NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ECONOMICS PROGRAM

ESSAYS ON ECONOMIC WELL-BEING IN CATTLE RAID VULNERABLE RURAL COMMUNITIES IN NIGERIA

SAIFULLAHI IBRAHIM SANI

PhD THESIS

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DEDICATION
…..to the pastoralists and the pathetic rural poor.

ACKNOWLEDGMENTS

ABSTRACT

ESSAYS ON ECONOMIC WELL-BEING IN CATTLE RAID VULNERABLE RURAL COMMUNITIES IN NIGERIA

This study examines the economic well-being of households dwelling in conflict-trap communities in northern Nigeria. Using micro-level data of 1,750 respondents, the study employed unique research tool such as ordinary least squares (OLS), quantile regression, multiple indicators and multiple causes (MIMIC) model, vulnerability analysis and decomposition that affords a multi-scalar tracing of the factors that determines well-being, at one hand, and barriers to well-being maximisation, on the other. Firstly, the OLS results show that livelihoods diversification exerts a strong positive influence on household well-being. However, a test of the diversification absorptive (resilience) hypothesis reveals that income earned from livelihood strategies is not sufficiently robust to compensate for the well-being loss due to covariate and idiosyncratic shocks. Secondly, vulnerability analysis shows higher vulnerability to disasters which was invariant of the perceived gender of the respondents. These disasters induced a significant forceful migration as a strategy of counteracting the rapid loss of well-being. However, the migration embark upon by the rural dwellers is mainly transient in nature owing to a strong rural attachment (local adaption) particularly, by the low-income individuals. Thirdly, result from constructed multi-variable financial inclusion index shows a strong positive impact of financial inclusion on household welfare. However, the decomposed analysis show that middle- and high-income households gain more from financial inclusion, compared to the targeted low-income households. In this sense, neutralising disasters through coping or adaptive strategy is a necessary condition but not sufficient to ensure the sustainability of well-being. This finding calls for the adoption of conventional livelihoods strategies beyond the less sustainable and less formal agro-pastoral mix. Since informal livelihood strategies, such as trade, environmental resource extraction, crop, and livestock production, indicated a strong signs of well-being disparities reduction across various income distributions. Therefore, broad-based policies on financial intervention focusing on household characteristics are needed to reduce credit rigidities in informal and semi-formal sectors of the economy as this would augment well-being.

Keywords: Cattle rustling; financial inclusion; hazards; inequality; livelihoods strategies; migration; well-being.

ÖZ

NİJERYA'DAKİ SIĞIR BASKINLARININ HASSAS KIRSAL TOPLULUKLARIN EKONOMİK REFAHI ÜZERİNE BİR DENEME

Bu çalışma kuzey Nijerya'daki çatışma tuzağı topluluklarında yaşayan hane halklarının ekonomik refahını incelemektedir. Araştırmaya katılan 1,750 mikro düzeydeki kesitsel veriyi kullanan çalışmada, sıradan en küçük kareler (OLS), kuantil regresyon, çoklu göstergeler ve çoklu nedenler (MIMIC) modeli, çoklu skalar veren kırılganlık analizi ve ayrıştırma gibi benzersiz bir araştırma aracı kullanılmıştır. Çalışmada, bir yandan refahı belirleyen faktörlerin, bir yandan da refah seviyesinin maksimize edilmesinin önündeki engellerin izlenmesi amaçlanmıştır. İlk olarak, OLS sonuçları gelir ve geçim çeşitliliğinin hanehalkı refahı üzerinde güçlü bir pozitif etki yarattığını göstermektedir. Bununla birlikte, çeşitlendirme absorbsiyon hipotezinin bir testi, geçim stratejilerinden elde edilen gelirin, doğal tehlike ve insan kaynaklı felaketlerden kaynaklanan refah kaybını telafi etmek için yeterince güçlü olmadığını ortaya koymaktadır. İkincisi, güvenlik açığı analizi, katılımcıların algılanan cinsiyetinin çalışmanın değişmezi olan afetlere karşı daha fazla hassasiyeti olduğunu ortaya koymaktadır. Bu felaketler, şoklardan kaynaklanan refah kaybını azaltmak için önemli ölçüde güçlü bir göç gerektirir. Bununla birlikte, özellikle düşük gelirli bireyler tarafından güçlü kırsal bağlanma (yerel adaptasyon) nedeniyle göç temel olarak geçicidir. Üçüncü olarak, yapılandırılmış çok değişkenli finansal içerme endeksine göre, finansal refahın hanehalkı refahı üzerindeki güçlü olumlu etkisi görülmektedir. Bununla birlikte, ayrıştırılmış analiz, orta ve yüksek gelirli hanehalklarının, hedeflenen düşük gelirli hanehalklarına kıyasla finansal katılımdan daha fazla para kazandığını göstermektedir. Bu anlamda, nötralize edici afetler gerekliliği ortaya çıkmaktadır, ancak hane halkının refahını sağlamak için yeterli olmadığı da bilinmektedir. Bu bulgu, geleneksel adaptasyon stratejilerinin ötesinde daha az sürdürülebilir ve daha az resmi tarım-pastoral karışımın strateji olarak benimsenmesini gerektirmektedir. Gayri resmi geçim stratejilerinin özellikle ticaret, çevre, tarım ve hayvancılık gibi, çeşitli gelir dağılımlarında refah eşitsizliğini azaltığına dair güçlü bulgulara işaret etmektedir. Refahı artıracağı için özellikle ekonominin kayıt dışı ve yarı resmi sektörlerindeki kredi katılıklarını

azaltacak ve hanehalkı özelliklerine odaklanan mali müdahale üzerine geniş tabanlı politikalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: refah, finansal katılım, geçim stratejileri, doğal tehlike, eşitsizlik, sığır hırsızlığı.

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ABBREVIATIONS

ANOVA	Analysis of Variance
CRVI	Cattle Raid Vulnerability Index
FGDs	Focus Group Discussions
FI	Financial Inclusion
GDP	Gross Domestic Product
HDI	Human Development Index
HDR	Human Development Report
IDCs	Internal Displacement Camps
IDP	Internally Displaced People
IOM	International Organisation for Migration
ISIS	Islamic State of Iraq and Syria
IUCN	International Union for Conservation of Nature
LAIs	Livelihood Assets Interventions
LGAs	Local Government Areas
MDGs	Millennium Development Goals
MIMIC	Multiple Indicators and Multiple Causes
NBS	National Bureau of Statistics
OLS	Ordinary Least Squares
PRA	Participatory Rural Appraisal
PRM	Permanent Rural Migration
PSM	Propensity Score Matching
QR	Quantile Regression
RD	Relative Deprivation
RIF	Recentered Influence Function
RMR	Rural Migration
RNCI	Rural Net Capital Inflow
RNCO	Rural Net Capital Outflow
SDGs	Sustainable Development Goals
SEM	Structural Equation Model
SHG	Self-Help Group
SLA	Sustainable Livelihood Approach
TLU	Total Livestock Unit
TRN	Transitory Rural Migration
UNDP	United Nation Development Programme
VEHI	Vulnerability to Environmental Hazards Index
WFS	Word Forum Summit

INTRODUCTION

As environmental hazards remain a global challenge, extreme climatic events like prolonged droughts and floods are becoming more prevalent, particularly in regions characterised by the heterogeneous nature of rainfall like West Africa. These frequent variations in rainfall induce massive losses of livelihood resources that often increase poverty, food insecurity and conflict, particularly in communities that are heavily dependent on rain-fed agriculture and natural resources (Fafchamps, Udry, & Czukas, 1998; Trogrlić, Wright, Adeloye, Duncan, & Mwale, 2018). Consequently, the shocks emanated from these extreme events might have differential impacts across communities, households, social groups and individuals, depending largely on their contexts, livelihood activities, assets and capabilities (Kelly & Evans, 2017; Tantua, Devine, & Maconachie, 2018). However, evidence regarding the vulnerability status of females in comparison to males remains ambiguous, often related to the heterogeneous nature of the society put into context (see Fielding & Lepine, 2017; Fielding, 2018; Fordham, 1998; Julia & Appolonia, 2009; for review).

The policy responses against hazards were tailored around the sustainable livelihood's advocacy for shifting away from the hazard-prone (e.g., rain-fed cropping) to the 'so called' hazard-resilience strategies (e.g., trade and paid wages). Extant literature asserts that rural communities across the developing world use various strategies in response to poverty, food insecurity, conflict as well as environmental stressors. These strategies range from increasing participation in the labour market (Gautam & Andersen, 2016), selling livestock and other assets (Dercon, Hoddinott & Woldehanna 2005), adjusting grain stocks (Fafchamps et al. 1998), engage in migration and receive remittances (Gray, 2009) to diversification of income sources (Gautam & Andersen, 2016; Porter, 2012). However, the capacity of people to respond appropriately is determined by their livelihoods opportunities embedded within their economic, human, and social capitals. In other words, the impacts of hazards on rural households is heterogeneous, depending on their livelihoods, and coping and adaptation strategies which in turn are shaped by observable household characteristics such as income, gender, and age, among other factors.

The Intergovernmental Panel on Climate Change (IPCC) reports that parts of Africa may experience longer and more intense droughts, with other areas experiencing more erratic rainfall (IPCC, 2012, 2014) which is likely to exacerbate the conflict as a result of increased competition for already scarce resources. Since all the vulnerability variables are inherently connected with peoples' livelihoods (vulnerability is likely to be reduced when livelihoods are adequate and robust), then understanding livelihoods, and the pattern of assets, incomes, exchange opportunities they involve is therefore crucial to understanding a large proportion of the way vulnerability is generated for different groups of people (Feeny & McDonald, 2016). It is therefore necessary to understand the sources of disparities in the existing livelihood strategies, particularly now that the income diversification narrative has been the dominant discourse, which would essentially help in designing pro-poor hazards reduction strategies. Analysis of vulnerabilities can help to determine where and how society can best invest to reduce vulnerability (Fielding, 2018). Just as it is strongly believed that hazards can widen inequalities, strategies to reduce the severity of hazards could also widen inequality, particularly if the available buffering institutions are shaped by some factors (such as literacy, political connection, gender, etc.) that can benefit certain groups. Against this backdrop, this thesis explores the economic well-being in cattle raid vulnerable rural communities in Nigeria.

CHAPTER 1
BASIS OF THE STUDY AND RESEARCH METHODOLOGY

1.1 Background to the Study

Pastoralism can be viewed as a tradition or occupation characterised by extensive livestock production in the rangelands (Blench, 2006). While interpreted as a cultural heritage, pastoralism is often associated with a particular group of people or ethnic group whose livelihoods are exclusively based on livestock production (Bollig & Schulte, 1999; Ibrahim, Ibrahim & Abdulazeez, 2018; Kaimba, Njhia & Guliye, 2011; Miller, 1999). Across the continents, the way in which people engage in livestock production can vary greatly. While in Sub-Saharan Africa (SSA) extensive livestock producers freely identify themselves as pastoralists, this stands in stark contrast to America where livestock production is not tied to cultural affiliations (Eaton, 2010; International Union for Conservation of Nature, henceforth IUCN, 2011; Mkutu, 2006). However, the common factor is the occupation of livestock rearing. Despite the commonalities that exist across the continents, the degree of socio-economic, political and technical support for pastoral development varies greatly, with some African governments strongly opposed to it, whilst many European countries increasingly promote mobile pastoralism in order to manage and conserve biological diversity (Coppock et al. 2014; IUCN, 2011).

The last two decades have witnessed growing interest in sustainable pastoral development, most notably in SSA and Central Asia. The agenda is to transform pastoralism into something that is similar to highly technologically advanced pastoral systems found in the USA and Australia (Blench, 2006; IUCN, 2011; Scheffran, Link & Schilling, 2012). However, due to ambiguities and inconsistencies (for example, the lack of clear direction and policy reversal) with development approaches (Behenke, 2008; IUCN, 2011), underinvestment characterised by failure to attract investment, climate change and widespread

ecological problems have rendered pastoralism into something less sustainable and less resilient (Blench, 2006; IUCN, 2011; Lee, Tung & Lin, 2018; Schiling, Opiyo & Schefran, 2012).

In many SSA countries, pastoralists are often held responsible for overgrazing the range (Moritz, Scholte, Hamilton & Kari, 2013), stemming from their inability to protect land despite their awareness about the importance of grazing management. In other words, pastoral societies are characterised by poor institutional framework to guarantee a sustainable management of resources and peaceful conflict management (Bollig, 1998; Bollig, 2006; Ibrahim et al. 2018). This has contributed to the degradation of the environment and has driven climatic change. It was on this kind of argument that Hardin's (1968) tragedy of the commons hypothesis was built. In this sense, sustainable pastoral development is critical to the efficient harnessing of the natural resources that is free from environmental degradation.

Crops and livestock production (agro-pastoralism) as a livelihoods strategies, are widely acknowledged as major components of agribusiness that are asserting a significant impact on economic well-being and a pathway out of poverty for rural youth. Households may sell their livestock or surplus crops and use the proceeds to build or extend their dwellings, or acquire capital equipment for farming purposes (Ibrahim et al. 2016). It also generates consumption links as households spend their increased income on goods and services produced in the economy (Behnke, 2008; Schneider & Gugerty, 2011; Thys el al. 2005; Xavier et al. 2001). The recent decline in well-paid secure employment in SSA has led to a sudden shift in policymakers' priorities towards reinvigorating the agricultural sector (Siegmund-Shultze & Rischkowsky, 2001). The emergent violent religious extreme group (*Boko Haram*) and cattle rustling (*Kiwo Haram*) particularly in Nigeria, posts threat to the attainment of agricultural sufficiency and challenges food security. Cattle rustling has recently become a key internal security concern in the country (Ibrahim et al. 2018; Olaniyan & Yahaya, 2016), and northern region is the epicentre of the menace. Coincidently in this region, crop and livestock production are the principal sources of well-being, especially in the remote areas. The *Fulani* and *Hausa* ethnic groups were predominately engage in agro-pastoral occupation, from livestock production alone they hitherto contributed average of 3.2 per cent of the country's gross domestic

product (GDP), particularly in the last three decades. However, they are now struggling to cope with incessant armed banditry (Köster & de Wolff, 2012).

The recent interest in the rural livelihoods research agenda was prompted by the need to uncover an innovative method of addressing the vicious cycle of the low quality of life experienced specifically by vulnerable households. Undeniably, rural livelihoods are subjected to recurrent shocks and stresses which increases vulnerability and renders their buffering institutions less resilient (Ibrahim, 2012; Ibrahim et al. 2018; Ziervogel & Calder, 2003). The poor households in particular, faces pervasive disasters, severe shocks and idiosyncratic risks that deepen their subsistence thresholds (Gautam & Andersen, 2016; Harvey et al. 2014; Tschakert, 2007; Ziervogel, & Calder, 2003), and the emergent raiding of pastoral livelihood assets, particularly in rural Nigeria, has weakened their adaptive capabilities (Ibrahim et al. 2016; Olaniyan & Yahaya, 2016). Consequently, the customary mix of crop and livestock production was completely disrupted and left households with no option rather than to explore other alternative means of livelihoods (Ibrahim et al. 2016; Ibrahim et al. 2018).

Prior to cattle rustling in Nigeria, livestock production was among the most widely sought livelihood diversification strategy, particularly for youth in the northern region. The proceeds from this activity were essentially geared towards not only maintaining, but also enhancing rural well-being (Ibrahim, 2012; Ibrahim et al. 2016). Thus, agro-pastoralists' livelihood strategies are based on livestock husbandry (Goldman & Riosmena, 2013) and crop farming (Sewando et al. 2016). In similar fashion, livestock represents a fundamental form of pastoral capital, and at the same time, it was regarded as the means through which wealth is stored for a "rainy day" (Behnke, 2008).

Even though there is minimal evidence about the causative factors responsible for raiding pastoral livelihoods in Nigeria, but a cursory examination of pastoral communities reveals that subjective marginalisation and deprivation have led to increase in the rate of poverty, absence of gainful employment, poor nutrition, lack of access to finance, low human capital, among others (Ibrahim et al. 2016; Olaniyan & Yahaya, 2016). Perhaps these are the major derivers of relative deprivation (Aliero & Ibrahim, 2012). Coincidently, literature suggests that these factors are breeding grounds for violent political movements in

general and strife in particular (Adano et al. 2012; Eaton, 2010; Gurr, 2005; Ibrahim et al. 2018; Mkutu, 2006; Perkins & Thompson, 1998).

Meanwhile, studies on the economics of development have suffered from a materialistic bias (Easterlin, 2001), as the sole emphasis has been on economic growth and neglected other important issues, such as peace and security (Wills-Herrera et al. 2011), which to some extent determines the level of development a country could attain. For instance, advanced economies are found to be relatively more peaceful and secured. In this sense, the concept of human security has been proposed as an umbrella concept to emphasize the relationship between individual and social insecurities in the tradition of the human development discourse (Sen, 2006). This highlights the principal idea behind the United Nation Development Programme's (UNDP) computation of Human Development Reports (HDRs) in 2000, with the aim of humanizing the treatment of security, distinguishing the security of nations or regions from the security of individuals (Wills-Herrera et al. 2011). The focus of HDRs was not to vividly capture the physical aspect of personal security, but to redefine it to include the capacity and abilities of individuals and communities to control their environments and secure basic conditions for prosperous life. Thus, against this background this thesis addresses salient theoretical and practical issues on economic well-being question in disaster-prone remote areas of Nigeria.

1.2 Problem Statement

As disasters triggered by the hazards of natural origin remains a global challenge, extreme climatic events such as prolonged droughts and floods are becoming more prevalent, particularly in regions characterised by the heterogeneous nature of rainfall like West Africa. These frequent variations in rainfall induce massive losses of livelihood resources that often increase poverty, food insecurity and conflict, particularly in communities that are heavily dependent on rain-fed agriculture and natural resources (Fafchamps et al.1998; Trogrlić et al. 2018). The simple scarcity model of conflicts asserts that if a hazard results in a decrease in livelihood resources, those affected by scarcity may resort to fighting over the remaining resources (Theisen et al. 2013).

The policy responses against hazards were tailored around the sustainable livelihood's advocacy for shifting away from the hazard-prone (e.g., rain-fed

cropping) to the 'so called' hazard-resilience strategies (e.g., trade and paid wages). Extant literature hypothesises that diversification driven by either 'push' (necessity or survival) or 'pull' (choice or accumulation) factors would widen the subsistence options, thereby paving the way for the attainment of higher quality of life among the rural households (for instance, see Dzanku, 2015; Ellis, 1998; Gautam & Andersen, 2016; Ibrahim el al. 2018; Sen, 2010; Wills-Herrera et al. 2011). However, the well-being retardation impact of cattle rustling, as well as the choice of livelihood strategies limited to households prone to dual shocks (climate and insecurity), have not been previously examined empirically.

The instantaneous effect of cattle theft is the rapid reduction in livestock investment capital which is attributed to indiscriminate stealing of breading animals that often slowed down the growth of herds (Manu et al. 2014). These acts have led to loss of human lives, stealing of livestock, and displacement of populations as well as disruption of people's livelihoods. The displacement of people has set off a chain-reaction creating environmental pressure on the more secure remote areas and the neighbouring urban certain. Forests have been cut down to provide land to the "landless" displaced from their ancestral homes, in the first place. This has gradually affected soil fertility and climatic conditions in the districts. Cattle rustling could possibly trigger rural – urban migration since the urban centres are perceived to be immune from cattle theft. However, there is deep-rooted literature in economics on the adverse consequences of rural – urban migration. It is well known fact migration from rural to urban slow agricultural productivity, pressures urban infrastructural facilities, and engendering social vices, such as robbery, fraud, etc.

While acknowledging the fact that successive governments have done fairly to improve inclusive development in remote areas by implementing numerous policies orientated within the context of sustainable rural development agenda. Indeed, some of the policies (such as rural banking scheme, microfinance, anchor borrower's programme, etc.) have had a considerable impact on social, economic, environment and political developments of rural communities. However, as a result of emergence of the organised cattle rustling as well as the unpredictable climatic variability have combine to hinder the sustainability of rural well-being. Consequently, rural dwellers were left with no options than embark on self-supported adaptive strategies such as migration,

livelihoods diversification among others. These two extreme events were identified as the major cumbersome to the attainment of acceptable threshold of economic well-being. For instance the sizes of livestock lost induced by the cattle raiding (or combination of droughts, floods and other idiosyncratic shocks etc.) have not lead to only decline in livestock livelihood security but also affected the children's health that depends on milk for their growth.

The indiscriminate raiding of vulnerable and disadvantaged groups, especially women and children, seems to be a symptom of the breakdown of the entire social order. The way in which cattle are raided for selfish purposes, as against the fact that pastoral communities have a lot of attachments to cattle due to their ritualistic and cultural importance. In this sense, loss of livestock is assumed to affect the entire social fabric.

On the other hand, the renewed interest in migration studies in the last two decades was informed by the development in the world economies that appeals for an alternative view of migration outcomes beyond what was hypothesised in the both the Lewis and the Todaro (1969) migration theories . The US financial crisis, Arab's spring and organised crimes (terrorism, cattle rustling and the likes) were unprecedented threefold shocks that virtually affect all the continents in the globe and challenged the traditional theories of migration. Even though countries were hit with different proportion of these events, but their ripple effect yielded an unwanted movement both within and between nations. It recently took different dimension forcing major world economies to initiate contractionary immigration policies aimed at ensuring safety of their citizens and improving the security of their borders. In Africa, specifically Nigeria is hit by all the three phenomena (Agbiboa, 2013; Higazi, 2016; Ibrahim et al. 2016; Olaniyan & Yahaya, 2016).

Emotional feeling of rural of homesickness is another important factor in rural migration question that influences economic well-being. Attachment to non-human aspect of the place (for example, environmental factors), people who spent their childhoods in rural environments have a different frame of reference for what constitutes home (Morse & Mudgett, 2017). Undoubtedly, households longed not only for people and places left behind, but also natural environmental like landscape and vegetation which are rarely available in modern cities (Morse et al. 2014; Mudgett, 2015) and this has received little quantitative attention in

the literature. Similarly, few extant studies have analysed how subjective deprivation may be linked to cattle rustling which in turn may trigger rural out-migration. Besides that, the multidimensionality of the cattle raid induced migration, particularly a class-based analysis has often gone unacknowledged in the literature.

This study contributes to the economic well-being discourse of households vulnerable to recurrent shocks by answering the following research questions:

i. The first research question explores the extent to which livelihoods diversification strategies counteract the well-being lost due to heterogeneous disasters.

ii. Second question centres on issues relating to vulnerability to recurrent shocks as well as disparities in gendered livelihood diversification.

iii. The third question determines the mitigation strategies in form of forceful migration. It also captures the multidimensionality of out-migration which clearly categorises the household's migration outcome into either seasonal, transitory or permanent.

iv. Fourth question explores the impact of local adaptation (rural attachment) and coping strategy on household's income. It further establishes the issue of income disparity of households with varied attachments to rural areas.

v. The fifth question studies the impact of financial inclusion on well-being. It further addresses questions regarding the paths of welfare enhancement of financially included and financially excluded households.

Although previous studies have raised claims (Bryceson, 2002; Ellis, 2000; Gautam & Andersen, 2016; Scoones, 2009; Wills-Herrera et al. 2011) about these questions, none of these studies has given these issues the deserved academic attention and nor have they addressed them systematically. Providing answers to these questions is crucial for sustainable rural development, because they would provide insights to the extent and the types of livelihood strategies that exert a positive impact on rural well-being. Similarly, the analysis contributes to evidence on the issue of whether the choice of livelihood strategy of cattle rustling-prone households is sufficiently robust to off-set the well-being loss from this menace.

1.3 Objectives of the Study

This study explored economic well-being of households in remote areas prone to cattle rustling in Nigeria. The study primarily identify whether livelihood diversification option is robust enough to compensate and counteract the reduction in well-being driven by the loss in livestock holding. The study has further analysed the migratory outcome of agro-pastoralists subject to various endogenous and exogenous shocks. Specific issues addressed are:

i. To explore the household-specific livelihood diversification options and the resiliencies of well-being enhancement strategies.

ii. To identify not only the impact of disasters on well-being, but also trace the gender dimension of vulnerability as triggered by the combination of human activity as well as hazards of natural origin.

iii. To explore the multidimensionality of rural migration and the extent to which well-being is affected.

iv. To examine the effect of rural attachment (local adaptation) on income disparity.

v. To identify the impact of access to formal financial services (financial inclusion) on economic well-being.

1.4 Motivations

The rapidly increasing emphasis on achieving economic growth has neglected other important issues, such as peace and security, which have been previously studied as public goods, not as commodities, and thus have not been measured as contributing factor to economic development (Wills-Herrera et al. 2011). Cattle rustling is a phenomenon affecting the peace and security of rural economy particularly in SSA. Despite its commonality among various the agro-pastoralists in remote areas, its impact vary significantly from one community to another, as do the motives, drivers and mitigating factors.

The plethora of literature on the cattle rustling suffered some academic bias by primarily focusing on identifying the causal and impact of raids (for instance see, Kaimba, 2011; Schilling et al. 2012), and ignoring the mechanism and dynamism of raiding pastoral livelihood security as well as the associated effect

on economic well-being. Taken together, extant studies provide mostly inconclusive insights, with contradictory or weak demonstrated issues related to effect of shocks on economic well-being. This study is unique in its substantial construction of well-being index using multidimensional factors, as opposed to single money-metric measure of welfare.

Whereas in Nigeria, despite the recent policy emphasis which focuses on improving agricultural value chain and deepening market access in order to enhance the utilisation of livelihoods asset particularly after the return of civilian rule in 1999, there is however little solid empirical evidence on the repercussion of cattle rustling on sustainable rural livelihoods. This study filled the lacuna in literature by using a unique data which permits robust estimation of cattle raiding and socio-economic well-being nexus. More so, the study explores the pathways through which these relationships are transmitted. This is instrumental in determining the severity of cattle raiding on pastoral sustainability on the one hand, and inform the appropriate, timely and effective policy intervention pivotal for addressing the perennial cattle theft and prevent any form of organised crime driven by subjective deprivation.

Plethora of literature has hypothesised that diversification driven by either push or pull factors would enhance economic well-being (Dzanku, 2015; Ellis, 1998; Gautam & Andersen, 2016; Ibrahim et al. 2018; Sen, 2010; Wills-Herrera et al. 2011). However, the well-being reduction driven by violent conflicts (for instance, cattle rustling) and natural hazards (for instance, floods, droughts, etc.) as well as the choice of livelihood strategies available to households prone to recurrent shocks (economic, environmental and social shocks), have not been adequately addressed.

The term 'sustainable livelihoods' which stem from the need for an extended well-being, relates to a wider set of issues linking the debates between poverty and environment. There is often little clarity in the extant literature about its scope, specifically in dealing with contradictions and trade-offs (Gautam & Andersen, 2016; Harvey et al. 2014; Scoones, 1998). Thus, it becomes a thrust of this thesis to bring an insight and blend the concept for effective social policy issue.

Rural population studies have been criticised for providing a rather narrow focus on uni-directional, long distance and permanent movements of people in

rural places. What is needed, it is claimed, is more sophisticated approach that is able to capture a broader range of spatial scales and temporalities associated with rural mobility (Milbourne & Kitchen, 2014). This study builds and present new challenges for traditional rural out-migration questions, addressing the influence of important emotional dimensions of attachment to both the non-human world on the migration outcome.

This study is unique in providing an insight into the extent to which the vicious cycle of cattle rustling is retarding (or not) the pace by which the ongoing agriculture-led rural poverty reduction policy is impacting on the lives of rural poor in Nigeria. This research is important because it test empirical evidence on this relationship which have both theoretical and practical implications for robust public policy.

1.5 An Overview of Research Methodology

This study used two complementing method of data collection: structured questionnaire and interview implemented within the context of key informants as well as focus discussions. The questionnaire was designed to solicit a detailed salient information on household characteristics, well-being assets, source of livelihoods, consumption expenditures, livestock and other assets loss to cattle raid, physical assets, and amenities, adaptive and coping strategies, among others. This thesis contains five empirical chapters that were tied to the specific objectives of the study as highlighted in section 1.3. While a snapshot of empirical method is presented in this section, the detail empirical strategies specific to the empirical chapters are provided within each of the thematic chapter. There are generic information applicable to all the empirical chapters, are thus given below.

1.5.1 Research Design

Unlike other form of violent conflicts, organised cattle raiding in rural Nigeria is a recent phenomenon arguably commend in the last decade. In a quest to enhance the efficacy and reliability of the outcome of this research, a wide range of relevant stakeholders were consulted and paved the way for obtaining key information that guided the selection of the cattle raid corridors. While complying with the conditionality of the triangulation framework, certain criteria were

established that guided the selection and the recruitment of the respondents. Key research stakeholders needed to have: (i) a satisfactory level of knowledge about the ongoing cattle rustling in the study area; (ii) a sense of objectivity demonstrated by how the rural inhabitants entrusted them in dispute settlements in the community (this is a unique quality required for focus group discussants); (iii) have a reasonable literacy level, a fundamental attribute required should they decide to provide their input in written form (this characteristic was a 'must' for the enumerators). Literacy is instrumental that makes possible the selection of informants for a terminal member check arbitrarily; and (iv) to avoid bias, have a unique link, not only to the raiders, but also to cattle theft victims (applicable to the enumerators). The relative ambiguity portrayed in the above criterion necessitated the selection of informants in batches. This process was in full compliance with the principles of nominated sampling. As fieldwork continued, informants were selected to fill in any gaps in the profile that arises.

The data collection for the study was conducted in phases between October 2014 and September 2015. The first phase was seemingly a participatory rural appraisal (PRA) geared towards determining the epicentre of cattle raiding, gathering preliminary information, and identifying the potential informants. The information gathered at this stage was instrumental in the design of the structured survey questionnaire and the interview guide, which were pilot-tested. The second phase was dominated by the activities relevant for the determination of appropriate sampling techniques that could aid generalisation of findings.

For simplicity as well the need for ensuring that an adequate number of cattle raid victims were included in the sample, the "Area Survey" (enumeration area) was restricted to the rural communities with reported cases of cattle rustling. Participants for interviews and focus group discussions (FGDs) were drawn via a maximum variation purposive sampling method. Moreover, three respondents from each surveyed area were selected for the FGDs and rendering a total of 489 discussants participated in various sessions. Their selection was informed by the level of expertise they demonstrated regarding the ongoing cattle raids during the pilot survey. This study has benefitted immensely from their wealth of experience about the menace. For convenience, FGDs in each of the selected clusters of local government areas (LGAs) were conducted in the

central municipality with representatives of the security agents (police and local vigilante groups) fully in attendance. The lead researcher moderated the discussion, while the rest of the survey team members were assigned with different tasks, principal of which was taking the minutes of the proceedings and documenting unstructured and spontaneous responses during the focus sessions. The moderator has played a vital role in steering the discussions in a manner that has enabled extraction of the desired information, as well as keeping the members on track (Sekaran & Bougie, 2016).

The study adopts multi-stages sampling procedure which involve selection of LGAs, district and villages based on agro-pastoral potential and intensity of cattle raids. Based on these criteria, three LGAs from each state and then two districts in these LGAs were purposely selected. Villages with cases of cattle theft in the selected districts were identified and random sampling process was applied in selecting the ward (enumeration area) from each village. At the village level, between 30 and 40 households were randomly selected. Their selection was proportionate to the total number of inhabitants in each of the selected village. Random selection is superior that could allow legitimate generalization of information from few people to many (Neuman, 2013). The study has used the sample size of 1,750 respondents, excluding the 489 discussants drawn for key informants and FGDs sessions.

1.5.2 Analytical Techniques

As explained in section 1.5 that this thesis has adopted the format of providing a detail analytical procedure in each of the empirical chapter. It is however, useful at this stage to provide some preliminary but generic information about method of analysing empirical data sourced through the survey of pastoral remote areas in northern Nigeria. It is pertinent to note that the thesis has used various combination of econometrics and statistical tools parsimoniously that ensured that every research question (derived in 1.2) is been adequately and concisely addressed. Therefore, an integrative process of analysing the quantitative data and qualitative responses generated from the structured questionnaire were adopted to ensure that the study has achieved the objectives stated in section 1.3. In this way, various analytical software like Stata version 14, SPSS version 23, AMOS version 23, Eviews 10 and GraphPAd InStat were

used while running both the descriptive and inferential statistics. The descriptive test includes frequencies, percentages and charts of various qualitative variables of observable household's characteristics.

