Science | Technology | Development

Ghana Journal of Science, Technology and Development | Vol. 10, Issue 2, March 2025
e-ISSN: 2343-6727
DOI: https://doi.org/10.47881/430.967x

Received: November 4, 2023
Accepted: May 30, 2024

Large-scale land acquisition and agricultural household labour supply in northern Ghana

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ABSTRACT

Although both local and international actors participated in large-scale land acquisition (LSLA), most studies currently available tend to concentrate on the effects of LSLA by foreign actors. This study investigated the factors influencing household exposure to LSLA by local and foreign organizations and their impact on labour supply in northern Ghana. The study made use of data collected from 664 households and applied the multinomial endogenous treatment effect model. The study specifically looked at the variables affecting home off-farm labour supply and household direct and indirect exposure to LSLA by domestic and international organizations. The findings showed that power dynamics, geographic location, and institutional factors have a significant impact on households' exposure to LSLA. Furthermore, the findings demonstrate that time spent working off-farm is increased by households' direct and indirect exposure to LSLA by domestic and foreign firms. Based on the findings, policy and future research conclusions and suggestions are offered.

Keywords: *Large-scale land acquisition, labour allocation, multinomial endogenous treatment effect model, Ghana*

INTRODUCTION

Despite being a global issue, unemployment is a key labour market issue in sub-Saharan Africa due to the increasing population (International Labour Organization (ILO), 2020). Due to this difficulty, the majority of governments in the region look for potential solutions to improve the employment prospects for growing populations (Daniel, 2011). On the other hand, it is asserted that significant agricultural investment has the potential to generate employment possibilities for nearby populations (Bottazzi et al., 2018; World Bank, 2010). Therefore, to increase employment prospects for their citizens, most governments and local authorities frequently sell land in substantial quantities to domestic and foreign agricultural firms (Amanor, 2012; Cotula et al., 2011). The situation has sparked discussion among development practitioners (Ayamga & Laube, 2020). The changing dynamics of employment brought on by large-scale land acquisition (LSLA) are major discussion points. Some studies (Dessy et al., 2012; Ju et al., 2016; Kleemann & Thiele, 2015; World Bank, 2010) argued that, if handled responsibly, such land deals can increase employment prospects and adoption of

better farming technology. Other studies (e.g., Behrman et al., 2012; Li, 2011) countered that such agreements might not increase the availability of off-farm labour because they may displace or eliminate local farm jobs without necessarily increasing the opportunities for off-farm employment. These ideas are supported by several other empirical studies that looked at the employment consequences of LSLA (e.g., Bamlaku Alamirew, Harald Grethe & Wossen, 2015; Deininger & Xia, 2016; Ju et al., 2016; Nolte & Ostermeier, 2017; Schoneveld et al., 2011). The findings of these studies, however, have been generally contradictory, with some studies (e.g., Deininger & Xia, 2016; Schoneveld et al., 2011) showing an increase in off-farm employment and others (e.g., Bamlaku et al., 2015; Nolte & Ostermeier, 2017) showing little to no off-employment for the displaced residents because of LSLA. In addition to the conflicting results, earlier research also lacked clarity regarding how LSLA by various players affected family employment. Both local and international organizations have been shown to engage in LSLA in the literature (Anseeuw, et al., 2012; Cotula et al., 2014). However, no empirical research exists on how LSLA by different actors impacts labour supply. This is particularly true in Ghana where several studies (e.g., Ayelazuno, 2019; Nyantakyi-Frimpong & Kerr, 2016) focused on only LSLA by foreign actors even though existing information (e.g., Civic Response, 2017; Cotula et al., 2014) show involvement of foreign and domestic actors.

The purpose of the current study is to investigate direct and indirect exposure to LSLA by domestic and foreign entities and their impact on labour supply to close the research gaps identified and to advance understanding of the LSLA issue. The Lands Commission of Ghana states that LSLA entails the purchase of land that is at least 20.23 hectares in size (Lands Commission, 2016). According to Borras and Franco (2012), such acquisitions are typically characterized by investments in the production of food and energy for sale on either home or foreign markets. Furthermore, these purchases must adhere to the land commission of Ghana's regulations regarding openness, observance of human rights, sustainability of benefits, and environmental protection. Additionally, according to Abdallah et al. (2022), LSLA by domestic entities refers to all varieties of LSLA that are entirely sustained by domestic companies while LSLA by foreign companies refers to all types of LSLA that are done by foreign entities. Further, indirect exposure comprises being close to affected households, losing uncultivated land, and having limited land due to enclosures, while direct exposure involves losing land and land-based resources including forests and forest products, water, and water-based products to domestic or foreign organizations (Abdallah et al., 2023; Abdallah et al., 2024).

The contribution of this study lies in an attempt to investigate the determinants of direct and indirect exposure to large-scale land acquisition (LSLA) by domestic and international enterprises in northern Ghana as well as their impact on off-farm labour supply. Such a study could give decision-makers an understanding of how LSLA effects off-farm labour supply and the categories of LSLA actors that improve off-farm labour supply.

In addition to the introduction, section two covers Ghana's LSLA and rural labour market. The approach is presented in section three, and the findings and analysis are presented in section four. The results and suggestions are presented in section five.

Ghana's rural labour market and LSLA

Agricultural labour dominates the labour market in many emerging nations. In Ghana's rural areas, for instance, the

proportion of labour employed by agriculture is typically larger than that in the non-agriculture sector (Ghana Statistical Service, 2020). Household labour remains the dominant source of labour for this sector, and it is typically used for tasks like preparing the land, plowing, harrowing, weeding, applying fertilizer, and harvesting, among other activities in the sector. However, these households also engage in a variety of off-farm activities, including agro-processing, trade, transportation services, the manufacturing of charcoal, the harvesting of firewood, repair services, wage work, and seasonal migration (Owusu et al., 2011). Thus, the farm and off-farm sectors often compete with the labour resources of households. Farm revenues, labour availability, off-farm pay, or the social opportunity costs of other activities are what determine how much labour the household should allocated to each of these sectors (Nolte & Ostermeier, 2017). Therefore, conditional on these factors' households supply labour off-farm for pay or free up family members to work elsewhere, reducing the availability of on-farm labour and increasing the availability of off-farm labour. These elements depend on access to the land, though.

However, recent large-scale land acquisitions (derogatorily referred to as "land grabbing") by both individuals and transnational corporations have put a strain on Ghanaian farmers' ability to access farmland. For instance, Cotula et al. (2014) found that while at least 40% of land purchases in Ghana featured foreigners, only 27% of them involved Ghanaian nationals. According to Jayne et al. (2014), Ghana has 2.20 million hectares under domestic and foreign LSLA. According to Kuusaana (2017), both foreigners and Ghanaians participated in the acquisition of 568ha in the Northern Region under the auspices of the Integrated Tamale Fruit Company. An organization called Civic Response, recently disclosed that 1,024,403 ha have been acquired in Ghana, of which 63% are owned by foreigners and 2% by locals (Civic Response, 2017). The proportion of home labour dedicated to off-farm employment is anticipated to be impacted by the proliferation of LSLA by both domestic and international firms. However, there are few studies in the empirical literature looking at how LSLA by domestic and foreign entities affects the supply of off-farm labour. This study focuses on the effects of massive land acquisitions in northern Ghana on off-farm labour.

