
- [35] M. Bruentrup, Let's Work Together? Innovative Social Entrepreneurship in the Field of Youth Policy Welcomed by German Local Governments: A Case Study of the Social Enterprise RheinFlanke, 2016. <http://purl.utwente.nl/essays/71543>.
- [36] E. Osabuohien, Handbook of research on in-country determinants and implications of foreign land acquisitions, IGI Global (2014). <https://doi.org/10.4018/978-1-4666-7405-9>.
- [37] A.A. Desalegn, Assessment of drug use pattern using WHO prescribing indicators at Hawassa University teaching and referral hospital, south Ethiopia: a cross-sectional study, *BMC health services research* 13 (2013) 1–6. <https://doi.org/10.1186/1472-6963-13-170>.
- [38] N. Dudley, S. Alexander, Will small farmers survive the twenty-first century—and should they? *Biodiversity* 18 (2–3) (2017) 68–70. <https://doi.org/10.1080/14888386.2017.1351397>.
- [39] G.T. Yengoh, K. Steen, F.A. Armah, B. Ness, Factors of vulnerability: how large-scale land acquisitions take advantage of local and national weaknesses in Sierra Leone, *Land Use Policy* 50 (2016) 328–340. <https://doi.org/10.1016/j.landusepol.2015.09.028>.
- [40] B.E. Aigbokhan, K.O. Ola, Foreign land acquisitions: household livelihood with some evidence on Nigeria, in: *Socio-Economic Development: Concepts, Methodologies, Tools, and Applications*. 1159–1178, IGI Global, 2019. <https://doi.org/10.4018/978-1-5225-7311-1>. IRMA-International.org: Foreign Land Acquisitions: Household Livelihood with Some Evidence on Nigeria: Ben E. Aigbokhan, Kehinde O. Ola: Book Chapters ch060.
- [41] E.M. Kumeh, G. Omulo, Youth's access to agricultural land in Sub-Saharan Africa: a missing link in the global land grabbing discourse, *Land Use Policy* 89 (2019), 104210. <https://doi.org/10.1016/j.landusepol.2019.104210>.
- [42] S. Murphy, P. Carmody, J. Okawakol, When rights collide: land grabbing, force and injustice in Uganda, *The Journal of Peasant Studies* 44 (3) (2017) 677–696. <https://doi.org/10.1080/03066150.2016.1259616>.
- [43] B. White, S.M. Borrás Jr., R. Hall, I. Scoones, W. Wolford, The new enclosures: critical perspectives on corporate land deals, in: *The New Enclosures: Critical Perspectives on Corporate Land Deals*, Routledge, 2013, pp. 13–42. <https://doi.org/10.1080/03066150.2012.691879>.
- [44] L. Cotula, The New Enclosures? Polanyi, international investment law and the global land rush, *Third World Quarterly* 34 (9) (2013) 1605–1629. <https://doi.org/10.1080/01436597.2013.843847>.
- [45] D. Kebede, B. Emana, G. Tesfay, Impact of land acquisition for large-scale agricultural investments on food security status of displaced households: the case of Ethiopia, *Land Use Policy* 126 (2023), 106507. <https://doi.org/10.1016/j.landusepol.2022.106507>.
- [46] J. Chu, K. Young, D. Phiri, Large-scale Land Acquisitions, Displacement and Resettlement in Zambia, 2015. <http://hdl.handle.net/10566/4296>.
- [47] L. German, G. Schoneveld, E. Mwangi, Contemporary processes of large-scale land acquisition in Sub-Saharan Africa: legal deficiency or elite capture of the rule of law? *World Development* 48 (2013) 1–18. <https://doi.org/10.1016/j.worlddev.2013.03.006>.
- [48] D.A. Ali, K. Deininger, Institutional determinants of large land-based investments' performance in Zambia: does title enhance productivity and structural transformation? *World Development* 157 (2022), 105932. <https://doi.org/10.1016/j.worlddev.2022.105932>.
- [49] P. Bottazzi, D. Crespo, L.O. Bangura, S. Rist, Evaluating the livelihood impacts of a large-scale agricultural investment: lessons from the case of a biofuel production company in northern Sierra Leone, *Land Use Policy* 73 (2018) 128–137. <https://doi.org/10.1016/j.landusepol.2017.12.016>.
- [50] K. Nolte, M. Ostermeier, Labour market effects of large-scale agricultural investment: conceptual considerations and estimated employment effects, *World Development* 98 (2017) 430–446. <https://nbn-resolving.org/urn:nbn:de:0168-ss0ar-55664-2>.
- [51] S. Niragira, J. Ndimubandi, J. Van Orshoven, M. D'Haese, J. Buysse, S. Ngendakumana, P. Sinzinkayo, Modelling crop portfolios that minimize human macronutrient deficiency on subsistence farms in Burundi, *Food Security* 14 (1) (2022) 23–37. <https://doi.org/10.1007/s12571-021-01216-1>.

- [52] T. Jiren, J. Hanspach, J. Schultner, J. Fischer, A. Bergsten, F. Senbeta, I. Dorresteijn, Reconciling food security and biodiversity conservation: participatory scenario planning in southwestern Ethiopia, *Ecology and Society* 25 (3) (2020), <https://doi.org/10.5751/ES-11681-250324>.
- [53] W. Sindayigaya, Foreign investments in agriculture–land grabbing, Article. Pdf, GLS Treuhand, Zukunftsstiftung Entwicklungshilfe. [http://www.Entwicklungshilfe3.de/Filead/Min/Entwicklungshilfe/Img/Land\\_grab](http://www.Entwicklungshilfe3.de/Filead/Min/Entwicklungshilfe/Img/Land_grab) (2011).