Moreover, cross-comparison between-group responses were implemented via independent t-test, chi-square and analysis of variance (ANOVA) tests (where deem applicable). Furthermore, various forms of regression such as ordinary least squares (OLS), quantile regression, and multiple indicators and multiple causes (MIMIC) model, among others were applied in the estimation of the parameters in the regression model. This has uniquely affords a multi-scalar tracing of various interconnections between regressands and regressors. The coefficients of the regressors were as the 'rule of thumb' evaluated at the 95% confidence level, with p-values less than 0.05 identified as significant.

1.5.3 The Study Area

The study was primarily conducted within the inter-state border rural communities in northwest geo-political region in Nigeria (see Figure 1.1). The region consists of seven states, including Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara states. The incidence of cattle raids is more intense in the border communities linking Katsina, Zamfara and Kaduna states axis (Ibrahim et al. 2016; Olaniyan & Yahaya, 2016). Two state-owned reserves in the region, notably the *Rugu* and *Falgore* forests, offer perfect concealment opportunities for criminals (Ibrahim, 2012; Ibrahim et al. 2016, 2018; Olaniyan & Yahaya, 2016). The *Rugu* forest, which spans over 220 kilometres, bordered the four states of Katsina, Zamfara, Niger and Kaduna, and extends to the Niger Republic. On the other hand, the *Falgore* forest covers approximately 1,000 square kilometres and its boundary stretches between Kano, Kaduna and Bauchi states.
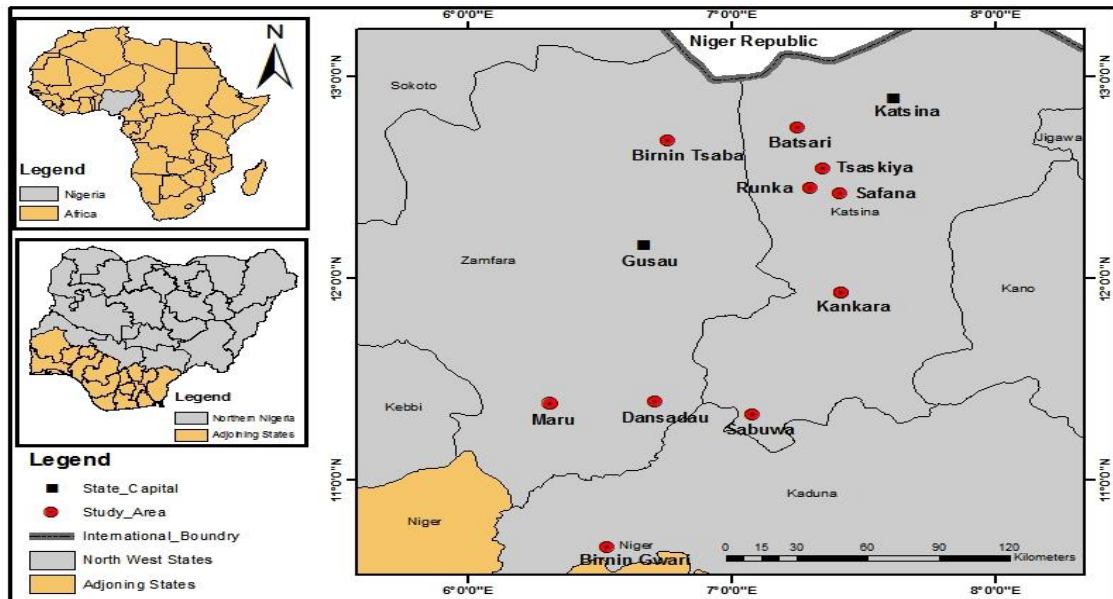
Figure 1.1: A map of the selected rural areas in north-west geopolitical region, Nigeria.

Nigeria has diverse and rich vegetation capable of supporting a large population of livestock (NBS, 2010). The northwest region in particular has a hot semi-arid climate around the Katsina, Kano, Kebbi, Sokoto and Zamfara states, while Kaduna state seems to have more favourable climatic condition as it fall within the tropical climatic regions of Nigeria.

Generally, the climatic condition in Northern Nigeria varies from one period to another as characterised by wet and dry seasons. The wet season lasts only from mid-May to September with little precipitation of not more than 20inch (500mm) a year. The mean maximum and minimum temperatures in the region are significantly higher than in other regions (averaging about minimum 21°C and maximum 36°C), in that making the region relatively more vulnerable to climatic shocks such as droughts and floods (Ibrahim, 2012; NBS, 2010). A substantial number of agro-pastoralists were dispersed in the entire Northern part of Nigeria, especially towards the north-western region (region of interest for this study). The population in the region grew by 22.10% from 1991 census to the last census held in 2006 (NBS, 2010). While disaggregating the growth rate by gender, 22.62% and 21.56% were accounted for male and female, respectively (Ibrahim & Aliero, 2011; Ibrahim & Bakori, 2011). There was a slight change in male-female ratio between the two periods in question. The male-female ratio in 1991 census is 50.45:49.55 and is relatively more balanced than 51.01:48.99 exhibited in 2006 census (Ibrahim & Ibrahim, 2014; Nuruddeen &

Ibrahim, 2014). Having the found little variance in population growth rate across the two period has lend support to claims that change in population over the time cannot account for changes in well-being, human development, livelihoods strategies and household vulnerability between male and female.

Indeed, rural communities in the north-west region are suffering from undue political marginalization. The effects of unbalanced development have manifested in form of a lack of adequate basic rural infrastructure and lopsided governmental social intervention, which has led to the concentration of the so-called agro-allied industries in the major cities. While farming is predominantly associated with the *Hausa* ethnic group, the pastoral livestock production is predominant linked with the *Fulani* ethnic group.

By and large, agriculture is the main source of livelihood in the northwest region, particularly in rural areas (Ibrahim et al. 2016). The mixed livestock-crop farming mechanism is the most common practice of agricultural symbiosis where livestock, particularly cattle, was the main farm input that supported subsistent farmers due to low adoption rate of mechanised farm equipments. In return, farm output is used as livestock feed. The farmers and herdsmen alike are accumulating cattle to the magnitude of irrationality as demonstrated in Herskovits's (1926) classic cattle complex theory.

1.6 Brief Overview of the Study

This study was organised into seven chapters (excluding a preliminary introduction): the basis of the study and overview of research methodology, literature review and five empirical chapters. Chapter one focuses on introductory aspect of the thesis, which includes background to the study, statement of the problem, objectives and motivation for the study. It further presents the general procedure of the thesis and describes the study area. Furthermore, chapter two deals not only with the theoretical framework but also presents the review of the related literature.

The first of the five empirical chapters is chapter three. The chapter answers the first research question raised in section 1.2. It presents the comprehensive application of econometric and statistical methods that enabled achieving the central objective of the thesis. The study further applied a stylised strategy of constructing the indices of economic well-being as well as the livelihood

diversification similar to the procedure of the UNDP often used in calculating human development index (HDI). The chapter also contains the MIMIC modeling procedure of integrating the money and non-money metric in measuring the household's well-being.

Chapter four is the second empirical chapter. It examines the major constraints on economic well-being. In addition to the analysis of confluence impact of disasters of natural origin as well as disasters entirely driven by human activities, the gender dimension of vulnerability were also investigated. The chapter was concluded with a construction of a simplified version of household-specific HDI.

Chapter five examines the robustness of mitigation strategies to counteract the economic well-being loss driven by recurrent shocks. It identifies rural out-migration as a most sought mitigation option against the socially constructed disasters. The chapter traces the link between deprivation and human-driven disasters. Elasticity of different migration outcome was estimated using OLS.

Chapter six examines the effect of local adaptation (or rural attachment) on the longevity of migratory decision as well as how such attachment is inducing income disparities. The study applies the multiple correspondence analyses to correlate rural out-migration with socio-economic factors such as population distribution and the rural class relation.

Chapter seven is the last empirical chapter. It investigates the impact of financial inclusion on welfare (well-being). Paths of welfare enhancements effect of financial inclusion were examined using quantile regression. A decomposition analysis was imposed in the comparison of economic well-being between financially included and financially excluded households. Additionally, robustness test was performed via the counterfactual decomposition proposed by Machado and Mata (2005). And lastly, the chapter draws conclusion and presents the implication of the thesis.

CHAPTER 2
LITERATURE REVIEW AND THEORETICAL PERPECTIVES

2.1 Introduction

The literature that stems from both the theoretical and empirical evidences connecting insecurity and economic well-being is still under construction. The entire world has in the last decade experienced an unprecedented turmoil that threatens peace and human happiness, and subsequently paving the way for the declining the global per capita product. Although the magnitude of the crisis within the same continents differs from one country to another, however, the notion that crisis anywhere is a threat to peace and security everywhere has paved the way for the unity among the world leaders to find the effective means of neutralising the dreadful insurgent groups (such as Islamic State of Iraq and Syria (ISIS) and *Boko Haram*) and armed bandits (e.g. cattle rustlers) among others. Certainly, cattle rustling shock had not receive the same attention as shocks induced by religious extremism. But recent brutality that the menace assumed has ignited a renew interest from the scientific community. Below are extant literature on various endogenous and exogenous factors that influence economic well-being and rural development.

2.2 Financial inclusion and well-being

Financial inclusion is one of the social concepts that is controversially defined among different disciplines. The economic conception of the term was orientated within the broader context of inclusive development that considers inclusivity in financial services as an important means to tackle poverty and inequality (Chibba, 2009). Financial inclusion is thus defined as the access to useful and affordable financial products and services that meet the financial needs of low-income and vulnerable members of society (World Bank, 2018). This is based

on the premise that financially included individuals are more favourably disposed to invest in education, start and expand businesses, manage risks and absorb financial shocks than financially excluded individuals (Banerjee, Duflo, Glennerster & Kinnan, 2015; Krumer-Nevo, Gorodzeisky & Saar-Heiman, 2017). In this way, Dev (2006) argued that financial inclusion occurs when peoples, regardless of their income level, have access to a wide range of financial services required to improve their lives.

On the other hand, geographers are mainly concerned with the physical access to banking services driven as a result of either the availability of formal financial service providers or limited access due to the closure of bank branches (Leyshon & Thrift, 1995). While the availability of banking services would stimulate access to banking, closure of banking branches would cause some individuals or certain groups of people to discontinue accessing the financial service infrastructure (Wentzel, Diatha & Yadavalli, 2016). Moreover, sociologists strongly believe that financial exclusion is as an important contributor to vulnerability that could possibly lead to social inclusion. Sinclair (2013) argued that access to financial services is essential for citizens to be economically and socially integrated into today's society. The implication is that individuals can improve their welfare through the increased financial access, which could have spill-over effects on the overall prosperity of their communities and the economy at large (Ibrahim, 2014).

Financial exclusion as a polar opposite of financial inclusion is characterised by the inability of individuals to access essential financial services that meet their financial needs (Sinclair, 2013). Conroy (2005) contended that financial exclusion (or deprivation) is a process that prevents poor and disadvantaged social groups from gaining access to the formal financial system. While access to transaction accounts is considered as the most basic form of formal financial inclusion, being financially excluded means that transactions by individuals, households and enterprises are entirely conducted in cash, and this could increase their susceptibility to irregular cash flows (Wentzel et al. 2016). A distinction thus needs to be drawn between those who are financially excluded due to barriers of access (for instance, lack of collateral or the 'so-called' hard-to-reach populations, including women and the rural poor) and those who are excluded by choice (what is aptly referred to as self-exclusion). The latter

situation may occur as a result of low financial literacy that may lead individuals to regard themselves unsuitable due to their previous negative experiences of financial services. These two extreme ends of the spectrum reflect the dichotomy between voluntary and involuntary financial inclusion.

The role of the financial sector as a leading contributor of growth has been widely accepted (Johnson & Nino-Zarazua, 2011) and over the last two decades, the focus has turned to solidifying the weak nexus between finance and poverty reduction, as well as the repositioning of the key players of the financial system by enhancing their capacity for deepening the financial infrastructure for better outreach. There is important literature on the effect of financial exclusion on the level of welfare, poverty and income inequality (Conroy, 2005; Kirsten, 2012; Krumer-Nevo et al. 2017; Sinclair, 2013; Wentzel et al. 2016). These studies have strongly emphasised the need to enhance the financial inclusivity of individuals, households and enterprises that could pave the way for the attainment of inclusive development. Other sets of studies (Baumann, 2004; Brannen & Sheehan-Connor, 2016; Daniels, 2004; Pagura & Kirsten, 2006; Uche, 1999) have examined how microfinance and other regulated non-banking institutions could complement the conventional banks in stimulating the banking culture, particularly for rural development.

2.3 Cattle Rustling

Cattle rustling as a form of violent conflict involves the forceful acquisition of livestock and other pastoral livelihood assets. The raiding of pastoral livelihood has evolved over time, from what was once a traditional practice of testing bravery involving small-scale violence or theft of livestock to replenish the livestock lost through environmental hazards or disease (Bollig, 2006; Eaton, 2010; Ibrahim et al. 2016; Kaimba et al. 2011; Schiling et al. 2012), to commercialised cattle raiding facilitated by the proliferation of small arms (Eaton, 2010). The manifestation of organised cattle rustling as well as the rapid changing social context are increasingly challenging the sustainability of agro-pastoralism, particularly in SSA.

There is growing body of literature attributing cattle raiding to poverty (Ibrahim et al. 2018; Kynoch & Ulicki, 2000; Omolo, 2010; Schilling et al. 2012), primitive accumulation of wealth (Kaimba, et al. 2011; Olaniyan & Yahaya, 2016;

Perkins & Thompson, 1998; Schilling et al. 2012; Simelane, 2005), retaliation (Eaton, 2010), tribal-based conflicts (Higazi, 2016; Schilling et al. 2012), institutional factors (Adano et al. 2012); drought (Scheffran et al. 2012); and proliferation of small arms (Mkutu, 2006; Olaniyan & Yahaya, 2016).

Moreover, empirical literature on the impact of cattle rustling on socio-economic well-being is diverse. Interestingly, there was no conflict in the finding in previous studies. The general conclusion was cattle theft has adversely effects economic well-being. For instance, Simelane, (2005) investigated the impact of cross-border cattle rustling on socio-economic activities in rural Southern Swaziland and found a declining economic fortunes of rural dwellers. At almost all levels cattle theft has deepened poverty as households have had their agricultural production significantly hampered.

2.4 Environmental Hazards and Violent Conflicts

Indeed, disasters are becoming increasingly frequent (Altay, 2008), costly and devastative (Horwich, 2000; Altay et al. 2013), disrupting the supply chains of micro-enterprises (Kouvelis et al. 2006; Altay & Ramirez, 2010). The micro-enterprises operating in the informal sector of economy is the backbone of livelihood diversification activities in most developing countries (Prasad et al. 2015). When disasters occurred, everyone along the supply chain is affected to some extent (Altay & Ramirez, 2010).

Northern Nigeria is one of the most highly prone, vulnerable and most disputatious regions of the world (Ibrahim, 2012; Olaniyan & Yahaya, 2016; Palmer et al. 2015), with new security threats from *Kiwo Haram* (organised cattle rustlers), *Boko Haram*, farmers-herders clash and the ISIS have emerged and combined with the perennial ethno-religious crisis to increase households' vulnerability to poverty (Ibrahim et al. 2016; Ziervogel & Calder, 2003). The climatic conditions of the region has made it vulnerable to recurrent hazards, such as droughts and floods (Agbonkhese et al. 2014; Ibrahim et al. 2016). Too little rainfall causes drought due to a lack of sufficient irrigation facilities, while too much precipitation causes floods that affect properties and farmlands (Pradhan, 2003; Tawari-Fufeyin et al. 2015). This climatic conditions varies from one period to another, as characterised by the wet and dry seasons. The wet season lasts only from mid-May to September with minimal precipitation of no

more than 20inch (500mm) a year. The mean maximum and minimum temperatures in the region are significantly higher than in other regions (averaging a minimum 21°C and maximum 34°C), thus further making the northern Nigeria relatively prone to disasters emanating from extreme events such as droughts and floods. This has increased the tendency of future conflicts related to climate change or water shortages, farm scarcity and degradation highly likely (Giordano & Ruiters, 2016; Lee et al. 2018), particularly in north-western geo-political region, where a large share of the population relies on agriculture and shocks on local agricultural prices increase the risk of violent events (Fjelde, 2015; Ibrahim & Aliero, 2012).

2.5 Livelihoods Diversification

Extant literature addressing diversification in agro-pastoral community is varied and diverse. Bryceson (2004) built an empirical analysis within the argument of structural changes which triggered the processes of deagrarianisation and depeasanisation owing to implementation of structural adjustment policies in SSA. Evidence from village case-study indicates a gradual decline in peasant commodity production, a surge in non-agricultural income diversification, the proliferation of multi-occupational households and accelerating rural class stratification. Using integrative approach of combining income and assets, Walelign et al. (2017) found common pathways out of poverty which includes an intermediate step during which households accumulate assets through farming, petty trading, and migratory work.

In a bid to assess whether African countries can achieve substantial food security within the time framework set by world food summit (WFS), Graff et al. (2011) employed panel data of eight African countries to reveal pessimism of SSA to reduced malnourishments by half in 2015. While acknowledging the importance of diversification, the study confirms that countries with diverse agricultural development pathways were more food secured than those trapped in mono-strategy. This highlights the need for multiple livelihoods diversity to mitigate food insecurity, seasonality and associated risks (Ellis, 2000). However, Gautman and Andersen (2016) examined the impact of livelihood diversification on household well-being in Nepal and the result showed that well-being was not associated with diversification *per se* but rather on a households'

involvement in 'high return sectors'. Ziervogel and Calder (2003) found that rural households in Lesotho are increasingly diversifying their livelihoods as a response to climatic variability. Elie (2015) discovered the relevance of state in engendering steady transition from core pastoralism to an auxiliary livelihood in Soqotra Island, Yemen. Moreover, Kassie (2017) investigate the role of livelihood diversification on farmland management strategies in rural Ethiopia, adopting the Herfindahl–Hirschman diversity index, the results shows a positive and significant effect of diversification on sustainable land management activities. Ducrotoy et al. (2017) used micro-data from Kachia grazing reserve in Nigeria and found that 55% of households derived income from off-farm activities.

2.6 Rural Out-migration

Literature on forceful migrations as a coping strategy in response to strife in SSA is limited, its importance should not be underestimated (McCabe et al. 2014). The extant researches primarily focus on the questions justifying the rationale behind migration. Some scholars suggest that migrations are driven by necessity or poverty (Milbourne, 2007; Loftsdottir, 2008; McCabe et al. 2014; Grolle, 2015), migrations to other places that offered the promise of more option for youth (Mudgett, 2015), deprivation and marginalisation (Stark & Taylor, 1991), displacement and security (Potkanski, 1997; Maconachie & Binns, 2007; Kaimba et al. 2011; Ibrahim et al. 2016) and other researchers conclude that migration is driven by choice (Hampshire, 2002; Greiner & Sakdapolrak, 2013; McCabe et al. 2014). Many scholars argued that migration has been a family-level decision that aims to reduce risk for the entire family (Loftsdottir, 2008). Hoggart (2007) has attempted a class transition migration study by examining the changing presence of the working classes in rural areas in UK. However, his analysis does contradict certain assumptions within the rural migration question, specifically the forceful displacement of working-class group from rural areas.

The effects of cattle rustling on household migration decisions and herd size amongst pastoralists in Baringo District in Kenya was investigated by Kaimba et al. (2011) and the study found that certain household-specific characteristic, particularly gender and age of the household head were significant determinants of migration, and also significantly influenced herd size.

Moreover, intensity of cattle rustling, and loss of livestock due to drought and/or disease also significantly influence the migratory decision.

Emotional feeling of rural homesickness is another important factor in rural migration question. Attachment to non-human aspect of the place (for example, environmental factors) for people who spent their childhoods in rural environments have a different frame of reference for what constitutes home (Morse & Mudgett, 2017). Undoubtedly, households longed not only for people and places left behind, but also natural environmental factors like landscape and vegetation which are rarely available in modern cities (Morse et al. 2014; Mudgett, 2015) and this has received little quantitative attention in the literature. Similarly, few extant studies have analysed how subjective deprivation may be linked to cattle rustling which in turn may trigger rural out-migration. Besides that, the multidimensional nature of the cattle raid induced migration, particularly a class-based analysis has often gone unacknowledged in the literature.

2.7 Theoretical Framework
Theories related to the theme of this thesis are reviewed and they are to serve as a basis of analysis. These are given below:

2.7.1 Enterprise Theory of Organised Crime
The induced theory of organised crime lent itself to enterprise theory of organised crime. Under this theory it is assumed that organised crime exists because legitimate markets leave many customers and potential customers unsatisfied (Smith, 1978). The impetus behind organised crime is not a criminal conspiracy, but simple market opportunity, which can also constrain organised crime's structure, form, and social perniciousness (Ibrahim et al. 2016). No doubt literature have stressed that cattle is the most sought of all among the pastoral livelihood assets during raiding operation. Sometimes, raiders use to offer window for a conditional cash swap of the confiscated belongings. Unfortunately, the cross-border remote areas are the epicentre of the menace thereby casting little hope of penetrating their market and its environment through any meaningful intervention for minimising the crime (Lyman & Potter, 2007). Thus, criminal enterprise will escalate with little hope controlling it due to potential high profit it could offer to perpetrators, because good and services in this market are supplied at rates far below competitive market prices (Smith,

1980). Assuming an ever-increasing market demand for illegally acquired goods due to lower prices, Liddick (1999) rightly observed that as long as demand exists, a marketplace exists, and entrepreneurs (cattle rustlers in the case of this study) will seek to meet demand regardless of the legality of the transaction.

2.7.2 The Theory of Livelihoods Strategy

Development economist, particularly the rural the development scientists have discussed issues relating to the various aspect of diversification. Like other social science concept, the literature offers varied, diverse and sometimes fragmentary insights into this complex phenomenon (Bessant, 2006). Scholars viewed rural livelihood diversification as a process by which vulnerable rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living (Ellis, 2000; Goldman & Riosmena, 2013). Just like it is highly risky for an economy to be in "Dutch disease" trapped. Households relying on a single activity are prone to shocks that might result from any instability emanated from the activity engaged in. Most often, diversification decision is made in line with economic realities: necessity versus choice (Ellis, 2000). Some forward looking households in rural economy chooses to diversified their livelihoods portfolio voluntarily, not for survival *per se*. Gautam and Andersen (2016) argued that diversification by choice involves making proactive decisions which would undoubtedly enhances economic well-being. Diversify driven by necessity usually supress well-being in the short-run. Evidence established that diversification out of desperation often end up subjecting rural households into more vulnerable livelihood system (Ellis, 2000; Gautam & Andersen, 2016).

The choice of the livelihood strategy is manly informed by natural endowments, cultural norms, occupational history, skill and literacy. Livelihood strategies in agro-pastoral remote areas are basically limited to customary livestock production (Goldman & Riosmena, 2013) and crop farming (Sewando et al. 2016). Livestock especially cattle, is perceived as crucial asset that stabilise subsistence livelihoods and neutralise contingencies, because rural dwellers actually considered livestock as most critical store of value often used as a buffer stock to counteract sudden income fluctuations. Moreover, increase in literacy in the last decade as a result of substantial investment in human

capital which stem from goal number two of millennium development goals (MDGs), has led to a sustained increase participation of agro-pastoralist into high return sectors (trading, skills and semi-skills employment).

In arguing for different investment requirement for diverse livelihood strategy, Gautam and Andersen (2016) maintained that the so called "high return sectors" offer higher returns, but demands higher take-off capital in form of human, social and financial. Thus, poor households without substantial asset may likely to remain excluded because their status has confined them continually in low return sectors. In this case, diversification may not break the vicious cycle of poverty. This is not to negate the benefit derivable from shift away, because diversification particularly within the context of high return enterprises could be a robust response against financial exigencies (Bessant, 2006).

There are several approaches to sustainable livelihood framework that was conceptualised in the inclusive development discourse with substantial focus on individual assets status and capabilities (see Carney, 2002), however, in turn, the study presented synthetic version of these framework which is frequently used while analysing sustainable rural development.

2.7.1 Sustainable Livelihood Approach

The discussions of sustainable livelihoods are often unclear, inconsistent and relatively narrow. Without concise clarification one runs the risk of adding to a conceptual muddle (Carswell et al. 1997). The concept of 'sustainable rural livelihoods' is increasingly central to the debate about rural development, poverty reduction and environmental management (Scoones, 1998). A livelihood is sustainable if it enables a household to cope with and recover from stress and shocks, maintain or enhance assets and capabilities, and provide extended opportunities for the next generation; and contributes net benefits to other livelihoods at the local and global levels both in the short and long term (Carswell, 1997; Chambers, 1987; Chambers & Conway, 1992; Ibrahim, 2012). Sustainability is further related to ability of particular combination of livelihood strategies to create gainful employment for a certain portion of the year (Scoones, 1998).

Economic well-being can be enhanced through a sustained diversification strategy into high return sectors. Such feat could be in what Bessant (2006) referred to as ''accumulation strategies'' that mainly deals with the income flows and stock of asset derived through diversification. Whereas the ''adaptive strategies'' permits risk spreading through livelihood adjustments or income diversification. Devereux (1999) argued for diversification by necessity that could pave the way for reduction of the severity of livelihood shocks (coping strategies) and, in extremes, to prevent destitution and death (survival strategies).

To avoid ambiguity in this thesis, diversification is operationalise to denote the process of constructing diverse portfolios of activities, assets and opportunities for the sake of survival and or accumulation (Bessant, 2006; Chambers, 1994; Ellis, 1998; Scoones, 2009) mirroring the dichotomy between the diversification by necessity and by choice. On the other hand, sustainability concerns the longevity of the capacity of a system to reproduce itself or expand over time (Ellis, 2000). As a consequence, sustainability implies resilience to the turbulence of our politics, economic systems and environmental change that seems to be so embedded within our world (Morse & McNamara, 2013). Thus, livelihood sustainability deals with issues concerning the capacity of household to adopt and sustain diverse range of activities without jeopardising future.

| Contexts, Conditions and Trends | Livelihood Resources | Institutional Processes & Organizational Structures | Livelihood Strategies | Sustainable Livelihood Outcome |

POLICY ⟷ LIVELIHOOD

History
Politics
Macro-economic conditions
Terms of trade
Climate
Agro-ecology
Demography
Social differentiation

Natural Capital
Economic/financial capital
Human capital
Social capital
and others…..

Institutions and Organizations

Agricultural intensification-extensification
Livelihood diversification
Migration

1. Increased number of working days created
•2 Poverty reduced
•3 Well-being and capabilities improved

Sustainability

4. Livelihood adaptation, vulnerability and resilience enhanced.
5. Natural resource base sustainability ensured

Contextual analysis of conditions and trends, and assessment of policy setting

Analysis of livelihood resources:trade-offs, combinations, sequences, trends

Analysis of institutional/organizational influences on access to livelihood resources and composition of livelihood strategy portfolio

Analysis of livelihood strategy portfolio and pathways

Analysis of outcomes and trade-off

Figure 2.1: The sustainable livelihood framework
(*Source: Scoones, 1998*)

The sustainable livelihood approach (SLA) is founded upon the notion that intervention must be based upon an appreciation of what underpins livelihood (Morse & McNamara, 2013). The SLA analysis encompasses a broad spectrum of interrelated factors, structures and processes that could make the dramatic impact on rural lives (Bessant, 2006; Carney, 1998; Chambers, 1995). It can be depicted from Figure 2.1 that given a particular context (of policy setting, politics, history and socio-economic conditions), what combination of livelihood resources (different types of capital) result in the ability to follow what combination of livelihood strategies (agricultural intensification/extensification, livelihood diversification and migration) (Scoones, 1998).

The sustainable livelihood framework, highlighted in Fig. 2.1, deals with issues that assess various capitals which characterise the quality of life at the level of the individual, household, village or group. The classification of these capitals into economic or financial, human, social and others (physical and natural) are then assessed in terms of their vulnerability to shocks and the institutional context within which they exist (Morse & McNamara, 2013). Policy intervention paths may be geared toward stimulating livelihoods by augmenting the available capital or by depressing idiosyncratic risk and vulnerability. The

first three in Fig. 2.1 focus on livelihoods, linking concerns over work and employment (poverty reduction strategies) with broader issues of adequacy, security, well-being and capability. The last two elements add the sustainability dimension, reflecting the resilience of livelihoods and the natural resource base. Sen (1975) notes three aspects of employment – income (a wage for the employed), production (employment providing consumable output) and recognition (where employment provides recognition for being engaged in something worthwhile). Chambers (1997) argued that such a well-being approach to poverty and livelihood analysis may allow people themselves to define the criteria which are important. This may result in a range of sustainable livelihood outcome criteria, including diverse factors such as self-esteem, security, happiness, stress, vulnerability, power, exclusion (Chambers, 1989).

Drawing from Chambers and Conway's (1992) view of sustainability, nomadic pastoralism is simply sustainable if the players involve (operators) can withstand and recover from shocks such as drought, famine, cattle theft, as well as, other endogenous and exogenous shocks, and extend the opportunity for pastoralism embedded sustainable livelihoods to the next generation, and overlay the benefit to the generality of community. These shocks were thematically presented in Figure 2.2.

Shocks			
Cattle raiding shocks		*Environmental shocks*	

Livelihoods assets			
Economc capital	*Social capital*	*Physical capital*	*Human capital*

Pathways			
Livelihoods diversifications		*Migration*	

Livelihoods outcome			
Poverty	*Decrease in off-farm income*	*Decrease in herd size*	*Loss of human factor and other assets*

Impact on individual and Household well-being
Resilience and Vulnerability

Figure 2.2: Modified sustainable livelihood framework

Admittedly, agro-pastoralism in SSA is suffering from low levels of capitalisation as well as weak forward and backward linkages which constrains the adaptive strategies of the households. As mitigating strategies, sometimes farm operators routinely make adjustments to a wide range of internal and external factors: environmental uncertainties, market volatility, structural disadvantages and diminishing returns (Bessant, 2006). However, Due to policy and institutional failures little attention are been paid in developing the capacity of rural households to engage in sustainable pro-poor activities outside agriculture (Bryceson, 2002; Vorley, 2002).

Contingencies such as acute illness of any family members or loss of crops due to extreme weather events incur additional economic burden (Gautam & Andersen, 2016). This further necessitates search for an alternative or supplementary income generating activity (Dzanku, 2015). Moreover, it may result in functional improvements to agricultural value chains and assuring better market access in order to achieve better well-being.

2.7.2 Micro-credit Delivery Model

Micro-credit is an innovative model developed to help marginalized poor household in remote areas through sustainable deepening in access to rurally modified financial services to the poor, who are generally excluded from the traditional banking system (Aliero et al. 2010; Aliero & Ibrahim, 2012; Boamah & Alan, 2016). The delivery of micro-credit is usually group-based which stem from using group of households as an alternate option to traditional collateral requirement as a micro-loan conditionality. This unique feature of collateral-free micro-loan distinguishes rural formal credit from the traditional credit offered in conventional banking arrangement (Dasgupta, 2005; Ibrahim et al. 2018). The idea behind this modelled banking system is to enable group of individual to form unions, such as cooperative, societies that would mainly offset the risks associated with borrowers who lack credit history and collateral (Boamah & Alan, 2016). Another form group-based financing is self-help group (SHG) mechanism of pooling resource together and revolve around the contributing members (Ibrahim, 2012). In this sense, micro-credit delivery is somehow appealing because it presents a new strategy for deepening livelihood diversity which could substantially serve as a pathway to reduce poverty (Atteraya et al. 2016).