Methodology

The theoretical link between LSLA and labour supply

The agricultural household model created by Ju et al. (2016) for land acquisition in China serves as the theoretical foundation for analyzing the labour supply implications of large-scale land acquisition (LSLA). The concept sees farm households as a single unit that benefits from riches from land assets in the form of consumer goods, leisure, and livelihood security. Ju et al. (2016) claim that a household maximizes the subsequent utility function:

$$U(C, L_l; W) = U(C, l_l) + W \quad (1)$$

where C, L_l and W are consumer goods, leisure, and wealth, respectively, with utility from wealth considered exogenous. They (Ju et al., 2016) further specified a Cobb–Douglas utility function over the current consumption of the single purchased good (C) and leisure (L_l) as:

$$U(C, L_l) = \alpha \log C + (1 - \alpha) \log L_l \quad \text{where } 0<\alpha<1 \quad (2)$$

The household utility function in equation 2.1 can further be specified as:

$$U(C, L_l; W) = \alpha \log C + (1 - \alpha) \log L_l + W \quad (3)$$

Under the conditions of the following budget, time, and production restrictions, the utility function in Equation 3 can be maximized:

$$pC = y = p_a Q_a + wL_w + (\overline{y}_a A')i \quad (4)$$

$$T = L_a + L_w + L_l \quad (5)$$

$$Q_a = L_a^r (A - A')^{1-r} \quad where\ A > A' \quad (6)$$

Where p is the unit value of consumer goods C; y is the total income including compensation received. In the absence of saving, total income (y) becomes the consumption expenditure. If output price (p_a) is unity, then y depends on only farm output Q_a. Both paid employment and self-employment are potential sources of nonfarm labour income. However, we introduce only total wage which is the product of market wage rate (w) and off-farm labour (L_w). Further, the product of compensation received per unit of land $(\overline{y}_a)$ and land leased to investors (A') is the compensation received $(\overline{y}_a A')$ while the associated annual rate of return on the investment using such payment is i which is assumed to lie between 0 and 1. Also, the variables p, w, $\overline{y}_a$ and A' are greater than zero. T , L_a, L_w, L_l are total time endowment, time allocated farm, off-farm, and in leisure, respectively. Further, A is the total area of land before the loss of land and it is assumed to lie between 0 and 1; $A - A'$ is the land remaining after acquisition; r is the coefficient of elasticity for factor input: Additionally, U and Q_a, are assumed to be increasing and concave. The farmer will have no output Q_a if all his/her land is affected by the acquisition i.e., if $A = A'$. Substituting equations (5)– (6) into (4), yields:

$$pC + wL_l = [L_a^r (A - A')^{1-r} - wL_a] + wT + (\overline{y}_a A')i = M \quad (7)$$

where consumption of goods and leisure equals full income M, which constitutes farm profits, time value, and compensation received. According to Ju et al. (2016), the Cobb–Douglas utility function implies that the constant share of M, α, is devoted to consumption, and α is the marginal propensity to consume. Thus, in terms of consumption and leisure, the full income is further defined as:

$$pC = y = \alpha M \quad (8)$$

$$L_l = \frac{1-\alpha}{w} M \quad (9)$$

Aside from consumption and leisure, wealth (W) is central to the utility function that shelves the household and can be gathered through savings and other activities. According to Ju et al. (2016), land is a valuable resource in China, and the potential appreciation of suburban farmland is huge because of its scarcity. Thus, family wealth depends to a large extent on the land owned. If W is exogenously influenced by future appreciation of the land, the W can be expressed as:

$$W = \bar{V}_a (A - A') \quad (10)$$

where $\bar{V}_a$ is greater than zero and the appreciation value for the unit area of land defined as the total land area less the land acquired. Substituting (4) and (6) into (1) leads to a utility function which defines the time allocation decision of the households as:

$$V(L_a, L_w, L_l; W) = V(L_a, L_w, L_l) + W \quad (11)$$

If equation (11) is maximized subject to time constraint in equation (5), we get the household's optimization problem summarized as follows:

$$max_{L_a, L_w, L_l} V(L_a, L_w, L_l) + W = \max_{L_a, L_w, L_l} \left[\alpha \log \frac{L_a^r (A - A')^{1-r} + wL_w + (\overline{y}_a A')i}{p} + (1-\alpha) \log L_l + W \right] \quad (12)$$

Setting up a Lagrangian function with Lagrangian multiplier λ to solve the above-constrained optimization yields:

$$Z(L_a, L_w, L_l; \lambda) = V(L_a, L_w, L_l; W) + \lambda(T - L_a - L_w - L_l) \quad (13)$$

The first-order conditions are:

$$\frac{\partial Z}{\partial L_a} = \frac{\partial Z}{\partial L_w} = \frac{\partial Z}{\partial L_l} = 0, \frac{\partial Z}{\partial \lambda} = 0 \quad (14)$$

Solving Equation (13) yields optimal family time allocation as:

$$L_a^* = (A - A')(r/w)^{1/(1-r)} \quad (15)$$

$$L_l^* = \frac{1-\alpha}{w}.\left[(A - A')(1 - r)(r/w)^{r/(1-r)}\right] + wT + \left(\overline{y}_a A'\right)i] \quad (16)$$

$$L_w^* = T - (A - A')(r/w)^{1/(1-r)} - \frac{1-\alpha}{w}.\left[(A - A')(1 - r)(r/w)^{r/(1-r)}\right] + wT + \left(\overline{y}_a A'\right)i \quad (17)$$

Differentiating equations (15) - (17) concerning land area acquired A' yields land loss on household time distribution decisions specified as:

$$\frac{\partial L_a^*}{\partial A'} = -(r/w)^{1/(1-r)} \quad (18)$$

$$\frac{\partial L_l^*}{\partial A'} = \frac{1-\alpha}{w}\left[\overline{y}_a i - (1 - r)(r/w)^{r/(1-r)}\right] \quad (19)$$

$$\frac{\partial L_w^*}{\partial A'} = (r/w)^{1/(1-r)} + \frac{1-\alpha}{w}\left[(1 - r)(r/w)^{r/(1-r)} - \overline{y}_a i\right] \quad (20)$$

According to equation (20), the effect of land loss from LSLA on off-farm labour supply $\frac{\partial L_w^*}{\partial A'}$, is determined by two items: the former is the change in farm production time $\left((r/w)^{1/(1-r)}\right)$ while the latter is the change in leisure time $\left(\frac{1-\alpha}{w}\left[\overline{y}_a i - (1 - r)(r/w)^{r/(1-r)}\right]\right)$. It can further be deduced from equation (20) that:

$$\frac{\partial L_w^*}{\partial A'} > 0, \text{ when } \overline{y}_a < \frac{1}{i}\left[(1 - r)(r/w)^{r/(1-r)} + \frac{w}{1-\alpha}(r/w)^{1/(1-r)}\right] \quad (21)$$

This indicates that land loss due to LSLA would increase time spent off-farm if the amount paid by investors ($\overline{y}_a$) is lower than the summation of the reduced farm profit $(1 - r)(r/w)^{r/(1-r)}$ and the required full income payment $\frac{w}{1-\alpha}(r/w)^{1/(1-r)}$ multiplied by the multiplier ($\frac{1}{i}$). The sum of the reduced farm profit and the required full income payment corresponds to the possible newly added leisure time $(r/w)^{1/(1-r)}$ which comes from the reduced farm production time. On the contrary when the compensation price ($\overline{y}_a$) is higher than this critical value, land loss from LSLA would lead to a decrease in time spent off-farm.

Ju et as (2016) model for land acquisition is to some extent applicable to Ghana, although the policy environment in China is different from Ghana. Whereas land is owned by the government in China, Ghana practices legal pluralism where statutory and customary land regimes coexist. Under China's acquisition policy, the acquisition process is championed by the government. In Ghana, however, the processes are championed by both state and local authorities. Moreover, the compensation promises are not materialized in Ghana and when even demanded the amount given does not cover all losses resulting from the acquisition. As mentioned previously, the

amount of compensation in China is at most 30 times the annual average value of output for three years after acquisition. Despite different land administrations under which this model was developed, the effect of such acquisitions on farm households remains a common issue for both countries. Thus, the question of how land acquisitions affect farm households' labour supply in northern Ghana is researchable using the model of Ju et al. (2016).