- [54] M.K. Desta, Land use/cover changes and the role of agroforestry practices in reducing deforestation and improving livelihoods of smallholders in Maytemeko Watershed, Northwest Ethiopia. <https://pub.boku.ac.at/obvbokhs/content/titleinfo/1931850/full.pdf>, 2015.
- [55] E.S. Osabuohien, U.R. Efobi, R.T. Herrmann, C.M.W. Gitau, Female labor outcomes and large-scale agricultural land investments: macro-micro evidence from Tanzania, *Land Use Policy* 82 (2019) 716–728, <https://doi.org/10.1016/j.landusepol.2019.01.005>.
- [56] A.A. Ogundipe, O. Akinyemi, O.M. Ogundipe, Large scale foreign land deals and agricultural trade in Africa, *Asian Journal of Agricultural Extension, Economics & Sociology* 7 (3) (2015) 1–17, <https://doi.org/10.9734/AJAEES/2015/13231>.
- [57] A.A. Ogundipe, M. Obi, O.M. Ogundipe, Environmental degradation and food security in Nigeria, *International Journal of Energy Economics and Policy* 10 (1) (2020) 316–324, <https://doi.org/10.32479/ijeeep.8083>.
- [58] F.N. Mabe, S. Nashiru, E. Mummuni, V.F. Boateng, The nexus between land acquisition and household livelihoods in the northern region of Ghana, *Land Use Policy* 85 (2019) 357–367, <https://doi.org/10.1016/j.landusepol.2019.03.043>.
- [59] T. Lavers, F. Boamah, The impact of agricultural investments on state capacity: a comparative analysis of Ethiopia and Ghana, *Geoforum* 72 (2016) 94–103, <https://doi.org/10.1016/j.geoforum.2016.02.004>.
- [60] P. Ahlerup, S. Tengstam, Do the land-poor gain from agricultural investments? Empirical evidence from Zambia using panel data (2015). <http://hdl.handle.net/2077/40183>.
- [61] M.P. Jarzebski, A. Ahmed, Y.A. Bofo, B.S. Balde, L. Chinangwa, O. Saito, A. Gasparatos, Food security impacts of industrial crop production in sub-Saharan Africa: a systematic review of the impact mechanisms, *Food Security* 12 (1) (2020) 105–135, <https://doi.org/10.1007/s12571-019-00988-x>.
- [62] B. Chanceline, Land grabbing and its impact on food security in Sub-Saharan Africa (2019), <https://doi.org/10.21272/sec.3.4.72-85.2019>.
- [63] J. Lay, K. Nolte, K. Sipangule, Large-scale farms and smallholders: evidence from Zambia, GIGA working papers (2018). <http://hdl.handle.net/10419/175430>.
- [64] S. Schlegel, Selective enclosure: an institutional approach to the history of immigration law, *Zeitschrift für Migrationsforschung* 2 (2) (2022) 61–92. <https://journals.ub.uni-osnabrueck.de/index.php/zm>.
- [65] E. Osabuohien, *The Palgrave Handbook of Agricultural and Rural Development in Africa*, Palgrave Macmillan, Cham-Switzerland, 2020, <https://doi.org/10.1007/978-3-030-41513-6>.
- [66] W.M. Trochim, Research Methods Knowledge Base, 2020. Retrieved 05/05/2020 from, <https://conjointly.com/kb/nonprobability-sampling/>.
- [67] P.C. Obasi, C. Chikezie, Smart agriculture and rural farmers adaptation measures to climate change in Southeast Nigeria: implications for sustainable food security, *Climate Change, Hazards and Adaptation Options: Handling the Impacts of a Changing Climate* (2020) 813–833, [https://doi.org/10.1007/978-3-030-37425-9\\_41](https://doi.org/10.1007/978-3-030-37425-9_41).
- [68] K.O. Aboaba, D.M. Fadiji, J.A. Hussayn, Determinants of food security among rural households in Southwestern Nigeria: USDA food security questionnaire core module approach, *J. Agribus. Rural Dev* 2 (56) (2020) 113–124, <https://doi.org/10.17306/J.JARD.2020.01295>.
- [69] N.A. Muhammad, S.F.B.A. Sidique, Determinants of food security among Households in Nigeria, *Pakistan Journal of Nutrition* 18 (2019) 1042–1052, <https://doi.org/10.3923/pjn.2019.1042.1052>.
- [70] J. Mendy, G.A. Asongwe, R.N. Nkongho, Vulnerability to food insecurity and coping strategies of agrarian households in the lower river region of the Gambia: implication for policy, *International Journal of Agricultural Science and Food Technology* 6 (1) (2020) 115–126. <https://www.peertechzpublications.com/articles/IJASFT-6-164.php>.
- [71] G.T. Yengoh, F.A. Armah, Effects of large-scale acquisition on food insecurity in Sierra Leone, *Sustainability* 7 (7) (2015) 9505–9539, <https://doi.org/10.3390/su7079505>.
- [72] J.A. Ariyo, M. Mortimore, Youth farming and Nigeria's development dilemma: the Shonga experiment, *IDS Bulletin* 43 (6) (2012) 58–66, <https://doi.org/10.1111/J.1759-5436.2012.00379.X>.
- [73] W.R. Speller, H. Mirza, A. Giroud, J. Salguero Huaman, G. Dixie, A. Okumura, The impact of larger-scale agricultural investments on local communities (2017), <https://doi.org/10.1596/26487>.