Contrastingly, risks are not spread throughout a group in individual lending model, rather the burden is placed entirely on the individual borrower (Kodongo & Kendi, 2013).
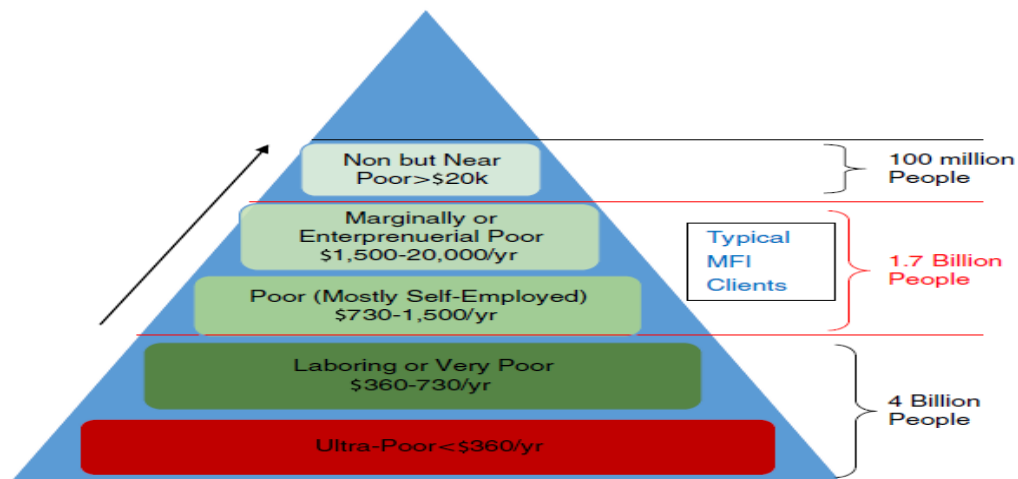
Figure 2.3: Micro-credit client targeting pyramid
(*Source: Toindepi, 2016*)

Micro-credit delivery model assumed that obstacles to livelihoods diversity can be reduced through provision of credit services to the vulnerable poor at affordable rate. This is hypothesised to particularly serve as a pathway out poverty because it could lead to increase in well-being, equity and sustainability. Otherwise, society may experience set of constraints that could spur civil strife and surge relative deprivation. There are different categories of vulnerable households primarily targeted by micro-credit institutions. Within the fivefold categories of poor household shown in Figure 2.3, micro-credit institutions are mainly targeting clients in the middle pyramid. Households in this group are entrepreneurs and self-employed poor with minimum average income of $730 per annum.

At the bottom of the pyramid shows that more than four billion people earn up to $730 per year (Toindepi, 2016) whom were excluded from micro-credit services because they exhibits high risk of credit repayment (Mathie, 2001). This group of poor people includes the ultra-poor or destitute and poor labourers in which the expectation for running a sustainable livelihood diversification strategies is unrealistic (Aghion & Morduch, 2005).

2.7.3Theory of Economic Deprivation

Social movement theories have emphasized that sudden social changes in the local order (be it political change or economic crises) can create chains of unpredictable actions. The abrupt change in societal recognition may result from political upheaval or economic crisis can, in part, cause distress which could trigger subjective deprivation when people are suddenly faced with a changed world (Ragnarsdóttir et al. 2013). Deprivation is perceived to be a causative agent of frustration, which in turn produces aggression when stored hostility against perceived aggressors is released by an immediate stimulus (Thompson, 1989). It is hypothesised, for instance, that the greater the intensity of deprivation among members of a population, the greater the magnitude of strife (Gurr, 1968). In this sense of reasoning, it is clear that a necessary precondition for the rise of any organized social movement is when people feel deprived (Glock, 1973). Relative deprivation theory has undergone stages of development since it was first applied in social research and was expanded to accommodate different aspects of human welfare. Relative deprivation generally refers to the perception of unfair disadvantage compared to a reference point that is salient to the individual (Crosby, 1979; Glock, 1973; Runciman, 1966; Smith et al. 2012; Useem, 1981). It entails comparing oneself to others in society, or more generally, comparing the socio-economic status of one place with another at a certain point in time.

Pastoralism as a customary livelihood strategy has long been characterised by poverty, government neglect, massive and pervasive suffering (Ogola, 2010; Ibrahim et al. 2018). It has been asserted that rural communities in northern Nigeria experienced higher levels of poverty relative to southern regions (Ibrahim & Ibrahim, 2014). Structural poverty and inequality within countries are breeding grounds for violent political movements in general and terrorism in particular (Gurr, 2005). Isa (2010) attributes the dwindling productive base of the northern economy to deteriorating social services and infrastructure, educational backwardness, rising youth unemployment, dwindling fortunes in agriculture, etc., which could be considered as strong causative agents of relative deprivation. It has been as well argued that nepotism (politics of where the president came from) is instrumental in determining who profits from the national wealth, particularly in a multi-ethnic developing economy. Along this line

of argument, Ibrahim and Ibrahim (2014) asserted that recent strife in northern Nigeria has been induced by political marginalisation experienced in the region since the return of civil rule in 1999. The outcome of the political process with regard to the provision of public infrastructure is typically inefficient. Efficiency in the provision of public projects is attained if the project is sited at a location where the marginal social benefits outweigh the marginal social costs (Parkin, 2012). It has consistently been observed in Nigeria that public projects are sited to easily identified groups (mainly reference groups) that maximise votes for the politician.

The intra-regional distribution of poverty within Northern Nigeria is relatively skewed. It is evident that widespread poverty rates are more prevalent in the rural communities than in the metropolitan areas (Aliero et al. 2010; Ibrahim & Bakori, 2011; Ibrahim, 2012). The damning poverty profile report from the National Bureau of Statistics (NBS) has not indicated any positive signs of reducing the gaps in rural-urban income inequality. Moreover, the rural communities in Northern Nigeria were found to have the highest percentage of households living below $1 USD, which accounted for 70.4%, while Southern Nigeria had slightly above 50% (NPC, 2011). This has further mirrored the pathetic conditions of communities living under the perennial threat of cattle raids.

Migration is one of the strategies adopted by the poor and the downtrodden to mitigate the effects of hostility in their community. Migration could perhaps be associated with a rise in a household's relative deprivation if the host community becomes the relevant reference group for the potential migrant. Migration within a country is more likely to generate alienation and increased relative deprivation through a smooth reference group substitution, particularly when the country is socially homogeneous. This suggests that the role of relative deprivation in internal migration may be quite different from the role of relative deprivation in international migration, due to social and cultural discontinuities across international borders. International migration has significant socio-economic chaos effects for the migrated countries and migrants, due to their relative different ideologies, religion and culture. For instance, the whole of Europe as well as the United States are particularly sceptical in regard to Muslim migrants.

There are four guiding principles that illustrate the conditions under which individuals may feel relatively deprived: rural dwellers might feel relatively deprived of socio-economic well-being when they (i) have few social amenities; (ii) observe that such social amenities are available in cities; (iii) want to maximise their welfare by having social amenities which they perceive to be the product of development; and (iv) believe development is feasible through the mechanics of social movement (Runciman, 1966).

Indeed, several forms of internal rural out-migration have been observed in the pre-cattle raid period. Seasonal and economic migration were considered the most widely practiced aspects of rural out migration. However, since the beginning of the pervasive cattle rustling shocks, migration has assumed a different dimension and intensity completely distinct to what typifies traditional migration. In this way, migration can thus be broadly classified as permanent and transient. The former is primarily influenced by the intensity of cattle raids, while the latter resembles the age-long economic tradition of movement from one place to another, which exemplifies the rural-urban migration that was hypothesised by Lewis (1954) and Todaro's (1969) migration theories. Transitory migration, in this case, is distinct to other forms of temporary migration. It is shorter and neither induce by economic factors nor urban attraction. Rather some shocks such as *Boko Haram*, cattle rustling and ethno-religious crisis, among others that were seemingly capable of inducing a forceful migration. Migrants within this spectrum sojourn in the internal displacement camps (IDCs) and neighbouring safer places within the region. In a report covering 13 states of Northern Nigeria by the International organisation for migration (IOM), it was revealed that there were almost 2,152,000 internally displaced people (IDP) between November and December 2015 (IDMC, 2016).

The propensity of households to participate in migration was directly related to their initial relative deprivation status (Stark & Taylor, 1991). Migration due to cattle theft is immune to *ex ant*e and *ex post* scrutiny. It is the result of relative deprivation and the anticipation of welfare improvement by the potential migrant. Stark and Yitzhaki (1988) argued that the deprivation concept and the utility concept are actually two sides of the same coin; whereas utility is defined as "having", deprivation is defined as "not having". It is important to note, however, that envy or altruism are not postulated; the relevant factors are how individuals

evaluate what they have (satisfaction) and what they do not have (deprivation) (Stark & Taylor, 1991).

Drawing from Stark & Yitzhaki's (1988) relative deprivation model, one can assume a continuous welfare distribution, as manifested by the presence or absence of social amenities in a village. Consequently, each welfare gain can, for the sake of exposition, be represented by an income range sufficient to maximize welfare relative to the reference group $[w, w + \Delta w]$ where $\Delta w \to 0$. Let $f(w)$ be the cumulative welfare gain in a village. Then, $i - f(w)$ is the percentage of households whose income is in excess of w. Hence, $i - f(w)$ represents the percentage of households that have sufficient income to obtain the commodities constrained by the income range $[w, w + \Delta w]$. An argument here is that the feeling of deprivation is an increasing function of the percentage of individuals who have income larger than w. A simple Relative Deprivation (RD) model can thus be established as:

$$RD = \int_{shs}^{lhs} z[i - f(w)]\delta x. \tag{2}$$
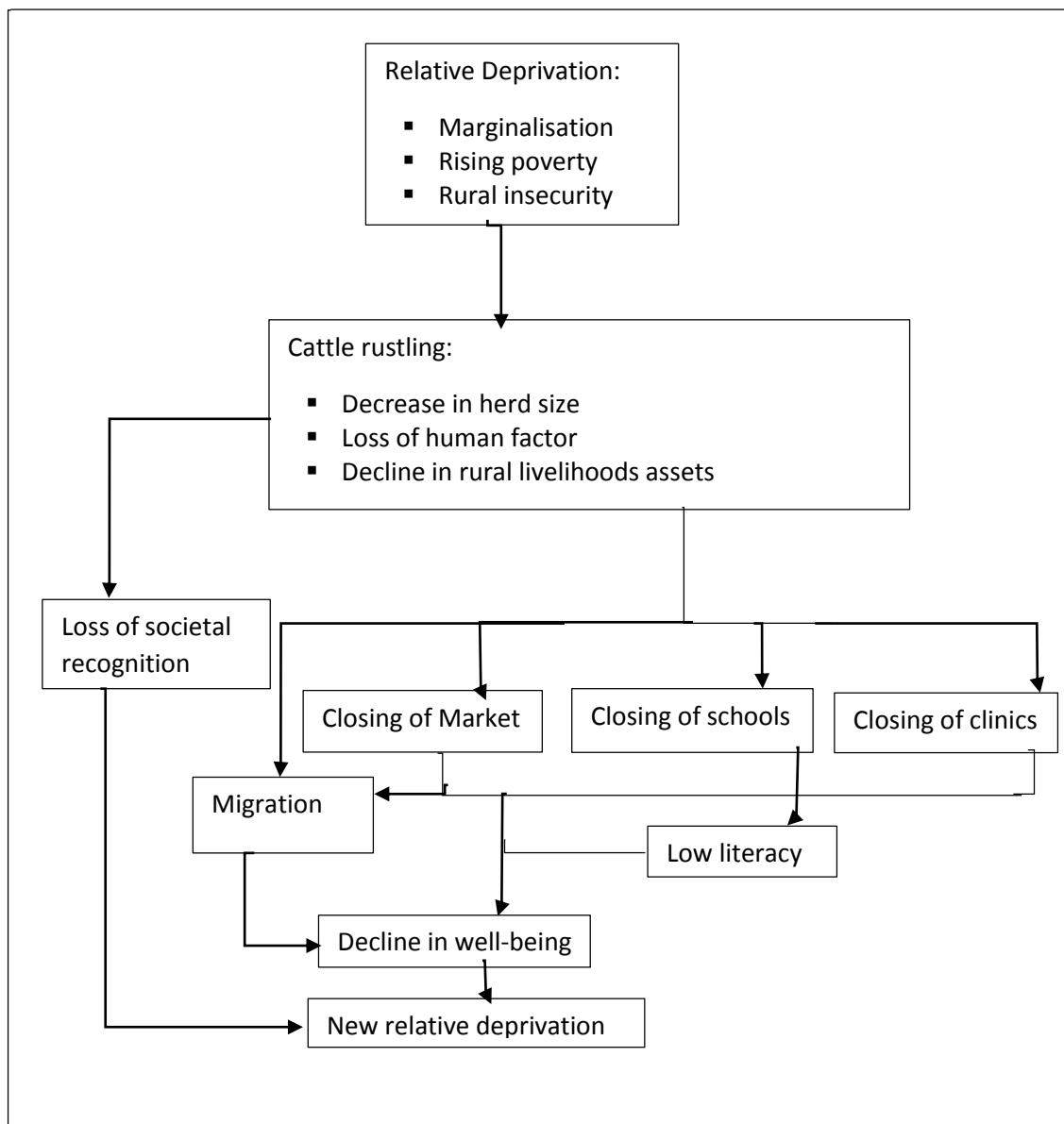
Figure 2.4: Relative deprivation and cattle raid: motives and effects

Note that $z[i - f(w)]$ is deprivation from not having $[w, w + \Delta w]$. Rural welfare can be explained as a function of income level sufficient to attain a decent standard of living. It can be seen that the notation *lhs* denotes the income level or large herd size sufficient to attract societal recognition (see Stark & Yitzhaki, (1988) for a proof of how Equation (2.1) can be decomposed into the proportion of households in the village that are richer than the households with income level equivalence of *lhs*). The relative deprivation hypothesised that migration will be observed if $U\left(RD_1^i\right) > U(RD_0^i)$, where *RD*₁ is the relative deprivation associated

with migration and RD_0 is the relative deprivation in the absence of migration (Stark & Taylor, 1991).

Let *RMR* be rural migration due to certain observable shocks such as financial, social and environmental shocks (for instance, cattle rustling). Consequently, the interactive effect of migration in the context of relative deprivation (*RMR x RD*) has an important information that aid could classification of households into various migration groups: permanent rural migration (*PRM*) and transitory rural migration (*TRM*). The latter is the migration for a short stay (spanning from three weeks to approximately a year) and migrants in this spectrum are expected to return whenever the security situation of their village improves. To avoid overlapping, households can be classified as a permanent migrant if they disposed-off or transferred with all their belongings from the crisis-prone village to other relatively safe locations. The residual (*p*) (rural residents (*R*) - *PRM + TRM)* is the total population left-over (*i*) in the village. The size of *p* depends on the elasticity of *PRM, TRM* and other socio-economic factors, such as rural health care, death rate, etc. And by assumption these factors do not change over the period of study. In general, the higher the *PRM,* the smaller the *p.* in this sense, If $PRM > TRM$, then $RD > 0$. This positive index of *RD* can be interpreted as low economic well-being in remote areas (see Figure 2.4).

CHAPTER 3
ECONOMIC WELL-BEING AND LIVELIHOOD STRATEGIES

3.1 Introduction

As highlighted in the preceding chapters that the studies on the economics of development have suffered from a materialistic bias (Easterlin, 2001), as the sole emphasis has been on economic growth. Other neglected important issues, are peace and security (Wills-Herrera et al. 2011), which to a large extent determine the level of development a country could attain. For instance, advanced economies are found to be relatively more peaceful and secure. Human security has been proposed as an umbrella concept to emphasize the relationship between individual and social insecurities in the tradition of the human development discourse (Sen, 2006). This highlights the principal idea behind the UNDP's computation of HDR in 2000, with the aim of humanizing the treatment of security, and distinguishing the security of nations or regions from the security of individuals (Wills-Herrera et al. 2011). The focus of HDR was not to vividly capture the physical aspects of personal security, but to redefine it to include the capacity and abilities of individuals and communities to control their environments and secure the basic conditions for prosperous life.

The renewed interest in the sustainable rural livelihoods research agenda was driven by the need to uncover the strategies that could lessen the vicious cycle of low quality of life, as there is some scientific consensus that the sustainability of well-being depends on the prevailing choice of livelihood options and their potential to contribute net benefits to other livelihoods at the local and global levels, both in the short and long term (Ibrahim et al. 2018; Su et al. 2018). While livelihood is interpreted as the means of gaining a living or a combination of the resources used and the activities undertaken in order to live (Chambers, 1995; Szabo et al. 2016), the scarcity of these resources could fuel conflict due

to competition and subsequently lead to a drastic reduction in livelihood security; those affected by scarcity may resort to fighting over the remaining resources (Theisen et al. 2013). In this way, the Intergovernmental Panel on Climate Change (IPCC) reports that parts of Africa may experience unpredictable rainfall variability (IPCC, 2012; 2014), which is likely to exacerbate the conflict as a result of the increased competition for already scarce natural resources. It is therefore imperative to understand the various livelihood diversification options and their associated employment, income and welfare effect, especially now that income diversification is recognised as the impetus needed for the achievement of the sustainable rural development agenda (Szabo et al. 2016).

Undeniably, livelihoods in remote areas are subjected to recurrent shocks that increase the vulnerability of households (Ziervogel & Calder, 2003) and affect their ability to sustain their economic well-being (Ibrahim, 2012). The poor agro-pastoralists in particular face pervasive environmental stressors, severe shocks and idiosyncratic risks that deepen their subsistence thresholds (Gautam & Andersen, 2016; Harvey et al. 2014; Tschakert, 2007; Ziervogel, & Calder, 2003), and recently in SSA, the intensity that resource-based conflicts have assumed due to changing social context (population explosion, unpredictable climatic condition and environmental degradation) has further weakened the ability of households to easily adapt (Ibrahim et al. 2016; Olaniyan & Yahaya, 2016). As such, the customary crop and livestock production mix practiced, particularly in rural Nigeria, was completely disrupted. Agro-pastoralists whom hitherto had contributed approximately 3.2% of Nigeria's GDP from cattle production alone, are now struggling to cope with the vicious cycle of violent conflicts (Ibrahim et al. 2016; Köster & de Wolff, 2012).

Prior to the intensification of violent conflicts in the early 21st century, livestock production was among the most widely sought livelihood diversity options, particularly in northern Nigeria. The proceeds from this activity were essentially directed towards sustaining economic well-being (Ibrahim, 2012; Ibrahim et al. 2016). In this way, livestock rearing generated consumption links, as households spent their increased incomes on goods and services produced in the economy (Behnke, 2008; Thys et al. 2005; Xavier et al. 2001). As such, sustainable rural well-being is based on livestock husbandry (Goldman &

Riosmena, 2013) and crop farming, particularly in SSA (Behnke, 2008; Sewando et al. 2016).

The livelihood strategies in agrarian societies have been discussed in the rural development literature for decades (see Gautam & Andersen, 2016; Bryceson, 2002, 2004; Ellis, 2000). Nonetheless, strategies that enhance households' well-being in resource-scarce and conflict vulnerable remote areas are weakly understood (Gautam & Andersen, 2016; Ibrahim, 2012; Omolo, 2010). Extant literature has shown that diversification driven by either 'push' (necessity or survival) or 'pull' (choice or accumulation) factors would widen the subsistence options, thereby paving the way for the attainment of a higher quality of life (Dzanku, 2015; Ellis, 1998; Gautam & Andersen, 2016; Sen, 2010; Wills-Herrera et al. 2011). However, the well-being retardation impact of violent conflict, as well as the options of livelihood strategies available to households prone to idiosyncratic shocks, have not been adequately examined empirically. Thus, this study contributes to the literature on well-being sustainability by answering the following research questions:

i. The first research question seeks to explore how cattle rustling is (or is not) retarding sustainable rural well-being.

ii. The second question involves determining whether diversification of livelihood is sufficient to counteract the well-being undermines by raiding of pastoral livelihood resources.

iii. The third question asks whether or not the well-being gain derived from various livelihoods option is heterogeneous.

Although previous studies have raised claims (Bryceson, 2002; Ellis, 2000; Gautam & Andersen, 2016; Scoones, 2009, Wills-Herrera et al. 2011) about these questions, none of these studies has given these issues the deserved academic attention and nor have they addressed them systematically. Providing answers to these questions is crucial for understanding the strategies for sustainable rural development. This is imperative for the attainment of the sustainable development goals (SDGs), particularly in SSA given that a cursory examination of their rural communities reveals that poverty, the absence of gainful employment, poor nutrition, low human capital, among others has manifested. Furthermore, the literature suggests that these factors are breeding

grounds for violent conflicts (Adano et al. 2012; Eaton, 2010; Gurr 2005; Mkutu 2006; Perkind & Thompson 1998). The rest of the chapter is structured as follows: Section 2 presents the empirical methodology, Section 3 contains the results and discussion, while the last section concludes the chapter.

3.2 Methods

3.2.1 Controlling Endogeneity during Data Collection

Cattle rustling, like other organised crimes, are very complex to examine. This calls for cautious adoption of various techniques of data collection. Endogeneity problems exist, because people choose either to raise livestock or not. Furthermore, some rural dwellers, particularly poor households, may have never had livestock and they could be systematically different from those who do have livestock. Additionally, some may be better equipped to protect themselves. Besides cattle rustling might occur in poorer areas, and those who rely more on livestock could be more economically challenged. All this illustrates the potential sources of endogeneity. To eliminate this problem (endogeneity problem in observational study), the literature recommended the adoption of the multi-stage sampling procedure as well as selecting an appropriate variable that controls for the sources for endogeneity associated with observable household characteristics (Dzanku, 2015; Krishnakumar & Nagar, 2008; Zereyesus et al. 2016). In this sense, LGAs, districts and villages were selected based on their agro-pastoral potential and the intensity of the cattle raids. Based on these criteria, three LGAs from each state and then two districts in these LGAs were purposely selected. Villages with cases of severe cattle theft in the selected districts were identified and a random sampling process was then applied in selecting the ward from each village.

3.2.2 Estimation Procedure

Many economic and social concepts, such as well-being and poverty, are multidimensional in nature and hence their operationalization needs measures or indices that capture and combine the various dimensions in an adequate manner (Krishnakumar & Nagar, 2008). The choice of indicators of well-being as well as the method of harmonizing the diverse scale of the varied basket of assets that typifies the household's well-being remain central to the analysis of

this study. These well-being baskets consider the unique multidimensionality of prosperity by combining non-money metrics and monetary indicators (Dzanku, 2015; Grosse et al. 2008) and thus avoid bias associated with using a single indicator (Aaker & Bagozzi, 1979). Accordingly, econometricians have shown that, even if an indicator is an unbiased representation of a theoretical construct, measurement error can still lead to biased conclusions (Griliches, 1974). For instance, improvement in well-being in the money-metric dimension does not necessarily imply an improvement in the non-monetary dimension of well-being (Grosse et al. 2008).

Table 3.1. Variables used for constructing a well-being index

Component (weight)	Sub-component (weight)	Indicators (weight)	Measurement
Housing (1/3)	Basic household assets (1/6)	Owned electronics (1/24)	1 = yes; 0 = otherwise
		Furnished (1/24)	1 = yes; 0 = otherwise
		Has electricity (1/24)	1 = yes; 0 = otherwise
		Has separate living room (1/24)	1 = yes; 0 = otherwise
	Sanitation (1/6)	Safe drinking water (1/24)	1 = yes; 0 = otherwise
		Access to kitchen (1/24)	1 = yes; 0 = otherwise
		Access to latrine (1/24)	1 = yes; 0 = otherwise
		Has first aid box (1/24)	1 = yes; 0 = otherwise
Consumption expenditure (1/3)	Food consumption (1/6)	Average weekly Food expenditure (1/6)	Converted from Nigerian Naira to USD
	Medical expenditure (1/6)	Average weekly medical expenditure (1/6)	Valued in USD
Wealth (1/3)	Savings (1/6)	Cash and non-cash savings (1/12)	Valued in USD
		Livestock (1/12)	Total livestock unit per capita (USD)
	Other assets (1/6)	Landed assets (non-farm) (1/12)	Valued in USD
		Acres of farm (1/12)	Valued in USD

The selection of key components that characterize a household's well-being was determined from the proceedings of the FGDs and household level interviews (See Table 3.1 for details of the variables used in computing the components and sub-components of well-being).

In standardizing the subcomponents of rural well-being, this study adopted the computational procedure of the United Nation Development Program (UNDP), which is often used in calculating Human Development Indices (HDI):

$$IndexX_i = \frac{X_i - X_{min}}{X_{max} - X_{min}},$$ (3.1)

where X_i is the observed value of an indicator of sub-component, X_{min} is the minimum value, and X_{max} is the maximum value of an indicator. The calculated index ranges from 0 to 1, while components with more than one indicator were derived simply by averaging the values of the sub-components.

The study further used MIMIC of a single unobservable latent variable model. This model is beneficial when multiple dependent variables need to be combined into a 'single' variable (Di Tommaso, 2007; Dell'Anno, 2007; Spanos, 1984; Zereyesus et al. 2016). It is normally modelled as a latent variable hypothetical construct which, while not directly observed, has operational implications for relationships among observable variables (Joreskog & Goldberger, 1975). The observable variables can appear as indicators of the latent variable, the cause of the latent variable, or both the cause and effect. Its specification depends on precise econometric exposition, which favours the adoption of the maximum likelihood method. It can be expressed as latent variable z^* which is linearly determined, subject to a shock ϵ, by a set of independent manifest indicators $x_1, .., x_k$:

$$z^* = \alpha' x + \epsilon$$ 3.2

$$y = \delta z^* + \mu,$$ 3.3

where $x = (x_1, \dots \dots, x_k)'$ is a set of observable regressors; $y = (y_1, \dots \dots, y_m)'$ is a set of observable indicators; $\alpha = (\alpha_1, \dots \dots, \alpha_k)'$ and $\delta = (\delta_1, \dots \dots, \delta_m)'$ are the two respective parameters; and ϵ and $\mu = (\mu_1, \dots \dots, \mu_m)'$ are disturbances. The latent variable z^* is linearly determined, subject to disturbance ϵ, by the vector of x variables. On the other hand, z^* linearly explains the components of

y, subject to disturbance μ. It is essential to state that the MIMIC model is only valid if and only if the estimated disturbances are mutually independent and are normally distributed with mean zero and constant variance (Chen, 1981).
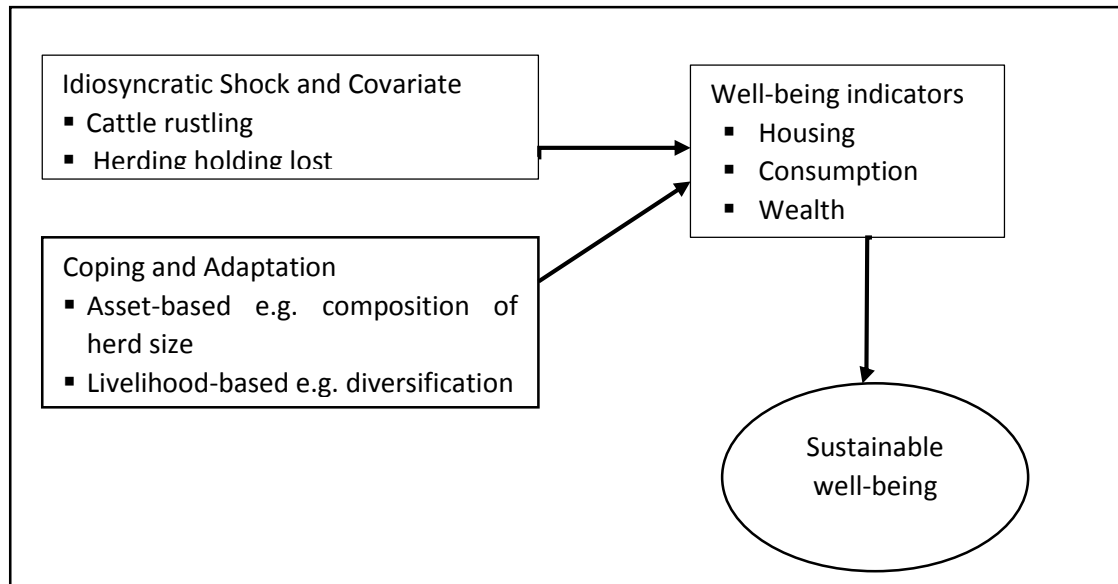
Figure 3.1: The conceptual MIMIC model of sustainable well-being

Indeed, MIMIC is a special case of a structural equation model (SEM), in which the influences of formative indicators on unobservable latent variables are assessed through their impact on the reflective indicators (Muthén, 2012). In this sense, the conceptual model that forms the basis for analysis of impact of cattle rustling-driven shock on sustainability of well-being in this thesis is demonstrated as the stylised path diagram of a MIMIC model of sustainable well-being in Figure 3.1. While idiosyncratic shocks undermine well-being, various asset-based as well as livelihood strategies could have a dramatic effect on sustainable well-being development. Livelihoods enable people to subsist: on the food they grow themselves, or earnings that are used to provide necessities and hopefully something more (Cannon, 2006; Ibrahim et al. 2018). Each livelihood activity requires a person to possess or have access to a range of assets (sometimes called 'capitals') such as farm land, a skill, tools, livestock, etc. While there are concerns about the potential subjectivity in the three equally weighted components of well-being, as their respective Cronbach's alpha values exceeded the 80% threshold, this demonstrated that the scales used to measure them was effective and have demonstrated uni-dimensionality and reliability. The MIMIC model permits simultaneous estimation of the measurement model

and the incorporation of causal variables in the structural model for the latent variable sustainable well-being.

While answering the research question, which involves determining whether cattle rustling has imposed significant well-being loss, the estimated well-being variable derived in Equation (3.2) was modelled as function cattle rustling variables and cumulative income derived from diversified activities (income diversity):

$$SWI_i^* = \beta_0 + \beta_1 CRI_i + \beta_2 NLL_i + \beta_3 HDS_i + \beta_4 YD_i + \gamma_1 + \varepsilon_i \qquad (3.4)$$

where SWI_i^* is the self-reported well-being of *i-th* household (a latent variable estimated via SPSS AMOS); CRI is the cattle raid intensity introduced as a dummy variable that takes the value of 1 if the cattle rustling is intensive, and 0 otherwise; YD is income diversity measured in USD; HDS is herd size; NLL is the number of livestock rustled; γ_1 measures the period of residency (in year) as a control for endogeneity linked to observable household characteristics. Following previous studies (Dzanku, 2015; Griliches, 2007; Krishnakumar & Nagar, 2008), it can be hypothesized that the coefficients of $\beta_1 < 0 \ and \ \beta_4 > 0$; once this condition holds, then the contribution of at least one of the livelihood strategies is resilient in enhancing rural well-being and its estimated coefficient in Equation (3.5) must be positive and significant:

$$SWI_i^* = \gamma_0 + \sum_{j=1}^{n} \gamma_{jk} S_{ik} + \varepsilon_i, \qquad (3.5)$$

where S_i denotes the vector of monetary earnings from different livelihood strategies, which consists of the profits from trade, farm wages, government salaries, income generated from handicrafts and earnings from livestock production, while $\gamma \ and \ \varepsilon$ are vector of the estimated coefficients and a white noise error term, respectively.

3.3 Results and Discussion

3.3.1 Demographic Characteristics

The survey respondents typically live in an extended family system with one household head who is usually the eldest person in the family; furthermore, the household head is usually male (Table 3.2 reported that 74% of the households

were headed by males) and is saddled with the responsibility of coordinating economic, security, social and political matters. The ages of the households ranges from 23 to 78 with a mean age of 43 years. The average size of the household is 12 and per capita livestock unit is 11.

Table 3.2. Demographic characteristics of the respondents

Variables	Min.	Max.	$\bar{x}$	σ
Gender	0	1	0.74	-
Age (years)	23	78	42.51	15.11
Household size	2	35	12.1	7.4
Literacy of household (years)	0	15	2.77	1.62
Herd size	0	43	11	17.69
Number of livestock lost	0	63	14.7	16.69
Income diversity (Non livestock income)	0	635 [a]	318.96 [a]	272.73 [a]
Longevity of livelihood diversity (%)	12 (1–2)[b]	15(3–5) [b]	28(6–10) [b]	45(>10) [b]
Number of activities		2.31		
Diversified households (%)		62		

[a]USD; [b]Years

The pre-organised cattle raid period marks a significant reduction in the households' livestock holdings due to low returns in nomadic pastoral livelihoods and paves the way for a transition from pure pastoralism to agro-pastoralism. However, the recent dimension that cattle rustling assumed has triggered a paradigm shift, with the diversification of livelihoods completely away from the agricultural sector being regarded as a risk avoidance strategy (Ducrotoy et al. 2017; Ibrahim et al. 2016). This eventual push can be referred to as a 'negative private externality producing positive public externality'. Moreover, the perpetual depletion of herd size (Table 3.2 indicates that the average herd size owned by the households is less than the average livestock stolen, i.e. 11<15) associated with the intensive cattle raiding has exposed the agro-pastoralists to various shocks (for instance, poverty and hunger) because livestock is the only item that can be sold quickly to obtain cash (Gautam & Andersen, 2016; Ibrahim et al. 2016, Mburu et al. 2017). In the remote areas, losing livestock is directly associated with the loss of societal recognition (Schilling et al. 2012). Thus, the

loss of livestock due to cattle rustling has further retarded the households' well-being.

