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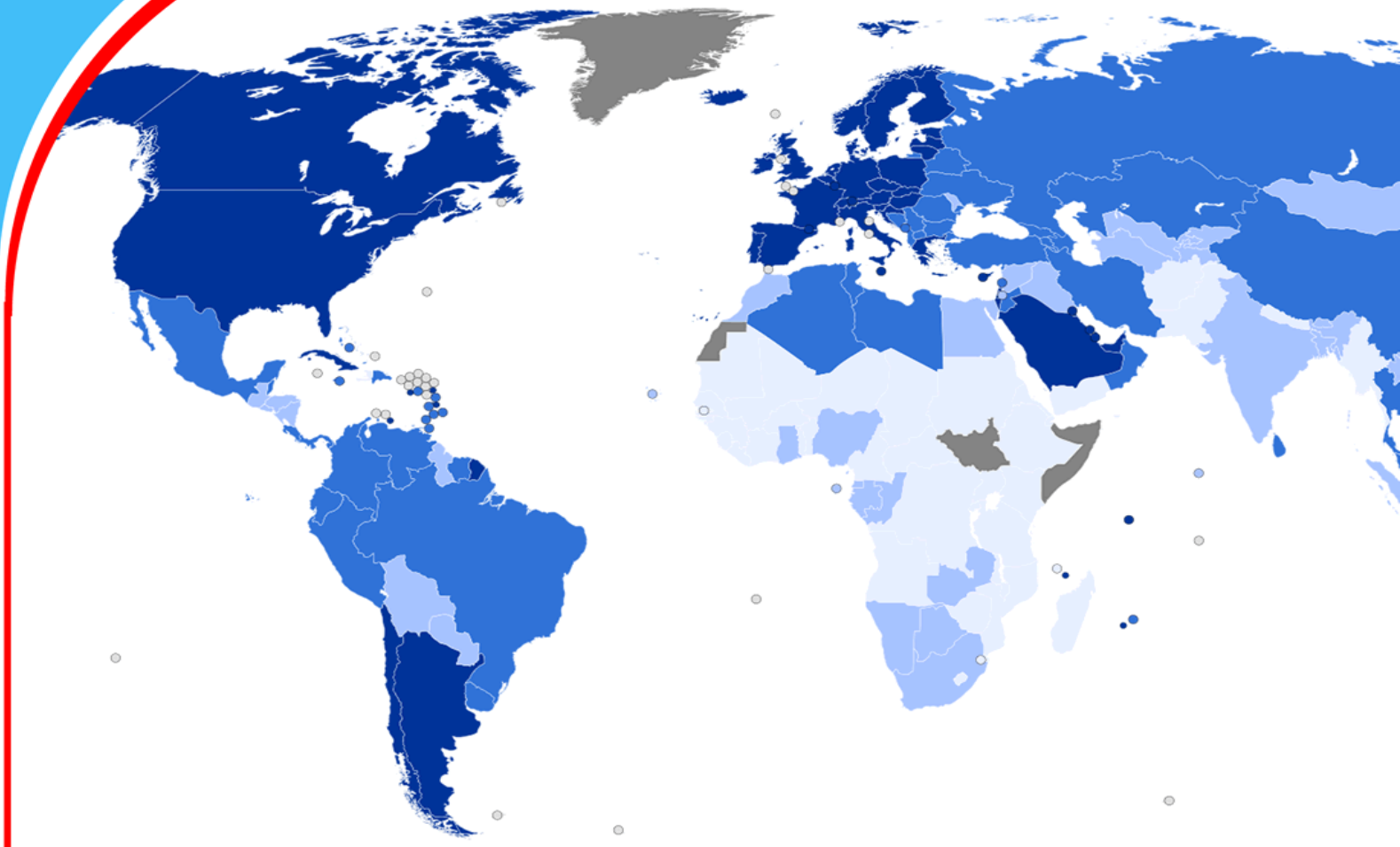

ROAD NETWORK AND HOUSEHOLD FOOD SECURITY IN ACHOLI SUB REGION, NORTHERN UGANDA: A PRAGMATIC PERSPECTIVE

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ABSTRACT

Purpose: This study aimed at examining the relationship between road network and household food security in Acholi subregion, northern Uganda.