Empirical specification and estimation of the effect of LSLA on time off-farm

Although no consensus exists about the direction of the effect of large-scale land acquisitions on households' labour supply, it is agreed in both theoretical and development literature that labour supply by households is related to land availability. Thus, the acquisition of land on large scale can have a direct impact on households' off-farm labour supply (Ju et al., 2016). Given that large-scale land acquisition is related to labour supply, the effect of large-scale land acquisition on off-farm labour supply (OFLS) can be specified as:

$$OFLS_i = \beta_0 + \beta_1 LSLA_i + \beta_2 X_i + \eta_i \quad (22)$$

Where $OFLS_i$ is the vector of the household off-farm labour supply (measured in hours spent in off-farm employment); $LSLA_i$ is a vector of various categories of exposed households (i.e., non-exposure, direct and indirect exposure to LSLA households) under domestic and foreign entities; X_i is a vector of supply-side/pull and demand-side/push factors shown in Table 1; η_i is a random term. Equation (22) also implies that the observations of the explanatory variables are considered fixed in repeated samples, that is, the assumption of fixed regressors. Given that this assumption holds, the labour supply effect of a household's exposure to LSLA will be β_1. Unfortunately, this may not hold for several reasons. First, a household's exposure to LSLA depends on both supply-side/pull and demand-side/push factors. This implies that household exposure to LSLA may be non-random as they might be systematically selected by state and traditional authorities and investors based on their plot characteristics. Given that most agricultural investments cannot do without water, input and output market access, and protection from institutions (Anseeuw, Wily, et al., 2012), these authorities are particularly likely to select plots nonrandomly based on their nearness to water sources, market access and institutional attributes (often unobservable). If this is the case, then there is a risk that the non-random selection process may lead to differences between households exposed to LSLA and non-exposed households, which can be mistaken for the effects of LSLA. Failure to account for this potential selection bias could lead to inconsistent estimates of the effect of LSLA. Aside from the self-selection problem, exposure to LSLA was captured using responses from a series of qualitative questions. These questions were generated from the operational definition of LSLA in this study and include whether a household has lost land or not, who acquired the land, and the type of loss. However, the treatment (category of exposure to LSLA) may not be incorrectly captured due to random recording errors or the provision of intentionally/unintentionally false statements. For instance, a respondent may intentionally report losing land to a domestic or foreign entity if he/she detects that he/she will be compensated for giving such information. In some instances, the interviewer may fail to simplify the questions to a level of understanding of respondents and this will result in incorrect answers of some of the questions. By extension, the incorrect responses may result in misclassification of households into non-exposed, directly, and indirectly exposed households under LSLA by foreign and domestic entities. Such

misclassification may cause a correlation between LSLA and the random error term and estimation of equation (22) by OLS may produce biased and inconsistent estimates. To correct any potential bias stemming from observed and unobserved characteristics and as well examine the effect of LSLA on off-farm employment, this study employed the multinomial endogenous treatment effect (METE) model.

The estimation of the multinomial endogenous treatment effect model (METE) proceeds in two stages (Deb & Trivedi, 2006). Denote $\mathbf{d_i}$ as a form of exposure to LSLA under domestic and foreign entities and defined it as $\mathbf{d_i} = (d_{i1,} d_{i2,} d_{i3}, \ldots, d_{iJ})$ with d_j as binary variables representing the observed non-exposure, direct and indirect exposure to LSLA under domestic and foreign entities. Also denote l_i as a latent factor that incorporates unobserved characteristics which are associated with the type of household's exposure and outcome, such that $\mathbf{l_i} = (l_{i1,} l_{i2,} l_{i3}, \ldots, l_{iJ})$ and l_j is the unobserved characteristics of exposed households. The first stage regression estimates the probability of exposure to any LSLA as:

$$\Pr(d_i|Z_i, l_i) = g(\alpha_1 z_i + \delta_1 l_{i1}, \alpha_1 z_i + \delta_2 l_{i2} + \alpha_J z_J + \delta_J l_{iJ} \quad (22)$$

Where $\mathrm{z_i}$ is a vector of households power relations, location, and institutional factors shown in Table 1; α_j and δ_i are the associated parameters; and ε_{ij} is the error terms which are independently and identically distributed and assumed to have no influence on l_{ij}; and $j = 1$ denote the control group (non-exposure to any of the LSLA considered in this study). Further, g is an appropriate multinomial probability distribution and assumed to have a Mixed Multinomial Logit (MMNL) structure (Deb & Trivedi, 2006) defined as:

$$\Pr(A = j) = \frac{\exp(\alpha_j z_i + \delta_j l_{ij})}{1 + \sum_{k=1}^{J} \exp(\alpha_k Z_i + \delta_k l_{ik})}, \quad j = 0, 1, 2, 3, \ldots, N \quad (23)$$

In the second stage, we evaluate the impact of household exposure on off-farm labour supply (OFLS) as:

$$E(OFLS_i|d_i, X_i, l_i) = \beta X_i + \sum_{j=1}^{J} \gamma_j d_{ij} + \sum_{j=1}^{J} \lambda_j l_{ij} \quad (24)$$

where X_i is an index of households' power relations, location, and institutional factors detailed in Table 1; β is parameter vectors and γ_j denotes the impact of direct and indirect exposure under domestic and foreign entities relative to non-exposure; $E(OFLS_i|d_i, X_i, l_i)$ is a function of each of the latent factors l_{ij}, and implies that unobserved characteristics that affect selection into an exposure also affect off-farm labour supply, OFSL (i.e. time spent off-farm). According to Deb and Trivedi (2006), when the factor-loading parameter λ_j, is positive (negative), households' exposure to LSLA and outcome are positively (negatively) correlated through unobserved characteristics and this further implies positive (negative) selection with the associated parameter vectors γ and λ respectively.

For successful estimation, it is necessary to assume a functional form for the outcome variable. In this study, the functional form

distributions were assumed to be gamma for time spent off-farm since it was captured as a continuous variable (Deb & Trivedi, 2006). In addition, it is required that the model specifies the number of simulations draws used per observation during estimation. In this study, the model was estimated using Maximum Simulated Likelihood (MSL) with draws of 400 simulations. Further, it is recommended that the z variables in the exposure model contain at least one selection instrument in addition to those automatically generated by the non-linearity of the selection model. This variable should influence exposure to LSLA but not time spent off-farm. This study uses as selection instruments, variables related to land governance, information sources, and power. Weak governance slows expropriation as the dangers of conflict with local users increase. Thus, acquirers with investments that have a long-term horizon of production cycles are less likely to invest in areas with weak land governance (Arezki et al., 2013; Lay & Nolte, 2018). Also, knowledge of other households affected by LSLA in other communities has often served as first-hand information regarding the LSLA by investors, as well as the effects of the LSLA. Farmers with such knowledge therefore tend to employ strategies that enhance tenure security, thereby reducing exposure to LSLA. Suhardiman et al. (2015) for instance revealed that farmers who had prior information from relatives and related networks about LSLA enhance the security of their remaining land through investment in rubber plantations. Similarly, households with power tend to have more influence and are therefore less likely to lose land even if it is fallowed (Goldstein & Udry, 2008). For instance, elders, opinion leaders, or natives of the community have power and are more influential than migrants. Because of their power and social influence, they are therefore less likely to be affected by LSLA as compared to the powerless or migrants (Arezki et al., 2013a). We use three indicators to account for land governance, information, and power, namely, availability of land institution, knowledge of any farmer affected by LSLA, and leadership position (see Table 2 for details). These variables are therefore expected to influence exposure to LSLA but not household's time spent off-farm. We established the admissibility of these instruments by performing a simple falsification test: if a variable is a valid selection instrument, it will affect the household exposure to LSLA, but it will not affect the time spent off-farm. Table 3 of section four shows that the knowledge and information sources can be considered as valid selection instruments: they are statistically significant determinants of the household's direct and indirect exposure under LSLA by domestic and foreign entities but not of time spent off-farm among the farm households under domestic and foreign entities (Table 5). Although the model is already identified without inclusion of instrument (Deb & Trivedi, 2006), our inclusion of these variables as instruments in z_i is preferable. This is because the selection correction terms may not be sufficient to identify outcome equations and may lead to multi-collinearity problems.