Notwithstanding the households' increased diversification in the cattle raiding period, the results in Table 3.2 provide minimal evidence supporting the claim that the shift away from agro-pastoralism is pushed by incessant cattle raiding. Because an overwhelming 45% of the households claimed that their engagement into multiple agricultural related occupations precedes organised cattle rustling in their communities.

It is apparent that complete shift away from agricultural related activities intensifies since the advent of cattle raids. Furthermore, information from the FGDs revealed that households were now more committed to their diversified livelihoods away from agricultural activities than in the pre-cattle rustling period. Overall, 62% of the household's derived income from off-farm activities, participating in an average of two livelihood strategies. The overall level of human capital is significantly low. This study documented a 3 years per capita literary rate for the entire sample, which is less than the 9 years basic educational requirement of Nigeria's educational system. At the household level, only 11% of them contained any member that had completed basic education. The low literacy rate inhibits the households' employability in jobs that require certain skills. This provides credence to the findings of Gautam and Andersen (2016), who reported that a one year increase in the household head's education increased the log odds of a salaried job by 50% in Nepal. This study also contributes to the debate about whether diversification is transient; the results in Table 2.2 (73% of the households diversified their livelihoods over the past 6 years) show some elements of consistency and stability in the longevity of livelihood diversity and confirms that the households' livelihood diversification is not transient.

In order to answer the research question concerning whether cattle rustling has any well-being retardation effect, certain socio-economic factors (such as growth, income, employment, assets ownership, etc.) that have a direct bearing on the households' well-being were examined. The resulting null hypothesis that cattle rustling has no well-being loss is rejected based on two mean comparison tests about the households' perception of the effect of cattle rustling on their economic well-being (see Table 3.3) and the result reveals significant

differences in the means of households who perceived that raiding of pastoral livelihood security has a significant negative effect on rural well-being. The overwhelming majority of the households in the surveyed areas indicated that cattle raiding has caused a significant income reduction, reduced both on and off farm wages, shrunk asset ownership, halted growth, affected children's education and made rural markets inaccessible, among other factors.

Table 3.3. Perceptions of the households on socio-economic well-being

Factors	Affected	Not affected	Diff.	P
Growth	0.92	0.08	0.84[**]	0.001
Income	0.88	0.12	0.76[**]	0.003
Employment	0.88	0.12	0.76[**]	0.003
Assets	0.90	0.10	0.80[**]	0.002
Population	0.92	0.08	0.84[**]	0.001
Child education	0.83	0.17	0.66[*]	0.011
Access to health facilities	0.82	0.18	0.64[*]	0.013
Market day	0.85	0.15	0.70[*]	0.011

[*]&[**] denotes significant at the 0.05 and 0.01 levels

3.3.2 Cattle Rustling and Household Well-Being

Since the argument of well-being loss in cattle rustling prone areas holds, then examining the impacts of cattle theft on well-being by adding income derived from pluriactivity would permit testing the diversification absorptive or resilience hypothesis. This is crucial, because it provides the necessary information vital for the understanding that the income derived by transitioning from the customary agro-pastoralism to other forms of employment can compensate for the well-being lost due to raiding of livestock. Information related to the palliative strength of livelihood diversification has serious policy implications. Moreover, the results would provide more grounds to support or refute the empirical studies, which favour diversification (Babatunde & Qaim, 2010; Barbieri & Mahoney, 2009; Bezu et al. 2012; Ducrotoy et al. 2017; Gautam & Andersen, 2016; Hoang et al. 2014; Liu et al. 2008; Scoones, 2009) instead of specialisation.

The three main hypotheses of interest are on the coefficients of $\beta_1, \beta_2 \text{ and } \beta_4$, associated with cattle rustling intensity, number of livestock loss and income

diversity, respectively. Table 3.4 shows significant negative coefficients of cattle rustling intensity as well as the number of livestock lost. Controlling for cattle rustling intensity, well-being diminishes by approximately 0.98 unit ($p<0.01$). This finding is consistent with the theoretical assumptions documented in the literature (Davies & Bennett, 2007; Ibrahim et al. 2016; Kynoch & Ulicki 2000; Omolo, 2010; Schiling et al. 2012). Furthermore, holding other factors constant, every one unit of livestock lost affects well-being by 0.78 units ($p<0.01$). Surprisingly, herd size has a negative and significant ($p<0.05$) influence on well-being, suggesting that possessing a relatively large number of livestock affects well-being. This could be possibly explained by the fact that, in a cattle raid prone community, the value of the livestock is seriously challenged as participants in the various FGDs session revealed that demand for livestock is highly elastic, indicating that in extreme cases, livestock producers lack the necessary market power to determine prices, and sometimes they are even sold their livestock at giveaway prices. This supports the finding of Kaimba et al. (2011), which documented that in the period of intensive cattle rustling, societal recognition attached to accumulation of herd size is in serious jeopardy.

Table 3.4. Coefficients of variables included in well-being model

Variables	Coefficients	t-value	P
Cattle rustling intensity	-0.980**	-3.17	0.002
Number of livestock loss	-0.770*	-2.48	0.013
Herd size (per capita)	-0.066*	-2.11	0.035
Income diversification index	0.020	0.66	0.510
Years of residency	0.320	3.28	0.020
R^2		0.51	
F		8.40** (0.000)	
X^2 Breusch-Pagan		2.43(0.2768)	
X^2 normal		0.2281	
N		1640	

Notes: years of residency was used as an instrumental variable controlling for endogeneity. The results show the resilience of income diversification strategy to counteract the effect of raiding pastoral livelihood security on rural well-being. *&** denotes significance at the 0.05 and 0.01 levels

This study found little evidence to suggest that income diversity is sufficiently robust to compensate for the well-being loss. While testing the diversification

resilience hypothesis, the results in Table 3.4 show that the coefficient of income diversity is positive and insignificant (p>0.10); thus, the null hypothesis is not rejected. Considering the fact that the overwhelming majority of the rural populace are strongly engaged in agricultural-based income diversification and given its seasonality, one would expect an insignificant impact of income diversity on rural well-being.

Lastly, the important parameter controlling for endogeneity in household characteristics, as highlighted in Table 3.4, shows that the estimated coefficient of years of residency is positive and significant at 1% level of significance. The sources of differences in observationally equivalent households are driven by the number of years of residency. This shows that the inherent endogeneity has been remedied by the instrument.

3.3.3 Sources of Well-Being Enhancements Strategies

The surveyed households substantially engaged in off-farm activities with the aim of enhancing their well-being. Nevertheless, income generated from diversification does not adequately compensate for well-being loss in raiding periods. The researchers learnt from the FGD sessions that, although the households have developed varied livelihood diversification strategies, they are yet to translate this into higher welfare gain. The overall well-being index reported in Table 3.5 is significantly low (0.33). This index is lower than the 0.76 reported by Kelley and Evans (2017) for Nigeria. This suggests that agro-pastoralists prone to cattle raiding shocks exhibit well-being lower than the entire country's threshold. Having a low well-being index in part indicates that households are actually force to low return sectors. Furthermore, cattle rustling has partly aggravated rural market failure, which could jeopardize the attainment of sustainable rural development goal.

To answer the research question regarding whether the well-being gain derived from various livelihoods option is heterogeneous, sources of well-being enhancement activities associated with the preselected economic activities are presented in Table 3.5. The results show that profit generated from trade is the most important stimulant of well-being. Holding other factors constant, well-being is predicted to increase by 0.53 when profit increases by one unit (p<0.01). Furthermore, of all the livelihood options, trade profit has the highest well-being

index and income effect values of 0.41 and 0.30, respectively. Similarly, a unit variation in each of government salary and off-farm wages affect well-being by 0.43 ($p<0.01$) and 0.21 ($p<0.01$), respectively. While government jobs have relatively higher well-being index and income effects, the employment effect of off-farm jobs outpaced that government jobs.

Table 3.5. Sources of well-being enhancement of agro-pastoralists' prone to cattle rustling

Variables	Coefficients	*P*	Well-being index	Income effect	Employment effect
Trade profit (wholesale and retail)	0.528**	0.000	0.41	0.30	0.22
Farm wage	-0.126	0.250	0.04	0.10	0.46
Off-farm wage (non-government)	0.212*	0.016	0.11	0.16	0.11
Government salary	0.433**	0.001	0.35	0.23	0.07
Income from handicrafts and crude manufacturing	0.179**	0.000	0.09	0.21	0.14
Income from livestock production	-0.351	0.000	-	-	-
Year of residency	0.431	0.000	-	-	-
Overall well-being index		0.33			
R^2		0.64			
F		6.32** (0.000)			
X^2 Breusch-Pagan		0.88 (0.8210)			
X^2 normal		0.2556			
N		1640			

Notes: the results show the impact of various economic activities engaged on well-being as well as their associated income and employment effects. *&** denotes significance at the 0.05 and 0.01 levels

Handicrafts and crude manufacturing jobs are estimated (positive and significant at 1% probability level) to strongly enhanced household well-being. This is partly explained by the recent improvements in rural road networks, which have extended the market coverage of some manufactured tools and products (for instance, local kitchen utensils, pots, beaded jewellery, etc.) to other parts of West African countries. In contrast, households that engage in low return sectors (farm wages and income from livestock production) have relatively the lowest well-being. Despite the high employment effect (46%) resulting from farm

labour, the wages earned from this activity are unsurprisingly low. The income effect of farm labour is only 10% and was found to be the lowest of all livelihood strategies. Farm labourers have little bargaining strength in the rural labour market. The estimated coefficient of earning from livestock production is negative and significant ($p<0.01$). Controlling for this variable, well-being is predicted to decrease by 0.35 when livestock earning decreases by one unit. The income and employment effects, as well as the well-being index of this activity were not report the due to inherent simultaneity in response to thematic question on livestock earnings (e.g. income from milk sell, cow dung, etc.).

Based on these results, it can be said that households that opted for livelihood diversification activities in the form of trade, salaried jobs, handicrafts, crude manufacturing and off-farm employment (ordering is essential because the magnitude of contributions both in terms of well-being, employment and income generation varies greatly from one activity to another) are better-off. The irrational selection of livelihood options through trial and error can undermine the sustainability of rural well-being (Bryceson, 2002; Ibrahim, 2012). This supported Gautam and Andersen's (2016) assertion that households can only enhance their well-being if their livelihood portfolios are channelled into the high return sector(s) among the prevailing off-farm opportunities at their disposal. However, participation in the so-called "high return sectors" is not without cost. It requires a substantial amount of capital and dexterity. Regrettably, households residing in remote areas have underwhelming low pupil enrolment rates (Stifel & Minten, 2017) and are more poverty driven (Alonso & Masot, 2017; Ibrahim & Aliero, 2012).

Nevertheless, being educated does not always lead to monopolization of high income-earning activities (Bryceson, 2002), since studies on rural Nigerians have shown that the non-farm activity operators' Western education does not automatically open doors to high earnings (Meagher, 1999), although it does enhance the opportunities. Thus, in order to maximise well-being gains from diversifying out of agriculture, the quest for gainful employment opportunities needs to be embedded in order to bridge the rural households' apprenticeship and entrepreneurial skills gap (Bryceson, 2004) as well as to lessen the rigidities that bedevil the expansion of the rural scale of production. This cannot be achieved without peace and security in the remote areas.

3.4 Conclusion

This chapter contributes to the literature on well-being, livelihood diversification and rural development by testing three hypotheses that have hitherto not been addressed systematically: cattle raid well-being retardation, diversification resilience and livelihood-choice hypotheses. The results elicit two key findings. First, the study found that cattle raids have, in addition to the associated well-being retardation effect, triggered a rapid shift away from the customary pastoralism-based livelihood to a diversified economic activities livelihood. Second, the test of the diversification resilience hypothesis reveals that income earned from livelihood strategies is not sufficiently robust to counteract the well-being loss triggered by the raiding of pastoral livelihood security. However, households that engage in more rewarding activities like trade, salaried jobs, handicrafts and crude manufacturing were found to be relatively better-off in terms of employment, income and welfare. Therefore, sustainable rural well-being depends to a large extent on how rapidly the households can break the entry barriers into these high return sectors.

A key implication of the findings in this chapter points to the fact that even though significant efforts have been made by the government and international donor agencies to improve households' well-being in remote areas, the results of this study suggest that these efforts are largely misguided; they are not geared towards expanding market access and improving human capital, capacity building and human empowerment. The extant efforts are predominantly politically motivated and focus entirely on the money metric indicators of well-being. Furthermore, the arrival of such policy intervention was alien to the methodology of participatory rural appraisal, which advocates that people should express and analyse their conditions as well as plan and act (Chambers, 1994) on issues bothering their well-being. The study suggests that achieving substantial communal well-being is the impetus for the attainment of sustainable rural development.

CHAPTER 4
RECURRENT SHOCKS AND WELL-BEING

4.1 Introduction

Globally, women comprise on average 43 percent of the agricultural labour force (Chandra, 2016) and substantially contribute their quota to the development of various sector of the economy. Yet, their livelihoods, rights and socio-economic status are still weakly asserted compared to men (Terry, 2009). Limited access to credit and risk-management instruments (Sewando et al. 2016) as well as structural inequality and disempowerment undermines women's ability to respond to climate change and food insecurity (Demetriades & Esplen, 2008). Climate variability acutely affects rural livelihoods and agricultural productivity, yet it is just one of many stresses that vulnerable rural households have to cope with (Ziervogel & Calder, 2003). Climate change is expected to disproportionately affect the women smallholder farmers by perpetuating the existing gender inequalities and exacerbating their social-economic and political risks (Tschakert, 2012). Women farmers are often disadvantaged due to discriminatory policies, belief and practices, and retracted access to livelihood resources (Arora-Jonsson, 2011).

The social dimensions of climate change in African drylands have attracted significant attention within the international community. Having experienced unprecedented downward trends in rainfall since the late 1960s, the Sudano-Sahelian region represents an important case for understanding the vulnerability of households to recurrent drought (Ayantunde et al. 2015). The poor agro-pastoral households in particular, face pervasive environmental stresses, severe shocks and idiosyncratic risks that deepen their subsistence thresholds (Chandra, 2016; Gautam & Andersen, 2016; Harvey et al. 2014; Tschakert, 2007; Ziervogel & Calder, 2003). Idiosyncratic shock as well as the coping strategy of vulnerable households was thematically presented in Figure 4.1 In

that it shown that where there of prevalence of social shocks, climate change and seasonality. Then Livelihood Assets Interventions (LAIs) is hypothesised to enhance well-being by stimulating livelihood strategies. For instance, higher level of income, better services in health care, more access to quality education and deepening access to financial services can certainly reduce vulnerability to shocks and improve food security. However, development literature has shown that incessant organised crimes in Africa have worsened the potentials and prospects of LAIs. The recent trend that cattle rustling and terrorism have assumed, particularly in Nigeria, have weakened household's capabilities to smoothly withstand the environmental shocks (Ibrahim et al. 2016; Olaniyan & Yahaya, 2016).
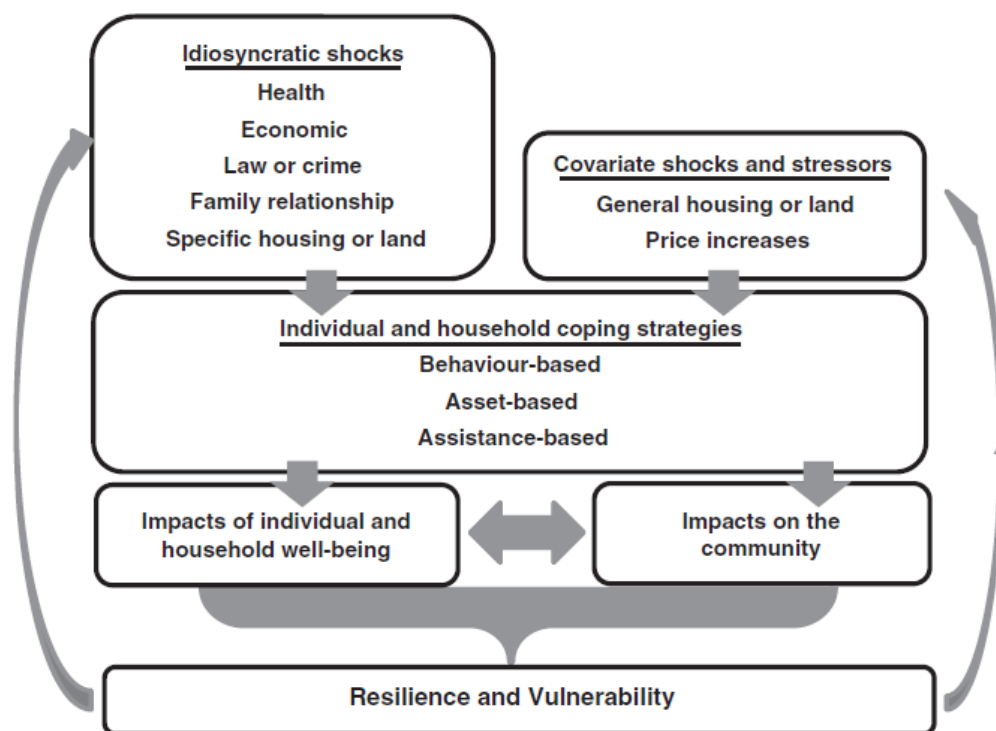
Figure 4.1: Shocks and coping strategies
(*Source: Heltberg et al. 2013*)

Humanitarian responses and climate change policies in conflict-prone agrarian communities emphasise gender responsive development (Brauch et al. 2011). Yet long-term climate change interventions in chaotic and volatile areas are limited given the political sensitivies of operating in conflict marred zones (Hsiang et al. 2011). Fewer interventions have focused on addressing the gender dimensions of development and humanitarian interventions

compounded by the socio-cultural complexity for women and marginalised ethnic groups to assert their rights in conflict areas (MacGregor, 2009).

There is little evidence to claim the success of gender parity in the recently concluded MGDs. Gender imbalance and discrimination against women in access to education, finance, politics, work and economic assets persists (Aliero et al. 2010; Fielding & Lepine, 2017). Similarly, progress towards the empowerments of women and girls in the SDGs has actually been slow. In SSA, Women in particular, possessed few productive and financial assets, suffers from social exclusion or inadequate networks of social support (Sewondo et al. 2016).

The gender dimensions of the recurrent environmental and human-induced shocks have not been previously discussed in development literature. Extant studies focus substantially on gender aspect of climate change and food security. Insights from the human security and climate change literature hypothesised that climate variability that intersects with conflicts emanating from ethnic and political factors would increase vulnerability to food price volatility, migration, crop failures, environmental disasters and land grabs (Barnett & Adger, 2007; Reuveny, 2007; Theisen et al. 2013). Climate change research focusing on gender dimensions and differential risk has studied the close link between gender equality and climate change, especially in rural farming settings where women have limited access to clean energy and technical assistance to irrigate their crops, and lack low-cost agricultural inputs and capital (Chandra, 2016) Thus, confluence of climate change with socio-economic realities confronting vulnerable communities in conflict-prone areas is weakly understood (Omolo, 2010). Moreover, livelihood strategies of agro-pastoralists have been discussed in development literature and practice for decades. Yet, the strategy that enhances household's well-being robustly in conflict-prone areas has received little scientific attention (Omolo, 2010; Ibrahim, 2012). Systematic gender-based examination of incident of cattle rustling, particularly how it affects livelihoods strategies in remote areas is of great importance for decision making and development of policies which aimed at improving agro-pastoralists' well-being in Sub-Saharan Africa.

Table 4.1. Variables used for constructing cattle raid vulnerability index

Component	Sub-component	Indicators	Measurement
Adaptive capacity	Human assets	Years of formal schooling	Count
		Access to information	1 = yes; 0 = otherwise
		Human empowerment and capacity building programme participated	1 = participated; 0 = otherwise
	Livelihoods strategy	Livelihoods diversification activities	Index
Exposure	Insecurity	Local security outpost	1 = available; 0 = otherwise
		Walking distance to the nearest police outpost	Minutes
		Awareness about the process of reporting cases of cattle theft	1 = aware; 0 = otherwise
		Poor response of security to repel attack	1 = yes; 0 = otherwise
	Informal security and network	Lack of local vigilante group	1 = yes; 0 = otherwise
		Proximity to border	Minutes
		Proliferation of small and light arms	1 = yes; 0 = otherwise
	Legal system	No severe punishment for perpetuators	1 = yes; 0 = otherwise
Sensitivity	Household's assets	Household size	Count
	Livestock	Herd size	Count
	Other assets	Cash volume	Value in USD
		Non-financial assets (automobiles, jewels etc.)	Value in USD
	Income composition	Share of livestock income to total income	Ratio
	Lack of access to financial services	Access to formal banking services such as saving, current account and credit facility, etc.	1 = yes; 0 = otherwise

4.2 Methodology

4.2.1 Strategy Adopted to Reduce Gender Bias

As a gender-based study, efforts were made to ensure adequate representations of all categories of household heads. The identified villages with reported cases of cattle theft were randomly selected, from which clusters of respondents were purposely selected. This has probed effected in minimizing gender gap. However, the concerted efforts of ensuring adequate number of

female representation in the sample probed difficult, because of the *Purdah* syndrome of female seclusion is deeply rooted in *Hausa-Fulani* culture. However, special relaxation was given to female on the requirements for their selections as survey enumerators and focus on group discussants. Moreover, by solely devoting a special section in the structured questionnaire that sought information about household, the study was able to cover seemingly unbiased representation of household heads spread across the survey areas. The idea was that female-head households have unconstrained economic and political freedom of interactions with an outsider.

4.2.2 Computational Procedures
4.2.2.1 The Cattle Raid Vulnerability Index (CRVI)
Drawing on Paavola (2003, 2008) cattle rustling vulnerability can be defined as weak preventing capacity to organised livestock theft of herdsmen. It is essential to stress that "vulnerability" is used in this study to denotes weak adaptive capacity, in the sense that strong adaptive capacity implies reduced vulnerability.

Vulnerability assessments have recently received significant attention of scholars in determining the risk posed by unusual climatic variability and opportunities for adaptation among the downtrodden households. Vulnerability is not confine to climatic or environment issues only. It cut across all issues that affect the livelihood of individual or group of individuals either directly or indirectly. Vulnerability is then considered as been exposure to stresses due to change in social and environmental conditions that serve to disrupt livelihoods (Adger, 1999). Assessments of rural household's vulnerability to natural and human-induced shocks have recently received significant scholarly attention in the scientific community. The essence of examining the social disturbances and the material outcomes its produce rests on the need to provide resilience methods of breaking the barrier to high quality of lives for the vulnerable poor (Tavares et al. 2015; Sewando et al. 2016; Alam et al. 2017). This study extended the Vulnerability Index (VI) assessments to the context of organised crimes. It should be stressed that loss of cattle due to raiding or diseases increases the danger of climate change. Since the affected households often engages in livelihood strategies detrimental to environmental sustainability such

as indiscriminate cutting-down of trees for firewood. The assessment of VI involves systematic aggregation of the components of adaptive capacity, exposure and sensitivity of households to shocks. Vulnerability is increasing function of the system's exposure and sensitivity, and decreasing function of the adaptive capacity (Ford & Smit, 2004). The VI model can thus be expressed as:

$$VI_i = (EXP_i + SEN_i - ADC_i),$$ 4.1

where VI_i is vulnerability index, EXP_i and SEN_i are exposure and sensitivity to shoks respectively, which together form what in vulnerability model called "the impact" or *I*, ADC_i is adaptive capacity. The greater the value of *I* ($EXP_i + SEN_i$) the more vulnerable is the agro-pastoral household. If the value of ADC_i is less than *I*, then VI_i is greater than 0. This is very clear going by the composition of various indicators made up of each sub-component. For instance, the sub-components of exposure (see Table 4.1) consist of factors that assesses whether or not households are secure. The less secure is the household the more vulnerability to cattle rustling. Thus, less secure household is hypothesized to be exposed to cattle theft. As such, exposure index was computed by factors exemplifies the security situation of the survey communities.

$$EXP_i = \frac{w_{sc}SC_i + w_{sn}SN_i + w_{sl}SL_i}{w_{sc} + w_{sn} + w_{sl}},$$ (4.2)

where EXP_i is exposure index; SC_i is the security sub-component which measures the joint status of availability of security outpost; proximity to the security outpost and effectiveness and promptness of formal security response against eventual cattle raiding, SN_i is informal security network which capture the availability of alternative informal security system such as local vigilante groups; nature of border (porous or otherwise) and proliferation of small and light arms; SL_i legal system which can take the form of restitutive (restorative) or punitive; and w_i is the weight assigned to each indicator.

Sensitivity is operationalized (in this study) within the context of Gallopin (2006) which referred to as 'the degree to which a system is affected by an internal or external disturbances or set of disturbances. The collections of indicators used for the computation of sensitivity index were arrived at from

informant discussions. The following formula was used in the computation of sensitivity index:

$$SEN_i = \frac{w_{hh}HH_i + w_{lv}LV_i + w_{os}OS_i + w_{ic}IC_i + w_{af}AF_i}{w_{hh} + w_{lv} + w_{os} + w_{ic} + w_{af}},$$
(4.3)

where SEN_i denotes sensitivity index, HH_i is the household size, LV_i is herd size, OS_i is non-livestock assets, IC_i share of livestock income to total income, AF_i is access to financial services, and w_i respective weight assinged to each indicator of the given component. It is hypothesised that the larger the herd size the more sensitive to cattle theft, since cattle rustlers have some informants that feed them with relevant information about the livestock unit holdings, breeds, quality, herd size and other sensitive information vital for successful raiding. Similarly, relatively small size female headed household that lacks access to financial services are hypothesised to be more sensitive to cattle theft. Several researchers consider proportion of on- to off-farm income as an important indicator. This is based on the assumption that deepening income diversification reduces rural households' vulnerability to shocks (see for instance, Piya et al. 2015; Sewondo et al. 2016).

The sustainable livelihoods framework of Scoones (1998) was instrumental in selecting the indicators of adaptive capacity. The study carefully selected appropriate indicators that measure the resilience of numerous activities engaged by households to cope and reduce the risk of losing their herds and other assets. The adaptive index was calculated via the following method:

$$ADC_i = \frac{w_{ha}HA_i + w_{ls}LS_i}{w_{ha} + w_{ls}},$$
(4.4)

where ADC_i is adaptive capacity, HA_i is human assets, LS_i is livelihood strategy, w_i is the respective weight attached to each indicator. More educated households are hypothesised to be less cattle theft prone, because increased literacy can unlock opportunities outside agro-pastoral mix.

Weighting and standardization are essential in VI aggregation. Extant literature favoured balanced weighted approach in which equality of contributions from each sub-component to the overall index is ensued (for instance, see Alam et al. 2017; Hahn et al. 2009; Pandey & Jha, 2012).

Variations in measurement of various sub-components were standardized as follows:

$$IndexX_i = \frac{X_i - X_{min}}{X_{max} - X_{min}}, \qquad (4.5)$$

where X_i is the observed value of an indicator of sub-component, X_{min} is the minimum value, and X_{max} is the maximum value of an indicator. The calculated index ranges from 0 to 1, while components with more than one indicator were derived simply by averaging the values of the sub-components. Since the relevant components of HDI computation were measured in Table 4.1, the study calculates overall and gender wise HDI for the sample via Equation (4.5).

The indexes of exposure, sensitivity and adaptive capacity expressed in Equation (4.2), (4.3) and (4.4), respectively were combined in Equation (4.6) to derived household vulnerability to cattle raid index:

$$CRVI_i = \left(\sum_{k=1}^{n} w_i EXP_i + \sum_{k=1}^{n} w_i SEN_i \right) - \sum_{k=1}^{n} w_i ADC_i, \qquad (4.6)$$

where $CRVI$ denotes cattle raiding vulnerability index of $i = 1,2,3,4, \ldots., n$ household head in k^{th} district; w_i is the respective weight of each components. Since the value of each dimension ranges from 0 to 1, equation (4.6) yields -1 > CRVI < 1. If EXP + SEN > ADC, then CRVI > 0 (denoting higher vulnerability to cattle rustling).

4.2.2.2 Vulnerability to Environmental Hazards Index (VEHI)

This section presents the procedure for the assessments of household's vulnerability to pervasive environmental stresses and severe shocks. Rural livelihood is subjected to pervasive shocks and stresses that increase risks and vulnerability (Ibrahim, 2012; Ziervogel & Calder, 2003). Rural poor in northern Nigeria is facing environmental shocks which precede the shocks induced by the perennial cattle thefts. The study was guided by the ActionAid International's (2005) Participatory Vulnerability Assessment (PVA) framework in selecting indicators for calculating VEHI. Member of the affected communities were fully involved in the processes of selecting and assigning weights of various

vulnerability indicators presented in Table 4.2. And then, aggregation was carried out with the aid of Equation (4.7):

$$VEHI_i = f(EVS_i + DRT_i - ADC_i), \tag{4.7}$$

where $VEHI_i$ is vulnerability to environmental hazards index, EVS_i, DRT_i and ADC_i are environmental shocks, drought, adaptive capacity, respectively. The higher the value of shocks (EVS_i and DRT_i) relative to adaptive capacity (ADC_i) the higher vulnerability to environmental hazard. Environmental shocks were measure via two proxies: floods and deforestation. Impacts of environmental shocks were hypotheses to increase household's vulnerability. The index of environmental shocks was obtained using the following expression:

$$EVS_i = \frac{w_{fd}FD_i + w_{df}DF_i}{w_{fd} + w_{df}}, \tag{4.8}$$

where FD denotes flood, DF is deforestation, w_i is their respective weights. The indicators use to measure the impact of environmental shock includes physical damages from flood, loss of lives and properties, as well as livelihood strategy perceived as causative of deforestation (see Table 4.2 for their measurements). Similarly, second additive component of VEHI is expressed in Equation (4.9):

$$DRT_i = \frac{w_{er}ER_i + w_{nt}NT_i}{w_{er} + w_{nt}}, \tag{4.9}$$

where ER_i is erosion, NT_i is nutrition and w_i is their respective weights. Index of drought deepens household's vulnerability. It is hypothesised that poorly nourished female headed household which substantially owned an eroded farm land to be relatively more vulnerable than do male-headed household.

Ability of household to cope and withstand the shocks from disasters triggered by hazard of natural origin is modelled in Equation (4.10):

$$ADC_i = \frac{w_{ef}EF_i + w_{hu}HU_i + w_{so}SO_i + w_{na}NA_i}{w_{ef} + w_{hu} + w_{so} + w_{na}}, \tag{4.10}$$

where EF_i, HU_i, SO_i and NA_i denotes economic, human, social and natural factors, respectively; w_i is their respective weights. The VEHI is a relative variable which is assumed to be either positive or negative (Wei et al. 2016). Positive index points to higher vulnerability and less capability of households to

cope and recover from idiosyncratic shocks, whereas negative value indicates less vulnerability to shocks.

Table 4.2. Variables used for constructing vulnerability to nature hazards index

Component	Sub-component	Indicators	Measurement
Environmental shock	Flood	Loss of life	Count
		Loss of property	Value in USD
		Physical damage	Number and value
		Proportion of households living in flood-prone houses	Count
	Deforestation	Firewood	1 = yes; 0 = otherwise
Drought	Erosion	Owned eroded land	1 = yes; 0 = otherwise
	Nutrition	Consumption expenditure per head	Value in USD
		Average monthly three square meals	Counts
		Livestock loss through death or disease	Value in USD
		Livestock sold due to drought	Value in USD
Adaptive capacity	Economic/financial capital	Households saving	1 = yes; 0 = otherwise
		Access to micro-credit	1 = yes; 0 = otherwise
		Average household income level	Value in USD
	Human capital	Literacy per capita	Average years of schooling
	Social capital	Membership of self-help group (SHG)	1 = yes; 0 = otherwise
		Remittances from emigrated household member	Value in USD
	Natural capital	Size of crop area per capita	Acre

4.2.3 Empirical Model

Livelihoods are hampered by various covariates and idiosyncratic shocks as shown in Figure 4.1. In this sense, the study further aim to establish whether and to what extent recurrent shocks affect income diversification, serving as a proxy for livelihood diversification strategies. To this end, Equation (4.11) expresses the impact of recurrent shocks on income earned through diversified economic activities, given as:

$$livdiv_i = \beta_0 + \beta_1 SHOCK_{CRi} + \beta_2 SHOCK_{EHi} + \sum_{i=1}^{n} \gamma_1 Z_i + \mu_i, \qquad (4.11)$$

where *livdiv*$_i$ is income diversity per capita, $SHOCK_{CRi}$ measured the per capita livestock loss from cattle rustling, $SHOCK_{EHi}$ is a dummy variable measuring the environmental hazards experienced by a *i-th* household, Z_i is the vector of household-specific socio-economic characteristics includes age, size, education, per capita income and herd size; β_i, γ_1 and μ_i are coefficients and a white-noise error term respectively.