Methodology: The study adopted a pragmatic paradigm, thus adopting a mixed methods approach. Quantitative data was collected from 384 respondents using a structured questionnaire while face-to-face interviews aided qualitative data collection. After data management and processing, Pearson correlation and standard regression were use for data analysis.

Findings: It was observed that road network is positively and significantly associated with household food security. The study established that road network accounts for 10% of the variance in food security among households in Acholi subregion, northern Uganda.

Unique contribution to practice and policy: Although there are conflicting views on the predictors of food security among households, the present study has confirmed thatroad network plays a critical role in influencing food security among households in Acholi subregion, Northern Uganda, thus serving its purpose.

Keywords: *Road network, Household, Food Security.*

INTRODUCTION

This study aimed at examining the relationship between road network and household food security in Acholi subregion. Household food security is a situation when all household members are able to obtain sufficient varieties of available foods at all times (Mahadevan & Hoang, 2015; Maxwell et al, 2013). On the other hand, a road network is a system with greater measurement in terms of length, time and cost (Asif, 2012). A road network is helpful to the household if it is strategically located, connects to different centers, requires an appropriate time of travel, and necessitates minimal cost to reach the centers (Sasidharan, 2017). Food security is still a challenge thus continues attracting the attention of researchers and policy makers worldwide. Globally, about 2 billion people are experiencing food insecurities and 149 million children are stunted (FAO et al., 2019). About 45% of the death in children is due to malnutrition, 21.3% children under five years are stunted, 6.1% wasted, and 5.6% overweight (SOF, 2020). In USA, by 2017, 40% of the population was food insecure, eating less than the national average acceptable meal due to high cost of accessing food (USDA, 2018). In Asia, 65% of the population is undernourished. In Korea alone, 41.6% of the population is undernourished, 22% in Pakistan, and 16.4% in Bangladesh (ADB, 2019 and SOF, 2019). In Africa, the situation is not any different; in Mauritania, 500,000 people cannot access and maintain their food consumption basket (Kieran, 2015). Similarly, 43% in Egypt and 55.8% in Liberia are food-insecure (IFPRI, 2013; Manda, 2020). Moreover, food security has been recognized as a human right and prime determinant of a healthy life (UNICEF, 2019).

In Uganda, despite several government interventionssuch as operation wealth creation (OWC) to crack food insecurity(OWC, 2013), over 11 million Ugandans are food insecure (OPM, 2017).A report by IPC (2021) estimated that 23% of the population suffers from acute food insecurity and consequently, 29% of children under five is stunted, 11% underweight, and 53% suffer from Anemia (UDHS, 2016).Moreover, Acholi subregion in Northern Uganda bears the highest rate of food insecuritycompared to other regions in Uganda (IPC report, 2019). In Acholi sub region, 12 per cent experience food insecurity stress (IPC, 2017), about 50% of the households eat less than two meals in a day with limited dietary diversity, 70% of the children are deprived of three meals in a day(UBOS; USAID, 2018). Consequently, 30.6% of the population in the region is stunting and 3.9% is wasting, 47% experience anemia due to vitamin deficiency (Bernstein & Weismann, 2020).

Empirically, studies have underscored road network as a key to food security and zero hunger. Sasidharan (2017) avers that good road infrastructure can increase food production, reduce poverty and decrease hunger. Sasidharan (2017) noted that households closer to a good road have access to larger food markets than those far from the road. Gafarso (2019) found a positive relationship between infrastructure and household food security in Ethiopia. Similarly, Olarinkoye (2016) established that high transport cost reduces households' participation in the market and households' food security is influenced by post-harvest losses due to the fact that households lack access to adequate storage and processing facilities. Olunfemi and Adefalu's (2016) conducted a study on the effect of road transportation network on crop production in Nigeria. The study's findings further showed that poor road network affects access to output markets, income, and transport cost. Ahmed (2016) found that access to output markets in

Pakistan is affected by transport cost, distance to market, and market information. Furthermore, WFP's (2017) study on the effect of road on market access and households' food security in Nepal observed that isolation negatively affects households' food security.