Information on the research site and data

The study was conducted in the Northern Region of Ghana (now Northern, Savannah, and Northeast regions). Locally, the area shares boundaries with the Upper East and Upper West, Bono East, Bono, and Oti regions. International boundaries are with Togo and Cote d'Ivoire to the west, and east respectively. The region is mostly Guinea savanna and characterized by a single rainy season. Most people in the region are engaged in agriculture cultivating yam, maize, millet, guinea corn, rice, groundnuts, beans, soybeans, and cowpea. The region has a total population of 2,479,461 inhabitants only but with a land area of about 70,384 km^2 (Ghana Statistical Service, 2013). The land is

mostly grassland, interspersed with guinea savannah woodland and drought-resistant trees such as acacia (*Acacia* species), mango (Mangifera *indica*), baobab (Adansonia *digitata*), shea (Vitellaria *paradoxa*), dawadawa (Parkia *biglobosa*), and neem (Azadirachta *indica*). Thus, aside from agriculture, inhabitants rely on some of the trees for fuelwood, shea nuts, etc. The land is, however, controlled by two complementary systems of governance. The four paramount chiefs in the area – the Ya-Naa of Dagbong and Bimbilla Naa of Nanung, Nayiri of Mamprugu, and the Yagbonwura of the Gonja Traditional area – constitute the first of the two systems. Each of these chiefs has sub-chiefs and relates hierarchically with them where sub-chiefs report to the paramount chiefs. Such relations are extended to land use such that any land use activity is reported to the respective paramount chiefs. However, land use, transfers, and management are largely influenced by varied customs and traditions of the area and are therefore incoherent. Moreover, transfers under the customary system are mostly informal and are not necessarily protected by law (Kasanga et al., 1996). The second tier is the Ministry of Lands and Natural Resources which is responsible for ensuring efficient and equitable land delivery services (Ministry of Lands and Natural Resources, 2019). Through the Land Commission, the ministry manages public lands vested in the President, facilitates land acquisition, minimizes, or eliminates sources of land boundary disputes and litigations, etc. However, the ministry is also challenged with several problems including the inability to promote efficient land markets and a lack of coordination among the various land administration agencies (Senu, 2014). The land of availability coupled with the challenges of the two-complementary systems make the region a hotbed for LSLA by domestic and foreign actors. Special cases in Northern Region include the 23,762ha acquired by Biofuel Africa Limited (Boamah, 2014), the ITFC which has a nucleus farm of over 568ha and over 2000 out-growers (Kuusaana, 2017). Another company that merits explicit mention in this connection is the IWAD which acquired 400 hectares in the Mamprugu-Moagduri district for agricultural investment (Ayelazuno, 2019).

Given the fact that information provided by farmers can sometimes be scattered, shady, and difficult to understand, the study employed a household survey. A total of 690 farmers consisting of exposed and nonexposed households were selected from 240,238 agricultural households (Ghana Statistical Service, 2013). The sample size was arrived at based on the estimation method given by Yamane (1967) as:

$$n = \frac{N}{1 + N(e)^2} \qquad (25)$$

Where *n* is the total number of agricultural households or sample size to be used for the study; *N* is the population size (N=240,238); *e* is the margin of error or level of precision which was 5 percent with 95 percent confidence level to be tolerated in this study. By substitution, the sample size *(n)* is calculated as:

$$n = \frac{240{,}238}{1 + 240{,}238(0.05)^2} = 399.335 \qquad (26)$$

The sample size was however adjusted to 690 to cover more households and to cater for errors and nonresponses that might arise.

With regards to sampling, six districts including Central Gonja, Mampurugu-Muagdure, Mion, North Gonja, Sagnarigu, and Savelegu were based on the predominance of vast tracks of arable land under commercial deals. Documented information from the Northern Regional Lands Commission revealed that the six districts dominate LSLA (Table 1). The information was acquired during our preliminary field visits to the Lands Commission for secondary data. The Commission made available to us, site files

and plans of land acquired by investors, information about the acquirers, community demographics of the acquisitions, and agricultural productivity. Based on the information, we documented information about the scale of arable land under commercial deals by district as shown in Table 1.

Table 1: Scale of arable land under commercial deals by district

District	Total area under LSLA (ha)	% of total deals
Central Gonja	30,989.92	43.17
Mampurugu-Muagdure	10,905.43	15.19
Mion	10,783.30	15.02
Savelegu	10,369.17	14.44
Sagnarigu	5,479.11	7.63
North Gonja	2,452.26	3.42
Bole	466.82	0.65
Tamale Metro	173.24	0.24
Gushiegu	34.13	0.05
Bunkpurugu-Yunyoo	24.38	0.03
Yendi Municipal	23.1	0.03
East Gonja	20.32	0.03
Nanumba South	13.47	0.02
Nanumba North	13.36	0.02
West Mampurisi	12.59	0.02
Saboba	12.52	0.02
Kpandai	12.29	0.02
Total	**71,785.41**	**100.00**

Source: Authors compilation from Regional Lands Commission, 2018.

Next, 41 affected communities were profiled from the six districts through a scoping exercise. The scoping exercise was conducted in the six selected districts to identify communities that are best represented by LSLA. To begin, we identified key stakeholders including leaders of communities indicated in the documented to harbour LSLA, officials of the Ministry of Food and Agriculture (MoFA), Northern Rural Growth Project (NRGP), Ghana Commercial Agricultural Project (GCAP), investors, and ActionAid Ghana. We then engaged with these stakeholders through meetings, interviews, and focus group discussions to validate the secondary data from the Lands Commission. The engagement and interviews of these stakeholders were based on an interview guide (see Appendix 3 for details). The interview guide was designed following the operational definition description of LSLA in section one. These questions were asked to key informants including MoFA's extension agents, officials of NRGP, GCAP, assemblymen, women leaders (Magazias), community chairmen, chiefs, and elders. Next, we visited the identified communities to gather firsthand information, observe local conditions, and assess the context of LSLA impacts. The visits also helped to properly identify communities affected by large-scale land acquisitions. Any community with acquisitions falling within the operational definition was captured as an area affected by LSLA. The final stage involved contrasting and selection of 23 affected communities that best represent LSLA by domestic and foreign entities. Although the 23 communities identified represented those communities affected by LSLA from domestic and foreign entities, it was difficult to locate agricultural households under direct exposure (i.e., households losing farmland, labour, forest

resources, etc., to domestic or foreign entities) and indirect exposure (i.e., households living affected households; households losing uncultivated; those who have limited land due to enclosures). The difficulty stemmed from the fact that there was no comprehensive list of agricultural households exposed to large-scale land acquisition (LSLA). To generate a list for each of the four groups of exposed households (i.e., households directly and indirectly exposed to LSLA by domestic entities, and households directly and indirectly exposed to LSLA by foreign entities) and to select the 690 calculated samples, we identified center of convergence of farmers in each community. These centers of convergence represent common places in every community where farmers normally converge to play local games like 'Oware', and 'Ludu game' or rest and discuss daily activities including farming and other pressing issues bordering farming and other livelihoods. Farmers from these locations were then asked to supply the names of agricultural households directly or indirectly exposed to LSLA by domestic and foreign entities. The final lists consisted of house numbers 428 and 500 households directly and indirectly exposed to LSLA by domestic entities, and 724 and 610, directly and indirectly households to LSLA by foreign entities across the 6 selected districts. The listed house numbers were used as a sampling frame for each group and then employed in the final stage of sampling of each group for the study. Specifically, 138 exposed households were randomly selected from each list and interviewed. In all 552 exposed households - consisting of 138 households each directly and indirectly exposed to LSLA by domestic entities and 138 households each directly and indirectly exposed to LSLA by foreign entities - were selected for the study. Since the evaluation of the effect of a program/intervention depends on counterfactuals (Cavatassi et al., 2011), nonexposed households (i.e., households that are neither exposed to LSLA by domestic nor foreign entities) were also selected to serve as the control groups. Specifically, 138 nonexposed households were selected to serve as the control group in the total sample. This made a total sample of 690 farmers for the study. The study area showing sampled districts and communities are shown in Figure 1.

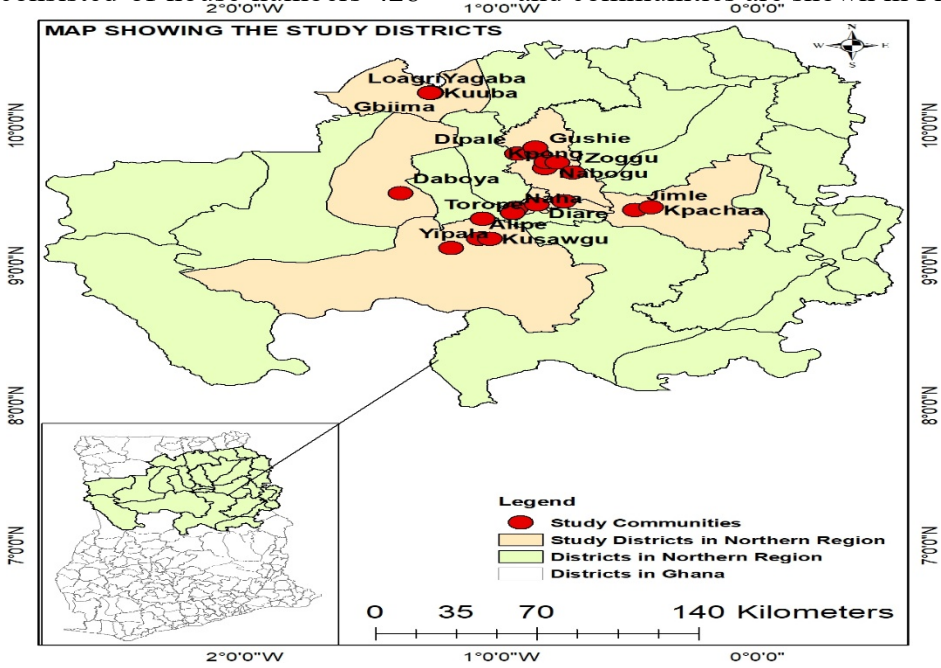

Figure 1: Northern regional map showing the study districts and communities.
Source: Field Survey, 2018