4.2.4 Decomposition Strategy

One of the central objectives of this study is to establish whether recurrent shocks have any effects on inter- and intra-gender income disparity. To achieve this objective, a decomposition analysis was applied to establish the relative contribution of between-group variance (differences of disaster effect between male and female respondents) and within-group variance (within each gender) to income diversification. If the between-group variance exceeds the within-group variance, then disaster exerts larger influence compared to other factors explaining the inter-gender disparity. The decomposition exercise follows the methodological strategy developed by Fields (2003) for treatment effect models based on the OLS estimation.

To begin decomposition, let $V_0(y_d)$ and $V_1(y_d)$ be the variances in income for the female and male respondents, respectively. If p_{mi} is the proportion of males affected by recurrent shocks, the within-group variance $V^w(y_d)$ and between-group variance $V^b(y_d)$ are given as:

$$V^w(y_d) = (1 - p_{mi})V_0(y_d) + p_{mi}V_1(y_d), \qquad (4.12)$$

$$V^b(y_d) = (1 - p_{mi})\, p_{mi}(\bar{y}_{d1} - \bar{y}_{d0})^2, \qquad (4.13)$$

where $\bar{y}_{d1}$ and $\bar{y}_{d0}$ are the respective mean values of the income in group 1 (male) and group 2 (female). The coefficient of the *between-groups* variance measures the extent to which differences in income are driven by disaster rather than other covariates, while the *within-group effect* measures the extent to which demographic characteristics contribute to various income differences.

4.3   Results and Discussion

4.3.1 Households Characteristics

As explained earlier, the cultural practice of *purdah* is deeply rooted in the tradition of agro-pastoral society in Nigeria. Married women specifically below 50 years of age were socially excluded; their economic activities are restricted to petty trade undergone within their matrimonial homes. The extended family system practice in the region is one with solitary household head who is usually the most elderly person in the family. It was found by the study that 74% of the household heads surveyed were male-headed and in contrast 26% of the households have female as their head (see Table 4.3). The primary duties of the household head are the coordination of economic, security, social and political matters for the betterment of the entire family members.

Table 4.3. Household characteristics

Variables	Overall	Male	Female	t-value	P>t
Household head gender	-	0.74	0.26	-	-
Education(years)	2.77	2.96	0.45	3.31***	0.000
HDS	14.06	34.39	2.46	4.82***	0.000
Income level	82.16a	103.71a	59.92a	5.08***	0.000
Cattle raid victims	0.66	0.63	0.67	0.009	0.993
Livestock loss	20.44	21.67	5.55	2.31**	0.021
Cash Loss	54.82	79.15	26.35	3.12**	0.006
Other assets loss	4624.56a	5534.30a	4453.21a	1.03	0.210
Displacement	22,499	9246b	13253b	1.14	0.101
Livelihood strategies:					
Wholesale & retail	0.23	0.22	0.35		
Off-farm wage (non-government job)	0.12	0.11	0.25		
Farm wage	0.48	0.50	0.22		
Services, tools making & handicrafts	0.10	0.09	0.16		
Government salary	0.07	0.08	0.02		
Number of activities	3.45	2.32	3.82	2.9032	0.0037

[a] values in USD; [b] number of people displaced due to shocks

*** $p < 0.01$, ** $p < 0.05$

There is commendable increase in overall literacy rate in the remote areas, which in part testify the success recorded in the recently concluded MDGs. In addition to the increase funding from international donor agencies, government at all levels partly invested massively on human development programmes. This has lent credence to the higher average year in schooling found in this studies

than reported in previous researches. For instance, the 2.77 average year of formal education reported in Table 4.3 is slightly higher than 1.96 and 1.98 documented by Aliero et al. (2010) and Aliero and Ibrahim (2012) respectively. However, the female education advocacy implemented within the context of girls child education programme had actually recorded little success. Its failure stem lack of technical expertise, political motivation, and not people-centred that it claimed to be.

While two mean comparison on household years of formal schooling per capita in Table 4.3 shows a significant difference between male- and female-headed households ($p<0.01$), male-headed family had 2.96 average years of schooling which higher than 2.77 year for overall sample, whereas less than one year (0.45) schooling per capita was found for families headed by female. Even though, mean comparison test reveals a significant difference in income between male and female headed families ($p<0.01$), however, most households are living below 1USD per capita and the average monthly per capita income across the survey households is 82USD (Table 4.1). Yet, female-headed family were found to be more relatively poverty trapped with average income level of 59.92 USD and livestock holding per head of 2.46. A simple version of HDI presented in Table 4.4 shows that female exhibited 0.192 HDI which is lower than 0.282 of male-headed family.

Table 4.4. Household's HDI

Gender	Life Expectancy Index	Literacy Index	Income index	HDI
Female	0.509	0.126	0.110	0.192
Male	0.498	0.237	0.189	0.282
Overall	0.483	0.206	0.249	0.263

Emergent cattle theft may likely to worsen the livelihoods condition of female-headed household as Table 4.3 shows that these families are more severely hit by cattle raiders in terms of livestock loss and other non-herding assets ($p<0.05$). Surprisingly, the study found that female-headed household are more diversified ($p<0.05$) and approximately engages into 4 distinct activities, whereas male-headed family are limited to approximately 2 livelihood strategies. Female increasing vulnerability to cattle rustling can be interpreted

as a factor pushing them to seek for coping strategies outside the customary agro-pastoralism.
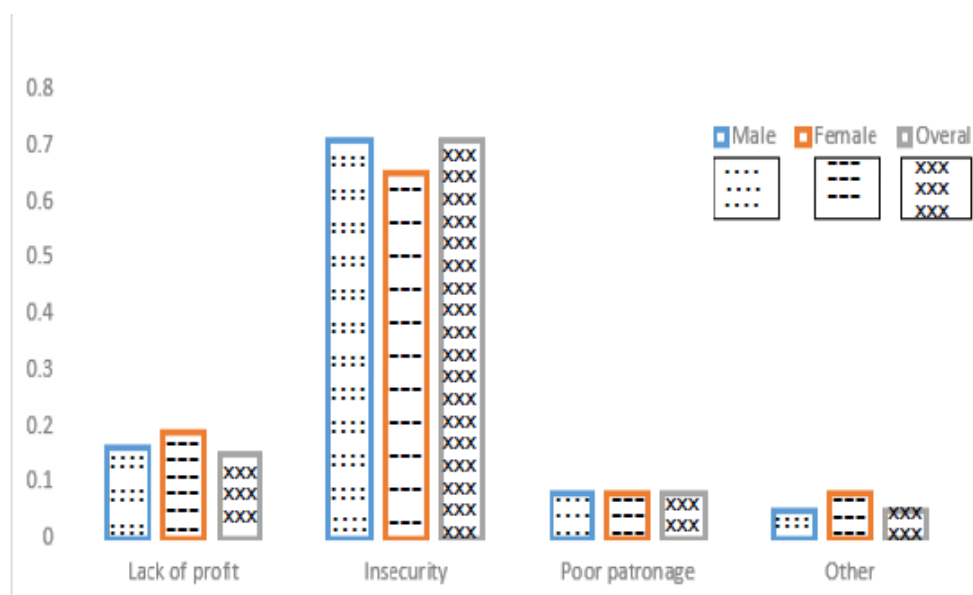
Figure 4.2: Household's decisions to change occupation

Multiple corresponding analyses of cattle rustling victims by household's primary source of income, reveals that diversification into less agro-pastoral occupations reduces household's vulnerability to cattle rustling (Table A1 in appendices). This cast doubt about the sustainability of customary agro-pastoralism occupation. Figure 4.2 showed that 71% of the entire sample attributed insecurity as the primary reason why they are quitting agro-pastoral related occupation. In spite of its avoidable unemployment effect, cattle raids could be viewed as factor driven or accelerating diversification by force into less agro-pastoral related occupation, it could as well deepens food insecurity scenario in Nigeria. Although cattle raid victims are gender invariant (*p>0.05*), but the relative female weakness is sufficient to justify arguing that female-headed household are more victimised by cattle rustlers.

4.3.2 Vulnerability

4.3.2.1 Cattle Raid Vulnerability Index

Vulnerability assessment is fundamental for informing adaptation to climate change policy (Cooper & Wheeler, 2017). Variations in gendered vulnerability to shocks arise as a result of differences in the scores for each of the components

of *CRVI$_i$* and *VEHIi* used in their aggregation. Table 4.5 presents the results of vulnerability equations described in the methodological section. Female-headed households were found to have *CRVI$_i$* of 0.437 compared to 0.413 exhibited by their male counterpart (*p<0.05*). This testifies that female-headed household exhibits more tendency for the risk and vulnerability of cattle raiding. Therefore, null hypothesis of no significant difference between the two groups of households is rejected. Women were socially excluded with limited access to information and by implication are more prone to cattle rustling.

There is also a significant difference in the adaptive capacity for the two groups (*p<0.01*). One might expect women-headed household to be more resilient to shocks because they are relatively engaging into more diversified livelihoods than do by male-headed households. A cursory look at the livelihoods strategies presented in Table 4.3, notwithstanding the overall low participation in what Gautam and Andersen (2016) called ''high return sectors'' by the entire sample, male-headed household were found to participate more into salaried jobs, profitable business and economic migration.

Table 4.5. Vulnerability indices

Indices	Female	Male	Overall	P>*t*
Adaptive capacity	0.231	0.354	0.311	0.002
Exposure	0.673	0.651	0.659	0.140
Sensitivity	0.584	0.510	0.532	0.031
CRVI	0.437	0.413	0.422	0.042
Environmental shock	0.539	0.542	0.540	0.203
Drought	0.566	0.561	0.562	0.120
Adaptive capacity	0.314	0.350	0.331	0.000
VEHI	0.451	0.442	0.445	0.162

Relative deprivation and marginalisation of remote areas especially in the border districts is perhaps the primary reason why the study found 0.659 as overall exposure index in Table 4.5. The indicators of exposure are not gender specific and their impacts are generic. Two groups comparison shows no significant difference between the household heads (*p>0.05*). On the other hand, female-headed households were found significantly more sensitive to cattle raid shocks because they lack adequate social support.

4.3.2.2 Vulnerability to Environmental Hazards Index

The study hypothesised that the higher the values of flood, deforestation, erosion and under nourishment then the more vulnerability to hazardous shocks. Second segment of Table 4.5 reported *VEHIi* of 0.451 and 0.442 for female-headed households and male-headed households, respectively; and there is no significant differences between the groups (*p>0.05*). Similarly, components-specific analysis of environmental shocks as well as drought shocks have in spite of their respective higher overall index shows no significant difference between the groups. A finding from flood indicators shows no evidence of loss of life due to flooding disasters, but lot of asset (physical and other property) were damaged. This study did not report the actual value of assets loss owing to exaggerative claims; households provided the estimated values of assets loss in anticipation for possible compensation. There is no evidence of proper documentation both at household level and the Local Emergency Management Unit- a constituent authority saddled with responsibility of handling environmental shocks.
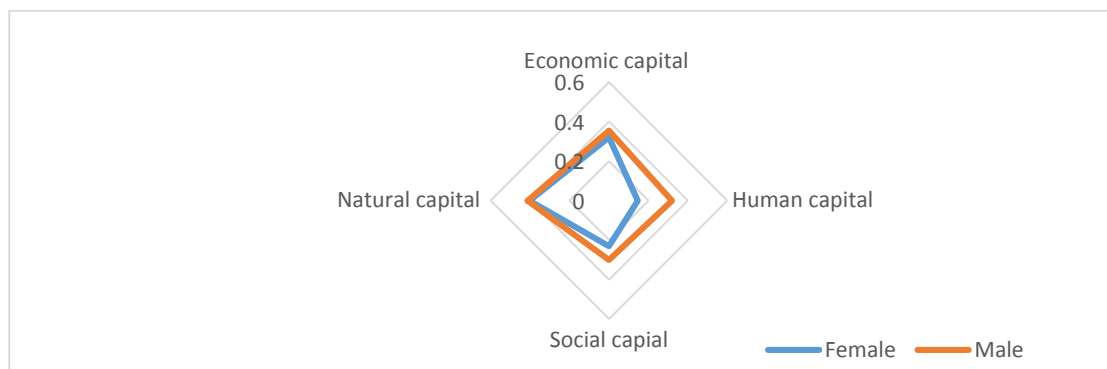
Figure 4.3: Livelihoods capital index

The capacity of households to resiliently withstand recurrent shocks was assess using sustainable livelihoods approach via oft-used fourfold capitals (economic, human, social and natural). Figure 4.3 shows a radar chart of the household's adaptive capacity. It seems there is no discernible difference in natural capital between the groups, but differences do exists in the economic, human and social capitals. Male-headed households were more economically empowered which enhanced their buffering institutions.

Table 4.6. Impact of shocks on income diversification

Variables	Overall	Female-headed HH	Male-headed HH
SHOCKS$_{CR\ income\ loss}$	-0.543***	-0.512**	-0.501***
	(-4.21)	(-1.98)	(-3.32)
SHOCKS$_{CRI\ herding\ holding\ loss}$	-0134***	0.043***	-0.025***
	(-3.59)	(3.82)	(-4.11)
SHOCKS$_{CR\ assets\ loss}$	-0.318**	-0.081***	-0.261***
	(-2.31)	(-4.60)	(-2.09)
SHOCKS$_{EH}$	-0.078***	-0.328**	-0.097**
	(-3.62)	(-2.39)	(-4.69)
Households age	-0.910**	0.076**	-0.563***
	(-2.45)	(2.19)	(-3.17)
Households size	0.732***	0.597**	0.631***
	(3.86)	(2.09)	(3.84)
Households literacy	0.351***	0.512**	0.432***
	(3.25)	(2.07)	(4.61)
Income proportion to agro-pastoralism	-0.531**	0.076**	-0.433***
	(-2.42)	(2.26)	(-3.75)
R^2	0.267	0.093	0.110
F	8.91	10.34	7.23
X^2Breusch-Pagan	1.11	1.33	2.61
	(0.2076)	(0.9450)	(0.1209)
X^2normal	0.6544	0.6107	0.6026
N	1750	823	927

t-values in parentheses

*** $p < 0.01$, ** $p < 0.05$

4.3.3 Impact of Shocks on Livelihood Diversification

Baseline results of impact of shocks on household's income diversification are presented in Table 4.6. Most importantly, the study observes quiet similar results in both the aggregated (overall) and the disaggregated (gender specific) models. Environmental- and human- induced shocks were negatively affecting income diversity of deprived agro-pastoralists in rural Nigeria. It is worth noting that female-headed households were estimated to gain higher income from herding loss due to cattle rustling shocks. Every unit of herding holding loss increases the tendency of income diversification of female-headed households by 0.043, *ceteris paribus.* Loosing livestock trigger more livelihood diversification

strategies by female-headed households than male-headed counterpart does. This partly explains the reason why significance difference was found in the number of activities engages between the categories of households in question.

Importantly the magnitudes of the shocks have salient economic implication. The coefficients are negative and significant (for all the variables except shocks triggered by herding loss in the female-headed household model). The size of the coefficients of shocks in income loss is relatively higher than the other idiosyncratic shocks. In all the models estimated, every unit of income loss from cattle rustling diminishes income diversification by approximately 0.5 ($p<0.05$). This lent credence to the claim that cattle rustling is deepening the vicious cycle of poverty in Nigeria. Moreover, the negative association suggests that shocks lead to spontaneous reduction in income diversity because livelihood strategy in most agrarian societies is hugely supported by unhindered crop and livestock production. This finding is broadly consistent with plethora of literature that reported decreases in household's well-being in post shocks periods (for instance, Dercon et al. 2005; Porter, 2012; Tibesigwa et al. 2016).

Livelihoods viability in resources-poor rural setting was strategically based on natural resources (Omolo, 2010). In rural Nigeria, perennial idiosyncratic shocks ranges from adverse climatic condition, flood, erosion, and drought were identified as major calamity that undermines household's capacity to maintain decent living standard. In stark contrast to cattle rustling shocks, male-headed households were more prone to environmental shocks. Table 4.6 shows that environmental shock has stronger impact in the male-headed household equation. Possession of natural capital (see Figure 4.3) and steady engagement in agricultural related activities increases male-headed households' vulnerability to environmental hazard. Current literature asserted that households that diversify their income sources are relatively immune to shocks and more able to adapt than are households trapped in a mono-income stream (see Aliero et al. 2010; Aliero & Ibrahim, 2012; Christiansen & Subbarao, 2005; Kochar, 1995; Porter, 2012; Tibesigwa et al. 2016).

Moreover, although the results of demographic variables are consistent with the *a priori*, it appears that human capital (as measured by literacy) is most important factor accounting for increase in income diversity. An increase in the

rate literacy could enhance the likelihood of participation in semi-formal and formal enterprises which could unlock and widens opportunities beyond subsistence agrarianism. Similarly, households' size increases the tendency of income diversification. In other words, larger families are more likely to diversify their livelihoods. Holding other factors constant, households with higher income proportion from agro-pastoral mix their income diversity was estimated to decrease by 0.531 (*p<0.05*) from a unit of income ploughed back in customary agro-pastoralism.

4.3.4 *Implication of Shocks for the Variance of Income Diversification*

Table 4.7 shows the results of the overall decomposition of the variance of income diversification of the male and female groups, where the interest is in whether *between influences* (hazard-driven) overshadow the *within drivers* (not related to hazard) of disparities in livelihood diversification of the groups.

Table 4.7. Gendered variance of income diversification

	Decomposition of variance: cattle rustling		Decomposition of variance: environmental hazards	
	Value	%	Value	%
Between	0.049	9.01	0.017	5.30
Within	0.497	90.99	0.297	94.70
Overall	0.546	100	0.314	100

The result of decomposition elicits several findings. First, disasters have moderate influences on inter- (*between*) gender income disparities, as a larger proportion of the inequalities are explained by the *within* factors (demographic characteristics). Second, the data shows that 9% of between-group differences were accounted for by cattle rustling while only 5.30% of such differences were driven by environmental hazards rather than individual characteristics. This finding is in line with the basis for framing the humanitarian response to disasters focusing substantially on women and children (Bankoff, 2001; Fielding, 2012; Grace & Janet, 2014). Indeed, many studies expanded the categories of vulnerable classes by including the poor, the very old, the disabled (Fielding, 2018; Fjelde, 2015; Fordham, 1998; Olaniyan & Yahaya, 2016; Tibesigwa et al. 2016), and other similar groups that are less able to cope with disasters.

The male-female dualistic construct in disaster discourse contributes to the neglect of intra-gender disparities (Gaillard et al. 2017) in the design and implementation of disaster risk reduction (DRR) policies. Such technocratic and top-down policies ignore other important social factors, such as literacy and income levels that to a larger extent determine the individual's capacity for disaster preparedness and disaster-resilience.

Moreover, the findings of this study point out the need for a paradigm shift in DRR strategies focusing more on the drivers of intra-gender inequality. This is consistent with the findings of previous empirical studies, which reported that people endowed with vast human capital are more capable of bouncing back from disasters (Akbar & Aldrich, 2018) and that literacy rates in particular are major components of recovery and resilience (Aldrich, 2011). Evidence has further shown that even the most vulnerable individuals were able to utilise a wide array of diverse resources, knowledge, and skills to confront natural hazards (Gaillard et al. 2017; Julia & Appolonia, 2009; Wisner, Gaillard, & Kelman, 2012) and human-induced disasters.

4.4 Conclusion

This chapter addresses questions regarding the recurrent shocks and gendered livelihood diversification disparity of deprived households in rural Nigeria. Two indices were constructed to account for the human-induced shock (cattle rustling) as well as the environmental shocks emanated from disaster related to flooding, climate variability, erosion and so on. The result reveals higher vulnerability to disasters triggered by the hazards of natural origin invariant of the household head, while female-headed households are more vulnerable to cattle rustling than their male counterpart. Two salient observations were deduced from shock analysis. Firstly, both natural and human-induced shocks were negatively affecting livelihoods diversification. The impact is invariant to the perceived gender of the household head. Secondly, livelihood resources and livelihood strategies at household's disposal are not resilient enough to spurs a positive sustainable livelihood outcome. These finding calls for adoption of conventional adaptation strategies align to transform the customary agro-pastoralism into small capitalist activities. The current practice of informal agro-pastoral mix is less sustainable because of its inherent market rigidity which fails

to attract the needed inflows of foreign investment and modern technology required to enhance agribusiness performance in rural Nigeria. Moreover, an emergent cattle rustling has further exacerbated the severity of problems in remote areas. As such sustainability of traditional agro-pastoralism is threatened by internal displacements, weakening traditional institutions, chronic poverty, food and economic insecurities (Twine 2005; Kirkland et al. 2007; Ibrahim, 2012; Ibrahim et al. 2018). With the massive drop in foreign exchange earnings as a result of the crash of the price of crude oil, Nigeria could explore the prospect of agriculture as a mover of growth. This suggests a win–win policy intervention that can substantially connect the economy to rely more on renewable resources that are relatively sustainable. The success of this policy is to a larger extent depends on political will, people oriented, openness and speeds in backward and forward linkages.

CHAPTER 5
MIGRATION AND WELL-BEING

5.1 Introduction

Livestock production is widely acknowledged as a major component of agribusiness that frequently exert a significant on impact on the income levels, and consequently, serving as a pathway out of poverty for rural youth. Certainly, households may sell their livestock and use the proceeds to build or extend their dwellings, or acquire capital equipment for farming purposes (Ibrahim et al. 2016). Additionally, it also generates consumption links as household can spend their increased incomes on goods and services produced in the economy (Behnke, 2008; Schneider & Gugerty, 2011; Thys el al. 2005; Xavier et al. 2001). The recent decline in well-paid secure employment in West African countries has led to a sudden shift in policymakers' priorities towards reinvigorating the agricultural sector (Siegmund-Shultze & Rischkowsky, 2001). The emergent violent religious extremism (*Boko Haram*) and cattle rustling (*Kiwo Haram*) were widely considered as the principal obstructions to the attainment of agricultural sufficiency, particularly in Nigeria (Ibrahim et al. 2018). Cattle rustling has recently become a key internal security concern in Nigeria (Olaniyan & Yahaya, 2016), and Northern Nigeria is the epicentre of this menace. In this region, crop and livestock production are the principal sources of well-being, particularly in the remote areas. The *Fulani* and *Hausa* ethnic groups, whom hitherto have contributed approximately 3.2 per cent of the country's GDP from livestock production, are now struggling to cope with incessant armed banditry (Köster & de Wolff, 2012).

The link between socio-economic deprivation and the rise of religious extremism has long been established in scholarly work. According to John and Harwood (2011), poverty and alienation among the Northern Nigerians are the key drivers of organised crime (cattle rustling) and radical movements (*Boko*

Haram). The dwindling productive base of the region was further affected by rising poverty, deteriorating social services and infrastructure, educational backwardness and extensive youth unemployment, since the advent of the menace (Agbiboa, 2013; Isa, 2010). Socio-economic backwardness was accepted as a responsible factor for endemic violence in the region (Ibrahim et al. 2018). A contrasting practice exists in the Horn of African pastoral community wherein raiding of pastoral livelihood security is often a cultural practice of replenishing and restocking of herds in response to outbreaks of disease or drought (Kaimba et al. 2011; Schilling et al. 2012). Although the contrasting scenario typifies the cattle raid cases in the two regions, they do have one common factor: relative deprivation. Pastoral communities in Eastern Africa are systematically neglected and they lack supporting infrastructures, such as roads and hospitals that could enable remote areas to be opened for development (Ogola, 2010). In the same manner, Northern Nigeria has been experiencing the economic and political marginalisation. The pastoral communities in Nigeria are characterised by a significant infrastructural gap - a factor which motivated rural out-migration to cities before the onset of the cattle raids.

Relative deprivation in the northern region can also be illustrated in terms of an 'illusion of modernity' which manifested in terms of the gradual changes in the lifestyles of pastoralists in the 21st century. Indeed, some herdsmen have in recent deeply embraced the modern way of living as a result of the increased penetration of information and communications technology (mobile phones, Internet, satellite, etc.) in their community (Ibrahim et al. 2018; Rueff & Rahim, 2016). Consequently, a large proportion of income is being irrationally and unproductively spent in an attempt to adapt to modern lifestyles. This has impacted negatively on the livelihoods of rural dwellers; in that it generated income-consumption gap, negative rural terms of trade and internal capital flight, among others (Ibrahim, 2012; Ibrahim et al. 2018).

Furthermore, the major source of income through livestock selling have failed to maintain the same pace with the newly induced pastoralist's consumption behaviour. In such that the terms of trade for pastoral households have negatively been affected not only in terms of the size of the agricultural surplus that these household markets, but also the quantity of other durable goods they often purchase (Stifel & Minten, 2017). In addition to the

aforementioned challenges, a combination of climatic and health constraints have depleted the pastoral livestock holdings, particularly in Northern Nigeria. Consequently, as a coping strategy, some of the herdsmen have resorted to unconventional means of restocking and replenishing their herds- a practice that has institutionalised the practise of cattle rustling, inequality and deepened relative deprivation. Internal dualism breeds violent political movements and aggravate relative deprivation (Gurr, 2005; Agbiboa, 2013).

Migration within a country is more likely to generate alienation and increase relative deprivation through a smooth reference group substitution (Stark & Taylor, 1991). There is growing body of literature attributing cattle raiding to poverty (Ibrahim et al. 2016; Kynoch & Ulicki, 2000; Omolo, 2010; Schilling et al. 2012); primitive accumulation of wealth (Perkins & Thompson, 1998; Simelane, 2005; Kaimba, et al. 2011; Schilling et al. 2012; Olaniyan & Yahaya, 2016); retaliation (Eaton, 2010); tribal-based conflicts (Higazi, 2016; Schilling et al. 2012); institutional factors (Adano et al. 2012); drought (Scheffran et al. 2012); and proliferation of small arms (Mkutu, 2006; Olaniyan & Yahaya, 2016). However, few extant studies have analysed how subjective deprivation may be linked to cattle rustling which may potentially trigger rural out-migration. Against this background, this chapter explores the impact of cattle raids on socio-economic well-being in Northern Nigeria. The study further examines the factors that influence different types of rural out-migration that a pastoral household embarks upon as a strategy of counteracting the severity of losing livelihood security.

5.2 Methods

5.2.1 Estimation Model

Migrants are axiomatically rational in the sense that they are assumed to express their preference for higher welfare by migrating out from hostile communities to a relatively safer community. This to a large extent determines the level of their utility (or relative deprivation) tenable at a given point in time (Ibrahim, 2012). The decision to migrate or not is fundamentally related to a household's status (feeling satisfied or deprived). The *i-th* household migrant in

a raiding rural community is presented in a model as a function of certain socio-economic factors and the characteristics given as:

$$RMR = f(NLL, LNLO, PRIL, PM, LIT, CRI). \tag{5.1}$$

The variables specified in Equation (5.1) were defined in Table 5.1. The relative deprivation dummy was introduced and, for the ease of estimation, Equation (5.1) was compressed and parameters were assigned in Equation (5.2):

$$RMR_i = \varphi_1 RD_{dummyi} \sum_{j=1}^{n} \gamma_2 Z_i + \mu_i \tag{5.2}$$

Where RMR_i is the number of household members engaged in rural migration, RD_{dummyi} is a latent variable defined by 1 if RD ≥ 0 and 0 if otherwise. Moreover, Z_i is the vector of exogenous variables, φ_1 and γ_2 are parameters and μ_i is a white noise error term, which by assumption is identically and independently distributed with zero mean and constant variance.

Table 5.1. Variables definition

Variables	Description	Measurements	Value levels/Units
HDS	Herd size	Count	
LIT	Educational attainment of household head	Count	Years in school
RMR	Number of household members engaged in rural migration	Count	
PRM	Number of household members engaged in permanent rural migration	Count	
TRM	Number of household members engaged in transitory rural migration	Count	
RD	Relative deprivation	Dummy	1 if RD ≥ 0 and 0 if otherwise
LNLO	Longevity into non-livestock occupation	Count	
NLL	Number of livestock lost to cattle raid	Count	
PRIL	Post-raid income level	Continuous	
PM	Persistent migration	Categorical	2 = agreed, 1 = disagreed, 0 = undecided
CRI	Intensity of cattle raid	Dummy	2 = intensive, 1 = moderate, 0 = otherwise
AFI	Annual off-farm income	Continuous	

Generally, migration decisions are made due to risks and uncertainties, such as the fear of loss of life and property. The migrants should be able to contend with chances and should have a sense of optimism about the potential relief that could be enjoyed in the migrated area (Ducey, 2001). To this end, another model was constructed to measure the transitory and permanent migration dynamics separately by decomposing Equation (5.2) into Equations (5.3) and (5.4):

$$PRM_i = \beta_0 + \varphi_1 RD_{dumi} + \beta_1 NLL_i + \beta_2 LNLO_i + \beta_3 PRIL_i + \beta_4 PM_i \qquad (5.3)$$
$$+ \beta_5 LIT_i + \beta_6 CRI_i + \beta_6 HDS_i + \varepsilon_i,$$

$$TRM_i = \theta_0 + \varphi_1 RD_{dumi} + \theta_1 NLL_i + \theta_2 LNLO_i + \theta_3 PRIL_i + \theta_4 PM_i \qquad (5.4)$$
$$+ \theta_5 LIT_i + \theta_6 CRI_i + \theta_6 HDS_i + e_i.$$

While the codes used in (5.3) and (5.4) are defined in Table 5.1, it is expected that the regressors in the preceding equations will exhibit different magnitudes driven by the degree of relative deprivation. Thus, it can be hypothesised that the higher the magnitude of RD, the greater the permanent migration and the less the transitory migration. If households have some robust buffering institutions, such as income diversity, savings or access to insurance, access to finance and so on; then, they may embark on transitory migration, even during persistent cattle raid periods. The Classical Ordinary Least Square (OLS) method was applied in the estimation of the parameters for the equations.

5.3 Results and Discussion

5.3.1 Socio-economic Characteristics

Similar to most agrarian societies, the main source of livelihood in the surveyed communities is agricultural related activities. In recent periods, rural dwellers have adopted diversified economic engagements as a response to dwindling agricultural fortunes. They increasingly engage in on-farm and off-farm activities as risk coping strategies against drought, poverty and food insecurity. The off-farm income spectrum is confined within un-skilled and semi-skilled related occupations. In this way, most people predominantly work as farm labourers, carpenters, housemaids, and other forms of menial jobs; a handful of them do have well-paid government jobs. The underwhelming minority (8%) indicated

that they work as civil servants and this corroborates the low literacy rate reported in Table 3.2. In spite of the fact that farming is mainly subsistence based, farmers usually produce in excess of their households' need. The proceeds of the farm produce are being traded in the markets and, in return, they purchase other essential commodities which they had limited access.

The primitive tradition of gender bias, which segregates women from explicit participation in economic activities, is gradually diminishing. This was attributed, in part, to the increasing support for women's literacy by international donor agencies and the devastating effects of cattle raid that render many women widows who are forced to fend for their families.

