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FOOD PRODUCTION AND FOOD SECURITY IMPLICATIONS OF LARGE-SCALE LAND DEALS: EVIDENCE FROM AGRICULTURAL HOUSEHOLDS IN NORTHERN GHANA

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BY

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JANUARY 2021

DECLARATION

Student

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this University or elsewhere:

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Supervisors'

We hereby declare that the preparation and presentation of the thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University for Development Studies.

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ABSTRACT

Following the 2007-08 multiple crises, most land-rich nations witnessed an upsurge in large-scale land acquisition (LSLA). This generated debate among development practitioners who raised mixed concerns about the implications of LSLA on local occupants. Whereas some view such practice as development opportunity, others highlight its threats to the environment, food sovereignty, food production, food security and other livelihoods. In line with these views, several empirical studies investigated the effects of LSLA on local occupants. However, the literature is unclear about how LSLA (i.e., acquisitions in ranges of 20.23ha or more) by different actors affect food production and food security of agricultural households. Using information gained directly from a survey of 664 agricultural households selected through multistage sampling, and six (6) focus group discussions, this study classified households into non-exposure to LSLA, direct exposure to LSLA (i.e., losing farmland, labour or forest resources to LSLA), indirect exposure to LSLA (i.e., living in affected community, losing uncultivated or having limited land due to LSLA) by domestic and foreign entities. Based on these classifications, this study analysed the food production and food security effects of LSLA by domestic and foreign entities in northern Ghana. Specifically, the study examined relationship between direct exposure and indirect exposure to LSLA by domestic and foreign entities and farmland access using descriptive statistics. Further, the study examined the effect of direct and indirect exposure to LSLA by domestic and foreign entities on labour supply using descriptive statistics and multinomial endogenous treatment effect model. Also, the effects of direct and indirect exposure to LSLA by domestic and foreign entities on farm investment were analysed using two-stage conditional maximum likelihood while the effects on farm income and food security were analysed using multinomial endogenous switching regression. Using descriptive statistics, the qualitative responses were analysed to explain the survey findings. The results revealed that households directly and indirectly exposed to LSLA by domestic and foreign entities are more likely to lose control over land use and transfer rights, redistribute farm labour to urban off-farm employment instead of unemployment or local rural off-farm employment where investment farms are established with the acquired land. Further, the results revealed that the direct and indirect exposure to LSLA by domestic and foreign entities reduces farm income despite increasing investment in short-term land improvements in a form of mineral fertilisers. Consequently, these factors also decrease household food security. Based on the effects of LSLA on land access and rights of control, labour allocation, long-term investment and higher expenditure on soil amendments, and farm income, both LSLA by domestic and foreign entities tend to undermine food security of affected households. Thus, traditional authorities or the state should enhance transparency in land markets for farmers to acquire land for production. Government through the ministry of food and agriculture can also expose farmers to land use intensification to counter the reduced access to land or labour-saving technologies on farms to counter the loss of labour. Skills development programs may also be introduced to enhance the benefits of labour supply to urban areas.

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DEDICATION

In memory of my late Father, Afa Alidu Abdallah.

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LIST OF ABBREVIATIONS

ABD	Accumulation by Dispossession
ATT	Average Treatment Effects on The Treated
ATU	Average Treatment Effect on The Untreated
CAADP	Comprehensive African Agriculture Development Programme
CSI	Coping Strategy Index
DD	Double-Difference
DFID	Department for International Development
ECLs	Economic Land Concessions
ESR	Endogenous Switching Regression
FAO	Food and Agriculture Organization
FASDEP	Food and Agriculture Sector Development Policy
FCS	Food Consumption Score
FDI	Foreign Direct Investment
FIAN	Foodfirst International Action Network
FOE	Friends of the Earth
GAPS	Ghana Agricultural Production Survey
GBM	Generalize Boosted Model
GCAP	Ghana Commercial Agricultural Project
GDP	Gross Domestic Product
GoG	Government of Ghana
GRAIN	Genetic Resources Action International Network
GSS	Ghana Statistical Service

HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Score
HHS	Household Hunger Scale
HLSI	Household Livelihood Security Index
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILC	International Land Coalition's Tirana Declaration
IMF	International Monetary Fund
ISSER	Institute of Statistical, Social and Economic Research
ITFC	Integrated Tamale Fruit Company
IWAD	Integrated Water and Agricultural Development
LSAI	Large-Scale Agricultural Investment
LSLA	Large-Scale Land Acquisition
METE	Multinomial Endogenous Treatment Effect
MESR	Multinomial Endogenous Switching Regression
MMNL	Mixed Multinomial Logit
MNLS	Multinomial Logit Selection
MNPS	Multinomial Propensity Score
MSL	Maximum Simulated Likelihood
MoFA	Ministry of Food and Agriculture
MSE	Mean Square Error
PACs	Potential Arable Cropland
PSM	Propensity Score Matching

RAI	Responsible Agricultural Investments
rCSI	Reduced Coping Strategy Index
SAPs	Structural Adjustment Policies
SRID-MoFA	Statistics, Research, and Information Directorate-Ministry of Food and Agriculture, Ghana
UN	United Nations
USAID	United States Agency for International Development
WFP	World Food Programme

CHAPTER ONE

INTRODUCTION

1.1 Background

The role of food production and food security in sustainable development has long been recognized and acknowledged in international development discourse. Improved food security can reduce poverty and hunger, and promote economic growth (Lele et al., 2016). At the household level, the poor can supplement their food needs with purchases from the market. This implies increased poverty since major share of income will be spent on purchasing food (Martin, 2010; Lele et al., 2016). In this regard, available food via production can reduce poverty by lower food prices in the market or saving the share of household income spent in purchasing food (Pangaribowo & Gerber, 2016; Sassi, 2018). Food security can also mitigate chronic deficiency of micronutrients, vitamins and minerals thereby promoting healthy population (e.g., Pangaribowo & Gerber, 2016). In turn, reduced levels of poverty and hunger may promote sustainable growth (Torero, 2014). Improved food security also plays a strong role in sustainable consumption (Lele et al., 2016). At the national level, availability of food via production can mitigate food deficit by maintaining supply levels to meet food requirements on continuous basis thereby promoting food access and sustainable consumption (Brooks, 2016). Thus, sustainable development cannot be achieved in isolation without improved food security.

In Africa, a major part of the population is rural and 51.1% are employed in the agricultural sector (FAOSTAT, 2020). Thus, growth in productivity can increase food availability thereby enhancing food security. Food availability can also increase level of food supply thereby lowering domestic food prices. With lower food prices, households can then increase purchases to enhance food security (Brooks, 2016). For these reasons, several efforts are made by most governments in Africa to promote the agriculture sector in order to enhance food security. Among these efforts are the Maputo Declaration in which African governments pledge to increase productive land under sustainable land management and also set aside at least 10% of national budget for agriculture (NEPAD, 2003). Also, the Malabo Declaration reemphasized the need to pursue the pledge of Maputo Declaration in order to enhance food security in Africa (AU Summit-Malabo, 2014). Despite these efforts, studies have shown that Africa still faces problems of food insecurity. For instance, the Food and Agriculture Organization concluded that Africa is significantly off track to achieve food security as 19.1% of her population are undernourished (FAO, 2020). Meanwhile, Djurfeldt, Aryeetey and Isinika (2010) have previously noted that sub-Saharan Africa failed to progress in terms of food security as compared to other regions. Thus, poverty reduction, zero hunger, sustainable growth, and consumption which are the central pillars of the sustainable development are threatened.

In the case of Ghana, the policy for Food and Agriculture Sector Development (FASDEP II) and the Medium-Term Investment Plan for the Agricultural Sector (METASIP I & II) have been developed by government and implemented in line with the Maputo and Malabo Declarations so as to increase productivity and food security. For instance, since 2008, the government has been implementing a national fertilizer subsidy programme to boost productivity and food security (Houssou et al., 2017; Iddrisu et al., 2020). Under the Commercial Agriculture Project of Ghana (GCAP), the government has directly encouraged the release of land in large scale in SADA areas and Accra plains for commercial production of rice, maize, soya, fruits and vegetables to enhance food security. This initiative has resulted in acquisition, developement and cultivation of over 9,000ha of land in Ghana (Ministry of Food and Agriculture, 2015c). Some traditional authorities have also transfer land in large-scale to investors with the aim of creating development opportunities for local occupants (Boamah, 2014). Yet the country still faces the challenge of food insecurity. Reports by Ghana's Ministry of Food and Agriculture and the World Food Programme show that about 5% of Ghana's population are food insecure. Both reports further suggest that the food insecure population is likely to increase by about 2 million people (WFP, 2009a; Ministry of Food and Agriculture, 2015b). Recent statistics available from the FAO also show that between 2014 and 2019, the number of severely food insecure people in Ghana increased from 2.1 million to 2.5 million (FAOSTAT, 2020a). This is true for northern Ghana where 16% of households are food insecure (WFP, 2012). Further studies also show that about 40% of the rural population in northern Ghana are vulnerable to food insecurity (Ministry of Food and Agriculture, 2015b). The challenge of food insecurity amidst several efforts means that any unexpected shock in the agricultural sector will even worsen the current food insecurity situation in the country.

Land on the other hand plays a significant role in food security through several paths. Securing access to land influences farm production and food security (Magrini & Vigani, 2016; Tanner, 2013). When land is secured, farmer's uncertainty associated with reaping the full benefits of his/her investment diminishes (Roth, 2014). This can lead to increase investment in labour, capital, and land improvements techniques since threat of displacement will be minimised. Increase investment in labour, capital, and land improvements techniques may then increase agricultural productivity and food security (Feder & Onchan, 1987; Hayes et al., 1997; Holden et al., 2009; Roth, 2014). Investment in labour, capital and land improvement techniques may also provide employment opportunities for agricultural labour households. Income earned from agricultural labour may further enhance purchasing of food required (Graham et al., 2010). It has also been noted that securing access to land improves households' access to incentives such as credit (e.g., Binswanger & Rosenzweig, 1986; Feder & Onchan, 1987; Sakprachawut & Jourdain, 2016). Such incentives may then be used to undertake farm investments or for consumption smoothing to enhance food security through market purchases (Feder & Onchan, 1987; Hayes et al., 1997; Goldstein & Udry, 2008; Ayamga & Dzanku, 2013; Roth, 2014; Ayamga, Yeboah, & Ayambila, 2016).

The dependence of food security on land implies that any challenges faced by farmers in accessing land for production will directly impact on sustainable development. One of such recent challenges faced by farmers is large-scale land acquisition (LSLA) by corporations for plantation agriculture, a phenomenon politically framed as land grabbing. Although large-scale land acquisitions existed since colonial period, the acquisitions skyrocketed following the 2007-08 multiple crises (i.e., food, energy/fuel, climate, and financial crisis). For instance, GRAIN (2016) reported that between 2008 and 2012, a total of 35 million hectares have been acquired globally. Meanwhile, 56.6 and 227 million hectares have been previously reported respectively by Deininger et al. (2011) and the Oxfam International (Oxfam International, 2011). In Africa, Cotula, Vermeulen, Leonard and Keeley (2009) reported over 2 million hectares of approved land deals. Subsequently, Graham, Sylvain, Rolf and Suárez (2010) and Friis and Reenberg (2010) reported 20 million and 63 million hectares. Such acquisitions are equally carried out by both citizens and transnational corporations (Deininger et al., 2011; Jayne et al., 2014, 2016). A study by Deininger et al. (2011), for example, acknowledged the involvement of foreign investors in large-scale land deals, but argues that domestic investors constituted more than half of the land deals in Nigeria (97%), Sudan (78%), Cambodia (70%), Mozambique (53%), 49% in Ethiopia and 7% in Liberia. Anseeuw et al. (2012) also opined that while media reports have emphasised the role of foreigners as land acquirers, national elites are also key players. Similarly, Jayne et al. (2014) and Jayne et al. (2016)

acknowledge the involvement of both domestic and foreign investors in large-scale land deals but argues that domestic actors now collectively control more potential arable crop land than large-scale transnational corporations in several parts of Africa. Even though the sizes are dissimilar (Deininger et al., 2011; Jayne et al., 2014, 2016), both may affect local livelihood in several ways. Followers of Marx (2010a) and Harvey (2003) including Li (2011), for instance, argued that such acquisitions may affect production through displacement of local peasants, restriction of rights to control over land use, and creation of reserved labour in local communities. Ju et al. (2016) also showed that given a production technology, total time at households' disposal, compensation received, market wage and consumption share of income, LSLA may reduce farm labour and household income but increase migration to off-farm. On the other hand, Marshall (1890) and followers (e.g., Barrows & Roth, 1990; Feder, 2007; Feder & Onchan, 1987; Goldstein & Udry, 2008; Hayes et al., 1997; Holden et al., 2009; Place & Hazell, 1993; Place & Migot-Adholla, 1998; Sjaastad & Bromley, 1997) argued that inefficient land tenure arrangements increases uncertainty and consequently, reduces long-term investment in land improving techniques, productivity and food security. Amartya Sen in his books entitled "*Poverty and Famines: An Essay on Entitlement and Deprivation*" and "*Development as Freedom*" argued that denial of productive resources including land robs poor people of their freedom to satisfy hunger or achieve food security (Sen, 1981b, 1999). In contrast to the theoretical views, proponents of LSLA argued that LSLA can bring about transmission of technology from plantations to peasants, creation of employment and market integration of smallholder farmers, productivity growth and food security (e.g., Technoserve, 2007; von Braun & Meinzen-dick, 2009). This notion is based on the assumption that investment from LSLA may lead to employment of local peasants and income earned is then used to purchase food on the market or purchase inputs for own production which eventually lead to food security (Cotula et al., 2008). However, opponents of LSLA argued that the benefits associated with such acquisitions do not often materialize and livelihoods are threatened. Theting (2010), for example, opined that investments from LSLA often failed to fulfil the promise of jobs creation. Tinyade (2010) and Behrman, Meinzen-dick and Quisumbing (2012) stressed that even in situations where farmers are employed, the conditions contained in the contracts are not favourable and employees are few due to the mechanised nature of investment farms. Robertson and Pinstrup-Andersen (2010) on the other hand argued that appropriation of land for large-scale farm development leaves displaced communities without collateral to secure monetary assistance for land improvement. However, questions regarding how LSLA affects food production and food security remained under explored. In particular, the questions regarding effect of LSLA by domestic and foreign entities on food production and food security remained under explored.

In Ghana, LSLA exists and has been carried out by both domestic and foreign actors (Cotula et al., 2009, 2014). However, acquisition by both actors vary. For instance, in Central Gonja District of Northern Region of Ghana, Nyari (2008) reported how a biofuel Africa Limited – a foreign company - acquired 38,000 hectares of land with the intention of creating the largest jatropha plantation in the world. On the other hand, the Integrated Tamale Fruit Company (ITFC) - Ghanaian firm – also acquired 568ha and has 1200 out-growers operating on 0.5-5ha each (Ayamga & Laube, 2020). Meanwhile, a total of 400ha has been jointly acquired by both nationals and foreigners in the Mamprugu-Moagduri district (Kuusaana, 2017). Although the acquisitions by domestic and foreign actors vary, it is likely that both might affect household livelihoods. Further, information on how each affect households is necessary for informing policy. Thus, a study investigating the effect of LSLA domestic and foreign actors on households is crucial. It is against this background that this study was conducted to investigate the effects of LSLA by domestic and foreign entities on household food production and food security in the Northern Region of Ghana.

1.2 Historical Overview of Large-scale Land Acquisition (LSLA) in Ghana

While LSLA is not new in Ghana, the processes of engagement and purposes for such deals have varied. Prior to the colonial period, acquisition process was mainly informal (Bugri & Yeboah, 2017; CARITAS GHANA, 2016; Senu, 2014; Wemegah et al., 2014). Attempts to formalize this process of land acquisition to allow for large-scale agricultural investments, infrastructural, and industrial development, and mining etc., led to several reforms or legislations which eventually led to commodification of customary land and displacement of local peasants who relied on the customary system for land access. For instance, the passing of the Poll Tax Ordinance of 1852 in particular compelled peasant farmers to abandon their farms to find wage employment or go into export crop production, mainly to raise money and pay the tax (Boakye, 2016). Other examples of the legislations that merit mentioning in this connection is the Crown Lands Bills of 1894 and 1897. These bills among other things, promoted mechanization of the gold mining industry on lands described as 'waste lands' and 'public lands' (Nti, 2013). Aside the Crown Lands Bills of 1894 and 1897, policies in the post-independence period (1957-66) favour large-scale mechanised agriculture as compared to small-scale farming. For example, the United Ghana Farmers' Council, the State Farms Corporation and the Ghana State Fishing Corporation promoted large scale mechanized farming at the expense of small-scale peasant farming. Other recent bills that contributed to processes of acquisition are the Ghana Free Zone Act of 1995 (Aryeetey et al., 2004); the Administration of Lands Act (Act 123) in 1962 (*The Lands Commission Act 2008, Ghana*, 2008); the World Bank (World Bank, 2013); and the Minerals and Mining Act of 2006 (Narh et al., 2016). Although these legislations and reforms created opportunities for various parts of the economy, they facilitated individual ownership of land and acquisition for a wide range of purposes. As a result, many domestic and foreign entities in Ghana are now acquiring land in large-scale for different purposes including food production (crops and livestock production), energy (biofuel production), mineral extraction, industry, tourism, and speculation (see for inatance, Nyari, 2008; Ayelazuno, 2011; Boamah, 2011, 2014; Boamah & Overa, 2015; Kuusaana, 2017; Ayelazuno, 2019).

1.3 Land Ownership and Acquisition in Ghana

In spite of the legislation and reforms introduced to govern processes of large-scale land acquisition and to allow individual land ownership, the customary land ownership has remained dominant in Ghana. Specifically, about 78% of all lands in Ghana are customary lands under the control of traditional rulers such kings, chiefs, and elders while 2% remain private land. The remaining 20% are public lands vested in the President on behalf of the people of Ghana (Kasanga & Kotey, 2001; ISSER, 2013) and currently managed by the Ministry of Lands and Natural Resources through: (i) the Forest Services, Wildlife, Timber Industry and Development Divisions and Plantation Development Fund Board under the Forestry subsector, (ii) the Lands Commission and Office of the Administrator of Stool Lands under the Lands sub-sector and (iii) Minerals Commission, Ghana Geological Survey Authority, Precious Mineral Marketing Company Limited, Mineral Development Fund, Ghana Integrated Aluminum Development Corporation and the Ghana Integrated Iron and Steel Development Corporation (Ministry of Lands and Natural Resources, 2019).

One thing that is clear in Ghana is the broad consensus on the need for land administration reforms. Many including the World Bank have recognised the implications of Ghana plural land tenure system for investment and economic development. The World Bank has since supported the

Government of Ghana (GOG) to implement two rounds of land administration reform known as the Land Administration Project (World Bank, 2013).

The challenges with Ghana's plural land tenure system are not only in the difficulties associated with defining, obtaining, registering, and enforcing land rights but also, the weakness and lack of uniform standards and procedures for land acquisition. These challenges have been exploited by both domestic investors and transnational agribusiness to acquire and enclose large tracts of land. The key problem of this research is on large-scale land acquisition but from the perspective of how large-scale impacts on food production and food security.

1.4 The Customary Land Tenure System and Large-Scale Land Acquisition in Ghana

While acquisition of large tracts of land for plantation agriculture is not new in Ghana, the phenomenon saw a big jump in the aftermath of the 2008 financial meltdown and price hikes in food and crude oil. By 2009 alone, total approved land deals reached 452,000 hectares in Ghana (Cotula et al., 2009). This surge in demand for land for plantation agriculture ushered in a new era of large-scale land deals between traditional authorities in charge of customary land management and investors (domestic and foreign entities). Such deals are further fueled by the nature of the customary land tenure system in Ghana.

In terms of management, land is vested in Earth Priests or "tendamba" among people in Upper East and West regions of northern Ghana; chiefs (skin or stool) among Dagombas, Mamprusi, Gonjas, and Nanumbas of Northern region and Akan in southern Ghana; and family among Ewes and the Dangbe tribes. Thus, the power to allocate land is vested in Earth Priest; chiefs (skin or stool) and family. However, the chiefs under customary system sometimes become more than mere trustees and therefore sell land in large-scales to investors without consulting their people

(Fonjong, 2017; Senu, 2014). In a recent study to investigate the role of chiefs in LSLAs in Ghana, Ahmed, Kuusaana, & Gasparatos (2018) found that chiefs often went beyond their customary roles as land custodians and act as land owners/sellers, negotiators and receivers of compensation and this has contributed immensely to the recent upsurge in LSLA.

Moreover, acquisition by local occupants under the customary system is mostly through oral or informal means. In rural areas, transactions in most cases are not registered with the Lands Commission. Transactions are by customary tenure rules without going through the due process of the law (Kasanga, Cochrane, King, & Roth, 1996). Thus, land rights under the customary system entail use rights and not necessarily protected by law in most cases (Civic Response, 2017; Kuusaana, 2017; Senu, 2014; Ubink & Amanor, 2008). Moreover, the processes involved in LSLA under the customary land management appear less costly and tedious to investors. The chiefs bypass the masses and do not insist on prior environmental impact assessment before the deals and hence make it less costly and tedious to investors (Fonjong, 2017). Both traditional authorities, domestic and foreign entities therefore take advantage of the informal procedures and engage large-scale land deals under customary system (Nyari, 2008). In northern Ghana for instance, Boamah (2014) discusses how chiefs formalised land deals using different informal procedures. Management is also challenged with poor record keeping leading to lease of large parcels of land or multiple sales (Alhassan, 2006; Fiadzigbey, 2006; Senu, 2014).

Further, a large share of Africa's land (i.e. about 70%) is under the customary system (Civic Response, 2017). The high percentage of land under customary control attract investors to most of areas (Cotula et al., 2009). Ghana in particular had 78% of her total area under customary system of management and this has strongly attracted local and international investors (Kasanga & Kotey, 2001; ISSER, 2013; Cotula et al., 2014). Cotula et al. (2014) in particular reported how land availability among other factors influenced the land deals in Brong Ahafo Region and the Northern region of Ghana. In Northern region of Ghana, a report by a contact person about vast unused land areas led to large-scale acquisition by Biofuel Africa Limited (Boamah, 2010).

1.5 Problem Statement

In the wake of the 2007-08 food, energy/fuel, climate change, and financial crisis, Africa witnessed an increase in large-scale land acquisitions (LSLA). However, as the practice climb sharply, both counter and supportive arguments also began to emerge. Some raised alarm about the dire consequences of land acquisitions on livelihood outcomes of citizens (e.g., GRAIN, 2008; Cotula, et al., 2009; Robertson & Pinstrup-Andersen, 2010; Friends of the Earth, 2010; Friis & Reenberg, 2010; Daniel, 2011; Anseeuw et al., 2012; etc.). Others view such practice as development opportunity embodying jobs, improved technology, increased incomes and food security (e.g., De Schutter, 2009; FAO, 2010; von Braun & Meinzen-dick, 2009; World Bank, 2010b among others). In response, empirical studies investigated LSLA and its implication on livelihoods (see for instance, Borras & Franco, 2013; German, Schoneveld, & Mwangi, 2013; Wolford, Borras, Hall, Scoones, & White, 2013; Cotula et al., 2014; Jiao, Smith-Hall, & Theilade, 2015; Suhardiman, Giordan, Keovilignavong, & Sotoukee, 2015; Giovannetti & Ticci, 2016; Hules & Singh, 2017; Nolte & Ostermeier, 2017; Petrescu-Mag, Petrescu, & Petrescu-Mag, 2017; etc.). However, the results from these studies have been generally mixed. Whereas Baumgartner et al. (2015) and Santangelo (2018), for example, found increase in food security of affected occupants, Bamlaku et al. (2015), Bottazzi et al. (2018), Jiao et al. (2015a) and Davis et al. (2014) found decrease in food security due to LSLA. Moreover, most of these studies have been unclear about how LSLA by different actors affect livelihoods of exposed agricultural households. It has been demonstrated in Africa that LSLA is carried out by both domestic and foreign entities (Civic Response, 2017; Cotula et al., 2011, 2014; Jayne et al., 2016). Although the sizes acquired by these actors are dissimilar, they both affect livelihoods of local occupants. Yet past studies focused on LSLA by foreign entities whiles that of domestic entities fly under research radar. This is particularly true in Ghana where several studies (e.g., Aha & Ayitey, 2017; Ahmed, Kuusaana, & Gasparatos, 2018; Ayelazuno, 2019; Boamah, 2014; Boamah & Overa, 2015; Hamenoo, Adjei, & Obodai, 2018; Nyantakyi-Frimpong & Kerr, 2016) focused on only LSLA by foreign entities even though existing information show involvement of both foreign and domestic investors. Cotula et al. (2014), for instance, showed that 27% of LSLA in Ghana involved Ghanaians whiles at least 40% involved foreigners. Jayne et al. (2014) also revealed that area under domestic and foreign LSLA is 2.20 million hectares in Ghana. The Civic Response - an organization that focuses on natural resources and people's rights - also revealed that of a total of 1,024,403 ha acquired in Ghana, 63% are foreign whiles 2% are locally owned (Civic Response, 2017). Ayamga and Laube, (2020) noted that while growing opposition led decline in LSLA by foreign entities, acquisitions by domestic players almost immediately filled the spaces created by the withdrawal of foreign entities. However, studies investigating the question of food production and food security implication of LSLA by actors is scanty in Ghana. In particular, studies on the questions of how LSLA by domestic and foreign entities affect land access and farm investment are left unanswered. Further, answers to questions of how such land enclosures influence household labour supply, farm income and food security are missing in the empirical literature. Anseeuw et al. (2012), for instance, argued that the effect of LSLA by different acquires may reflect in changes in employment, access to a resource, food security, income, livelihood security, food production, loss of dignity, self-determination, and the rights of occupants. Yet empirical studies examining the paths through which land deals by different actors might affect households are limited despite the fact that such information could be very useful for policy makers in Ghana.

To fill the research gaps raised and as well contribute to knowledge on the growing debate on LSLA, the present study examined the food production and food security effects of LSLA with specific reference to domestic and foreign entities in northern Ghana. Specifically, study examined the effects of direct and indirect exposure to LSLA on food production and food security relative to non-exposure to LSLA under domestic and foreign entities. Such analysis could provide policy makers with insights into the category of households that are affected by the LSLA under various actors.

1.6 Research Questions

In investigating how large-scale land deals affect household food production and food security, the study poses five questions. The questions explore the relationship between land enclosures by agribusiness entities and access to farmland on the one hand, and household food production and food security on the other. The specific questions are:

i. What is the relationship between large-scale land acquisitions by domestic and foreign entities and farmland access in northern Ghana?

ii. How do these land enclosures influence household labour supply in northern Ghana?

iii. What is the relationship between large-scale land acquisitions by domestic and foreign entities and farm investment in the study area?

iv. What is the farm income effect of large-scale land acquisition by domestic and foreign entities in northern Ghana?

v. What are the effects of large-scale land deals by domestic and foreign entities on food security in northern Ghana?

1.7 Objectives of the Study

Specifically, the study seeks to:

i. Examine the relationship between large-scale land acquisitions by domestic and foreign entities and farmland access in northern Ghana.

ii. Analyse the effects of land acquisitions by domestic and foreign entities on labour supply in northern Ghana.

iii. Examine the relationship between large-scale land acquisitions by domestic and foreign entities on farm investment in northern Ghana.

iv. Determine the effects of large-scale land acquisitions by domestic and foreign entities on farm income in northern Ghana, and to,

v. Analyse the effects of large-scale land acquisitions by domestic and foreign entities on food security in northern Ghana.

1.8 Contribution of the Study to Knowledge

The contribution of this study to knowledge comes in several folds. First, while LSLA is nothing new, most of the evidence focus on foreigners. Thus, the question of whether the domestic LSLA affect households' food production and food security in Ghana remains a knowledge gap yet to be filled. The findings will therefore highlight the forms of land deals that affect farm households and help in informing policy development.

Second, even though LSLA and its effects on food security has been studied, all the major paths (i.e., farmland access, labour supply, farm investment, income and food security), through which land deals might affect households, have not been extensively studied. By way of contributing to the debate on the food production and food security effects of LSLA, the study also investigates household farmland access, labour supply farm investments and farm income effects of LSLA in Ghana.

Third, the potential impacts of LSLA on households have been generally inconclusive as illustrated by the two competing narratives: the development optimism narrative and the neo-colonialism narrative. Thus, the findings of this study will throw more light on the longstanding debate and help resolve the ambiguities surrounding these narratives.

1.9 Organization of the study

This study is organized into nine (9) main chapters. Chapter one presents the background to the study. Chapter one also presents a historical overview of the large-scale land acquisition in Ghana, how the customary system of land tenure, ownership and acquisition contributes to the phenomenon investigated. Finally, problem statement, research questions and objectives, scientific contribution, and chapter organizations are presented. Chapter two focused on the review of large-scale land acquisition, food security and measurements, effects of LSLA on welfare and food security in particular. This was followed with theoretical and conceptual frameworks of the study, as well as hypotheses. Chapter Three looked at the research methodology employed for the study. Results and discussion are then presented in the next four (4) chapters. Specifically, Chapter Four examined the effects of households' exposure to LSLA by domestic and foreign entities on farmland access whiles Chapter Five examined labour supply effects of households' exposure to LSLA by domestic and foreign entities. Chapter Six focused on examining farm investments effects of exposure to LSLA by domestic and foreign entities in northern Ghana. Chapter Seven examined the effects of households' exposure to LSLA by domestic and foreign entities on food production captured as farm income. Then, the households' food security effects of exposure to

LSLA domestic and foreign entities are presented in Chapter Eight. Finally, conclusion and policy recommendations are presented in Chapter Nine.

1.10 Definition of Some Terminologies in Context

There are several definitions for large-scale land acquisition (LSLA) in literature as presented in chapter two of this study. However, because the study is situated in Ghana, a definition by the Lands Commission of Ghana (Lands Commission, 2016) is adopted as the operational definition for LSLA. According to the lands commission of Ghana, large-scale land acquisition (LSLA) involves acquisition of land that covers a land area of about 20.23 hectares or more (Lands Commission, 2016). Such acquisitions are usually characterised by investment in production of mango and rice, groundnuts, soya beans, millet, jatropha carcass and onion for sale in either domestic or international markets. Further, such acquisition require the guidelines of the land commission of Ghana or the code of conduct proposed by the De Schutter (2009) and von Braun & Meinzen-dick (2009) for transparency, respect of human rights, sustainability of benefits and environment in acquiring or leasing land in large-scale.

On the basis of the above definition, this study defines **LSLA by domestic entities** to include all forms of LSLA that are wholly perpetuated by domestic entities (Levien, 2011). On the other hand, **LSLA by foreign entities** are defined to include all forms of LSLA that are perpetuated by foreign entities (Amanor, 2012).

Households under **direct exposure to LSLA** by domestic or foreign entities are households losing farmland, labour or forest resources while those under **indirect exposure to LSLA** by domestic or foreign entities represent households living in affected community, losing uncultivated or having limited land due to enclosures by domestic and foreign entities.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The effect of large-scale land acquisition (LSLA) on households has seen a dramatic growth in both theory and empirical works. In spite of the growth however, the direction of the effect is still a growing subject of debate as there is no consensus in both theory and empirical literature. Since the main focus of the current study is LSLA, food production and food security, this section is devoted to reviewing these theories and related literature in the empirics. Specifically, this chapter discusses pertinent literature on large-scale land deals, food production and food security. The chapter explores the theoretical and empirical drivers of large-scale land deals over time and how smallholder agriculture evolves in response to commodification of agricultural land and land resource scarcity. Aside introduction, this section is organised as follows. Section two review literature on concept of LSLA, trend and investments driving LSLA and as well as the drivers of LSLA. Section three presents the concept of land access and related literature whiles section four and five present the literature on labour supply, farm investment and measurements. In section six, reviews concerning household food production and approaches to measurement are presented. In section seven, literature on food security is reviewed. Section eight then reviewed empirical studies on the effects of LSLA on household livelihoods. Theoretical and conceptual frameworks of the study are then presented in section nine and ten, respectively.

2.2 Review of Studies in Large-Scale Land Acquisition

2.2.1 Concept of Large-Scale Land Acquisition and Approaches to Measurement

Literature concerning large-scale land acquisition (LSLA) has always been on the rise. However, despite the continuous increase in volume of literature on this topic, there appear to be little hope of reaching any agreement on common definition. A careful study of literature show that the definition come from different dimensions, namely, the geographical, scale and the process dimension. The geographical dimension places much emphasis on investors' country of origin. A case in point is VIVAT International (2015) which defined large-scale land acquisitions as land acquisitions by transnational corporations, private investors, and foreign governments through sale or lease contracts which sometimes can last for as long as 99 years and are highly detrimental to the interests of the affected communities. Another example is from GRAIN Briefing (2008) which defines large-scale land acquisitions as land deals carried out by foreign entities. Other studies partly agreeing with this definition are Duangklad (2010); the FIAN International (2010); Zoomers (2010); and Davis et al. (2014). While this definition may be true, it is worth pointing out that land deals may sometimes be initiated by domestic governments or elites. On the other hand, the scale dimension to large-scale land acquisitions places much emphasis on the size of land acquired. A case in point is Cotula et al. (2009) who described large-scale acquisition as outright purchase of 1000 hectares or more. In addition, the definition by Cotula et al. (2009) is regardless of any detail such as purpose, investor, or time length. Also, the above definitions overlook deals that are corrupt, non-transparent, non-consultative and do not lead to compensation of farmers. Other studies conducted on the basis of scale dimension include Friends of the Earth (2010), Twene (2016) among others.

On the other hand, the process dimension focuses more on the approaches employed in land acquisitions, describing them as non-transparent, non-consultative. The definition from the process dimension is based on the principles presented by De Schutter (2009) for acquisition of land in large-scale. Such definition has been adopted by International Land Coalition's Tirana Declaration (ILC, 2011) to describe large-scale land acquisitions as acquisitions or concessions that violate human rights, are not based on informed consent land users, not based on a thorough assessment, or are in disregard of social, economic, and environmental impacts, not transparent not based on effective democratic planning, independent oversight, and meaningful participation. This definition views the concept of LSLA from a much broader perspective by looking at a variety of factors. What is more significant about the definition is its recognition of the need to seek the consent of the affected people, respect for human rights and consider environmental and social impacts assessment in all land deals. This is extremely necessary because many conflicts that have arisen from land grab cases have often revolved around key the issues raised in this definition. In addition, this definition also seeks to provide a holistic framework or criteria that can be used to justify whether a land deal can be regarded as land grab or not. The process dimension is further presented by Borras and Franco (2012) who describe LSLA as (i) conversion of forest land or land previously devoted to food production for subsistence or domestic consumption to produce food or biofuels for export; (ii) transnational in character and driven largely by the Gulf states, Chinese and South Korean governments and companies; (iii) land deals involving finance capital and partly leading to speculative deals; (iv) deals that are often shady in character and involve national and local governments; (v) deals which often lead to displacement of local communities; and (vi) deals which require regulation, whether through the Responsible Agricultural Investments (RAI) or voluntary guidelines advocated by social movements and NGOs.

Base on the scale (Cotula et al., 2009) and process dimension of the concept of LSLA (De Schutter, 2009; von Braun & Meinzen-dick, 2009), the Lands Commission of Ghana described LSLA as acquisition that covers a land area of about 20.23 hectares or more and on the other hand, a land acquisition that covers an area less than 20.23 hectares but triggers social, economic and/or environmental concerns that needs to be safeguarded. Further, such acquisitions must: (i) not violate human rights (ii) be based on free, prior and informed consent of affected, (iii) be based on a thorough assessment of social, economic and environmental impacts (iv) be based on transparent negotiations and (v) be based on consultative planning (Lands Commission, 2016). Since the study is situated in Ghana, the definition by the Lands Commission of Ghana is adopted in section (1.10) as the operational definition for LSLA in this study.

Following the definitions, three approaches are common in literature for measuring large-scale land acquisition. The first and second approach involve two distinct levels of self-reported indicators. The first is binary indicator where an individual, household, community is directly capture as affected and non-affected by LSLA. This has been employed in several studies (e.g., Jiao et al., 2015; Shete & Rutten, 2015; Aha & Ayitey, 2017; Bottazzi, Crespo, Omar, & Rist, 2018; Mabe et al., 2019). The second approach is similar to the first approach, but further captures the size of land loss by households through LSLA. This approach has been employed by Tuyen (2014). However, one obvious problem concerning the self-reported indicators is that farmers may report being affected, losing land through LSLA or inaccurate size of land loss especially if they detect that they will be compensated for the loss or decline to report if they detect that providing such information might lead to further loss. Also, this approach fails to detect inaccurate responses as it does not give room for further questions. Further the approach fails to justify why a particular deal is classified as LSLA. Unlike the first and second approaches, the third approach involves counting of the number of deals and has been employed at the national or multi-national studies (Arezki, Deininger, & Selod, 2013; Giovannetti & Ticci, 2016; Kareem, 2018; Pardo, 2017; Lay & Nolte, 2018; Santangelo, 2018). The final approach is the indirect approach which is based on a set of core principles proposed by several researchers and think-tanks (De Schutter, 2009; von Braun & Meinzen-dick, 2009; Borras & Franco, 2012; International Land Coalition, 2012;) for large-scale land acquisitions and leases. In this approach, households are asked a series of qualitative questions regarding land loss to the supposed investors. Then, based on these responses, households are classified as exposed to LSLA and used in a reduced-form regression equation to analyse the household exposure to LSLA and its effects on livelihoods. What is more important in this approach is its recognition of the need to seek the consent of the affected people, respect human rights and consider environmental and social impacts assessment in all land deals. According to Twene (2016), this approach can provide a holistic framework or criteria that can be used to justify whether a land deal can be regarded as land grab or not.

In this study, because we do not have the list of households and communities exposed to large-scale land acquisitions, we combined the first and final approach, where the first approach is employed to identify households exposed to acquisitions covering 20.23ha or more whiles the final approach is adopted for further categorization of households into LSLA by domestic and foreign entities and as well as direct and indirect exposure to LSLA by domestic and foreign entities. A detailed methodology for satisfactory measurement is presented in chapter three of this study.

2.2.2 Historical Antecedent and Evolution of Large-Scale Land Acquisition

Large-scale land acquisition (LSLA) and its characteristics are far from being a new or unique to most capitalist systems as there are several historical instances of such acquisitions and dispossessions by colonizers, rich and powerful authorities and as well as resistance in national and colonial territories. A careful study of the literature revealed that under the Old Kingdom of Egypt, large public estates were granted to the clergy or to officials of the royal court and several villages were obliged to provide unpaid labour to these officials (Moreno García, 2008). Under the *latifundia* of the Roman Empire, the enclosures in Britain, the large Spanish and Portuguese colonial estates in the Americas and the collectivisation in the Union of Soviet Socialist Republics, large-scale land and mines belonging to the peasants were expropriated by rich individuals. Aside these systems, colonization also accelerated LSLA at the expense of the native populations. In different locations and at different periods, colonizers exploited land and other resources, forcing indigenous people to work on plantations and mines of the colonizers or grow specific crops or to pay tax in cash (Bernstein, 2010). However, whiles acquisitions under each of these systems dispossessed a great number of previous rights holders of the land, they only benefited a small number of rich individuals. Aside the benefits exploited from the land, the acquirers also exploited the workforce formed by the dispossessed. Even though some of the affected peasants openly resisted, acquisitions were still carried out using armed force or legal and regulatory measures that established and protected the rights of the new possessors (Roudart & Mazoyer, 2014).

Thus, just like in the past, the current acquisitions are legalized by laws and policies (Ayodele, 2012; Cotula, 2013; Lay & Nolte, 2018; Pardo, 2017; Yaro, 2013). Also, like the previous acquisitions, the current wave of acquisitions is greatly facilitated by powerful authorities including the state, traditional authorities, elites, or foreigners, etc. However, the current wave of acquisition differs from the past in terms of the trend of acquisition and actors involved. For instance, the Multilateral Investment Guarantee Agency and the World Bank now fund land related investments and thus, contribute the recent wave of land acquisitions (Clapp, 2012). Also, reliable information from literature showed that the size of land acquired in Africa exceeded what was observed in the past. Deininger et al. (2011), for example, showed that in 2004–09 alone, total number of projects involved in LSLA amounted to 132 in Sudan, 405 in Mozambique, 17 in Liberia, 115 in Nigeria, and 406 in Ethiopia whiles total acquisitions engulfed by these projects amounted to 4.0 million ha in Sudan, 2.7 million in Mozambique, 1.6 million in Liberia, and 1.2 million in Ethiopia. Schoneveld et al. (2011) cited by Jayne et al. (2014) showed that LSLA amounted to 1.96 million hectares in Ghana, 0.33, million hectares in Kenya and 1.81 million hectares in Zambia since 2005. Such acquisitions involved a multitude of actors. On the supply side, actors include the local chiefs and their elders and as well as the home country government/state but on the demand side, actors involved governments from countries initiating investments, financial entities, large-scale agro-processing industries, traditional agricultural or agro-industrial operators. The demand side actors may also be broadly categorized into public and private or domestic and foreign entities (Deininger et al., 2011). In most of these cases, acquisitions from projects from domestic investors, acquiring land in large scale, outnumber that of foreign investors.

2.2.3 Trend and Investors Driving Large-Scale Land Acquisition

Even though large-scale land acquisition (LSLA) is a global phenomenon, empirical and well-documented evidence show that Africa dominates in terms of recent land deals. For example, in a policy brief on the risk and opportunities associated with LSLA, von Braun and Meinzen-dick (2009) summarizes reports on large land acquisitions by investors from different countries. While acknowledging the scarcity of well-documented evidence, they presented land acquisitions by foreign investors which also showed that LSLA in Africa exceeded that of Asia and Europe. Using published research reports and the Land Matrix dataset, Cotula (2012) also conducted a study to examine the pattern, number of deals, location and determinants of LSLA. One of the findings of the study showed that aggregate land areas acquired in selected countries of Africa exceeded that of the land area in Asia. The results further indicate that acquisitions by foreign entities are higher than that of domestic entities. Using the published research reports and Land Matrix data, Anseeuw et al. (2012) organized a report on land rights and the global rush for land. The report revealed that Africa appears to be the main target of the land rush. Specifically, the report shows that, of the publicly reported deals, about 134 million hectares are located in Africa (of which 34 million hectares have been confirmed), 43 million hectares in Asia (of which 29 million hectares have been confirmed), 19 million hectares in Latin America (of which 6 million hectares have been confirmed) and 5.4 million hectares in other regions (of which 1.6 million hectares have been confirmed). Further drawing from media reports and case studies, they (Anseeuw et al., 2012) asserted both foreigners and national elites are key players in land acquisitions and that the increase in land acquisitions by foreign entities is fueling that of nationals. In studying the factors influencing foreign land acquisition for large-scale agricultural investment, Arezki, Deininger and Selod (2013) employed data sets from GRAIN and land Matrix to do a comparative analysis of countries affected by land rush. Their results show that countries in Africa had more land acquired than other areas of the globe. In a more recent study to quantify the livelihood implications of LSLA, Davis, Odorico, and Rulli (2014) catalogued countries that have recorded increasing land deals involving foreign investors. Their results show that Africa accounted for 43% of the appropriated area. Even though the approaches and findings were somewhat different, the pictures consistently show that LSLA is more prevalent in Africa and that both domestic and foreign investors are driving such acquisitions.

In Ghana, the evidence presented about the trend of LSLA are not different from Africa and elsewhere in the globe. The evidence presented by Cotula et al. (2014) in particular revealed that both foreign and Ghanaian investors play a role in LSLA. Others including Acheampong and Campion (2014) and Friends of the Earth (2010) also show that both foreign and domestic entities are involved in LSLA in Ghana. Table 2.1 shows the detail information of various companies involved in LSLA, their countries of origin, number of acquisitions, and the investment type. The information shows that number of foreign investor companies and as well as total number of lands acquired outweighed that of domestic investor companies. This therefore further justifies the fact that both foreign and domestic investors acquire land in Ghana.

Table 2.1: Examples of land deals in Ghana

Company/Investor	Investor	Land acquired	Location of LSLA	Investment type
Agroils	Italy	105, 000ha	Northern Region	Jatropha
Galten Global Alternative Energy	Israel	100,000ha	Volta Region	Jatropha
Gold star Farms	Ghana	14,000ha	Eastern region	Jatropha
Bioful Africa	Norway	Over 27,000ha	Northern Region	Jatropha and other crops
Scanfuel	Norway	400,000ha	Ashanti Region	Jatropha
Kimminic Corporation	Canada	13,000ha	Brong Ahafo Region	Jatropha
Jatropha Africa	UK/Ghana	120,000ha	Brong Ahafo Region	Jatropha
Integrated Tamale Fruit Company (ITFC)	Ghana	568ha	Northern Region	Mango
Integrated Water Management and Agricultural Development (IWAD) Ghana Ltd.	Ghana-Netherland	400ha	Northern Region	Sugarcane, rice, maize, soybeans, onion, groundnuts sorghum.
AVNASH processing company Ltd.	India	Over 60 ha	Northern Region	Rice production and processing
Akate Farms and Trading Company Ltd.	Ghana	853ha	Ashati Region	Corn (Maize), Fruit, Mango, Pineapple, Soya Beans
Ghana Commercial Agriculture Project	Ghana	4,500ha	Brong Ahafo and Northern Region	Rice
Natural African Diesel Ghana Ltd	South Africa	50,000ha	Brong Ahafo Region	Biofuels
AgDevCo	UK-Northern Ireland	5,740ha	Brong Ahafo Region	Corn (Maize), Rice, Sorghum, Soya Beans
Marubeni Co., Government of Ghana	Japan, Ghana	30,000ha	Northern Region	Sugar Cane
Ghana Commercial Agriculture Project	Ghana	2,310ha	Upper East	Sorghum, Corn (Maize), Rice, Soya Beans

Source:(Friends of the Earth, 2010; Acheampong & Campion, 2014; Civic Response, 2017; Kuusaana, 2017; Ayelazuno, 2019; IWAD Ghana, 2019;)

2.2.4 Drivers of Large-Scale Land Acquisition in Africa

Despite the consistency in the trend and investors driving large-scale land acquisition (LSLA), the drivers of LSLA in Africa appear to vary. While settlements and food production were the major drivers of land acquisitions in the history (see for instance, Senu, 2014 for detals), no consensus exist on the drivers of the current increase in LSLA. Some section of the literature argues that the profit maximization motive of neoliberal capitalism is the major cause of the recent upsurge in LSLA. According to this section of scholars, neoliberal capitalism or its ways of capital accumulation have been strongly hit by the 2007-08 multiple crises (i.e. food, energy, climate change and financial crisis) and that what is observed today as LSLA is driven largely by profit maximization motive of capitalism (e.g., Ayelazuno, 2011; Daniel, 2011; Borras & Franco, 2012; Mcmichael & Mcmichael, 2012; Hall, 2013). For Zoomers (2010) seven processes drive the current global land large-scale acquisition and include foreign direct investment (FDI) in food production, FDI in non-food agricultural commodities and biofuels, nature conservation or ecotourism purposes, large-scale tourist complexes, urban extensions, rapid increase in 'retirement' or 'residential' migration and land purchases by migrants in their countries of origin. Meanwhile, others (e.g. Wolford et al., 2013) also highlight the prominent role play by the state, elites, frontline politicians and other citizens in facilitating LSLA. These studies noted that aside capturing 'marginal lands' and converting them into investable commodity, the state, elites, politicians and other citizens, aid and abate foreigners in LSLA through policies and other legal processes (e.g. Baglioni & Gibbon, 2013; Hall, 2013; Yaro, 2013). Of particular interest is Yaro (2013) who noted that states' role in the structural adjustment policies promoted privatisation of land. For Yaro (2013), such policies facilitate the emergence of land sales as private sector acquired land for development which consequently led to shifts in the control of land in less develop countries. On the other hand, Demssie (2013) attributes the upsurge in LSLA to development, arguing that slow progress of rural development coupled with the state's pursuit of political stability has led to the support of land sales by African states. Similarly, Reno (1998) in his book, *Political Logic of Weak States: In Warlord politics and African states*, argues that in an attempt to cut-off competition from opposition for power, most African states (hereinafter weak states) reduced the scope of government by turning to foreign friends for economic development. Under such circumstances, terms and conditions, such as market liberalization policies are imposed on the weak states by their foreign allies, which in turn facilitate LSLA (Lafrancesca, 2013). As part of the influence of legal processes, others (Cotula, 2013; Thernsjö, 2015) draws from theory of great transformations to explain the influence of law in facilitating artificial reconfiguration of land, labour and money and how this consequently leads to exploitation, land appropriation and LSLA.

Other studies explain LSLA within the framework of land scarcity and the resource abundance arguments. The land scarcity school of thought draws on the Boserupian intensification process (Behrman, Meinzen-Dick, & Quisumbing, 2014; Boserup, 1965; Headey & Jayne, 2014) and relates the convergence of LSLA to increasing population density. For these scholars, population increase has put more pressures on land, causing more people to demand access to the scarce commodity, leading to monetization and the upsurge of LSLA as observed today. On the other hand, the followers of the resource abundance school of thought relate the recent upsurge in LSLA to the widely held belief that land is abundant in Africa. According to this school of thought, what perhaps might have accounted for these trends in LSLA, especially in Africa, could probably be attributed to the perception that there are available lands that are untapped and given poor conditions of owners, land prices could be much cheaper, and profits could be higher. Thus, this assumption has pushed greed-driven and speculative tendency of individuals to invest in large tracks of land in Africa (Cotula et al., 2009). Such notion seems compatible with Alemu (1999) who argue that households who hold more land than they are able to cultivate face the risk of losing it to other land users. Others also see LSLA as a product of firm's FDI decision which also determined by other factors. Dunning (1998) for instance argued that a firm's FDI decision is determined by firm-specific or ownership (O) factors such as productivity and intangible assets (such as technologies, managerial skills and brands); location (L) factors including resource, market, efficiency and strategic asset; and internationalisation (I) factors including governance, property rights protection, trade barriers, input and factor markets, institutions, laws and policies. Another important factor that has been highlighted in the literature as the main driver of LSLA is financialization. According to Clapp (2012), financialization refers to the increasingly important role played by financial markets within a specific sector. For Clapp (2012), financialization provides power to banks and financial investors and thus increases the number of investors in agriculture and the related products such as land. This in turn increases the distance between producers and consumers in terms of geography and knowledge in the product. The distancing then obscures knowledge about the agricultural and related products like land, allowing external cost and higher profits for investors. Increase in profit encourages more investment in land and hence the LSLA.

Meanwhile, remarkable empirical evidence also emerged, with a couple of this evidence focusing on the testing the drivers of large-scale land acquisitions. In most of these studies however, varied factors have been employed as indicators. Yet the emerging results mostly corroborate each other and also appear consistent with the explanations. Few appeared contradictory, mixed, or inconclusive. Notable among these studies which merits pointing out are Arezki et al. (2013);

Giovannetti & Ticci (2016); Lay & Nolte (2018); Mcleod et al. (1996); Mishra & Mishra (2017); Krishna et al. (2017); Pardo (2017); Santangelo (2018).