The survey was conducted using a questionnaire. The questionnaires covered information regarding labour supply (captured as the number of hours spent off-farm). The questionnaire also captured a series of questions leading to the construction of households' direct and indirect exposure to LSLA by domestic and foreign entities. LSLA was first captured as a binary variable derived from the question "Have you lost land to either individual who is a citizen, outsider, company, or foreigner?" Respondents who answered in the affirmative were further asked to specify who acquired their land. Based on the responses to these questions, households were grouped into: (1) exposed to LSLA by domestic entities; and (2) exposed to LSLA by foreign entities. Further, exposed households (i.e., households under categories 2 and 3) were asked questions concerning the details of the losses due to LSLA. Based on responses to these questions, exposed households were further validated as directly and indirectly exposed households. As mentioned in section (1), the directly exposed households included those losing farmland, labour, and farmland-based resources such as forest resources and forest base resources, etc. The indirectly exposed households include those living nearby and would have to live with the implications of commoditization of land relations often associated with LSLA; those losing uncultivated land and now must travel longer distances to clear new farms; those having limited land and cannot practice fallowing, monocropping because land has become scarce due to enclosures. Following, the extant literature on drivers of LSLA (Arezki et al., 2013; Lay & Nolte, 2018), questions on power relations, location, and institutional conditions were included to capture supply-side factors. It must be pointed out that the variables focused on only supply-side variables because demand-side factors are investor/firm-specific factors that were unavailable at the firm level. Regarding the survey, the study resorted to face-to-face interviews, and 12 enumerators (2 for each district) were recruited and trained to help interview the selected household heads. The enumerators were recruited and trained on interviewing skills and how to manage the questions. The household survey was conducted in three stages namely, recognizance survey, pretest, and main survey of targeted respondents. The pretest and the main survey were preceded by a recognizance survey which involved visits to the areas selected. During the visits, meetings were held with local stakeholders of the communities. These allowed for the establishment of networks for the study. The recognizance survey was followed by the pretest of the questionnaire. The purpose of the pretest was to get feedback regarding the questionnaire structure and the perceived time cost of administering the question. The pre-test exercise was conducted using twenty households. The farmers were selected from different communities outside the study area. Specifically, all the farmers for the pre-test were selected from Wamale and Lahagu – an LSLA-affected communities in the Tamale metropolis. This provided an opportunity for flaws and deficiencies in the questionnaire to be identified and remedied. The final survey was conducted after all the corrections were made. Whereas some of the respondents were interviewed on their farms, others were interviewed at their place of residence. Information on LSLA and farmland access were captured for the 2017/2018 cropping season. The definition/measurement and expected sign of each variable employed for this study are presented in Table 2.

Table 2: Variable definition/measurement and a priori expectations in models for LSLA

Variables	*Definition/measurement*	*Expected sign*	
		Exposure to LSLA	Off-farm labour supply
Off-farm labour supply	Total labour time allocated to off-farm employment (in hours) per season	N/A	N/A
Household power relations			
Gender	1 if the household head is male, 0 otherwise	-	+
Education	Number of years spent in formal education	-	-
Knowledge	1 if the household has prior knowledge of farmers in other communities affected by the LSLA before being exposed to LSLA; 0 if otherwise	-	N/A
Leadership position	1 if the household head is in any leadership position; 0 if otherwise	-	N/A
Landholding	Total number of acres of land owned by the household	+	-
Location factors			
Good fertile	1 if the fertility of the soil is good; 0 if otherwise	+	-
Moderately fertile	1 if the fertility of the soil is moderate; 0 if otherwise	+	-
Poorly fertile	1 if the fertility of the soil is poor; 0 if otherwise	-	+
Wage rate	Monthly wage rate (in Ghana cedis (GH¢))	+	+
Compensation	Payment received after displacement (Amount in Ghana cedis (GH¢))	+	+/-
Fallow period	Number of years	+	-
Water sources	1 if there is an available water source in the village of the location of the household; 0 if otherwise	+	-
Sagnarigu	1 if the farmer is in the Sagnarigu district, 0 otherwise	+	+/-
Mion	1 if the farmer is in the Mion district, 0 otherwise	+	+/-
Central Gonja	1 if the farmer is in the Central Gonja district, 0 otherwise	+	+/-
Savelegu	1 if the farmer is in the Savelegu district, 0 otherwise	+	+/-
Yagaba-Kubori	1 if the farmer is in the Yagaba-Kubori district, 0 otherwise	+	+/-
North Gonja	1 if the farmer is in North Gonja district, 0 otherwise	+	+/-
Institutional factors			
Social group	Membership to a social group (1=yes; 0=no)	-	-
Financial institution	1 if a financial institution is available in the district of the household; 0 if otherwise	+/-	+
Land institution	1 if a formal land institution such as lands commission, land survey department, and town and country planning is available in the district of the household; 0 if otherwise	+/-	N/A
Treatment categories			
Exposure to LSLA by domestic entities			
Direct exposure	1 if a household lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	N/A	+
Indirect exposure	1 if a household lived nearby affected households or lost uncultivated land; have limited land and cannot practice fallowing, monocropping because land has become scarce due to enclosures; 0 if otherwise	N/A	+
Exposure to LSLA by foreign entities			
Direct exposure	1 if a household lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	N/A	+
Indirect exposure	1 if a household lived nearby affected households or lost uncultivated land; have limited land and cannot practice fallowing, monocropping because land has become scarce due to enclosures; 0 if otherwise	N/A	+

RESULTS AND DISCUSSIONS

4.1 Descriptive analysis

Before presenting the results of the factors influencing households' direct and indirect exposure to LSLA by domestic and foreign entities, as well as their effects on labour supply (captured as time allocated to off-farm employment), we present in Table 3, a descriptive statistic of the variables employed for the analysis. The statistics in Table 3 show that there are observed differences between exposed (i.e., directly, and indirectly exposed households to LSLA by domestic and foreign entities) and nonexposed households (i.e., households that are neither directly nor indirectly exposed) in terms of time allocated to off-farm. For instance, under exposure to LSLA by domestic entities, the average time allocated to off-farm employment is 15.4 and 12.1 hours, respectively for the directly and indirectly exposed households. On the other hand, the average time allocated by directly and indirectly exposed households under exposure to LSLA by foreign entities is 25.5 and 21 hours, respectively. Meanwhile, time allocated off-farm is 7.1 hours for households that are neither directly nor indirectly exposed to LSLA by domestic and foreign entities. In terms of household characteristics, there are also some differences between non-exposure and direct and indirect exposure to LSLA by domestic and foreign entities. For instance, whereas no compensation was received by non-exposed households (control group), average compensation ranges between GH¢349.23 and GH¢668.61 per acre for households directly and indirectly exposed to LSLA by domestic entities; and GH¢378.56 and GH¢895.98 per acre for households directly and indirectly exposed to LSLA by foreign entities. Further, the average landholding is 16.7 acres for nonexposed households but ranges between 8.6 and 11 acres for directly and indirectly exposed households under LSLA by domestic and foreign entities, respectively. There are also marked differences in wage rates of nonexposed households (GH¢17.94), directly (GH¢107.94) and indirectly (GH¢145.47) exposed households under foreign entities and directly (GH¢25.87) and indirectly (GH10.89) exposed households under domestic entities. The relatively low wages under domestic entities stem from the fact that most LSLA by domestic entities is speculative investments that do not use the land for labour-demanding investment and therefore do not hire labour as compared to foreign investors. Similarly, there are differences between exposed and nonexposed households in terms of gender, level of education, the proportion of households who are in leadership positions, social groups, wage rate, duration of fallowing, soil fertility, and district of location. Thus, the differences in off-farm labour time allocation by nonexposed, directly and indirectly, exposed households under LSLA by domestic and foreign entities cannot be considered as the effect of LSLA. This is because such differences may be due to differences in the characteristics of the nonexposed, directly, and indirectly exposed households in the sample. To control for such differences and as well examine factors influencing households' exposure to LSLA and its effects on labour supply, the multinomial endogenous treatment effect (METE) model specified under section three was employed. The METE model controls for selection bias that might result from observed and unobserved differences between exposed and nonexposed households. As noted in section three, the METE proceeds in two stages. The first stage is a multinomial logit selection model of the factors influencing households' direct and indirect exposure to LSLA by domestic and foreign entities. The second stage then investigates the effects of direct and indirect exposure to LSLA by domestic and foreign entities. The results are presented in the next sections.