Table 5.2. Socio-economic characteristics

Variable	Min.	Max.	Mean	*t*-test
AFI	7.31[a]	145.91[a]	82.47[a]	2.61[**]
RD_{dum}	0	1	0.89	
RMR	2	12	8.34	3.25[**]
NLL	0	63	13.7	2.31[*]
LNLO	1	25	12.15	
PRIL	9.12[a]	55.63[a]	19.02[a]	
PM	1	2	1.43	
CRI	1	2	1.73	

[a]USD, [*&**] denotes significant at the 0.05 and 0.01 levels

5.3.2 Socio-economic Well-being

Social changes within a given society are considered as one of the principal drivers of relative deprivation. Ragnarsdóttir et al. (2013) posited that abrupt social changes can trigger subjective deprivation, which can create subjective injustice and emotional distress. The perennial cattle rustling has posed a considerable challenge to the socio-economic well-being of rural dwellers. The FGDs revealed that the menace caused them to feel sentiments of fear and despair. Their aspirations are destroyed and development is hindered as they lived in an environment devoid of hope. In the FGDs sessions, participants

lamented that cattle raids represent the worst crisis they have ever experienced. They claimed that no farmer is spared from the devastating and savage attacks by the cattle marauders. At the household level, pastoralists and commercial cattle producers were the major victims of rustling. Farmers and other categories of households lost their livestock to raiders. Reacting to the incessant attacks, the vast majority of the interviewees demonstrated willingness to leave their present occupations if tangible actions were not implemented to combat the problem. Such an eventuality would likely deepen the unemployment crisis and eradicate traditional pastoralism in the region. The survey results reveal that the level of unemployment increased to 88% in the raiding period as highlighted in Figure 5.1. This would worsen the vicious cycle of poverty and threaten food security in the region, which is consistent with the result in Table 5.2 that shows a significant decline in average off-farm income. There is a paucity of data about the actual value of wealth and the numbers of livestock lost to the raiding menace, as information provided by the respondents could be exaggerated in anticipation of compensation or relief from the government.
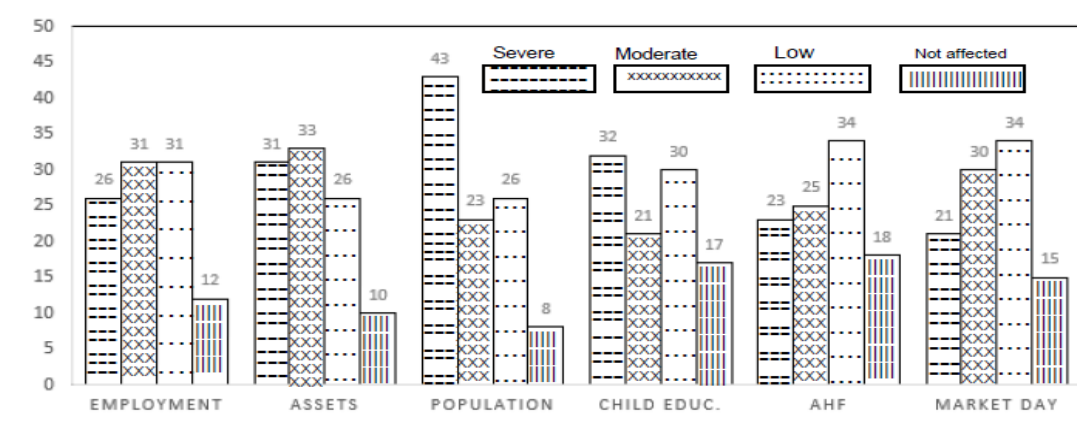
Figure 5.1: Socioeconomic well-being

Among all the rural areas surveyed, the common items confiscated by the rustlers included:

i. *Cash*: the absence of rural bank branches has limited the saving options of the rural dwellers to merely keeping their money in cash form. When they are the victims of such attacks, they often lose all of their hard-earned savings. Furthermore, cash is more attractive to cattle rustlers in the region than any other form of wealth. This is in sharp contrast to the East African scenario where raiding is culturally motivated.

ii.   *Automobiles*: cattle raiders need automobiles for rapid conveyance of the items rustled. The FGDs revealed that the stolen vehicles were usually sold in the neighbouring countries.

iii.   *Women*: in some instances, women and girls were most impacted by the raiders. In many cases, women were raped before their wealth was confiscated. In extreme circumstances when a member of the household protested against their demands, Female members of the household would be severely molested and or even killed. The victims of such atrocities are often subject to stigmatisation and they have no option other than to migrate out. The raiders have also been accused of child trafficking activities. On numerous occasions, the rustlers have abducted women and children, with the females being sexually abused and their future jeopardised.

iv.   *Youth*: the motives for raiding herders' communities are not unconnected with the raiders' need to forcefully recruit more fighters. Youths have been abducted, radicalized and forcibly engaged in cattle rustling. It was further revealed in the FGDs that the abducted youths were being deceitfully assured that, if they participated in successful cattle raids, they would not only regain their freedom, but also their livestock and other assets would henceforth be protected from further raids.

Livestock can be viewed as a vehicle through which rural dwellers accumulate assets and wealth; societal recognition is the function of herd size. Consequently, losing livestock is directly associated with the loss of societal recognition (Schilling et al. 2012). A household head who loses significant assets to cattle raids may therefore resort to migration. Household interviews and FGDs revealed that most of the permanent migrants are those who lost all of their assets. The respondents' desire to maximise their herd sizes validates Herskovits's (1926) cattle complex theory. Livestock is therefore a fundamental form of pastoral capital, which is the means through which wealth is stored (Behnke, 2008). The loss of assets in the region is more severe in border villages and in communities close to the *Rugu* forest. A porous border condition, which makes the proliferation of small arms possible, has been indicated as a possible reason behind the poor security in the border villages. The efforts of the security

forces to expose the suspected cattle rustlers in *Rugu* forest have recorded little success. This situation has led to a call for the constituted task force to re-energize, re-strategize and be more proactive in the war against cattle raiding

Raiding can directly lead to the loss of lives and properties and indirectly contributes to the spread of diseases. The overwhelming majority of the respondents (92%) indicated that the population in their villages had significantly reduced since the inception of cattle raiding. Apart from the loss of lives, rural outmigration and displacement were the major factors responsible for the trend. This has also had a retarding effect on the rural workforce. Furthermore, checks have revealed that 6 out 10 rural out-migrants are skilled or semi-skilled workers whom were optimistic of a problem free adaptation to the new environment. This further confirms the finding of Gray (2009), who documented that out-migration has a lost labour effect. In addition to the loss of lives, there has been a widespread of diseases in the raided villages. Different degrees of injuries have been sustained by men, women and children. In some extreme cases, patients have had to travel for an average of 60 kilometres to metropolitan areas in order to received better medical attention. Similarly, respondents lament the disruption to community health services during intensive cattle raid periods, which has further aggravated child and maternal death rates. Given by such circumstance, the attainment of SDGs in such communities can at best be described as "myth".

The provision of quality child education is one the most important indicator of prosperity and well-being in pastoral societies. There is growing concern regarding the dilapidated state of rural schools in terms of infrastructure, superstructure and the nonchalant attitude of students in rural areas within the region. The average schooling hours have consistently dropped from 7 hours to 0 hours during the extreme raid periods. This, in the same manner as the rural health sector, also requires comprehensive restructuring, repositioning and re-strategizing for effective service delivery. Furthermore, the weekly market seems to be the bedrock of commercial activities in most rural economies. The market is not only the medium through which agricultural produce is traded in large quantities, but it is also facilitates the paths through which backward and forward linkages are maintained between the traditional and modern sectors of the economy. Rural markets play an important role in the remoteness-well-being relationship (Stifel & Minten, 2017). It is equally the vehicle that ensures the

needed diversity in sustainability rural development. Any activities that disrupt the operations of rural markets would be highly detrimental to rural well-being. The normal operations on market days in the cattle rustling rampage rural areas in Nigeria have been hampered, thereby depriving rural dwellers in the region from access to various essential commodities, thus triggering rural outmigration. The lack of secure markets could endanger economic insecurity in the pastoralist communities (Schilling et al. 2012; Speranza, 2010).

5.3.3 Migration

Table 5.3 presents the results for the regression predicting the elasticity of different rural outmigration in pastoralist communities. The estimated models met the OLS regression assumptions and fits the data well (f-statistics, which measures overall adequacy, is significant). The estimated coefficient of relative deprivation for all the models is positive and significant (the calculated t-values are greater than 1.96 rule of thumb), implying that rural outmigration increases as rural dwellers feel relatively deprived. Moreover, the propensity of relative deprivation in the permanent migration equation is higher than for transitory migration (0.43 > 0.35). This implies that the more households feel relatively deprived, the more they embark on permanent migration.

The coefficient of the number of livestock lost is positive and significant, which implies that the more the livestock lost, the greater the rural out-migration. The disaggregate coefficients of the variable show varying elasticities. Holding other variables constant, the number of livestock lost to cattle raid influences the tendency for transitory rural out-migration by 0.73 ($p<0.01$). This is significantly higher compared to the permanent migration, which has 0.33 ($p<0.05$) magnitude. This finding implies that households who lost substantial numbers of livestock have less incentive to embark on permanent migration. Moreover, respondents who have relatively diversified sources of income (occupation diversity) were found to migrate temporarily. The estimated coefficient of longevity into non-livestock occupation is positive (0.81) and significant ($p<0.05$) in the transitory migration model. This can possibly be explained in part by their engagement in off-farm sources of livelihood and their minimal reliance on cattle related activities. However, during intensive raid periods, economic activities decelerate.

Table 5.3. Coefficient of rural out-migration

Variable	RMR	PRM	TRM
RD_{dum}	0.63**	0.43**	0.35**
	(3.52)	(2.98)	(3.11)
NLL	0.43**	0.33	0.73**
	(2.74)	(1.98) *	(3.58)
LNLO	-0.41	-0.10	0.81*
	(1.44)	(1.31)	(2.54)
PRIL	0.62**	0.52**	0.28*
	(2.89)	(2.89)	(2.15)
PM	0.56**	0.16*	0.15
	(5.84)	(2.14)	(1.21)
LIT	0.55**	0.74	-0.55
	(2.59)	(3.18) **	(1.38)
CRI	0.81*	0.32*	0.21
	(2.21)	(2.11)	(1.32)
HDS	0.43**	0.21	-0.76**
	(2.67)	(0.45)	(3.25)
R^2	0.40	0.33	0.42
F	12.61**	9.31**	11.25**
	(0.000)	(0.000)	(0.000)
X^2 Breusch-Pagan	1.23	0.23	1.02
	(0.6233)	(0.9370)	(0.7583)
X^2 normal	0.5211	0.4492	0.2014
N	518	338	641

*&** denotes significant at the 0.05 and 0.01 levels, t-values in parenthesis

The schematic framework (Figure 2.4) shows that rising cattle theft could lead to the temporary closure of the market, which in turn could affect household income diversity. Thus, households with diversified occupations are predicted to embark on temporary migration. Besides that, the rise in rural transitory migration is attributed to emotional factors, such as homesickness (Morse & Mudget, 2017). Moreover, cattle raid intensity is positive and statistically significant in the overall migration and permanent migration model. The estimated coefficient of the variable is positive (0.21) but not significant ($p>0.05$) in the transitory rural out-migration model. Therefore, the study found that permanent migration increases with the cattle raid intensity. This is consistent with the results highlighted in Table A5 in appendices. Similarly, the herdsmen

with large herd sizes were found to migrate permanently more than those with less. This is based on the estimated parameter of 0.21 in Equation (5.4), but not statistically significant ($p>0.05$). In this sense, rural out-migration can be perceived as insurance against the vicious cycle of cattle rustling. Similarly, it can be discerned from Table 5.3 that there is evidence of a rural brain drain, as a significant number of permanent out-migrants are literate. Holding other factors constant, literacy influences permanent migration by 0.55 ($p<0.01$). However, this revelation should be approached with caution, as it does not confine permanent migration to the literate rural dwellers. The findings predict that less literate rural dwellers are likely to embark on transitory migration. This could be because less literate rural out-migrants may find it more difficult to adapt to new surroundings.

5.4 Conclusion

This chapter analyses the role of cattle raids on rural out-migration within the relative deprivation framework. Rural out-migrations were bifurcated into permanent and transitory migrations and their respective elasticities were estimated from the data sourced from the survey conducted on the cattle raid plagued communities in Nigeria. It was found that the number of livestock lost, the cattle raid intensity, and the herd size are all significant determinants of permanent migration. On the other hand, income diversity and illiteracy are important factors accounting for transitory rural out-migration. In general, relative deprivation was found to be the push factor, while persistent migration (used here to measure the success or otherwise of the previous out-migrants) was the pull factor accounting for overall rural out-migration. The status of rural infrastructure is a further source of relative deprivation, which in turn could trigger more rural out-migration. Thus, rural livelihood enhancement intervention embedded within the context of conflict mitigation mechanism is required to decrease the perceived relative deprivation.

CHAPTER 6
RURAL ATTACHMENT AND INCOME INEQUALITY

6.1 Introduction

The renewed interest in migration studies in the last two decades was informed by the development in the world economies that appeals for an alternative view of migration outcomes beyond what was hypothesised in the both the Lewis (1954) and the Todaro (1969) migration theories. Three major events highlighted the degree of manifestation of the socially constructed shocks which cut across all the continents of the globe: the US financial crisis, Arab's spring and organised crimes (terrorism, cattle rustling and the likes). Even though countries were hit with different proportion of these extreme events, but yielded unwanted movement within and between nations as its common consequences in which major world economies are struggling to control. In Africa, specifically Nigeria is hit by all the three phenomena. Extant studies and security reports have traced the link between organise crimes and terrorist groups in *Maghrebian* countries (Agbiboa, 2013; Higazi, 2016; Ibrahim et al. 2016; Olaniyan & Yahaya, 2016).

Dry season migration to rural and urban places in the West African savanna and coastal zones is the most prevalent type of extra-local movement (Grolle, 2013). In Nigeria however, particularly since the beginning of the pervasive cattle theft crisis, migration has assumed a different dimension and intensity that is completely distinct from the traditional practise. Economic deprivation and organised crime have intensified and widen the migration paradigm paving the way for transient and permanent migration. The predominant pastoral communities in the northern part of Nigeria is characterised by a significant infrastructural gap. Stressing the magnitude of undue pastoral marginalisation, Ibrahim (2012) argued that despite their overwhelming numerical strength, constituting more than 10 % of the country's populations, yet, they were continuing to be left out in decision making affecting their livelihoods and

rendered them to benefit little from developmental programmes (Aliero & Ibrahim, 2012; Ibrahim et al. 2018).

Literature on economic migrations and pastoral development discourse in SSA is limited, its importance should not be underestimated (McCabe et al. 2014). The extant researches primarily focus on the questions justifying the rationale behind migration. Some scholars suggest that migrations are driven by necessity or poverty (Grolle, 2015; Loftsdottir 2008; McCabe et al. 2014; Milbourne, 2007), migrations to other places that offered the promise of more option for youth (Mudgett, 2015), deprivation and marginalisation (Stark & Taylor, 1991) and others conclude are driven by choice (Hampshire, 2002; Greiner & Sakdapolrak, 2013; McCabe et al. 2014), displacement and security (Potkanski, 1997; Maconachie & Binns, 2007; Kaimba et al. 2011; Ibrahim et al. 2016). Many scholars suggest that migrations are a family-level decision that aims to reduce risk for the entire family (Loftsdottir, 2008). Hoggart (2007) has attempted a class transition migration question by examining the changing presence of the working classes in rural areas in UK. However, the study does contradict certain assumptions within the context of rural paradigm that deals with the issue of forceful displacement of working-class group from rural areas.

Emotional feeling of rural of sickness is another important factor in rural migration question. Attachment to non-human aspect of the place (for example, environmental factors) for people who spent their childhoods in rural environments have a different frame of reference for what constitutes home (Morse & Mudgett, 2017). Undoubtedly, households longed not only for people and places left behind, but also natural environmental like landscape and vegetation which are rarely available in modern cities (Morse et al. 2014; Mudgett, 2015) and this has received little quantitative attention in the literature. Similarly, few extant studies have analysed how subjective deprivation may be linked to cattle rustling which in turn may trigger rural out-migration. Besides that, the multidimensionality of the cattle raid induced migration, particularly a class-based analysis has often gone unacknowledged in the literature.

Rural population studies have been criticised for providing a rather narrow focus on uni-directional, long distance and permanent movements of people in rural places. What is needed, it is claimed, is a more sophisticated approach that is able to capture a broader range of spatial scales and temporalities associated

with rural mobility (Milbourne & Kitchen, 2014). This chapter builds and present new challenges for traditional rural out-migration questions, addressing the following questions: why do cattle raid induced rural migration resulted in both transient and permanent migration? Specifically the question sought to dig out why rural out-migration outcome is not linear and what special quality (or characteristics) dictates the path that out-migrant follows? The last question was drawn on the argument that neglecting to examine the migrants' feelings for places, literature potentially missed important emotional dimensions of attachment to both the non-human world (Morse et al. 2014; Morse & Mudgett, 2017). Thus, does homesickness due to the environment or human attachments produce seasonal or transient rural migration?

Following the Smith critique in the last decade that the trends in rural population research have largely abandoned quantitative approaches to population change (Smith, 2007), whether these involve spatial analyses of national population datasets or specially commissioned surveys of households in particular localities, replacing these with place-based qualitative accounts of the social-cultural consequences of rural population change (Milbourne, 2007). This study is an integrative approach of place-based qualitative and class-based changing rural population built on quantitative statistical analysis. This approached would provide more sophisticated, theoretical and a detailed empirical accounts of rural population change and its social and cultural consequences (Smith, 2007; Milbourne, 2007).

6.2 Econometric Strategy

The empirical model specified to estimate the regression coefficients is given as:

$$y_i = \alpha x_i + \delta w_i + \beta z_i + \varepsilon_i, \tag{6.1}$$

where y_i is the income for *i-th* migrant's household; the x_i measures the migrant's attachment to rural areas (its detail computational procedure was discussed below); while w_i is a vector of cattle rustling variables which includes the dummy variable of cattle rustling (1= affected, 0= otherwise), value of livestock raided, and non-herding asset rustled; moreover, z_i is a vector of relevant control variables which include age, gender, household size, and

literacy (years of formal school). Finally, ε_i is a white-noise error term which conforms the assumption of identically and independently distributed with zero mean and constant variance.

The conceptual definition of rural attachment determines the components used for the measurement of x_i. This study follows the psychological approach of conceptualising *attachment*. Ainsworth (1989) defined an attachment as the affectional tie of a child to it caregiver that is long-lasting, emotionally salient, person-specific, and involves the child's attempts to use the caregiver as a secure base from which to explore and a safe haven in times of threat. This established a major aspect of attachment related to human factors without recourse to non-human resources. Moreover, understanding that households not only long for people, but also for the natural environment adds non-human dimension of rural attachment (Morse et al. 2014; Mudgett, 2015). In this sense, attachment theory includes a list of some of the stimuli that initially elicit caregiving, such as pervasive concern, care, and responsibility (Shaver & Fraley, 2000) which would ultimately lead to improvement in welfare and could play crucial role in cooperative social relationships (Ainsworth et al. 1978; Gross et al. 2017). This broadly attributed the attachment to include varieties of natural resources that could enhance individual well-being. Bowlby (1982) argued that attachment theory entails keeping caregiver and care-receiver in close proximity.

In Equation (6.1) x_i as a dummy variable equals to 1 if a migrant is 6urally attached; and 0 if otherwise. To compute x_i the study assigns an attachment score according to household's longing to each of the indicators presented in Table 6.1. The maximum attachment score is 100 percent given that each component is equally weighted. This study further adopted the computational procedure of the UNDP, which is often used in calculating HDI:

$$IndexA_i = \frac{A_i - A_{min}}{A_{max} - A_{min}}, \qquad (6.2)$$

where A_i is the observed value of an indicator of sub-component, A_{min} is the minimum value, and A_{max} is the maximum value of an indicator. Components with more than one indicator were derived simply by averaging the values of the sub-components. The calculated index ranges from 0 to 1, with 1 indicating rural

attachment. A cut-off of 50 percent is used to separate between rurally attached household from the non-attached household.

This study used an iterative process to analyse the quantitative data and qualitative responses generated from the structured questionnaire. Then OLS method was applied in the estimation of the parameters in Equation (6.1). The coefficients of the covariate were evaluated at the 95% confidence level, with *p*-values less than 0.05 identified as significant.

Table 6.1. Variables used for constructing attachment to human and non-human index

Component (weight)	Sub-component (weight)	Indicators (weight)	Attached if ….
Human (1/2)	People (1/4)	Family (1/8)	A household long for his family
		Relatives (1/8)	Relatives are residing in rural areas
	Social networks (1/4)	Self-help groups (1/8)	Household is an active member
		Saving and credit societies (1/8)	Household enjoys rotating saving and credit
Non-human (1/2)	Ecological resources (1/4)	Vegetation (1/16)	The household is accustomed rural vegetation
		Agricultural land (1/416)	Household engage in crop production
		Landscape (1/16)	A rural houses is landscaped
		Soil (1/16)	There is no erosion epidemic
	Natural resources (1/4)	Rocks and mountains (1/8)	Household live in mountainous areas
		Fresh air (1/8)	There is minimal air pollution

It is important to note that the OLS estimator provides only a partial view of the interaction among the variables specified in Equation (6.1). This is in contrast to Quantile Regression (QR), which permits the examination of the impact of covariates on different quantiles of the response distribution. Thus, QR provides a more comprehensive picture of the effect of the predictors on the response,

as it specifies changes in the quantiles of the distribution. Recentered Influence Function (RIF) within the context of QR allows the examination of the impact of changing the distribution of regressors on the marginal quantiles of the income distributions $F_y(y)$.

The empirical strategy of RIF proceeds by estimating the sample quantile q_τ, the density function $f_y(q_\tau)$ of the quantile using kernel methods, and forms a dummy variable of 1 if $y \leq q_\tau$, and 0 otherwise, which is called the Influence Function (IF). Then, RIF can be obtained by adding the sample quantile with IF, as given in Equation (6.3):

$$RIF(y; q_\tau, f_y) = q_\tau + \frac{\tau - 1(y \leq q_\tau)}{f_y(q_\tau)}. \tag{6.3}$$

Following Firpo, Fortin and Lemieux (2009), the conditional expectation of the RIF i.e. $E[RIF(y; q_\tau|X)] = X\beta_\tau$ can be modelled as a linear function of predictor variables, while the regression coefficients present a marginal effect of the variables on quantiles of the income distribution. In this way, the mean of RIF at the тth quantile equals the conditional quantile q_τ which seems to be the important theoretical property of RIF (Ibrahim et al. 2018).

Furthermore, the Propensity Score Matching (PSM) of Rosenbaum and Rubin (1983) was applied to address the potential endogeneity issues of Equation (6.1). Caliendo and Kopeinig (2008) advocated using multiple algorithms, rather than just one, to test the required assumptions of PSM. Moreover, in testing the robustness of estimation, the study used counterfactual decomposition proposed by Machado and Mata (2005). Households were then decomposed into two: rurally attached and non-rurally attached. Then, three impulse multipliers were used to examine the estimated coefficients. The χi *effect* measures the extent to which rural attachment contributes to various income differences. Then *cattle rustling effect* measures the extent to which differences in income across quantiles are driven by cattle rustling factors rather than other covariates, while *characteristics effect* measures the impact of household characteristics on various income quantiles.

Table 6.2. Basic descriptive statistics

Variable codes	Description	Units/levels	Mean	*t*-test
AMI	Average monthly income	Count	82.47[a]	2.61[**]
RMR	Number of household members engaged in rural migration	Count		
SRM	Seasonal migration	Count		
TRN	Transient migration	Count		
PRM	Permanent migration			
VAL	Value of assets lost (herding and non-herding)	Valuation naira but converted in USD at 305=$ (2017)	314.75 [a]	
HMSK	Homesickness	Ordinal scale 1-5	2.15	
EATC	Environmental attachment	Ordinal scale 1-5	4.32	
LIT	Years in formal education	Years	3.02	
CRI	Intensity of cattle raid	2 = intensive, 1 = moderate, 0 = otherwise	1.73	
HDS	Herd size	43	14	3.56[**]

[a]USD, [*&**] denotes significant at the 0.05 and 0.01 levels

6.3 Results and Discussion

6.3.1 Household Characteristics

Table 6.2 reveals that vast majority households are living on below 1USD per capita and the average monthly income across the survey households is 82USD. Mean comparison test reveals a significant reduction income between pre and post raiding periods (*p<0.01*). The main source of livelihoods is agro-pastoralism which embodied the mixture of crop production and rearing of livestock. Crop production is mainly subsistence in nature, thus relying on selling of livestock as their main source of income. However, remittances from family members living away from home and women's crafts supplements the income stream of some

households. The average herd size is 14 and a significant decrease in herding holdings was found since the inception of cattle theft (*p<0.01*). Households who lost a significant number of livestock have no option than to migrate (being a strategy adopted to improve employment, housing and welfare) because livelihood diversification in agro-pastoral areas are substantially built around livestock related activities.

Cattle raiding could adversely affect environmental sustainability because household that cannot migrate mainly engage in activities capable of degrading the environment (such as making firewood). Since classical population theory best fitted Nigeria's situation, environment problem in the urban centres are likely to exacerbate due to more pressure on fixed resources (Jolly, 1994) which may eventually lead to environmental degradation. Massive urban influx through rural migration may limit the effectiveness of conservative policies, and indeed further casts doubt on the effectiveness of the implementation of SGDs. This stem from the complex link between environmental degradation and the migration hypothesised in dependency theory.

6.3.2 Categorization of Migrants by Wealth and Age Distribution

The aim here is to trace the associations between different classes of the out-migrants in a bid to determine the predominant category from each of the migration type. This is crucial in establishing whether migration typology is influence by push or pull factors. To this end, total livestock unit (TLU) per capita were calculated based on which households were classified into the wealth category as presented in Table 6.3. This approach of categorising wealth status of agro-pastoralist and pastoralist has received significant wider adoption by scholars, arguably since Potkanski's (1997) pioneered the application in pastoral question (for instance, see Ducrotoy et al. 2017; McCabe et al. 2010; McCabe et al. 2014; Sieff, 1999).

Seasonal migration is mainly in response to economic conditions. Result in Table 6.3 shows no significant class difference (*p>0.05*) among the seasonal out-migration. This is consistent with the previous studies that the poor youth are mainly a labour migration in search of work in the urban areas in the post - harvest period (McCabe et al. 2014) while wealthy households increasingly invested in urban properties (Fredrick, 1961; McCabe et al. 2010) and other their

portfolio (Ibrahim et al. 2017) and then felt they needed to be in the towns to look after their investments (Fredrick, 1961).

Table 6.3. Multiple correspondence analysis of rural out-migration

Type	Wealth category							Age brackets				
	DT[a]	VP[b]	PO[c]	MD[d]	MW[e]	WL[f]	χ^2 >p	18-30	31-45	46-65	66>	χ^2 >p
PRM	0.03	0.07	0.12	0.18	0.31	0.29	0.002[**]	0.21	0.35	0.33	0.11	0.041[*]
TRM	0.09	0.19	0.20	0.21	0.12	0.19	0.130	0.14	0.16	0.36	0.34	0.013[*]
SRM	0.15	0.20	0.21	0.18	0.16	0.10	0.260	0.36	0.31	0.25	0.08	0.020[*]

Notes: [a,b,c,d,e and f] represent destitute, very poor, poor, medium, moderately wealthy & wealthy. [*&**] denotes significant at the 0.05 and 0.01 levels

A potential distributional issue arises as there might be less working population in rural areas. In the multi-correspondence result has evidence to support the claim of drain in the working population, the result shows that 92%, 64% and 89% of the out-migrants fall within 18 – 65 age brackets for seasonal, temporary and permanent migration, respectively (*p<0.05*). An older household head often resisted migration because of strong attachment to both human and environmental factors of their villages. "I would rather die and bury close to my ancestors than to leave my village" claimed by an elder statement during FGDs session.

The class issue is apparent in permanent migration. 68% of wealthy households of 31 – 65 age categories migrated. The synthesis of this result with the Murdoch (1995) hypothesis that high scale of rural out-migration has led the middle-classes 'captured' rural spaces, provides sufficient evidence to the claim that cattle rustling potentially induce capital flight.

Moreover, the transient migration has often heightened during intensive raiding period. The study found no significant difference in the wealth category in the temporary migratory segment. The number of households in wealthier category is quite small, making it extremely difficult to discern any underlying patterns. However, it was found that 70% of households above 45 years significantly embarked on transient migration. Youth within 18 – 45 age brackets are very repellent as such tasks of securing their communities heavily rest on them. This study challenges the claim that migration is limited by peasant

Table 6.4. Regression analysis: OLS and Quantile of rural attachment

Variables	Dependent variable: migrant's household income									
	OLS	Q_10	Q_20	Q_30	Q_40	Q_50	Q_60	Q_70	Q_80	Q_90
	0.305**	0.463**	0.413**	0.401**	0.383**	0.234**	0.187**	-0.215**	-0.162**	-0.150**
	(5.87)	(4.15)	(5.21)	(8.64)	(4.47)	(3.21)	(6.42)	(-3.56)	(-8.45)	(-6.32)
Cattle rustling effects:										
Cattle raid_dummy	-0.271**	-0.063**	-0.085**	-0.101**	-0.135**	-0.164**	-0.193**	-0.215**	-0.162**	-0.150**
	(-4.31)	(-4.15)	(-5.21)	(-8.64)	(-4.47)	(-3.21)	(-6.42)	(-3.56)	(-8.45)	(-6.32)
Livestock lost	-0.252**	-0.044**	-0.071*	-0.903**	-0.982**	-0.133*	-0.145*	-0.215**	-0.162**	-0.150**
	(-3.67)	(-4.15)	(-2.33)	(-8.64)	(-4.47)	(-2.21)	(-2.12)	(-3.56)	(-8.45)	(-6.32)
Non-herding asset lost	-0.295**	-0.063*	-0.071**	-0.074*	-0.083**	-0.086**	-0.089*	-0.215**	-0.162**	-0.150**
	(-3.87)	(-2.15)	(-5.21)	(-1.98)	(-4.47)	(-3.21)	(-2.42)	(-3.56)	(-8.45)	(-6.32)
Demographic effects:										
Household's age	-0.104**	-0.113**	-0.153**	-0.173	-0.196**	-0.210**	0.031*	0.042	0.187**	-0.215**
	(-3.85)	(-5.21)	(-7.63)	(-1.41)	(-5.33)	(-6.24)	(2.42)	(1.15)	(4.42)	(-5.55)
Household's gender	0.432*	0.315**	0.362**	0.364**	0.411**	0.483*	0.234**	0.187**	-0.122	-0.140
	(2.36)	(5.17)	(4.11)	(4.41)	(5.64)	(2.17)	(3.21)	(6.42)	(-1.16)	(0.92)
Household size	0.171**	-0.046**	-0.053**	-0.061**	0.108**	0.125**	0.153**	0.171**	-0.113**	-0.134**
	(4.15)	(-4.31)	(-5.21)	(-6.98)	(4.47)	(7.10)	(5.22)	(4.64)	(-4.47)	(8.21)
Literacy	0.032**	0.035**	0.038**	0.041**	0.046**	0.061*	0.093*	0.102**	0.184**	0.210**
	(6.43)	(4.15)	(5.21)	(8.64)	(4.47)	(2.17)	(2.14)	(4.16)	(6.25)	(3.81)
R^2	0.33	0.28	0.27	0.28	0.29	0.28	0.27	0.29	0.28	0.29
Observation						1750				

*&** denotes significance at the 0.05 and 0.01 levels, respectively.

through exemplification of Marxian transition from the customary agro-pastoralism to industrial labourers (McMichael, 1997; Minkoff-Zern, 2017; van der Ploeg, 2010). The finding in this study that migration is invariant to the wealth category has offered new insight into the rural migration question.

6.3.3 Coefficients of Rural Attachment and Income Inequality

The estimated result of Equation (6.1) was presented in Table 6.4. For ease of exposition, OLS results are we presented in Column (2) while Q_10 – Q_90 in Columns (3) – (11) were the summary of quantile regression. Analysing the relationship between χ_i and migrant's income, OLS result shows that low-income migrants were more attached to rural areas. This result adheres to *apriori* expectation and consistent with previous rural migration literature (McCabe et al. 2014). Moreover, the estimated coefficient shows that in every unit of migrant's income, 0.31 units emanated from activities related to the factors used in constructing χ_i (financial integration, social network natural resources, and ecological resources, etc.). Similarly, cattle rustling variables revealed a strong negative effect on household's income. However, the impact is stronger on higher income quantiles.

Quantile regression offers a complete picture of the relationship between the variables than OLS. Because it computes various percentage points of the distributions while OLS only gives a summary of the distribution corresponding to the set of covariates. The estimated quantile result shows that rural attachment has a larger impact on the lower quantiles of the migrant's income and becomes weaker as income increases. The effect was, however, negative on the higher quantiles of the migrant's income (from the 70th to the 90th quantile).