For instance, the results displayed by the 'law and order' variable in the study of Arezki et al. (2013) indicates inconsistency with Karl Polanyi's view that the law facilitates moves towards the commoditization of land, yet the quality of land governance was significant throughout the results. Similarly, the results from the study showed inconsistencies with the theories of resource abundance and land scarcity as displayed by the availability of suitable but uncultivated land, yield gap and total population. In contrast Pardo (2017) found a significant relationship between law enforcement level and LSLA. Lay and Nolte (2018) also employed agricultural area and water resources, and institutional quality to determine the influence of law and resources in LSLA, as presented in the firm's 'ownership-location-internalisation (OLI)' theory of Dunning (1998). However, whiles a country's resources did not show any significant relation with LSLA, institutional quality of both for host and investor countries yield positive relation with LSLA. Similarly, Giovannetti and Ticci (2016) test the role of different dimensions of institutional quality and abundant water resources in LSLA and found that security and regulatory quality, strength and security of land tenure rights facilitate the investment in land for biofuels. However, the type of tenure system did not have any influence in LSLA. Meanwhile, Goldstein and Udry (2008) had earlier reported that land which is not fallowed is virtually never to lost relatives or other land users under indigenous African land tenure systems. On the other hand, Krishna et al. (2017) test the role of migration status, ethnicity and other socioeconomic characteristics in forest land appropriation. However, the results indicate that both migrants and households with different ethnicities were less likely to be involved in forest land appropriation. Other features that are also central in these studies are the location of the research, as well as the geographical location of the investors. Aside being conducted outside Ghana and Northern Region in particular, these studies focused on acquisitions by foreign investors while those by domestic investors fly under research radar. Yet replication of such results with key interest on how some of these theories applied in Northern Region (via factors influencing domestic and foreign LSLA) could have far reaching implications for knowledge and policy.

2.3 Access to Land in Context

According to the Food and Agricultural Organization, access to land for agriculture is the ability to use land and other natural resources (e.g., use rights for grazing, growing subsistence crops, gathering minor forestry products, etc.), to control the resources (e.g., control rights for making decisions on how the resources should be used, and for benefiting financially from the sale of crops, etc.), and to transfer rights to the land to take advantage of other opportunities (e.g., transfer rights for selling the land or using it as collateral for loans, conveying the land through intra-communal reallocations, transmitting the land to heirs through inheritance, etc.) (FAO, 2002). According to the International Land Coalition and the Food and Agriculture Organization, land refers to natural resources (FAO, 2002; International Land Coalition, 2012). This implies that use, control, and transfer rights are not restricted to land area alone, but it also includes other natural resources, such as water and trees, which may be essential for people's livelihoods. Access rights include location, time, use, and community relationship (Focus on Land in Africa, 2020). Access to land may be obtained through market and non-market modes of acquisitions. The non-market modes of acquisitions include free allocation, inheritance, gift, borrowing and squatting whiles the market modes include legally sanctioned processes such as lease, purchase, sharecropping, loan, rent etc.

2.3.1 Access to land in Ghana

As far as land ownership and management is concerned, Ghana practices legal pluralism where statutory and customary land regimes coexist. Smallholder access to land is predominantly defined by customary system and may be obtained through rent, gift, pledge, loan, purchase, lease, sharecropping, squatting and inheritance. According to the Ministry of Food and Agriculture (MoFA) of Ghana, renting refers to the situation where the holder does not own the land but rents from someone else (SRID-MoFA, 2012). In the case of sharecropping, the holder does not own the land and therefore share crops with others. On the other hand, squatting refers to a situation where land is used without permission from anybody (SRID-MoFA, 2012). According to Ayamga (2012), gifting refers to a situation where the new owner acquired the right to own or use the land freely without payment in-cash or in-kind. Pledging refers to passing on the right to use the land to another party in exchange for a money loan. In land loaning, the owner has more land than he requires and therefore entrusted a portion to friend/another user usually for certain period of time. This is similar to leasing, but the difference is that there is money payment in leasing. Purchasing however, refers to outright acquisition of complete land rights on permanent basis usually for cash (Ayamga, 2012). Access to land also include use, control, and transfer rights. Among peasants in Northern region land use, control, and transfer is connected to common rights including ability to cultivate crops and rear animals or both, ability to fallow it or practice monocropping, ability to rent it out to other users such as friends and relatives, ability to control food produce on that land and ability to access water from that land. This study therefore captured farmland access using lease, pledging, purchase, sharecropping, renting-in, ability to produce crops and rear animals or both, ability to fallow it, practice monocropping, ability to rent it out to other users such as friends and relatives, ability to control food produce on that land and ability to access water from that land.

2.4 Household Labour Supply in Ghana

In Ghana, labour is reportedly divided between two sectors of the household economy, namely, agricultural, and non-agricultural sector. According to the Ghana's Ministry of Food and Agriculture (MoFA), out of the total economically active population (8,292,114), share of agricultural labour force is about 51% whiles that of the non-agricultural labour force is about 49% (SRID-MoFA, 2012). Recently, the Ghana Statistical Service also confirmed that the structure of the Ghanaian economy in terms of employment has not seen much change as agriculture remains one of the main industry engaging 3.3 million of the currently employed (Ghana Statistical Service, 2016). Main agricultural activities in this sector include land preparation, ploughing, harrowing, weeding, application of fertilizer, harvesting, etc. Thus, the dominance of the agriculture sector among the active population implies that majority of the people in Ghana allocate their time to these activities. In the non-agricultural sector however, households engaged in activities such as agro-processing, commerce, transport services, charcoal production, firewood gathering, repair services, wage work, seasonal migration, among others (Owusu et al., 2011). It must however be noted that household's choice of work in any particular sector depends on the prevailing conditions. Smallholders have been noted to switch between self-employment/own farm production and off-farm employment or combine both depending on the opportunities available or social opportunity costs of these activities (Nolte & Ostermeier, 2017). Poverty levels for northern Ghana in particular has been reported to be very high (Ghana Statistical Service, 2014). Such levels of poverty coupled with decreasing farm profits may push farmers to accept wage employment or releasing family members to work on other farms, thereby decreasing own farm labour supply in favour of off-farm labour supply. This study focuses on movement of labour between farm and off-farm employment due to large-scale land acquisition.

2.5 Farm Investment

Farm investment has been defined as an inter-temporal phenomenon in which households expects to reap a stream of future returns in a form of increased productivity or profit by spending/supplying resources on/to land to improve productivity (Ayamga, 2012). Generally, farmers invest in three main activities including capital equipment, land improving techniques and nonagricultural activities and assets (Feder, 1987; Feder & Onchan, 1987) and these can be grouped into short-term and long-term farm investment. These have been captured in different ways. Feder and Onchan (1987), for example, measured farm investment by simply using binary indicators (i.e., whether or not a land improvement occurred) in the absence of the actual values of land improvement. Similarly, Hayes et al. (1997) used binary indicators to represent investment in land improvement, trees and medium-term investments. Also, Teshome, (2014) asked whether farmers invest in soil conservation measures on their own plots or not. Based on the answers, a binary dependent variable- representing 1 if household invested and 0 if household did not invest in conservation measure- was constructed. Other studies also employed similar methods in capturing investment on the farm (e.g. Abdulai, Owusu, & Goetz, 2008). On the other hand, Pender and Kerr (1998) employed a continuous variables (i.e. value of labour time and cash expenses on each plot) to measure farm investment. Similarly, Aha and Ayitey (2017) employed the aggregate sum of the monetary value of labour time spent, capital and resources used by farmers on their farms to measure investment. Other studies that used similar approach include Feder (2007), Abdulai and Goetz (2013), Kousar and Abdulai (2015).

Aside these studies, there are other studies which measured farm investment at two stages using binary variable in the first stage and continuous variable in the second stage (e.g. Ayamga, 2012; Ayamga & Dzanku, 2013; Ma & Abdulai, 2017). In particular the study of Ayamga (2012) argued that there exists two distinct level of investment decision making in the household: the first involve a binary decision to invest and second involves how much to invest. Thus, based on this argument, the study measured household farm investment at two levels, where the first is a binary indicator (i.e., 1 if household invested and 0 if household did not invest) whiles the second is the amount spent on soil conservation and irrigation techniques. Even though such approach can sometimes prove impractical since most farmers in Africa are illiterates and barely keep records, it is better for proper capturing of farm investments. Nonetheless, in this study, farm investments were captured using binary indicators since data on amount invested was not sufficient for the analysis.

2.6 Household Food Production and Approach to Measurement

Like many areas in Africa, food production in Ghana is influenced by land, labour and capital inputs. These inputs are in a way manageable by farmers. Aside the effects of these inputs, food production is stochastic due to unfavorable weather and highly variable climate conditions, diseases and pest infestations (Nyari, 2008). In addition to these, there are other external factors influencing food production in Ghana. These include the influence of government policies on inputs including land. All these factors combined and increased production risk and uncertainty for farmers and force smallholder farmers to adopt production systems that will completely eliminate or reduce losses on their farms. Aside these challenges, resources are difficult to come by as finance is a challenge to farmers in most part of Ghana. Consequently, producers diversify into crops and animal production to manage the limited resources and as well avoid failure (Seini, 2002). Thus, in Ghana, the food produced by households mostly comes from two enterprises, namely, crops and livestock production. Regarding crop production, staple crops are mixed or intercropped while cash crops are usually grown by monocropping (MoFA, 2013). In the forest zone, tree crops including cocoa, oil palm, coffee and rubber particularly remain significant. The food crops in this area are mainly inter-cropped with mixtures of maize, plantain, cocoyam, and cassava. In the middle belt production is characterized by mixed or sole cropping of maize, legumes, cocoyam, or yam, with tobacco and cotton being the predominant cash crops. Cotton and tobacco are also important in the northern sector, where the food crops are mainly sorghum, maize, millet, cowpeas, groundnuts and yam (SRID-MoFA, 2012, 2013). However, rice is important in all the zones (FAO, 2019). For northern Ghana, our survey revealed that multiple cropping remains significant. In the multiple cropping system for instance, several crops were planted on different fields, to avoid the possible risk of total crop failure associated with the weather. The household survey conducted also revealed that a combination of leafy vegetables such as amarathus, Jute mallow (Corchorus *olitorius*), Spinach (Spinacia *oleracea*) and cereals such as maize or tubers such as cassava and yam, is a commonly employed in food production and this fulfills a variety of functions, including reduced pest and disease incidence, reduced soil erosion, more yield stability, and more household food security.

Regarding livestock production, majority of households keep some sort of livestock. Even though the sector remained adjunct to crop production, it is a major feature in Ghana's agriculture and contributes largely to food needs, draught power, soil fertility, income and agricultural GDP (FAO, 2019). Aside these needs, most households across the country have been reported to keep livestock for various reasons ranging from prestige, meat, mobile banks since they can be quickly converted to cash, insurance during crop failure among other things (SRID-MoFA, 2013). Livestock reared include poultry, cattle, sheep and goat (MoFA, 2013). However, poultry production predominates in the south, while cattle production is concentrated in the Savannah zones, with sheep and goat production widespread throughout the country (FAO, 2019). Our survey revealed multiple livestock production or mixture of both crops and livestock. The multiple livestock production system consisted of combination of cattle, sheep, goats, and poultry.

Because of the multiple or mixed nature of the two enterprises, it is usually difficult to capture food produced by each enterprise into a single indicator. To capture household food produced by each enterprise, we employed income or total value of each produced. Thus, the food from crop and livestock production are each valued as income from crops and livestock. This approach has been widely used in literature for measuring household food production (see for instance, Kato, Ringler, Yesuf, & Bryan, 2009; Olarinde, Oduol, & Binam, 2012; Issahaku & Abdulai, 2019; etc., for details).

2.6.1 Trend of Household Food Production in Ghana

Several studies (e.g., Seini, 2002; Djurfeldt et al., 2010; GSS, 2012; SRID-MoFA, 2012, 2013; MoFA, 2013b; FAOSTAT, 2020b) have provided quantitative estimates and trends of food production in Ghana. These studies however indicate that despite the general increase, production figures have not been stable in the country. Estimates from Ghana's Ministry of Food and Agriculture in particular indicated that between 2000 and 2010, production of both crop and livestock increased in an undulating manner (MoFA, 2013). A report on facts and figures published in 2013 by the Ministry revealed that total production of crops such as maize, millet, rice, sorghum, cassava, cocoyam, plantain and yam ranged from 16.8 million Mt to 27.6 million Mt. Similar trends was reported about industrial crops such as cocoa, rubber, oil palm, cotton, coffee and sheanuts. Another report by Chauvin, Mulangu and Porto of the United Nations Development Programme in 2012 indicates that yields of crops including cereals, fruits yield, oil crops, and tuber yields have been growing in Ghana with an average annual growth rate of 1.5%, 1.35%, 0.13%, and 1.10% respectively. However, the report indicated that the country sometimes experienced shortfalls in yields for all crops except that of fruits (Chauvin et al., 2012). These figures were however far below the yields of SSA's largest producers (Chauvin et al., 2012). In a study of agricultural growth and competitiveness under policy reforms in Ghana, Seini (2002) also revealed that production of cereals, starchy staples, cocoa and cotton increased over the period of 1981 to 1995, even though production fluctuated over the entire period. With regards to livestock, MoFA reported that between 2000 and 2010, the total increased and population ranged from 20.5 million to 47.8 million for cattle, sheep, goats, pigs and poultry (MoFA, 2013). This increased occurred along with products including beef, chicken, chevon, mutton, pork, processed meat, and milk.

Meanwhile, the growth in production of crops in particular has been observed with rapid area expansion. Thus, the general increase in both food crops and livestock is probably associated with available area for extensification and grazing by livestock and hence, suggest the importance of land availability to most production systems in Ghana.

2.7 The Concept of Food security

The concept of food security has not been stable since its evolution. The concept seems to have expanded for measurement at different levels since its evolution. In the words of Maxwell (1994), the concept has evolved, developed, multiplied and diversified since the World Food Conference in 1974. For instance, by 1974, the emphasis had been on world food supply and prices and on the need to secure the system against risks. Ideally, this emphasis was largely influenced by the way food security was been defined in literature (e.g., UN, 1975; etc.). In particular, the United Nation defined food security as availability at all times of adequate world supplies of basic foodstuffs, to sustain a steady expansion of food consumption and to offset fluctuations in production and prices (UN, 1975). This definition indicates that any country can achieve food security by just supplying the sufficient level of food products. Owing to this definition, proposals were geared towards national or global self-sufficiency. However, even with the adequate food supply at the national and global level, hunger was still prevalent. This led to evolution and measurement of food security at micro level. Such evolution was largely influenced by Sen's (1981a, 1981b) entitlement approach and particularly reflected in the definition proposed during the World Food Summit.

According to the World Food Summit (1996), food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life' (World Food Summit, 1996). This definition indicates that food security is multidimensional concept capturing food availability, accessibility, utilization and sustainability/stability (Pieters, Hannah, Andrea Guariso, & Vandeplas, 2013). According to Lele et al. (2016) the dimensions are strongly interlinked and are singly not sufficient for the achievement of food security. Thus, to completely capture all the dimensions of food security and as well account for any diversity of food security, the definition from the World Food Summit is adopted for this study. The definition has been employed in several studies for capturing the multidimensional nature of food security (e.g., Fawole & Ozkan, 2017; Magrini & Vigani, 2016). For the purpose of providing a complete picture of food security, the dimensions and determinants are presented in the following subsections.

2.7.1 Food availability and Determinants

According to the World Food Programme, food availability based concept of food security refers to the physical presence of food in the area of concern through all forms of domestic production, commercial imports and food aid (WFP, 2009). The definitions of food availability indicate two important issues that must be noted. First, the definition indicate that availability is measured at the aggregate level (i.e., either household, regional, national, or global level). Second, the definition also indicates the availability-based concept of food security reflects only the supply side of food security. These imply that a household, community, region, or nation can achieve food security if it is able to supply sufficient level of food at all times. However, an important shortfall of measuring food security at the macro or aggregate level (i.e., household, community, regional or national level) is the assumption of homogeneity. Under these assumptions, a household, community, region or nation is portrayed as homogenous and independent units that act cooperatively to maximize a shared utility function. However, this is not true in practice since heterogeneous units are nested with a particular community. In particular, Maxwell and Smith (1992) argued that there exists a difference in power dynamics, social norms, or other factors for each unit within the community which affects allocation of resources to generate income or produce food. This in turn affects access to food at every unit. Thus, aggregate or macro analysis based on homogeneity assumption fails to explain food insecurity at the individual level when there is no food shortage at the household, regional, national or global level (Maxwell, 1994). As a result, the accessibility-based concept has been employed for measurement of food security at the household and individual level.

2.7.2 Food access and Determinants

Food access concerns a household's ability to acquire food in sufficient quantity and quality, through one or a combination of own production purchases and food aid (WFP, 2009b; Magrini & Vigani, 2016; Pieters et al., 2013). Unlike the availability-based concept, the accessibility-based concept measure food security at the household, as well as the individual level. Thus, the application of food access-based measure of food security is distinguished from availability-based concept in several folds. First, the access-based approach to measuring food security relaxes the assumption of homogeneity and allows individual based analysis. This makes it is difficult to distinguish food availability from food access, especially in areas where local markets are malfunctioning. Second the shift from macro to micro level analysis (i.e., food availability to food accessibility) accounts for intra-household dynamics, social norms, and disparities. Additionally, the accessibility dimension of food security focuses on both supply and demand side of food security, trying to find a balance between the two (Maxwell, 1994; Duangklad, 2010).

Another critical point worth noting is the drivers of food access. According to World Food Programme, an individual's food is access depends on food production, market purchases and in-kind transfers or loans from relatives, members of the community, the government, foreign donors or private citizens (WFP, 2008, 2009b). According to Pieters et al. (2013), these factors define the set of productive activities which are pursued to meet income and food security objectives. Other studies also notes that food access is also influenced by the aggregate availability of food through the latter's impact on supply and, therefore, prices in the market (Maxwell, 1994; Maxwell, Coates & Vaitla, 2013; Maxwell, 2014).

Another important determinant of food access is households' assets. The assets are collection of resources use by households in generating income and food needs. Six types of assets are recognized. These include: human assets influenced by access to education and training, health services, sanitation, clean water, and adequate amounts of nutritious food; physical assets which is largely influenced by roads, rail networks, communication facilities, ports, land, machinery, tools, and draft animals, jewelry, furniture, electronics, appliances, animals; social assets which include social network, trust and reciprocity; financial assets which include savings, credit, insurance, remittances, pensions, cash transfers from social welfare programmes, livestock or jewelry; natural assets including land, water, wildlife, biodiversity, and forests and political assets including rights and political power. On the other hand, ethnic favouritism, social discrimination and gender inequality constitute the socio-political factors that influenced food access (Jayne et al. 2001; Dohrmann and Thorat, 2007). The policy environment consists of economic growth, aid, education, public, health, social protection and land and property right reform policies and the economic environment constitutes recession, price inflation for food or other basic staples, hyperinflation, crop failure or other supply shock to basic staples. The natural environment consists of flood, earthquake, tsunamis, mudslide, drought, excessive rainfall while the political environment constitutes strikes, disputed elections, violence, destruction, and armed conflicts.

However, it must be noted that accessibility of food in the household does not necessarily translates into food security. This is because individuals or households with sufficient food access can still be unable to absorb nutrients due to unhealthy practices or can have unstable welfare conditions. Barret and Lentz (2009) particularly explained that a household might have access to all the necessary food products for a balanced diet, but still prefer to buy hypo- or hyper-caloric food. Similarly, Banerjee and Duflo (2006) noted that an increase in income may influence households or individuals to spend on items such as toffees, alcohol, or fast food instead of healthy and nutritious food. Alternatively, the way food is distributed within a household might cause some members to eat more and others less than required. It has been noted that women and children are particularly more likely to access food because of the limited power they have over control of assets within the household. Further, food may be available and accessible to every member within a household, but an individual will still be food insecure due to his/her ability to utilize it. Thus, given the prevalence of any of the circumstances elaborated, an individual with a household will be food insecure even if there is available food. For these reasons utilization and stability has been introduced to fully measure food security of households and are discussed below.

2.7.3 Food utilization and Determinants

According to the World Food Programme, food utilization refers to households' use of the food to which they have access, and individuals' ability to absorb and metabolize the nutrients – the conversion efficiency of the body (WFP, 2009b). Similarly, the United States Agency for International Development (1992) argued that food utilization broadly refers to the actual food that is consumed by individuals; how it is stored, prepared, and consumed; and what nutritional benefits the individual derives from consumption. Primarily, food utilization falls under the subject area of nutrition (Khalid & Schilizzi, 2013). On the other hand, Pieters et al. (2013) defines food utilization as an individual's dietary intake and his/her ability to absorb nutrients contained in a food that is eaten.

According to the World Food Programme, the food consumed by an individual must be of sufficient quantity and quality to satisfy not merely subsistence needs, but also energy needs for daily activities, notably income generation (World Food Programme 2007). Food utilization has both a socio-economic and biological dimension. The socio-economic dimension refers to decisions related to what food is consumed and how the food is allocated within the household. Both decisions in turn are influenced by intra-household dynamics and social customs/taboos. The biological dimension of food utilization refers to the ability of the human body to take food and transform it into energy for daily activities or to store it for future energy needs.

Food utilization is strongly influenced by food prices, health practices, resource availability, caregiver's knowledge and capacity, educational level of the caregiver, individual health status and intra-household choices regarding the distribution of food (Pieters et al., 2013; Lele et al., 2016). The health status also depends on quality environment and access to health services which also depend on water supply, sanitation, housing conditions and waste disposal. Intra-household food distribution patterns also determine the dietary intake and nutrition level of each individual in a household. The distribution patterns are in turn influenced by education and gender inequality (USAID, 2011; Sassi, 2018).

2.7.4 Food Stability and Determinants

Stability is the last dimension of food security that is attained when the above three dimensions can be sustained in a stable manner over a period of time (Fawole & Ozkan, 2017). According to the United States Agence for International Development (2011), stability is defined as the ability to access and utilize appropriate levels of nutritious food over time. By this definition, the USAID focused on time and thus viewed stability as temporal dimension, or timeframe, of food security as implied by the wording “at all times” in the definition of food security. On the other hand, Pieters et al. (2013) rather focused on what happens to livelihoods when households are hit by temporary negative shocks and hence viewed stability as an embodiment of two additional important dimensions, namely, the vulnerability and resilience towards the state of affairs. Whiles vulnerability is the probability of a household becoming food and nutrition insecure after, say, a food price shock, resilience is the time needed for the household to get back to its food and nutrition status as it was before the shock. Vulnerability- the risk that the food and nutrition status of the household is undermined by negative shocks- depends on three main factors, namely, risk prevention, risk mitigation, risk coping. These factors are also largely determined by less risky production, migration, proper feeding or prevention of diseases, diversification, hedging, selling assets, withdrawing savings, migrating, seeking temporary employment, withdrawing children from school and reducing the diversity of the diet, household resources, social networks, education, etc. on the other hand, resilience- which is the ability and the time needed to restore or surpass the pre-shock status- depends on most of the measures aimed at reducing vulnerability (Pieters et al., 2013).

2.7.5 Measurement of Food Security

Based on the above definitions, several standard indicators and self-reported techniques have been proposed for measurement of food security. The standard indicators include, but not limited to the self-sufficiency in food production (SSF), food consumption score (FCS), household food insecurity access score (HFIAS), household dietary diversity score (HDDS), coping strategy index (CSI), vulnerability index, household food expenditure, total expenditure, water sources, sanitation and access, reduced coping strategy index (rCSI), household hunger scale (HHS) and have been proposed by the World Food Programme (WFP, 2009b). On the other hand, the self-reported techniques capture household food security status by asking direct questions to the one in charge of food in the family without subjecting it to standard food security indicators. The variety of methods implies that there is currently no universally accepted indicator which captures all the dimensions of food security. Besides, each of the indicators proposed has weaknesses and also fails to capture all the dimensions of food security (Fawole & Ozkan, 2017). Thus, depending on the objectives of measuring food security and the prevailing circumstances, a combination of different indicators has been employed in several studies for measurement. For instance, in a study to examine the determinants of food security in Zimbabwe, Mango et al. (2014) employed the HFIAS and HDDS. Meanwhile, Makate et al. (2016) relied on the food consumption score, household food insecurity access score and household dietary diversity score to measure food security in the same location. On the other hand, Magrini and Vigani (2016) employed the consumption expenditure, average maize yield, average daily calorie intake, diet diversity indicator, source of water for drinking and food preparation, vulnerability index and access to storage structure to analyse the impact of agricultural technologies on the multiple dimensions of food security in Tanzania. In Ethiopia, Shiferaw et al. (2014) relied on the FCS and subjective responses as indicators for analysing the impact of the adoption of improved wheat varieties on food security. On the other hand, Alamirew et al. (2015) used the FCS to examine the contribution of large-scale farms to local-level food security in Ethiopia.

However, as stated earlier, each indicator has strengths and weaknesses. For instance, even though the FCS is easy to calculate as compared with other methods, it is noted to lack the requisite ability to demarcate processed and unprocessed foods which is very important in measuring food security status (Fawole & Ozkan, 2017). On the other hand, CSI is cost effective, easy to undertake, suitable for assessing short run impact of food shock (transitory food insecurity). It also helps to identify the level of vulnerability and trade-offs made in acquisition of foods. However, it is capable of raising false alarms by creating false responses especially when food aid is expected in emergency situations. It also lacks adequate information to distinguish between pre-crisis (chronic poverty) and food insecurity (WFP, 2009b).

To capture the food security status of households, this study used SSF. This indicator captures the total grain produced and available for household's own consumption. In areas where agricultural production is the main livelihood activity and food purchases are constrained by lack of access to markets, SSF has direct linkage with land availability and food security (Duangklad, 2010; Pieters et al., 2013; WFP, 2009a). It is therefore believed that LSLA will impact on SSF and hence food security. In addition to SSF, FCS and HFIAS were employed. This allows checking for consistency of the results with other measured indicators. Moreover, the use of multidimensional measures is a growing field in welfare analysis and has been recommended and used in few studies elsewhere (see for instance Ravallion and Lokshin, 2002; Deaton, 2010, Shete and Rutten, 2013; Shiferaw et al., 2014).

2.7.6 Food Security Situation in Northern Ghana

Most policy initiatives in Ghana and the agricultural sector in particular, are directed towards achieving food security and zero hunger. For instance, under the second Food and Agriculture Sector Development Policy (FASDEP II) of the ministry of Food and Agriculture, government strategies for the attainment of food security and emergency preparedness has been outlined (MoFA, 2007). While some of these strategies have been utilized, others are still underway. Similarly, these strategies have received the backing of the Comprehensive African Agriculture Development Programme to ensure successful implementation (CAADP, 2003).

However, despite the existent of these policies in the country, hunger issues have not been addressed equally across the country. To an extent that there is a dramatic north-south divide where food insecurity remains widespread in the northern savannah (IFAD 2012, IMF, 2012). For instance, compared to the 5% of food insecure population reported by Ghana's Ministry of Food and Agriculture and the World Food Programme for Ghana (Ministry of Food and Agriculture, 2015b; WFP, 2009a), about 16% of households in northern Ghana are estimated to be either severely or moderately food insecure (Lisa and Wuni, 2012). The detailed illustration of the food security situation in northern Ghana is shown in Figure 2.1.

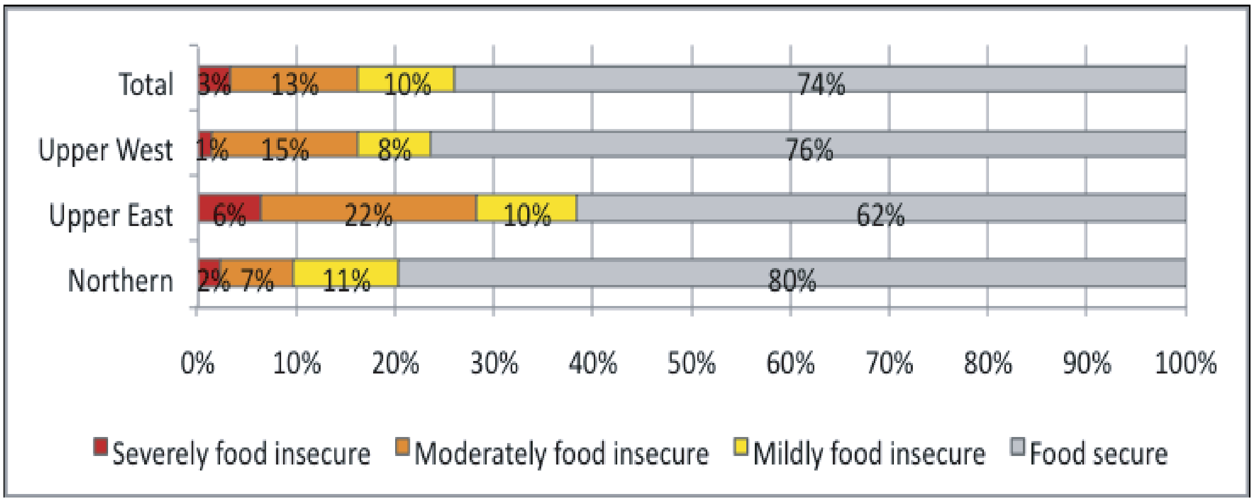

Figure 2.1: Food insecure households by region

Source: *Lisa and Wuni (2012)*

Though a variety of constraints limit households' ability to achieve food security in the long run, farm size stands tall among the rest because households depend directly on farming for food security needs. The relationship between households' food security and farm size is further shown in Figure 2.2, with the former decreasing as farm size decreases.

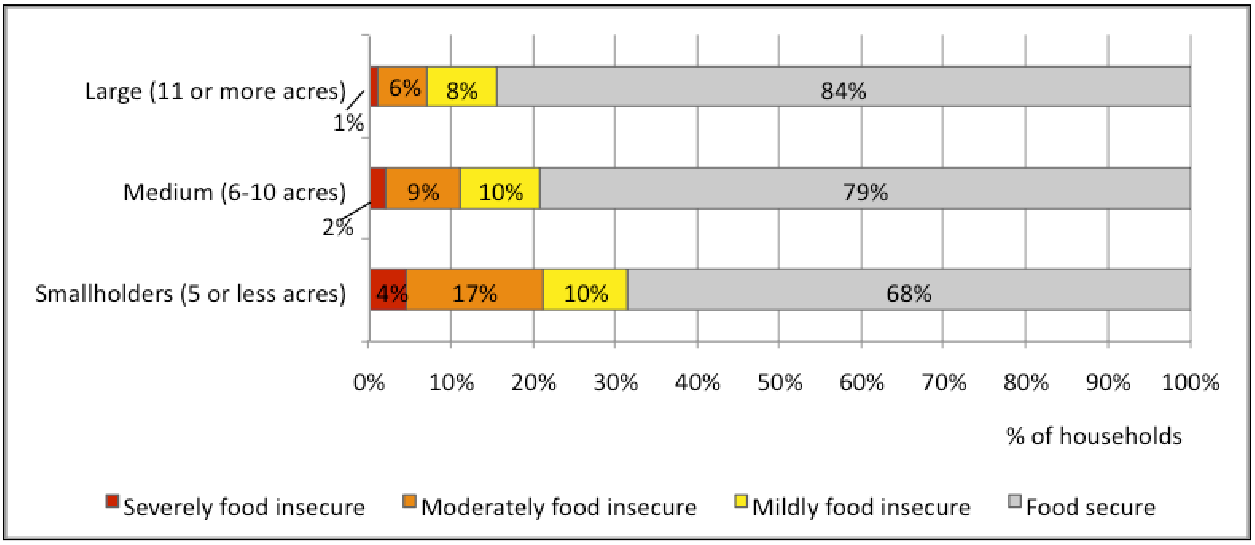

Figure 2.2: Food security status by farm size

Source: *Lisa and Wuni, (2012)*

As worst as the situation stands, the avenues for improvement are few. For instance, Darfour and Rosentrater, (2016) recently conducted a study on agriculture and food security situation in Ghana and found that while 5% of Ghana's population are already food insecure, about 2 million people are vulnerable to becoming food insecure. Given the prevalence of LSLA in northern Ghana, situation is even more likely to increase since most households are agrarian.

2.8 Effect of Large-Scale Land Acquisition on Households

Two competing views generally carry the debate on the implications of large-scale land acquisition (LSLA) on households, namely, neo-colonialism and development optimism views (see Boamah, 2014; Rahmato, 2011, etc. for details). The neo-colonialism view, inspired by the populace discourse, highlights the potential negative livelihoods impacts of LSLA in poor countries and therefore calls for support to disallow any entity involved in such practices (e.g., Daniel, 2011; FIAN International, 2010, 2017; Friends of the Earth, 2010; GRAIN, 2008). On the converse, the development optimism view, inspired by managerial discourse, recognizes immense dangers in the global rush for land, but still insists that there are considerable opportunities that could benefit both investors, host governments and their populations. According to this school of thought, responsible decision-making and equally responsible investment could help minimize the costs and damages assumed to be inherent in land deals and consequently lead to a win-win outcome for parties involved (e.g., Borras & Franco, 2012; Cotula et al., 2009; De Schutter, 2009; Deininger et al., 2011; Energy Commission, 2010; Technoserve, 2007).

These views are in line with theoretical and empirical implications of LSLA on households. In the next sections, these are reviewed. Specifically, empirical evidence on the effect of LSLA on farmland access, labour supply; farm investment, farm income and food security are presented.

2.8.1 Effect of Large-Scale Land Acquisition on Household Land Access in Africa

In most part of Africa, household land access is predominantly based on tradition, custom, or culture, and do not translate into statutory ownership. This is because statutory ownership is strongly tied to registration and holdings under tradition, custom, or culture are not necessarily backed by registration. Thus, such landholdings lack legally enforceable status and rights are never properly defined. In addition, there is a plurality of norms and legal regimes governing land issues which are not necessarily coherent and tend to lead to conflicts (Graham et al., 2010). As a result, most household land access is threatened by large-scale land acquisition (LSLA). The World Bank's global poverty study conducted in 2002 and cited by Quarcson (2014) revealed that farmland access by farmers is decreasing as a result of LSLA. Daniel (2011) also confirmed that there is scramble for land by multinationals and local companies in partnership with foreigners to cultivate jatropha for production of biodiesel for export. In Ethiopia, Kenya, Mozambique, Cameroon, Congo, Angola, Madagascar, Nigeria, Sierra Leone and Tanzania, over 3 million hectares of land was reported to have been transferred to foreign and domestic investors (Friends of the Earth, 2010). In Kenyan, about 40,000 hectares of land was reported in November 2008 to have been leased to the government of Qatar for the production of horticultural products for Qatar (Quarcson, 2014). Similar cases have been reported elsewhere in Africa. Ghana in particular has been noted in most of the LSLA reports channeled out recently. For instance, Schoneveld (2010) cited by Anseew (2012) reported that over one million hectares of community lands have been leased by chiefs to 17 different biofuels developments in Ghana. Besides, inventory data from three Africa countries showed that total land deals as a percentage of potential arable crop land in Ghana revolved around 1.9% (Cotula et al., 2014). The Friends of the Earth also reported a deal involving a total of 779,000 hectares in Ghana (Friends of the Earth, 2010). Nyari (2008) also reported how Biofuel Africa bypassed official development authorization and deceived an illiterate chief to sign away 38,000 hectares with his thumb print. Other reports citing Ghana among the host countries for LSLA include Cotula et al. (2009) and Graham et al. (2010). Even though no report has been sighted about farmers being evicted from such large areas, such actions clearly show there is simply no place for the small farmer in these areas and that the possibility of access is at least affected even if land is not decreased or totally loss through such acquisitions.

Besides these reports, theoretical and empirical evidence also exist to support how household access to land is affected by LSLA. Marx (2010) and Harvey (2003) in particular argued that taking land, establishing rights on such holdings, enclosing it, and expelling a resident population limit farmland access. Boserup (1965) on the other hand identified a sequence of land use including forest-fallow, bush-fallow, short-fallow, annual cropping, and multi-cropping. She then argued that agricultural development over time passes through this sequence of land use. The pace of such sequence is started by demographic characteristics including population. In Boserup's (1965) view, agricultural households will face binding land constraints due to pressure from population growth and in response, switch from an extensive production system to a more intensive system. In a study to examined the effects of large-scale land acquisition for jatropha plantation on small scale farmers in the Asante Akim North District, Quarcson (2014) found diminishing access to farmland due to lease of a minimum of 303,514.7 ha of land to Scanfuel Ghana Limited. In Savelugu-Nanton District of northern Ghana, Kuusaana (2017) found that 23 farmers were dispossessed of 568 ha of active fallow land leased to the Integrated Tamale Fruit Company (ITFC) to produce mango for the export and local markets whiles 500 ha of land is under out-grower operations. On the other hand, Acheampong and Campion (2014) conducted a study to assessed the effect of large-scale acquisition of land for production of *Jatropha curcas* on farmers' livelihoods in Ghana. Their results showed that several households have lost their land to Jatropha plantations leading, in some cases, to violent conflicts between biofuel investors, traditional authorities and the local communities. Meanwhile, earlier study by Festus Boamah (Boamah, 2014; Boamah & Overa, 2015) showed how households in the northern and southern part of Ghana loss 23,000 ha of land to Biofuel Africa Limited, 65,000 ha of land to Kimminic project and 13000 ha to ScanFarm project. Hamenoo, Adjei, & Obodai (2017) also investigated the implications of large-scale land acquisition for jatropha cultivation on the livelihoods of farming households. The results revealed that majority of households now have limited access to farmland in the area.

The evidence largely shows that no matter how the leases are managed, the negative effect on farmland access will be inevitable. However, despite the evidence, others argued that farmers are not always displaced and are allowed to stay on the land after acquisition. Behrman and Quisumbing (2011) in particular argued that investors may allow households to continue living on the land on informal basis. Under such circumstances, farmland access may not be affected. Meanwhile, Nketiah (2017) assessed how agricultural LSLA affect farm households' access to land and other alternative land -based resources and services. The study found that the non-affected respondents unexpectedly had difficult access to alternative land-based assets than affected communities. Thus, the literature on LSLA effect on farmland access is not straightforward and depends on whether farmers are displaced or not.

2.8.2 Large-Scale Land Acquisition and Household Farm Labour in Africa

Rising unemployment has become a global concern. Africa in particular is witnessing an alarming increase in unemployment due to high population growth rates. Owing to this challenge, most government in Africa search for possible solutions. Large-scale agricultural investment on the other hand, is said to have the potential of benefiting local communities in terms of employment opportunities (Bottazzi et al., 2018; von Braun & Meinzen-dick, 2009; World Bank, 2010a). Most governments or local authorities therefore accommodate large-scale land investors with hopes of increasing employment opportunities from such investments for their inhabitants (Daniel, 2011). In Ghana for instance, government views renewed inflow of agricultural FDIs as a means of improving the fortunes of the agricultural sector and to serve as a key economic development strategy (Kuusaana, 2017; Lands Commission, 2016; Ministry of Food and Agriculture, 2015a). Aside government, others including traditional authorities accept large scale investment on conditions that such deals will bring about employment (Boamah, 2010). In some instances, such hopes are met, and host communities or displaced farmers get employment in such projects. Evidence exists to substantiate these claims. In a typical case study in Indonesia for example, production of biodiesel was reported to provide 2.5 million jobs (Cassman and Liska, 2007). Also, findings from Schenoveld et al. (2010) revealed greater access to off-farm livelihood opportunities, such as plantation employment. In Zambia, Milimo *et al*. (2011) reported that land commercialization for large scale agriculture has successful ensured employment to 113 people.

Opponents (e.g., Behrman & Quisumbing, 2011; FIAN International, 2010, 2017; etc.) on the other hand argued that in most cases, these hopes or expectation from investors of large-scale projects are not met as the type of jobs created is often smaller or seasonal and comes with low wages, poor working conditions. Behrman et al. (2014) and Behrman and Quisumbing (2011) in particular argued that investors may employ mechanization which is labour saving. Under such conditions local labour may not be needed and the evicted farmers are left struggling since they lost the only asset they had. In Mozambique for instance, the FIAN International (2010) reported that there was employment for only 200 workers for not more than six months and evicted farmers were left to fend for themselves and their families. Also, an empirical evidence from Ethiopia show that the total employees by an investor company is smaller than employment capacity of the company and that the type of employment created did not provide opportunities for farmers to learn new farming skills as jobs provided requires only limited skills (e.g., Bamlaku Alamirew, Harald Grethe & Wossen, 2015). Similar finding was presented by Nolte and Ostermeier (2017) where the displacement effects of Large-Scale Agricultural Investment was partially mitigated through the cultivation of labor intensive crops and the application of contract farming schemes.

It must however be noted that all the circumstances described above (i.e., whether employment opportunities exist or whether it is partial or seasonal, etc.) withdraw labour from household labour pool and thus leads to decrease in labour force for households or increase in off-farm employment. In the case of unemployment, the displaced farmers migrate to look for jobs and farm labour input decreased while off-farm labour increase. In northern Ghana for instance, Nyantakyi-Frimpong and Kerr (2016) found that most farmers have left the countryside completely to search for jobs, after losing their productive agrarian capital (farmlands) to investors. Twene (2016) also revealed that after the land acquisition for Bui Dam project, some family members northern Ghana migrated to big towns and cities in search for alternative livelihoods. In a more recent study, Ayelazuno (2019) revealed that land acquisition forced some peasants to move from Yagba community to Accra and other areas to look for menial jobs to be able to pay fees. When employed, farmers spent most of their time on the investors' farm without getting much time for their own farms. This evidences therefore shows that labour supply to household own farm is decreased due to migration and employment opportunities caused by LSLA.

2.8.3 Large-Scale Land Acquisition and Household Farm Investments

One of the main reasons put forward by proponents of large-scale land acquisition (LSLA) as the yardstick for encouraging such deals is the technological benefits that have been perceived to await host countries. For instance, the immediate former President of the International Fund for

Agricultural Development (IFAD) from 2007 to 2017, Dr. Kanayo F. Nwanze believed that there is a potential for win-win situations as such land deals can among others, bring in new technologies (Kovalyova, 2009). Deininger and Xia (2016) also conceived that among other benefits, exposed workers can learn simple techniques such as crop rotation, intercropping and line sowing which are then easily transmitted from large to small farms. Benfica, Tschirley and Sambo (2002) also believed that large farms can benefit neighboring smallholders via a number of channels that include access to improved techniques. In addition to these hopes, a number of works have established how large-scale investments have led to transfer of technology. In fact, both theory and empirical works have established that large-scale investments play a vital role in promoting increased technological level of farmers in recipient countries. For instance, building on the theory of agricultural intensification of Boserup (1965), Behrman et al. (2014) argued that large-scale land deals bring about introduction of high inputs of capital, new technologies, and agrochemicals in areas where they are located. Following the conceptualization that large-scale investment can bring about technology adoption, Deininger and Xia (2016) on the other hand assessed spillovers effects from large farm establishment in Mozambique. The results suggest positive short-term effects from newly established large farms on adoption of agricultural practices and input use by small farms less than 50 km from newly established large operations. In Nigeria, Adewumi, Jimoh and Omotesho (2013) also examined the effects of the presence of foreign migrant farmers on small scale farming systems. The results from their study revealed significant increases in seed rate, fertilizer, and other chemicals per farmer in the area when compared to the situation that was prevalent before the white farmers settled there.

Despite the fact these deals can yield spillover effects for local farmers, there are still others with mixed feelings about the spillover effects of such deals. For example, Ilse Aigner, the Germany's

Agriculture and Consumer Protection Minister from 2008 to 2013, told Reuters that every country should own their land to make sure they can feed their own people (Kovalyova, 2009). The foreign direct investment literature in particular is also noted to be doing well in this direction. A notable example is the work of Dessy, Gohou, and Vencatachellum (2012) which elaborated on the relationship between land leases to foreigners and local farmers' modernization efforts. Specifically, Dessy et al. (2012) developed an occupational choice model to show that introduction of high capital inputs, new technologies and agrochemicals by investor companies can bring about positive or negative changes in livelihoods of local occupants. Building on the occupational choice model of Dessy et al. (2012), Kleemann and Thiele (2015) on the other hand showed that the effect of large-scale land acquisition rather depends on the investment model of investors. If the investor plants capital-intensive staple food crops, spillovers to the local farmers will be rare because farmers do not get the chance to learn the newly introduced technologies as contacts to the investment farm is limited. However, if the investor plants cash crops, technological spillover is large because those farmers will learn technologies through contract farming and then inform local farmers about the benefits and correct use of a technologies. This leads to high purchase of newly introduced technologies for use on their own farms. However, none of propositions from these models has been tested empirically.

In Ghana however, only Aha and Ayitey (2017) examined the effects of land acquisition on decision to invest in farming. The results revealed that the increasing appropriation of communal lands for biofuel plantations without consultation, fair and adequate compensation to the indigenous land holders has resulted in low investments in the farms of the affected farmers. However, in as much as the study is applauded, it is also important to note that the effects of such acquisition on investment was indirectly captured through uncertainty, tenure insecurity and farm sizes cultivated among farmers in affected communities. Moreover, the study focused on only two districts in southern Ghana and results emanating for it can therefore not be a representative for all areas in Ghana.

2.8.4 Large-Scale Land Acquisition and Household Food Security

The growing interest of investors in Sub-Saharan Africa's vast arable or potential arable areas and its effects on livelihood outcomes has drawn diverse attention in literature and international discourse. In Ethiopia for instance, Shete and Rutten (2015) investigated the impacts of large-scale acquisition (LSLA) on household incomes and food security. Their findings revealed that in situations of long-standing competing claims to land resources and relatively high population densities, acquiring land for large-scale farming reduces local communities' food-security status and as well results in a loss of income among local people in Oromia Region, Ethiopia. In a subsequent study, Alamirew, Grethe & Wossen, (2015) also examined the contribution of LSLA to local-level food security in Bako Tibe District, Oromia Region, Ethiopia. Their result confirmed the findings of Shete and Rutten (2015) and specifically revealed that foreign land deals increased the odds of households falling into food insecurity and that the employment opportunities are both temporal and marginal. Furthermore, their results showed that land deals result in a decline of households' FCS and thus have a negative effect on households' food security. Meanwhile, results of a preceding study conducted by Yengoh and Armah (2015) to investigated the food security effects of land acquisitions in northern Sierra Leone were similar to that of Shete and Rutten (2015) and Alamirew et al. (2015). The results of Yengoh and Armah (2015) specifically show an increase in the severity of food insecurity, hunger, fallen household income from agricultural production, limited employment opportunities and lower wages from employment by the company. In that regard, the study conclude that rural people are better off producing their own food than depending on the corporate structure of land investment companies. Around the same time, Baumgartner, Braun, Abebaw, and Mu (2015) also investigated the impacts of large-scale land investments on income in Ethiopia. Their results showed that large-scale agricultural investment leads to at least 50% increase in income for respondents. On the other hand, Santangelo (2018) in a more recent study, investigated the influence of developed-country and developing-country LSLA on host country food security. However, their study displayed mix results especially when compared with preceding studies (including Bamlaku Alamirew, Harald Grethe & Wossen, 2015; Shete & Rutten, 2015; Yengoh & Armah, 2015). Whereas results of the developed-country investors' LSLA showed a positive influence on food security and hence contradict these studies, the results of developing-country investors' LSLA showed a negative influence on food security and thus confirmed these studies. In Nigeria, Ojo (2008) investigated the effects of land acquisition for large-scale farming on the performance of small-scale farming. The results revealed lower profitability, productivity and technical efficiency among households who donated land for large scale oil palm project as compared to households who did not donate land for the project. Based on such findings, the study then concluded that acquisition of land for large scale farming in the study area had adverse effects on small-scale farming and could further worsen the food security crisis in Nigeria. In Vietnam, Tuyen (2014) conducted a study to examine the impact of farmland loss on income distribution of households in Hanoi's Peri-Urban Areas of Vietnam. However, the study revealed that farmland loss was not statistically correlated with the likelihood of the household being in a given income group. Nevertheless, other factors, including households' education, access to credit, productive assets and notably their nonfarm participation before farmland loss, were found to increase the chances of the households moving up the income ladder. Meanwhile, a preliminary quantification of the economic impacts of LSLA on rural livelihoods of

28 countries targeted by large-scale land acquisitions revealed that LSLA can potentially affect the incomes of about 12 million people globally with implications for food security among others (Davis et al., 2014). In Cambodia, Jiao, Smith-Hall and Theilade (2015) empirically quantifies environmentally augmented rural household incomes and analyzes how economic land concessions (ELCs) affect such incomes. However, ELCs were found to consistently have negative impacts on household total income, environmental income, and livestock holdings. Specifically, total household annual income subject to ELCs were estimated to decrease by 15–19%. On the other hand, Nguyen, Hegedus, and Nguyen (2019) investigate the effect of land acquisition and compensation on the livelihoods in Vietnam using income as one of the outcome indicators. An interesting finding of the study is that the income from agriculture after land acquisition decreased significantly by 27.3%, while the income from services and business increased significantly between 13.9% and 35.2% compared to before land acquisition. The decrease in agricultural income and the increase in income from business and services were obviously associated with reduction in agricultural land and compensation due to the acquisitions. In northern Sierra Leone, Bottazzi, Crespo, Omar and Rist (2018) employed yields and income as part of indicators in their evaluation of livelihood impacts of land acquisition by a biofuel production company for large-scale agricultural investment. However, the results indicate lower yields, but increase in total monetary income for the affected villages.

In Ghana, similar studies have also been conducted to investigate the effect of LSLA on food security. For instance, Boamah (2010) examined the food security implications of land acquisition for jatropha biodiesel project in the Central Gonja and Yendi Districts of northern Ghana. The study found that acquisition of land for jatropha project improved household food security through employment creation, improved petty trading as well as increased food production on an otherwise abandoned farmland. In another study, Boamah (2011) examined the food security implications of LSLA and found that the relationship between biofuels and food could be either baneful or beneficial for local communities, depending on specific contexts. Another important study which merits mentioning in this connection is the study by Twene (2016). As part of the study's attempt to investigate the relationship between LSLA and rural livelihood sustainability in Ghana, Twene (2016) examined the relationship between LSLA and household income. The results revealed a significant reduction of income from farming and fishing due to LSLA. Meanwhile in a preceding and similar study, Boamah and Overa (2015) rather looked at the impacts of biofuel land deals on household income. However, the study found that LSLA for biofuel increases incomes of households with members employed by the LSLA companies in Ghana. Nyantakyi-Frimpong and Kerr (2016) also used descriptive statistics to investigate the impact of LSLA on food security among other outcomes. However, the results revealed that aside leading to landlessness, particularly among women, LSLA also leads to migration and food insecurity among the landless households. Also, a study by Alhassan, Shaibu and Kuwornu (2018) examined the livelihood effect of LSLA on farmers in Ghana. With analysis from Spearman rank correlation, descriptive and content analysis, the results revealed a significant and negative relationship between LSLA and food production, income, and nutrition of farming households. Based on these findings, the study concluded that LSLA in Ghana is to some extent a threat to development.

From the literature presented, two issues are noted and merits pointing out. First, most of these studies assumed LSLA as cross-border, foreign and transnational practice and thus, examinations and interpretations from these studies are also conducted in that context with much less attention to domestic LSLA. Second, with the exception of few, most of these studies relied on descriptive statistics, to provide evidence on the effects of LSLA on food security. However, some of these methods of designs have limitations.

2.9 Theoretical frameworks for the study

Generally, this study is situated within the sustainable livelihood framework developed by UK's Department for International Development (DFID, 1999). However, the study also draws from several models to develop a conceptual framework for testing the effects of LSLA on farmland access, labour supply, farm investments, farm income and food security. These models include the Marx's (2010) theory of primitive accumulation and Harvey's (2003) theory of accumulation by dispossession (ABD), agricultural household model of Ju et al. (2016) and Sen's (1981) entitlement approach to starvation and famines. These models are presented below.