Table 3: Descriptive statistics by exposure status

Variable	Non-exposed (Control group)	Category of households under exposure to LSLA by domestic entities		Category of households under exposure to LSLA by foreign entities	
		Directly exposed	Indirectly exposed	Directly exposed	Indirectly exposed
Outcome variable					
Off-farm labour	7.15 (3.18)	15.43 (4.82)	12.08 (6.42)	25.52 (51.39)	20.95 (30.29)
Household power relations					
Gender	0.94 (0.24)	0.92 (0.26)	0.91 (0.29)	0.94 (0.24)	0.87 (0.34)
Education	2.05 (4.52)	1.28 (2.96)	2.21 (4.18)	2.05 (4.52)	2.04 (4.38)
Knowledge	0.34 (0.48)	0.53 (0.50)	0.66 (0.48)	0.34 (0.48)	0.28 (0.45)
Leadership position	0.25 (0.43)	0.31 (0.46)	0.23 (0.42)	0.25 (0.43)	0.26 (0.44)
Landholding	16.72 (8.93)	8.58 (6.07)	9.54 (4.24)	10.06 (14.24)	11.02 (61.44)
Location factors					
Good fertile	0.18 (0.38)	0.16 (0.37)	0.14 (0.34)	0.18 (0.38)	0.10 (0.31)
Moderately fertile	0.19 (0.13)	0.50 (0.37)	0.11 (0.21)	0.26 (0.24)	0.40 (0.24)
Poorly fertile	0.60 (0.22)	0.18 (0.37)	0.64 (0.21)	0.52 (0.24)	0.51 (0.33)
Fallow period	2.686 (1.64)	2.85 (8.70)	2.24 (4.19)	2.67 (9.10)	1.59 (3.73)
Water sources	0.25 (0.16)	0.28 (0.14)	0.16 (0.10)	0.35 (0.21)	0.16 (0.11)
Wage rate	17.94 (6.94)	25.87 (4.59)	10.89 (3.91)	107.94 (356.94)	145.47 (330.59)
Compensation	-	668.61 (46.60)	349.23 (43.31)	378.56 (13.31)	895.98 (16.04)
Sagnarigu	0.23 (0.42)	0.06 (0.24)	0.28 (0.45)	0.33 (0.48)	0.16 (0.37)
Mion	0.31 (0.46)	0.07 (0.25)	0.11 (0.32)	0.08 (0.28)	0.09 (0.29)
Central Gonja	0.12 (0.32)	0.23 (0.42)	0.06 (0.24)	0.10 (0.31)	0.19 (0.39)
Savelegu	0.42 (0.50)	0.46 (0.50)	0.23 (0.42)	0.35 (0.48	0.36 (0.48)
Yagaba-Kubori	0.17 (0.37)	0.17 (0.38)	0.27 (0.44)	0.13 (0.33	0.17 (0.38)
North Gonja	0.22 (0.42)	0.85 (0.36)	0.72 (0.45)	0.12 (0.13)	0.03 (0.16)
Institutional factors					
Social group	0.37 (0.48)	0.38 (0.49)	0.43 (0.50)	0.37 (0.48)	0.46 (0.50)
Financial institution	0.58 (0.50)	0.28 (0.45)	0.31 (0.46)	0.58 (0.50)	0.64 (0.50)
Land institution	0.46 (0.50)	0.34 (0.48)	0.33 (0.47)	0.18 (0.39)	0.54 (0.50)

Note: Standard deviations are in parenthesis. Sagnarigu district is the reference category.

Factors influencing households' direct and indirect exposure to LSLA

The results of the multinomial logit model (MNLM) of the factors influencing a household's direct and indirect exposure to LSLA by domestic and foreign entities are presented in Table 4 for further discussion. One critical issue that is worth noting is the independence of irrelevant of alternatives (IIA) assumption which drives the use of the MNLM. A test using the Hausman test for the IIA assumption and the Wald test of combining categories (see Appendix 1 and 2 in the Appendices for details) suggest that households were appropriately categorized into non-exposed, directly, and indirectly exposed households under both domestic and foreign entities.

The results of the MNLM revealed that the parameters used for the analysis jointly influence household's direct and indirect exposure to LSLA by domestic and foreign entities [Under exposure to LSLA by foreign entities: Wald test ($\chi2\ (40) = 300.16;\ p = 0.000$); Under exposure to LSLA by domestic entities: Wald test ($\chi2\ (40) = 235.16;\ p = 0.000$)]. All variables under household power relations had a significant relation with the household's direct and indirect exposure to LSLA by domestic and foreign entities. For instance, the gender of the household head is positive and significantly related to direct and indirect loss of land under LSLA by domestic and foreign entities. This is inconsistent with the study's prior expectation and thus, suggests that male-headed households are more likely to lose land directly or indirectly under exposure to LSLA by domestic and foreign entities than the nonexposed households. In most parts of northern Ghana, land is owned by males. This probably explains why males were more likely to lose land directly or indirectly to LSLA by domestic and foreign entities. The educational level of the household is also found to be significant at 5% and negatively related to the household's direct and indirect land loss to LSLA by domestic entities. This suggests that highly educated households are less likely to lose land directly or indirectly to LSLA by domestic entities than non-expose households. Education enhances the household's knowledge about land as well as easy access. In terms of information search, the highly educated household tends to have information related to land and may be able to understand all the necessary procedures relating to acquisition and registration. This can therefore help reduce the risk of eviction in less educated households. Similar, inferences can be made about household's prior knowledge of affected households. Specifically, the household's prior knowledge is significant at 10% and negatively related to LSLA by foreign entities, suggesting households with prior knowledge of other exposed households are less likely to lose land directly or indirectly to LSLA by domestic and foreign entities than non-exposed. This finding is consistent with our prior expectation and also confirms the finding of Suhardiman et al. (2015) in Laos where farmers with prior information from relatives and related networks about LSLA enhance the security of their remaining land through the use of rubber plantations, thereby avoiding further loss to investors. Power as reflected in leadership positions is also significant and negative, suggesting that household heads in leadership positions in the area are less likely to lose land directly or indirectly under exposure to LSLA by domestic and foreign entities than nonexposed household heads. Such a finding is plausible because elders, opinion leaders, or chiefs have power and are more influential than migrants or mere citizens. As a result, they are therefore less likely to lose land to domestic and foreign entities. These results support Goldstein and Udry's (2008)

argument that landholders who exercised significant authority within communities are less likely to lose such holdings. Landholding is positive and significant at 1% for direct and indirect loss of land to domestic entities but 5% for direct and indirect loss of land to foreign entities. The positive sign suggests that households with larger landholdings are more likely to lose land directly or indirectly under LSLA by domestic and foreign entities than the nonexposed households. This result was explained by the fact that larger areas needed more resources for production and given the limited resources, households were unable to cultivate all parcels possessed and therefore risked losing it to investors. Alemu (1999) argued that households who hold more land than they can manage face the risk of losing it to state authorities. Following Alemu's (1999) argument, this study hypothesized a positive relationship between landholding and direct and indirect loss of land to domestic and foreign entities. Interestingly, the results of the relationship between landholding and LSLA confirm our hypothesis and Alemu's (1999) framework. Overall, the significant relationship between direct and indirect exposure to LSLA by domestic and foreign entities supports the notion that access to land can be influenced by the existence of structures and processes such as household power relations (DFID, 1999).