6.3.3.1 Robustness Test

Robustness check was run to resolve the potential endogeneity problem in the model. Following Caliendo and Kopeinig (2008), Gimenez-Nadal and Molina (2016), Zhang and Posso (2017) the study runs Propensity Score Matching (PSM) with multiple matching algorithms. The results presented in Table 6.5 shows that in all the estimated methods, the coefficient of Average Treatment effect on the Treated (ATT) is closer to the coefficients of OLS with the same

level of significance. For instance, using kernel as the matching algorithm of kernel yields an ATT of 0.314 that migrant's income will be approximately 30 percent higher for the emigrants not rurally attached.

Table 6.5. Propensity Score Matching

Matching method	ATT	
	χ_i **coefficient**	**Cattle rustling coefficient**
1-Nearest neighbour (one-to-one)	0.318**	−0.288**
	(0.041)	(0.072)
4-Nearest neighbour	0.320**	−0.293**
	(0.036)	(0.066)
Radius	0.311**	−0.291**
	(0.052)	(0.084)
Kernel	0.314**	−0.287**
	(0.048)	0.068
Local linear regression	0.309**	−0.274**
	(0.037)	(0.052)
Baseline results		
OLS	0.305**	−0.271**
	(0.052)	(0.044)

** denotes significant at the 0.01 level

Note: Standard error in parenthesis

Further robustness test based on Machado and Mata (2005) in Table 6.6 is consistent with the previous results by having that from 10th to the 60th quantiles, the proportion of χ_i *effect* is higher than both the *cattle rustling effect* and *characteristics effect*. This suggests that cattle rustling and household characteristics were not attributing to income inequalities for the low-income households.

Table 6.6. Machado and Mata (2005) counterfactual decomposition

	Q_10	Q_20	Q_30	Q_40	Q_50	Q_60	Q_70	Q_80	Q_90
χ_i	50.32	44.54	41.25	39.78	35.90	33.00	30.16	25.96	22.67
Cattle rustling effect	28.54	31.21	33.75	35.01	35.12	35.34	36.03	36.83	38.23
Characteristics effect	21.14	24.25	25.00	25.21	28.98	31.66	33.81	37.21	39.10
Total					100				

Note: Q_10 to Q_10 indicate quantiles from 10 to 90

The effect of three coefficients reached equilibrium at the 50th and 60th quantiles. However, the *cattle rustling effect* and *characteristics effect* exceed *χi effect* at the 70th, 80th and 90th quantiles. This indicates that income inequalities in high-income households might be driven by cattle rustling and perhaps the level of literacy among the other characteristics.

Table 6.7. Re-estimating y_i with the varying migration component

Excluded	SRM		TRM		PRM	
y_i:	χi coef.	Cattle coef.	χi coef.	Cattle coef.	χi coef.	Cattle coef.
OLS	0.293**	−0.288**	0.284**	−0.253**	−0.201*	0.043*
	(3.44)	(−5.32)	(4.13)	(−7.11)	(−3.41)	(2.18)
Q_10	0.289**	−0.213**	0.264*	−0.198**	0.031	0.003
	(6.32)	(−3.31)	(2.21)	(−5.32)	(1.24)	(1.10)
Q_20	0.287**	−0.222**	0.251**	−0.202**	−0.192*	0.052
	(5.14)	(−6.33)	(4.33)	(−3.52)	(−2.23)	(1.24)
Q_30	0.277**	−0.211**	0.242**	−0.221**	−0.222**	0.402
	(8.52)	(−8.12)	(5.12)	(−4.13)	(−2.63)	(0.87)
Q_40	0.265*	−0.208**	0.231**	−0.234**	−0.210**	0.022*
	(2.23)	(−4.22)	(4.14)	(−5.01)	(−4.38)	(2.13)
Q_50	0.251**	−0.214**	0.265**	−0.245**	−0.176**	0.056**
	(5.21)	(−5.32)	(6.32)	(−7.91)	(−3.31)	(3.82)
Q_60	0.268**	−0.197**	0.267**	−0.247*	−0.152**	−0.152**
	(3.11)	(−5.12)	(3.01)	(−2.11)	(−4.01)	(−5.01)
Q_70	−0.214**	−0.203**	0.217**	−0.250**	−0.152**	0.273*
	(−2.62)	(−3.52)	(7.11)	(−6.31)	(−5.61)	(3.83)
Q_80	−0.213**	−0.218**	0.202**	−0.231	−0.141**	0.283
	(3.48)	(−4.31)	(5.13)	(−1.52)	(−5.11)	(1.10)
Q_90	−0.254**	−0.233*	−0.284**	−0.203*	−0.192**	0.302
	(−6.12)	(−2.32)	(−2.10)	(−2.22)	(−5.24)	(1.44)
N	518		641		338	

Note: SRM, TRM, and PRM are income from seasonal, transient and permanent migrants, respectively excluded from y_i. *&** denotes significance at the 0.05 and 0.01 levels, respectively; *t*-values in parenthesis

Three key finding can be deduced from the foregoing analysis. First, cattle rustling has a strong negative impact on household's income and the impact cut across all households with different income levels. Second, low-income households are more attached to rural areas. As the emigrant's income increases, their attachment to rural area becomes weaker. In this sense, cattle rustling can trigger income inequality. This support the claim that disasters (both

natural and human-induced) could exacerbate the pre-existing inequalities (Fussel et al. 2010).

Additionally, the study estimated the coefficient of various types of migration by systematic elimination of integrative components of y_i as presented in Table 6.7. This permits establishing whether symmetric exclusion of different components of migrant's income would give new insight to the preceding results. The OLS model reveals that the increase in income of permanent migrants decreases their attachment to rural areas. The result is consistent with quantile regression, as rural attachment shows a lower impact from the 50th to the 90th quantiles of the permanent migrant's income. Fear of possible loss of wealth might perhaps explain why wealthy households are less attached to rural areas.

6.3.4 *Environmental Attachment and Migration Coefficients*

Two important variables (coefficients of relative deprivation and transient dummy) in the regression results as presented in Table 6.8 are crucial for addressing the research questions of whether or not the migration of a deprived household is transient in nature. Controlling for transient migration, the study found that one-quarter of rural migration is transient in nature. The coefficient of transient migration is negative and significant ($p<0.05$) implying an inverted U-shaped. On the other hand, the coefficient of relative deprivation is positive and significant ($p<0.01$), meaning that the deprived feelings of the household increases the migration tendencies by 0.38 units.

Attachments to both human (homesickness) and environmental factors exerted significant negative impact on rural out-migration. Among all the categories of migrants, it was transient emigrants that were more attached to the human factors (see Table 6.9). They primarily expressed their affection to the rural environmental factors they missed. Literature on the rural population question hypothesises massive attachments and place-based loyalty, particularly by the low and middle group households (Milbourne & Kitchen, 2014; Morse & Mudget, 2017). Generally, rural dwellers are known to feel strong associations with their home geography (Morse et al. 2014).

Table 6.8. Coefficients of rural migration

Variables	Coefficients	t-value	P
RD_{dum}	0.38**	-3.17	0.002
VAL	0.87*	-2.48	0.013
HMSK	-0.51**	-4.63	0.000
EATC	-0.24**	-4.52	0.000
TRN_{dum}	-0.16*	-2.01	0.040
HDS	0.23*	-2.21	0.015
HHS	-0.12	1.53	0.140
R^2	0.81		
F	7.65** (0.000)		
X^2 Breusch-Pagan	2.13 (0.7313)		
X^2 normal	0.2108		

*&** denotes significant at the 0.05 and 0.01 levels

Another important factor addressing rural migration question in conflict prone remote areas is the risk associated with potential loss of wealth. The coefficient of per capita wealth loss (value of the asset loss) shown in Table 5.8 is positive and significant. One possible explanation for this trend is that household may migrate out of fear (as a preventive) for further loss of wealth while wealthy household whom were not yet fall victim may averse the loss my migrating to urban centres. Similarly, the disaggregate result presented in Table 6.9 reveals that potential loss of wealth can trigger of both categories of out-migration, though the magnitude of transient migration is higher. Contrarily, the results were mixed on the herding holdings. The coefficient of seasonal migration is positive and significant ($p<0.05$) whereas in transient migration is significantly negative. One possible reason for this is because herding migration is usually a customary transhumance movement to the southern part in search of pasture and water in the fall and returning to northern part when the pasture improve toward the tail end in the spring season.

Migration due to cattle raid is not explained by household size. The coefficient of household size is not a significant predictor of in the overall migration, but the negative of the variable can be interpreted as large families with a wide social network may perhaps not migrate. Besides, the process of family member to leave requires wider consultation and is often based on family decision (McCabe et al. 2014). Moreover, relatively deprived household may

exemplified both push and pull factors in the rural migration question. Because relative deprivation coefficient in seasonal migration model has more marginal effect than in other models (0.73 greater than 0.43 and 0.35 in PRM and TRM, respectively).

Table 6.9. Predictors of migration types

Variable	SRM	TRM	PRM
RD_{dum}	0.73*	0.35**	0.43**
	(2.44)	(3.11)	(2.98)
VAL	0.43**	0.73**	0.33*
	(2.74)	(3.58)	(1.98)
HMSK	-0.54**	-0.14**	0.01
	(-4.32)	(3.64)	(1.23)
EATC	-0.66**	0.28*	-0.12**
	(-4.32)	(2.15)	(-2.89)
LIT	0.07*	-0.50	0.34**
	(2.19)	(-1.38)	(3.18)
CRI	0.58	-0.21	0.32*
	(1.24)	(-1.32)	(2.11)
HDS	0.43**	-0.76**	0.21
	(2.67)	(-3.25)	(0.45)
R^2	0.68	0.52	0.43
F	12.61	11.25	9.31
	(0.000)	(0.000)	(0.000)
X^2 Breusch-Pagan	1.81 (0.3130)	1.56 (0.9904)	2.16 (0.2210)
X^2 normal	0.9510	0.4406	0.7426
N	518	641	338

*&** denotes significant at the 0.05 and 0.01 levels, *t*-values in parenthesis

In addition to the capital flight found in the preceding section, that there is also evidence of a rural brain-drain, as a significant number of permanent out-migrants are literate. Although literacy is positive and significant ($p< 0.05$) in the seasonal migration model, is not sufficient to counter the brain-drain claim. This is because of the seasonal migrants are substantially literate, intelligent and smart that can easily cope with the complexities of urban centres. The decision to migrate by illiterate low income household is most often ambivalence (Bouvier & Simcox, 1989; Gray, 2009; McCabe et al. 2014). They need to travel

to urban places, but they are afraid of finding it extremely difficult to settle due to financial barrier.

Moreover, cattle raid intensity is positive and statistically significant in permanent migration model and inverted U-shaped in transient migration model but not significant. Porous border (Ibrahim et al. 2016) which made proliferation of small and light arms in pastoral easier is responsible for rising incidence of cattle raiding (Mkutu, 2006). Households living in border remotes areas close to Niger Republic often cross into neighbouring villages during intensive raiding period.

6.4 Conclusion

This chapter examines the impact of rural attachment on migrant's household income in cattle rustling plagued remote areas of Nigeria. The result reveals that cattle rustling has a strong negative impact on household income and the impact cut across all households with different income levels. Moreover, low-income households are more attached to rural areas than richer ones. Thus, the study argue that dualism between urban and rural area could increase as a result of cattle rustling. If the argument of rural deprivation as a driver of cattle rustling holds, then migration in spite of its importance as a coping strategy, has significantly harm the rural economy because it actually produces a spontaneous change in the rural population distribution, alters the class relation, and drains the working population which could ultimately spark further social exclusion and economic deprivation. Seasonal migration was substantially for economic reason. In search of labour employment for the working class on the one hand. And for wealthy households is for investment and the need to manage their business on the other. The end result is negative rural net capital outflow (RNCO) since rural net capital inflow (RNCI) in the form of remittance from labour wages and business profits is usually low. Besides, it was found in this study that three-quarter of the permanent migrant actually transited from economic migration (Seasonal migration) after they have successfully established sustainable economic opportunities. This open the possibility that the little RNCI is being leaked out back to the urban centres.

The index of relative deprivation 0.89 shown in Table 6.2, was extremely high. However, it is actually not a surprising result given by the social status of

the remote areas surveyed. Deprivation in those areas can be illustrated by the lack of adequate social investment and underinvestment in critical infrastructure. Many agro-pastoral remote areas are actually without the needed social amenities like schools, hospital, dams and other essentials of life. This highlights the principal reason behind an organised cattle rustling as an anonymous discussion with bandits reveals that they are raiding livestock as a transfer of aggression of their social exclusion. Drawing on deprivation, cattle raiding and migration result, the study conclude that despite the potential important aspect of the livelihoods diversification effect of migration, but it has the implication on the rural economy because it actually produce a spontaneous change rural population distribution, alter the class relation, brain-drain and capital flight which at the end may extend social exclusion and economic deprivation.

CHAPTER 7
FINANCIAL INCLUSION AND WELFARE

7.1 Introduction

Much of the debate and controversies over financial inclusion are built around the impact of micro-credit on the reduction of poverty and welfare disparities. This argument is based on the promising performance of financial services on welfare enhancement, especially in a liberalised financial system. Formal participation in a financial system is suggested to offer households immunity against idiosyncratic risks and sudden shocks, because with access to cheap finance, poor households would be able to invest in education and diversify their livelihoods (Aliero & Ibrahim, 2012a; Banerjee, Duflo, Glennerster, & Kinnan, 2015; Bruhn & Love, 2014; Burgess, Pande, & Wong, 2005; Ibrahim & Aliero, 2012; Dev, 2006; Dupas & Robinson, 2013).

The welfare of households as to meet basic needs and sustain increases in income largely depends on access to formal financial services. There is rigorous empirical evidence that indicates a strong positive relationship between financial inclusion and income growth (King & Levine, 1993; Levine, 1997; Levine & Zervos, 1998), and access to finance and poverty eradication (Beck, Demirguc-Kunt, & Levine, 2004). Interestingly, in financial development literature, the findings of both micro- and macroeconomic empirical research are consistent. From the microeconomic viewpoint, studies showed that financial inclusion positively affects household welfare (Aliero & Ibrahim, 2012b; Banerjee et al. 2015; Ibrahim & Aliero, 2012). The literature on financial products even showed that access to formal financial services, such as demand deposit, micro-credit, payment facilities, and micro-insurance, increases household income, empowers women, smoothens consumption, and reduces vulnerability to financial shocks (Aliero & Ibrahim, 2012b; Ashraf, Karlan, & Yin, 2010; Cole et al. 2013; Dupas & Robinson, 2013 Karlan, Osei, Osei-Akoto, &

Udry, 2014; Park & Mercado, 2015). Macroeconomic studies, on the other hand, found a strong positive relationship between financial inclusion and overall human development (Aghion & Bolton, 1997; Chibba, 2009; Galor & Zeira, 1993; Galor & Moav, 2004; Ibrahim, 2014; Sarma & Pais, 2011). However, notwithstanding the growing body of financial development literature, the channels through which formal financial services are affecting poor households continue to be inadequately understood (Demirgüç-Kunt & Levine, 2008).

Extant literature has already provided insights into the welfare implication of financial inclusion for countries at various stages of economic development. However, the paths to welfare enhancement through financial inclusion remain partially acknowledged in financial development literature. Decomposition analysis of the impact of financial inclusion on livelihood activities, particularly within the context of a welfare drive, would resolve the ambiguities associated with the priorities of financial development policies: either deepening the financial sector or increasing outreach. This thesis adds to the literature by examining the robust pathways through which financial inclusion ensures income convergence and enhances welfare parity. The analysis is based on survey data on households from northern Nigeria, where social shocks are particularly severe due to extremism (*Boko haram*) and cattle rustling (*Kiwo haram*). At the same time, the government has implemented several initiatives for promoting a rural banking culture in cognisance of the benefits associated with using financial institutions as a conduit for inclusive development and poverty reduction.

7.2 Empirical Methodology

7.2.1 Econometric Model

Borrowed heavily from Stark and Yitzhaki's (1988) relative deprivation model. Assume a continuous welfare distribution as a function of the income increase as a result of financial inclusion, in the sense that each welfare effect of financial inclusion, as opposed to deprivation, can be represented by the financial status of a household that can sustain a decent welfare $[w, w + \Delta w]$, where $\Delta w \rightarrow 0$. Let $f(w)$ be the cumulative welfare of the household. Then, $i - f(w)$ is the *i-th*

household, whose income is greater than w. Hence, $i - f(w)$ represents a household with a decent living standard, subject to financial status $[w, w + \Delta w]$. The argument is that financial deprivation (exclusion) is an increasing function of an income below w. This is based on the premise that poor and vulnerable households are often excluded from formal financial services due to moral hazard, information asymmetries, and the exorbitant costs of incorporating them into a formal financial system. A simple financial inclusion (FI) model can thus be established as:

$$FI = \int_{lris}^{hris} z[i + f(w)]\delta x. \tag{7.1}$$

Note that $z[i + f(w)]$ is the financial inclusion for (or deprivation $z[i - f(w)]$ for not) having $[w, w + \Delta w]$. If welfare is assumed to be an increasing function of per capita expenditure (or broadly well-being assets), the notation *hris* can be seen as returns from a high-income earning strategy sufficient for $f(w)$. If we observe that $w(FI_1) > w(FD_0)$, then it suffices arguing that financial inclusion is the potential source of the welfare differences between financially included households and financially excluded ones.

Table 7.1. Variables used for constructing financial inclusion

Component (weight)	Indicators (weight)	Included if
Microcredit (1/4)	Agro-credit (1/8)	Accesses agricultural loan
	Other credit (1/8)	Household benefits from other forms of empowerment loans
Demand deposit (1/4)	Savings account (1/8)	Household owns a saving account
	Current account (1/8)	Household uses transaction account
Insurance (1/4)	Micro-insurance (1/4)	Household is insured
Time deposit (1/4)	Fixed account (1/4)	Household invests in a time deposit account

The cumulative welfare of financially included household $w(FD_1)$ is represented by a score of 1 as opposed to 0 for cumulative welfare $w(FD_0)$ for financially excluded household. The financial inclusion must exceed a cut-off of 50%, which is the equivalent of half of the weighted indicators used to distinguish between the two groups of households. The maximum inclusion

score is 100%, given that each component of financial inclusion is equally weighted, as described in Table 7.1.

Financial development literature was built on the 'non-excludability assumption', meaning there is no rule whatsoever barring a household from participation on the formal financial market, other than ignorance, financial illiteracy, irrationality, and other characteristics within the household domain. Given this assumption, the overall welfare distribution (w) of financially included households (FI_w) and that of financially excluded households (FD_w) can be decomposed into explained/composition and the unexplained/welfare, as expressed in Equation (7.2):

$$\underbrace{(FI_w - FD_w)}_{Overall\ effect} + \underbrace{(FI_w - W_c)}_{welfare\ effect} + \underbrace{W_c + FI_w}_{composition\ effect}, \tag{7.2}$$

where W_c is the welfare counterfactual, which accounts for the welfare loss of financially excluded households. To establish the paths to welfare augmentation of the various livelihood activities, the study decompose the low-return income earning (*lris*) and high-return income earning (*hris*) into the proportion of earnings associated the various livelihood strategies, and examine their impact on a household's welfare. Hence, the study analyse the system of equations:

$$W_{1i} = \alpha FI_i + \beta Q_i + \mu_i, \tag{7.3}$$

$$W_{2i} = \gamma_0 + \gamma_1 E_i + \gamma_2 A_i + \varepsilon_i. \tag{7.4}$$

In Equation (7.3), W_i is the level of welfare of the *i*th household (using two proxies: per capita expenditure and well-being index). These proxies were proved efficient in previous studies (e.g. see Dimova & Wolff, 2008; Dzanku, 2015, Gautam & Andersen, 2016; Glewwe & Hall, 1998); FI_i measures financial inclusion (computed by factors explaining household's access to financial services, as highlighted in Table 7.1); Q_i is a vector of relevant control variables, which includes per capita income, household age (measure in year), gender, household size, and literacy (years of formal school); β is the associated vector of the coefficients; μ_i is a white-noise error term, which is identically and independently distributed, with zero mean and constant variance. In Equation (7.4), E_i denotes the vector of monetary earnings from various livelihoods activities, which consists of the profits from own businesses, off-farm wages,

farm wages, earnings from crop production, livestock rearing, and environmental resource extraction; A_i is a categorical variable that controls for unobserved time-invariant characteristics, such as location where i^{th} household is (1 = crisis prone village, 0 = otherwise); while γ_i and ε_i are vector of estimated coefficients and a white-noise error term $\varepsilon_i \sim N(0, \sigma)$, respectively.

There are two salient econometric drawbacks associated with the two pairs of preceding equations: simultaneity and endogeneity. Most households are engaging in multiple livelihood activities. This simultaneity of income streams could lead to the autocorrelation of error term, such that $Cov\left(\varepsilon_i, \varepsilon_j | E_i, E_j\right) \neq 0$. On the other hand, endogeneity arises in the sense that financial inclusion could lead to more income earning opportunities and, thus, higher welfare for financially included households. However, it remains plausible that an income increase could potentially allow households greater access to finance. To eliminate these problems, the study first used primary data, where a restriction is imposed on a single option in designing the question on primary occupations and its associated income in the questionnaire. Second, the potential endogeneity issue was addressed by applying the PSM of Rosenbaum and Rubin (1983), based on multiple algorithms, as suggested in Caliendo and Kopeinig (2008).

The OLS method was applied in the estimation of the parameters from the preceding equations. Moreover, owing to the deficiency of OLS capturing variable inter-relationships at different points in the conditional income distribution, the study further apply quantile regression. In testing robustness, the counterfactual decomposition proposed by Machado and Mata (2005) was applied. Households were decomposed into financially included and excluded. Then, two proportional multipliers were used to examine the estimated coefficients: the *coefficient effect* measures the extent to which differences in income across quantiles are driven by financial inclusion rather than other covariates, while the *characteristics effect* measures the extent to which household characteristics contribute to the various income differences.

7.2.2 Empirical Strategy

The empirical measurement of variable FI depends on it conceptual definition. Two issues are relevant to conceptualizing financial inclusion, as opposed to

financial deprivation: definition and measurement. Consequently, financial inclusion is defined as vulnerable households' ability to access useful and affordable financial products and services, such as transactions, savings, credit, and insurance (Aliero & Ibrahim, 2012a; Ashraf et al. 2010; Donou-Adonsu & Sylvester, 2016). These financial products were measured in this study similarly to the main approaches adopted in macroeconomics literature. For instance, one strand of the literature measures financial access as a proxy of the proportion of individuals with transaction accounts or the size of the banked population (Ibrahim, 2014; Massara & Mialou, 2014; Park & Mercado 2015). Moreover, an equally weighted five-pillar approach, consistent with the contextual objective of financial inclusion (transaction, smoothing, and resilience), was adopted as a methodological strategy for measuring FI. Therefore, the study used variables that determine whether a household is accessing either micro-credit, demand deposits, time deposits, or insurance from the formal financial market. Moreover, the standardization of the components of FI follows similar strategy to the UNDP (2014) computation of the multidimensional poverty index.

On the other hand, welfare was measured by two proxies: per capita expenditure and well-being index. Previous research used the logarithm of per capita expenditure as a simplified measure of welfare (see Dimova & Wolff, 2008; Glewwe & Hall, 1998). Moreover, the components of the self-reported well-being index, measured by wide range of livelihood assets and income, consumption expenditure, health factors, and other relevant factor that ensure happiness and add quality to household life, are presented in Table 3.1. This follows the relevant literature that advocates a self-reported measure of welfare by constructing a well-being index (see Table A3 in appendices), which considers the multidimensionality of prosperity by combining non-money metrics and monetary indicators of the living standard (Dzanku, 2015; Gautam & Andersen, 2016; Grosse, Harttgen, & Klasen, 2008; Krishnakumar & Nagar, 2008).

7.3 Data and Descriptive Statistics

As stated in chapter one, data were collected in phases, between October 2014 and September 2015. The study adopted a stratified multi-stage sampling

procedure, which involved simultaneous determination of survey area and respondents. Moreover, villages with existing formal financial institutions were purposely selected, so that the decision of households not to use financial services is not due to a lack of banking outreach.

The data seemingly provide the dynamics of financial inclusion and relevant livelihood activities. The survey questionnaire was designed to solicit a considerable amount of details on demographics, income sources, access to formal financial services, and relevant well-being indicators. However, out of the 1,750 surveyed households, 68 (or 4%) were unable to provide complete information on some indicators for the well-being index, either by omission or commission. To avoid bias, 4% of the data were adjusted for the missing data by standardizing the components of the well-being score. This accounted for slight differences in the data used for the proxy of welfare: 1,750 and 1,682 observations for the per capita expenditure and well-being index, respectively.

Table 7.2. Descriptive statistics of financially included and financially excluded households

Variables	Overall	Financially included	Financially excluded	*t-value*
Gender (1 = male) (µ)	0.739	0.277	0.723	-13.982**
Age (µ)	42.510	41.321	43.584	-1.630
Household size (µ)	12.163	10.442	13.643	-8.543**
Literacy (µ)	2.773	3.011	2.329	4-732**
Per capita expenditure (µ)	2.504	2.601	2.454	3.442**
Well-being score	0.412	0.583	0.387	6.221**
Financial inclusion (µ)	0.276	1.000	0.000	-
N	1,750	483	1,276	

Note: ** denotes significance at the 0.01 level.

The stratified descriptive data show that, despite moderate overall financial inclusion scores (approximately 28%, as per Table 7.2), financially included households have relatively more favourable statistics in terms of welfare and overall human development. This leads to the central conjectures this study addresses systematically: the welfare effect of financial inclusion > 0, financial inclusion effect on various income distribution > 0, and income (or welfare) convergence $Q\_50 - Q\_10 < 0$ and $Q\_90 - Q\_50 < 0$.

7.4 Results and Discussion

7.4.1 Regression Results

The estimated results of Equation (7.3) are presented in Table 7.3. Iteratively, the objective here is to establish the major determinants of household welfare. Models (7.1) and (7.2) are the overall estimates using per capita expenditure and the well-being index, respectively. Models (7.1a) and (7.2a) were computed with data from financially included households; while Models (7.1b) and (7.2b) show the estimated coefficients of financially excluded households. It is important to note that most coefficients are consistent with *a priori* expectations. The variable of concern is financial inclusion, and the results show it exerts a strong positive impact on household welfare. This supports the findings of previous studies (Aliero & Ibrahim, 2012b; Burgess et al. 2005; Dimova & Adebowale, 2018; Dupas & Robinson, 2013; Ibrahim & Aliero, 2012).

To show whether the welfare differences between financially included and deprived households are driven by financial inclusion, the study presents the quantile regression result in Table 7.4, highlighting the welfare differences within the financially included (or excluded) (i.e. within group difference) and those between the financially included and excluded (i.e. between group difference). The effect of financial inclusion is better welfare, with the rapid increase of regression coefficients across each quantile, when compared to a slower effect for a financially deprived household, especially at lower quantiles. Interestingly, despite pre-existing inequalities within the two groups of households, the welfare disparity at the lower quantiles distribution [0.249(Q_50 - Q_10)] is much larger compared to the relatively narrower disparity at higher quantiles [0.096(Q_90 - Q_50)] for financially included households. This welfare inequality is consistent, even when using the well-being index as a dependent variable. A key finding is that financial inclusion could lower welfare inequalities between middle- and high-income households, while inequalities within low-income households could exacerbate. Conversely, inequality is higher at higher quantiles [0.149(Q_90 - Q_50)] than in lower ones [0.062(Q_50 - Q_10)] for deprived households.

Table 7.3. Determinants of household welfare

Variables	Per capita expenditure (log)						Well-being index					
	Model (7.1)		Model (7.1a)		Model (7.1b)		Model (7.2)		Model (7.2a)		Model (7.2b)	
	Coef.	Std. error	Coef.	Std. error	Coef.	Std. error	Coef.	Std. error	Coef.	Std. error	Coef.	Std. error
FI			0.541**	0.051					0.311**	0.099		
Household's income	0.327**	0.120	0.423**	0.083	0.641**	0.121	0.453**	0.072	0.443**	0.072	0.238*	0.115
Household's age	0.228**	0.084	0.319*	0.128	0.153**	0.028	0.214**	0.082	0.201**	0.025	0.120	0.125
Household's gender	-0.126	0.156	-0.161*	0.072	-0.115*	0.022	-0.204**	0.048	-0.211**	0.055	-0.098	0.063
Household size	0.212**	0.042	0.383**	0.064	-0.149**	0.044	-0.250**	0.062	0.410**	0.084	-0.212**	0.074
Literacy	0.433*	0.195	0.488**	0.057	0.302**	0.031	0.511**	0.074	0.308**	0.062	0.451**	0.042
R^2	0.41		0.39		0.35		0.45		0.42		0.36	
N	1750		483		1276		1682		463		1219	

Notes: Models (7.1) and (7.2) are overall models, using consumption expenditure and composite welfare index, respectively. Similarly, Models (7.1a) and (7.2a) were computed with data on financially included households, while Models (7.1b) and (7.2b) estimate the coefficients of financially excluded households. * and ** denote significance at the 0.05 and 0.01 levels, respectively.

Table 7.4. Estimate of the welfare differences between financially included and deprived households

Status	Dependent variable: Per capita expenditure (log)			Within group diff.	
	Q_10	Q_50	Q_90	Q_50- Q_10	Q_90- Q_50
Financially included	0.093**	0.342**	0.437**	0.249	0.096
	(4.39)	(5.61)	(4.11)		
Financially deprived	0.032**	0.094**	0.243*	0.062	0.149
	(4.10)	(5.45)	(2.12)		
Between group diff.	0.061	0.248	0.194		
	Dependent variable: Well-being index				
Financially included	0.061*	0.193**	0.272**	0.132	0.079
	(2.25)	(5.23)	(4.47)		
Financially deprived	0.058**	0.140**	0.180**	0.082	0.040
	(4.34)	(3.51)	(5.41)		
Between group diff.	0.003	0.053	0.092		

Notes: * and ** denote significance at the 0.05 and 0.01 levels, respectively. *t*-values are between parentheses.