2.9.1 The Sustainable Livelihood Framework

The sustainable livelihood frameworks (as shown in Figure 2.3) was developed by Department for International Development (1999) of UK to help in understanding and analysing livelihoods of the poor. It is also useful in assessing the effectiveness of existing efforts to reduce poverty. The framework consists of five key components namely, vulnerability context, livelihood assets, transforming structures and processes, livelihood strategies and livelihood outcomes. In its simplest form, the framework views people as operating in a context of vulnerability. The vulnerability context highlights the external environment within which people live. This includes critical trends such as economic and resource trends, shocks such as drought, earthquake, flooding, conflicts, economic, health and seasonality such as seasonal fluctuations in prices, production, employment opportunities and large-scale land acquisition. People's livelihoods and the wider availability of assets are fundamentally affected by critical trends as well as by shocks and seasonality. In the short to medium term and on an individual or small group basis there is little that can be done to alter it directly.

Within the vulnerability context, people have access to certain assets or poverty reducing factors. These assets include human capital, social capital, natural capital, physical capital, and financial capital. It is believed that people require a range of assets to achieve positive livelihood outcomes; no single category of assets on its own is sufficient to yield all the many and varied livelihood outcomes that people seek. This is particularly true for poor people whose access to any given category of assets tends to be limited. As a result, they have to seek ways of nurturing and combining what assets they do have in innovative ways to ensure survival. These gain their meaning and value through the structures and processes. Also, any change in the vulnerability context is as a result of activities at the level of transforming structures and processes. Transforming structures and processes within the livelihood framework are the institutions, organizations, policies, and legislation that shape livelihoods by operating at all levels, from the household to the international arena, and in all spheres, from the most private to the most public. They do not only determine the terms of exchange and returns, but also determine access to land and other assets. Access to land can be influenced by existence of structures such as public institutions that make and enforce legislation and private commercial land traders; processes such as national land use policies, policies on decentralisation of resource management, local conventions on land allocation/inheritance, informal restrictions on land ownership, existing ownership rights and power relations, the state of land markets and within household power relations and conventions on access to land.

These structures and processes also influence the livelihood strategies – ways of combining and using assets – that are open to people in pursuit of beneficial livelihood outcomes that meet their own livelihood objectives. Common examples of the livelihood strategies include income generating activities, productive activities, reproductive choices risk reduction strategies, coping strategies, investment strategies, agricultural intensification or extensification, livelihood diversification, migration, etc. Each strategy is a product of combination of activities and choices that people make/undertake in order to achieve their livelihood outcomes. These outcomes include more yields, more income, improved food and nutritional security, education security, health security, habitat security, social network security, personal safety, environmental security, life skills capacity, etc.

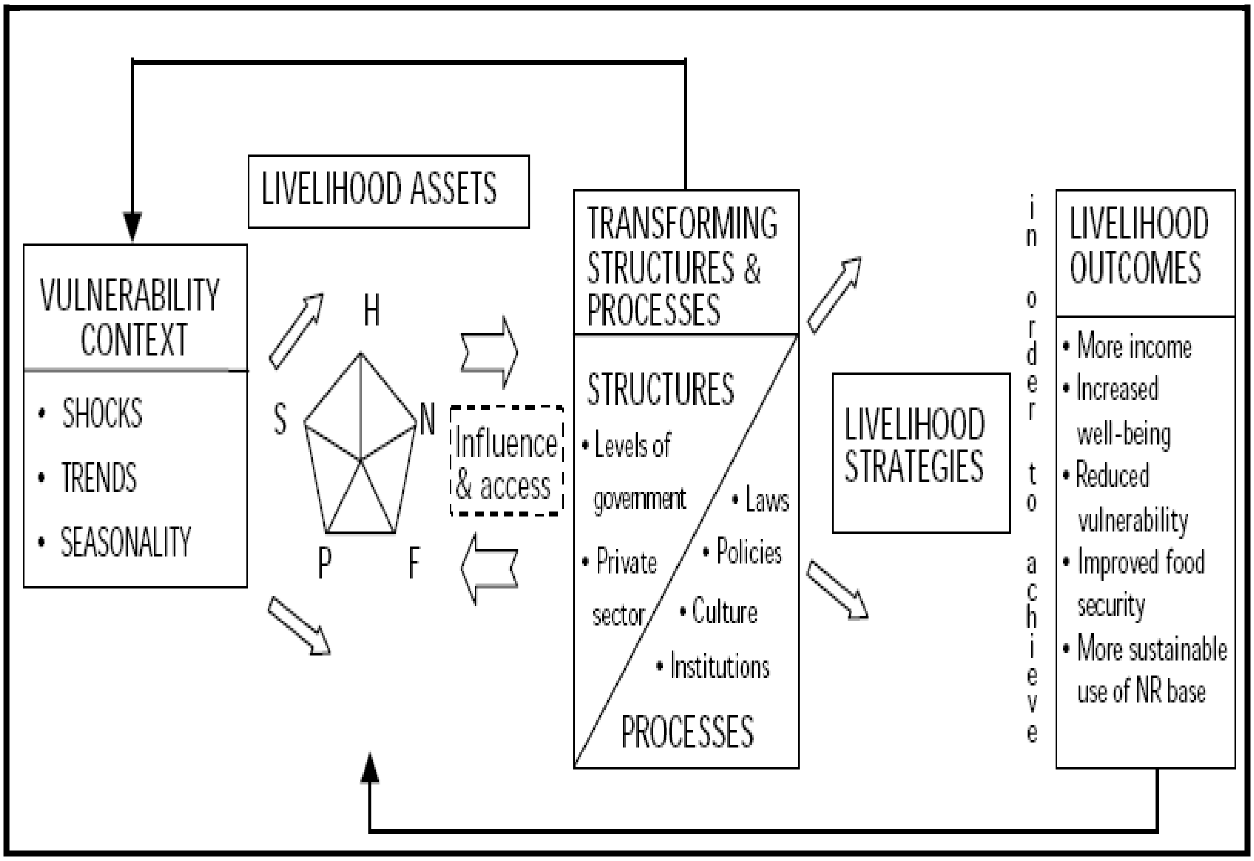

Figure 2.3: Sustainable Livelihood Framework

Source: (DFID, 1999)

2.9.2 Theoretical relationship between large-scale land acquisition and farmland access

In this study, the effect of large-scale land acquisition (LSLA) on farmland access is investigated through the lens of primitive accumulation and accumulation by dispossession (ABD). The primitive accumulation and ABD originated from Adam Smith's earlier account of the origin of two social classes – wealthy and the poor classes – that were depicted to have emerged from a peaceful process. In his account of the processes leading to these classes, Adam Smith argued that some workers became wealthy by labouring more diligently than others, and gradually built-up wealth and eventually leave the less diligent workers to accept living wages for their labour. Karl Marx on the other hand, refuted such explanation, describing it as childishness. To elaborate why, Marx distinguished between primitive and capitalist accumulation and further argued that the latter subsumes both expanded reproduction and the centralization of capital, which are not fit to explain the source of the resources that need to be mobilized at the origin of capitalism i.e., before the first cycle of capitalist production can begin. Regarding the former (i.e., concept of primitive accumulation) Marx argued that it is not the result of the capitalist mode of production but its point of departure and hence precedes capitalist accumulation (Marx 1976, 873–895). In Marx's view primitive accumulation entailed taking for example, land, establishing rights on such holdings, enclosing it, and expelling a resident population to create a landless proletariat, and then releasing the land into the privatised mainstream of capital accumulation. This requires the forceful displacement or removal of peasants from access to and/ or resources land. The so-called primitive accumulation, therefore, is nothing else than the historical process of divorcing the producers from their means of production. Under such system, resources use by the poor class for production are privatised or individualised and converted into property of wealthy class for production. The end product of such process is boundless enrichment of the wealthy class and loss of farmland access and impoverishment of the poor class since the main productive resource in the production system of the poor class is converted to the production system of the wealthy class. Such process is accomplished through violence, war, enslavement, robbery, murder and colonialism. Building on Marx's ideas, Harvey (2003) reconstructed the concept of primitive accumulation into accumulation by dispossession (ABD). While emphasizing the role of violence, extra-economic coercion and non-market mechanisms, Harvey (2003) argued that the concept of primitive accumulation also includes reducing the access of peasants to common property or open access resources such as livestock trails, land and land-based resources such as water. It can also involve restriction of access to key resources such as water and fertile soil. This involves the commoditisation of resources and the conversion of common property rights into private property rights. This can employ mechanisms of expropriation that do not involve the explicit use of force and can include commercialization, fraud, oppression, looting, predation, manipulation of the public debt, the international credit system, financial speculation, 'stock-exchange gambling', state policies etc.

Within the process of primitive accumulation, Marx and Harvey also discussed how taking rights over households' resources leads to commodification of labour (Harvey, 2003; Marx, 2010). According to Marx (2010), as the poor class are dispossessed of their main productive resource, e.g. land and land-based resources, property-less or industrial reserve army of workers is created. These group of workers will at last have nothing to sell except their own skins. This implies they must give up their labour power in return for a wage for survival. This leads to an enclosure of workers who are force to work for the wealthy under lower wage rates. However, in the view of Harvey (2003), it also includes coercions and appropriations of precapitalistic knowledges, skills, social relations, practices and beliefs (Harvey 146). Harvey (2003) further argued that in contemporary ABD, peasants are more likely to be co-opted than violently coerced as described by Marx. Emphasizing on the idea of co-opting, Hall (2011) also argued that dispossession involves adverse incorporation rather than exclusion 'of smallholder agriculture into new value chains, patterns of accumulation and wider transformations in agrarian structure and agro-food systems that precipitate.

In spite of the specific differences in machinations employed in Marx's primitive accumulation and Harvey's (2003) accumulation by dispossession in exploitation, both suggest that a variety of mechanisms can be explored by rich class in acquiring production resources of the poor.

In Ghana, acquisition of land and land-based resources is occurring at an alarming rate and the mechanism described by Marx (2010) and Harvey (2003) for dispossessing the poor of their productive resources share resemblance with the processes employed for such acquisitions. Although land is a valuable resource use by the local peasants for production, access is by custom/tradition or state. Thus, the power to allocate or reallocate such lands for production or any other venture lies with state and traditional authorities who control 20% and 78% of land, respectively. Under the compulsory acquisition act, the state can acquire private rights to land for development purpose without the willing consent of occupants or transfer such rights to private developers. Where the state is no longer interested in the land, private investors may acquire lands for specific purposes (Senu, 2014). Under these situations, money and power may be employed by rich private entities to acquire public lands without necessarily using force or violence. Under customary system, the law also mandates the traditional authorities to manage land on behalf of the local occupants. However, traditional authorities sometimes become more than mere trustees and can sometimes reallocate large scales of land to investors without necessarily observing all the procedures in land acquisition. Aside the use of power to reallocate, both state and traditional authorities can classify land as abundant and idle. Such classifications pave way for commodification of ‘common property’ lands. Once deemed abundant and idle, land legitimately turns into a commodity for acquisition. Nyari (2008) for instance reported how Biofuel Africa Ltd acquired 38,000 hectares without the consent of all official authorities that matter in land acquisition. Such processes have been reported to have led to loss of farmland access.

2.9.3 Theoretical relationship between large-scale land acquisition, labour supply and farm income

The theoretical basis for modeling labour supply and farm income effects of large-scale land acquisition (LSLA) is based on the agricultural household model developed by Ju, Ni, Ni, & Wu (2016). Since the 1990s, China’s land demand for economic and urban growth has been increasing rapidly. To meet the increasing demand for land[1], a policy to acquire and convert rural land to urban land was implemented by government. The policy increased compensation of the affected households for at most thirty (30) times the average value of land for three years before acquisition. This however, raised concerns since the policy did not capture the entire benefits associated with the loss farmlands. To solve such problem, payment of unemployment insurance benefits to farm workers and retired elders were included in the policy. Considering the land acquisition policy for China, Ju et al. (2016) modified the agricultural household model of Benjamin (2009) to capture the welfare implications of land acquisition in China. The model views farm household as a collective entity with utility for consumer goods, leisure, and livelihood security associated wealth from land assets. According Ju et al. (2016), household maximizes the following utility function:

$$U(C, L_l; W) = U(C, l_l) + W \qquad (2.1)$$

[1]By China’s Land Laws, amount paid for land loss covers only output value of farmland because land is owned by local government and producers are assumed to use land for production only.

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 current consumption of the single purchased good (C) and leisure (L_l) as:

$U(C, L_l) = \alpha \log C + (1-\alpha) \log L_l$ where $0<\alpha<1$ (2.2)

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

$U(C, L_l; W) = \alpha \log C + (1-\alpha) \log L_l + W$ (2.3)

The utility function specified Equation 2.3 can be maximized subject to budget, time and production constraints respectively specified as:

$pC = y = p_a Q_a + wL_w + (\bar{y}_a A')i$ (2.4)

$T = L_a + L_w + L_l$ (2.5)

$Q_a = L_a^r (A - A')^{1-r}$ $where\ A > A'$ (2.6)

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 expenditure for consumption. If output price (p_a) is unity, then y depends on only farm output Q_a. Nonfarm labor income may come from wage employment and self-employment. However, we introduce only total wage which is the product of market wage rate (w) and off-farm labor (L_w). Further, the product of compensation received per unit of land $(\bar{y}_a)$ and land leased to investors (A') is the compensation received $(\bar{y}_a A')$ whiles 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, $\bar{y}_a$ 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 prior to loss of land and it is assumed 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 (2.5)– (2.6) into (2.4), yields:

$$pC + wL_l = [L_a^r(A - A')^{1-r} - wL_a] + wT + (\bar{y}_a A')i = M \qquad (2.7)$$

where consumption of goods and leisure equals full income M, which constitute 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:

$$pC = y = \alpha M \qquad (2.8)$$

$$L_l = \frac{1 - \alpha}{w} M \qquad (2.9)$$

Aside 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 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 land, the W can be expressed as:

$$W = \bar{V}_a(A - A') \qquad (2.10)$$

where $\bar{V}_a$ is greater than zero and appreciation value for unit area of land defined as total land area less the land acquired. Substituting (2.4) and (2.6) into (2.1) leads to a utility function which defines time allocation decision of the households as:

$$V(L_a, L_w, L_l; W) = V(L_a, L_w, L_l) + W \qquad (2.11)$$

If equation (2.11) is maximized subject to time constraint in equation (2.5), we get household's optimization problem summarized as follows:

$max_{L_a, L_w, L_l} V(L_a, L_w, L_l) + W$

$$= \max_{L_a, L_w, L_l} \left[\alpha \log \frac{L_a^r (A - A')^{1-r} + wL_w + (\overline{y}_a A')i}{p} + (1 - \alpha) \log L_l + W \right] \quad (2.12)$$

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

$$Z(L_a, L_w, L_l; \lambda) = V(L_a, L_w, L_l; W) + \lambda(T - L_a - L_w - L_l) \qquad (2.13)$$

The first-order conditions are:

$$\frac{\partial Z}{\partial L_a} = \frac{\partial Z}{\partial L_w} = \frac{\partial Z}{\partial L_l} = 0, \frac{\partial Z}{\partial \lambda} = 0 \qquad (2.14)$$

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

$$L_a^* = (A - A')(r/w)^{1/(1-r)} \qquad (2.15)$$

$$L_l^* = \frac{1-\alpha}{w} . \left[(A - A')(1 - r)(r/w)^{r/(1-r)} \right] + wT + (\overline{y}_a A')i] \qquad (2.16)$$

$$L_w^* = T - (A - A')(r/w)^{1/(1-r)} - \frac{1-\alpha}{w} . \left[(A - A')(1 - r)(r/w)^{r/(1-r)} \right] + wT + (\overline{y}_a A')i \quad (2.17)$$

Substituting Equation (2.16) into (2.9) leads to the optimal income M* which constitute farm profits, value of time owned, and compensation received specified as:

$$M^* = (A - A')(1 - r)(r/w)^{r/(1-r)} + wT + (\overline{y}_a A')i \qquad (2.18)$$

Substituting optimal time input Equations (2.15)–(2.17) into income function (2.4) and utility function (2.1), leads to optimal values of total income $y^*(L_a{}^*, L_w{}^*)$ and utility $V^*(L_a{}^*, L_w{}^*, L_l{}^*; W)$ of the households specified as:

$$y^*(L_a{}^*, L_w{}^*) = \alpha M^* = \alpha\left[(A - A')(1 - r)(r/w)^{r/(1-r)} + wT + (\overline{y}_a A')i \right] \qquad (2.19)$$

$$V^*(L_a{}^*, L_w{}^*, L_l{}^*; W) = \left[\alpha \log \frac{y_a^*(L_a^*) + y_w^*(L_w^*) + (\overline{y}_a A')i}{p} + (1 - \alpha) \log L_l^* + W \right] \quad (2.20)$$

Differentiating with respect to land area acquired A' in Equations (2.15) -(2.17) yields land loss on household time distribution decisions specified as:

$$\frac{\partial L_a^*}{\partial A'} = -(r/w)^{1/(1-r)} \tag{2.21}$$

$$\frac{\partial L_l^*}{\partial A'} = \frac{1-\alpha}{w}\left[\overline{y}_a i - (1-r)(r/w)^{r/(1-r)}\right] \tag{2.22}$$

$$\frac{\partial L_w^*}{\partial A'} = (r/w)^{1/(1-r)} + \frac{1-\alpha}{w}\left[(1-r)(r/w)^{r/(1-r)} - \overline{y}_a i\right] \tag{2.23}$$

Equation (2.21) indicates that depending on production technology, decrease in land due to land acquisition will also lead to decrease in supply of farm labor i.e., $\frac{\partial L_a^*}{\partial A'} < 0$. Given total time at households' disposal, the acquisition effect on the total time for off-farm activities will be positive $i.e., \left(\frac{\partial L_l^*}{\partial A'} + \frac{\partial L_w^*}{\partial A'}\right) > 0$. However, such outcome depends on other variables such as compensation received $\overline{y}_a$, coefficient of elasticity r, market wage rate w and consumption share of income α. We focus on the value of compensation price $(\overline{y}_a)$. According to Equation (2.23), $\frac{\partial L_w^*}{\partial A'}$ is determined by two items: the former is the change of farm production time and the latter is the change of leisure time. Also:

$$\frac{\partial L_w^*}{\partial A'} > 0, when\ \overline{y}_a < \frac{1}{i}\left[(1-r)(r/w)^{r/(1-r)} + \frac{w}{1-\alpha}(r/w)^{1/(1-r)}\right] \tag{2.24}$$

Equation (2.24) indicates that land reduction 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 $(r/w)^{1/(1-r)}$ that comes from the reduced farm production time. On the contrary when the compensation price $(\overline{y}_a)$ is higher than this critical value, land reduction would lead to a decrease in time spent off-farm. For welfare effect of land acquisition, we differentiate V^* with respect to A' in Equation (2.20). This gives:

$$\frac{\partial V^*}{\partial A'} = \frac{a}{y^*}\frac{\partial y^*}{\partial A'} + \frac{1-\alpha}{L_l^*}\frac{\partial L_l^*}{\partial A'} - \bar{V}_a = \frac{1}{M^*}\left[\bar{y}_a i - (1-r)(r/w)^{r/(1-r)} - \bar{V}_a M^*\right] \quad (2.25)$$

Expression (2.25) indicates that the welfare effect of land reduction consists of income and leisure, the loss of land appreciation $(-\bar{V}_a)$. Equation (2.25) also implies that:

$$\frac{\partial V^*}{\partial A'} < 0, when\, \bar{y}_a < \frac{1}{i}\left[(1-r)(r/w)^{r/(1-r)} + \bar{V}_a M^*\right] \qquad (2.26)$$

where $\bar{V}_a M^*$ results from appreciation value per unit of land area multiplied by optimal full income. Equation (2.26) indicates that the effect of acquisition of land on welfare depends on compensation receive and the summation of multiplier $(\frac{1}{i})$ times the farm profit and the appreciation value of land acquired. However, compensation amount is based on only value of output without land appreciation, land acquisition may decrease household welfare. This also explain the increase in off-farm labor supply due to land acquisition. Second, differentiating off-farm labour supply with respect to compensation received $\bar{y}_a$ in Equation (2.23) yields the value of off-farm labour supply defined as:

$$\frac{\partial L_w^*}{\partial \bar{y}_a} = -\frac{1-\alpha}{w}A'i \qquad (2.27)$$

Equation (2.27) implies that given the amount of land, rate of return on investment with compensation received, wag rate, the amount received as compensation and consumption income, compensation amount will decrease time spent off-farm. With respect to the effect of land acquisition on income, partial derivative of Equation (2.19) yields:

$$\frac{\partial y^*}{\partial A'} = \alpha\left[\bar{y}_a i - (1-r)(r/w)^{r/(1-r)}\right] \qquad (2.28)$$

Equation (2.28) shows that income effect of land acquisition depends on the values of the rate of return on investment $(\overline{y}_a i)$ with compensation received and the farm profit $(1-r)(r/w)^{r/(1-r)}$. Thus, land acquisition will have a positive effect on income $\left(i.e., \frac{\partial \overline{y}_a}{\partial A'} > 0\right)$ if the value of the rate of return on investment from amount received as compensation is higher than the farm profit. The contrary also holds. With compensation price effect of income, a partial derivative of Equation (2.19) yields:

$$\frac{\partial y^*}{\partial \overline{y}_a} = \alpha A' i \qquad (2.29)$$

Equation (2.29) implies that the amount received as compensation has a positive effect on family income. This is determined by the definition of Equation (2.19) which indicates that the income from amount received as compensation is a component of total income.

Ju et al.'s (2016) model for China's land acquisition is to some extent applicable for Ghana, although the policy environment in China is different from Ghana. Whereas land is owned by 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 government. In Ghana however, the processes are championed by both state and local authorities. Moreover, the compensation promises are not actually materialized in Ghana and when even demanded the amount given do not cover all losses resulting from 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. In spite of different land administration 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 in northern Ghana is researchable using the model of Ju et al. (2016).

2.9.4 Theoretical relationship between large-scale land acquisition and farm investment

The main effect of large-scale land acquisition (LSLA) on farm investment is the uncertainty of households regarding whether they will be able to reap all benefits of investments made on plots occupied before they are evicted. In other words, prevalence of LSLA in a particular area creates perception of tenure insecurity regarding the land occupied, thereby dissipating some forms of farm investments. Thus, the theoretical basis for analysing the relationship between LSLA and farm investments is deeply rooted in the neoclassical theories depicting the relationship between land tenure insecurity and farm investment. One of the central arguments of the neoclassical theories of land is that traditional or communal land tenure systems induce inefficient allocation of resources thereby reducing agriculture's contribution to social well-being (Barrows & Roth, 1990). This school of thought therefore argued that communal land tenure systems should be replaced by systems of individualisation or privatisation of land tenure to enhance access to capital (including credit) for fixed-place investment. Pioneer among these theories is Marshall’s (1890) ‘traditional view’ or 'tax-equivalent’ approach to the relationship between land tenure arrangements and resource allocation. The traditional view argues that efficient land tenure arrangements such as fixed rent tenancy of should be promoted in order for holders to enhance long-term investment because share tenancy create uncertainties about the returns to producer for his/her investments, thereby dissipating long-term investments in land (Marshall, 1890). Such arguments have been a subject of debate in theoretical literature and has since paved way for later-day neo-classical economists who researched into how such arrangements caused tenure insecurity for smallholders thereby, influencing different types of farm investments. Notable among these studies is Feder & Onchan (1987) who formulated conceptual model relating ownership security, credit supply and farm investment in Thailand. According to Feder & Onchan (1987), the farmer chooses between investments in capital equipment K, which is not lost in the event of eviction;

land improvements M, which are completely lost in an eviction; and nonagricultural activities and assets Z, which are unaffected by eviction. The farmer invests in the first period and produces in the second, with the objective of maximizing expected terminal wealth:

$$\operatorname*{Max}_{k,m} E(V) = (1-\Phi).\{A.y(k,m,S) + P(m).A + F[L(\Phi,\mathrm{A}) + W_0 - k.A - m.A] - (1+r).L(\Phi,A)\} + \Phi\{F[L(\Phi,\mathrm{A}) + W_0 - k.A - m.A] - (1-r).L(\Phi,A)\} \qquad (2.30),$$

resulting from substitution of budget constraints $L(\Phi,\mathrm{A}) + W_0 = k.A + m.A$+Z into the probability weighted sum of terminal wealth in the absence and presence of eviction respectively defined as:

$$V_1 = A.y(k,m,S) + P(m).A + F(Z) - (1-r).L(\Phi,A) \qquad (2.31),$$

$$V_2 = F(Z) - (1-r).L(\Phi,A) \qquad (2.32)$$

Where A is the amount of land, k and m denote per-acre amount of capital and land improvement techniques; S is human capital; P is the terminal value of land; F is the value of the risk-free agricultural activities; Φ is the probability of eviction; L is the amount of credit influenced by A and Φ; $A.y(k,m,S)$ is production value, $P(m).A$ is the land value; F(Z) is the returns to nonagricultural activities and $(1-r).L(\Phi,A)$ is debts and r is the rate of interest. The first-order conditions of equation (2.30) for a maximum will subsequently yield the following implicit and nonlinear functions:

$$\frac{\partial E(V)}{\partial k} = [(1-\Phi).(y_k - F') - \Phi F'].A = 0 \qquad (2.33)$$

$$\frac{\partial E(V)}{\partial m} = [(1-\Phi).(y_m + P' - F') - \Phi F'].A = 0 \qquad (2.34)$$

Equations (2.33) – (2.34) imply that farmers will invest in capital equipment and land-improving or conservation measures if any of such investments leads to positive expected terminal wealth aggregated over the planning horizon. However, the change in expected terminal wealth in equations (2.33)-(2.34) is each not observable, but can be related households farm investment in the following reduced form structural equations:

$$K = K(\Phi, W_o, A, S) \qquad (2.35)$$

$$M = (\Phi, W_o, A, S) \qquad (2.36)$$

Where investment in capital equipment K in (2.35) and land improvements M in (2.36) are influenced by household's indicator of tenure insecurity Φ, initial wealth W_o, amount of land A, and human capital S. Place & Hazell (1993) argued that equations (2.35)-(2.36) can be estimated to directly to test the influence of tenure insecurity on land investments. Hayes et al. (1997) also developed a variant version of Feder & Onchan (1987) and Place & Hazell's (1993) model arguing that tenure security affects variable input use only indirectly through its impact on investments. They argued that there is no direct link between tenure security and variable inputs in this model. On the basis of such explanation, Hayes et al. (1997) did not include tenure security in the function of variable input use. Aside the dependency of farm investment on tenure insecurity or rate of evictions, some portions of the theoretical literature showed a reverse causality between farm investments and tenure insecurity. For instance, Sjaastad & Bromley (1997) and Place & Migot-Adholla, (1998) showed that farmers with perceived risk of losing their land rights may resort to undertaking higher investments which in turn enhance their claims to the land. Abdulai, Owusu, & Goetz (2011) also show that a tenant or sharecropper who feel insecure can conserve or invest in the soil to minimise eviction by landlords.

In Ghana, land is vested in the hands of traditional authorities and state. Thus, the power to allocate or reallocate such lands for production or any other venture lies with state and traditional authorities who control 20% and 78% of land, respectively. The state can acquire private rights to land for development purpose without the willing consent of occupants or transfer such rights to private developers. Traditional authorities can also reallocate large scales of land to investors without necessarily observing all the procedures in land acquisition. Under these circumstances, both traditional authorities and state have reportedly lease land to investors and these have led to concerns about the effect of such action on households farm investments (see for instance, Aha & Ayitey, 2017; Boamah, 2014; Hamenoo, Adjei, & Obodai, 2017; Kuusaana, 2017; Twene, 2016). Such leases have also been reported to have an effect on investment of households (Aha & Ayitey, 2017; Roth, 2014). Base on the assumption that uncertainty (perception of tenure insecurity) increases among households exposed to LSLA, the conceptual model of Feder & Onchan (1987) can be employed to answer the question of how LSLA influence farm investments withing the neoclassical theory of land rights.

2.9.5 Theoretical relationship between large-scale land acquisition and food security

To examine the relationship between large-scale land acquisition (LSLA) and food security, this study draws from the "entitlement approach" to starvation and famines. The entitlement approach to starvation and famines was formulated by Amartya Sen in a book entitled 'Poverty and Famines: An Essay on Entitlement and Deprivation' in 1981 and has been used in several studies (e.g., Aniah, 2016; Namaa, 2017; Sen, 1981b) to study socio-economic and political conditions, resource ownership, and how they are related to food security.

Focusing on entitlements and assuming an economy with private ownership and exchange in the form of trade, Sen (1981a) argued that a person's entitlement set or set of alternative commodity bundles (e.g., food, output from production), E, depends on his/her endowment (e.g., land, labour, capital, knowledge from education, farmer's own skill and other resources) and the exchange entitlement mapping (the function that specifies the set of alternative commodity bundles that the person can command respectively for each endowment bundle). Further, the exchange entitlement mapping, depends on the characteristics of the society in question and a person's position in it. This implies that an individual can be plunged into food insecurity if his/her endowment collapses either through a fall in the endowment bundle, or through an unfavourable shift in the exchange entitlement mapping. Since both endowment bundle and exchange entitlement mapping depends on legal, political, economic and social characteristics of the society, a fall in the endowment bundle or unfavorable shift in the exchange mapping can result from change in any of these characteristics of the society. Thus, in its basic form, the approach focuses on how people command food using different abilities including production possibilities, trade opportunities, the entitlements and other legal means available in the society, and how starvation or food insecurity can result from denial of access to these abilities through legal, political, economic and social characteristics of the society.

Sen's (1981) entitlement approach is applicable in Ghana. In northern Ghana, majority of households depends on land to make long term investments to increase assets, production, and food security. However, access to land for such activities depends on state and local authorities who implement programmes and policies favouring upsurge in large-scale investments. For instance, through the Ministry of Food and Agriculture, government of Ghana encourages the release of land for the commercial agriculture (Ministry of Food and Agriculture, 2015a). The upsurge of these investments affect household's exchange entitlement mapping and endowment including land, labour, capital, and other resources (Boamah & Overa, 2015; Hamenoo et al., 2018; Kuusaana, 2017; Nketiah et al., 2019). This theory is relevant to the study because it provides a coherent perspective to better appreciate how LSLA, as a product of either legal, political, economic, and social characteristics of the society, affect food security.

2.9.6 Potential-outcomes/Counterfactual framework

Generally, the potential-outcomes/counterfactual framework argues that proper assessment of a programme's (i.e., type of exposure to LSLA in this study) impact on an intended outcome, requires outcome, Y_i^C, at a state where households/individuals were not exposed to the programme (counterfactual or base outcome/category) and Y_i^T, the state where the households/individuals were exposed to the programme. In this way the only difference between the two groups (i.e., the exposed and its counterfactual) will be the treatment (i.e., type of exposure to LSLA in this study). Based on such information, the impact of the programme Δ, will then be the difference between the household's or individual's outcome after the programme and the outcome before the programme specified in equation (2.37) or (2.38) as:

$$\Delta = Y_i^T - Y_i^C \qquad (2.37)$$

$$ATE = E[Y_i^T | X_i, T = 1] - E[Y_i^C | X_i, T = 0] \qquad (2.38)$$

In an experimental setting or a randomized control trial, this equation (2.37) or (2.38) is easily estimated by collecting data on the state of household/individual before exposure and after exposure to a programme i.e., randomly assigning individuals into treatment (exposed) and control (unexposed) groups, such that the only differentiating factor among exposed and non-exposed is the type of exposure to LSLA (Asfaw et al., 2012). Thus, randomized experiments have the advantage of avoiding selection bias at the level of randomization (Khandker et al., 2010). Unfortunately, randomized trials are not always available and most data (such as the one employed in this study) are from nonrandomized experiments such as cross-sectional surveys. In such settings, it is impossible to estimate a programme's impact on an intended outcome because a household or an individual exist in one of mutually exclusive states (i.e., either exposed or unexposed to LSLA) and such data do not provide information on the counterfactual situation (Ravallion, 2008). Thus, the evaluation problem in nonrandomized experiments is a missing data on the household or individual had they not been exposed to LSLA (Heckman et al., 1997; Dehejia & Wahba, 2002; Dehejia, 2005; Smith & Todd, 2005; Caliendo and Kopeinig, 2008). However, it is unadvisable to approximate outcome from actually unexposed household to counterfactual households because a potential difference in attributes between the former and the latter will generate selection bias (Cerdan-Infantes et al., 2008; Bravo-Ureta et al., 2011). For the purpose of clarity, Duflo et al. (2008) further illustrates this problem by adding and subtracting the term, $E[Y_i^C | X_i, T = 1]$, in equation (2.38) as:

$$ATE = E[Y_i^T | X_i, T = 1] - E[Y_i^C | X_i, T = 1] - E[Y_i^C | X_i, T = 0] + E[Y_i^C | X_i, T = 1] \quad (2.39)$$

This consequently leads to equation (2.40) defined as:

$$ATE = E[Y_i^T - Y_i^C | X_i, T = 1] + E[Y_i^C | X_i, T = 1] + E[Y_i^C | X_i, T = 0] \quad (2.40)$$

According to Duflo et al. (2008), $E[Y_i^T - Y_i^C | X_i, T = 1]$ is the average treatment effect on the treated (ATT) and $E[Y_i^C | X_i, T = 1] + E[Y_i^C | X_i, T = 0]$ corresponds to the selection bias. Fortunately, literature has argued that given a vectors of household characteristics, ATT can be estimated as follows:

$$ATT = E[Y_i^T - Y_i^C | X_i, T = 1] = E(Y_i^T | X_i, T = 1) - E(Y_i^C | X_i, T = 1) \quad (2.41)$$

A number of methods including parametric and semi-parametric methods, have been used in impact evaluation to address the fundamental question of selection bias and to determine ATT specified in (2.41). These methods include matching methods – propensity score matching (PSM), double-difference (DD) methods, instrumental variable (IV) methods, regression discontinuity

(RD) design and endogenous switching regression (ESR). Each of these methods carries its own weaknesses in determining a programme impact. For instance, the IV approach to correction of selection bias requires an instrument that is correlated with the programme but not correlated with unobserved characteristics affecting the outcome. However, such instrument is sometimes difficult to come by. In addition, the approach requires functional form assumptions like linearity and normal distribution for the error term in the outcome equation. These are strong assumptions if not supported by theory (Mendola 2007). This is particularly relevant for this study if we consider that the concept of food security still lacks a robust theoretical model framework exactly because of its multidimensionality (Pangaribowo et al. 2013). On the other hand, the PSM methods assume that selection bias is based only on observed characteristics and thus, fails to capture selection bias arising from unobserved variables of an intervention. With regards to the double-difference (DD) methods, the main drawback rests precisely with the assumption of time-invariant selection bias which is implausible for many targeted programmes in developing countries like Ghana. Also, the major concerns with the regression discontinuity design are (a) that it produces local average treatment effects that are not always generalizable (b) that the effect is estimated at the discontinuity, so, generally, fewer observations exist than in a randomized experiment with the same sample size; and (c) that the specification can be sensitive to functional form, including nonlinear relationships and interactions. Unlike the other methods the ESR controls for selection bias arising from observed and unobserved factors. However, ESR requires use of instrument for proper identification of the treatment which is difficult to come-by. To avoid the weaknesses illustrated above or ensure robustness, some studies (e.g., Bekele Shiferaw, Menale Kassie, 2014; Khonje, Manda, Alene, & Kassie, 2015) employed semi-parametric and parametric techniques for impact evaluation. Specifically, the semi-parametric method here is the propensity score matching (PSM) approaches while the parametric approaches include the IV approaches.

2.10 Conceptual Framework

When land is acquired for establishment of a new project, it implies transition from land use by former occupants to certain use by the new owners. This can have implications for the livelihoods of former occupants. To conceptualize how large-scale land acquisition (LSLA) affects access to farmland, labour supply, farm income and food security, this study draws from the theoretical models presented under section 2.8. Based on the sustainable livelihood framework of the UK's Department for International Development (DFID) presented in Figure 2.3, Figure 2.4 is developed. However, unlike Figure 2.3 which shows links within and between some components, Figure 2.4 only shows what is necessary in this study. Also, unlike DFID's framework which has multiple entry points and fails to explicitly show what really is at the beginning or at the receiving end of the vulnerabilities, Figure 2.4 begins with the supply-side factors or structures and processes and end with livelihood outcomes including farm income and food security. Figure 2.4 starts with supply-side factors such as the structures and processes because in this particular study, it is the formal or informal institutions and policy decisions to lease the land which creates vulnerabilities context for the local people thereby threatening livelihoods outcomes including farm income and food security. Based on the expositions of the sustainable livelihood framework in Figure 2.3 and the fact that institutions and policies favour large scale agricultural investments and therefore exposes households to such acts, this study consider exposure to LSLA as vulnerability. Here, the reason for doing so is that LSLA is outside victims' control and can only be managed by traditional and state authorities through changes in policy, helping victims to become more resilient and better able to capitalize on its positive aspects.

Following, the extant literature on drivers of LSLA (Arezki et al., 2013; Lay & Nolte, 2018), the conceptual framework in Figure 2.4 argues that exposure to LSLA does not occur in its own rights but driven largely by supply-side and demand-side factors. However, household's exposure to LSLA is not without immediate consequences. As observed in literature (Harvey, 2003; Marx, 1867) LSLA can lead to loss of farmland access. However, the extent of loss depends on the investment model of investor's farm. In some investment models, local populations may be displace, or allowed to use the land either on formal or informal basis (e.g., Behrman & Quisumbing, 2011; Dessy et al., 2012; Kleemann & Thiele, 2015; Li, 2011). In the case of northern Ghana, field survey and literature (see for instnace, Acheampong & Campion, 2014; Boamah, 2014; Boamah & Overa, 2015; Kuusaana, 2017) revealed that there were evictions caused by LSLA even though employment opportunities were created to some extent. Thus, following the arguments on primitive accumulation and accumulation by dispossession (Harvey, 2003; Marx, 1867), the conceptual framework in Figure 2.4 argued that establishing rights over large tracts of land by supposed investors will lead to loss of farmland access. As mentioned in section (2.3), farmland access may be reflected in changes in market mode of land acquisition including purchasing, pledging, sharecropping, loaning, and renting-in; and land rights (i.e., use, control and transfer rights) including control over food produced, access to water and ability to transfer land, practice monocropping and fallowing. Thus, as shown in Figure 2.4, the effect of LSLA on farmland access may be reflected in increase in proportion of households acquiring land through purchase, pledge, sharecrop, loan, and rent-in, decrease in proportion of households with control over food produced, access to water and ability to transfer land, decrease proportion of households using monocropping, proportion of households using land fallowing.

Regarding household's labour supply, the effect of LSLA is not straightforward. Literature argued that due to loss of land, most household members cannot find land to farm and this can bring about several dynamics in labour supply (Harvey, 2003; Marx, 1867). On one hand, there may be increase in labour inputs for farm activities - especially at the initial stages of land loss - because members who cannot find land to farm create excess labour (mostly reflected in increase in leisure time) (Marx, 1867). However, the excess labour may subsequently drive down farm wages and consequently, income from labour (Ju et al., 2016). This may increase household participation in off-farm employment, thereby causing labour scarcity/decrease for household farm activities (Ju et al., 2016). For instance, plantation farms established after LSLA may increase labour demand. In this case there may be competition between household farm and off-farm activities for household labour, leading to labour scarcity/decrease for household farm activities and increase for off-farm employment. Members may also decide to move to seek off-farm employment in urban areas instead of working with plantations established (Headey & Jayne, 2014b). Such decision can also lead to decrease in farm labour inputs for household farm activities but increase in labour supply to off-farm employment (Ju et al., 2016). These evolving dynamics depend on labor-saving technologies employed after LSLA (Behrman & Quisumbing, 2011; Li, 2011), market wages, compensation prices and other factors. LSLA may also affect labour supply through farmland access because land size of agricultural households is inversely proportional to labour supply (Rosenzweig, 1978). The conceptual framework in Figure 2.4, highlights the links between LSLA, farm labour inputs, and labour supply to off-farm employment.

As access to farmland diminishes, several dynamics are introduced by farmers especially in relation to farm investment decisions. Some portion of the literature argued that land acquisition may introduced land constraints (e.g., Boserup, 1965). In response to the land constraints, households may increase application of more labour per unit of land (on condition that labour is available), increased use of fertilizer per hectare, irrigation investments, increased mechanization, more use of modern practices and impressive yield growth (Boserup, 1965; Headey & Jayne, 2014b). Behrman et al. (2014) also added that the increased demand and acquisition of land may also lead to introduction of high capital inputs, new technologies, mechanization, and agrochemicals in order to make land more productive as quickly as possible and to maximize profit. Such developments may reduce transaction cost for farmers or increase access to factor and output markets which are the main barriers to farm investment (Ali et al., 2019). The by-product of this development is technology transmission to local farms (Dessy et al., 2012; Kleemann & Thiele, 2015). Other section of the literature also argued that land scarcity introduced by large-scale land acquisitions may cause uncertainty in farmers mind about his/her investment returns (Aha & Ayitey, 2017; Ayamga, 2012; Feder & Onchan, 1987; Hayes et al., 1997; Marshall, 1890; Place & Hazell, 1993). These may compel farmers to prioritize short-term investment over long-term farm investment. Figure 2.4 highlights the link between the two types of farm investment made by farmers and LSLA. Ali et al. (2019) on the other hand argued that investment in land improving techniques by exposed farmers may be discouraged if output demanded in the output market is too small to defray the costs of inputs (Ali et al., 2019). Moreover, LSLA may also affect investment through labour supply. For instance, excess labour created by LSLA may lead to investment in land improving techniques that are labour demanding. However, subsequent migration of such labour to off-farm employment may discourage investment in some land improving techniques, most especially, the labour demanding techniques.

Consequently, the dynamics in land access, labour supply and farm investment due to exposure to LSLA may affect production and food security (Dessy et al., 2012; Ju et al., 2016; Kleemann &

Thiele, 2015; Sen, 1981). For instance, the immediate consequences of loss of labour for farm input may be decrease production, farm income and food security. On the other hand, off-farm activities (labour supply off-farm) emanating from changes induced by LSLA may contribute positively to production, farm income and food security in the long run. This is because income earned from such activities may be used to purchase food for the affected households. The income from off-farm activities may also provide farmers with liquid capital for purchase of new technologies introduced by investments from LSLA, leading to increase production, farm income and food security (Chang & Mishra, 2008; Fernandez-cornejo et al., 2007; Holden et al., 2004; Lanjouw, 2001; Owusu et al., 2011). On the other hand, engagement in off-farm activities may undermine adoption of newly introduced technologies through time allocated to farm activities. This will eventually lead to decrease productivity, farm income and food security. Following literature (Ju et al., 2016; Sen, 1981a), the conceptual framework argued that exposure to LSLA will affect farm income and food security. The link between LSLA, farm income and food security are also captured in the framework as shown by an arrow from LSLA to outcomes box in Figure 2.4 below. Other effects may include development of rural infrastructure, and poverty-reducing improvements such as construction of schools and health posts or environmental pollution, degradation, destruction of forest areas (Dessy et al., 2012; Kleemann & Thiele, 2015) and are captured in Figure 2.4 but are not the focus of this study. Following the potential-outcomes/counterfactual framework, the links between LSLA, labour allocation, farm investment, farm income and food security will be explored.

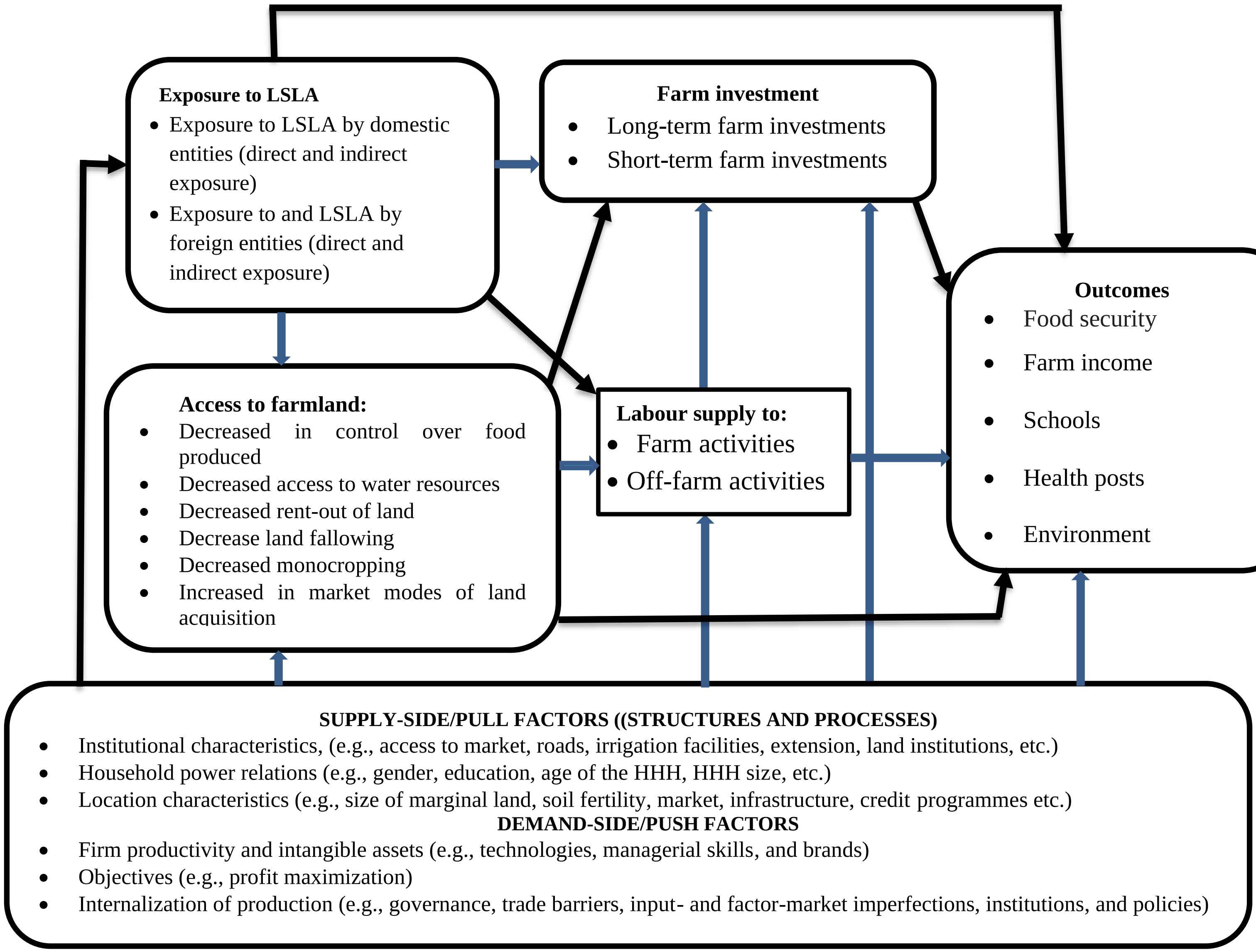

Figure 2.4: Conceptual framework of large-sale land acquisition (LSLA) and food security

Source: Author's conceptualization based on the literature, 2018

2.11 Summary of Chapter Two

This chapter reviewed the empirical literature on the main thematic areas of this study – LSLA, production and related factors, and food security. The chapter also explored the empirical and theoretical literature on the implications of LSLA on local occupants. Regarding LSLA, this study explored the concept, history, trends, investors and drivers that contributed largely to shaping the current debate, research and policies in sub-Saharan Africa and Ghana in particular. On the issue of concepts of LSLA, the review revealed three dimensions -namely the geographical, scale and the process dimension - upon which the concept of LSLA is defined. However, each of the dimensions presents some lapses in describing LSLA. In an effort to properly describe LSLA in Ghana, a combination of the scale and process dimension of LSLA has employed by the Lands Commission - the lead agency in charge of land registration in Ghana – and has been adopted as the operational definition of LSLA in this. The review also revealed that current wave of LSLA is not only a repetition of historical processes, but shares resemblance with what happened in past. The only difference between the present and the past form of LSLA is the trend and investors involved and as well as the drivers of LSLA.

Regarding production, the study explored the literature on production, land access, labour supply and farm investment. The review show that households diversify into both crops and animal production to manage the limited resources and as well avoid failure. Despite this effort, production has not been stable and has been influence by land access, labour, and investment in inputs. Concerning land access, the review revealed that access is governed by indicators of market and non-market modes of land acquisition and land rights including land use, control and transfer rights. On the issue of labour supply, the review revealed that households labour is divided between the agricultural and non-agricultural sector and that allocation between the two sectors depends on the opportunity costs of these activities. Further, it is revealed that farm investment can be measured in three ways namely: binary indicators, continuous indicators (i.e., the amount invested) or a combination of both at two-stages.

The review also showed that two opposing views, neo-colonialism and development optimism narrative, had emerged on the implication of LSLA on local occupants. The first view highlights the potential benefits of LSLA, whiles the second remained skeptical and highlight its potential threats to local occupants. The opposing views of these two schools of thought have fallen in line with both empirical and theoretical literature. Whereas some empirical and theoretical literature showed positive effect of LSLA on households' land access, labour supply, farm investment, farm income and food security, others show negative effects. Moreover, none of the existing studies analyse the land access, labour supply, farm investment, farm income and food security effects of LSLA by actors involved. The lack of clear-cut consensus in both empirical and theoretical literature on effect of LSLA on households, and scantiness of literature on the implication of LSLA by actors involved leaves a knowledge gap in the literature that this study seeks to address. Base on the review and knowledge gap, a conceptual framework is developed to highlight and test the links between LSLA and farmland access, labour supply, farm investments, farm income and food security.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is organised into seven sections. Aside introduction, the next section (section 3.2) presents the background of the research location in Ghana. Section 3.3 presents the design under which the study was conducted. Section 3.4 presents information regarding the target units of this study, the size selected and how they were selected. In section 3.5, detailed information regarding data collection is presented. Section 3.6 presents detailed information of the instruments employed in gathering the data. In the final section (section 3.7), information regarding how the data was analysed to achieve each of the objectives is presented.

3.2 Location of the Research Site in Ghana

The study was conducted in the northern part of Ghana (i.e., Northern, Savannah and North East region) (see Figure 3.1). 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 with some parts of it extending to the Sudan savannah zone. Further, it is characterised by a single rainy season which is of longer duration (lasting between May and October) but unpredictable and sporadic. The single rainy season is followed by relatively dry climate which last between November and March/April. Majority of people in the region are engaged in agriculture cultivating yam, maize, millet, guinea corn, rice, groundnuts, beans, soybeans, and cowpea. However, adverse conditions affect the inhabitants, farming, and other economic activities in the region. In particular, the effects of the high temperatures and heat are apparent with drought and regular outbreaks of cerebrospinal meningitis. The main vegetation is grassland, interspersed with guinea savannah woodland, characterised by drought-resistant trees such as acacia (*Acacia* species), mango (Mangifera *indica*), baobab (Adansonia *digitata*), shea (Vitellaria *paradoxa*), dawadawa (Parkia *biglobosa*), and neem (Azadirachta *indica*). Other features of the area which are of particular interest are the size, nature, and governance/management of the land in the region.

In terms of size, the area (i.e., Northern, Savannah and North East region) occupies about 70,384 square kilometers of the total land area of Ghana (MoFA, 2013). Also, the land is mostly low lying except in the north-eastern corner with the Gambaga escarpment. The area is less dense (35pp/sq. km) with total population of 2,479,461 inhabitants as at 2010 (GSS, 2012).