Soil fertility variables including good soil fertility are positive and significantly related to households' direct and indirect loss of land to LSLA by domestic and foreign entities, suggesting that plots of households with fertile soils are more likely to be exposed directly and indirectly to LSLA by domestic and foreign entities as compared to plots with poor fertility. Similarly, the availability of water sources is positive and significantly related to households' direct and indirect loss of land to LSLA by domestic and foreign entities, suggesting that households in villages with water availability are more likely to be exposed directly and indirectly to LSLA by domestic and foreign entities as compared to households in villages without an availability water source. The results also confirm Anseeuw et al. (2012) who observed that acquirers are interested in lands that are fertile, well-watered or with good rainfall and easily accessed by roads. The results on the location factors are mixed. The variables representing Yagaba-Kubori, North, and Central Gonja districts are positive and significantly related to households' direct and indirect loss of land to LSLA by domestic and foreign entities while Mion district is negatively related to households' direct and indirect loss of land to LSLA by domestic and foreign entities. These suggest that households in North Gonja, Central Gonja, and Yagaba districts are more likely to lose land directly or indirectly under LSLA by domestic and foreign entities than those in Sagnarigu district. On the other hand, those households in Mion are less likely to lose land directly or indirectly under LSLA by domestic and foreign entities. This confirms the argument that a firm's decision to participate in FDI is determined by location factors (Dunning, 1998) but contradicts other studies that find a negative relationship between LSLA and location factors. Lay & Nolte (2018) proxied location variables with agricultural areas and water resources. However, their study did not find any positive effects of agricultural areas and water resources on LSLA. On the other hand, being in the Mion district is negatively related to direct and indirect loss of land under domestic and foreign entities, suggesting that households with plots located in the Mion district are less likely to lose land to domestic and foreign entities as compared to the nonexposed households. This contradicts our hypothesis that households with plots located in the Mion District are more likely to lose land directly or indirectly

under exposure to LSLA by domestic and foreign entities than those in the Sagnarigu district. Respondents explained that the Mion district has fewer water resources for large-scale production. However, given that large-scale agricultural investment is largely contingent on available water resources (Anseeuw, Wily, et al., 2012), households in that area are less likely to lose land to investors.

The results further indicate the importance of the length of time in fallow, as measured by the average number of years in fallow, in direct and indirect loss of land under LSLA by domestic and foreign entities. Specifically, the average number of years of fallowing is positive and significantly related to direct and indirect loss of land to LSLA by domestic and foreign entities and thus, suggests that households with plots under longer duration of fallowing risk facing direct and indirect loss of land to LSLA by domestic and foreign entities than nonexposed. This is consistent with our a priori expectation and previous studies (Goldstein & Udry, 2008; Alemu., 1999) which demonstrated that fallowed land can be lost to relatives or other land users under indigenous African land tenure systems.

Also, the role of strong institutions, as reflected in the availability of financial and land institutions, in households' exposure to LSLA is mixed in this study. For instance, the availability of financial institutions in farmers' districts shows a significant and positive association with direct land loss but a negative association with indirect loss under LSLA by domestic and foreign entities. These suggest that strong financial institutions are more likely to expose households directly to LSLA but less likely to expose them to LSLA under foreign and domestic entities. Also, the availability of formal land institutions in farmers' districts shows significant and negative association with direct land loss under LSLA by domestic and indirect land loss under LSLA by foreign entities. On the other hand, land institution shows a significant and positive association with indirect land loss under LSLA by domestic entities and direct land loss under LSLA by foreign entities. These results are inconsistent with past studies which highlighted a positive relationship between LSLA and laws, and policies reflected in institutional availability. In Ghana, the results do not adequately reflect Yaro's (2013) assertion that policies facilitate the emergence of land sales and consequent changes in the control of land. However, the results are in line with Arezki et al. (2013) who found mixed results for the relationship between institutions and LSLA.

Table 4: Multinomial logit model estimates of households' exposure to LSLA

Variable	**Under exposure to LSLA by domestic entities**		**Under exposure to LSLA by foreign entities**	
	Direct	Indirect	Direct	Indirect
Household power relations				
Gender	1.55 (0.69)**	0.46 (0.08)***	0.17 (0.04)***	0.22 (0.11)**
Education	-1.98 (0.84)**	-0.69 (0.12)***	-0.12 (0.06)*	-0.44 (0.18)**
Knowledge	-0.43 (0.25)*	-2.09 (1.01)**	-0.42 (0.13)***	-0.54 (0.26)**
Leadership position	-0.11 (0.04)***	-0.37 (0.07)***	-0.20 (0.09)**	-0.24 (0.08)***
Landholding	0.32 (0.09)***	0.20 (0.06)***	0.15 (0.07)**	0.10 (0.04)**
Location factors				
Good fertile	0.85 (0.44)*	0.32 (0.13)**	0.22 (0.09)**	0.60 (0.07)***
Moderately fertile	0.02 (0.34)	0.38 (0.29)	0.10 (0.40)	0.25 (0.68)

Fallow period	0.09 (0.05)*	0.12 (0.03)***	0.12 (0.02)***	0.07 (0.04)*
Water sources	-0.8 (0.53)*	-0.06 (0.04)*	-0.36 (0.20)*	-0.56 (0.24)**
Wage rate	-0.28 (0.46)	-0.01 (0.13)	-0.26 (0.42)	0.11 (0.51)
Compensation	-1.01 (0.04)	0.10 (0.28)	0.19 (0.14)	0.43 (0.58)
North Gonja	0.29 (0.04)***	0.56 (0.15)***	0.52 (0.02)***	0.56 (0.13)***
Mion	-0.05(0.02)**	-0.42 (0.08)***	-0.65 (0.31)**	-0.72 (0.13)***
Central Gonja	0.21 (0.03)***	2.09 (1.01)**	0.11 (0.01)***	0.10 (0.01)***
Savelegu	-0.06 (0.30)	-0.30 (0.26)	-0.01 (0.13)	-0.02 (0.03)
Yagaba-Kubori	0.29 (0.04)***	0.56 (0.15) ***	0.42 (0.08)***	0.65 (0.34)*
Institutional factors				
Social group	0.04 (0.27)	-0.03 (0.03)	-0.33 (0.19)	-0.13 (0.39)
Financial institution	0.21 (0.05)***	-0.10 (0.02)***	1.17 (0.44)***	-1.01 (0.04) ***
Land institution	-0.06 (0.04)*	0.21 (0.05) ***	0.30 (0.10)**	-0.83 (0.36)**
Constant	2.19 (0.16)***	-1.98 (0.84)**	-0.48 (0.21)**	-0.44 (0.25)*
Pseudo R^2	0.43		0.55	
Joint significance of excluded instruments: χ^2 (6)	11.84***		25.34***	
Wald χ^2 (40)	300.16***		235.16***	
No. of observations	472		531	

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively. The baseline category is non-exposure to LSLA. The baseline category for the districts is Sagnarigu. Standard errors are in parenthesis.

Labour supply impacts of direct and indirect exposure to LSLA

Table 5 presents the second stage that measures the off-farm time impacts of direct and indirect exposure to LSLA under domestic and foreign entities. Under LSLA by domestic entities, the coefficients on the factor loadings (λ) in the equations for time spent off-farm were negative and significant for direct and indirect exposure. These suggest that unobserved variables that increase the probability of a household's direct and indirect exposure to LSLA also lead to decreased time spent off-farm as compared to non-exposure. On the other hand, the coefficients on the factor loadings (λ) in the equation for time spent off-farm under LSLA by foreign entities were positive and significant for direct and indirect exposure and thus, suggest that unobserved variables that increase the probability of household's direct and indirect exposure to the LSLA also lead to higher levels of time spent off-farm as compared to non-exposure. Note that labour supply (number of hours per season) was transformed using an inverse hyperbolic sine (IHS) transformation following Bellemare and Wichman (2020). Thus, the coefficient estimates can be interpreted as one would in a log-level specification. Exogenous covariates including gender, education, landholding, soil fertility, wage rate, social group membership, availability of financial institution, and location of households are significant in the equations for time spent off-farm under LSLA domestic and foreign entities. However, most notable among these covariates is wage rate which is positive and significant at 1% under both equations and thus, suggests that a 1% increase in off-farm wage rate will lead to a 36% and 30% increase in time spent off-farm for direct and indirect exposure to LSLA by domestic and foreign entities as compared to non-exposure. Another is landholding which decreases time spent off-farm by 0.23 and 0.28 and thus

suggests that a 1% increase in landholding leads to a 23% and 28% increase in time spent off-farm for direct and indirect exposure to LSLA by domestic and foreign entities as compared to non-exposure. On the issue of off-farm time effects of exposure to LSLA, the results show an increase in time spent off-farm for direct and indirect exposure to LSLA under domestic and foreign entities. Under exposure to LSLA by domestic entities, coefficients for direct and indirect exposure of households in the equation for time spent off-farm are 0.70 and 0.68 respectively, and significant. These suggest that time spent in off-farm employment will increase by 70% and 68% respectively for direct and indirect exposure to LSLA under domestic entities as compared to non-exposure. Similarly, the coefficients for direct and indirect exposure of households in the equation for time spent off-farm under LSLA by foreign entities are 0.58 and 0.16, respectively. These suggest that time spent in off-farm employment will increase by 58% and 16% respectively for direct and indirect exposure to LSLA under foreign entities as compared to non-exposure. These results lend support to the notion that LSLA can enhance off-farm employment opportunities and off-farm labour supply (World Bank, 2010). The results also confirm Ju et al. (2016) who demonstrated that land reduction from LSLA leads to an increase in labour supply to off-farm activities.