Table 7.5. Paths to welfare enhancement

	Dependent variable: Per capita expenditure (log)									
	Financially included					Financially deprived				
				Within group diff.					Within group diff.	
Activities	Q_10	Q_50	Q_90	Q_50-Q_10	Q_90-Q_50	Q_10	Q_50	Q_90	Q_50-Q_10	Q_90-Q_50
Profit from own business	0.453** (5.39)	0.385** (5.14)	0.271** (3.64)	-0.068	-0.114	0.156** (4.31)	0.262** (5.43)	0.283** (4.63)	0.106	0.021
Off-farm wages	0.032* (2.10)	0.201** (6.83)	0.387** (4.21)	0.169	0.186	0.051** (3.83)	0.152** (3.34)	0.189* (2.12)	0.101	0.037
Farm wages	-0.341** (-4.15)	0.121** (6.22)	0.050** (5.20)	0.462	-0.071	0.021** (3.23)	0.094** (5.23)	0.117** (5.13)	0.073	0.023
Earnings from crop production	0.314** (5.62)	0.182** (5.51)	0.081** (5.12)	-0.132	0.101	0.154** (5.51)	0.162** (5.11)	0.271** (6.43)	0.008	0.109
Earnings from livestock rearing	-0.091** (-3.15)	-0.108 (-1.51)	-0.122* (-2.23)	-0.017	-0.014	0.008 (1.21)	-0.018* (-1.98)	-0.091* (-2.16)	-0.026	-0.073
Environmental resource extraction	0.361** (4.74)	0.263** (5.23)	0.185* (2.23)	-0.098	-0.078	0.251** (5.23)	0.234** (5.41)	0.211** (7.56)	-0.017	-0.023
Area_dummy	-0.213** (-3.54)	-0.164* (-2.11)	-0.180* (-2.32)	0.049	-0.016	-0.142* (-2.13)	-0.148** (-3.23)	-0.151** (-3.56)	-0.006	-0.003
R^2	0.33	0.35	0.32			0.33	0.34	0.34		
	Dependent variable: Well-being index									
Profit from own business	0.321** (4.72)	0.261** (3.55)	0.352** (5.14)	-0.068	0.091	0.085** (3.14)	0.162** (5.12)	0.173** (3.61)	0.077	0.011
Off-farm wages	0.096** (5.11)	0.151** (3.61)	0.184** (3.24)	0.055	0.033	0.062** (3.83)	0.092* (2.13)	0.159** (3.52)	0.03	0.067
Farm wages	-0.144** (-5.14)	-0.133** (4.12)	0.082** (3.54)	0.011	0.215	0.021** (6.22)	0.080** (5.23)	0.102** (4.16)	0.059	0.022
Earnings from crop production	0.202** (3.21)	0.152** (4.81)	0.111* (2.12)	-0.050	-0.041	0.082** (3.51)	0.102** (6.16)	0.151** (4.44)	0.002	0.049
Earnings from livestock rearing	-0.032** (-4.27)	-0.074* (-2.11)	-0.092** (-4.32)	-0.042	-0.018	-0.048** (-4.51)	-0.083 (-3.43)	-0.098 (-4.64)	-0.035	-0.015
Environmental resource extraction	0.183* (2.12)	0.141** (4.31)	0.102** (4.21)	-0.042	-0.039	0.063** (5.23)	0.082** (3.41)	0.091** (4.56)	0.019	0.009
Area_dummy	-0.206** (-4.41)	-0.208** (-3.18)	-0.212* (-2.12)	-0.002	-0.004	-0.142** (-6.22)	-0.142* (-2.11)	-0.125** (-4.75)	0.000	0.017

| R² | | 0.31 | 0.30 | 0.30 | | | | 0.32 | 0.32 | 0.30 | |

Table 7.6. Household income, financial inclusion, and welfare

	Dependent variable: Per capita income (log)									
Variables	OLS	Q_10	Q_20	Q_30	Q_40	Q_50	Q_60	Q_70	Q_80	Q_90
Well-being index	0.443**	0.026*	0.047**	0.062*	0.083**	0.113**	0.132**	0.140**	0.202**	0.261**
	(6.21)	(2.13)	(6.53)	(2.50)	(6.48)	(5.82)	(4.32)	(5.53)	(6.31)	(8.23)
FI	0.311**	0.105**	0.143**	0.210**	0.240**	0.272**	0.285**	0.301**	0.308**	0.310**
	(4.82)	(5.41)	(6.15)	(4.52)	(6.43)	(4.31)	(4.73)	(3.52)	(5.53)	(4.21)
Household age	0.210*	0.214**	0.180**	0.162**	0.140*	0.123	0.105**	0.098**	0.072	0.053
	(3.82)	(3.35)	(4.12)	(4.82)	(2.12)	(1.27)	(5.23)	(4.16)	(1.15)	(1.20)
Household gender	-0.135**	-0.182**	-0.173**	-0.156**	-0.142**	-0.131**	-0.122**	-0.114*	-0.094*	-0.081**
	(-4.23)	(-4.62)	(-5.41)	(-6.42)	(-4.40)	(-3.52)	(-5.41)	(-2.41)	(-2.25)	(-5.11)
Household size	0.224**	0.241**	0.239**	0.227**	0.213*	0.183*	0.163	0.148	0.131*	0.120
	(5.51)	(5.15)	(3.23)	(4.41)	(2.19)	(2.11)	(1.43)	(1.51)	(2.23)	(1.21)
Literacy	0.412**	0.161**	0.180**	0.185**	0.202**	0.243*	0.264*	0.282**	0.308**	0.356*
	(4.13)	(4.41)	(3.22)	(5.03)	(4.14)	(2.23)	(2.14)	(4.56)	(5.53)	(2.21)
Area_dummy	-0.301**	-0.183**	-0.173**	-0.163**	-0.160**	-0.152**	-0.144*	-0.135**	-0.122**	-0.111**
	(-3.12)	(-5.51)	(-3.32)	(-4.23)	(-5.24)	(-4.10)	(-2.21)	(-5.16)	(-3.45)	(-4.18)
R²	0.43	0.35	0.35	0.34	0.36	0.34	0.35	0.36	0.34	0.36
N						483				

Table 7.7. Propensity score matching

Estimator	Baseline result		Matching methods			
	OLS	Nearest neighbour	Radius	Stratification	Kernel	Local linear regression
FI	0.311**	0.317**	0.331**	0.321**	0.347**	0.325**
	(0.063)	(0.083)	(0.076)	(0.083)	(0.068)	(0.062)
Well-being index	0.443**	0.451**	0.442**	0.434**	0.423**	0.441**
	(0.082)	(0.091)	(0.065)	(0.057)	(0.047)	(0.064)

Note: ** denotes significance at the 0.01 level. Standard errors are between parentheses.

Table 7.8. Counterfactual decomposition

	Q_10	Q_20	Q_30	Q_40	Q_50	Q_60	Q_70	Q_80	Q_90
Coefficient effect	68.54	66.21	64.75	55.01	47.83	46.11	48.15	51.31	51.88
Characteristics effect	31.46	33.79	35.25	44.99	52.17	53.89	51.85	48.69	48.12
Total					100				

Note: Q_10 to Q_90 indicate quantiles from 10 to 90.

7.4.2 Paths of Welfare Enhancement

Following the findings in the preceding section, the study trace the paths to welfare enhancement of livelihood activities, as this would identify the economic activity that exerts a greater impact on welfare disparity reduction among the various household income categories. The results in Table 7.5 shows a strong welfare effect from business profits, off-farm wages, and earnings from exploiting environmental resources. Interestingly, there exists a marginal inequality between lower and higher quantiles for the households engaging in these activities

The negative sign of within group differences in business profit for financially included households at lower [-0.068(Q_50 - Q_10)] and higher quantiles [-0.114(Q_90 - Q_50)] indicates that trade has not only the highest welfare effect, but also exerts a stronger impact for decreasing welfare inequality. The business profit for financially deprived households shows inequality across all quantiles. Moreover, earnings from livestock production have a negative inequality effect on welfare across all quantiles, but the impact is relatively weak. A higher incidence of livestock theft by cattle rustlers is the possible reason for having a weaker livestock earning-welfare nexus.

Another important path to welfare augmentation are earnings from crop production. The gap in the well-being index of financially included households at lower [-0.005(Q_50 - Q_10)] and higher quantiles [-0.041(Q_90 - Q_50)] is minimal, indicating that earnings from crop production could ameliorate welfare disparities. This reinforces the calls for using agro-credit as an alternative means of reducing poverty and welfare inequalities. Therefore, the Nigerian government needs to intensify and widen the anchor borrowing programme to cover the entire country, so as to achieve overall higher standards of living. This is imperative for Nigeria, especially now that the lower price of crude oil is significantly affecting the economy.

7.4.3 Robustness Tests

As robustness analysis, the study estimate the OLS model of the relationship between per capita income, FI, and welfare. The results, presented in Table 7.6, show a strong positive impact of financial inclusion on per capita income. Similarly, the estimated quantile results from Q_10 - Q_50 show smaller

coefficients of FI, with greater inequality across the lower quantiles and marginally stationary coefficients at higher quantiles, especially from Q_60 to Q_90. Moreover, when controlling for an area of residence (area dummy), the results show per capita income of the households residing in conflict-prone villages to be 31% lower than for households residing in the less hostile areas. If the argument of internal dualism as a breeding ground for organised crime holds (Gurr, 2005; Agbiboa, 2013), then the need for inequality eradication driven by a financial inclusion policy becomes more pronounced, in order to decrease the perceived income disparity between rich and poor households.

Following Gimenez-Nadal and Molina (2016), PSM with multiple matching algorithms was implemented as a robustness exercise. The results in Table 7.7 show that the coefficient of average treatment effect on the treated (ATT) is closer to the coefficients of OLS, with the same level of significance for all the estimated models. For instance, using nearest to neighbour as matching algorithm yields an ATT of 0.317 (using the *FI* estimator), which means that welfare of the financially included households is approximately 32% higher than of financially deprived ones.

Further to the robustness analysis based on Machado and Mata (2005), the counterfactual decomposition test, highlighted in Table 7.8, is consistent with the previous findings. The results show that, from the 10th to the 40th quantiles, the proportion of the *coefficients effect* is higher than that of the *characteristics effect*, suggesting that financial inclusion, rather than household characteristics, is contributing to the income inequalities for low-income households. However, inequality at the upper-middle quantiles (50th until 70th) is explained by the *characteristics effect*, especially household literacy, gender, and area of residency.

A major difference from the previous studies lies in the ambiguities associated with the extent to which financial inclusion is affecting welfare. On one hand, some studies claimed that the benefit of financial inclusivity is welfare convergence across all households (Chibba, 2009; Donou-Adonsu & Sylvester, 2016; Ghalib, Malki, & Imai, 2015; Jalilian & Kirkpatrick, 2015), while others revealed that financial inclusion promotes inequality (Fafchamps, 2004; Ray, 1998). While findings of this study do not entirely rule out the possibility of either claim, they settle the debate by identifying that welfare equality is only possible

for middle- and high-income households, while pre-existing inequality within the low-income households could exacerbate.

CONCLUSION

This study examines the economic well-being in cattle rustling vulnerable communities in Nigeria. While the impact of the idiosyncratic shocks and covariates on well-being were rigorously examined in the preceding four empirical chapter, final chapter investigates the finance-welfare nexus by constructing a multi-variable financial inclusion index regressed against household welfare. As expected, OLS shows a strong positive effect of financial inclusion on household welfare. On the other hand, quantile regression reveals middle- and high- income households benefitted relatively more from financial inclusion, compared to lower income households. Therefore, it can be argued that for financial inclusion to alleviate welfare inequality and ensure income convergence, rural financial markets must be redesigned to allow wider access to credit, specifically for low-income and vulnerable households. First, there is an urgent need for policy reversal to reduce the exorbitant interest rate and other exploitative hidden charges that low-income households could not possibly afford while transacting with rural deposit financial institutions (RDFIs). The practices of charging a high rate of interest on loan facilities and crediting depositor's account with minimal interest rate can compromise the financial inclusion objective of alleviating poverty. In this sense, regulatory bodies in SSA can draw from the Asian RDFIs pricing template particularly from Bangladesh where a single digit interest rate is charged on microcredit as opposed to double digits in SSA.

While the important obstacles to the inclusive finance peculiar to northern Nigeria include trust and religious requirements, other challenges such as financial literacy, transaction costs and collateral conditionality are largely generic issues. The recent success recorded by JAIZ Bank operating as a sole interest-free bank in the northern region as well as the unprecedented oversubscription of *Sukuk* bonds strongly points to the vast untapped potential of the Islamic financial market in Nigeria. In this way, Islamic development finance institutions could play a dedicated role in closing financial gaps by facilitating the interest-free financial intermediation. Diversification of financial services is thus a crucial step towards exiting the financial exclusion trap. This second policy review suggests the need to move away from the one-size-fits-all to a more diversified customer-centric model where financial services would

be simultaneously provided on interest-based vis-à-vis interest-free financial windows.

This study identified a strong welfare augmentation effect from informal livelihood strategies, such as environmental resource extraction, and crop and livestock production. While these activities do not seem to be credit attractive due to their associated uncertainty, especially the rain-fed cropping and pastoral livestock production. This implies that special effort is needed for the RDFIs to collect information and develop their own risk assessment tools in order to go beyond the perceived risk syndrome (Giordano & Ruiters, 2016). With the recent emphasis on reinvigorating the agricultural sector in SSA that has subsequently improved the credit rating of farmers, RDFIs need to draw on informal financial institutions while developing their risk assessment tools so as to reduce credit rigidities in the informal and semi-formal sectors of the economy. While the study left it for the future research to establish the causality between financial inclusion and income diversification, it can be admitted that despite applying PSM in controlling potential endogeneity, yet the study cannot completely rule out this problem.

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APPENDICES

Table A1. Multiple correspondence analysis of incidence of cattle rustling by socio-characteristic of the respondents

Gender	Affected	Not affected
Male	836	495
Female	67	33
Occupation		
Security agents	52	42
Traditional rulers	90	26
Businessmen	74	82
Farmers	543	266
Politicians	55	14
Civil servants	23	23

Table A2. Variables used for constructing financial inclusion

Component (weight)	Indicators (weight)	Included if ….
Microcredit (1/4)	Agro-credit (1/8)	A household long for his family
	Other credit (1/8)	Relatives are residing in rural areas
Demand deposit (1/4)	Savings account (1/8)	The household is accustomed rural vegetation
	Current account (1/8)	Household engage in crop production
Insurance (1/4)	Micro-insurance (1/4)	A rural houses is landscaped
Time deposit (1/4)	Fixed account (1/4)	There is minimal air pollution

Table A3. Variables used for constructing a well-being index

Component (weight)	Sub-component	Indicators	Measurement
Housing (1/3)	Basic household assets	Owned electronics	1 = yes; 0 = otherwise
		Furnished	1 = yes; 0 = otherwise
		Has electricity	1 = yes; 0 = otherwise
		Has separate living room	1 = yes; 0 = otherwise
	Sanitation	Safe drinking water	1 = yes; 0 = otherwise
		Access to kitchen	1 = yes; 0 = otherwise
		Access to latrine	1 = yes; 0 = otherwise
		Has first aid box	1 = yes; 0 = otherwise
Consumption expenditure (1/3)	Food consumption	Average weekly Food expenditure	Converted to from Nigeria Naira to USD
	Medical expenditure	Average weekly medical expenditure	Converted to USD
Wealth (1/3)	Savings	Cash and non-cash savings	Converted to USD
		Livestock	Total livestock unit Per capita (USD)
	Other assets	Landed assets (non-farm)	Valued in USD
		Farm	Valued in USD

Table A4. Distribution of hazards and raiding shocks by income and literacy quartiles

Income quartile			
Quartile	Cattle rustling shocks	Drought shock	Flood shock
1	0.79	0.76	0.71
2	0.71	0.62	0.65
3	0.55	0.67	0.68
4	0.43	0.59	0.64
Literacy quartile			
1	0.77	0.78	0.65
2	0.69	0.73	0.58
3	0.52	0.61	0.61
4	0.50	0.53	0.54

Notes: 1 to 4 are the 1st to the 4th quartiles. For each of the shocks, 1 was scored for a pastoralist that experienced it, 0 otherwise. The result shows a systematic difference in shocks experienced between pastoralists with various levels of income and literacy.

Table A5. Shocks and coping strategies

	(1) K_1	(2) K_2	(3) K_3	(4) K_4	(5) K_5
Drought (1 = experienced, 0 = otherwise)	0.247*** (5.13)	0.015 (1.04)	0.085* (1.76)	0.037 (1.36)	0.058* (1.92)
Flood (1 = experienced, 0 = otherwise)	0.104*** (3.59)	0.015** (2.26)	0.085*** (2.59)	0.015 (1.19)	0.121*** (4.58)
Raiding (1 = experienced, 0 = otherwise)	0.115** (2.12)	0.212*** (5.42)	0.004 (1.33)	0.014** (2.08)	0.077*** (3.26)
Age	0.006 (0.81)	0.071** (2.09)	0.032 (1.16)	0.012 (1.42)	0.022** (2.35)
Marital status	0.072*** (2.91)	0.035*** (3.46)	0.015** (1.94)	0.092** (2.01)	0.005 (1.07)
Household size	0.021*** (3.03)	-0.037 (-1.09)	0.088** (2.36)	-0.035*** (-2.71)	0.019 (1.34)
Literacy (years of schooling)	0.302*** (5.27)	0.009* (1.74)	-0.060 (-0.38)	-0.101 (-1.36)	0.452*** (6.33)
Years of residency	0.032*** (4.01)	-0.092*** (-3.63)	0.132*** (4.73)	0.005 (1.22)	0.053 (0.84)
Pseudo R^2	0.202	0.211	0.312	0.284	0.307
Observation	756	675	734	437	722

Notes: K_1 to K_5 represent coping strategies in form of diversifying income source, migration, livestock sell-and-repurchase (destock and restock), sell assets, and received credit, respectively. Robust t-values are reported in parenthesis. This table shows the results of Logit regression that examine the likelihood of using various coping strategies to cushion the effect of shocks. ***,**, * represent significance at the 1 per cent, 5 per cent & 10 per cent level, respectively.

Reference No.:

Baseline Survey Questionnaire on Economic Well-being in Cattle Rustling prone communities in Katsina State, Nigeria.

This is a survey aimed at finding out some of the current issues surrounding the subjective well-being in cattle rustling prone in rural areas of Katsina state. Your responses to the following questions will be used for analytical purpose only. All information will be kept strictly confidential and will not be used to identify you in any way.

Quality Check

TYPE OF QUALITY CHECK		STAFF NAME	DATE	REMARK
ACCOMPANY	1			
SPOT CHECK	2			
BACKCHECK	3			
EDITING	4			
CALL BACK	5			
IN OFFICE CHECK	6			

Section 1: General Information

1	LGA	
2	Ward	
3	Village	
4	Respondent name	
5	Phone number	
6	date of interview (days/ Month /year)	
7	Name of interviewer	
8	Name of supervisor	

Section2: Personal data

1. Sex: Female: 1   Male: 2
2. Respondent Age:

18	1
19 -45	2
46-60	3
>60	4
No response	5

3. Marital status:

Single	1
Married	2
Divorced	3
Separated	4
No response	5

4. Please circle the highest stage of school completed:

Primary School	1
Secondary School	2
College/ Diploma	3
Graduate school	4
No formal education	5

5. Business Occupation:

Retail	1	Manufacturing	4
Whole sale	2	Services	5
Agriculture	3	Others	6

6. What is your major source of income?

a.	Own business (non- farming)	1
b.	Money from family/friends/husband (Dependent)	2

c.	Farming	3
d.	Salaries	4
e.	Do not receive income	5

7. How long are you on the above stated source of income?

a.	Less than a year		c.	2-5yrs		e.	More than 10yrs	
b.	1 to 2 years		d.	6-10 yrs				

8. Are you planning to change your business?

Yes	1
No	2

9. Why are you considering changing your business

a.	Lack of profit	
b.	Insecurity	
c.	No market	
d.	Others, please specify	

10. Is there bank in your community?

Yes	1
No	2

11. What is the distance between your house to the nearest bank
    _____KM
12. Do you have a bank account?

Yes	1
No	2

13. Indicate any of the financial services are currently enjoying (thick as much as applicable)

a.	Agro-credit	
b.	Other formal credit	
c.	Current account	
d.	Saving account	
e.	Micro-insurance	
f.	Fixed account	

14. What is your major form of saving?

a.	Commodities	
b.	Animals	
c.	Landed assets	
d.	Saving in bank	

Section 2: Causes of Cattle Rustling

15. Did you know about cattle rustling?

Yes	1
No	2

If yes, CONTINUE, If No, GO TO Q35

16. How will you rate your understanding about the menace (cattle rustling)?

a.	Very High	1
b.	High	2
c.	Adequate	3
d.	Low	4
e.	Very Low	5

17. When did you think cattle rustling begins in rural areas of Katsina state?

a.	This year	1
b.	Last year	2
c.	Five years ago	3
d.	Last decade	4

e.	I can't remember	5

In your opinion, what are the causes of cattle rustling?

a._____

b._____

c._____

d._____

What did you think is responsible for the rise in cattle rustling in rural areas?

a._____

b._____

c._____

d._____

18. Did you think the rustlers are living in nearby town?

Yes	1
No	2

19. Have you ever reported any case of cattle rustling?

Yes	1
No	2

20. To who did you reported?

a.	Police force	1
b.	Civil defence	2
c.	Military	3
d.	Village head	4
e.	Politician	5
f.	Religious leaders	6
g.	Wizard	7
h.	Others_____ (please specify)	8

21. Is there any interval within which cattle rustlers are often going out for operation?

Yes	1
No	2
I don't know	3

If yes, CONTINUE, otherwise, GO TO Q24

22. How often cattle-rustlers used to go out for operation?

a.	Every 5 days	1
b.	Between 5 – 10 days	2
c.	11 – 20 days	3
d.	21 – 30 days	4
e.	40 and above	5

23. What time the cattle rustlers mostly attack?

a.	In the morning	1
b.	In the afternoon	2
c.	In the evening	3
d.	Wee hours	4
e.	No specific time	5

24. Do they usually give notice of their coming?

Yes	1
No	2

If yes, CONTINUE, otherwise, GO TO Q28

25. Do they usually respect their notice?

Yes	1
No	2

26. What preventive method did people often resorted upon the notice of the cattle rustlers?

a.	Report to the nearest police station	
b.	Mobilise a local vigilante group	
c.	Runaway to safe areas	
d.	Quickly sold our animals	
e.	All the above	

Section 3: Effect of Cattle Rustling

27. Do you have cattle?

Yes	1
No	2

28. How many cattle you have before and during the menace of cattle rustling?

Before	During

29. Is your income level dropping since the beginning of cattle rustling?

Yes	1
No	2

30. What is your average monthly income before and during the menace of cattle rustling?

Before	During

31. Is there issue of people migrating from your community other safe place since the inception of cattle rustling?

Yes	1
No	2

32. Please, give an estimate number of people leaving your community before and during the menace of cattle rustling?

Before	During

33. How does the cattle rustling affects your community in terms of:

	Severe	Moderate	Low	Not affected
Growth	1	2	3	4
Income	1	2	3	4
Employment	1	2	3	4
Assets	1	2	3	4
Population	1	2	3	4

Section 4: Risks, Hazards and Disaster

34. Is there any dead casualty among members of your family as a result of extreme events?

Yes	1
No	2

35. To what extent did the following factors affect your family?

	Very high	high	Not at all	Not at all	Low	Very low
Floods						
Erosion						
Deforestation						
Drought						

36. Give account of value of properties and assets that were lost as a result of extreme events

	Value of properties	Assets
Floods		
Erosion		
Deforestation		
Drought		

37. Are you a member of any self-help group?

Yes	1
No	2

38. Is there any change in your consumption expenditure in the last 10 year?

Yes	1
No	2

39. Give account of your average monthly consumption expenditure

Before	Now

40. Give account of the average monthly remittance from the emigrated household member_____

Reliability test

```
. alpha var1 var2 var3


Test scale = mean(unstandardized items)


Average interitem covariance:     .0446905
Number of items in the scale:            3
Scale reliability coefficient:      0.7603


. alpha var1 var2 var3, std


Test scale = mean(standardized items)


Average interitem correlation:      0.1219
Number of items in the scale:            3
Scale reliability coefficient:      0.8940


. alpha var1 var2 var3


Test scale = mean(unstandardized items)


Average interitem covariance:     .0446905
Number of items in the scale:            3
Scale reliability coefficient:      0.7203


. alpha var4 var1 var2 var3


Test scale = mean(unstandardized items)
Reversed item:  var4


Average interitem covariance:     .0812616
Number of items in the scale:            4
Scale reliability coefficient:      0.7308


. alpha var1 var2 var3 var5 var6 var7 var8


Test scale = mean(unstandardized items)
Reversed item:  var7


Average interitem covariance:     .0621703
Number of items in the scale:            7
Scale reliability coefficient:      0.7435
```

```
. alpha var5 var6 var7 var8


Test scale = mean(unstandardized items)


Average interitem covariance:      .1517282
Number of items in the scale:             4
Scale reliability coefficient:       0.8263


. alpha var21 var22 var23 var25 var26 var27  var28
Test scale = mean(unstandardized items)


Average interitem covariance:      .2083355
Number of items in the scale:             7
Scale reliability coefficient:       0.9196
```

```
HETROSKEDASTICITY TEST RESULTS
      Source |       SS           df       MS      Number of obs   =      1,189
-------------+----------------------------------   F(7, 1181)      =       2.99
       Model |  37.4532063         7  5.35045804   Prob > F        =     0.0041
    Residual |  2115.99339     1,181  1.79169635   R-squared       =     0.0174
-------------+----------------------------------   Adj R-squared   =     0.0116
       Total |  2153.44659     1,188  1.81266548   Root MSE        =     1.3385


------------------------------------------------------------------------------
        var8 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        var7 |  -.0101779   .0365037    -0.28   0.780    -.0817972    .0614414
        var6 |   .0413909   .0223507     1.85   0.064    -.0024607    .0852425
       var16 |   .0425813    .021315     2.00   0.046     .0007619    .0844007
       var17 |   .0776879   .0311627     2.49   0.013     .0165475    .1388283
       var19 |   .0333192   .0298115     1.12   0.264    -.0251702    .0918086
       var22 |   .0018671   .0525373     0.04   0.972    -.1012098    .1049441
       var21 |  -.0453504   .0237425    -1.91   0.056    -.0919326    .0012318
       _cons |    3.51287   .1782021    19.71   0.000     3.163242    3.862498
------------------------------------------------------------------------------


. estat hettest


Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of var8


         chi2(1)      =     2.43
         Prob > chi2  =   0.2768
regress var3 var7 var4 var6 var5 var9 var22 var21


      Source |       SS           df       MS      Number of obs   =      1,193
-------------+----------------------------------   F(7, 1185)      =       8.19
       Model |  21.1181545         7  3.01687921   Prob > F        =     0.0000
    Residual |  436.536498     1,185   .36838523   R-squared       =     0.0461
-------------+----------------------------------   Adj R-squared   =     0.0405
       Total |  457.654652     1,192  .383938467   Root MSE        =      .60695


------------------------------------------------------------------------------
        var3 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        var7 |  -.0390094   .0160376    -2.43   0.015    -.0704746   -.0075442
```

```
     var4 |  -.0260024   .0063546    -4.09   0.000     -.03847    -.0135348
     var6 |   .0340624   .0100827     3.38   0.001    .0142804     .0538444
     var5 |   .0501803   .0114175     4.40   0.000    .0277796      .072581
     var9 |   .0001526   .0287286     0.01   0.996    -.056212     .0565172
    var22 |  -.0667422   .0233608    -2.86   0.004   -.1125753    -.0209091
    var21 |   .0335885   .0105171     3.19   0.001    .0129543     .0542228
    _cons |   2.015955    .097969    20.58   0.000    1.823744     2.208167
------------------------------------------------------------------------------
```

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var3

        chi2(1)   =   0.88
        Prob > chi2 =   0.8210

. regress var4 var2 var3 var16 var17 var19 var28 var29

```
      Source |       SS           df       MS      Number of obs   =     1,176
-------------+----------------------------------   F(7, 1168)      =      4.64
       Model |  255.632831         7  36.5189758   Prob > F        =    0.0000
    Residual |  9183.83571     1,168  7.86287304   R-squared       =    0.0271
-------------+----------------------------------   Adj R-squared   =    0.0213
       Total |  9439.46854     1,175  8.03359024   Root MSE        =    2.8041
```

```
------------------------------------------------------------------------------
        var4 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        var2 |  -.0974622    .116628    -0.84   0.404   -.3262859     .1313615
        var3 |  -.4536134   .1365854    -3.32   0.001   -.7215935    -.1856333
       var16 |  -.0089065   .0445753    -0.20   0.842   -.0963631     .0785502
       var17 |  -.0344145   .0653229    -0.53   0.598   -.1625779     .0937489
       var19 |  -.0462966   .0585235    -0.79   0.429   -.1611195     .0685263
       var28 |   .5090954    .148305     3.43   0.001    .2181215     .8000693
       var29 |   -.138641   .0954819    -1.45   0.147   -.3259762     .0486943
       _cons |   10.71024   .4721027    22.69   0.000    9.783977     11.63651
------------------------------------------------------------------------------
```

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

```
      Ho: Constant variance
      Variables: fitted values of var4


      chi2(1)      =      1.11
      Prob > chi2  =    0.2076


. regress var2 var1 var3 var6 var18 var20 var21 var22


    Source |       SS           df       MS      Number of obs   =     1,190
-------------+----------------------------------   F(7, 1182)      =      18.49
       Model |  62.5838508        7  8.94055012   Prob > F        =     0.0000
    Residual |  571.655645     1,182  .483634217   R-squared       =     0.0987
-------------+----------------------------------   Adj R-squared   =     0.0933
       Total |  634.239496     1,189  .533422621   Root MSE        =     .69544


------------------------------------------------------------------------------
        var2 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        var1 |  -.4098184   .0758835    -5.40   0.000    -.5586998    -.260937
        var3 |   .3502735   .0333477    10.50   0.000     .2848462    .4157009
        var6 |   .0090323   .0114855     0.79   0.432    -.0135019    .0315664
       var18 |  -.0259469   .0460995    -0.56   0.574    -.1163929    .0644991
       var20 |  -.0658561   .0570843    -1.15   0.249    -.1778539    .0461417
       var21 |  -.0132534   .0120108    -1.10   0.270    -.0368182    .0103115
       var22 |   .0405415   .0341702     1.19   0.236    -.0264996    .1075825
       _cons |   2.106398   .1541088    13.67   0.000      1.80404    2.408755
------------------------------------------------------------------------------


. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
      Ho: Constant variance
      Variables: fitted values of var2


      chi2(1)      =      1.33
      Prob > chi2  =    0.9450


. regress var15 var2 var7 var6 var18 var21 var20 var24


    Source |       SS           df       MS      Number of obs   =     1,189
-------------+----------------------------------   F(7, 1181)      =       7.62
       Model |  107.954025        7  15.4220036   Prob > F        =     0.0000
    Residual |  2390.69694     1,181  2.02429885   R-squared       =     0.0432
```

```
-------------+-------------------------------   Adj R-squared  =    0.0375
      Total |  2498.65097     1,188  2.10324155   Root MSE       =    1.4228


------------------------------------------------------------------------------
      var15 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       var2 |   .0077468   .0568331     0.14   0.892    -.1037584    .1192519
       var7 |   .2132823    .037513     5.69   0.000     .1396827    .2868818
       var6 |   .0153468   .0235004     0.65   0.514    -.0307604    .0614541
      var18 |  -.3151775   .0943937    -3.34   0.001    -.5003756   -.1299794
      var21 |   .0338012   .0233994     1.44   0.149    -.0121078    .0797101
      var20 |   .1873491   .0922309     2.03   0.042     .0063944    .3683038
      var24 |   .0927064   .0467745     1.98   0.048      .000936    .1844768
      _cons |   1.467584    .243036     6.04   0.000     .9907539    1.944415
------------------------------------------------------------------------------
```

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var15
        chi2(1)   =   1.23
        Prob > chi2 =   0.6233

. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var15
        chi2(1)   =   0.23
        Prob > chi2 =   0.9370
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var15
        chi2(1)   =   1.02
        Prob > chi2 =   0.7583

```
. estat hettest


Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var15
        chi2(1)      =    2.13
        Prob > chi2  =   0.7313
. estat hettest


Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var15
        chi2(1)      =     1.81
        Prob > chi2  =   0.3130
. estat hettest


Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var15
        chi2(1)      =     1.56
        Prob > chi2  =   0.9904
. estat hettest


Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
        Ho: Constant variance
        Variables: fitted values of var15
        chi2(1)      =     2.16
        Prob > chi2  =   0.2210
```

Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Q40H, Q40B, Q40E, Q40D, Q40G, Q40A, Q40C, Q40F[b]	.	Enter

a. Dependent Variable: Q31

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.215[a]	.046	.041	.53055

a. Predictors: (Constant), Q40H, Q40B, Q40E, Q40D, Q40G, Q40A, Q40C, Q40F

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.082	8	2.510	8.918	.000[b]
	Residual	416.032	1478	.281		
	Total	436.114	1486			

a. Dependent Variable: Q31

b. Predictors: (Constant), Q40H, Q40B, Q40E, Q40D, Q40G, Q40A, Q40C, Q40F

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.224	.026		47.498	.000
	Q40A	.057	.018	.133	3.125	.002
	Q40B	.041	.013	.103	3.189	.001
	Q40C	-.009	.018	-.022	-.506	.613
	Q40D	-.004	.012	-.011	-.324	.746
	Q40E	-.039	.016	-.085	-2.437	.015
	Q40F	.060	.019	.158	3.137	.002
	Q40G	-.021	.017	-.057	-1.205	.228
	Q40H	-.004	.015	-.012	-.296	.767

a. Dependent Variable: Q31

BIOGRAPHY

S.S. Ibrahim has his Bachelor and Master Degree in Economics from the prestigious Usmanu Danfodiyo University, Nigeria. Having previously worked in Isa Kaita College of Education, Dutsin-ma as well as Umaru Musa Yar'adua University before he joined the service of Federal University Dutsin-ma, has enabled him accumulated a rich wealth of experience. The articles he has published in world-leading journals, particularly journals indexed in the SSCI, ESCI, and SCOPUS, attests his intellectual productivity.

PLAGIARISM REPORT

ETHICS COMMITEE APPROVAL

26.06.2018

Dear Saifullahi Sani Ibrahim

Your application titled **"Essays on Economic Well-Being in Cattle Raid Vulnerable Rural Communities in Nigeria"** with the application number YDÜ/SB/2018/184 has been evaluated by the Scientific Research Ethics Committee and granted approval. You can start your research on the condition that you will abide by the information provided in your application form.

Assoc. Prof. Dr. Direnç Kanol

Rapporteur of the Scientific Research Ethics Committee