With respect to land governance, two-complementary systems of governance exist. The four paramount chiefs in the area – the Ya-Naa of Dagbong in Yendi, and Bimbilla Naa of Nanung in Bimbilla of Northern Region; the Nayiri of Mamprugu in North East Region; and the Yagbonwura of the Gonja Traditional area in Damongo of the Savannah Region – constitute the first of the two governance systems. Each of these chiefs has sub-chiefs and relates under them in a hierarchical way. Specifically, the sub-chiefs report to the paramount chiefs. The hierarchical order of power relations between the chiefs is extended to land use such that any land use activity in Dagbong, Mamprugu, Nanung and Gonja Traditional area is reported to the respective paramount chiefs by their sub-chiefs. However, land use, transfers and management are challenged with incoherency as they are largely influenced by the customs and traditions of each community. Land transfers are mostly by oral or informal under the customary system and are not necessarily protected by law in most cases (Kasanga et al., 1996). The second 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 Land Commission, the ministry manages public lands and any other lands vested in the President, facilitates the acquisition of land on behalf of Government, provide surveying and mapping services, minimize or eliminate sources of land boundary disputes, conflicts and litigations etc. However, the ministry is challenged with several problems and weaknesses. For instance, the ability to settle land problems, promote efficient land markets and secure economic and financial returns from lands is reportedly weak. Further, duplication of functions and lack of coordination of the various land administration agencies have complicated the situation (Senu, 2014).

The challenges of the two-complementary systems discussed above, and availability of land coupled with small population density and cheap farm labour make the region a hotbed for large-scale land acquisition by agribusiness investors. Special cases include the 23,762 hectares acquired by Biofuel Africa Limited in the Central Gonja and Yendi districts (Boamah, 2010), the Integrated Tamale Fruit Company (ITFC) in Savelegu district which has a nucleus farm of over 160 hectares and over 2000 out-growers many of whom are urban elites responding to the prospects of mango exports and acquiring lands (Ayamga & Wolfram, 2015; Kuusaana, 2017). Another company that merits explicit mention in this connection is the Integrated Water Management and Agricultural Development Ghana Limited (IWAD) which acquired 400 hectares in Mamprugu-Moagduri district for agricultural investment (Ayelazuno, 2019). Several other examples of LSLA by returning citizens, retiring from civil service and others seeking to invest their incomes in landed property also exist in the area.

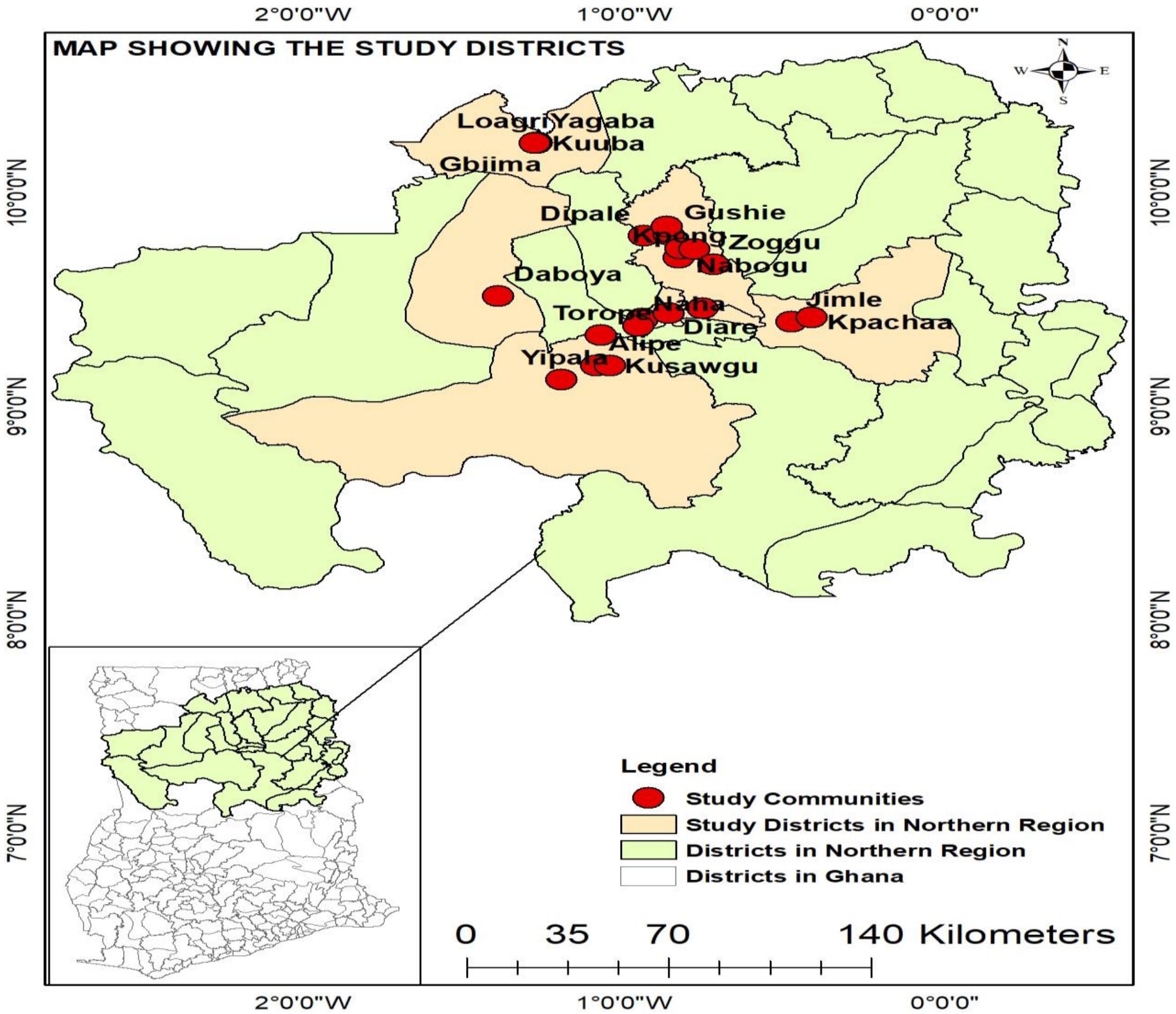

Figure 3.1: Map of study districts and communities

Source: Researcher's Construct, 2018.

3.3 Research Design

Research design refers to the overall plan employed by the researcher to obtain answers to the research questions and for testing hypothesis formulated (Johnson & Christiansen, 2014). According to Creswell (2009), choice of research design depends on the research questions, objectives, hypothesis and the issue being addressed. The purpose of this study was to analyse the effects of different forms of large-scale land acquisition on households' food production and security. However, as mentioned previously in sections (1.2) and (1.3), large-scale land acquisition is not a new phenomenon in Ghana and had been an ongoing practice since the colonial period. This implies that random assignment of farm households to treated and nontreated groups (a requirement for estimating impact of a programme) is not be possible. Given such caveats, there was the need to employed a design that allows control of assignment to treatment without relying on random assignment (Johnson & Christiansen, 2014). In this regard, the quasi-experimental research design was employed as the main research design. According to Johnson and Christiansen (2014), a quasi-experimental research design is type of experimental research design that does not provide for full control of potential confounding variables primarily because it does not randomly assign participants to comparison groups. Similar studies (e.g., Aha & Ayitey, 2017; Bottazzi et al., 2018; Mabe et al., 2019; Ojo, 2008; Shete & Rutten, 2015) made use of this type of design in classification of households for data collection and analysis. Thus, the sampled households in this study were classified under two main groups namely, ‘non-exposure to LSLA’ and ‘exposure to LSLA’. The households under ‘exposure to LSLA’ include households affected by LSLA from domestic and foreign entities whiles households under ‘non-exposure to LSLA’ include those that are neither affected by LSLA from domestic nor foreign entities. Further, households under exposure to LSLA by domestic and foreign entities were classified under ‘direct exposure to LSLA’ and ‘indirect exposure to LSLA’ by domestic and foreign entities. Using survey household survey and focus group discussions data was gathered from these households. Descriptive statistics and econometric models were then employed on the data to examine the implication of LSLA on households. The following sections present the information on sampling, data and analytical strategies employed.

3.4 Types and Sources of Data

Qualitative and quantitative data were collected from primary and secondary sources. Data from the primary sources were mainly obtained from household survey and focus group discussions with semi-Structured questionnaire and interview guide. These data sources helped to have access to reliable and accurate first-hand information relevant to the study. The secondary data was obtained from Lands Commission, Land survey department, and Town and country planning unit of Tamale. These sources provided secondary information which facilitated the attainment of the study objectives.

3.5 Target Population, Sample Size and Sampling Procedure

As of 2010, the total population of agricultural households in Ghana was 2,503,006 households. Out of this population, agricultural households in the study area was 240,238 households (GSS, 2012). Thus, the target population for the study comprised of all agricultural households (N=240,238) that are located within the geographical enclave of the study area.

The basic unit of analysis in this study is the agricultural household; hence a total of 690 exposed and nonexposed agricultural households were selected from target population. This sample size was considered for statistical reasons and partly for logistical considerations. Statistically, the sample size was large enough to study and generalize about the population in the study area. The sample size was arrived based on the estimation method given by Yamane (1967) and cited in Visco (2008) as:

$$n = \frac{N}{1 + N(e)^2} \qquad (3.1)$$

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 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:

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

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, the study relied on multi-stage sampling technique to completely gather quantitative data from the farmers. Several studies (e.g., Arezki et al., 2013; Lay & Nolte, 2018; etc.) have found that investment in land is strongly influenced by availability of potential arable crop land. The study area was selected for the study because it is with a known record of having vast potential arable cropland (PACs) in Ghana and therefore likely to attract investors. Next, six districts including Central Gonja, Mampurugu-Muagdure, Mion, North Gonja, Sagnarigu and Savelegu were again purposively selected on the basis of predominance of vast tracks of arable land under commercial deals. Documented information from the Northern Regional Lands Commission revealed that the six districts dominate in arable land under commercial deals or large-scale land acquisition (LSLA) and represent about 98.87% of the total deals documented (see Table 3.1).

Table 3.1: 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 using data obtained from Regional Lands Commission, 2017.

Using the reduction process, 23 communities exposed to LSLA were identified from the six districts. In the first stage of the reduction process, scoping exercise was conducted in the six selected districts to identify communities that is best represented by LSLA. The identification of the affected communities was based on key informant interview guide (see Appendix 1 for details). The interview guide was designed following the operational definition in section 1.10 of chapter one. These questions were asked to key informants including MoFA's extension agents, assemblymen, women leaders (Magazias) and community chairmen. The key informants were to help the researcher 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. At the end of the scoping exercise, 41 communities affected by LSLA were identified and profiled. Next, contrasting and comparing exercise was conducted on the 41 affected communities to identify similar communities that is best represented by LSLA from domestic and foreign entities. The contrasting identified 23 communities out of 41 affected communities.

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, common places - where farmers normally converge to play local games like 'Oware', 'Ludu game' or talk about daily activities including farming and other pressing issues - were identified for every community visited. Farmers from these locations were then asked to supply the names of agricultural households exposed to LSLA. The names supplied were compiled into a list and then used in the final stage sampling of exposed households for the study. In sampling exposed households, the simple random sampling technique was employed.

Specifically, the lottery method was used to avoid biases associated with nonprobability method of listing. To do this, the alphabets were written on a piece of paper which was folded together with other blank pieces of paper. The heads of exposed households then asked to pick at random with replacement. Farmers that picked the piece of paper with written alphabet were interviewed. This exercise was repeated until the selected farmers matched with the sample size. In all 552 exposed households – consisting of 276 households exposed to LSLA by domestic entities and 276 exposed to LSLA by foreign entities were selected for the study. On the other hand, non-exposed households were 138 households in the total sample. This made a total sample of 690 farmers for the study. It must however be noted that spill over effect is a general problem when selecting control groups in impact evaluation (Winters et al., 2011). Following Cavatassi, Salazar, Gonza, & Winters (2011), the study introduced proximity as a criterion to reduce spill over effects on non-exposed households. Thus, households with plots farther away from exposed households and are neither exposed to LSLA by domestic nor foreign entities were selected as the non-exposed households. This action was based on the idea that 'contamination' or spill over effects, arising from exposure to LSLA may affect neighbours before spreading but will not affect distant households. However, some responses were dropped in the data because of inaccuracies, inconsistencies, and outliers. This reduced the total sample to 664 households consisting of 526 exposed and 138 non-exposed. Among the 526 exposed households, 129 and 131 households were directly and indirectly exposed to LSLA by domestic entities whiles 136 and 130 were directly and indirectly exposed to LSLA by foreign entities. The distribution of the sampled farmers and their location in the selected districts and communities are respectively shown in Table 3.2 and Figure 3.1.

Table 3. 2: Selected Districts, Communities and Sample Size by Exposure Group

District	Community	Non-exposed	Exposed to LSLA by domestic entities	Exposed to LSLA by foreign entities	Total
Sagnarigu	Bukpamo	6	12	12	30
	Naha	6	8	15	29
	Nangbagu	4	13	13	30
	Changnaayili	5	13	9	27
Savalegu	Diare	6	12	12	30
	Dipale	6	10	13	29
	Gushie	5	11	14	30
	Kpong	4	11	14	29
	Nabogu	4	11	14	29
	Tunaayili	6	10	10	26
	Yapalsi	6	10	14	30
	Zoggu	6	10	11	27
Yagba-Kubori	Yagba	6	10	10	26
	Kuuba	5	13	11	29
	Loagri	7	12	10	29
	Gbiima	5	11	10	26
Mion	Jimle	8	14	8	30
	Kpachaa	7	10	12	29
North Gonja	Daboya	8	12	10	30
Central Gonja	Kusawgu	7	14	9	30
	Torope	10	13	8	31
	Yipala	5	10	13	28
	Alipe	6	10	14	30
Total	**23**	138	260	266	664

Source: Household Survey, Regional Lands Commission and Survey Department, 2017.

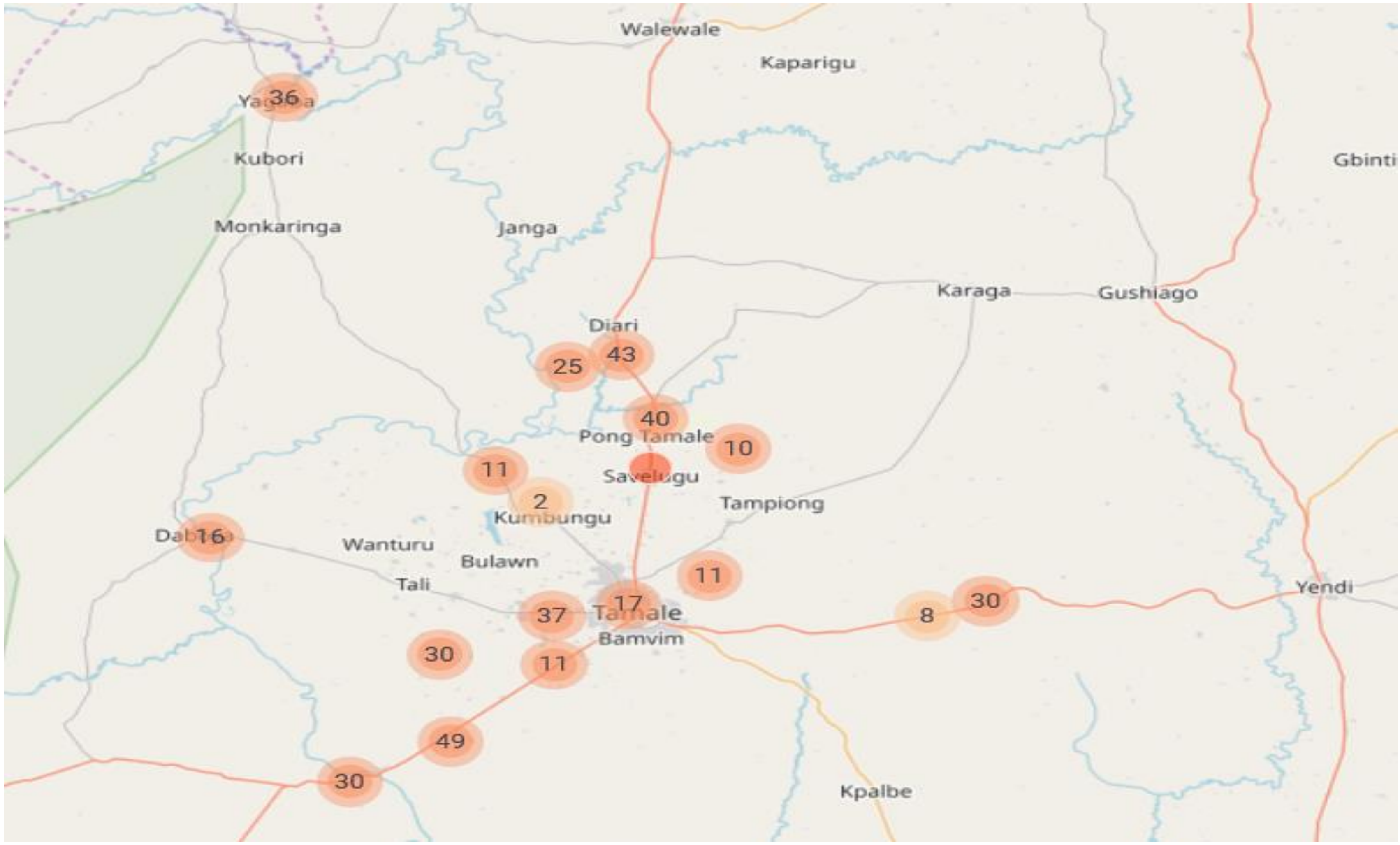

Figure 3.2: Overview of the study area

Note: The orange-colored circles represent the location of the respondent's communities during the interview whiles a figure in the orange-colored circles represent the number of farmers interviewed at that particular location.

Source: Field Survey, 2018

Based on this comprehensive sampling procedure, the sample can be considered to be highly representative of the overall population of agricultural households in Northern Region. Hence, the phenomenon under study can be extrapolated directly to the regional level.

In addition to the household survey, the study employed group interviews (hereinafter focus group discussions) to provide further explanations to the results from the household survey. The focus group discussion is a qualitative technique of data collection which involves interviewing a group of subjects which together prompt a discussion. Compared with household survey, focus group discussions allow the researcher to cover a wide breadth of topics in a limited amount of time (Kawamura & Morgan, 1998). Compared to the household surveys, the focus group setting is more likely to compel participants to reflect on LSLA and livelihoods and give detail explanations which have not been revealed with the survey. Regarding sampling, study employed purposive sampling technique in selecting 84 participants into six different groups for discussions. The choice of purposive sampling technique over random sampling technique stems from the fact that a randomly sampled group is unlikely to hold a shared perspective on the research topic and may not even be able to generate meaningful discussions. Second, small number of participants involved in most focus group projects makes it extremely unlikely that a sample of size 40 or so will be adequate to represent a larger population, regardless of random selection (Kawamura & Morgan, 1998). Babbie (2013) for instance, suggests that twelve (12) to fifteen (15) people are typically enough for an effective discussion. On the other hand, Twumasi (2001) proposes that the group should range from five (5) to twelve (12) in order to achieve an effective discussion. Since LSLA and livelihoods are both dimensionally broad and accuracy of information gathered on such issues can sometimes depend on group size, this study selected the 14 affected farmers with low household livelihood security index (HLSI) into each group after considering the suggestions from

Babbie (2013) and Twumasi (2001). The HLSI was calculated following Kamaruddin and Samsudin (2014), Buabeng (2015) and Mabe, Nashiru, Mummuni and Boateng (2019). The selecting of affected farmers with low HLSI is based on the idea that homogeneity of participants allows free flow of conversations among participants and also facilitate the analyses. After calculating the HLSI, the survey data which includes contacts of respondents were disaggregated into districts and sorted by HLSI. The top fourteen households with low HLSI were then selected in each district and invited using the contacts recorded during the household survey. In all, 84 participants (consisting of 42 participants exposed to LSLA by domestic entities and 42 participants exposed to LSLA by foreign entities) were selected to participate in six (6) focus group discussion, with one focus group discussion in each of the six districts selected for the study. These districts include Sagnarigu district; Savalegu; Yagba-Kubori; Mion; North Gonja; Central Gonja. As previously mentioned, each group composed of participants exposed to LSLA by domestic and foreign entities.

3.6 Data Collection

Large-scale land acquisition (LSLA), food production and food security remain central to livelihoods but are difficult to study. With respect to land, information provided by farmers can sometimes be shady and more considerably, scattered, and difficult to understand. For instance, for fear of been evicted or providing information that might lead to further dispossession, farmers or disgruntled victims are sometimes less inclined in sharing their stories [Vermeulen & Cotula, (2010) cited in Nyantakyi-Frimpong & Kerr, (2016)]. This makes it difficult to get precise information on total landholdings. Similarly, the multidimensional nature of and food security makes it complex as it is difficult to gather complete information about farmers. Given these nuanced issues and the need to piece together information concerning LSLA and food security, the study employed household survey and focus group discussions for the data collection. Thus, after sampling the households, household survey and group interviews were employed for better capture data and answer the questions of the study. By these methods, questions were asked to participants selected and the responses were written by the enumerators. In addition, these methods were employed so as to give the interviewee(s) the opportunity to ask questions for clarification.

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, reconnaissance survey, pretest, and main survey of targeted respondents. The pretest and the main survey were preceded by a reconnaissance survey which involved visits to the areas selected. During the visits, meetings were held with local stakeholders of the communities. These allowed for establishment of networks for the study. This lasted for one week and helped in familiarization and establishment of rapport in the communities. The reconnaissance survey was followed by the pretest of questionnaire. The purpose of the pretest was to get feedback regarding the questionnaire structure and the perceived time-cost in 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 in 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. This covered a period of one month with the enumerators making personal visits to the destination of the respondents. Whereas some of the respondents were interviewed on their farms, others were interviewed at their place of residents. On the average, the duration of each interview ranged from 120-180 minutes (i.e., 2-3 hours) and this was largely contingent on the pace of the response by the respondent. Information on LSLA, information on labour supply, farm investments, crops food production were captured for the 2017/2018 cropping season. Further issues regarding predefined indicators of food security were captured. Given the study objective of measuring the farmland access, labour allocation, farm investment, farm income and food security effects of exposure to LSLA, outcome information of the state of households before exposure to LSLA is imperative. However, because such information is concurrently unavailable in a cross-sectional study, non-exposed households were used as control groups for comparison. Thus, the survey also captured the same information about the nonexposed households.

Regarding the focus group discussions, the participants were informed about the survey results prior to the start of each interview, so that they could use the results as a reference point to offer their explanations. Tape recorder was the main instrument for recording the conversations at the group level. However, the responses from the interviews were also written in a pocket notebook so that in the event of the recorder failing, the information will remain intact. It is worth noting that more than half (46) of the 84 participants had previously taken LSLA surveys in their communities and therefore had experience in issues concerning LSLA. For this reason, each discussion averagely lasted in less than 3 hours (180 minutes) and ranged between 1.75 hours and 2.5 hours. Overall, the group discussions lasted for 6-days with most of the time spent on probing the participants about the responses provided for the questions asked. The rationale for probing participants is to help explain the results of the survey. There were instances where participants expressed contradicting explanations for some of the results. In such cases, the participants were allowed to dialogue and come to a common conclusion.

3.7 Instruments used for Data Collection

The study used semi-structured questionnaire loaded in Kobo Toolbox for the household survey[2]. The questionnaire had six sections. Section one covered information regarding farmer/household, farm/plot, and institutional characteristics of the respondents. Section two covered information on household LSLA. Further questions relating to transparency, respect for existing rights, destination of the products and benefits were captured in section two. These questions were however asked on the basis of the information given about land loss. With respect to transparency, the team asked whether households were informed and involved in negotiating the deals. In respect of existing rights, questions regarding access to land, compensation and sustainable employment and living wages were asked i.e., whether households were allowed access to land, whether they were properly compensated and whether the activities from the LSLA are creating employment and access to living wages. With respect to benefits, the team asked whether the compensation is an ongoing revenue stream and whether the benefit is used for any development project. Lastly, the team asked if the produce from the grabbed land is sold in the local market for local people to consumed. Also, information on the type and extent of land loss and the scales of land loss were asked. Section three covered information on *households' land holdings and farm labour allocation*; Section four covered information on *households' farm investments*; section five covered information on *households' food production*; and section six covered information on *households' food security*. Section six of the questionnaire employed formats proposed in literature

[2]Kobo Toolbox is an online open-source suite of tools for field data collection developed by the Harvard Humanitarian Initiative at the Brigham and Women's Hospital. The software stores the excel formats, which can be downloaded and imported into Stata, SPSS, or any statistical software for analysis. Thus, one notable advantage of using the software is that the time needed for data entry is saved for other purposes. The Kobo Toolbox was installed in Android phones of each of the enumerators and questions from the questionnaire were then loaded onto the Kobo Toolbox for the household survey.

and documents of think-tanks (eg.g, FAO, 2008; Makate et al., 2016; Mango et al., 2014; Swindale & Bilinsky, 2006; WFP, 2009b) for generating information on food security indicators (i.e. FCS, HFIAS) for measuring food security of households. Specifically, templates for calculating FCS and HFIAS formed part of the questionnaire. Regarding FCS for instance, the template contained questions regarding all foods eaten. Each food group was given a score of 0 to 7, depending on the number of days on which it was consumed. For HFIAS, the respondents were asked nine occurrence questions, reflecting their experience about the occurrence of food insecurity for the previous 30 days. Each question is followed by two choices, 'yes' and 'no'. Each severity question is succeeded with another question on rate of occurrence during the previous 30 days. The lowest score in HFIAS is zero and it occurs if respondent answers in the negative for all the questions. The highest score is 27, which occurs when a household answers in the affirmative to all questions and 'often' to the nine frequency of occurrence questions.

Regarding the focus group discussions, an interview guide and tape recorder were used in capturing responses. The interview guide consisted of open-ended questions. These questions were generated from the findings of the survey data and required respondents to provide a general view about farmland access, labour supply, farm investment, food production and food security effects of exposure to LSLA under domestic and foreign entities. Specifically, questions captured information about farmland access, labour supply, farm investment, food production and food security effects of LSLA by domestic and foreign entities.

3.8 Data Analysis

The data from the household survey were cleaned and edited. Cleaning and editing were done to detect faulty data, and to prevent any form of ambiguities and inconsistencies in the responses offered by the interviewees. Specifically, changes noted in mode of acquisition, reasons for engaging with land institutions, name of contracting company or out-grower and the crop produced, reasons for not receiving compensation, etc. – carried the same message, but in different wording and were edited to allow the software to easily transform the data into a countable and tabulated form. Also, calculations of some of the outcome variables such as farm income required quantities of output produced. However, this information was missing for some of the households and was therefore dropped. After dropping some of the cases, a total of 664 cases remained and were imported into STATA version 15.0 for analysis and generation of the results of this study.

As mentioned in section (3.5), LSLA is difficult to study since information provided by farmers can sometimes be erroneous. In this study, exposure to LSLA was first captured as a binary variable derive 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. Base on the responses to these questions, households were grouped into: (1) non-exposed; (2) exposed to LSLA by domestic entities; and (3) exposed to LSLA by foreign entities. Further, exposed households (i.e., households under category 2 and 3) were asked questions concerning the details of the loses due to LSLA. Based on responses to this questions, exposed households were further classified as directly and indirectly exposed household. The directly exposed households included those losing farmland, labour, and farmland-based resources such as forest 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 have to travel longer distances to clear new farms; those having limited land and cannot practice fallowing, monocropping because land has become scarce due to enclosures. Based on the above classifications, the effect of each of the direct and indirect exposure to LSLA by domestic and foreign entities on households was analysed using descriptive statistics, Pearson Chi-Square (χ^2) test and counterfactual approaches. However, the choice of a specific method was made with due consideration to the objective and the potential estimation problems that may come thereof. The empirical strategies for analyzing the effects of LSLA on farmland access, off-farm employment, farm investments, farm income and food security from survey data are outlined in the next subsections.

Regarding the focus group discussions, responses were transcribed into a field notebook by listening to the audio recordings at least thrice to help ensure accuracy of transcription. The transcribed data was then sorted into coded themes with emphasis on knowledge of LSLA and its implications on local people. Further, three assistants with knowledge in qualitative methods were independently assigned to review the transcribed information and the coded themes, with emphasis on the impacts of LSLA on livelihoods. A meeting was then organised to discuss results, and to resolve discrepancies regarding the transcribed data and coded themes. In the end, there was 100% accuracy in transcription and coding as none of the reviewers detected any discrepancy. Next, the coded statements made by the participant were entered into Stata 15 software for analysis using frequencies and percentages. These coded statements were employed to explain the survey results.

3.8.1 Effects of Land Acquisitions on Farmland Access

In this section, the method employed to examine the relationship between LSLA, and farmland access is presented. As indicated in section 2.3.1 of chapter two, land refers to both land area and land-based resources whiles access refers to the rights to use, control and transfer land and land-based resources (FAO, 2002). Thus, farmland access refers to the rights to use, control and transfer land and land-based resources without any restrictions. In northern Ghana, common rights among peasants include ability to cultivate crops and rear animals or both, ability to fallow it or practice monocropping, ability to rent it out to other users such as friends and relatives, ability to control food produce on that land and ability to access water from that land. Farmland access is also connected with modes of acquisition including lease, sharecropping, loaning, purchasing, and renting. This study therefore captured farmland access using production ability (i.e., whether a households is able to produce crops or rear animals on it plot), water access (i.e., whether a households is able access water on the plot), ability to fallow (i.e., whether a households is able to fallow its plot), monocropping (i.e., whether household is able practices monocropping on its plot), ability to control food produced (i.e., whether household is able to control food produced on the plot), and ability rent-out (i.e., whether households can rent-out plot to any person), lease (i.e., whether households can acquire land through leasing), sharecropped (i.e., whether households can acquire land through sharecropping), purchase (i.e., whether households can acquire land through outright-purchase) and rent-in (i.e., whether households can acquire land through renting-in), inheritance (i.e., whether households can acquire land through inheritance) and gift (i.e., whether households can acquire land through gifts). Descriptive statistics such as percentages, and crosstabulations with Chi-square statistics were employed to determine the relationship between these indicators and the various categories of households under LSLA by domestic and foreign entities (i.e., direct, and indirect exposure). The descriptive statistics were used to analyse the relationship between modes of land acquisition and various categories of households under exposure to LSLA by domestic and foreign entities. The cross tabulations were used to investigate any association between the indicators of rights to farmland access and various categories of households under LSLA by domestic and foreign entities. The Chi-square test on the other hand was used to investigate whether there is significant association between the different categories of LSLA by domestic and foreign entities and the indicators of farmland access. In the Chi-square analysis, the *p-values* which indicates the level of statistical significance for associations between variables was set to less than 0.05.

3.8.1.1 Hypotheses

As argued by the Marx (2010) and Harvey (2003), taking land, establishing rights on such holdings, enclosing it, and expelling a resident population limit farmland access. Since land access is connected to modes of acquisition, use, control, and transfer rights of the land and land-based resources, it is hypothesized that:

i. Market modes of land acquisition such as leasing, sharecropping, pledging, outright-purchase, and renting-in will be common among households that lost land directly or indirectly to LSLA by domestic and foreign entities

ii. Direct and indirect land lost to LSLA by domestic and foreign entities will limit all forms of land rights in northern Ghana. This implies that LSLA will limit production decision, decision to fallow, practice of monocropping, ability to access water resources on the plot, ability to control food produced and ability to rent-out land among households exposed to LSLA.

3.8.2 Effect of Large-Scale Land Acquisition on Labour Supply

Farm households supply labour to either farm or off-farm employment. Thus, labour supply can be directly captured using binary indicators (i.e., whether household participates in farm or off-farm employment), the number people working on farm or off-farm or number of hours spent on farm or off-farm. In this study, the effects of LSLA on labour supply were examine through its impact on level of farm labour supply, number of people working off-farm and time spent in off-farm employment. Descriptive statistics such as means, standard deviation and percentages were used to show the relationship between direct and indirect exposure to LSLA under domestic and foreign entities and households' perception of level of farm labour supply, and number of people working off-farm. Lastly, the direct and indirect exposure to LSLA under domestic and foreign entities on time spent in urban off-farm were examined using the multinomial endogenous treatment effect (METE) model. The paragraphs that follow outline the notion behind application of METE model.

Although no consensus exists about direction of 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, acquisition of land in large scale can have direct impact on households' off-farm labour supply (Cotula et al., 2009; Friis & Reenberg, 2010a; GRAIN, 2016; Ju et al., 2016; von Braun & Meinzen-dick, 2009). Given that large scale land acquisition is actually related to labour supply, the effect of large-scale land acquisition on labour supply to off-farm can be estimated using OLS model of the form:

$$LS_i = \beta_0 + \beta_1 LSLA_i + \beta_2 X_i + \eta_i \qquad (3.2)$$

Where LS_i is the vector of the household labour supply (measured in hours); $LSLA_i$ 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 as captured in the Figure 2.4 and Table ; η_i is a random term. Equation (3.4) also implies that the observations of the explanatory variables are considered fixed in repeated samples, that is, assumption of fixed regressors. Given that this assumption holds, $LSLA_i$ will be uncorrelated with X_i and η_i, and equation (3.2) can be estimated using OLS. In this regard, the labour supply effect of household's exposure to LSLA will be β_1 which is unbiased and consistent (e.g. Wooldridge & Semykina, 2005). Unfortunately, this does not hold for a number of reasons. As mentioned previously, household's exposure to LSLA depends on both supply-side/pull and demand-side/push factors. This implies that household's 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, protection from institutions (Anseeuw 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 effects of LSLA. Failure to account for this potential selection bias could lead to inconsistent estimates of the effect of LSLA. Aside 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 household has loss land or not, who acquire the land and type of loss. However, the treatment (category of exposure to LSLA) may be mismeasured because of random recording of errors or the provision of intentionally/unintentionally false statements. For instance, a respondent may intentionally report losing land to 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 answering of some of the questions. By extension, the incorrect responses will lead to errors in classification of households into nonexposed, directly and indirectly exposed households under LSLA by foreign and domestic entities. Such errors may cause a correlation between LSLA and the random error term and estimation of equation (3.2) by OLS may produce biased and inconsistent estimates.

To correct for these biases and as well determine the effect of the multiple treatment, approaches such as multinomial propensity score (MNPS), multinomial treatment effect (METE) and multinomial endogenous switching regression models (MESR) are respectively proposed by Cefalu and Buenaventura (2017) and McCaffrey et al. (2013), Deb and Trivedi (2006) and Bourguignon et al. (2007) for multinomial treatments, and have been employed in most studies (Kassie et al., 2018; Khonje et al., 2018; Manda et al., 2016; McCaffrey et al., 2013; Ng'ombe et al., 2017). However, multinomial propensity score (MNPS) relies on conditional independent assumption (CIA) and assumption of common-support and does not control for bias resulting from unobserved characteristics. However, owing to the fact that this study aims to control for 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 use of the METE model is based on the idea that proper evaluation of effect of an intervention on any outcome of interest in a nonrandomized experiment must use techniques that control for selection bias stemming from both observed and unobserved variables. This is because failure to use such techniques might lead to wrong estimates of the effect of the intervention. Other techniques that exist for this estimation are the multinomial endogenous switching regression (MESR) (Bourguignon et al., 2007). The empirical strategy for analyzing the effects of LSLA by domestic and foreign entities on households' off-farm employment is using the METE model is presented below.

3.8.2.1 *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 large-scale land acquisition (LSLA) under domestic and foreign entities, and defined it as $\mathbf{d}_i = (d_{i1,} d_{i2,} d_{i3}, \dots, d_{iJ})$. Where d_j is a binary variable 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 associated with the type of household's exposure and outcome, such that $\mathbf{l}_i = (l_{i1,} l_{i2,} l_{i3}, \dots, l_{iJ})$ and l_j is the unobserved characteristics of exposed households. The first stage regression estimates the probability of exposure to any form of exposure to LSLA as:

$$\Pr(d_i|Z_i, l_i) = g(\alpha_1 Z_i + \delta_1 l_{i1}, \alpha_1 Z_i + \delta_2 l_{i2} + \alpha_J Z_J + \delta_J l_{iJ} \qquad (3.3)$$

Where z_i is a vector of household and choice characteristics; 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:

$$\Pr(A = j) = \frac{\exp\,(\alpha_j Z_i + \delta_j l_{ij})}{1 + \sum_{k=1}^{J} \exp\,(\alpha_k Z_i + \delta_k l_{ik})}, \quad j = 0, 1, 2, 3, \dots, N \qquad (3.4)$$

In the second stage, we evaluate the impact of household's exposure on farm investment (I) as:

$$E(E_i|d_i, X_i, l_i) = \beta X_i + \sum_{j=1}^{J} \gamma_j d_{ij} + \sum_{j=1}^{J} \lambda_j l_{ij} \qquad (3.5)$$

where X_i is a set of exogenous covariates with associated parameter vectors β and γ_j denotes the impact of direct and indirect exposure under domestic and foreign entities relative to non-exposure; $E(I_i|d_i, X_i, l_i)$ is a function of each of the latent factors l_{ij}, and implies that unobserved characteristics that affect selection into an exposure also affect outcomes (i.e. time spent on urban 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 was assumed to be gamma for time spent off-farm since it was captured as 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.

For identification of the treatment equations, 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. Such 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 dangers of conflict with local users increases. Thus, acquirers with investments that has 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 serve 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 enhances 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 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 compare to the powerless or migrants (Arezki et al., 2013a). Three indicators were employed to account for land governance, information and power, namely, availability of land institution (measured as 1 if formal land institution such as lands commission, land survey department and town and country planning is available; 0 if otherwise), knowledge of any farmer affected by LSLA (measured as 1 if any member of the household had prior knowledge of farmers in other communities affected by LSLA; 0 if otherwise) and leadership position (measured as 1 if a farmer is in leadership position in the community; 0 if otherwise). These variables are therefore expected to influence exposure to LSLA but not household's time spent off-farm. Admissibility of these instruments was established 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 5.3 of the chapter five 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 5.4). Although the model is already identified without inclusion of instrument (Deb & Trivedi, 2006), 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.

3.8.2.2 *Specification of the relationship between large-scale land acquisition and time off-farm*

As revealed in the multinomial endogenous treatment effect model, the relationship between the index of LSLA and time spent of farm is estimated in two stages. The first stage is the selection equation specified in this study as:

$$LSLA_i = \beta_0 + \beta_1 PR_i + \beta_2 L_i + \beta_3 I_i \qquad (3.6)$$

The second stage is the outcome equation specified as:

$$OFT_i = \beta_0 + \delta_1 PR_i + \delta_2 L_i + \delta_3 I_i + \delta_4 LSLA_i \qquad (3.7)$$

Where $LSLA_i$ is an index of non-exposure, direct and indirect exposure of household to land loss under LSLA by domestic and foreign entities; $\beta_i's$ are coefficients of the parameters to be estimated; PR_i is a vector of power relations within household i and include gender of the household head, his/her educational level, leadership position, landholding, tenure security and prior knowledge of other households affected by LSLA in other communities. Further, L_i is an index of the location factors including fertility of soil, duration of fallowing, availability of water resources, wage rate, compensation and districts under study; I_i is a vector of institutions, governance, laws and policies including the presence of social group, financial institutions and land institutions.

The variable representing households' power relations, location factors and institutions, governance, laws and policies were selected base on literature on LSLA and off-farm employment (e.g., Abdulai & Regmi, 2000; Benjamin, 2009; Ju et al., 2016; Weersink, Nicholson, & Weerhewa, 1998). These variables were categorised under supply-side factors in our conceptual framework in section (2.9) of chapter two. The definition/measurement and expected sign of each variable on LSLA and time spent in urban off-farm employment are presented in Table 3.3 below. It must be pointed out that the variables focused on only supply-side variables because demand side factors are investor/firm-specific factors which were unavailable at firm level.

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Table 3.3: Variable definition/measurement and a priori expectations in models for LSLA

Variable	*Definition/measurement*	*Expected sign*	
		Exposure to LSLA	Urban off-farm employment
Urban off-farm employment	Total labour time allocated to urban off-farm employment (in hours)	N/A	N/A
Wage rate	Amount in Ghana cedis (GH¢)	+	+
Compensation	Payment received after displacement (Amount in Ghana cedis (GH¢))	+	+/-
Fallow period	Number of years	+	-
Landholding	Total number of acres of land owned by the household	+	-
Gender	1 if household head is male, 0 otherwise	-	+
Water sources	1 if there is available water resource; 0 if otherwise	+	-
Good fertile	1 if fertility of the soil is good; 0 if otherwise	+	-
Moderately fertile	1 if fertility of the soil is moderate; 0 if otherwise	+	-
Poorly fertile	1 if fertility of the soil is poor; 0 if otherwise	-	+
Social group	Membership to social group (1=yes; 0=no)	-	-
Financial institution	1 if household financial institution is available; 0 if otherwise	+/-	+
Education	Number of years spent in formal education	-	-
Sagnarigu	1 if farmer is located in Sagnarigu district, 0 otherwise	+	+/-
Mion	1 if farmer is located in Mion district, 0 otherwise	+	+/-
Central Gonja	1 if farmer is located in Central Gonja district, 0 otherwise	+	+/-
Savelegu	1 if farmer is located in Savelegu district, 0 otherwise	+	+/-
Yagba-Kubori	1 if farmer is located in Yagba-Kubori district, 0 otherwise	+	+/-
North Gonja	1 if farmer is located in North Gonja district, 0 otherwise	+	+/-
Leadership position	1 if household head is in any leadership position; 0 if otherwise	-	N/A
Land institution	1 if formal land institution such as lands commission, land survey department and town and country planning is available; 0 if otherwise	+/-	N/A
Knowledge	1 if household has prior knowledge of farmers in other communities affected by the LSLA; 0 if otherwise	-	N/A
Exposure to LSLA by domestic entities			
No exposure	1 if household is neither directly nor indirectly affected; 0 if otherwise	N/A	-
Direct exposure	1 if households lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	N/A	+
Indirect exposure	1 if household live 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			
No exposure	1 if household is neither directly nor indirectly affected; 0 if otherwise	N/A	-
Direct exposure	1 if households lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	N/A	+
Indirect exposure	1 if household live 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	+

3.8.2.3 Hypothesis

Based on the theory (e.g., Ju et al., 2016) and conceptual framework in section (2.9) of chapter two of this study, the following hypotheses are formulated for the relationship between exposure to large-scale land acquisition (LSLA) and household labour supply:

i. Level of farm labour input is expected to decrease among households directly and indirectly exposed to LSLA under domestic and foreign entities.

ii. Number of exposed household members working in off-farm employment (i.e., rural off-farm employment where the investment farms are established after acquisition, urban employment, and unemployment) is expected to increase for direct and indirect exposure to LSLA under domestic and foreign entities.

iii. Time spent on off-farm employment is expected to increase for direct and indirect exposure to LSLA under domestic and foreign entities.

3.8.3 Effect of large-scale land acquisitions on farm investment

In this study, the effect of large-scale land acquisition (LSLA) on farm investments is estimated through its effects on two types of farm investment namely, long-term (investment in irrigation or soil and water conservation techniques (SWCT)), and short-term (NPK (15:15:15), Sulphate of Ammonia and Urea (46:0:0)) farm investments. The study focus on these techniques because adoption among smallholders has been a long-term policy objective of most countries in sub-Saharan Africa (see for instance, NEPAD, 2003) and Ghana in particular (see for example, Ministry of Food and Agriculture, 2017; MoFA, 2007), yet information on adoption in the wake of LSLA is scanty. Each type of investment was measured using binary indicators: long-term farm investments (i.e.,1 if household had made investment in irrigation or soil and water conservation techniques (SWCT) and 0 if otherwise) and short-term farm investments (i.e., 1 if household had made investment in variable inputs such as NPK (15:15:15), Sulphate of Ammonia and Urea

(46:0:0) and 0 if otherwise). Binary indicators were used because most of the farmers were unable to recall the quantities of organic fertilizer applied for the 2017/2018 cropping season. Moreover, it was extremely difficult to obtain reliable information about the amounts of labour spent on each of these investments. Quiet apart from these problems, there was not well establish price for application of SWCT, and most farmers could not recall the amount spent in application of these techniques on their farm. Thus, there was no option than to use dummy variables to assess the importance of investment behavior.

There is a consensus proposition in theoretical and empirical literature that farmer's perception of tenure insecurity creates uncertainty about returns to his/her investments, compelling the farmer to choose short-term investments over medium and long-term investments (Barrows & Roth, 1990; Feder & Onchan, 1987; Hayes et al., 1997; Marshall, 1890; Place & Hazell, 1993). Feder & Onchan in particular show from first order conditions of equation (2.30) that farmers will invest in capital equipment and land-improving or conservation measures if any of such investments leads to positive expected terminal wealth aggregated over the planning horizon. However, the change in the expected terminal wealth is not observable, but can be related to household's investment in capital equipment K and land improving techniques M in the following reduced-form structural equations:

$$K = K(\Phi, W_o, A, S) \qquad (3.8)$$

$$M = (\Phi, W_o, A, S) \qquad (3.9)$$

Investment in capital equipment K and land improving techniques M in equations (3.8) and (3.9) are both influenced by tenure insecurity Φ, initial wealth W_o, amount of land A and human capital S and can be generally expressed as:

$$I_{ik}^{*} = \delta_i E_{ik} + \vartheta_i X_{ik} + \mu_{ik} \quad (k = \text{long term, short term farm investments}) \qquad (3.10)$$

Where I_i represent type of farm investment made by household i; E_i is a vector of direct and indirect exposure to LSLA under each of the domestic and foreign entities replacing household's tenure insecurity; X_i is a vector of initial wealth (captured as household income), land, human capital (captured as education in this study), and other supply-side variables shown in Table 3.4; X_i may also include rate of return on investment which is regarded as proxy for the profitability of land improving structures. Since respondents could not recall the value of the returns on investments made, households' perceptions of the impacts of investments on improvements in land quality and crop yield was employed to capture return on investment. Another variable in X_i is the time dimension. Which is captured using education (measured as the number of years in schooling); δ_2 is the coefficient of X_i; μ_I is a random term. Denoting long-term and short-term farm investments respectively as LTI and STI, equation (3.10) can be transformed into a binary probit equation for participation for each investment option under the following mapping from the latent variable to its observed realization:

$$I_{ik} = \begin{cases} 1 \; if \; I_{ik}^{*} > 0 \\ 0 \; if \; I_{ik}^{*} \leq 0 \end{cases} \qquad (k = LTI, STI) \quad (3.11)$$

Equation (3.10) implies that when examining the effect of the different forms of exposure to LSLA on the binary indicator for farm investment, one can include types of exposure to LSLA (i.e., direct and indirect exposure) in logit or probit model for each of the farm investment and interpret δ_1 as the effect of direct or indirect exposure to LSLA on household farm investment decision. This is true under assumption that no correlation exists between the error term μ_i and direct and indirect exposure to LSLA E_i in equation (3.8) i.e., $\rho = corr(\mu_i, E) = 0$. However, state, and traditional authorities in charge of land sales may have selected the plots based on their quality attributes (often unobservable). Such non-random process of selecting plots for acquires may lead to systematic difference between exposed (i.e., direct, and indirect exposure) and non-exposed households. The differences may lead to correlation between the error term μ_i and exposure variables E_i [i.e., $corr(\mu_i, E_i) \neq 0$]. Failure to account for such potential selection bias could lead to inconsistent estimates of the effect of direct and indirect exposure to LSLA under domestic and foreign entities. Moreover, it has been shown in empirical and theoretical studies that in many traditional tenure systems, farmers may minimize eviction rates through investment in short to long-term land improving techniques. Abdulai, Owusu, & Goetz (2011) for instance show that a tenant or sharecropper who feel insecure can conserve or invest in the soil to minimize eviction by landlords. Other studies further argued that farmers with perceived risk of losing their land rights may resort to undertaking higher investments which in turn enhance their claims to the land (Place & Migot-Adholla, 1998; Sjaastad & Bromley, 1997). Given such reverse causality, $\rho = corr(\mu_i, E_i) \neq 0$. In this regard, logit or probit estimation of equation (3.8) will lead to biased estimates. To account for the potential selection bias and reverse causality and as well examine the effect of direct and indirect exposure to LSLA on farm investment in equation (3.8), the following systems of simultaneous equation are specified:

$$E_i = a_0 + a_i X_i + \pi_i I_i + \varepsilon_i \qquad (3.12)$$

$$I_i = \delta_0 + \delta_1 E_i + \delta_2 X_i + v_i \qquad (3.13)$$

Where E_i is vector of direct or indirect exposure to LSLA under domestic entities; denotes the I_i type of farm investment; X_i is the value of control variable for household I; $\varepsilon_i$and v_i are predicted values in exposure and investment equation, respectively. To estimate the system of equations above, a two-stage least square methods have been proposed but requires either the dependent variable or endogenous variable to be continuous. However, both the dependent and endogenous variables in this study are discrete. Hence, the usual two-stage approach will not be able to address the endogeneity problem. Alternative methods include the two-stage instrumental variable (2SIV) (Lee, 1981), the generalized two-stage simultaneous probit (G2SP) (Amemiya, 1978), Amemiya's generalized least square (AGLS) (Newey, 1987), two-stage least square probit (2SLSP) (Hausman and Taylor, 1981), and two-stage conditional maximum likelihood (2SCML) (Rivers and Vuong, 1988). To estimate the effect of direct and indirect exposure to LSLA under each of domestic and foreign entities on farm investments, this study employed the two-stage conditional maximum likelihood (2SCML) model (Rivers and Vuong, 1988; Wooldridge, 2002) since both exposure to LSLA and the different farm investments (i.e., long term investment and short-term investment) were each captured as binary variables. The 2SCML approach assumes that the predicted values of the second-stage equation are normal, conditional on the endogenous explanatory variable, and the predicted values from the first-stage equation. Thus, rather than using only the predicted values of the endogenous variables obtained through the first-stage regression as in the standard IV approach, the 2SCML includes the endogenous variables and their respective predicted values obtained from the first-stage equation into the second stage probit equation. In this study, the 2SCML approach because it outperforms most of the alternative in terms of bias and mean square (Alvarez & Glasgow, 2000; Bollen, Guilkey, & Mroz, 1995; Rivers and Vuong, 1988). In addition, the 2SCML provides several convenient tests of endogeneity. To examine the effect of direct and indirect exposure to LSLA on short and long-term investment under domestic entities, the following systems of equations were specified:

$$E_i = a_0 + a_i X_i + \eta_i \qquad (3.14)$$

$$P_i^I = \delta_0 + \delta_1 E_i + \lambda_i \hat{E}_i + \delta_2 X_i + \omega_i \qquad (3.15)$$

Where P_i^I denote probability of short term or long-term investment made by household I, $\hat{E}_i$ is the residual term from equation (3.11). These equations were then estimated using the two-stage conditional least squares (2SCML). The 2SCML technique employs linear probability model for the first stage estimation [equations (3.14)] and then introducing the residual ($\hat{E}_i$) and the endogenous variable (E_i) into the second-stage estimation [i.e., probability of farm investment equation (3.15)]. An important feature of 2SCML is that the usual t-statistics for coefficients λ_i is valid tests of the null hypotheses that the exposure variables are exogenous in the investment equations (Abdulai et al., 2011; Wooldridge, 2002). In equation (3.15), the significance of λ_i is an indication that exogeneity is rejected and that the inclusion of the predicted values corrects for endogeneity.