In short, the results concerning the effect of LSLA on household labour supply are largely consistent with the theoretical predictions of this study. Specifically, the study found that direct and indirect loss of land under exposure to LSLA by domestic and foreign entities leads to an increase in time spent in off-farm employment. These suggest that LSLA by both domestic and foreign entities increases off-farm labour supply. This, therefore, highlights the role of LSLA by both domestic and foreign entities in increased off-farm labour supply in northern Ghana. The results further support the theoretical framework which demonstrated that LSLA by domestic and foreign entities will increase labour supply to off-farm employment (Ju et al., 2016).

Table 5: METE-based estimates of off-farm time allocation effects of LSLA

Outcome	**Exposure to LSLA by domestic entities**	**Exposure to LSLA by foreign entities**
	Time spent off-farm	**Time spent off-farm**
Direct exposure	0.70 (0.03)***	0.58 (0.13)***
Indirect exposure	0.68 (0.28)**	0.16 (0.08)*
Gender	0.09 (0.01)***	0.01 (0.00)***
Education	0.05 (0.01)***	0.03 (0.01)**
Landholding	-0.23 (0.04)***	-0.28 (0.04)***
Good fertile	-0.08 (0.01)***	-0.07 (0.01)***
Moderately fertile	-0.46 (0.05)***	-0.15 (0.06)**
Fallow period	0.03 (0.15)	0.01 (0.05)
Water sources	-0.02 (0.06)	-0.01 (0.03)
Wage rate	0.36 (0.04)***	0.30 (0.02)***
Land value	0.01 (0.01)	0.01 (0.01)
North Gonja	0.21 (0.24)	0.22 (0.22)
Mion	-0.89 (0.04)***	-0.01 (0.32)
Central Gonja	-0.08 (0.02)***	-0.45 (0.21)**

Savelegu	0.29 (0.20)	0.13 (0.18)
Yagaba-Kubori	-0.39 (0.02)***	-0.20 (0.04)***
Social group	-0.63 (0.03)***	-0.46 (0.25)*
Financial institution	-0.39 (0.23)*	-0.63 (0.23)***
/lambd_Directly exposure	-1.97 (0.62)***	1.42 (0.33)***
/lambd_Indirectly exposure	-1.40 (0.08)***	0.89 (0.16)***
Joint significance of district dummy variables: χ^2 (15)	167.26***	100.22***
Joint significance of excluded instruments: χ^2 (6)	F(3, 428)=0.16	F(3, 528)=0.23
No. of observations	472	531

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively. Standard errors are in parenthesis. The baseline category is non-exposure to LSLA. The reference for district is Sagnarigu.
Source: Author's computation from field survey, 2018

Conclusions and Recommendation

This study examined the implication of LSLA by domestic and foreign entities on household labour supply in northern Ghana. Specifically, the study analysed the factors influencing households' direct and indirect exposure to LSLA by domestic and foreign entities and their effects on labour supply to off-farm employment. The data employed comes from a survey of 664 households selected through a multistage sampling technique. The analyses were born out of the theory of agricultural household which opines that land reduction by large-scale land acquisitions will increase labour inputs for off-farm employment.

Regarding the factors influencing households' exposure to LSLA, the results indicate that households' direct and indirect exposure to LSLA by domestic and foreign entities are influenced by the household's power relations, location, and institutional conditions in northern Ghana. Concerning the effects of LSLA by domestic and foreign entities on household labour supply, the results showed that both direct and indirect exposure to LSLA under domestic and foreign entities enhances off-farm labour supply. This study therefore concludes that both LSLA by domestic and foreign entities increase labour supply to off-farm employment. In Ghana, the agricultural sector depends largely on manual labour employing more than half (about 51%) of the total labour force (Ghana Statistical Service, 2016, 2020). On the other hand, the service and industrial sectors also require labour for survival. This implies a possible trade-off between supplying labour for farms and off-farm. To balance the trade-off, skill development programs can be established to train the migrating labour to enhance the benefits of labour supply to off-farm activities. On the other hand, labour-saving technologies may be introduced to counter the loss of farm labour to off-farm employment. This requires efforts from the government, NGOs, and all stakeholders that matter in sustainable development. Investors can also be encouraged to employ win-win strategies in land acquisition to mitigate the dire consequences of land loss on local communities. Win-win strategies including contract farming and outgrower schemes do not only allow farmers access to their farmlands, but they also enhance both long- and short-term farm investments, farm income, and food security and may therefore be implemented by investors.

Also, since the study was conducted in only northern Ghana, the findings and conclusions may not reflect what prevails elsewhere in Ghana. For this reason, the study suggests that future research should consider the effects of large-scale land acquisitions (LSLA) by domestic and foreign entities in other areas or expand the study area to determine the effects of the LSLA in other affected areas of Ghana. Additionally, this study presents only the effects of LSLA by domestic and foreign entities on labour supply. However, such effects do not translate into an incremental effect of LSLA by domestic and foreign actors. As the scale of land acquired by domestic and foreign entities increases, off-farm employment may differ. For this reason, the study suggests that future research should extend the analysis to the effects of the intensity of LSLA by domestic and foreign entities on off-farm employment.

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Appendix

Appendix 1: Hausman tests of IIA assumption

Ho: Odds (Outcome J vs Outcome K) are independent of other alternatives **(domestic entities)**				
Omitted	chi2	df	P>chi2	evidence
Indirect	0.000	1	1.000	for Ho
Direct	0.470	12	1.000	for Ho
None	1.152	11	1.000	for Ho
Ho: Odds (Outcome J vs Outcome K) are independent of other alternatives **(foreign entities)**				
Omitted	chi2	df	P>chi2	evidence
Indirect	0.374	12	1.000	for Ho
Direct	0.000	1	1.000	for Ho
None	0.000	1	1.000	for Ho

Appendix 2: Wald tests for combining alternatives

Ho: All coefficients except intercepts associated with a given pair of alternatives are 0 (i.e., alternatives can be combined) [**domestic entities**]			
	chi2	df	P>chi2
Non-Exposure & Direct exposure	149.67	11	0.000
Non-Exposure & Indirect exposure	139.93	11	0.000
Direct exposure & Indirect exposure	80.32	11	0.000
Ho: All coefficients except intercepts associated with a given pair of alternatives are 0 (i.e., alternatives can be combined) [**domestic entities**]			
Non-Exposure & Direct exposure	100.91	11	0.000
Non-Exposure & Indirect exposure	101.44	11	0.000
Direct exposure & Indirect exposure	97.76	11	0.000

Note: A significant test is evidence against Ho.

Appendix 3: Key Informant Interview Guide

Key element of the operational definition	Key questions
Transparency in negotiations	Were existing local landholders informed? Were they involved in negotiations over land deals? Was the prior consent of the local people obtained?

Respect of existing rights	Does the acquisition allow access to productive resources?
	Are the affected people adequately compensated?
	Does it create sustainable employment and access to living wages?
	Are labour rights respected in the area?
Sustainability of benefits	Is the benefit an ongoing revenue stream?
	Is the benefit used in any developmental project in the area?
Environmental sustainability	Are the practices environmentally friendly?
Destination of the products	Are the produce sold in the local market?

Source: Authors design based on the operational definition of the study, 2018.