Aside selection bias, long-term and short-term investment could be interdependent. For instance, a household investing labor and/or money in long-term land improvement will have less labor and money available for land short-term improvement (loss of labor and income effect). On the other hand, households investing in long-term land improving technologies may invest in short-term input like fertilizer since the two types of investments may complement each other in achieving output increase. Ignoring such potential interdependence between long-term and short-term land improving may be biased estimates of the impact of LSLA on improvement decisions. Thus, because of the potential substitutability or complementarity between the investment options, it is most likely that the error terms of these equations will be correlated. Let us assume that the error term $\mu_{ik}(k = \text{LTI}, \text{STI})$ in equation (3.10) jointly follow a multivariate normal distribution with mean zero and variance 1, and the covariance matrix $\sum$. This can be expressed as:

$(\mu_{LTI}, \mu_{LTI}) \sim MVN(0, \Sigma)$. Maximum likelihood method can then be employed to estimate the parameters and the correlations of the error terms (Greene, 2008). Thus, in the case of this study, the second stage estimation of effect of direct and indirect exposure to LSLA on short and long-term investment under each of the domestic and foreign entities (i.e., equation (3.15)) using 2SCML is multivariate probit model. The multivariate probit model tests the potential interdependency between long-term and short-term farm investment using the sign of the correlation coefficient between the different investments. The sign of correlation coefficients between long-term and short-term investment could provide an idea of whether there is complementarity (positive correlation) or substitutability (negative correlation) between long-term and short-term investment (Belderbos et al., 2004).

For the effect of short and long-term investment on direct and indirect exposure to LSLA under each of domestic and foreign entities, the following systems of equations were estimated using the two-stage conditional least squares (2SCML):

$$I_i = \delta_0 + \delta_2 X_i + \epsilon_i \qquad (3.16)$$

$$P_i^E = \delta_0 + \delta_1 I_i + \gamma_i \hat{I}_i + \delta_2 X_i + \xi_i \qquad (3.17)$$

Where P_i^E denote probability of exposure to LSLA, $\hat{I}_i$ is the residual term from equation (3.16). This again require use of a linear probability model for the first stage estimation (equations (3.16)) and then introducing the residual ($\hat{I}_i$) and the endogenous variable (I_i) into the second-stage multinomial logit estimation [equations (3.17)]. In case of this study, the second stage of the effect of short and long-term investment on direct and indirect exposure to LSLA [i.e., equation (3.17)] will use the multinomial logit regression since exposure to LSLA was captured as categorical variable and dissimilar[3]. Again, coefficient γ_i is valid tests of the null hypotheses that the investment variables are exogenous in the exposure equations (Abdulai et al., 2011; Wooldridge, 2002). If coefficient γ_i is significant, exogeneity is rejected and their inclusion corrects for endogeneity. The definition and measurement of the variables used in the analysis are presented in Table 3.5.

3.8.3.1 *Identification of equations for farm investment and exposure to large-scale land acquisition*

Proper identification of the equations for exposure to large-scale land acquisition (LSLA) (3.14) and farm investment (3.12) requires that some of the variables included in the first-stage estimation of investment and exposure to LSLA are excluded from the second-stage multivariate probit estimations of exposure to LSLA and households' farm investments. Thus, in the second-stage multivariate probit equations for farm investment under domestic and foreign entities, variables including land institution (measured as 1 if household has access to formal land institution such as lands commission, land survey department and town and country planning; 0 if otherwise) were excluded but included in the first-stage equations of direct and indirect exposure to LSLA under domestic and foreign entities. Intuitively, farmers with access to land institution tend to obtain more information about land and related issues. Information about land and related issues facilitate the rate of registration, certification and security of land tenure rights and may therefore decrease the probability of being exposed to LSLA. With regards to the second-stage multinomial logit equation for exposure to LSLA under each of the domestic and foreign entities, prior knowledge of other households affected by LSLA (measured as 1 if any member of the household had prior knowledge of other communities affected by LSLA; 0 if otherwise) was excluded but included in

[3]We run a Hausman tests for the IIA assumption following Long and Freese (2001) and the results indicate that the assumption is not violated.

the first-stage equations of farm investment. Farmers with prior knowledge of other households affected by LSLA in other communities tend to invest in land improving techniques in order to enhances tenure security of their land. Thus, first-hand information regarding the types of land acquired by investors reduces risk of eviction through farm investment. Suhardiman et al. (2015) for instance revealed that farmers who had prior information from relatives and related networks about LSLA enhance security of their remining land through investment in rubber plantations. Even though the instruments are intuitively valid, a test for validity of instruments was conducted following Lee's (1992) overidentification test statistics with $\chi 2$ distribution and degrees of freedom equal to the number of excluded instruments. According to Lee (1992), the test involves estimating an alternative version of equations (3.15) and (3.17) with the instruments. The insignificance of coefficients of the instruments in the estimations are then considered as evidence that the instruments can be excluded from equations (3.15) and (3.17).

3.8.3.2 Hypotheses to be tested

In line with literature (e.g., Feder & Onchan, 1987; Hayes et al., 1997; Marshall, 1890), the following hypotheses about the relationship between type of exposure to large-scale land acquisition (LSLA) under domestic and foreign entities and households' farm investments were tested:

i. Direct and indirect exposure to LSLA by domestic and foreign entities decreases household's probability of long-term farm investments

ii. Direct and indirect exposure to LSLA by domestic and foreign entities increases household's probability of short-term investments.

As pointed in literature (e.g., Sjaastad & Bromley, 1997; Place & Migot-Adholla, 1998; Abdulai et al., 2011), a household can invest to establish implicit property rights to land and decrease existing rates of eviction by LSLA. As result, this study further hypothesized that:

iii. Household's probability of direct and indirect exposure to LSLA by domestic and foreign entities decreases with long-term farm investments

iv. Household's probability of direct and indirect exposure to LSLA by domestic and foreign entities decreases with short-term investments.

Table 3.4: Variable definition/measurement

Variable	*Definition/measurement*	*STI*	*LTI*	*Exposure*
Long-term investments	Dummy (1 if household had made investment in either irrigation or soil and water conservation techniques and 0 if otherwise)	N/A	N/A	-
Short-term investments	Dummy [1 if household had made investment in either NPK, Ammonia or Urea and 0 if otherwise]	N/A	N/A	-
Household income	Aggregate income from farm, off-farm wages, salary, petty-trade, and other activities (in GHS)	+	+	-
Return on investment	Perception of the impacts of investments on land quality and crop yield (1 if improved, 0 if otherwise)	+	+	
Fertilizer subsidy	Dummy (1 if farmer benefited from the 2017/2018 fertilizer subsidy programme, 0 if otherwise)	+	+	-
Gender	Dummy (1 if household head is male, 0 if otherwise)	+	+	-
Age	Age of household head (years)	+/-	+/-	-
Household size	Number of people residing in a household	+	+	-
Education	Number of years spent in formal education	+	+	-
Farm size	All the land under the management and control of household without regard to title, legal form, size, or location (ha)	+/-	+/-	+
Leadership	Dummy (1 if household head is in any leadership position; 0 if otherwise)	+	+	-
Sagnarigu	Dummy (1 if farmer is located in Sagnarigu district, 0 if otherwise)	+/-	+/-	+
Mion	Dummy (1 if farmer is located in Mion district, 0 if otherwise)	+/-	+/-	+
Central Gonja	Dummy (1 if farmer is located in Central Gonja district, 0 if otherwise)	+/-	+/-	+
Savelegu	Dummy (1 if farmer is located in Savelegu district, 0 if otherwise)	+/-	+/-	+
Yagba-Kubori	Dummy (1 if farmer is located in Yagba-Kubori district, 0 if otherwise)	+/-	+/-	+
North Gonja	Dummy (1 if farmer is located in North Gonja district, 0 if otherwise)	+/-	+/-	+
Social group	Dummy (1 if farmer is a member of social group; 0 if otherwise)	+	+	-
Road	Distance to the nearest weathered road (km)	+	+	+
Credit	Dummy (1 if household has access to credit; 0 if otherwise)	+	+	-
Water resources	Dummy (1 if there is available water resource in the village; 0 if otherwise)	+	+	+
Good fertile	Dummy (1 if fertility of the soil is good; 0 if otherwise)	+	+	+
Moderately fertile	Dummy (1 if fertility of the soil is moderate; 0 if otherwise)	+	+	+
Poorly fertile	Dummy (1 if fertility of the soil is poor; 0 if otherwise)	+	+	-
Land institution	Dummy (1 if household has access to formal land institution such as lands commission, land survey department and town and country planning; 0 if otherwise)	NA	NA	+
Exposure to LSLA by domestic entities				
Direct exposure	1 if households lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	-	-	N/A
Indirect exposure	1 if household live 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 households lost farmland, labour, and farmland-based resources to foreign entities; 0 if otherwise	-	-	N/A
Indirect exposure	1 if household live nearby affected households or lost uncultivated land; have limited land and cannot practice fallowing, monocropping due to scarcity of land caused by foreign enclosures; 0 if otherwise	-	-	N/A

Notes: STI and **LTI** denote short-term investment and long-term investment, respectively.

3.8.4 Effects of Large-Scale Land Acquisitions on Household Farm Income

Households farm income comes from sale of crops and livestock, leasing machines and agricultural wage labor. However, crops and livestock directly depend on land and may therefore be influenced by large-scale land acquisitions (LSLA) through the quantity of output produced. Farm income in this study therefore represents income from crops and livestock. Farm income was estimated from each enterprise by multiplying quantity of output from each of the enterprises with their respective median market price of the prices provided by the farmers[4]. The resulting income from crops and livestock were then aggregated as household farm income. Such approach has been applied in empirical literature (e.g., Abdulai & Regmi, 2000; Kato et al., 2009). The effects of direct and indirect expsoure to LSLA by domestic and foreign entities on farm income was then estimated using this variable.

Following equation (2.28) of Ju et al.'s (2016) version of the so-called agricultural household model, this study argues that exposure to LSLA is a function of farm income specified as:

$$FI_i = \alpha_i X_i + \theta_i LSLA_i + u_i \qquad (3.18)$$

Where FI is the farm income of ith household; X_i is a vector of return on investment, compensation received, wag rate, consumption income (captured as household income), and other households, location and institutional characteristics; $LSLA_i$ is a vector of non-exposure, direct and indirect exposure to LSLA by domestic or foreign entities; α_i and θ_i are the associated coefficients to be estimated; and u_i is the error term. Since the theoretical model assumes only one season, this

[4]The median prices were used to avoid the effect of variations in local prices.

study considers time to be unity the empirical specification. Nonetheless, education (measured as the number of years in schooling) is included to capture variation income due to time.

In line with potential-outcomes/counterfactual framework and other studies evaluating the effect of multiple treatment (Kassie et al., 2018; Teklewold et al., 2013), this study employed the multinomial switching regression (MESR) to examine the effect of direct and indirect exposure to LSLA by domestic and foreign entities on farm income. The argument here is that the effect θ_i of each category of LSLA (i.e., non-exposure, direct and indirect exposure) under domestic and foreign entities may suffer from endogeneity since the exposure to LSLA is not randomly assigned to farm households. To control for such potential endogeneity, the MESR model was therefore employed to estimate equation (3.18). The MESR is estimated in two stages under exposure to each of the domestic and foreign entities. Under LSLA by domestic entities for instance, the probability of direct and indirect exposure to LSLA is estimated in the first stage, using the multinomial logit selection model (McFadden, 1978) specified as:

$$Pr(\eta_{ij} < 0|z_i) = \frac{exp(\delta_j z_i)}{\sum_{i=1}^{N} exp(\delta_k z_i)} \qquad (3.19)$$

The above model was estimated through maximum likelihood approach using the '*mlogit*' command in Stata 15. J-1 coefficients were estimated for J categories with 'non-exposure' as the base category. The estimated coefficients described the probability of direct and indirect exposure relative to the base category (i.e., non-exposure to LSLA by domestic entities). Such estimation represents the first stage of the MESR under domestic entities. In the second stage of the MESR, the relationship between the farm income and a set of exogenous variable X is estimated for each of the categories (i.e., non-exposure, direct and indirect exposure to LSLA by domestic entities) following McFadden (1984) (hereafter referred to as the DMF model) and Bourguignon et al.

(2007). The direct exposure includes households that lost farmland, labour, and farmland-based resources to domestic entities; indirect exposure includes households that live nearby affected households or lost uncultivated land or have limited land and cannot practice fallowing, monocropping because land has become scarce due to enclosures; and 'no exposure to LSLA' which is the reference category in this study and includes households that are neither directly nor indirectly exposed to LSLA by domestics entities. Under exposure to LSLA by domestic entities, the equations of farm income for the three categories of exposure (i.e., j=non-exposure, direct exposure, and indirect exposure) are given as:

$$\begin{cases} Regime\ 1: & FI_{iNE} = \alpha_1 X_i + u_{i1}\ \ if\ \ DE = 1 \\ Regime\ 2: & FI_{iDIE} = \alpha_2 X_{i2} + u_{i2}\ \ if\ DE = 2 \\ Regime\ 3: & FI_{iIDE} = \alpha_3 X_{i3} + u_{i3}\ \ if\ \ DE = 3 \end{cases} \quad (3.20)$$

where $FI_{ij}{}'s$ are farm income of the ith household in regime j, and the error terms $u_{ij}{}'s$ are distributed with $E(u_{ij}|z,X) = 0$ and $var(u_{ij}|z,X) = \sigma_j^2$. If there is correlation between the error term u_i in equation (3.18) and any of the variables in X_i or LG_i, OLS estimates of α_i and θ_i in equation (3.18) will be biased. For a consistent estimation of α_i and θ_i, Lee (1982) proposed that participants be grouped non-exposure, direct exposure and indirect exposure in order to capture the differential responses of the three groups shown in equation (3.20). Next, the selection correction terms of the alternative choices generated from Eq. (3.19) are then included in equation (3.20). For Bourguignon et al. (2007), consistent estimates of $\alpha_i{}'s$ in the (3.20) can be obtained by estimating the following MESR models:

$$\begin{cases} Regime\ 1: & Y_{iNE} = \alpha_1 X_i + \sigma_1 \hat{\lambda}_{i3} + \omega_{i1}\ \ if\ \ DE = 1 \\ Regime\ 2 & Y_{iDIE} = \alpha_2 X_{i2} + \sigma_2 \hat{\lambda}_{i2} + \omega_{i2}\ \ if\ DE = 2 \\ Regime\ 3: & Y_{iIDE} = \alpha_3 X_{i3} + \sigma_3 \hat{\lambda}_{i3} + \omega_{i3}\ \ if\ DE = 3 \end{cases} \quad (3.21)$$

where σ_j is the covariance between $\varepsilon_{ij}'s$ and $u_{ij}'s$; $\omega_{ij}'s$ are error terms with an expected value of zero; and $\hat{\lambda}_j$ is the inverse mills ratio computed from the estimated probabilities in equation (3.19) as:

$$\lambda_j = \sum_{m \neq j}^{J} \rho_j \left[\frac{\hat{P}_{im} ln(\hat{P}_{im})}{1 - \hat{P}_{im}} + \ln(\hat{P}_{ij}) \right] \qquad (3.22)$$

where ρ is the correlation coefficient of $\varepsilon_{ij}'s$ and $u_{ij}'s$ and $\hat{P}_{ij}$ is the probability that household *i* is exposed to a choice j. Standard error of each equation in Eq. (3.21) are bootstrapped to account for the heteroscedasticity arising from the generated regressors due to the two-stage estimation procedure. For proper identification of equation (3.19), it is important for the variables in the multinomial logit selection (MNLS) model to contain at least one instrument in addition to those automatically generated by the nonlinearity of the model. In this study, we included farmers' knowledge of any household affected by LSLA and access to formal land institution in the MNLS model (Eq. 3.19) but excluded them from the equations in (3.20). Even though these instruments are intuitively strong, we established admissibility by performing a simple falsification test following literature (e.g. Di Falco, Veronesi & Yesuf, 2010, 2011). Results confirm that selection instruments are valid as they jointly affect exposure to LSLA (see Table 5.3 of chapter five) but not farm income (see Tables 7.2 of chapter seven).

Using the above framework, the average treatment effects on the treated (ATT) is then computed by comparing the expected farm income of households exposed to LSLA (actual) and those households that are not exposed (counterfactuals). Here, direct, and indirect exposure to LSLA under domestic entities are the treatment groups whiles that of the non-exposed are the control groups. Following Carter and Milon (2005), Di Falco and Veronesi (2014), and Teklewold et al. (2013), and the impact evaluation literature (Heckman et al., 2001), the expected farm incomes of exposed households with exposure (actual), non-exposed without exposure (actual) and the respective counterfactuals are we defined as follows:

Exposed households with exposure (actual):

$$E[FI_{ij}|DE = j, X_{ij}, \hat{\lambda}_{ij}] = \alpha_j X_{ij} + \sigma_j \hat{\lambda}_{ij} \qquad (3.23)$$

Non-exposed households without exposure (actual):

$$E[FI_i|DE = 1, X_{i1}, \hat{\lambda}_{i1}] = \alpha_1 X_{i1} + \sigma_1 \hat{\lambda}_{i1} \qquad (3.24)$$

Exposed households had they not been exposed (counterfactual):

$$E[FI_{i1}|DE = j, X_{ij}, \hat{\lambda}_{ij}] = \alpha_1 X_{ij} + \sigma_1 \hat{\lambda}_{ij} \qquad (3.25)$$

Non-exposed households had they been exposed (counterfactual):

$$E[FI_{ij}|DE = 1, X_{i1}, \hat{\lambda}_{i1}] = \alpha_j X_{i1} + \sigma_j \hat{\lambda}_{i1} \qquad (3.26)$$

Consequently, the average treatment effects on the treated (ATT) is computed as difference between (3.23) and (3.25) while the average treatment effect on the untreated (ATU) is the difference between (3.24) and (3.26). Similarly, the equations of farm income for the three categories of exposure (i.e., j=no exposure, direct exposure, and indirect exposure) under exposure to LSLA by foreign entities are estimated using the same procedure specified above.

3.8.4.1 Hypotheses to be tested

In line with equation (2.28) $\left(\frac{\partial y^*}{\partial A'} = \alpha\left[\overline{y}_a i - (1-r)(r/w)^{r/(1-r)}\right]\right)$ of section (2.8.3) of the soc-called agricultural household model, it is argued that the effect of large-scale land acquisitions (LSLA) on current income is determined by compensation payment ($\overline{y}_a$) and the reduced farm profit $(1-r)(r/w)^{r/(1-r)}$. This effect would be positive $\left(\frac{\partial \overline{y}_a}{\partial A'} > 0\right)$ if the former is higher than the latter and negative if the formers is lower than the latter. However, since the households under this study are mainly agrarian, farm income – a component of household's current income – will solely depend on available farmland and will decrease even when compensation payments are high. It is therefore hypothesised that:

i. Farm income will decrease under direct and indirect exposure to LSLA by domestic entities

ii. Farm income will decrease under direct and indirect exposure to LSLA by foreign entities.

The variables employed in analysing the effect of LSLA on farm income are presented in Table 3.6 below. These variables were selected from literature on LSLA and household farm income (Ju et al., 2016).

Table 3.5: Variable definition/measurement

Variable	Definition	Expected sign
Farm income	Aggregate income from crop and livestock (GH¢)	
Landholding	All the land under the management and control of household (ha)	+
Return on investment	Perception of the impacts of investments on land quality and crop yield (1 if improved, 0 if otherwise)	+
Compensation	Payment received after displacement (Amount in Ghana cedis (GH¢))	+
Labour	Labour application (hours)	+
TLU[1]	Tropical livestock units (livestock numbers converted to a common unit)	+
Household income	Aggregate income from farm, off-farm wages, salary, petty-trade, and other activities (in GH¢)	+
Wage rate	Amount in Ghana cedis (GH¢)	-
Fertilizer	Expenditure on fertilizer (GH¢)	+
Age	Age of household head (years)	+
Plot distance	Plot distance to home (km)	+
Social group	Membership to social group (1=yes; 0=no)	+
Leadership	1 if household head is in any leadership position; 0 if otherwise	+
Credit	1 if household has access to credit; 0 if otherwise	+
Knowledge	1 if the farmer has knowledge of any household affected by the LSLA; 0 if otherwise	+
Good fertile	1 if fertility of the soil is good; 0 if otherwise	+
Moderately fertile	1 if fertility of the soil is moderate; 0 if otherwise	+
Poorly fertile	1 if fertility of the soil is poor; 0 if otherwise	-
Education	Number of years spent in formal education	+
Sagnarigu	1 if farmer is located in Sagnarigu district, 0 otherwise	+/-
Mion	1 if farmer is located in Mion district, 0 otherwise	+/-
Central Gonja	1 if farmer is located in Central Gonja district, 0 otherwise	+/-
Savelegu	1 if farmer is located in Savelegu district, 0 otherwise	+/-
Yagba-Kubori	1 if farmer is located in Yagba-Kubori district, 0 otherwise	+/-
North Gonja	1 if farmer is located in North Gonja district, 0 otherwise	+/-
Exposure to LSLA by domestic entities		
No exposure	1 if household is neither directly nor indirectly affected; 0 if otherwise	+
Direct exposure	1 if households lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	-
Indirect exposure	1 if household live 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	-
Exposure to LSLA by foreign entities		
No exposure	1 if household is neither directly nor indirectly affected; 0 if otherwise	+
Direct exposure	1 if households lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	-
Indirect exposure	1 if household live 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	-

Notes: Tropical Livestock Units (TLU's) are livestock numbers converted to a common unit. Conversion factors are cattle = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chicken = 0.01 (Harvestchoice, 2015).

3.8.5 Effects of Large-Scale Land Acquisitions on Food Security

In areas where agricultural production is the main livelihood activity, food security is linked with production indicators such as SSF. However, SSF is also strongly influenced by availability of land especially in rural areas where agricultural production is the main livelihood activity and food purchases are constrained by lack of access to markets (WFP, 2009a; Duangklad, 2010; Pieters et al., 2013). It is therefore believed that LSLA will impact on SSF. For these reasons, we employed self-sufficiency in food production (SSF) as the main indicator of food security in this study. Thus, the effect of exposure to large-scale land acquisition (LSLA) on food security is estimated through this indicator. In addition to SSF, we also consider FCS and HFIAS. This allows us to check for consistency of the results from SSF. The detail methods for construction of these indicators are presented in section (3.9.5.1). Following Sen (1981), this study assumes that FS_i as a vector of SSF, HFIAS and FCS is a function of LSLA and vectors of other characteristics X_i specified as:

$$FS_{ij} = \alpha_j X_i + \beta_i LG_i + \varepsilon_{ij} \qquad (3.27)$$

Where FS_i is a vector of food security indicators (FSS, HFIAS and FCS) for household i; LG_i is a vector of the forms of LSLA; X_i is a vector of supply-side/pull and demand-side/push factors as captured in the Figure 2.4; α_j and β_i are the respective coefficients; and ε_{ij} is a random term. If all factors in Equation (3.27) are properly observed, then β_i represent the effect of LSLA LG_i on food security FS_{ij} if OLS model is estimated. However, local authorities may select plots base on possibility of those plots to host a developmental project proposed by investors. Such nonrandom selection processes may lead to systematic differences between exposed (direct and indirect exposure) and non-exposed households and that can be mistaken for effects of exposure to LSLA. Failure to account for such potential selection bias could lead to inconsistent estimates of the effect of LSLA. In line with the potential-outcome framework, this study employed multinomial endogenous switching regression to consistently estimate the effect of exposure to LSLA food security. The multinomial endogenous treatment effect model can also be used for this estimation but the average treatment effect on the exposed households is not possible with such method and hence, the justification for using MESR. The MESR is estimated in two stages. The first stage involves estimation of multinomial logit selection model specified in Equation (3.19). The second stage estimates the effect of multiple treatment categories [j= non-exposure (1), direct (2) and indirect exposure (3)] on food security indicators (i.e., SSF, HFIAS and FCS) following McFadden (1984) and Bourguignon et al. (2007). The categories include non-exposure, direct, indirect exposure, and non-exposure to LSLA under domestic and foreign entities. The direct exposure includes households that lost farmland, labour, and farmland-based resources to domestic entities. Indirect exposure includes households that live nearby affected households or lost uncultivated land or have limited land and cannot practice fallowing, monocropping because land has become scarce due to enclosures. Non-exposure to LSLA is the reference category in this study and includes households that are neither directly nor indirectly exposed to LSLA by domestic entities. The equations of food security for the three categories are given as:

$$\begin{cases} Regime\ 1: & FS_{iNE} = \alpha_1 X_i + u_{i1} \quad if \;\; DE = 1 \\ Regime\ 2: & FS_{iDIE} = \alpha_2 X_{i2} + u_{i2} \quad if \;\; DE = 2 \\ Regime\ 3: & FS_{iIDE} = \alpha_3 X_{i3} + u_{i3} \quad if \;\; DE = 3 \end{cases} \quad (3.28)$$

where $FS_{ij}'s$ are food security indicators (i.e., SSF, HFIAS and FCS) of the ith household in regime j, and the error terms $u_{ij}'s$ are distributed with $E(u_{ij}|z,X) = 0$ and $var(u_{ij}|z,X) = \sigma_j^2$. If the $\varepsilon_{ij}'s$ and $u_{ij}'s$ are not independent, OLS estimates of $\alpha_i's$ in equation (3.27) will be biased. For a consistent estimation of $\alpha_i's$, inclusion of the selection correction terms of the alternative choices in Eq. (3.28) is necessary. For Bourguignon et al. (2007), consistent estimates of $\alpha_i's$ in the (3.28) can be obtained by estimating the following MESR models:

$$\begin{cases} Regime\ 1: & FS_{iNE} = \alpha_1 X_i + \sigma_1 \hat{\lambda}_{i3} + \omega_{i1}\ \ if\ \ DE = 1 \\ Regime\ 2 & FS_{iDIE} = \alpha_2 X_{i2} + \sigma_2 \hat{\lambda}_{i2} + \omega_{i2}\ \ if\ DE = 2 \\ Regime\ 3: & FS_{iIDE} = \alpha_3 X_{i3} + \sigma_3 \hat{\lambda}_{i3} + \omega_{i3}\ \ if\ DE = 3 \end{cases} \quad (3.29)$$

where σ_j is the covariance between $\varepsilon_{ij}'s$ and $u_{ij}'s$; $\omega_{ij}'s$ are error terms with an expected value of zero; and $\hat{\lambda}_j$ is the inverse mills ratio computed from the estimated probabilities of the first stage multinomial logit selection model. The inverse mills ratio $\hat{\lambda}_j$ is specified as:

$$\lambda_j = \sum_{m \neq j}^{J} \rho_j \left[\frac{\hat{P}_{im} ln(\hat{P}_{im})}{1 - \hat{P}_{im}} + \ln(\hat{P}_{ij}) \right] \quad (3.30)$$

where ρ is the correlation coefficient of $\varepsilon_{ij}'s$ and $u_{ij}'s$ and $\hat{P}_{ij}$ is the probability that household *i* is exposed to a choice j. Standard error of each equation in Eq. (3.29) are bootstrapped to account for the heteroscedasticity arising from the generated regressors due to the two-stage estimation procedure.

For proper identification of equation (3.29), it is important for the variables in the first stage multinomial logit selection (MNLS) model to contain at least one instrument in addition to those automatically generated by the nonlinearity of the model. In this study, we included farmers' knowledge of any household affected by LSLA and access to formal land institution in the first stage MNLS model but excluded them from the equations in (3.29). Even though these instruments are intuitively strong, we established admissibility by performing a simple falsification test following Di Falco, Veronesi, & Yesuf (2011). Results confirm that selection instruments are valid as they jointly affect exposure to LSLA (see Table 5.3 of chapter fiver) but not equations for food security (see Table 8.2 of chapter eight).

Using the above framework, the average treatment effects on the treated (ATT) is then computed by comparing the expected food security of households exposed to LSLA (actual) and those households that are not exposed (counterfactuals). Here, direct, and indirect exposure to LSLA under domestic are the treatment groups whiles that of the non-exposed are the control groups. Following Carter and Milon (2005), Di Falco and Veronesi (2014), and Teklewold et al. (2013), and the impact literature (Heckman et al., 2001), the expected food security of exposed households with exposure (actual), non-exposed without exposure (actual) and counterfactuals are defined as follows:

Exposed households with exposure (actual):

$$E[FS_{ij}|DE = j, X_{ij}, \hat{\lambda}_{ij}] = \alpha_j X_{ij} + \sigma_j \hat{\lambda}_{ij} \qquad (3.31)$$

Non-exposed households without exposure (actual):

$$E[FS_{i1}|DE = 1, X_{i1}, \hat{\lambda}_{i1}] = \alpha_1 X_{i1} + \sigma_1 \hat{\lambda}_{i1} \qquad (3.32)$$

Exposed households had they not been exposed (counterfactual):

$$E[FS_{i1}|DE = j, X_{ij}, \hat{\lambda}_{ij}] = \alpha_1 X_{ij} + \sigma_1 \hat{\lambda}_{ij} \qquad (3.33)$$

Non-exposed households had they been exposed (counterfactual):

$$E[FS_{ij}|DE = 1, X_{i1}, \hat{\lambda}_{i1}] = \alpha_j X_{i1} + \sigma_j \hat{\lambda}_{i1} \qquad (3.34)$$

Consequently, the average treatment effects on the treated (ATT) is computed as difference between (3.31) and (3.33) while the average treatment effect on the untreated (ATU) is the difference between (3.32) and (3.34). Similarly, the equations of food security for the three categories of exposure (i.e., j=no exposure, direct exposure, and indirect exposure) under exposure to LSLA by foreign entities are estimated using the same procedure specified above.

3.8.5.1 Variable Description and Measurements

Food Self-Sufficiency

The first indicator is self-sufficiency in food production (SSF) which captures the total grain produced and available for household's own consumption. SSF is continuous variable constructed as follows:

$$SSF_i = \frac{Total\ available\ cereal}{Population\ of\ family\ unit} \qquad (3.35)$$

Where: $\text{Total available cereal} = TC + CPH$; TC is total refined cereal in a maize equivalent basis specified as: $TC = [(\text{MP}*0.90*0.97) + (\text{SP}*0.90*0.97) + (\text{RP}*0.65*0.99) + (\text{CP}*0.85)$ with 0.90, 0.90, 0.65 and 0.85 as the milling ratios for millet, sorghum, rice and maize respectively and 0.97, 0.97 and 0.99 as the maize equivalent of millet, sorghum and rice on a milled basis, respectively. Further, CPH is the cereal in maize equivalent basis that is purchase from cash crops such as cotton, groundnut, cowpea, and other legumes. The calculation of self-sufficiency in this study is based on a threshold of 200kg of cereal per annual equivalent employed by (Jolly & Gadbois, 1996). Thus, a household is self-sufficient and has food throughout the 2017/2018 cropping season if the calculated total grain produced and available for household's own consumption is greater or equal to 200kg and deficient if the value is less than 200kg per capita per annum.

Household food insecurity access scale (HFIAS)

The household food insecurity access scale (HFIAS) is strongly linked to quantity and quality components of food access (Leroy, Ruel, Frongillo, Harris, & Ballard, 2015). The HFIAS mostly represents households' perception of their own diet in the past 30 days. It is a continuous variable that measures individual's food security in terms of access. The HFIAS assumes that households' experiences of food insecurity cause predictable reactions which can be captured and quantified into a score (Mango et al., 2014). This score indicates frequency of consumption of less preferred foods to skipping of meals. Following Swindale and Bilinsky (2006), Makate et al. (2016) and Mango et al. (2014), this study measured HFIAS by first capturing responses from occurrence questions which reflect food insecurity level of increase. Specifically, nine questions were asked to respondents. The questions were about their experience of food insecurity during the 2017/2018 cropping season and reflects (Q1a) anxiety about food adequacy; (Q2a) eating less-preferred foods; (Q3a) eating foods of a limited variety; (Q4a) inability to eat even less-preferred foods; (Q5a) eating smaller meals than needed; (Q6a) eating fewer meals in a day; (Q7a) failing to obtain food of any kind; (Q8a) going to bed hungry; and (Q9a) going the whole day or night without eating anything. A 'yes' response to any of these questions is given a value of one and a 'no' response is given a value of zero. A question on frequency-of-occurrence (F) then followed each severity question. These questions asked how often a reported condition occurred during the previous 30 days with 1, 2 and 3 representing 'rarely' 'sometimes' and often respectively. Using these responses, the HFIAS is then calculated by summing the scores generated from the responses as follows:

$$HFIAS = (\text{Q1a})(\text{F1}) + (\text{Q2a})(\text{F2}) + (\text{Q3a})(\text{F3}) + (\text{Q4a})(\text{F4}) + (\text{Q5a})(\text{F5}) + (\text{Q6a})(\text{F6}) + (\text{Q7a})(\text{F7}) + (\text{Q8a})(\text{F8}) + (\text{Q9a})(\text{F9}) \qquad (3.36)$$

Where F is the frequency of occurrence of a particular condition during the previous 30 days with 1, 2 and 3 representing rarely, sometimes, and often respectively. Summarily, the minimum HFIAS is zero and is obtained when a household responds 'no' to occurrence and frequency of occurrence. The highest score is 27, which is obtained when a household responds in the affirmative to all the questions on occurrence and 'often' to questions concerning rate of occurrence.

In northern Ghana, Agriculture represent the largest employer, accounting for over 57% of total households but largely depends on land (MoFA, 2013b). It is therefore most likely that loss of land can trigger occurrence and frequency of occurrence of food insecurity situations described in equation (3.25). ln particular, loss of land can trigger significant changes in food choice, number of meals taken and food variety, especially in areas where food consumed has a strong link with agricultural production.

Food consumption score (FCS)

The food consumption score (FCS) is recommended by the World Food Programme (WFP, 2009b) and Leroy et al. (2015) and have been employed in several studies (e.g. Bamlaku Alamirew, Harald Grethe & Wossen, 2015; Bekele Shiferaw, Menale Kassie, 2014; Makate et al., 2016; Mango et al., 2014; etc.). The FCS represents the dietary diversity, energy, macro, and micro value of the food consumed. The FCS is a continuous variable measured by first recording frequency or the number of food groups consumed by an individual within a household over a reference period, usually a seven-day period. The food groups are nine in number according to (WFP, 2008, 2009b) and include: (i) Cereals and tubers which constitute food items such as maize, rice, sorghum, millet, bread, other cereals, cassava, potatoes and sweet potatoes; (ii) Pulses such as beans, peas, groundnuts and cashew nuts; (iii) Vegetables such vegetables, relish and leaves; (iv) Fruits (v) Meat and Fish including beef, goat, poultry, pork, eggs and fish; (vi) Milk including milk, yoghurt and other dairy products; (vii) Sugars including sugar and sugar products, and honey (viii) Oil such as oils, fats and butter; and (ix) Condiments such spices, tea, coffee, salt, fish power, small amounts of milk for tea. The frequency of consumption of each food group is then multiplied by a predetermined weight assigned to each food group to generate a score. The FCS for each individual was then calculated by summing these scores into one composite score. This is defined mathematically as:

$$FCS_i = \sum_{i=1}^{n} A_i\, B_i \qquad (3.37)$$

Choice of Explanatory Variables

Based on previous studies and information collected from respondents, some explanatory variables were selected and employed in analysing the effect of LSLA on household food security. The definition/measurement and a priori expectations of these variables are presented in Table 3.7.

3.8.5.2 Hypotheses to be tested

In line with Sen's (1981a) entitlement approach to starvation and famines the following hypotheses are tested in this study about the relationship between various types of exposure to LSLA under domestic and foreign entities and food security:

i. direct and indirect exposure to LSLA by domestic and foreign entities decreases household's self-sufficiency in food production (SSF)

ii. direct and indirect exposure to LSLA by domestic and foreign entities decreases food consumption score (FCS).

iii. direct and indirect exposure to LSLA by domestic and foreign entities increases household's food insecurity access scale (HFIAS)

Table 3.6: Variable definition/measurement and a priori expectations

Variable	Definition/measurement	Expected sign		
		SSF	FCS	HFIAS
Exposure to LSLA by domestic entities				
No exposure	1 if household is neither directly nor indirectly affected; 0 if otherwise	+	+	-
Direct exposure	1 if households lost farmland, labour, and farmland-based resources to domestic entities; 0 if otherwise	-	-	+
Indirect exposure	1 if household live 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	-	-	+
Exposure to LSLA by foreign entities				
No exposure	1 if household is neither directly nor indirectly affected; 0 if otherwise	+	+	-
Direct exposure	1 if households lost farmland, labour, and farmland-based resources to foreign entities; 0 if otherwise	-	-	+
Indirect exposure	1 if household live 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	-	-	+
Covariates				
HH_income	Household income (sum of income from farm, off-farm wages, salary, petty-trade and other activities -GHS)	+	+	-
Landholding	All the land under the management and control of household (acres)	+	+	-
Labour	Labour application (hours)	+	+	-
Gender	1 if household head is male, 0 otherwise	+	+	-
Education	Number of years spent in formal education	+	+	-
Knowledge	1 if household has prior knowledge of other households affected by LSLA; 0 if otherwise)			
Market distance	Distance to main market (km)	+	+	-
Remittances	1 if household has access to remittances; 0 if otherwise	+	+	-
Social group	Membership to social group (1=yes; 0=no)	+	+	-
Droughts	1 if ever experience droughts on the plot; 0 if otherwise	-	-	+
Credit	1 if household has access to credit; 0 if otherwise	+	+	-
Water sources	1 if household has access good water source; 0 if otherwise	+	+	-
Good fertile	1 if fertility of the soil is good; 0 if otherwise	+	+	-
Moderate fertile	1 if fertility of the soil is moderate; 0 if otherwise	+	+	-
Poor fertile	1 if fertility of the soil is poor; 0 if otherwise	-	-	+
Sagnarigu	1 if farmer is located in Sagnarigu district, 0 otherwise	+/-	+/-	+/-
Mion	1 if farmer is located in Mion district, 0 otherwise	+/-	+/-	+/-
Central Gonja	1 if farmer is located in Central Gonja district, 0 otherwise	+/-	+/-	+/-
Savelegu	1 if farmer is located in Savelegu district, 0 otherwise	+/-	+/-	+/-
Yagba-Kubori	1 if farmer is located in Yagba-Kubori district, 0 otherwise	+/-	+/-	+/-
North Gonja	1 if farmer is located in North Gonja district, 0 otherwise	+/-	+/-	+/-

CHAPTER FOUR

RELATIONSHIP BETWEEN LARGE-SCALE LAND ACQUISITION AND HOUSEHOLD FARMLAND ACCESS

4.1 Introduction

In this chapter, the results of the relationship between households' direct and indirect exposure to large-scale land acquisitions (LSLA) under domestic and foreign entities on farmland access is presented within the framework of Marx's (2010) primitive accumulation and Harvey's (2003) accumulation by dispossession. The relationship between LSLA and farmland access took the form of differences between exposed (i.e., direct and indirect exposure to LSLA under domestic and foreign entities) and nonexposed households in terms of purchasing, leasing, pledging, sharecropping, and renting, households' ability to produce crops and animals, fallow land, practice monocropping, ability to access water resources, ability to control food produced and ability to rent-out land in the area without restrictions. Bar charts and crosstabulations with Chi-square statistics were employed to explore the differences between the various categories of exposed households (i.e., direct, and indirect exposure) under domestic and foreign entities and nonexposed households. The results are presented in the following sections.

4.2 Large-Scale Land Acquisitions and market modes of land acquisition

An important argument of the theory of primitive accumulation or accumulation by dispossession is that establishing rights over resources of the poor class limits access to such resources (Harvey, 2003; Marx, 1867). Principal indicators of resource access are the means of privatization, commoditisation or commercialisation which are also influenced by market modes of land acquisitions. The relationship between the large-scale land acquisitions (LSLA) and market modes of land acquisition (i.e., lease, sharecrop, pledge, purchase and rent-in) are shown in Figure 4.1 and Figure 4.2. Generally, the various categories of households under exposure to LSLA by domestic and foreign entities are associated with the market modes of land acquisition in northern Ghana. As regards to Figure 4.1, majority of each of the households that lose land directly and indirectly to LSLA by domestic entities also acquire farmland by leasing, sharecropping, pledging, purchasing and renting-in whiles a few of the households that neither lost land directly nor indirectly to LSLA by domestic entities acquire land through leasing, sharecropping, pledging, purchasing and renting-in. For instance, whereas about 19.2% of the nonexposed households acquired land through leasing, about 35.4% and 45.4% of the households that lost land indirectly and directly to LSLA by domestic entities acquired land through leasing. This therefore suggest that acquisition by leasing is common among households directly and indirectly exposed to LSLA by domestic entities. Also, about 21.3% of the none exposed households acquired land through sharecropping, whiles 28.2% and 50.5% of the households that lost land indirectly and directly to LSLA by domestic entities acquired land by sharecropping. Further, about 26.1% and 63.2% of those who lost land indirectly and directly to LSLA by domestic entities also acquire land by purchase whiles few of the none exposed households (10.7%) acquired land by purchase. With regards to acquisition by rent-in (Figure 4.1), about 28.3% and 56.1% of the households who lost land indirectly and directly to LSLA by domestic entities also acquired farmland by rent-in whiles 15.6% of the none exposed households acquired land by rent-in. These results therefore suggest that market modes of acquisition including leasing, sharecropping, pledging, outright-purchase and rent-in are more common among households that lost land directly or indirectly to LSLA by domestic entities as compared to households that are none exposed to LSLA by domestic entities.

Similar trend is observed in the relationship LSLA by foreign entities and market modes of land acquisition (Figure 4.2). Specifically, Figure 4.2 indicate that the various categories of households under exposure to LSLA by foreign entities are associated with leasing, sharecropping, pledging, purchasing and renting-in in the area. Thus, majority of each of the households that that lose land directly and indirectly to LSLA by foreign entities also acquired land by leasing, sharecropping, pledging, purchasing and rent-in whiles few of the none exposed households that acquire land by lease (24.3%), sharecropping (13.6%), pledge (11.1%), purchase (13.6%) and rent (21.1%) (see Figure 4.2).

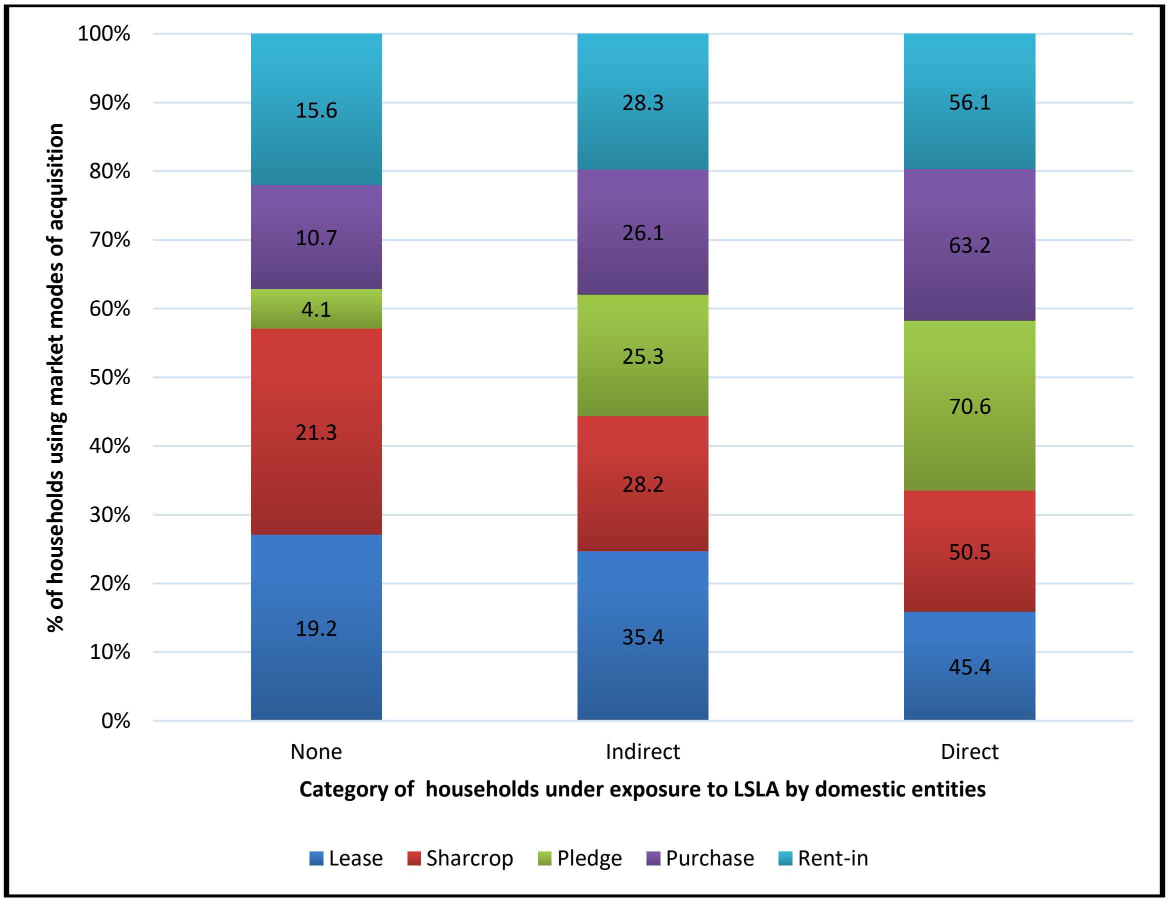

Figure 4.1: Market modes of farmland acquisition by category of households under domestic exposure to LSLA in Northern Ghana
Source: Field Survey, 2018

Overall, the results (i.e., Figure 4.1–4.2) show that market modes of acquisition including leasing, purchasing, pledging, sharecropping, and renting more common among both households that are directly and indirectly exposed to LSLA by domestic entities and foreign entities than the none exposed households. This suggest that both LSLA by domestic and foreign entities are more likely to induce market mode of land acquisition including leasing, sharecropping, pledging, purchasing and renting-in especially among affected households and this is irrespective of whether the acquisition is carried out by domestic or foreign entity. This clearly support the study's hypothesis that the practice of market modes of land acquisition such as leasing, sharecropping, outright-purchase, and renting-in is likely to be common among households affected by LSLA by domestic and foreign entities. The results also clearly reinforce the notion that commoditization or privatization of common property is common in the wake of LSLA (e.g., Behrman et al., 2014; Boserup, 1965; Harvey, 2003; Marx, 2010). During a focus group discussion, the participants argued that in the wake of LSLA, the only way to secure full control of land is to buy the land or come into contract with landowners. This probably explains why leasing, sharecropping, pledging, outright-purchase, pledging and renting-in are common among households that lost land directly or indirectly to LSLA by domestic and foreign entities. This explanation also confirms other studies which argued that market mode of land acquisition reduces risk of eviction (e.g., Feder & Onchan, 1987; Marshall, 1890; Place & Hazell, 1993; Place & Migot-Adholla, 1998; Sjaastad & Bromley, 1997) and probably explains why acquisition by purchase, sharecrop, lease, pledge and rent-in are high among households affected by LSLA by domestic and foreign entities

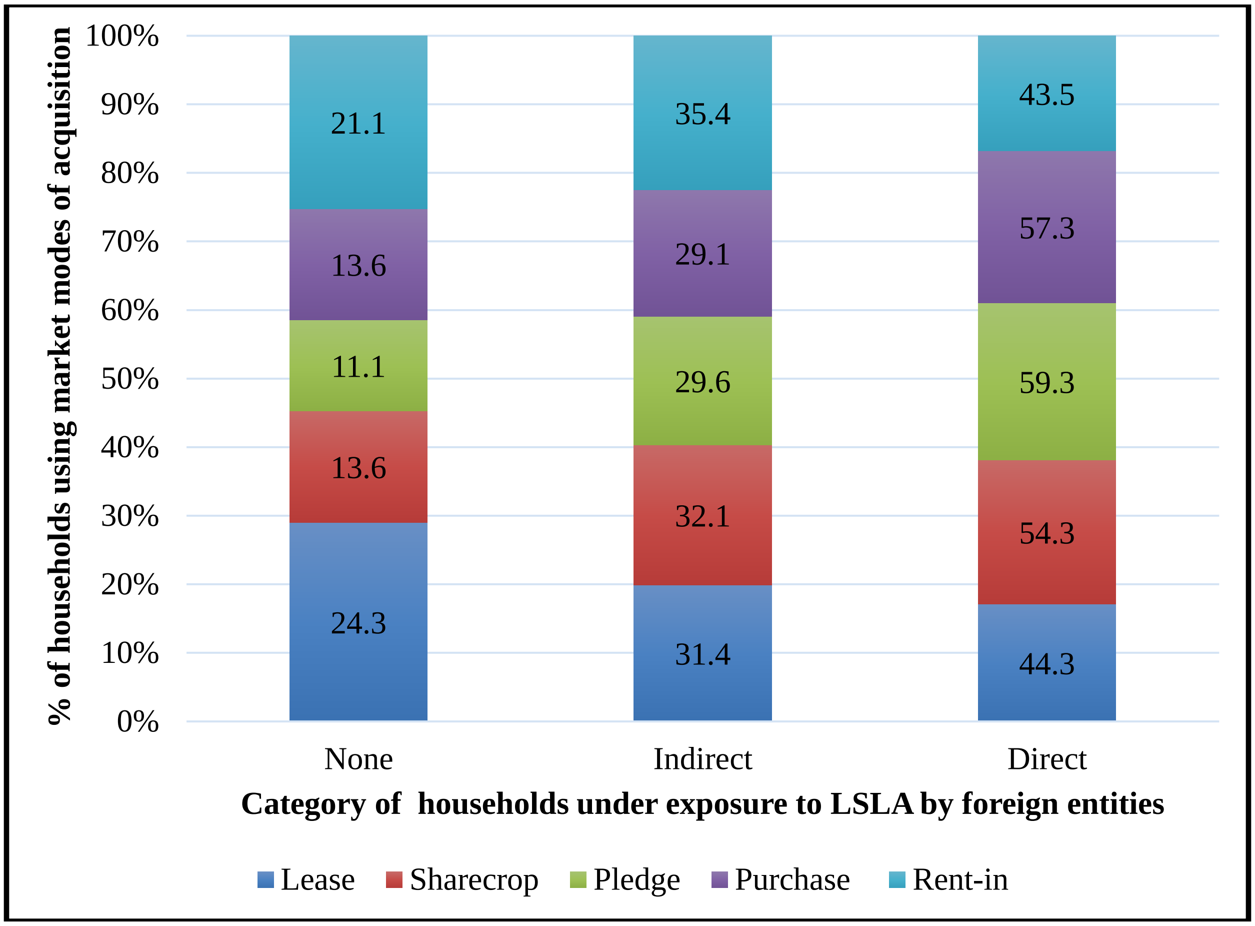

Figure 4.2: Market modes of farmland acquisition by category of households under foreign exposure to LSLA in Northern Ghana
Source: Field Survey, 2018

4.3 Large-Scale Land Acquisitions and production of crops and/animals

Table 4.1 shows the results of the relationship between the various categories of households exposed to large-scale land acquisitions (LSLA) by domestic and foreign entities and ability to produce crops, animal, or both. Majority of the households that lost land indirectly (67.5%) and directly (86%) to LSLA by domestic entities are much more likely to be unable to produce crops, animals, or both whiles few (3.5%) of the none exposed households are likely to be unable to produce crops, animals, or both. On the contrary, few households that lost land directly (about 14%) and indirectly (32.5%) to domestic entities are much more likely to produce crops, animals, or both whiles 328 (96.5%) of the none exposed households are much more likely to produce crops, animals, or both. Further, there was a significant association between the various categories of households that lost land to LSLA by domestic entities and ability to produce crops, animal, or both $[\chi^2(2) = 305.52, \mathrm{p} < 0.05]$. This suggests that households that lost land directly or indirectly to LSLA by domestic entities are significantly different from the none exposed households or are less likely to be able produce crops or animals or both as compared to nonexposed households. The trend in these results is similar among households exposed to LSLA by foreign entities. Under exposure to LSLA by foreign, as high as 29.9% of the indirectly exposed and 85.2% of the directly exposed households are unable to produce crops, animals, or both whiles few (2.9%) of the none exposed households are unable to produce crops, animals or both. The results further show that there is a significant association between various categories of households exposed to LSLA by foreign entities and households' ability to produce crops or animals or both $[\chi^2(2) = 291.05,\ \mathrm{p} < 0.05]$. It therefore stands to reason that there is a strong relation between categories of households exposed to LSLA by foreign entities and household's ability to produce crops or animals or both using a particular piece of land. Generally, the results suggest that households who lost land directly or indirectly to LSLA by domestic and foreign entities are significantly less likely to be able produce crops, animals or both. This further suggest that LSLA by both domestic and foreign entities significantly affect household ability to produce crops animals or both. This is not surprising given that land is a major factor in the production of both crops and animals in northern Ghana. The results confirm the study's hypotheses and previous literature (Anseeuw et al., 2012; Cotula et al., 2009; Robertson & Pinstrup-Andersen, 2010; von Braun & Meinzen-dick, 2009) which argued that LSLA can lead to decrease in food crop and animal production in host communities. The results also corroborate with Twene (2016) who found that LSLA has adverse effect on local food crop production and quantity of fish harvested.

Further, the results are consistent with Twomey & Schiavoni (2015) who found that the capacity to grow food was limited by LSLA in Tanzania. The results however contradict with Quarcson (2014) and Hamenoo et al. (2017) who found no evidence of reduced crop production and food security in the wake of LSLA.

Table 4.1: Relationship between LSLA and crop or animal production

Category of households under domestic exposure		Able to produce crop or animals or both?		
		No	Yes	Total
Indirect exposure	Frequency	27	13	40
	%	67.50	32.50	100.00
Direct exposure	Frequency	80	13	93
	%	86.02	13.98	100.00
Non-exposure	Frequency	12	328	340
	%	3.53	96.47	100.00
Total	Frequency	119	354	473
	%	25.16	74.84	100.00
Pearson chi2(2) = 305.5231 Pr = 0.000				
Category of households under foreign exposure		No	Yes	Total
Indirect exposure	Frequency	29	68	97
	%	29.90	70.10	100.00
Direct exposure	Frequency	81	14	95
	%	85.26	14.74	100.00
Non-exposure	Frequency	10	329	339
	%	2.95	97.05	100.00
Total	Frequency	120	411	531
	%	22.60	77.40	100.00
Pearson chi2(2) = 291.0487 Pr = 0.000				

Source: Field Survey, 2018

4.4 Large-Scale Land Acquisitions and household's ability to fallow land

The results of the relationship between the various categories of households under domestic and foreign large-scale land acquisitions (LSLA) and households' ability to fallow land are shown in Table 4.2. Under LSLA by domestic entities, majority of the households that lost land indirectly (80%) and directly (91.4%) to LSLA by domestic entities are less likely to practice fallowing whiles few (about 2.4%) of the nonexposed households are less likely to practice fallowing. Put in another way, as low as 20% of the indirectly exposed and 8.6% of the directly exposed households are more likely to practice land fallowing whiles as high as 97.7% of the nonexposed households are more likely to practice fallowing. Further, the p-value of 0.00 is smaller than the alpha value of 0.05, suggesting that the result is significant ($\chi^2(2) = 362.30,\ p < 0.05$). Thus, in terms of land fallowing, the proportion of households that lost land directly and indirectly to LSLA by domestic entities are significantly different from the proportion of households that did lose land to LSLA by domestic entities.

Similar result is shown for the relationship between LSLA by foreign entities. For instance, whereas 88.4% of the indirectly exposed and 90.7% of the directly exposed households under LSLA by foreign entities are less likely to practice fallowing, only 14.3% of the nonexposed households are less likely to practice fallowing. On the other hand, as low as 11.6% of the indirectly exposed and 9.3% of the directly exposed households are much more likely to practice fallowing whiles about 86.7% of the nonexposed households are more likely to practice fallowing. The results further show that there is a significant association between the various categories of households under LSLA by foreign entities and whether households are able to fallow their land $\chi^2(2) = 295.47,\ p < 0.05$. It therefore sounds reasonable to conclude that the abandonment of indigenous farming systems like land fallowing is inevitable among households exposed to LSLA by domestic and foreign entities. Several reasons were ascribed to the low practice of fallowing among households exposed to LSLA by both domestic and foreign entities. The first reason is that most of the affected farmers resorted to off-farm employment, working for wages or food. Such transfer from farming to wage employment resulted in declines in the traditional farming practices like fallowing, monocropping and shifting cultivation. The second reason is that the government of Ghana has introduced fertilizer subsidy programme for which most households are members and do not need fallowing to improve fertility of their remaining plots. The results of the relationship between LSLA and land fallowing highlights the study's hypothesis and findings of previous studies. For instance, Hilhorst, Nelen, and Traoré, (2011) found that LSLA affected old fallows, forests, woods and pasture resources in Benin, Burkina Faso, Mali and Niger and hence confirms the finding of this study. The results also corroborate with the findings of Hamenoo et al. (2017) in Asante Akim North District of Ghana where abandonment of indigenous farming systems was common among households affected by LSLA. The results further confirms other studies which argued that decline in practice of indigenous farming technologies is common among households affected by LSLA (e.g., Robertson & Pinstrup-Andersen, 2010; Tinyade, 2010).

Table 4.2: Relationship between LSLA and fallowing land

Category of households under domestic exposure		**Able to Fallow land?**		
		No	Yes	Total
Indirect exposure	Frequency	32	8	40
	%	80.00	20.00	100.00
Direct exposure	Frequency	85	8	93
	%	91.40	8.60	100.00
Non-exposure	Frequency	8	332	340
	%	2.35	97.65	100.00

Table 4.2 continued.

Total	Frequency	125	348	473
	%	26.43	73.57	100.00
	Pearson chi2(2) = 362.3000	Pr = 0.000		
Category of households under foreign exposure		No	Yes	Total
Indirect exposure	Frequency	84	11	95
	%	88.42	11.58	100.00
Direct exposure	Frequency	88	9	97
	%	90.72	9.28	100.00
Non-exposure	Frequency	45	294	339
	%	13.27	86.73	100.00
Total	Frequency	217	314	531
	%	40.87	59.13	100.00
	Pearson chi2(2) = 295.4691	Pr = 0.000		

Source: Field Survey, 2018

4.5 Large-Scale Land Acquisitions and household's ability to practice monocropping

The practice of monocropping also appear to be low among various categories of households exposed to large-scale land acquisitions (LSLA) by domestic and foreign entities. For instance, under exposure to LSLA by domestic entities, as low as 27.5% of the indirectly exposed and 29% of the directly exposed households appear to be more likely to practice monocropping whiles as high as 93.8% of the nonexposed households appear much more likely to practice monocropping in the area (Table 4.3). On the contrary, as high as 72.5% of the directly exposed and 71% of the directly exposed households are appear less likely to practice monocropping whiles only 6.2% of nonexposed households appear less likely to practice monocropping in the area. A test with a Chi-square statistic shows that it is very unlikely that the use of monocropping will be independent of direct and indirect exposure to LSLA by domestic [$\chi^2(2) = 219.95,\ p < 0.05$]. This therefore imply that under LSLA acquisition by domestic entities, households that lose land directly or indirectly are significantly less likely to adopt monocropping in northern Ghana.

Regarding exposure to LSLA by foreign entities, the practice of monocropping appear to be low among the exposed households and strongly associated with direct and indirect exposure to LSLA by foreign entities. For instance, as low as 36.8% of the indirectly exposed and 18.6% of the directly exposed households are more likely to practice monocropping, but as high as 96.5% of the nonexposed households are much more likely to practice monocropping. On the other hand, as high as 81.4% of the indirectly exposed and 63.2% of the directly exposed households are much more likely to practice monocropping whiles only 3.5% of the nonexposed households are more likely to practice monocropping in northern Ghana (Table 4.3). The results therefore suggest that the various categories of households under exposure to LSLA by foreign entities are associated with households' ability to practice monocropping. Further test with Chi-square statistics show that it is very unlikely that the practice of monocropping and exposure to LSLA by foreign entities are independent of each other [$\chi^2(2) = 293.46,\ p < 0.05$]. This further suggest that households affected by LSLA by foreigners are significantly more likely to abandon the practice of monocropping. Overall, the results suggest that LSLA reduces household's ability to adopt monocropping and that the reduction is irrespective of whether the acquisition is done by domestic or foreign entities. In other words, LSLA by both foreign and domestic entities affect adoption of monocropping in northern Ghana. During a focus group discussion, one participant explained: "*Monocropping is land-intensive technology and cannot therefore be adopted among households affected by LSLA since they have small or no land to cultivate*" (Focus Group Discussions, November, 2018).

The results confirm the study's hypothesis that direct and indirect land lost to LSLA by domestic and foreign entities will limit all forms of land use rights including right to practice monocropping. However, the results are inconsistent with that of Hamenoo et al. (2017) who found increase in cultivation of only vegetables but decrease in cultivation of only maize due to LSLA in Asanti Akim District of Ghana.

Table 4.3: Relationship between LSLA and monocropping

Category of households under domestic exposure		Able to practice monocropping?		
		No	Yes	Total
Indirect exposure	Frequency	29	11	40
	%	72.50	27.50	100.00
Direct exposure	Frequency	66	27	93
	%	70.97	29.03	100.00
Non-exposure	Frequency	21	319	340
	%	6.18	93.82	100.00
Total	Frequency	116	357	473
	%	24.52	75.48	100.00
	Pearson chi2(2) = 219.9503 Pr = 0.000			
Category of households under foreign exposure		No	Yes	Total
Indirect exposure	Frequency	60	35	95
	%	63.16	36.84	100.00
Direct exposure	Frequency	79	18	97
	%	81.44	18.56	100.00
Non-exposure	Frequency	12	327	339
	%	3.54	96.46	100.00
Total	Frequency	151	380	531
	%	28.44	71.56	100.00
	Pearson chi2(2) = 293.4595 Pr = 0.000			

Source: Field Survey, 2018

4.6 Large-Scale Land Acquisitions and household's ability to rent-out land

Large-scale land acquisition by both domestic and foreign entities also appear to discourage transfer of land to other users through renting out. Under LSLA by domestic entities, for instance, as high as 77.5% of the indirectly exposed and 88.2% of the directly exposed households are less likely to rent out land whiles as low as 2.4% of the nonexposed households are less likely to rent-out land (Table 4.4). Further, as low as 22.5% of the indirectly exposed and 11.8% of the directly exposed households under LSLA by domestic entities are more likely to rent-out land. However, as high as 97.6% of the nonexposed households are much more likely to rent-out land in northern Ghana. The results therefore show that there is an association between households' exposure to LSLA by domestic entities and ability to renting out. A test with Chi-square statistic confirms that there is a significant relationship between the various categories of households exposed to LSLA by domestic entities and ability to rent out land [$\chi^2(2) = 33.34,\ p < 0.05$]. This suggests that households exposed to LSLA by domestic entities are significantly less likely to transfer land to other users through renting.

Similar results have been revealed under LSLA by foreign entities. For instance, whereas 45.3% of the indirectly exposed and 84.5% of the directly exposed households under LSLA by foreign entities appear less likely to rent-out land, only 4.1% of the nonexposed households appear less likely to rent-out land. On the other hand, 54.7% of the indirectly exposed and 15.5% of the directly exposed households are more likely to rent-out land whiles 95.9% of the nonexposed households are more likely to rent-out land in northern Ghana (Table 4.4). Further, the results show that there is a significant association between the various categories of households exposed to LSLA by foreign entities and households' ability to rent out their land $\chi^2(2) = 274.13,\ p < 0.05$ (Table 4.4). The results therefore suggest that households that are exposed LSLA by foreign entities are also significantly less likely to transfer land by renting rent out. Thus, LSLA by domestic and foreign entities are both significantly associated with renting out land, suggesting transfer of land through renting is significantly less likely to be a practice among both households exposed to LSLA by domestic and foreign entities. The results corroborate with the conceptual framework which argued that LSLA will lead to decrease in transfer of land by renting out. These results confirms the notion that land rights may be limited in the wake of LSLA (Behrman et al., 2014; Boserup, 1965; Cotula et al., 2009; Harvey, 2003; Marx, 2010). Participants of the focus group discussions explained that they cannot rent out their land because such lands are either accessed through temporary agreement between farmers and owners or nonexposed. This probably explains the lower rate of land transfer through renting-out land by exposed households. However, others further argued that the recent upsurge in LSLA has led to distrust among farmers and hence the low number of households' participation in renting-out.

Table 4.4: Relationship between LSLA and renting-out land

Category of households under domestic exposure	**Able to rent-out land?**			
		No	Yes	Total
Indirect exposure	Frequency	31	9	40
	%	77.50	22.50	100.00
Direct exposure	Frequency	82	11	93
	%	88.17	11.83	100.00
Non-exposure	Frequency	8	332	340
	%	2.41	97.59	100.00
Total	Frequency	121	352	473
	%	25.58	74.42	100.00

Pearson chi2(2) = 33.3404   Pr = 0.000

Table 4.4 continued.

Category of households under foreign exposure		No	Yes	Total
Indirect exposure	Frequency	43	52	95
	%	45.26	54.74	100.00
Direct exposure	Frequency	82	15	97
	%	84.54	15.46	100.00
Non-exposure	Frequency	14	325	339
	%	4.13	95.87	100.00
Total	Frequency	139	392	531
	%	26.18	73.82	100.00
Pearson chi2(2) = 274.1309 Pr = 0.000				

Source: Field Survey, 2018

4.7 Large-Scale Land Acquisitions and access to water resources

Peasants' access to water resources such as fish and water bodies also appear to be affected by large-scale land acquisitions (LSLA) by foreign and domestic entities. Under LSLA by domestic entities, for instance, 50% of the indirectly exposed and 79.6% of the directly exposed households are less likely to have access to water resources whiles only 4.4% of the nonexposed households are less likely to have access to water resources such as fish and water bodies (see Table 4.5). On the other hand, 50% of the indirectly exposed and 20.4% of the directly exposed households are more likely to have access to water resources including fish and water bodies. This suggests households exposed to LSLA by domestic entities are also more likely to experience limited access to water resources in the area. A Chi-square test show there is significant relationship between households' access to water resources and the various category of households under LSLA by domestic entities $[\chi^2(2) = 250.51,\ p < 0.05]$, suggesting that LSLA by domestic entities significantly limit access to water resources.

The pattern of the results of LSLA by foreign entities is not different from that of LSLA by domestic entities. For instance, whereas 45.3% of the indirectly exposed and 74.2% of the directly exposed households under LSLA by foreign entities are less likely to have access to water resources, only few (4.1%) of the nonexposed households are less likely to have access to water resources in the area. In other words, 54.7% of the indirectly exposed and 25.8% of the directly exposed households under LSLA by foreign entities are more likely have access to water resources, whiles 95.9% of the nonexposed households are more likely to have access to water resources in northern Ghana (see Table 4.5). A Chi-square test showed there is significant relationship between access to water resources and the various category of households under LSLA by foreign entities [$\chi^2(2) = 229.15,\ p < 0.05$] (see Table 4.5). This therefore suggest that LSLA by domestic and foreign entities significantly more likely to limit households' access to water resources in northern Ghana. A further probe into why LSLA affect water resources revealed that land acquired by investors are located or embody water resources of local peasants leading to limited access to resources like water and fish. Others explained that the activities of the acquirers also contributed largely to loss of access to water resources. One participant attempted to explain how activities of the acquirers contribute to loss of water access as follows:

"*Some of the acquirers constructed and installed irrigation canals in the water bodies which is of central position than reach of those of us who need much of the water for production. This draws more water in times of low water, leading to insufficient water for irrigation by local farmers in the area. The canal has also limited movement to the installation area thereby limiting the quantity of fish harvested*" (Focus Group Discussion, November 2018).

This finding is consistent with Robertson & Pinstrup-Andersen (2010) who observed that host communities that lose land to LSLA could suffer water shortages. The results are also consistent with the findings of Tinyade, (2010) in Mozambique where peasants water interests was sidelined due to investments from large-scale land acquisition. The results also confirm the observation that large-scale land acquisitions may result in local people losing access to the resources on which they depend for their food security (Cotula et al., 2009).

Table 4.5: Relationship between LSLA and access to water

Category of households under domestic exposure		**Access to water?** No	Yes	Total
Indirect exposure	Frequency	20	20	40
	%	50.00	50.00	100.00
Direct exposure	Frequency	74	19	93
	%	79.57	20.43	100.00
Non-exposure	Frequency	15	325	340
	%	4.41	95.59	100.00
Total	Frequency	109	364	473
	%	23.04	76.96	100.00
Pearson chi2(2) = 250.5087 Pr = 0.000				
Category of households under foreign exposure		No	Yes	Total
Indirect exposure	Frequency	43	52	95
	%	45.26	54.74	100.00
Direct exposure	Frequency	72	25	97
	%	74.22	25.77	100.00
Non-exposure	Frequency	14	325	339
	%	4.13	95.87	100.00
Total	Frequency	129	402	531
	%	24.29	75.71	100.00
Pearson chi2(2) = 229.1532 Pr = 0.000				

Source: Field Survey, 2018

4.8 Large-Scale Land Acquisitions and household's food control

Where households lose access to resources upon which part or all of their livelihoods depend, they move off-farm or accept employment with investment farm which provide resources to farmers for food production (Behrman et al., 2012; Dessy et al., 2012; Kleemann & Thiele, 2015; Nolte & Ostermeier, 2017). If households accept employment from investment farm, control of food produced is limited as they cannot sell produce without prior consent of the acquirers (Borras & Franco, 2012). Table 4.6 shows the relationship between the various categories of households under exposure to large-scale land acquisitions (LSLA) by domestic and foreign entities and control over food they produced. The results show that households' control over the food produced from land occupied is strongly associated with the various categories of households under exposure to LSLA by domestic and foreign entities. Under exposure to LSLA by domestic entities for instance, majority of the households that lost land indirectly (75.5%) and directly (68.5%) to LSLA by domestic entities are less likely to have control over food produced whiles few (6.2%) of the nonexposed households are less likely to have control over food produced. On the other hand, few of the households that lost land indirectly (27.5%) and directly (31.5%) to LSLA by domestic entities are more likely to have control over food produced whiles majority (93.8%) of the nonexposed households are much more likely to have control over food produced. Further, the p-value of 0.00 is smaller than the alpha value of 0.05, suggesting that the result is significant ($\chi^2(2) = 362.30,\ p < 0.05$). This further suggest that the proportion of households that lost land directly and indirectly to LSLA by domestic entities are significantly less likely to have control over food they produced.

Similar results are shown with the relationship between LSLA by foreign entities and ability to control food produced. For instance, whereas 64.2% of the indirectly exposed and 90.7% of the directly exposed households under LSLA by foreign entities are less likely to have control over food produced, only 7.4% of the nonexposed households are less likely to have control over food produced in the area. On the other hand, as low as 31.5% of the indirectly exposed and 27.5% of the directly exposed households are more likely to have control over food produced whiles as high as 93.8% of the nonexposed households are much more likely to have control over food produced in northern Ghana. The results further show that there is a significant association between the various categories of households under LSLA by foreign entities and whether households are able to control food produced $\chi^2(2) = 295.47, p < 0.05$. A further test with Chi-square statistics show that a significant relationship exists between various categories of households under exposure to LSLA by foreign entities and whether households have control over food they produced $[\chi^2(2) = 210.34, p < 0.05]$. This suggest that LSLA by foreign entities is significant more likely to limit households' control over food they produced. Overall, the results suggest that LSLA by both domestic and foreign entities limit control of food produced by affected households, but LSLA by domestic actors appear to limit households' control of food produced as compared to LSLA by foreign actors in northern Ghana. The reason for the limited control of food among affected households was simply explained by the focus group participants as follows: "*Farmers affected by LSLA either rely on remaining plots, go into contract with investors, rent, borrow land from friends/neighbor, pledge or enter into sharecropping agreement with owners. Under all these circumstances, one cannot sell produced without paying a portion to owners of land*" (Focus Group Discussions, November, 2018).

Another participant explained: "*Access to productive resources including land and labour is a core factor shaping farmers' capacity to grow and sell their own produce. As a result of LSLA, we are* *not being able to access these resources and our capacity to grow food and the amount of saleable surplus produced has been reduced"* (Focus Group Discussions, November, 2018).

The limited control of food among affected households confirms the theoretical assertion that common property enclosures will restrict all form of rights to such property by peasants. De Schutter (2009), Li (2011), and Borras and Franco (2012) have been arguing about the possible consequences of LSLA on food control in host communities. De Schutter (2009), for example, argued from the human rights perspective that LSLA can undermine the rights of people to food and productive resources especially if land is leased or sold to domestic or foreign investors. Li (2011) also discusses the farm employment distortions of LSLA, arguing that investment from such land deals may employ co-opting and under such circumstance, local people may not have the complete control of the food produced. The current finding of the relationship between LSLA and food control in northern Ghana lends credence to these studies. The results also corroborate with Lafrancesca (2013) who found that LSLA undermine the control of food by host communities in Senegal. The results also corroborate with Twomey & Schiavoni (2015) in Tanzania where households' capacity to sell food was limited by LSLA.

Table 4.6: Relationship between LSLA and household's food control

Category of households under domestic exposure		**Have control of food produced?**		
		No	Yes	Total
Indirect exposure	Frequency	29	11	40
	%	75.50	27.50	100.00
Direct exposure	Frequency	63	29	92
	%	68.47	31.52	100.00
Non-exposure	Frequency	21	318	339
	%	6.19	93.81	100.00
Total	Frequency	113	358	471

	%	23.99	76.01	100.00
Pearson chi2(2) = 210.3403 Pr = 0.000				

Table 4.6 continued.

Category of households under foreign exposure		No	Yes	Total
Indirect exposure	Frequency	61	34	95
	%	64.21	35.79	100.00
Direct exposure	Frequency	88	9	97
	%	90.72	9.28	100.00
Non-exposure	Frequency	25	313	338
	%	7.40	90.60	100.00
Total	Frequency	174	356	530
	%	32.83	67.17	100.00
Pearson chi2(2) = 288.9902 Pr = 0.000				

Source: Field Survey, 2018

4.9 Summary of Chapter Four

Theoretical and development literature (Anseeuw et al., 2012; DFID, 1999; Harvey, 2003; Marx, 1867; von Braun & Meinzen-dick, 2009) argued that farmland access of local occupants can be undermine by LSLA. This chapter examined cross-sectional data from northern Ghana for evidence of decrease farmland access. The results presented clearly indicate that there is a significant relationship between the various categories of households exposed to LSLA by domestic and foreign entities and farmland access indicators including household's mode of land acquisition, ability to produce crops and animals, fallow land, practice monocropping, ability to access water resources, ability to control food produced, ability to rent-out land. This implies that households that lose farmland and farmland-based resources such as forest resources; live in/nearby an affected community; lose uncultivated land or have limited land due to enclosures are all less likely to have access to farmland for production and other livelihoods. This finding corroborates with the sustainable livelihood framework (Figure 2.3 in section 2.10) and conceptual framework (Figure 2.4 in section 2.9) of this study which argued that acquisition of large tracts of land by supposed investors will affect farmland access. The finding also lends support to the notion that taking land, establishing rights on it, enclosing it, and expelling a resident population limit farmland access (Harvey, 2003; Marx, 2010). Such finding is consistent with the study of Hamenoo et al. (2017) in which large-scale land acquisition was found to reduce households land access in Ghana. It also lends support to Bottazzi et al. (2018) who found significant reduction in land and natural resources due to transformation of community land into sugar cane plantations in Sierra Leone. The finding further lends support to the observation that LSLA can undermine access to land and control of land-based resources of the local population (Graham et al., 2010). The results are also consistent with the study of Matenga & Hichaambwa, (2017) where households affected by LSLA own less land than their nonaffected counterparts. The findings however contradict with that of Boamah & Overa (2015) who found that LSLA improved access to land on the investment farm.

Based on these findings, it is expected that LSLA would most likely affect labour supply, investments, farm income and food security. In particular, farm labour input may be reduced in favour of off-farm labour allocation to either unemployment/leisure, rural areas where investment farms are established or urban off-farm employment. In the next chapter, the study examines how LSLA affect level of farm labour input, movement of households' member to off-farm and time spent in urban off-employment.

CHAPTER FIVE

EFFECT OF LARGE-SCALE LAND ACQUISITIONS ON HOUSEHOLD LABOUR SUPPLY

5.1 Introduction

This section analysed the relationship between large-scale land acquisitions (LSLA) [i.e., nonexposed, directly and indirectly exposed households) under exposure to] by domestic and foreign entities and labour supply. Such analysis is born out of Equation (2.24) which indicates that given other factors, land reduction would lead to decrease in labour inputs for farm and consequently increase labour inputs for leisure or off-farm employment. Thus, the questions to be answered in this section is whether LSLA has led to decrease levels of farm labour inputs and whether there is increase in number of people working off-farm, as well as time spent off-farm due to LSLA. Bar charts and descriptive statistics are first employed to show how various categories of households under LSLA by domestic and foreign entities are associated with level of farm labour input and number of people working off-farm. Next, the multinomial endogenous treatment effect model is employed to show how labour time for off-farm employment is related to LSLA.

5.2 Large-Scale Land Acquisitions and level of farm labour input

One argument often put forward by opponents of large-scale land acquisition (LSLA) is that such acquisitions leads to reduction in labour power for households farm activities. Ju et al. (2016) in particular showed that given other factors, land reduction due to LSLA would lead to decrease in labour inputs for farm activities. Figure 5.1 and 5.2 present the opinions of various categories of households under exposure to LSLA by domestic entities about level of labour for farm activities in northern Ghana. The results show that LSLA by domestic and foreign entities decreased households' labour allocation for farm activities among affected households. As indicated in Figure 5.1, majority of each of the households that lose land directly and indirectly to LSLA by domestic entities also thinks that labour allocation for farm activities had either decreased or significantly decreased whiles few of the nonexposed households are of the view that labour allocation to farm activities had decreased or significantly decreased. For instance, whereas 40.5% and 50.9% of the households that lost land indirectly and directly to LSLA by domestic entities opined that farm labour inputs had significantly decreased, only 7.7% of the nonexposed households opined that farm labour input had decreased significantly. Further, 30.2% and 60.1% of the households that lost land indirectly and directly to LSLA by domestic entities opined that farm labour inputs had decreased, whiles only 9.7% of the nonexposed households opined that farm labour input had decreased. On the other hand, majority (80.6%) of the nonexposed households indicate significant increase in farm labour input, whiles few of the households that lost land directly (11.3%) and indirectly (8.1%) to LSLA by domestic entities opined that farm labour input had significantly increased. Similarly, majority (70.6%) of the households that neither lost land directly nor indirectly to LSLA by domestic entities think that labour allocation to farm activities had increased, whiles few of the households that lost land directly (22.3%) and indirectly (7.1%) to LSLA by domestic entities argued that labour for farm activities had increased. The incidence of increased farm labour input among the exposed households was largely attributed to the explanation that these households have relatives in near and unaffected communities who share land and as well helped perform farm activities even in the absence of the affected members. Nonetheless, majority of the directly and indirectly exposed households are of the view that labour allocation to farm activities has decreased, whiles few of the nonexposed households indicate a decrease in labour supply to farm activities. On the other hand, majority of the nonexposed households indicated that farm labour allocation has increased whiles few of the households that loss land directly and indirectly to LSLA by domestic entities are of the view that labour for their farm activities has increase.

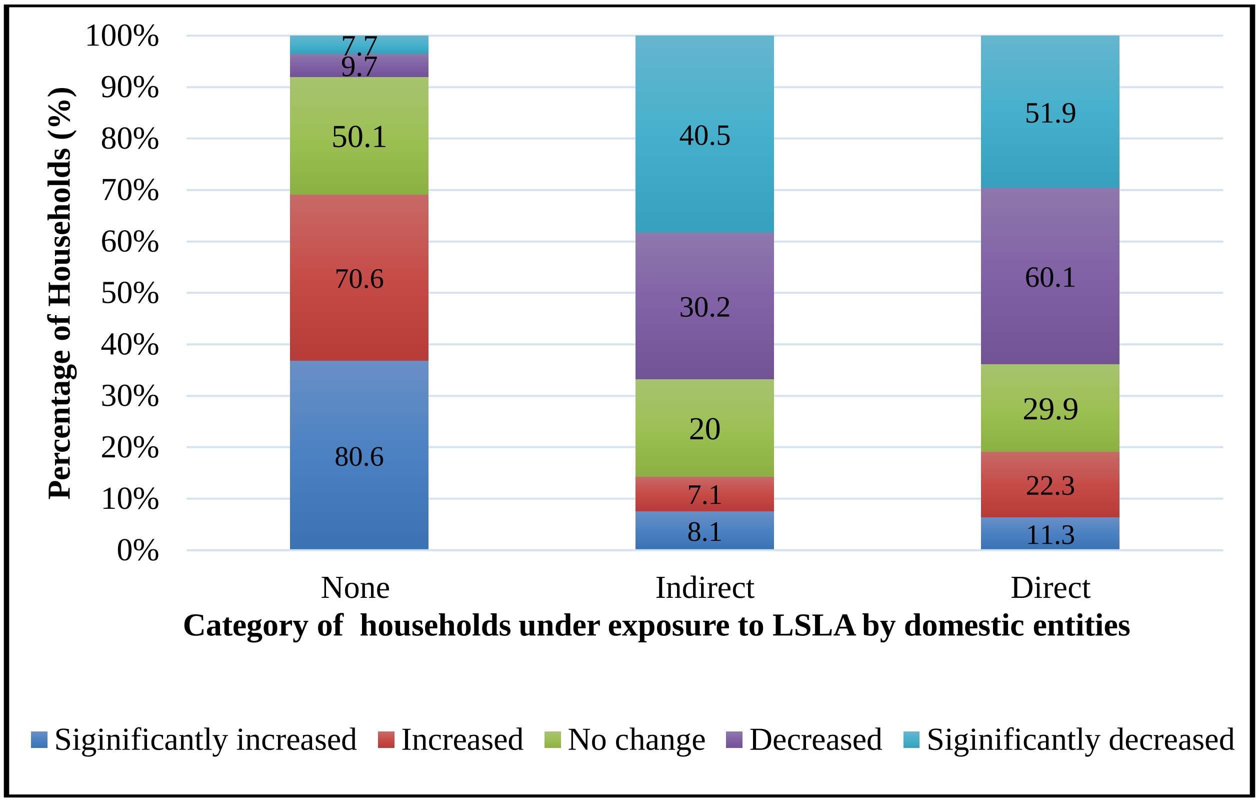

Figure 5.1: Farm Labour Under Exposure to LSLA by Domestic Entities
Source: Author's own computation, 2018.

The results on the relationship between LSLA by domestic entities are similar to that shown under LSLA by foreign entities (Figure 5.2). Specifically, about 53.7% and 37.4% of the indirectly and directly exposed households respectively indicate significant decrease in labour allocated to farm activities whiles few (8.9%) of the households that neither lost land directly nor indirectly to LSLA by foreign entities indicate a significant decrease for farm labour inputs. Further, whereas 50.8% and 34.7% of the households that lost land directly and indirectly to LSLA by foreign entities indicate decrease in labour allocated to farm activities, only 14.5% of the households that neither loss land directly nor indirectly to LSLA by foreign entities indicate a decrease in labour allocated to farm activities. On one hand, majority (82.9%) of households that neither lost land directly nor indirectly to LSLA by foreign entities indicated that labour allocation to farm activities had increased significantly. On the other hand, few of the households that lost land directly (8%) and indirectly (9.1%) to LSLA by foreign entities indicated significant increase in labour allocation to farm activities. Further, 70.1% of the households that neither loss land directly nor indirectly to LSLA by foreign entities indicated that in labour allocation to farm activities had increase whiles 15.2% and 14.7% of the households that respectively lost land directly and indirectly to LSLA by foreign entities indicated that labour allocation to farm activities had increased. Thus, whereas majority of the households that lost land directly and indirectly to LSLA by foreign entities indicate decrease in labour supply to farm activities, few of the nonexposed households indicate a decrease in labour supply to farm activities. In other way, majority of the nonexposed households indicated that farm labour allocation has increase whiles few of the households that lost land directly and indirectly to domestic entities are of the view that labour for their farm activities has increase. The results therefore suggest that households who lose farmland and farmland-based resources such as forest resources or living nearby/in affected communities, lose uncultivated land due to enclosures also lose farm labour. Migration by the youth was the main reason ascribed to the reduction in farm labour input among exposed households, and several reasons were advanced for the migration. The first reason for the migration is that most of the jobs created by large farms from LSLA required skills and qualification from formal training to be carried out successfully. However, the exposed youth that mostly provide labour possessed none of such qualifications and were therefore not employed. In search of livelihoods, the unemployed youth migrated to other areas to look for jobs, and this resulted in decreased in farm labour inputs for most households.

The second reason was that few were employed into low skill jobs and the wages earned form such jobs could not sustain the families of the exposed youth for the entire year. To supplement low salaries, members had to look for additional jobs elsewhere. The final reason was that investors used mechanised farming and employed few people leaving majority of youth who had nothing to do than to look for jobs elsewhere. The quest to find jobs led to migration to Accra, Kumasi, and Tamale and this resulted in labour shortage for households. These findings corroborate with Behrman et al., (2014), Behrman and Quisumbing (2011) and FIAN International (2010) who argued that investors may employ mechanize farming or high skilled labour, leaving evicted farmers to fend for themselves and their families.

It is however worth noting that a change in farm labour inputs could imply changes in off-farm activities. Although the opinions of the households indicated decrease in farm labour input due to LSLA, it is unclear whether such decrease favours off-farm activities including increase in members working off-farm and time spend off-farm. In the next sections, the effect of LSLA on members working off-farm and time spend off-farm is explored.

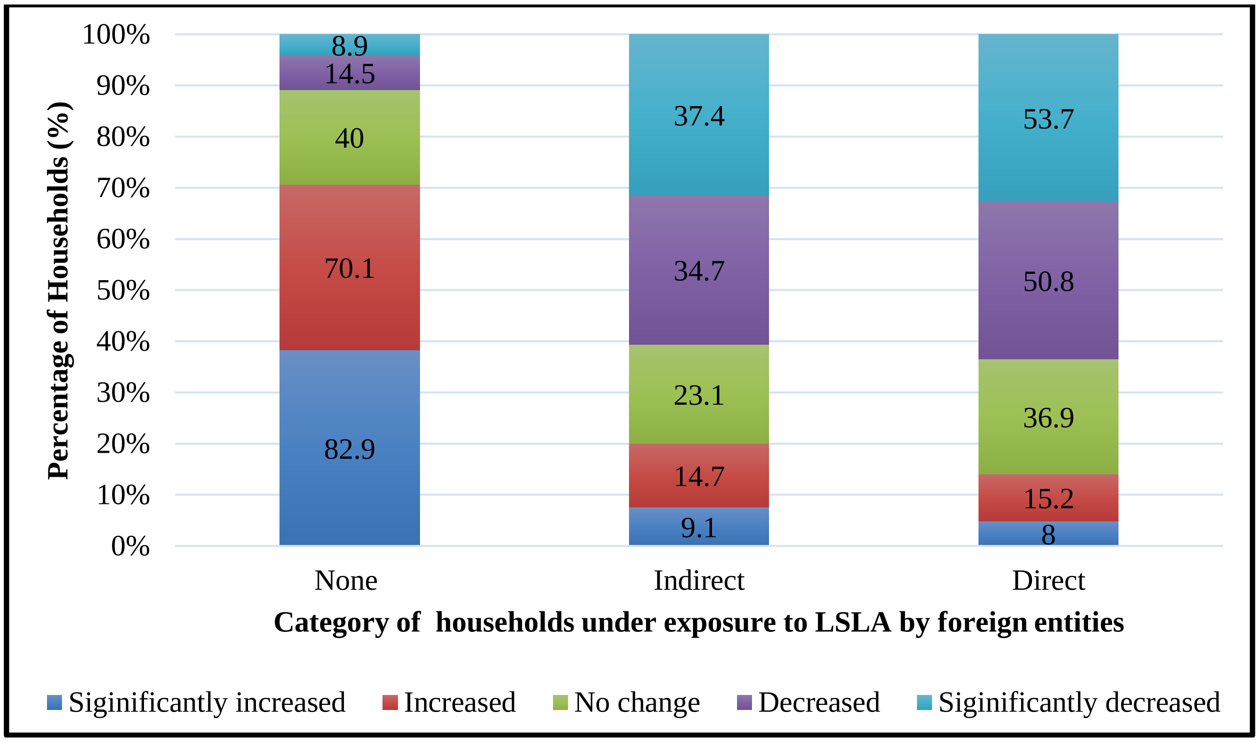

Figure 5.2: Farm Labour Under Exposure to LSLA by Foreign Entities
Source: Author's own computation, 2018.

5.1 Large-Scale Land Acquisitions and household members working off-farm

It is clear from the Figure 5.1 and 5.2 that labour allocation to farm activities has decrease as indicated by various categories of households exposed to large-scale land acquisitions (LSLA) by domestic and foreign entities. However, such finding cannot be a justification to conclude that LSLA increases off-farm employment. The overall decreased in labour allocation to farm activities due to LSLA could imply redistribution of labour to unemployment (reserved/surplus labour or leisure), rural off-farm employment by investment farms established from the land acquired or urban off-farm employment. By way of rectification of direction of movement of labour loss in farm activities, this study further compares the distribution of members of nonexposed to directly and indirectly exposed households under LSLA by domestic and foreign entities that are in off-farm sector (Table 5.1). The results indicate that number of members in off-farm sector depends on category of household under exposure to LSLA by domestic and foreign entities. Under exposure to LSLA by domestic entities, about 2 members from each of the nonexposed, directly and indirectly exposed households are employed in the rural off-farm sector where the investment farms are established. Further, about 2 members from each of the nonexposed, directly and indirectly exposed households under LSLA by domestic entities remained unemployed. On the other hand, about 2 members from the households that are neither directly nor indirectly exposed to LSLA by domestic entities are employed in the urban off-farm sector whiles about 9 and 6 members of the directly and indirectly exposed households are employed in the urban off-farm sector. The pattern of labour distribution for households exposed to LSLA by foreign entities is similar to that of the households exposed to LSLA by domestic entities. For instance, about 3 members from each of the nonexposed, directly and indirectly exposed households are employed in the rural off-farm sector where the investment farms are established, whiles about 2 members each from the nonexposed, directly and indirectly exposed households remained unemployed under exposure to LSLA by foreign entities. On the other hand, whereas about 2 household members from the nonexposed households are employed in the urban off-farm sector, about 8 and 5 members from the direct and indirect exposed households are employed under exposure to LSLA by foreign entities. Thus, in terms of members employed in urban off-farm sector, there are differences between nonexposed and exposed households (i.e., directly, and indirectly exposed households) under exposure to LSLA by domestic and foreign entities. On the other hand, no differences are evident for exposed and nonexposed in terms of members that are employed in the rural off-farm and unemployment sectors. The results therefore imply that losing farmland and farmland-based resources such as forest resources or living nearby/in affected communities, losing uncultivated land due to enclosures results in redistribution of household's farm labour into urban off-farm employment sector but not rural off-farm sector where investment farms are established or unemployment sector (surplus labour or leisure). The increase in number of members working in urban off-farm employment due to LSLA was attributed to migration due to loss of land for farming. The results confirm the earlier views of households regarding level of farm labour in the study area. Aside confirming the study's conceptual framework and hypothesis, the results reinforced the notion that given other factors, reduction in land will decrease farm labour input and consequently increase off-farm labour input (Ju et al., 2016). Literature on the relationship between labour and land argued that land constraints induced by LSLA may induce a reduction in labour time allocated to on-farm activities (Behrman et al., 2014; Boserup, 1965; Dessy et al., 2012; Kleemann & Thiele, 2015). The results on the relationship between LSLA and distribution of members in off-farm employment generally supports this argument.

Table 5.1: LSLA and distribution of household members in Off-farm employment

Off-farm sector	**Households under domestic exposure to LSLA**			**Households under foreign exposure to LSLA**		
	None	Direct	Indirect	None	Direct	Indirect
Rural off-farm employment	1.80 (1.91)	2.25 (4.21)	2.00 (1.07)	2.80 (1.91)	3.45 (2.92)	2.57 (1.62)
Urban off-farm employment	2.00 (1.87)	8.80 (3.68)	6.21 (1.21)	1.85 (1.81)	7.88 (1.19)	5.07 (1.24)
Unemployed (surplus labour/leisure)	1.85 (2.81)	1.75 (8.87)	1.65 (1.70)	2.01 (1.87)	2.09 (2.43)	1.99 (1.73)

Standard deviations are in parenthesis

5.4 Large-Scale Land Acquisitions and time spent in urban off-farm

The results in Figure 5.1-5.2 and Table 5.1 suggest that instead of rendering households unemployed or creating employment in rural off-farm where investment farms are established, large-scale land acquisition (LSLA) pushes households into urban off-farm employment activities. Given that LSLA actually pushed households into off-farm employment, time allocated to off-farm employment may increase due to LSLA. This section therefore analysed the relationship between various categories of LSLA by domestic and foreign entities and labour time allocated to off-farm employment. The multinomial endogenous treatment effect (METE) model specified under section (3.9) of chapter three was employed for the analysis. The METE model controls for selection bias resulting from observed and unobserved characteristics. As indicated under section (3.9) of chapter three, acquisition of households' plots is non-random as they may have been influenced by nearness to water sources, market access or institutional attributes (often unobservable). Such non-random acquisition process can lead to differences in time spent off-farm by exposed (directly and indirectly exposed households) and non-exposed households. Table 5.2 particularly show that there are 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, 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, 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, direct and indirect exposure to LSLA by domestic and foreign entities. For instance, on average there was no compensation for the non-exposure (control group), but this however ranges between GH¢349.23 and GH¢668.61 per acre for direct and indirect exposure (treated groups) to LSLA by domestic entities; and GH¢378.56 and GH¢895.98 per acre for direct and indirect exposure to LSLA by foreign entities. Further, 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. Similarly, there are differences between exposed and nonexposed households in terms of gender, level of education, proportion of households who are in leadership position, 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 the effects of LSLA, the multinomial endogenous treatment effect (METE) model was employed. Th results are presented in Table 5.5.

As noted in section (3.5), the first stage of the METE model is multinomial logit selection model of the factors influencing households' direct and indirect exposure to LSLA by domestic and foreign entities. The results of the multinomial logit model (MNLM) of the factors influencing household's direct and indirect exposure to LSLA by domestic and foreign entities are presented in Table 5.3 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 Hausman test for the IIA assumption and Wald test of combining categories (see Appendix 3 and

4 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.

Table 5.2: 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
Off-farm labour	7.15 (3.18)	15.43 (4.82)	12.08 (6.42)	25.52 (51.39)	20.95 (30.29)
Compensation	-	668.61 (46.60)	349.23 (43.31)	378.56 (13.31)	895.98 (16.04)
Landholding	16.72 (8.93)	8.58 (6.07)	9.54 (4.24)	10.06 (14.24)	11.02 (61.44)
Fallow period	2.686 (1.64)	2.85 (8.70)	2.24 (4.19)	2.67 (9.10)	1.59 (3.73)
Gender	0.94 (0.24)	0.92 (0.26)	0.91 (0.29)	0.94 (0.24)	0.87 (0.34)
Water sources	0.25 (0.16)	0.28 (0.14)	0.16 (0.10)	0.35 (0.21)	0.16 (0.11)
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)
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)
Education	2.05 (4.52)	1.28 (2.96)	2.21 (4.18)	2.05 (4.52)	2.04 (4.38)
Wage rate	17.94 (6.94)	25.87 (4.59)	10.89 (3.91)	107.94 (356.94)	145.47 (330.59)
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)
Yagba-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)
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)
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. North Gonja district is the reference category

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 expsore to LSLA by foreign entities: Wald test ($\chi 2$ (40) = 300.16; $p =$ 0.000); Under expsore to LSLA by domestic entities: Wald test ($\chi 2$ (40) = 235.16; $p =$ 0.000)]. All variables under household power relations had a significant relation with household's direct and indirect exposure to LSLA by domestic and foreign entities. For instance, gender of the household head is negative and significantly related to direct and indirect loss of land under LSLA by domestic and foreign entities. This is consistent with the study's a prior expectation and thus, suggest that male-headed households are less likely to lose land directly or indirectly under exposure to LSLA by domestic and foreign entities than the nonexposed households. According to participants during focus group discussions, women's rights to use land as wives, mothers and daughters largely depends on males, particularly their husbands who most of the time share their land. However, most husbands who lost land through LSLA mostly reclassified female-controlled plots as male-controlled plots for production to meet households needs. This probably explains why males are less likely to be exposed directly or indirectly to LSLA by domestic and foreign entities. Educational level of household is also found to be significant at 5% and negatively related to 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. Education enhances household's knowledge about land and 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 risk of eviction than the less educated household. Similar, inferences can be made about household's prior knowledge of already affected households. Specifically, 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 as well confirms the finding of Suhardiman et al. (2015) in Laos where farmers with prior information from relatives and related networks about LSLA enhance security of their remining land through the use of rubber plantations, thereby avoiding further loss to investors. Power as reflected in leadership position is also significant and negative, suggesting that household heads in leadership position 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 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. this results support Goldstein and Udry's (2008) argument that land holders 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 are able to 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 confirms our hypothesis and Alemu's (1999) framework.

Among the location factors, good soil fertility, availability of water resources, being in Yagaba-Kubori, North and Central Gonja districts are positive and significantly related to households' indirect and indirect loss of land to LSLA by domestic and foreign entities. These suggest that households located in areas with fertile plots, available water resources, Yagaba-Kubori, North and Central Gonja are more likely to lose land directly or indirectly under LSLA by domestic and foreign entities than nonexposed households. This confirms the argument that a firm's decision to participate in FDI is determined by location factors (Dunning, 1998). The results also confirms 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. However, the results contradicts with other studies which find negative relationship between LSLA and location factors. Lay & Nolte (2018) in particular proxied location variables with agricultural area and water resources. However, their study did not find any positive effects of agricultural area and water resources on LSLA. On the other hand, being in 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 with our hypothesis that households with plots located in Mion District are more likely to lose land directly or indirectly under exposure to LSLA by domestic and foreign entities than the nonexposed. Respondents explained that that Mion district has less water resource for large scale production. However, given that large-scale agricultural investment is largely contingent on available water resources (Anseeuw et al., 2012), households in that area are less likely to lose land to investors.

The results further indicate the importance of 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, suggest 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 Goldstein and Udry (2008) who reported that land which is fallowed can be lost to relatives or other land users under indigenous African land tenure systems.

Also, the role strong of institutions in promoting LSLA is confirmed in this study. In particular, availability of formal land and financial institutions show significant and positive association with direct and indirect land loss under LSLA by domestic and foreign entities. These suggest that strong institutions with laws and policies are more likely to expose households to LSLA by foreign and domestic entities. These results are consistent to other studies which highlighted a positive relationship between LSLA and institutions, laws, and policies. In Ghana, the results particularly corroborated with Yaro's (2013) observation that policies facilitate the emergence of land sales and consequent changes in the control of land. Also, Cotula's (2013) finding that that the law facilitated moves towards the commodification and access to land for investors has been confirmed in Ghana. The results is also consistent with Lay and Nolte (2018) who found positive relationship between institutional quality and LSLA. Similarly, the results is consistent with the study of Giovannetti and Ticci (2016) in which institutional quality facilitated the investment in large-scale land for biofuels. However, the results of the relationship between institutional quality variables and LSLA in this study contradicts with Arezki et al. (2013) who found mixed results with respect to the relationship between quality of institutions and LSLA.

Table 5.3: 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)**
Tenure security	-0.32 (0.27)	-0.07 (0.37)	0.29 (0.19)	0.37 (0.28)
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)
Yagba-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)*

Table 5.3 continued

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. Standard errors are in parenthesis.

Table 5.4 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 household's direct and indirect exposure to LSLA also lead to decrease time spent off-farm as compare 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. 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, suggest that 1% increase in off-farm wage rate will lead to 36% and 30% increase in time spent off-farm for direct and indirect exposure to LSLA by domestic and foreign entities. Another is landholding which decreases time spent off-farm by 0.23 and 0.28 and thus suggest that 1% increase in landholding of leads to 23% and 28% increase time spent off-farm for direct and indirect exposure to LSLA by domestic and foreign entities. On the issue of urban off-farm time effects of exposure to LSLA, the results show 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 urban off-farm employment will increase by 70% and 68% respectively for direct and indirect exposure to LSLA under domestic entities. 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. These therefore substantiate the earlier finding that direct and indirect exposure to LSLA under domestic and foreign entities lead to redistribution of farm labour inputs to urban off-farm employment. The results also lend support to the notion that land reduction lead to increase in labour supply to off-farm activities (Ju et al., 2016). The results also confirm the conceptual framework which argued that direct and indirect exposure to LSLA under domestic and foreign entities leads to increase in labour supply to off-farm activities. Our result also confirms other literature which argued that taking rights over households' resources (e.g. land) creates group of workers who give up their labour power in return for a wage for survival (Harvey, 2003; Marx, 2010).

Table 5.4: 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)***
Tenure security	0.03 (0.03)	0.00 (0.05)
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)
Yagba-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

Generally, the results concerning the effect of LSLA on household labour supply is largely consistent with theoretical predictions and the conceptual framework of this study. Specifically, the results show that direct and indirect loss of land under exposure to LSLA by domestic and foreign entities leads to reduction in levels of farm labour inputs among the affected households. Further, the results show that direct and indirect loss of land under exposure to LSLA by domestic and foreign entities lead to increase in household members working in urban off-farm employment but no change in household members working in rural off-farm employment and unemployment (labour surplus or leisure). The study also found that direct and indirect loss of land under exposure to LSLA by domestic and foreign entities leads to increase in time spent in urban off-farm employment. These suggest that direct and indirect loss of land under exposure to LSLA by domestic and foreign entities lead to redistribution of farm labour inputs into urban off-farm employment instead of rural off-farm employment by the investment farms established after acquisition or unemployment (surplus labour or leisure). This therefore highlights the role of LSLA by both domestic and foreign entities in increased urban off-farm employment and labour scarcity in northern Ghana. However, the results are not surprising because farm labour allocation depends on farmland access and may be reallocated to other activities farmers cannot find land to farm. The results further support the sustainable livelihood framework (Figure 2.3 in section 2.10) which argued that exposure to LSLA as a component of vulnerability context and a product of transforming structures and processes will undermine livelihoods and the availability of resources such as labour (DFID, 1999). The results also confirm the Ju et al. (2016) and the conceptual framework which argued that LSLA by domestic and foreign entities will decrease farm labour input but increase labour for off-farm employment. The results also corroborate with view that such LSLA may increase migration and participation in off-employment since such investments may destroy local farm employment without necessarily creating jobs for local farmers (e.g., Anseeuw, Wily, Cotula, & Taylor, 2012; Daniel, 2011; FIAN International, 2010, 2017; Li, 2011; Tinyade, 2010). Li (2011) discusses the farm employment distortions of LSLA, arguing that investment from such land deals mostly requires land of local people for production and corporate profit, but not their labour and hence the anticipated increase in demand of local labour by large scale establishments do not always materialize. The current findings of the relationship between LSLA and labour supply confirms Li's (2011) view. The results also lend support to Ali et al. (2019) find that investment from LSLA did not lead to job creation in Ethiopia. The results, however, contradict with Boamah (2010) and Boamah and Overa (2015) who found that LSLA led to employment generation for affected households in Ghana.

5.5 Summary of Chapter Five

In chapter five, the effects of large-scale land acquisitions by domestic and foreign entities on labour supply is examined under the agricultural household model of (Ju et al., 2016). According to Ju et al. (2016), given total time at households' disposal, loss of land due to LSLA will lead to decrease in households' labour input but an increase in labour input for off-farm activities. The analysis was conducted using descriptive statistics and multinomial endogenous treatment effect model.

In line with Ju et al. (2016), the study found that land loss due to LSLA by both domestic and foreign entities reduces labour input for farm activities but increases labour input for off-farm activities in northern Ghana. Specifically, households that loses land to LSLA by both domestic and foreign entities tend to redistribute farm labour to urban off-farm employment instead of unemployment or local rural off-farm employment where investment farms are established with the acquired land. This goes contrary to the narrative that LSLA can generate employment for local occupant (Deininger et al., 2011).

The low redistribution of farm labour to urban off-farm employment instead of rural off-farm employment where investment farms are established after acquisition can have implication for farm investment in the area. Loss of labour to urban employment may discourage adoption of labour demanding techniques. On other hand, land scarcity introduced by LSLA may cause uncertainty in farmers mind about his/her investment returns (Feder & Onchan, 1987; Marshall, 1890). In any case adoption of land improving techniques may be affected. In the next section, the relationship between LSLA and investment in land improving techniques are examined.

CHAPTER SIX

RELATIONSHIP BETWEEN LARGE-SCALE LAND ACQUISITIONS AND HOUSEHOLD FARM INVESTMENTS

6.1 Introduction

The neoclassical theory of the relationship between tenure security and farm investment argues that land scarcity increases tenure insecurity and compel farmers to prioritize short-term farm investment over long-term land improvement techniques (Feder & Onchan, 1987; Marshall, 1890). Thus, the main objective of this section is to present and discuss the evidence of the effect of direct and indirect exposure to large-scale land acquisitions (LSLA) under domestic and foreign entities on households' farm investments. However, as discussed in section (3.9.3), investments may also enhance perceived land tenure security. Thus, the potential reverse causality between LSLA and investments is also tested. The two-stage conditional maximum likelihood (2SCML) was employed to examine effect of direct and indirect exposure to LSLA under domestic and foreign entities on the short-term and long-term farm investment. The same approach was employed to test the reverse causality. As mentioned under section (3.9) of chapter three, the purpose of using the 2SCML is to control endogeneity and to estimate a system of equations involving farm investments and exposure to LSLA under domestic and foreign entities.

6.2 Descriptive statistics of the variables used for the analysis

As far as the farm investment effect of LSLA is concerned, the descriptive statistics of the control variables are necessary. Table 6.1 presents the descriptive statistics of the variables included in the analysis. The statistics indicate differences between non-exposure and exposure households (i.e., direct, and indirect exposure) under domestic and foreign entities. Among the sampled households, about 55% of the nonexposed households participates in long-term farm investment [i.e., irrigation or soil and water conservation techniques (SWCT)]. Meanwhile, 11% and 22% of the direct and indirectly exposed households under domestic entities participate in long-term investment whiles 16% and 17% of the directly and indirectly exposed households under foreign entities participate in long-term investment. On the other hand, 75% and 47% of the directly and indirectly exposed households under domestic entities participate in short-term investment [i.e., NPK (15:15:15), Sulphate of Ammonia and Urea (46:0:0)] whiles 39% and 41% of the directly and indirectly exposed households under foreign entities participate in short-term investment [i.e., NPK (15:15:15), Sulphate of Ammonia and Urea (46:0:0)]. Meanwhile, 31% of the nonexposed households participate in short-term farm investment [i.e., NPK (15:15:15), Sulphate of Ammonia and Urea (46:0:0)] (Table 6.1). Thus, whereas investment in long-term land improvement techniques [i.e., irrigation or soil and water conservation techniques (SWCT)] is lower for exposed households as compared to nonexposed households under domestic and foreign entities, investment in short-term improving techniques [i.e., NPK (15:15:15), Sulphate of Ammonia and Urea (46:0:0)] is higher for the exposed households. One reason ascribed to such finding is that some of the affected households who get employed by the investment farms not only obtain information about the techniques but earn income that is used to purchase these inputs for production. However, these revelations not enough to conclude that exposure to LSLA compel farmers to prioritized short term investment over long-term investment. These results are not enough to make such conclusion because there are differences between exposed and nonexposed households in terms of other characteristics. For instance, on the average, household income ranges between GH¢3,668.61 and GH¢4,349.23 for directly and indirectly exposed households under domestic entities and GH¢3668.61 and GH¢5,095.65 for directly and indirectly exposed households under foreign entities (Table 6.1). With respect to gender, the statistics indicate that there more males in the sample than females. This is probably due to the fact that males dominate in agriculture than females in area (Ghana Statistical Service, 2013). The statistics also show that average age in the sample is about 47 years. It is however worth mentioning that both exposed and nonexposed households are represented by adults or matured group of respondents. Thus, the sampled respondents for the study are within the age range defined by FAO (2004) as economically active population. Further, educational level is low given that the average number of years spent in school is about 2 years in the sample. This is therefore likely to have more implications for household's land access and livelihood in the area.

Given the differences presented above, it may be misleading to conclude that exposure to LSLA compelled farmers to choose short-term improving techniques over long-term improving techniques. As argued in most studies of impact evaluation (Abdulai & Huffman, 2014; Khonje et al., 2018; Khonje, Manda, Alene, & Kassie, 2015; Ma, Abdulai, & Ma, 2017; Ma, Abdulai, & Renan, 2017; Owusu et al., 2011), such differences in characteristics may be the cause of the differences in outcome. Using the 2SCML model, this study accounts for the differences and as well evaluates the relationship between exposure to LSLA and farm investment. The results are presented in the next two sections.

Table 6.1: Variable summary statistics

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		Total
		Direct	Indirect	Direct	Indirect	
Exposure to LSLA by domestic entities						
Non-exposure						0.72
Direct exposure						0.20
Indirect exposure						0.08
Exposure to LSLA by foreign entities						
Non-exposure						0.63
Direct exposure						0.18
Indirect exposure						0.18
Long-term investment	0.55 (0.74)	0.11 (0.26)	0.22 (0.41)	0.16 (0.37)	0.17 (0.37)	0.38 (0.49)
Short-term investment	0.31 (0.49)	0.75 (0.43)	0.47 (0.12)	0.39 (0.49)	0.41 (0.17)	0.80 (0.40)
HH_income	5,349.23 (13.31)	3,668.61 (46.60)	4,349.23 (13.31)	5,095.65 (21.03)	3668.61 (46.60)	5095.65 (21.03)
Return on investment	0.11 (0.16)	0.36 (0.17)	0.21 (0.20)	0.25 (0.09)	0.31 (0.11)	0.10 (0.24)
Fertilizer subsidy	0.70 (0.46)	0.11 (0.09)	0.15 (0.21)	0.74 (0.44)	0.77 (0.42)	0.75 (0.43)
Farm size	15.06 (4.24)	3.58 (6.07)	2.54 (4.24)	2.39 (5.78)	3.54 (4.24)	6.39 (3.78)
Household size	12.59 (3.18)	11.93 (7.63)	12.44 (7.28)	10.11 (5.22)	11.93 (7.63)	12.44 (7.28)
Leadership	0.25 (0.43)	0.31 (0.46)	0.23 (0.42)	0.25 (0.43)	0.23 (0.42)	0.26 (0.44)
Labour	15.35 (2.85)	24.33 (8.59)	18.46 (6.41)	19.11 (8.59)	17.32 (7.66)	10.75 (2.61)
Gender	0.94 (0.24)	0.92 (0.26)	0.91 (0.29)	0.93 (0.26)	0.91 (0.29)	0.93 (0.26)
Age	47.65 (2.61)	47.28 (3.44)	45.56 (2.90)	46.97 (2.87)	45.56 (2.90)	46.97 (2.87)
Water resources	0.59 (0.12)	0.13 (0.27)	0.19 (0.13)	0.12 (0.15)	0.46 (0.50)	0.41 (0.49)
Road access	0.58 (0.50)	0.28 (0.45)	0.31 (0.46)	0.33 (0.47)	0.40 (0.49)	0.35 (0.48)
Credit	0.18 (0.38)	0.16 (0.37)	0.14 (0.34)	0.16 (0.37)	0.31 (0.46)	0.33 (0.47)
Social group	0.88 (0.32)	0.92 (0.26)	0.86 (0.34)	0.89 (0.32)	0.43 (0.50)	0.39 (0.49)
Knowledge	0.34 (0.48)	0.53 (0.50)	0.66 (0.48)	0.61 (0.49)	0.66 (0.48)	0.61 (0.49)
Good fertile	0.35 (0.48)	0.47 (0.50)	0.37 (0.48)	0.38 (0.49)	0.37 (0.48)	0.38 (0.49)
Moderately fertile	0.45 (0.50)	0.40 (0.49)	0.46 (0.50)	0.45 (0.50)	0.46 (0.50)	0.45 (0.50)
Poorly fertile	0.19 (0.40)	0.13 (0.34)	0.17 (0.37)	0.17 (0.38)	0.17 (0.37)	0.17 (0.38)
Education	2.05 (4.52)	1.28 (2.96)	2.21 (4.18)	1.97 (3.86)	2.21 (4.18)	1.97 (3.86)
Sagnarigu	0.15 (0.36)	0.06 (0.24)	0.28 (0.45)	0.17 (0.38)	0.28 (0.45)	0.17 (0.38)
Mion	0.09 (0.28)	0.07 (0.25)	0.11 (0.32)	0.09 (0.29)	0.11 (0.32)	0.09 (0.29)
Central Gonja	0.23 (0.42)	0.23 (0.42)	0.06 (0.24)	0.18 (0.39)	0.06 (0.24)	0.18 (0.39)
Savelegu	0.40 (0.49)	0.46 (0.50)	0.23 (0.42)	0.36 (0.48)	0.23 (0.42)	0.36 (0.48)
Yagba-Kubori	0.12 (0.32)	0.17 (0.38)	0.27 (0.44)	0.17 (0.38)	0.27 (0.44)	0.17 (0.38)
North Gonja	0.02 (0.13)	0.85 (0.36)	0.72 (0.45)	0.02 (0.15)	0.05 (0.21)	0.02 (0.15)

Notes: Standard deviations are in parenthesis. **Source: Field Survey, 2018**

6.3 Exposure to Large-Scale Land Acquisition

Table 6.2 presents the regression results of determinants of direct and indirect exposure to large-scale land acquisitions (LSLA) by domestic and foreign entities. As mentioned previously, exposure to LSLA under each of the domestic and foreign entities was captured as polychotomous variable. Thus, the results were obtained using multinomial logit regression model in the second stage of the 2SCML. Thus, the endogenous variables (i.e., long-term, and short-term farm investment in this study) and their predicted values from the first-stage linear probability model were incorporated into a second stage MNLM model. The first stage results can be found in Appendix 5 of the Appendices. As shown in Table 6.2, the coefficients of the predicted values derived from the first-stage land investment equations are each significantly different from zero. Moreover, Wald chi-square test revealed that the predicted values are jointly significantly different from zero. Thus, the null hypotheses that the investment variables are exogenous in the exposure equations is rejected. These suggest that the coefficients of the investment variables would have been different if we did not control for endogeneity. Thus, the inclusion of the predicted values of long-term and short-term farm investments corrects for endogeneity. Also, the $\chi 2$ statistics for joint significance of the instrument fail to reject the exclusion restriction that households' prior knowledge of other households affected by LSLA can only influence direct and indirect exposure to LSLA through farm investment. Of particular interest is the results displayed by variables representing long and short-term farm investment. These variables are all negatively sign as expected and significant at 1% in the equations for direct and indirect exposure to LSLA under both domestic and foreign entities. Such findings support the hypothesis that households investing in long-term and short-term land improving technologies enhance tenure security of land and are less likely to experience direct and indirect exposure to LSLA. The results confirm the reverse causality between exposure to direct and indirect LSLA and investment in northern Ghana. This finding further lends support to empirical and theoretical studies which argued that farmers in many traditional tenure systems may minimize eviction rates through investment land improving techniques (Abdulai et al., 2011; Brasselle et al., 2002; Place & Migot-Adholla, 1998; Sjaastad & Bromley, 1997).

Further, gender, leadership position and educational level are each appropriately sign and significant and thus suggest that probability of direct and indirect exposure to LSLA under domestic and foreign entities tends to be lower among male-head households, leaders, and highly educated individuals as compare to non-exposure. This further suggest the importance of intrahousehold power dynamics in curtailing households' exposure to LSLA. Land institution also had the expected negative sign and significantly influence both direct and indirect exposure under domestic and foreign entities and thus suggest that household with access to formal land institution such as lands commission, land survey department and town and country planning are less likely to experience either direct or indirect exposure to LSLA under domestic and foreign entities. This is plausible because information from land institution can help facilitate the rate of registration, certification, security of land tenure rights and by extension, reduces rate of eviction. Social group membership is also plausibly signed and had a significant influence on direct and indirect exposure to LSLA under domestic and foreign entities and thus suggest that households that participate in social group activities are less likely to face direct or indirect exposure to LSLA. Ideally, the resurgence of LSLA after the 2007/08 has seen Non-Governmental Organisations (NGOs) and other social groups including Action Aid-Ghana, Regional Advocacy, and Information Network Systems (RAINS) at the forefront of the fight against acquirers. These groups express concerns on the food security implications of LSLA and therefore work on slogans such as 'environmental protection watchdogs' and 'guardians of livelihoods of the poor'. The mouthpiece of the marginalized subscribed to some of these discourses in their campaign against LSLA. It is therefore not surprising that membership to social group is significant and negatively related to direct and indirect exposure to LSLA under domestic and foreign entities. Access to credit is also negatively signed in all equations as expected but significantly related to only direct and indirect exposure to LSLA under domestic entities. This suggest that households with credit access are less likely to be exposed to direct and indirect exposure to LSLA under only domestic entities. The main reason ascribed to the insignificant relationship between credit access and exposure to LSLA under foreign entities is that credit receive is not resourceful enough to contest acquisitions by wealthy foreigners who have backing of state and traditional authorities. On the other hand, availability of water resource in village where household is located is also positively signed as expected and yet significantly related to only direct and indirect exposure to LSLA under foreign entities. This suggest that household located in villages with available water resources is more likely to experience to direct and indirect exposure to LSLA under foreign entities but not under domestic entities. One reason ascribed to this result is that domestic entities mainly rely on rainwater for production after acquisition and therefore do not depend on other water resources before acquiring land for agricultural production. Soil fertility is also positively signed as expected, and significantly related to direct and indirect exposure to LSLA under domestic and foreign entities. This suggest that households on plots with fertile soil are more likely to experience direct and indirect exposure to LSLA under domestic and foreign entities. This finding contrast with the those who argued that LSLA occur only on marginal lands (Technoserve, 2007) .

Table 6.2: Multinomial logit estimates of determinants of exposure to LSLA

Variable	Under exposure to LSLA by domestic entities				Under exposure to LSLA by foreign entities			
	Direct exposure (DE)		Indirect exposure (IDE)		Direct exposure (DE)		Indirect exposure (IDE)	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
LTI	-0.93	0.06***	-0.28	0.06***	-0.41	0.03***	-0.15	0.04***
STI	-0.17	0.02***	-0.82	0.14***	-0.24	0.01***	-0.66	0.08***
Residual_LTI	-0.09	0.02***	-0.15	0.04***	-0.41	0.17**	-0.17	0.09*
Residual_STI	0.12	0.02***	-0.22	0.07***	-0.21	0.01***	0.31	0.03***
HH_income	-0.08	0.13	0.21	0.21	-0.01	0.01	0.01	0.12
Return on investment	0.02	0.17	0.11	0.16	0.06	0.17	0.21	0.20
Leadership position	-0.04	0.01***	-0.20	0.12*	-0.04	0.02**	-0.11	0.06**
Gender	-0.01	0.01*	-0.11	0.03***	-0.41	0.17**	-0.02	0.12
Age	-0.26	0.17	-0.04	0.27	0.21	0.17	0.08	0.12
Household size	0.12	0.44	0.17	0.77	-0.33	0.41	-0.13	0.12
Education	-0.05	0.00***	-0.09	0.00***	-0.35	-0.22	-0.12	-0.16
Farm size	-0.03	0.12	0.03	0.19	-0.28	0.35	0.19	0.24
Land institution	-0.01	0.01*	-0.07	0.00***	-0.12	0.07*	-0.28	0.12**
Social group	-0.15	0.09*	-0.55	0.17***	-1.18	0.69*	-0.28	0.15*
Road	0.18	0.30	0.48	0.55	-0.45	0.57	0.44	0.39
Credit	-0.50	0.11***	-0.17	0.04***	-0.11	0.74	-0.35	0.50
Water source	0.11	0.23	0.43	0.55	0.29	0.02***	0.21	0.03***
Good fertile	0.52	0.04***	0.16	0.00***	0.38	0.05***	0.64	0.33*
Moderate fertile	1.20	0.04***	0.38	0.14**	-0.76	0.33**	0.47	0.28*
_cons	-1.04	0.08***	-0.40	0.08***	-1.99	1.07*	-0.56	0.13***
Joint significance of location variables: χ^2 (6)	52.53***							
χ^2-statistic for joint significance of residuals	3.13***							
Joint significance of instruments	0.98 (0.83)							
No. of observations	472				531			

Notes: ***, ** and * indicate statistical significance at 1%, 5% and 10%.

Source: Author's Computation from Field Survey, 2018

6.4 Farm investments

The results of the farm investment impact of direct and indirect exposure to large-scale land acquisitions (LSLA) under domestic and foreign entities are presented in Table 6.3. As mentioned in section (3.9.3), long-term and short-term farm investment may be interdependent (substitutes or complements). Thus, under the 2SCML, the direct and indirect exposure variables and their corresponding predicted values from the first stage linear probability model were incorporated into second stage multivariate probit model. As observed in Table 6.3, all estimated correlation coefficients are negative and significant at the 1%, suggesting that unobserved variables involved in each investment option are significant and negatively related, and confirms that it is more efficient to model investment decisions jointly rather than separately. These also imply that long-term investments in irrigation or soil and water conservation techniques and short-term investment in inputs like NPK, urea and ammonia are substitutes. Further, Chi-square (χ^2) statistics for joint significance of the instrument fail to reject the exclusion restriction that households' access to formal land institution such as lands commission and town and country planning can only influence investment through direct and indirect exposure to land. Further, all the variables representing the predicted values derived from the first-stage regressions for exposure to LSLA are statistically significant at conventional levels, indicating simultaneity bias and that the coefficients will not have been the same if 2SCML is not employed in the estimation (Brasselle et al., 2002; Wooldridge, 2002). Also shown in the table are the Chi-square (χ^2) statistics for the joint Wald tests on the vector of these predicted values from the first-stage estimations. These values reveal that for each investment equation, the null hypothesis that the predicted values are jointly equal to zero is rejected. These confirm the results of the individual t-statistics which indicate simultaneity bias. On the issue of the effect of exposure to LSLA on farm investment, the results revealed that direct and indirect exposure to LSLA under both domestic and foreign entities are significant at 1% in the equations for short-term and long-term farm investments. However, whiles these variables are negatively related to long-term farm investment, they are positively related to short-term farm investment. A follow up during focus group discussions revealed that short-term land improving technologies such as NKP has been subsidized in the area and hence the increase in investment. The findings support the hypothesis that direct and indirect exposure to LSLA under domestic and foreign entities will decrease household's probability of long-term farm investments but enhance household's probability of short-term investments. The results further lends support to the notion that direct and indirect exposure to LSLA will compel farmers to choose short-term investment over long-term farm investments (Feder & Onchan, 1987; Marshall, 1890).

In addition to the above finding, household income had a positively sign as expected and significantly influence both long-term and short-term investment in land improving technologies under LSLA domestic and foreign entities. These suggest that under exposure to LSLA by domestic and foreign entities, high income households stand the chance of enhancing both long-term and short-term investment in land improving technologies. On the other hand, households' participation in the fertilizer subsidy programme is positive as expected and significantly related to only short-term investment in land improving technologies like NPK, urea and Sulphate of Ammonia. This suggests that under exposure to LSLA by domestic and foreign entities, participation in fertilizer subsidy programme will enhance investment in only short-term land improving techniques. The main reason ascribed for the insignificant effect of participation on long-term investment is that the package of the fertilizer subsidy programme does not cover cost of irrigation or soil and water techniques and farmers lack the required resources to carry out such investments.

As expected, gender of the household head had a positive and significant influence on both long and short-term investments, indicating that under exposure to LSLA by domestic and foreign entities, male-headed households are more likely to invest in long- and short-term land improving techniques than their female-headed counterparts.

Further both education and social group membership met our a priori expectations as these variables are both positive and significantly related to both types of farm investments under exposure to LSLA by domestic and foreign entities. These findings imply that highly educated households and households who hold membership to social groups are more likely to enhance their probability of investment in both long and short-term investments. The results are plausible because educational is assumed to increase households ability to obtain, process, and use any accessible information related to farming and investment (Lapar and Pandey, 1999).

Highly educated households access more information about land improving technologies and therefore stand the chance to invest in these practices than the less educated households. Similarly, social group tends to provide production and investment information to members. Aside the information, such groups provide cooperative labour where members constituted themselves into groups and take turns to provide the required labour for investing in land improving technologies.

Credit enhances resource mobilization and investment in both long term and short-term land improving technologies (Boahene et al., 1999). Households with credit access were therefore expected to participate in both long and short-term investments. Surprisingly, access to credit is significant but did not have the positive sign as expected. This suggest that households who had access to credit are less likely to invest in both long and short-term land improving technologies. A follow up during focus group discussions revealed that most of the farmers do not have land and therefore divert the credit into other activities aside mobilization of resources for farming. Further, all the variables representing the fertility of soil had the expected negative sign but do not have a significant influence on investments. Thus, the fact that high fertile plots do not enhance investment to improve soil fertility is explain to some degree.

Table 6.3: Multivariate probit estimates of determinants of farm investments

Variable	Under exposure to LSLA by domestic entities				Under exposure to LSLA by foreign entities			
	LTI		STI		LTI		STI	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Direct exposure	-0.87	0.23***	0.43	0.13***	-0.75	0.22***	0.05	0.02**
Indirect exposure	-0.76	0.01***	0.99	0.41**	-0.29	0.11**	0.08	0.02***
Residual_direct	0.51	0.21**	-0.66	0.34*	-0.08	0.02***	0.04	0.02**
Residual_indirect	-0.45	0.03***	0.33	0.01***	-0.07	0.02***	0.05	0.02**
HH_income	0.27	0.03***	0.30	0.02***	0.09	0.02***	0.02	0.03
Return on investment	0.02	0.24	0.33	0.27	0.03	0.29	0.26	0.30
Fertilizer subsidy	0.05	0.12	0.12	0.03***	0.04	0.22	0.05	0.01***
Gender	0.54	0.05***	0.65	0.02***	0.55	0.14***	0.63	0.26***
Age	0.10	0.13	-0.28	0.23	-0.20	0.22	0.15	0.19
Household size	0.01	0.12	0.02	0.40	-0.01	0.04	0.01	0.06
Educational level	0.11	0.04***	0.01	0.00***	0.01	0.00***	0.01	0.00***
Farm size	-0.41	0.98	-0.34	0.61	-0.21	0.42	-0.22	0.52
Compensation	-0.61	0.57	-0.11	0.31	0.10	0.12	0.03	0.02
Social group	0.13	0.05**	0.27	0.02***	0.78	0.05***	0.58	0.05***
Road	-0.27	0.35	-0.12	0.22	-0.30	0.34	0.17	0.26
Credit	-1.21	0.05***	-0.61	0.02***	-0.21	0.04***	-0.49	0.02***
Water source	0.12	0.92	0.07	0.15	0.10	0.34	0.03	0.17
Good fertile	-0.02	0.03	-0.21	1.00	-0.40	0.20	-0.01	0.05
Moderate fertile	-0.06	0.63	-0.22	0.50	-0.10	0.12	-0.20	0.22
_cons	0.66	0.08***	-0.43	0.04***	5.10	0.08***	0.81	0.07***
ρ_{LTISTI}	-0.87	0.08***	-0.84	0.10***	-0.97	0.11***	0.87	0.14***
Joint significance of location variables: χ^2 (6)	61.69***		92.72***		32.24***		38.06***	
χ^2-statistic for joint significance of predicted values	3.23***		2.45***		2.27 ***		4.23***	
Joint significance of instruments	1.49 (0.47)		7.44 (0.11)		5.69 (0.55)		10.63 (0.10)	
No. of observations	400				508			

Notes: ***, ** and * indicate statistical significance at 1%, 5% and 10%. Source: Author's Computation from Field Survey, 2018

Clearly, the empirical analysis reveals that long and short-term investments by a given household varies significantly with direct and indirect exposure to LSLA under domestic and foreign entities. This is plausible because households' investment in land improving techniques depends on land access and labour availability. Thus, loss of land and subsequent labour migration is likely to affect investment. The results confirms the theoretical predictions that increased scarcity of land or rate of evictions increases tenure insecurity and compel farmers to prioritize short-term investments in land improving techniques over long-term land improving techniques (Barrows & Roth, 1990; Feder & Onchan, 1987; Hayes et al., 1997; Marshall, 1890; Place & Hazell, 1993). The sustainable livelihood framework (Figure 2.3 in section 2.10) argues that livelihood strategies including reproductive choices risk reduction strategies, coping strategies, investment strategies or agricultural intensification are likely to be affected by products of transforming structures and processes or vulnerability context (DFID, 1999). Such argument is confirmed in the current findings on the relationship between LSLA and farm investment. The results, however, contradicts with other studies (e.g., Behrman et al., 2014; Dessy et al., 2012; Kleemann & Thiele, 2015; Rahmato, 2011) which argued that large scale land acquisitions or LSLA may lead to increased investment in farm technologies by local communities. The results further revealed household income, participation in fertilizer subsidy programme, gender, education, social group memebrship credit access as important determinants of long and short-term farm investment and thus suggst the importance of houshold and institutional charactristics in farm investment. The results further provide evidence to confirm the hypothesis that household's probability of direct and indirect exposure to LSLA under LSLA by domestic and foreign entities will decrease with long-term farm investments. This therefore lends support the study's hypothesis and the theoretical argument that there is a reverse causality between tenure exposure to LSLA and farm investment where individual investments in land improving techniques also contribute to lower tenure insecurity or rate of evictions (Abdulai et al., 2011; Place & Migot-Adholla, 1998; Sjaastad & Bromley, 1997). In addition, gender, leadership position, educational level, availability of land institution, social group membership, availability of water resource, credit access and fertility of soil as important determinants of households' exposure to LSLA under domestic and foreign entities. These therefore revealed the strong role of household, institutional and location variables in LSLA.

The effect of LSLA on farm investment may affect production and food security (Dessy et al., 2012; Ju et al., 2016; Kleemann & Thiele, 2015; Sen, 1981a). This is because in Ghana and northern Ghana in particular, agricultural production depends mainly on land, labour supply and farm technologies. Thus, it is also most likely that the effect of land loss on land improving techniques will trigger significant changes in food production. the next section explored the impact of exposure to LSLA by domestic and foreign entities on production measured farm income.

6.5 Summary of Chapter Six

This chapter examined the relationship between LSLA by domestic and foreign entities and investment in long- and short-term land improving techniques in northern Ghana. The analyses were informed by neoclassical theory of the relationship between tenure security and farm investment which argues that land scarcity increases tenure insecurity and compel farmers to prioritize short-term farm investment over long-term land improvement techniques (Feder & Onchan, 1987; Marshall, 1890). The analyses were conducted under the assumption that whiles LSLA may compel farmers to choose short-term farm investment over long-term land improvement techniques, the reverse may also hold where both types of investment reduce the rate of eviction. Thus, a two-stage conditional maximum likelihood (2SCML) was employed to control endogeneity resulting from potential reverse causality between LSLA and investments and as well examine relationship between LSLA under domestic and foreign entities and the short-term and long-term farm investment.

The findings of the study were largely consistent with the study's hypothesis and theoretical depiction on the subject. First the study found that households affected by LSLA tend to investment in short-term land improving technologies such as mineral fertilizer as oppose to long-term investment in irrigation and soil and water conservation techniques. This is in tandem to the notion that inefficient land tenure arrangement will compel farmers to prioritize investment in short-term land improving techniques over investment in long-term in land improvement techniques (Feder & Onchan, 1987; Marshall, 1890).

Second the study revealed that investment in short-term and long-term in land improvement techniques are more likely to reduce exposure to LSLA in northern Ghana. This finding support previous studies (Sjaastad & Bromley, 1997; Suhardiman et al., 2015) and the study's hypothesis that household's probability of direct and indirect exposure to LSLA by domestic and foreign entities decreases with long-term and short-term farm investments. These results could have dire consequences on farm income and food security since land improving techniques are key to production and food security of agricultural households. In the next sections, the effects of LSLA on farm income and food security are explored.

CHAPTER SEVEN

EFFECT OF LARGE-SCALE LAND ACQUISITIONS ON HOUSEHOLDS' FARM INCOME

7.1 Introduction

This chapter delves into the question of the effects of exposure to large-scale land acquisitions (LSLA) on farm income in northern Ghana. The chapter addresses this question by adhering to the propositions of the agricultural household model and the conceptual framework of this study. The agricultural household model opines that given higher compensation prices and reduced farm profit, land acquisition by investors in poor and vulnerable areas can lead to increase household farm income. The multinomial endogenous treatment switching regression (MESR) model is employed for the analysis.

7.2 Descriptive statistics of the variables used for the analysis

Table 7.1 present the summary statistics of the variables employed for the analysis. Specifically, the statistics include differences between the exposed and nonexposed households in terms of farm income and other control variables. The statistics indicate some differences between non-exposure and exposure of households (i.e., direct and indirect exposure) to large-scale land acquisitions (LSLA) by domestic and foreign entities. For instance, compared to the average farm income of the nonexposed households (GH¢1,974.12), average farm income of exposed households is low and ranged between GH¢815.18 and GH¢1,463.95 for direct and indirect exposure under domestic and foreign entities. However, aside the differences in farm income, there were differences between the exposed and nonexposed households in terms of other households' characteristics. For instance, compared to average landholding of nonexposed (10.6 acres or 4.3 hectares), average landholding of exposed households is low and ranges between 5.1 and 7.4 acres (i.e., about 2.1 to 3 hectares) for direct and indirect exposure to LSLA by domestic and foreign entities. Further, whereas average expenditure on labour ranged between 7.19 hours and 10.43 hours/acre for direct and indirect exposure to LSLA under domestic and foreign entities, average labour expenditure is 8.14 hours/acre under non-exposure. The high labour expenditure for the exposed households was attributed to the fact that household members providing farm labour have been affected by LSLA and therefore migrated to urban areas to look for jobs. Farmers operating on the remaining or borrowed land therefore had to rely on hired labour for land clearing, planting, weeding, fertiliser application and harvesting. With regards to agrochemicals, average expenditure for the exposed households is high and ranges between GH¢183.20 and GH¢369.65/acre for direct and indirect exposure LSLA under domestic and foreign entities whiles expenditure for non-exposure is GH¢176.88/acre. During a focus group discussion, the participants explained that household members affected by LSLA who still want to farm either rely on remaining plots, go into contract with investors, rent, borrow land from friends/neighbor, pledge or enter into sharecropping agreement with owners. Under these circumstances, exposed households resorted intensification (i.e., producing more outputs with more use of inputs on a durable basis) and hence, the high expenditure on agrochemicals. On average, there was no compensation for non-exposed or nonaffected households (control group). However, average compensation ranges between GH¢319.24 and GH¢793.55/acre for direct and indirect exposure (treated groups) under LSLA by domestic entities. Similarly, there were differences between exposed and nonexposed households in terms of other household, institutional and location characteristics. For instance, there are more males across all samples of exposed households than in the sample of nonexposed households. Whereas the proportion of males is 91% for nonexposed households, the proportion of males ranged between 90 and 94% in the sample of exposed households. Average age of the nonexposed households is about 47 years in the sample but ranged between 47 and 48 years among the exposed households. Thus, in terms of age, exposed households appear older than the nonexposed households. Level of education is low (2 years on the average) and almost the same across all samples. There were also differences between the exposed and nonexposed households in terms of social group membership, district of location, access to land institution, prior knowledge of households affected by LSLA, proximity to market, extension office and financial institution. Thus, the differences in farm income of nonexposed and exposed households (i.e., direct, and indirect exposure) under LSLA by domestic and foreign entities cannot be considered as the effect of LSLA. This is because the differences could be arising from their differences in landholding, labour cost, expenditure on agrochemicals, compensation received, gender, age, household size etc. other than LSLA. To account for such differences and as well examine the effects of LSLA on farm income, we employed the multinomial endogeous switching regression (MESR) model. The results from the MESR model are presented in the following section.

Table 7.1: Variable definition and summary statistics by exposure status

Variable	Non-exposure		Under exposure to LSLA by domestic entities				Under exposure to LSLA by foreign entities			
			Direct		Indirect		Direct		Indirect	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Farm income (GH¢ per acre)	1,974.12	82.44	815.18	70.39	908.81	62.62	954.60	79.52	1,463.95	56.05
Household income (GH¢)	3,668.61	46.60	2,000.65	11.14	4,349.23	13.31	5,349.23	13.31	5,095.65	21.03
Landholding (acres)	10.60	3.87	5.05	2.24	6.91	2.52	6.05	2.02	7.35	1.05
Return on investment	0.12	0.15	0.14	0.15	0.38	0.18	0.69	0.20	-0.22	0.29
Wage rate	5.31	2.85	8.59	4.33	8.41	3.46	9.11	2.59	10.75	2.61
Labour (hours per acre)	8.14	3.27	7.19	2.88	9.30	4.78	9.95	2.72	10.43	2.78
TLUs[1]	2.58	8.83	2.69	10.64	3.09	10.09	1.83	10.64	1.83	3.29
Cost of Agrochemicals (GH¢ per acre)	176.88	(7.43)	183.20	7.10	233.68	3.71	369.65	9.71	274.68	3.71
Compensation (GH¢ per acre)	-	-	658.55	32.14	319.25	13.35	358.56	12.11	793.55	12.09
Gender of farmer (1=male; 0=female)	0.91	0.29	0.93	0.26	0.94	0.24	0.92	0.26	0.90	0.21
Age of farmer (in years)	45.56	2.90	46.97	2.87	47.65	2.61	47.28	3.44	47.65	2.61
Household size (number of members)	11.93	7.63	12.44	7.28	12.67	6.70	12.59	8.18	8.67	3.70
Educational level (in years)	2.21	4.18	1.97	3.86	2.11	3.97	1.28	2.96	2.44	1.23
Farmer group (1=yes; 0=otherwise)	0.43	0.50	0.39	0.49	0.37	0.48	0.38	0.49	0.22	0.11
Prior knowledge of households affected by LSLA (1=yes; 0=no)	0.66	0.48	0.61	0.49	0.61	0.49	0.53	0.50	0.45	0.19
Land institution access (1=yes; 0=no)	0.41	0.49	0.41	0.49	0.40	0.49	0.41	0.49	0.12	0.13
Distance to extension (in Km)	52.07	5.75	67.39	5.97	80.14	3.58	56.77	2.30	30.14	4.33
Market distance (in Km)	4.78	1.05	2.99	1.13	3.98	1.14	5.87	1.63	5.18	2.22
Distance to financial institution (Km)	43.34	6.13	59.51	2.67	77.93	3.63	35.89	3.74	56.93	2.45
Sagnarigu (1=yes; 0=otherwise)	0.28	0.45	0.17	0.38	0.15	0.36	0.06	0.24	0.23	0.18
Mion (1=yes; 0=otherwise)	0.11	0.32	0.09	0.29	0.09	0.28	0.07	0.25	0.19	0.48
Central Gonja (1=yes; 0=otherwise)	0.06	0.24	0.18	0.39	0.23	0.42	0.23	0.42	0.33	0.13
Savalegu (1=yes; 0=otherwise)	0.23	0.42	0.36	0.48	0.40	0.49	0.46	0.50	0.30	0.19
Yagba-Kubori (1=yes; 0=otherwise)	0.27	0.44	0.17	0.38	0.12	0.32	0.17	0.38	0.18	0.22
North Gonja (1=yes; 0=otherwise)	0.15	0.21	0.12	0.15	0.32	0.13	0.11	0.09	0.22	0.21

Notes: SD represents standard deviation; [1]Tropical Livestock Units (TLUs) are livestock numbers converted to a common unit. Conversion factors are cattle = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chicken = 0.01 (Harvestchoice, 2015). Source: Author's computation from field survey, 2018

7.3 Multinomial endogeous switching regression results of farm income effect of large-scale land acquisitions (LSLA)

As indicated previously in section (3.8.4), the MESR model estimates the effect of exposure to LSLA in two stages. The first stage is the determinants of households' direct and indirect exposure to LSLA which has been presented and discussed in chapter five and six of this study. The second stage results of the determinants of farm income from the MESR model are presented in Table 7.2. Regarding the determinants of farm income of nonexposed and exposed households (i.e., direct and indirect exposure) under domestic and foreign entities, many of the selection correction terms ($\lambda_i's$) are significant at least at the 5% level. This confirms the presence of endogeneity due to selection bias. Thus, the use of linear regression would have produced biased results. This further suggests that direct and indirect exposure to LSLA under domestic and foreign entities will not have the same effect on nonexposed household should they be exposed to LSLA.

Regarding other variables in Table 7.2, it was found that landholding, expenditure on labour and agrochemicals, number of tropical livestock units (TLU) and credit access exert a positive and significant influence on farm income. This finding shows the significant role of household's resources in mitigating the negative effect of direct and indirect exposure to LSLA under domestic and foreign entities thereby increasing farm output and income of households. Gender and educational level of household head are positive as expected and significantly related to farm income of both exposed households (direct and indirect exposure) and nonexposed households under exposure to LSLA by domestic and foreign entities, suggesting role of male-headed and highly educated households in increasing farm income of exposed households in the study area. Males have power in terms of control over plots and other resources than females (Boahene et al., 1999) and have been not to reclassify female-control plots as male-control plots in the wake of

LSLA (Nyantakyi-Frimpong & Kerr, 2016). Thus, with such reclassification, male-headed households stand the chance of increasing production and farm income than females. The result on education is reasonable because educated households stand the chance of mitigating effect of LSLA by using the information and management skills obtained through education. They may also diversify with the remaining or borrowed land to increasing production and farm income than their less educated counterparts. Social group membership is also positively signed and significant in all farm income equations. This suggest that farmers' membership in social group has probably help him to reestablish a new farm which consequently mitigated the effect of LSLA thereby improving yields and farm income. Good and moderate fertile soil are both positive and significantly related to farm income of exposed and nonexposed households in the sample. This suggests the important role played by fertile plots in mitigating the negative effect of LSLA on farm income in the area.

With regards to the effect of exposure to LSLA (i.e., testing hypotheses i and ii under section 3.8.4.1), the study compared farm income of the treated households (in this case, direct and indirect exposure to LSLA under domestic and foreign entities) to their control or counterfactual households (in this case, non-exposure groups). The comparisons were made using t-test and the farm income generated from MESR estimations. The results are presented in Table 7.3 and revealed significant decrease in farm income for both direct and indirect exposure to LSLA under domestic and foreign entities. Under exposure to LSLA by domestic entities, direct and indirect exposure of households to LSLA respectively decreases farm income by GH¢ 881.10/acre and GH¢484.16/acre. These results support the study's hypothesis that farm income will decrease under direct and indirect exposure to LSLA by domestic entities. The results further suggest that households who lost farmland, labour, and farmland-based resources or live nearby affected households, lost uncultivated land, or have limited land due to LSLA by domestic entities will all experience significant reduction in farm income in northern Ghana.

Table 7.2: Estimates of the determinants of farm income

Variable	Under exposure to LSLA by domestic entities			Under exposure to LSLA by foreign entities		
	Non-exposure	Direct exposure	Indirect exposure	Non-exposure	Direct exposure	Indirect exposure
Landholding	0.57 (0.42)	1.44 (0.41)***	1.47 (0.40)***	0.57 (0.21)***	0.76 (0.19)***	0.28 (0.21)
Labour	0.02 (0.01)**	0.05 (0.01)***	0.02 (0.01)**	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)
Wage rate	0.01 (0.02)	0.01 (0.02)	0.00 (0.03)	0.02 (0.03)	0.03 (0.03)	0.01 (0.04)
Household income	0.05 (0.20)	0.16 (0.18)	0.26 (0.19)	0.19 (0.24)	-0.10 (0.24)	0.43 (0.30)
Return on investment	0.07 (0.24)	0.18 (0.22)	0.05 (0.22)	0.15 (0.29)	0.08 (0.29)	-0.38 (0.37)
TLU	0.16 (0.04)***	0.22 (0.04)***	0.27 (0.03)***	0.06 (0.02)***	0.09 (0.02)***	0.07 (0.02)***
Agrochemicals	1.10 (0.41)***	1.99 (0.50)***	1.10 (0.41)***	0.53 (0.23)**	0.19 (0.10)*	0.71 (0.33)**
Compensation	0.12 (0.68)	0.01 (0.08)	0.06 (0.18)	0.09 (0.22)	0.03 (0.17)	0.05 (0.10)
Credit access	2.06 (0.35)***	1.44 (0.42)***	1.95 (0.50)***	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)**
Gender of head	0.55 (0.28)*	0.59 (0.34)*	0.62 (0.32)*	0.15 (0.08)*	0.24 (0.14)*	0.33 (0.15)**
Age of head	-0.07 (0.34)	-0.61 (0.42)	-0.16 (0.42)	-0.22 (0.63)	-0.21 (0.92)	-0.24 (0.98)
Educational level	0.16 (0.04)***	0.28 (0.05)***	0.31 (0.05)***	0.44 (0.17)***	0.65 (0.16)***	0.44 (0.18)**
Household size	-0.01 (0.34)	-0.47 (0.32)	0.02 (0.17)	0.11 (0.16)	0.01 (0.01)	0.01 (0.21)
Market distance	0.01 (0.03)	-0.04 (0.03)	-0.04 (0.04)	0.00 (0.01)	0.02 (0.11)	0.01 (0.01)
Extension distance	0.01 (0.05)	0.07 (0.06)	0.08 (0.06)	-0.05 (0.13)	-0.02 (0.02)	-0.01 (0.03)
Social group	0.04 (0.01)***	0.21 (0.11)*	1.51 (0.52)***	0.40 (0.21)*	0.34 (0.20)*	0.21 (0.10)**
Good fertile	0.75 (0.41)*	1.51 (0.43)***	1.50 (0.42)***	0.85 (0.32)***	0.02 (0.01)**	0.17 (0.07)**
Moderate fertile	0.02 (0.01)**	0.05 (0.01)***	0.03 (0.01)**	0.65 (0.17)***	0.16 (0.09)*	0.46 (0.17)***
Joint significance of district dummy variables	F(5, 472) = 1.16	F(5, 471) = 1.12	F(5, 449) = 1.34	F(5, 463) = 0.43	F(5, 469) = 0.33	F(5, 469) = 0.48
Joint significance of instruments	F(2, 471) = 0.84	F(2, 469) = 0.76	F(2, 464) = 0.80	F(2, 529) = 0.46	F(2, 530) = 0.39	F(2, 530) = 1.57
Ancillary						
σ^2	2.92 (0.78)***	0.57 (0.22)**	0.39 (0.48)	0.94 (0.66)	0.83 (0.25)***	1.62 (0.33)***
λ_1		0.02 (0.01)**	0.03 (0.01)**		0.05 (0.01)***	0.03 (0.01)**
λ_2	0.05 (0.01)***		-0.51 (0.25)**	0.43 (0.30)		-0.11 (0.03)***
λ_3	-0.54 (0.26)**	0.21 (0.07)***		0.97 (0.43)**	0.52 (0.37)	
No. of observations	138	129	131	138	136	130

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.
Source: Author’s computation from field survey, 2018.

Further, direct and indirect exposure to LSLA by foreign entities respectively decreased farm income by GH¢783.33/acre and GH¢473.28/acre (Table 7.3). The results further suggest that households who lost farmland, labour, and farmland-based resources or live nearby affected households, lost uncultivated land, or have limited land due to LSLA by foreign entities will all experience significant reduction in farm income in northern Ghana.

One participant attempted to explain the decrease in farm income as follows: *"The acquisition of land by large-scale investor has not only led to loss of productive land but also destruction of forest and associated products including shea trees and nuts, bush meet, fuelwood, charcoal production. In his view this trend has led to decrease in farm income"* (Focus group discussions, November, 2018).

The results affirms the argument of the framework of the DFID that livelihood outcomes could be affected following institutional policies and processes that usually creates vulnerabilities which often adversely impact on the available livelihood assets and strategies of the local inhabitants (DFID, 1999). The current finding supports this view because LSLA as a component of vulnerability context and a product of transforming structures and processes affect farm income - a livelihood outcome. These results also support the study's hypothesis that farm income will decrease under direct and indirect exposure to LSLA by foreign entities. Aside supporting the hypotheses of this study, the results also lend support to the notion that LSLA decreases income of the affected households (Ju et al., 2016). The results contradict with the study of Boamah & Overa (2015) in southern Ghana where LSLA was found to improve income. However, the results are consistent with previous studies - outside Ghana - which found negative effect of land acquisition on income of affected households. In Ethiopia, Shete and Rutten (2015) in particular found that large-scale land acquisition results in a loss of income among local people. On the other hand, Baumgartner et al. (2015) found that affected households lose a significantly higher income share (4.4%) due to the reduced access to land from LSLA. The results however contradict with Tuyen (2014) who found no significant influence of land acquisition on households' income. It is generally clear from the results that farm income decreases under LSLA by both domestic and foreign entities. The farmers explained that LSLA by both domestic and foreign entities affected production leading to reduction in farm output and consequently farm income. This results confirm Twene (2016) who argued that takeover of land for development project will not only affected the core livelihood assets such as agricultural land and water bodies, but also their livelihood outcomes such as income.

Table 7.3: MESR based treatment effects of exposure to LSLA on farm income

Outcome variable	LSLA (j)	Status of Exposure: Exposure ($j = 2,3$) (1)	Non–exposure ($j = 1$) (2)	ATT (3) = (1) – (2)
Under exposure to LSLA by domestic entities				
Farm income (GH¢/acre)	Direct Exposure	566 (14.44)	1,377 (54.44)	-811.10 (44.11)***
	Indirect Exposure	1561 (21.34)	2045 (20.36)	-484.16 (29.11)***
Under exposure to LSLA by foreign entities				
Farm income (GH¢/acre)	Direct Exposure	2396 (35.13)	3179 (21.22)	-783.33 (33.55)***
	Indirect Exposure	1561 (25.44)	2034 (25.11)	-473.28 (26.23) ***

Notes: ** and *** indicate statistical significance at 5% and 1% respectively. Standard deviations are in parenthesis; j represents type of exposure to LSLA. Standard errors in parenthesis.

7.4 Summary of Chapter Seven

Chapter seven examined the relationship between LSLA by domestic and foreign entities and household's farm income in northern Ghana. The analyses were informed by the agricultural household model of Ju et al. (2016) which stipulates that given values of the rate of return on investment with compensation received is less than farm profit, large-scale land acquisition will have a negative effect on farm income. The analyses were conducted using multinomial endogenous switching (MESR) regression. The application of the multinomial endogenous switching (MESR) regression LSLA is endogenous since the exposure to LSLA is not randomly assigned to farm households.

Consistent with the theoretical prediction (e.g., Ju et al., 2016), the results revealed households exposed to LSLA by domestic and foreign entities have lower farm income and this is probably due to loss in land access, labour, land-based resources and uncultivated land. The change in farmland access, labour supply, farm investment and farm income due to exposure to LSLA may affect food security (Dessy et al., 2012; Ju et al., 2016; Kleemann & Thiele, 2015; Sen, 1981a). This is because in rural areas where markets are malfunctioning, food security depends mainly on agricultural production. Thus, loss of land may trigger significant changes in labour movement, investment and food production captured as farm income. Consequently, food security may be affected. The next section explores the impact of LSLA on food security.

CHAPTER EIGHT

IMPACT OF DOMESTIC AND FOREIGN LARGE-SCALE LAND ACQUISITIONS ON HOUSEHOLD FOOD SECURITY

8.1 Introduction

This section examined the effects of exposure to LSLA – direct and indirect exposure to LSLA under domestic and foreign entities – on food security indicators such as food self-sufficiency, food consumption score (FCS) and household food insecurity access scale (HFIAS). The analysis and results are presented within the framework of Sen's (1981) entitlement approach to starvation and famines. According to Sen (1981), an individual can be plunged into food insecurity if his/her endowment collapses either through a fall in the endowment bundle, or through an unfavourable shift in the exchange entitlement mapping. This implies that food insecurity can result from denial of access to land through exposure of households to LSLA. In this regard, the hypotheses that direct and indirect exposure to LSLA under domestic and foreign entities will decrease households' self-sufficiency in food production and food consumption score are tested. Further, the hypothesis that direct and indirect exposure to LSLA under domestic and foreign entities will increase households' food insecurity access score is tested. The multinomial endogenous switching regression model is employed for the analyses and the results are presented in the following sections.

8.2 Descriptive statistics of the variables used for the analysis

Table 8.1 summarizes the descriptive statistics of variables employed for the analysis. The statistics show differences between exposed (direct and indirect exposure) and nonexposed households in area. The statistics indicate that exposed households [direct and indirect exposure to large-scale land acquisitions (LSLA)] are more food insecure than the non-exposed household in the sample. Compared with non-exposure (364.19kg of maize equivalent per capita consumption per annum), level of self-sufficiency in food is lower and ranged between 113.94kg and 151.96kg of maize equivalent per capita consumption per annum, for direct and indirect exposure to LSLA under domestic and foreign entities. Using the mean values for self-sufficiency in food, the results imply that nonexposed households are self-sufficient in staple food supplies if Von Braun and Eileen's (1994) rule-of-thumb figure of 170kg of maize equivalents per capita per annum is applied. Thus, whereas an individual in a nonexposed household is food self-sufficient, the same cannot be said of an individual in an exposed household under domestic and foreign entities. Further, household food insecurity access score (HFIAS) is higher for direct and indirect exposure to LSLA under domestic and foreign entities and ranged between 6.6 to 11.6 as compared to HFIAS of non-exposure (3.7). On the other hand, food consumption score (FCS) of nonexposed household is higher (98.9) than that of the exposed households which ranged between 24.7 and 50.1 for direct and indirect exposure to LSLA under domestic and foreign entities.

The statistics discussed above suggest that exposure to LSLA may have a role in undermining household's food security in northern Ghana. However, given that exposure to LSLA is endogenous, a simple comparison of the food security indicators cannot be considered for causal interpretation. That is, the above differences may not be the result of exposure to LSLA, but instead might be due to other factors, such as differences in observed characteristics presented in Table 8.1 or unobserved characteristics. For conclusive results of the effect of exposure to LSLA on food security indicators, the multinomial endogenous switching regression (MESR) model is employed. The next section presents and discusses the estimation results of the MESR, accounting for observed and unobserved characteristics.

Table 8.1: Variable definition and summary statistics by exposure status

Variable	Non-exposure		Under exposure to LSLA by domestic entities				Under exposure to LSLA by foreign entities			
			Direct		Indirect		Direct		Indirect	
SSF	364.19	5.93	123.51	7.70	151.96	6.55	113.94	3.30	118.43	8.59
HFIAS	3.67	5.26	10.67	2.38	11.55	2.57	8.65	1.75	6.64	2.52
FCS	98.90	4.81	34.22	2.62	24.70	4.58	41.04	2.92	50.05	2.24
SRFS	0.61	0.18	0.20	0.40	0.34	0.48	0.47	0.10	0.40	0.50
Household income	5,349.23	13.31	1434.11	16.22	1,095.65	21.03	1168.61	46.60	1534.23	12.33
Landholding	10.60	3.87	5.05	2.24	6.91	2.52	6.05	2.02	7.35	1.05
Labour	87.14	7.27	177.19	6.88	220.30	8.78	206.95	6.72	310.43	8.78
TLU	2.58	8.83	2.69	10.64	3.09	10.09	1.83	10.64	1.83	3.29
Compensation	-	-	658.55	32.14	319.25	13.35	358.56	12.11	793.55	12.09
Gender of farmer	0.91	0.29	0.93	0.26	0.94	0.24	0.92	0.26	0.90	0.21
Age of farmer	45.56	2.90	46.97	2.87	47.65	2.61	47.28	3.44	47.65	2.61
Household size	11.93	7.63	12.44	7.28	12.67	6.70	12.59	8.18	8.67	3.70
Educational level	2.21	4.18	1.97	3.86	2.11	3.97	1.28	2.96	2.44	1.23
Farmer group	0.43	0.50	0.39	0.49	0.37	0.48	0.38	0.49	0.22	0.11
Prior knowledge	0.66	0.48	0.61	0.49	0.61	0.49	0.53	0.50	0.45	0.19
Land institution	0.41	0.49	0.41	0.49	0.40	0.49	0.41	0.49	0.12	0.13
Market distance	4.78	1.05	2.99	1.13	3.98	1.14	5.87	1.63	5.18	2.22
Credit	0.18	0.38	0.16	0.37	0.14	0.34	0.31	0.46	0.33	0.47
Water sources	0.59	0.12	0.13	0.27	0.19	0.13	0.12	0.15	0.46	0.50
Remittances	0.18	0.17	0.14	0.34	0.16	0.37	0.11	0.24	0.33	0.14
Sagnarigu	0.28	0.45	0.17	0.38	0.15	0.36	0.06	0.24	0.23	0.18
Mion	0.11	0.32	0.09	0.29	0.09	0.28	0.07	0.25	0.19	0.48
Central Gonja	0.06	0.24	0.18	0.39	0.23	0.42	0.23	0.42	0.33	0.13
Savalegu	0.23	0.42	0.36	0.48	0.40	0.49	0.46	0.50	0.30	0.19
Yagba-Kubori	0.27	0.44	0.17	0.38	0.12	0.32	0.17	0.38	0.18	0.22
North Gonja	0.15	0.21	0.12	0.15	0.32	0.13	0.11	0.09	0.22	0.21

Notes: Tropical Livestock Units (TLU's) are livestock numbers converted to a common unit. Conversion factors are: cattle = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chicken = 0.01 (Harvestchoice, 2015)

Source: Author's computation from field survey, 2018

8.3 Effect of large-scale land acquisitions on household food security

As mentioned previously in sections (3.8.5), estimation of causal effect of exposure to LSLA using the multinomial endogenous switching regression (MESR) model proceeds in two stages. The first stage involves the determinants of direct and indirect exposure to LSLA, and the second stage involves the determinants of food self-sufficiency and average treatment effect of direct and indirect exposure to LSLA. However, the results of the first stage are similar to the results presented in chapter five and six of this study and are therefore not presented in this section. On the other hand, the second stage results of the determinants of food self-sufficiency and average treatment effect of direct and indirect exposure to LSLA are presented in Table 8.2 and 8.3, respectively.

With respect to the determinants of food self-sufficiency (Table 8.2), the results revealed that household income and landholding are each significant and positively related to food self-sufficiency and thus, suggest the importance of wealth and/ productive resources in attainment of food self-sufficiency. In Africa, many rural households are already inclined towards self-sufficiency in food production (Djurfeldt et al., 2010). However, food self-sufficiency requires that households produce their own food needs. Given that food production is solely based on resources including land availability, household income and access to credit (Ghana Statistical Service, 2013, 2020; MoFA, 2013b; SRID-MoFA, 2013), households with these resources will therefore tend to produce and increase food self-sufficiency in the area. Remittances are significant determinants of food self-sufficiency and hence indicate the importance of safety net programmes for farm households in achieving food self-sufficiency in the area. Age and educational level of the household head are also significant and positively related to food self-sufficiency and thus indicate the importance of demographic characteristics in attainment of food self-sufficiency by both exposed and nonexposed households. Membership to farmer group is also significantly related to food self-sufficiency and thus indicate the role of social network in food self-sufficiency in northern Ghana.

With respect to the average treatment effect (i.e., testing of hypotheses i, ii and iii in section 3.8.5.2), the study presents the level of self-sufficiency in food (SSF) production of households under the actual case that the farm households are exposed to a particular type of LSLA (i.e., direct and indirect exposure to LSLA) under domestic and foreign entities and the counterfactual case that they are not exposed. Using t-test, the average treatment effects on the treated (ATT) were then estimated by comparing the SSF of actual and counterfactual scenarios. As mentioned previously, the effect of exposure to LSLA on other indicators such as household food insecurity score (HFIAS) and food consumption score (FCS) were also estimated to check for consistency. However, the second stage determinants of household food insecurity access score and food consumption score are presented in Appendices 7 and 8. On the other hand, the results of the average treatment effect of direct and indirect exposure to LSLA on HFIAS and FCS are also presented in Table 8.3. Generally, the results show that exposure to LSLA (i.e., direct and indirect exposure to LSLA) under domestic and foreign entities significantly decreases household food security in northern Ghana. Under LSLA by domestic entities, direct and indirect exposure to LSLA decreased level of food self-sufficiency by 985.2kg and 123.9 kg of maize equivalent per capita consumption per annum. These represent 79.7% and 25.4% reduction in level of self-sufficiency in food production for households that lost land directly and indirectly to LSLA by domestic entities. Similarly, households' food self-sufficiency decreased by 349.9 kg and 52.2 kg of maize equivalent per capita consumption per annum, respectively for direct and indirect exposure to LSLA under foreign entities. These represent 67.7% and 20.8% decrease in level of self-sufficiency (SSF) in food production for direct and indirect exposure to LSLA under foreign entities. These results support the study's hypothesis that direct and indirect exposure to LSLA by domestic and foreign entities decreases household's food self-sufficiency (SSF).

Table 8.2: Determinants of food self-sufficiency (second stage of MESR)

Variable	**Under exposure to LSLA by domestic entities**						**Under exposure to LSLA by foreign entities**					
	Non-exposure		Direct		Indirect		Non-exposure		Direct		Indirect	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Household income	0.11	0.02***	0.12	0.03***	0.12	0.04***	0.13	0.01***	0.19	0.04***	0.11	0.05**
Landholding	0.07	0.02***	0.84	0.48*	0.61	0.15***	1.18	0.39***	0.43	0.07***	0.46	0.20**
Labour	-0.05	0.01	-0.01	0.03	-0.09	0.12	0.04	0.04	0.10	0.08	0.03	0.05
TLU	0.39	0.30	0.59	0.51	-0.01	0.21	-0.02	0.18	-0.01	0.02	-0.04	0.06
Compensation	-0.20	0.21	-0.94	0.95	-0.09	0.43	-0.34	0.23	-0.21	0.62	-0.09	0.33
Gender	0.71	1.26	0.00	0.00	-0.39	1.01	-0.25	0.93	0.59	1.35	-0.49	1.28
Age	0.57	0.20***	1.85	1.15	1.17	0.39***	0.20	0.12*	0.27	0.28	0.29	0.19
Educational level	0.575	0.25**	0.49	0.12***	0.38	0.19**	0.51	0.20***	0.68	0.18***	0.44	0.10***
Farmer group	0.32	0.05***	0.41	0.18***	0.45	0.07***	0.16	0.08**	0.36	0.07***	0.25	0.03***
Market distance	-0.17	0.11	0.16	0.81	-0.23	0.23	-0.01	0.10	-0.65	0.50	-0.26	0.33
Credit	0.69	0.16***	0.41	0.19**	0.53	0.29*	0.02	0.01**	0.04	0.02**	0.03	0.01***
Water sources	-0.09	0.11	-0.63	0.69	-0.11	0.22	-0.03	0.16	0.07	0.56	0.36	0.22
Remittances	0.68	0.20***	0.66	0.26***	0.61	0.33*	0.82	0.12***	1.01	0.19***	0.30	0.13**
Joint significance of district dummy variables	97.09***		30.49***		19.27***		239.60***		62.27***		18.43***	
Joint significance of instruments	F(2, 473) = 0.55		F(2, 471) = 0.58		F(2, 412) = 0.29		F(2, 462) = 0.44		F(2, 454) = 0.18		F(2, 468) = 0.54	
Ancillary												
σ^2	-0.26	0.16*	0.39	0.11***	-0.16	0.08**	0.50	0.11***	0.31	0.03***	0.17	0.02***
λ_1			-0.48	0.16***	3.46	1.05***			0.56	0.29*	0.49	0.23**
λ_2	-0.40	0.20**			-0.65	0.36*	0.92	0.15***			0.57	0.08***
λ_3	0.57	0.05***	0.65	0.11***			0.41	0.05***	0.66	0.26**		
No. of observations	200		137		135		300		120		111	

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively. Source: Author's computation from field survey, 2018

Also, FCS decreased by 7.36 and 5.17 respectively for households that lost land indirectly and indirectly to LSLA under domestic entities. These represent 14.6% and 11.1% decrease in FCS for direct and indirect exposure to LSLA under domestic entities. Similarly, food consumption score (FSC) decreased by 6.97 (13.4%) and 4.23 (9.8%) for direct and indirect exposure to LSLA under foreign entities. Thus, the hypothesis that direct and indirect exposure to LSLA by domestic and foreign entities decreases household's food consumption score is met. With respect to HFIAS, the results revealed that direct and indirect exposure to LSLA under domestic entities increased HFIAS by 1.45 and 1.42. In percentage terms, these represent 48% increase in HFIAS for direct exposure to LSLA and 35.9% increase in HFIAS for indirect exposure to LSLA under domestic entities. The decrease is however 0.95 (28.1%) and 0.93 (19.2%) for direct and indirect exposure to LSLA under foreign entities. These results meet the study's hypothesis that direct and indirect exposure to LSLA by domestic and foreign entities decreases household's food insecurity access score.

Table 8.3: MESR based treatment effects of exposure to LSLA on food security indicators

Outcome variables	LSLA (j)	Exposed (j = 2,3) (1)	Non–exposed (j = 1) (2)	Average treatment effects on the treated (ATT) (3) = (1) – (2)
Under exposure to LSLA by domestic entities				
SSF	Direct exposure	25.54 (26.18)	1236.76 (19.30)	-985.22 (12.50)***
	Indirect exposure	364.55 (27.44)	488.43 (44.15)	-123.88 (44.59)***
FCS	Direct exposure	42.99 (1.97)	50.35 (1.58)	-7.36 (1.39)***
	Indirect exposure	41.26 (1.72)	46.43 (1.56)	-5.17 (1.05)***
HFIAS	Direct exposure	4.46 (0.30)	3.02 (0.23)	1.45 (0.27)***
	Indirect exposure	5.36 (0.49)	3.95 (0.37)	1.42 (0.46)***
Under exposure to LSLA by foreign entities				
SSF	Direct exposure	167.47 (20.83)	517.33 (61.23)	-349.86 (38.57)***
	Indirect exposure	198.11 (56.34)	250.28 (32.17)	-52.17 (16.82)**
FCS	Direct exposure	45.17 (1.75)	52.14 (4.87)	-6.97 (2.54)***
	Indirect exposure	39.10 (2.20)	43.33 (4.09)	-4.23 (2.20)**
HFIAS	Direct exposure	4.33 (0.25)	3.38 (0.89)	0.95 (0.37)***
	Indirect exposure	5.78 (0.56)	4.85 (1.32)	0.93 (0.80)**

Notes: ** and *** indicate statistical significance at 5% and 1% respectively. Standard deviations are in parenthesis.
Source: Author's computation from field survey, 2018

8.4 Summary of Chapter Eight

Chapter eight examined the relationship between LSLA by domestic and foreign entities and household's food security in northern Ghana. The analyses were informed by Sen's (1981) entitlement approach to starvation and famines which argued that an individual can be plunged into food insecurity if his/her endowment collapses either through a fall in the endowment bundle, or through an unfavourable shift in the exchange entitlement mapping. Since households are not randomly assigned to LSLA, the analyses were conducted under the assumption that LSLA may be endogenous. Thus, the multinomial endogenous switching (MESR) regression was employed to control for the potential endogeneity in LSLA.

Overall, the results suggest that direct and indirect exposure to LSLA decrease household food security in northern Ghana. The results also imply that losing farmland, labour, and farmland-based resources or living nearby affected households or losing uncultivated land, having limited land due to enclosures by domestic and foreign entities lead to decrease in household's food security in northern Ghana. This is plausible because agriculture which constitute a major livelihood for most households in northern Ghana (Ghana Statistical Service, 2013) is largely dependent on land. Thus, losing access of land to either domestic or foreign entities will affect livelihood outcomes including food security. The results confirms the sustainable livelihood framework (DFID, 1999) which argues that livelihoods outcomes including farm income and food security are fundamentally affected by livelihood assets and strategies, vulnerability such as landlessness created by transforming structures and processes including state policy to transfer land to investors. These findings confirm Sen's (1981) entitlement approach to starvation and famines which argues that an individual can be plunged into food insecurity if his/her endowment collapses either through a fall in the endowment bundle, or through an unfavourable shift in the exchange entitlement mapping. These results also confirmed the notion that large-scale LSLA in poor and vulnerable areas poses a potential threat to their economies and livelihoods and endangers their chances of achieving food security (Actionaid International, 2009; Friends of the Earth, 2010; Friis & Reenberg, 2010a; GRAIN, 2008, 2016; Rahmato, 2011; Robertson & Pinstrup-Andersen, 2010; Tinyade, 2010). Similar results have been found in other studies examining the impacts of LSLA on food security in Ghana. For instance, the results is consistent with Nyantakyi-Frimpong and Kerr (2016) who found that LSLA leads to food insecurity among the affected households. The results in this study is also similar to the finding of Alhassan, Shaibu and Kuwornu (2018) in which LSLA was found to exert a negative effect on food security of farming households. The results also confirmed empirical studies which found that large scale acquisition decrease food security (Bamlaku Alamirew, Harald Grethe & Wossen, 2015; K. F. Davis et al., 2014; Jiao et al., 2015a; Nguyen et al., 2019; Ojo, 2008; Shete & Rutten, 2015; Yengoh & Armah, 2015). On the other hand, the results goes contrary to Baumgartner et al. (2015) and Santangelo (2018) who respectively found that LSLA increased income and food security of households in affected communities. The decrease in food security due to LSLA can have serious implications for sustainable development of local people in the area. This is because poverty and hunger reduction, sustainable consumption and economic growth which are the central pillars of sustainable development (Lele et al., 2016; Zero Hunger Challenge, 2016) could be affected in the area

CHAPTER NINE

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

9.1 Introduction

This study examined implication of large-scale land acquisitions (LSLA) on food production and food security in northern Ghana. Specifically, the study examined the effects of direct and indirect exposure to LSLA under domestic and foreign entities on households' farmland access, labour supply, farm investment, farm income and food security using the quantitative and qualitative data. The quantitative data was collected from 664 households using multi-stage sampling technique.

In an attempt to examine the effects of LSLA by domestic and foreign entities on farmland access, the study explored the effects of direct and indirect exposure to LSLA under domestic and foreign entities on modes of farmland acquisition including purchasing, leasing, pledging, sharecropping, and renting. The study also explored the effects of direct and indirect exposure to LSLA under domestic and foreign entities on land use, control, and transfer rights including households' ability to produce crops and animals, fallow land, practice monocropping, ability to access water on the plot, ability to control food produced and ability to rent-out land in the area without restrictions. These analyses were conducted using bar charts and cross tabulations with Chi-square statistics. With regards to labour supply, the study explored the opinion-based/self-reported effects of direct and indirect exposure to LSLA under domestic and foreign entities on levels of farm labour inputs using bar charts. Further, the study analysed the direct, and indirect exposure to LSLA under domestic and foreign entities on labour distribution to off-farm employment, using cross tabulation. Finally, the effects of direct and indirect exposure to LSLA under domestic and foreign entities on time spent in urban off-farm employment was analysed using the multinomial endogenous treatment effect model. These analyses are born out of the theory of agricultural household model which showed that land reduction by large-scale land acquisitions will decrease farm labour inputs and consequently increase labour inputs for leisure or off-farm employment.

Regarding the relationship between LSLA and household farm investments, the study examined the effects of direct and indirect exposure to LSLA under domestic and foreign entities on long-term and short-term farm investments using the two-stage conditional maximum likelihood (2SCML). This analysis was born out of the neoclassical theory of the relationship between tenure security and farm investment which argues that land scarcity increases tenure insecurity and compel farmers to prioritize short-term farm investment over long-term land improvement techniques. Further, the effect of long and short-term investment on direct and indirect exposure to LSLA under domestic and foreign entities (reverse causality) was examined using the 2SCML. Such analysis was also born out of the proposition that potential reverse causality exists between perceived rate of eviction and households farm investments.

On the issue of farm income effects of LSLA, the current study explored the direct and indirect effects of exposure to LSLA under domestic and foreign entities on household's farm income in northern Ghana. Such analysis is in line with the proposition that land reduction through large scale acquisition will decrease income of the affected households. The analyses were conducted using the multinomial endogenous switching regression (MESR) model.

For food security effects of LSLA, the study examined the direct and indirect exposure to LSLA under domestic and foreign entities on food self-sufficiency, food consumption score and household food insecurity access scale using multinomial endogenous switching regression model. The analyses were conducted within the framework of Sen's (1981) entitlement approach to starvation and famines which argues than an individual can be plunged into starvation, hunger or food insecurity if his/her endowment collapses either through a fall in the endowment bundle, or through an unfavourable shift in the exchange entitlement mapping.

The summaries of the major findings, conclusions and the policy recommendations arising from the conclusions are next presented.

9.2 Summaries of Major Findings

Regarding the effects of direct and indirect exposure to large-scale land acquisitions (LSLA) by domestic and foreign entities on household's farmland access, the results showed a strong association between exposed households (direct and indirect exposure to LSLA) and market modes of acquisition as majority of exposed households now acquire land through leasing, sharecropping, pledging, outright purchasing, and renting-in whiles few of the nonexposed households acquire land through such modes of acquisition. The results also showed a strong association between exposure to LSLA (direct and indirect exposure to LSLA) under domestic and foreign entities and land use, control and transfer rights as majority of the exposed households are now unable to produce crops and animals, fallow their land, practice monocropping, access water and control food produced on the acquired plots or rent-out land. Overall, the results suggest that households that lose land, either directly or indirectly from large-scale land acquisitions are more likely to acquire land through market modes of acquisition in northern Ghana. On the contrary, such households are more likely to lose control over land use and transfer rights.

Regarding effects of LSLA by domestic and foreign entities on household's labour supply, the results from the opinion-based/self-reported effects of LSLA revealed that both direct and indirect exposure to LSLA from domestic and foreign entities reduces levels of farm labour inputs. Further, the results showed that households affected by LSLA tend to redistribute farm labour to urban off-farm employment instead of unemployment or local rural off-farm employment where investment farms are established with the acquired land. Further analysis of the relationship between time spent in urban off-farm employment and direct and indirect exposure to LSLA from domestic and foreign entities with the multinomial treatment effect model confirm that both direct and indirect exposure to LSLA under domestic and foreign entities increases time spent in urban off-farm employment. Responses from focus discussions revealed that the decrease levels of farm labour inputs and subsequent increase in time spent in urban off-farm is cause by migration of members of household members to look for additional jobs to supplement low household income.

Regarding the relationship between LSLA and households' farm investments, the estimations revealed that households affected by LSLA tend to invest short-term land improving technologies such as mineral fertilizer rather than long-term investments in irrigation and soil and water conservation techniques. In addition, households that invest in long- and short-term land improving technologies are more likely to avoid exposure to LSLA in northern Ghana.

Regarding farm income effects of LSLA, the results from the multinomial endogenous switching regression showed that households exposed to LSLA, directly or indirectly have lower farm incomes than those not exposed because of loss of land, labour, land-based resources and uncultivated land. farm income decreased under both direct and indirect exposure to LSLA by domestic and foreign entities.

Ultimately, these same factors also decrease household food security. Thus, households LSLA have lower food security than nonexposed households in northern Ghana.

9.3 Conclusions

The issue of large-scale land acquisition and its impacts on livelihoods has received much focus in both development and academic literature. However, much of the focus has been shifted to only LSLA by foreign actors, even though several reports and empirical studies show that different actors are involved in LSLA (e.g., Cotula et al., 2014; Friends of the Earth, 2010; Friis & Reenberg, 2010). Thus, there has been a gap in the literature concerning the variety of actors in LSLA and as well as their effects on livelihoods. This gap may in turn affect policy design and sustainable development, especially when a broader picture of the impacts of LSLA is lacking. As limelight is continuously turned on only LSLA by foreign actors, policy design will be based on prior assumptions that only foreigners are involved in LSLA. Thus, to ensure effective policy interventions that will reduce any negative effects of LSLA in Ghana, knowledge of the actors in LSLA and their impacts on livelihoods is crucial. The current study contributed to knowledge by analysing the implications of LSLA by actors involved. Aside highlighting the fact that domestic actors are also involved in LSLA, this study analysed the implications of LSLA by domestic and foreign actors on farmland access, labour supply, farm investments, farm income and food security in northern Ghana. This is to inform policy makers on whether to focused on LSLA by both domestic and foreign actors.

On the basis of the results obtained in this study, some conclusions are drawn and are in line with the study's objectives and findings. Regarding the effect of large-scale land acquisitions (LSLA) on farmland access, the results suggest that households that lose farmland, labour and farmland-based resources or lose uncultivated land, live nearby affected households, have limited land due to enclosures by domestic and foreign entities are more likely to lose access to farmland in northern Ghana. Based on these findings, this study concludes that both LSLA by domestic and foreign entities undermine households' access to and use rights over farmlands in northern Ghana.

Similarly, the results revealed that households that lose farmland, labour and farmland-based resources or lose uncultivated land, live nearby affected households, have limited land due to enclosures by domestic and foreign entities also lose farm labour inputs. However, time spent in urban off-farm employment tends to increase among such households. This study therefore concludes that both LSLA by domestic and foreign entities encourage migration of household labour for urban employment.

Whiles LSLA dissipates farm investment, the reverse causality is also possible where investment reduces household's likelihood of being exposed to LSLA by domestic and foreign entities. Based on findings about effect of direct and indirect exposure to LSLA from domestic and foreign entities, this study concludes that there is a bi-directional relationship between LSLA and households farm investment. Households tend to trade long-term land improvements for short-term investment in mineral fertilizer.

Also, LSLA by domestic and foreign entities decrease households' farm income despite higher investment in short-term land improvements in the form of mineral fertilizer.

Based on the effects of LSLA on (i) land access and rights of control; (ii) reduced allocation of household labour to farming; (iii) reduced long-term investments and higher expenditure on soil amendments; and lower farm income; LSLA tend to undermine the food security of affected households.

9.4 Recommendations

Clearly, large-scale land acquisitions (LSLA) by both domestic and foreign entities reduce local people's access to farmland in northern Ghana. It is also clear from the study that the affected farmers can increase access to farmland through market modes of acquisition including lease, purchase, sharecrop, pledge and rent-in. Thus, relevant authorities including the state and traditional authorities can enhance transparency in the land market. This will enable households to acquire land for continuous production to improve farm income and food security. Individuals in the area without farmland after the LSLA may also be encouraged to negotiate with members who have adequate farmland for production. The negotiation can include agreement between the farmer and the landowner on how produce should be shared. Additionally, land use intensification techniques may be introduced to agricultural households to enable them increase production with the limited land at their disposal.

As a result of loss of land due LSLA, households now migrate to urban areas for employment at the expense of farming. Thus, skill development programmes can be established to train the migrating labour so as to enhance the benefits of labour supply to the urban areas.

Also, labour-saving technologies may be introduced on the farms to counter loss of farm labour to urban employment. This requires efforts from government, NGOs and all stakeholders that matter in sustainable food production.

These households tend to avoid investments in long-term farm improvement techniques. These can have long term effect on food production in the area. This calls for programmes that enhance access to mineral fertilizer. The ongoing fertilizer subsidy programme is on point and should therefore be promoted to cover all agricultural households in Ghana.

9.5 Suggestions for Further Research

First, 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 suggest 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.

Second, this study provided only the effects of LSLA by domestic and foreign entities on household farmland access, labour supply, farm investment, farm income and food security. 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, the farmland access, off-farm employment, farm investment, farm income and food security effect of LSLA by domestic and foreign entities may differ. For this reason, the study suggest that future research should extend the analysis to effects of intensity of LSLA by domestic and foreign entities on farmland access, off-farm employment, farm investment, farm income and food security.

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APPENDIX

Appendix 1: 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?

	Were 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 operational definition of the study, 2017.

Appendix 2: Household Questionnaire

UNIVERSITY FOR DEVELOPMENT STUDIES
FACULTY OF AGRIBUSINESS AND COMMUNICATION SCIENCES
DEPARTMENT OF AGRICULTURE AND RESOURCE ECONOMICS
TAMALE, GHANA

HOUSEHOLD QUESTIONNAIRE: FOOD SECURITY IMPLICATIONS OF LARGE-SCALE LAND ACQUISITION: EVIDENCE FROM AGRICULTURAL HOUSEHOLDS IN NORTHERN GHANA

Date of Interview ______________________ District Name ___________________________

PART I
General Information

Community ____________________________ GPS _______________

Section A: Farmer characteristics									
1.	Gender *(tick what applies)*		1	Male		2	Female		
2.	Relationship of respondent to household head *(if respondent is not household head):*								
	1	Husband/wife		2	Father/mother		3	Sister/brother	
	4	Grandfather/mother		5	Uncle/aunty		6	Others (specify:)	
3.	Age (years):								
4.	Farming experience (years):								
5.	What is your highest educational level completed? *(tick what applies)*								
	1	None		2	Arabic school		3	Primary *(class 1 – 6)*	
	4	Junior High School *(JHS1-JHS3)*		5	Secondary *(SHS1-SHS3, Vocational or Technical)*		6	Tertiary *(Training college, university, polytechnic)*	
	7	Specify the number of years spent in school:							
6.	Marital status								
	1	Single		2	Married		3	Widowed	
	4	Separated			Others (Specify:)				
7.	How many people live in your household (number of people eating from the same pot?								
	1	Male adults:		2	Female adults:		3	Boys:	4 Girls: **Total:**
8.	What is the household's economic activity (ies)? *(tick what applies)*								
	1	Own farm		2	Daily wage labour *(farming or non-farming activities*		3	Salaried worker	
	4	Petty trading		5	Craftsman *(examples: bricklayer, carpenter, tailor….)*		6	Other (*Please specify*)	
9.	What is your religious background?								
	1	Muslim		2	Christian		3	ATR	
	4	Other, specify:							
10.	Number of people in your household earning cash income:								
11.	Average monthly income earnings of the household (GHS) for each activity ***ticked*** in **6 above**								
12.	Does your household own motor bike(s) or car(s) as a means of transport?						YES	NO	
13.	Does your household own a fridge?						YES	NO	
14.	Does your household own any storage facility?						YES	NO	
15.	Does your household own livestock?						YES	NO	
16.	Does your household own tractor(s)?						YES	NO	
17.	Does your household own radio?						YES	NO	
18.	Does your household own telephone?						YES	NO	
19.	Does your household own TV?						YES	NO	
20.	Does your household own heater?						YES	NO	

21.	Does your household own gas cylinder?									YES	NO
22.	Do you receive remittances or support from anyone outside the household									YES	NO
23.	Are you a member of any social organization									YES	NO
24.	Do you have relative in leadership position									YES	NO
25.	Do you believe in government support in case of crop failure/shock									YES	NO
26.	Number of close relatives living in and outside the community:										
27.	Has this community ever experienced floods?									YES	NO
28.	Has this community ever experienced drought?									YES	NO
	Section B: Farm/plot characteristics										
29.	Do you have land?									YES	NO
30.	Walking distance from the plot to the nearest city/road (mins)										
31.	How did you acquire it?										
	1	Inheritance		2	Gift		3	Lease		4	Sharecropping
	5	Pledge		6	Loan		7	Purchase		8	Others
32.	What was the dominant mode of land acquisition/transaction in this community in the last five years? *(tick what applies)*										
	1	Inheritance		2	Gift		3	Lease		4	Sharecropping
	5	Pledge		6	Loan		7	Purchase		8	Others
33.	Have you currently noticed some changes in the mode of acquisition?									YES	NO
34.	What changes have you noted so far in mode of acquisition in the last five (5) years?										
	1										
	2										
	3										
	4										
35.	What is the dominant type of land ownership in this community? *(tick what applies)*										
	1	Family land		2	Stool/skin land		3	Private land		4	Government land
36.	What is your perception of tenure security of the plots you are cultivating?										
	1	Secured		2	Insecure						
37.	What is your perception of the fertility of your cultivated and unused plots? *(tick what applies)*										
	1	Good soil fertility		2	Moderately fertile		3	Poorly fertile			
38.	What is your perception of the slope of your cultivated and unused lands?										
	1	Flat slope		2	Moderate slope		3	Steep slope			
39.	What is your perception of the depth of your cultivated and unused lands?										
	1	Shallow soil depth		2	Moderate soil depth		3	Deep soil depth			
40.	What was the average fallow period before the large-scale land acquisition?									____________ years	
41.											
	Section C: Institutional characteristics										
42.	Do you have access to any formal land institution?									YES	NO
43.	Did you access this institution (s) in the last 2-3 years?									YES	NO
44.	Why are you engaging with this/these institution (s)?										

	1		
	2		
	3		
	4		
45.	What is the walking distance from your plot to the institution(s) (mins.)?		
46.	What is the nature of land governance in this community?		
	1 Customary ☐ 2 Statutory ☐ 3 Private ☐ 4 Both		
47.	Do you have access to good road in this community?	YES	NO
48.	What is the walking distance to main markets (min)?		
49.	Do you have access to extension services?	YES	NO
50.	What is the walking distance to extension agents' office (min)?		
51.	Do you have access to formal/informal financial institutions?	YES	NO
52.	What is the walking distance to formal/informal financial (min)?		
53.	If yes to **30**, have you ever received credit from any of these institutions?	YES	NO
54.	If yes to **32**, how much did you receive (GHS)?	Total:	
55.	If yes to **30**, do you save with these institutions?	YES	NO
56.	Do you have access to good drinking water?	YES	NO
57.	Do you have access to health facility?	YES	NO
58.	What is the walking distance to the health facility (min)		

PART II
Large-Scale Land Acquisition Information

59.	Who is the owner of the plot you are cultivating?		
	1 Own by citizen ☐ 2 Own by Foreigner ☐ 3 Others, specify:		
60.	Have you loss land to either individual who is an outsider, company or foreigner or any investor?	YES	NO
61.	If YES to **60**, how many acres?		
62.	For any choice in **59** or YES to **60**, specify who acquired it?		
63.	For any choice in **59** or YES to **60**, can you indicate how it was acquired? (*tick what applies*)		
	1 Through the family head ☐ 2 Through the chief and elders		
	3 Through the "Tendana" ☐ 4 Others		
64.	If YES to **60**, were you consulted during the acquisition processes?	YES	NO
65.	If YES to **58**, are you still using that plot?	YES	NO
66.	If NO to **58**, do you know anybody that has loss land to either individual who is an outsider, company or foreigner or any investor	YES	NO
67.	If YES to **64**, how far is your plot from it (mins.)?		
68.	If NO to **65**, what is the occupant using the plot for?		
	1 Food production for consumption ☐ 2 Food production for domestic exchange		
	3 Food production for export ☐ 4 Biofuel production for export		
	5 Biofuel production for consumption ☐ 6 Biofuel production for domestic exchange		
69.	If NO to **65**, were you compensated for your loss?	YES	NO
70.	If YES to **69**, how much were you paid (GHS)?		

71.	Did you reinvest this money in your own farm?	YES	NO
72.	If NO to **69**, state why you were not compensated.		
	1		
	2		
	3		
	4		
73.	If YES to **65**, do you have control over the food you produced on that plot?	YES	NO
74.	Do you produce under contract farming or out grower scheme?	YES	NO
75.	If YES to **74**, specify company's name and the crop you produced for this company?		
76.	Also, describe the package under the contract.		

PART III
Household Landholding and Labour Supply Information

	Section A: Household Landholding	
77.	What is the size of your land under cultivation (acres)?	
78.	What is the size of your unused/marginal land (acres)?	
79.	What is the size of your borrowed land (acres)?	
80.	What size of your land is rented out (acres)?	
81.	What size of your land is rented in (acres)?	
82.	What is the size of your land under irrigation (acres)?	
83.	What is the average land value in this community (GHS/plot)?	

	Section B: Labour Use and Other Production Costs				
84.	**Activity**		**Persons**		**Working days**
	Clearing				
	Ploughing				
	Harrowing				
	Planting				
	Weeding				
	Fertilizer application				
	Harvesting				
	Bagging				
	Input transport				
	Output transport				
	Others				
85.	What is the average wage for hired labour (GHS/acre)?				

PART IV
Household Farm Investment Information

86.	Did you apply organic fertilizer?			YES	NO
87.	Did you apply farmyard manure?			YES	NO
88.	Did you apply Pure Nitrogen (N)?			YES	NO
89.	Did you apply Pure Phosphate (P)?			YES	NO
90.	Did you apply Pure Potash (K)?			YES	NO
91.	Did you apply compound fertilizer (NPK)?			YES	NO
92.	Did you apply Urea?			YES	NO
93.	**Investment**	**Price/bag**	**Total bags**	**Frequency/year**	**Applied area (acre)**
	Organic fertilizer				
	Farmyard manure				
	Pure Nitrogen				
	Pure Phosphate				
	Pure Potash				
	NPK				
	Urea				
94.	Did you apply any soil and water conservation technique?			YES	NO
	SWCT			**Applied area (acre)**	
	Crop rotation				
	Mulching				
	Zero tillage				
	Intercropping with nitrogen fixing crops				
	Crop residue incorporation				

PART V
Food Production Information

95.	For each of the following crops, indicate the production information in the 2016/2017 cropping season.			
	Crop	**Number**	**Price per Unit**	**No. of Acres**
	Millet (MP) (bags)			
	Sorghum (SP) (bags)			
	Rice (RP) (bags)			
	Corn (CP) (bags)			
	Cotton (CTP) (bags)			
	Groundnuts (GP) (bags)			
	Cowpea (CWP) (bags)			
	Other Legumes (OL) (bags)			
	Okro (bags)			
	Pepper (bags)			
	Onion (bags)			
	Cabbage (bags)			
	Bra (in Alonka)			
	Ayoyo (in Alonka)			

	Alefu (in Alonka)			
	Tomatoes (box)			
	Bean leaves (in Alonka)			
96.	For each of the following livestock, indicate the production information in the 2016/2017 cropping season.			
	Livestock	**Number**	**Price per Animal**	
	Chicken			
	G. Fowl			
	Ducks			
	Turkey			
	Pigeon			
	Rabbit			
	Goats			
	Sheep			
	Cattle			
	Donkey			
	Pigs			
97.	For each of the following products, indicate the production information in the 2016/2017 cropping season.			
	Animal Products	**Number**	**Price per Unit**	
	Eggs (in crates)			
	Milk (in bottles)			

PART VI
Food Security Information

Section A: Food Consumption Score (FCS)					
98.	Kindly recall the foods consumed by your household in the previous 7 days.				
	Item	Food Group	Weight (A)	Day Eaten in Past 7 Days (B)	Score (AxB)
	Maize, rice, sorghum, millet, bread and other cereals	Cereals and tubers			
	Cassava, potatoes and sweet potatoes				
	Beans, peas, groundnuts and cashew nuts	Pulses			
	Vegetables, relish and leaves	Vegetables			
	Fruits	Fruits			
	Beef, goat, poultry, pork, eggs and fish	Meat and fish			
	Milk, yoghurt and other dairy products	Milk			
	Sugar and sugar products	Sugar			
	Oils, fats and butter	Oil			
				Composite Score	
Section B: Household Food Insecurity Access Score					
99.	In the past 30 days:				

	Did you worry that your household would not have enough food?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	Did you or any household member eat less preferred food because of a lack of resources?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	Did you or any household member eat just a few kinds of food day after day because of a lack of resources?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	Were you unable to even eat less-preferred foods due to lack of resources to obtain other types of food?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	did you or any household member eat a smaller meal than you felt you needed because there was not enough food?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	did you or any other household member eat fewer meals in a day because there was not enough food?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	was there ever no food at all in your household because there were no resources to get more?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	did you or any household member go to sleep at night hungry because there was not enough food?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
	did you or any household member go a whole day without eating anything because there was not enough food?							YES		NO
	I f YES, how often?		1	Rarely		2	Sometimes		3	Often
100.	How will you rate the food security status of your household?									
		1	Food secure		2	Marginally food insecure				
		3	moderately food insecure		4	Severely food insecure				
	Household Farm Labour Supply Before Large-scale land acquisition									
101.	How has the large-scale land acquisition affected your farm labour supply?									
		2	Significantly improved		2	Improved		3	No change	
		4	Bad		5	Worsened		6	Significantly worsened	
	How many members constituted your family labour before large-scale land acquisition?									
	How many members are now in rural non-farm activities in the community after large-scale land acquisition?									
	How many members are now in other rural areas after large-scale land acquisition?									
	How many members are now in urban areas after large-scale land acquisition?									
	Before the large-scale land acquisition									

Activity		**Persons**		**Working days**
Clearing				
Ploughing				

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Harrowing				
Planting				
Weeding				
Fertilizer application				
Harvesting				
Bagging				
Input transport				
Output transport				
Others				
What is the average wage for hired labours (GHS/acre) before large-scale land acquisition?				

Household Landholdings Before Large-scale land acquisition		
	What was the size of your land under cultivation before large-scale land acquisition (acres)?	
	What was the size of your unused/marginal land (acres) before large-scale land acquisition?	
	What was the size of your borrowed land (acres) before large-scale land acquisition?	
	What was size of your land is rented out (acres) before large-scale land acquisition?	
	What was size of your land is rented in (acres) before large-scale land acquisition?	
	What was the size of your land under irrigation (acres) before large-scale land acquisition?	
	What was the average land value in this community (GHS/plot)?	
	What was the average fallow period before the large-scale land acquisition?	
	What was your perception of the soil fertility before the large-scale land acquisition?	

		1	Good soil fertility		2	Moderately fertile		3	Poorly fertile

	What is your perception of the depth of your cultivated and unused lands before large-scale land acquisition?

		1	Shallow soil depth		2	Moderate soil depth		3	Deep soil depth

What was the dominant type of land ownership in this community before the large-scale land acquisition? *(tick what applies)*

1	Family land		2	Stool/skin land		3	Private land		4	Government land

What was the mode of land acquisition/transaction in this community before large-scale land acquisition? *(tick what applies)*

1	Inheritance		2	Gift		3	Lease		4	Sharecropping
5	Pledge		6	Loan		7	Purchase		8	Others

What is your perception of tenure security of the plots before large-scale land acquisition?

1	Secured		2	Insecure

Household Farm Investment Before Large-scale land acquisition		
102. Are you aware of the fertilizer subsidy program in the planting for food and jobs programme?	Yes	No

103.	Have you benefited from the fertilizer subsidy program in the 2017/2018 cropping season?				Yes	No
104.	**Investment**	**Price/bag**	**Total bags**	**Frequency/year**	**Applied area (acre)**	
	Organic fertilizer					
	Farmyard manure					
	Pure Nitrogen					
	Pure Phosphate					
	Pure Potash					
	NPK					
	Urea					
105.	Did you apply any soil and water conservation technique?				YES	NO
	SWCT			**Applied area (acre)**		
	Crop rotation					
	Mulching					
	Zero tillage					
	Intercropping with nitrogen fixing crops					
	Crop residue incorporation					
106.	For each of the following crops, indicate the production information **before large-scale land acquisition**					
	Crop	**Number**		**Price per Unit**	**No. of Acres**	
	Millet (MP) (bags)					
	Sorghum (SP) (bags)					
	Rice (RP) (bags)					
	Corn (CP) (bags)					
	Cotton (CTP) (bags)					
	Groundnuts (GP) (bags)					
	Cowpea (CWP) (bags)					
	Other Legumes (OL) (bags)					
	Okro (bags)					
	Pepper (bags)					
	Onion (bags)					
	Cabbage (bags)					
	Bra (in Alonka)					
	Ayoyo (in Alonka)					
	Alefu (in Alonka)					
	Tomatoes (box)					
	Bean leaves (in Alonka)					
107.	For each of the following livestock, indicate the production information **before large-scale land acquisition**					
	Livestock	**Number**		**Price per Animal**		
	Chicken					
	G. Fowl					
	Ducks					
	Turkey					
	Pigeon					

	Rabbit		
	Goats		
	Sheep		
	Cattle		
	Donkey		
	Pigs		
108.	For each of the following products, indicate the production information **before large-scale land acquisition**		
	Animal Products	**Number**	**Price per Unit**
	Eggs (in crates)		
	Milk (in bottles)		
109.	How will you rate the food security status of your household before the large-scale land acquisition?		
	1 Food secure		2 Marginally food insecure
	3 moderately food insecure		4 Severely food insecure

……. Thank You Very Much for Your Co-operation…….

Appendix 3: Interview Guide

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FACULTY OF AGRICULTURE, FOOD AND CONSUMER SCIENCES

DEPARTMENT OF AGRICULTURE AND FOOD ECONOMICS

INTERVIEW GUIDE FOR GROUP DISCUSSIONS

A. LSLA and household farmland access

1. How is farmland access before and after LSLA by domestic and foreign entities?
2. How will households exposed to LSLA by domestic and foreign entities respond to changes in farmland access?
3. Are there differences between households exposed to LSLA by domestic and foreign entities in terms of farmland access?

B. LSLA and household labour supply

1. How is labour supply before and after LSLA by domestic and foreign entities?
2. How do exposed households respond to the decrease in farm labour time allocation?
3. Are there differences between households exposed to grabs by domestic and foreign entities?

C. LSLA and household farm investment

1. How is farm investment in irrigation and soil and water conservation techniques before and after LSLA by domestic and foreign entities?
2. How is farm investment in mineral fertiliser (i.e., Sulphate of Ammonia, Urea and NPK) before and after LSLA by domestic and foreign entities?
3. What opportunities and challenges exist for take up of mineral fertilisers (i.e., Sulphate of Ammonia, Urea and NPK) by households exposed to LSLA by domestic and foreign entities?
4. What opportunities and challenges exist for take up of irrigation and soil and water conservation techniques by households exposed to LSLA by domestic and foreign entities?

D. LSLA and farm income and food security

1. How was local food production before and after LSLA by domestic and foreign entities?
2. How was food security before and after LSLA by domestic and foreign entities?

3. What differences exist between households exposed to grabs by domestic and foreign entities in terms of managing farms?
4. What differences exist between households exposed to grabs by domestic and foreign entities in terms of food sources?
5. How might these possible differences in perspectives and responses explain the differences between the two groups in terms landholding, labour supply, farm investment, food production and food security?

Appendix 4: 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 5: 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 6: First-stage estimations of determinants of household's investment in long and short-term land improving technologies

Variable	Under exposure to LSLA by domestic entities		Under exposure to LSLA by foreign entities	
	LTI	STI	LTI	STI
Leadership position	0.41 (0.29)	0.54 (0.27)**	0.06 (0.29)	0.34 (0.34)

Gender	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	-0.01 (0.01)
Age	0.09 (0.03)***	0.11 (0.03)***	0.08(0.03)***	0.05 (0.03)
Household size	0.01 (0.02)	0.01 (0.02)	0.00 (0.03)	0.02 (0.03)
Education	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Farm size	0.05 (0.20)	0.16 (0.18)	0.26 (0.19)	0.19 (0.24)
Land institution	-0.35 (0.27)	-0.52 (0.25)**	-0.54 (0.26)**	-0.19 (0.31)
Social group	0.01 (0.02)	0.03 (0.01)**	0.02 (0.02)	-0.01 (0.02)
Road	-0.11 (0.03)***	-0.03 (0.03)	0.04 (0.03)	0.04 (0.04)
Credit	-0.05 (0.28)	0.14 (0.27)	0.03 (0.29)	0.31 (0.32)
Water source	0.00 (0.00)*	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)
Good fertile	0.01 (0.01)*	0.01 (0.01)**	0.01 (0.01)*	0.02 (0.01)**
Moderate fertile	0.21 (0.24)	0.22 (0.22)	0.07 (0.23)	0.07 (0.28)
Sagnarigu	-1.89 (0.41)***	-0.01 (0.32)	0.81 (0.30)***	0.46 (0.35)
Mion	-1.08 (0.25)***	-0.45 (0.21)**	-0.50 (0.23)**	-0.86 (0.30)***
Central Gonja	0.29 (0.20)	0.13 (0.18)	-0.27 (0.19)	0.00 (0.23)
Savelegu	-2.39 (0.28)***	-2.20 (0.27)***	-2.28 (0.27)***	-1.76 (0.31)***
Yagba-Kubori	-1.63 (0.30)***	-0.46 (0.25)*	-0.24 (0.24)	-1.60 (0.38)***
Constant	0.84 (0.60)	0.32 (0.58)	0.07 (0.59)	-0.52 (0.78)

Notes: *** Denotes significance level at 1%; ** Denotes significance level at 5%; and * Denotes significance level at 10%. Standard errors are in parentheses

Appendix 7: First-stage estimations of determinants of direct and indirect exposure to LSLA

Variable	Under exposure to LSLA by domestic entities		Under exposure to LSLA by foreign entities	
	DE	IDE	DE	IDE
Leadership position	0.37 (0.37)	0.55 (0.43)	1.30 (0.42)***	1.36 (0.40)***

Gender	0.02 (0.01)**	0.02 (0.01)**	0.05 (0.01)***	0.03 (0.01)**
Age	0.08 (0.03)**	0.16 (0.03)***	0.23 (0.04)***	0.28 (0.04)***
Household size	0.03 (0.03)	0.01 (0.04)	0.03 (0.03)	0.00 (0.05)
Education	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)***	0.00 (0.00)***
Farm size	-0.10 (0.24)	0.43 (0.30)	-0.21 (0.33)	0.25 (0.37)
Land institution	-1.21 (0.40)***	-0.07 (0.34)	-0.54 (0.42)	-0.19 (0.42)
Social group	0.00 (0.03)	0.00 (0.03)	-0.04 (0.04)	-0.04 (0.04)
Road	0.05 (0.04)	0.02 (0.05)	0.07 (0.06)	0.08 (0.06)
Credit	0.32 (0.36)	0.35 (0.39)	0.53 (0.41)	1.48 (0.53)***
Water source	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Good fertile	0.02 (0.01)**	0.01 (0.01)*	0.01 (0.01)*	0.01 (0.01)
Moderate fertile	0.07 (0.29)	-0.41 (0.36)	-0.20 (0.47)	-0.47 (0.51)
Sagnarigu	0.97 (0.38)**	0.89 (0.43)**	1.40 (0.52)***	-0.32 (0.76)
Mion	-0.83 (0.33)**	-0.50 (0.39)	-2.90 (0.84)***	-2.37 (0.77)***
Central Gonja	0.45 (0.25)*	-0.43 (0.28)	0.05 (0.33)	-0.55 (0.35)
Savelegu	-1.86 (0.33)***	-2.07 (0.35)***	-1.46 (0.42)***	-1.93 (0.49)***
Yagba-Kubori	-0.22 (0.30)	-0.09 (0.35)	-0.43 (0.39)	0.24 (0.34)
Constant	-2.19 (0.81)***	-2.69 (0.88)***	-5.80 (1.10)***	-5.25 (0.94)***

Notes: *** Denotes significance level at 1%; ** Denotes significance level at 5%; and * Denotes significance level at 10%. Standard errors are in parentheses

Appendix 8: Estimates of the determinants of Food Consumption Score - second stage of MESR)

Variable	Nonexposed	Exposed to LSLA by DE	Exposed to LSLA by FE
Landholding	0.27 (0.02)***	0.76 (0.19)***	0.28 (0.21)
Labour cost	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)

TLU[1]	0.06 (0.02)***	0.09 (0.02)***	0.07 (0.02)***
Agrochemicals	0.53 (0.23)**	0.19 (0.10)*	0.71 (0.33)**
Compensation	0.09 (0.22)	0.03 (0.17)	0.05 (0.10)
Credit access	0.00 (0.00)**	0.00 (0.00)**	0.00 (0.00)**
Gender of head	0.15 (0.08)*	0.24 (0.14)*	0.33 (0.15)**
Age of head	-0.22 (0.63)	-0.21 (0.92)	-0.24 (0.98)
Educational level	0.44 (0.17)***	0.65 (0.16)***	0.44 (0.18)**
Household size	0.11 (0.16)	0.01 (0.01)	0.01 (0.21)
Market distance	0.00 (0.01)	0.02 (0.11)	0.01 (0.01)
Extension distance	-0.05 (0.13)	-0.02 (0.02)	-0.01 (0.03)
Social group	0.40 (0.21)*	0.34 (0.20)*	0.21 (0.10)**
Good fertile	0.85 (0.32)***	0.02 (0.01)**	0.17 (0.07)**
Moderate fertile	0.65 (0.17)***	0.16 (0.09)*	0.46 (0.17)***
Joint significance of district dummies	F(5, 259) = 0.43	F(5, 169) = 0.33	F(5, 169) = 0.48
Joint significance of instruments	F(3, 229) = 0.46	F(3, 180) = 0.39	F(3, 130) = 1.57
Ancillary			
σ^2	0.94 (0.66)	0.83 (0.25)***	1.62 (0.33)***
λ_1		0.05 (0.01)***	0.03 (0.01)**
λ_2	0.43 (0.30)		-0.11 (0.03)***
λ_3	0.97 (0.43)**	0.52 (0.37)	
Observations	305	200	159

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.
Source: Author's computation from field survey, 2018**.**

Appendix 9: Determinants of Household food insecurity access score (HFIAS) - second stage of MESR)

Variable	Nonexposed		Exposed to LSLA by DE		Exposed to LSLA by FE	
	Coef.	SE	Coef.	SE	Coef.	SE

Household income	0.13	0.01***	0.19	0.04***	0.11	0.05**
Landholding	1.18	0.39***	0.43	0.07***	0.46	0.20**
Labour	0.04	0.04	0.10	0.08	0.03	0.05
TLU	-0.02	0.18	-0.01	0.02	-0.04	0.06
Compensation	-0.34	0.23	-0.21	0.62	-0.09	0.33
Gender	-0.25	0.93	0.59	1.35	-0.49	1.28
Age	0.20	0.12*	0.27	0.28	0.29	0.19
Educational level	0.51	0.20***	0.68	0.18***	0.44	0.10***
Farmer group	0.16	0.08**	0.36	0.07***	0.25	0.03***
Market distance	-0.01	0.10	-0.65	0.50	-0.26	0.33
Credit	0.02	0.01**	0.04	0.02**	0.03	0.01***
Water sources	-0.03	0.16	0.07	0.56	0.36	0.22
Remittances	0.82	0.12***	1.01	0.19***	0.30	0.13**
Joint significance of district dummies	F(5, 250) = 0.55		F(5, 198) = 0.28		F(5, 130) = 0.96	
Joint significance of instruments	F(3, 262) = 0.44		F(3, 194) = 0.18		F(3, 168) = 0.54	
			Ancillary			
σ^2	0.50	0.11***	0.31	0.03***	0.17	0.02***
λ_1			0.56	0.29*	0.49	0.23**
λ_2	0.92	0.15***			0.57	0.08***
λ_3	0.41	0.05***	0.66	0.26**		
Observations	305		200		159	

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1% respectively.