Theoretically, this study was anchored on the entitlement theory by Sen (1981). The theory assumes that food security is a function factors of demand and supply. Sen's (1981) theory thus connects exchange entitlement to the net cost of buying and selling food. It is posited that a household uses what is available to it to obtain consumption, trade and production entitlements. Sen (1981) believes that famine can exist amidst food availability as long as an identifiable group of people have limited access to available food or suffer a food exchange failure. The theory therefore recognizes the role of infrastructures, and social systems in food security. However, Anderson and Cook (1999) noted that achieving food security is a holistic approach. It requires having consistent safe foods available in stores, acceptability of food sources and anxiety over food availability or supply. Nevertheless, the theory of entitlement informed this study on the importance of accessibility in achieving household food security.

Despite the above empirical debate and theoretical underpinnings, studies on road network and household food security are inadequate in scope. Besides concentrating on developed countries such as Pakistan and Korea, available literature has mostly focused on distance and transport cost, ignoring other dimensions of road network such as nature of the road, travel time and mode of transport. More so, research on the effect of road network on household food security specifically in Acholi sub region, Northern Uganda is still insufficient. This revealed a literature gap that this study intended to cover by studying the relationship between road network and households' food security in the context of Acholi sub region, Northern Uganda. Based on the theoretical underpinnings and empirical literature, the study therefore hypothesized as follows;

***H1**: Road network is Positively Associated with Household Food Security*

RESEARCH METHODOLOGY

Research paradigm

The study followed a pragmatic philosophical orientation. Pragmatism assumes that reality only exist after investigation into the problem indicating multiple realities (Maarouf, 2019). This study therefore adopted an objective and subjective view of reality for a truthful and realistic conclusion, thus opting for a mixed research approach (Cresswell, 2014). Taking pragmatic approach enabled the present studyto realize complementary strengths of methods, consistent with Johson and Turner (2003).

Research design

The study undertook a cross-sectional research design because it is cheaper, quicker, and easy to administer with minimal control effect (Creswell, 2009). The study used a mixed approach, incorporating both quantitative and qualitative research approaches. Consistent with the pragmatic approach and the study purpose, the study used a sequential explanatory mixed methods design (QUAN-Qual) in two distinctive phases i.e. quantitative followed by qualitative. In terms of usage and precedence, the quantitative approach was the most dominant complemented by the qualitative approach.

Study population

The study population composed of 1,059,500 household heads from Acholi sub region. The study covered districts of Kitgum, Agago, Gulu, and Amuru in Acholi sub region, Northern Uganda. The four districts were chosen because of high levels of food insecurity compared to the other districts in the same sub region. Moreover, according to the UBOS (2017), the above four districts; Amuru (88.9%), Gulu (88.3%), Kitgum (88.9%), Agago (88.9%) have the highest number of persons eating less than three meals in a day. Yet FAO (2002) recommends that a healthy person should eat a standard of three meals in a day for a healthy and active life.

Sample size

Overall, a sample size of 384 households was determined using Krejcie and Morgan (1970) table. The sample was derived from the four study districts as indicated in the sampling frame Table 1 below.

Table 1: Sampling frame

S/N	District	Population of household	Sample Size
1	Gulu	418300	152
2	Amuru	188600	68
3	Kitgum	267600	97
4	Agago	185000	67
	Total Households	**1,059,500**	**384**

Source: UBOS (2017)

Sampling technique and procedure

The study adopted a stratified simple random sampling technique. Sampling followed a three-stage procedure. The first stage involved categorizing households by districts. Kitgum, Agago, Gulu, and Amuru Districts were selected because of the higher level of food insecurity in Acholi subregion (UBOS, 2017). Lastly, 384 household heads were randomly selected proportionately. The study obtained 370 usable questionnaires representing a response rate of 90%,indicating that the findings are a true representation of respondents' knowledgeabout the study variables (Field, 2006). 32 (saturation point) face-to-face interviews were conducted on market leaders and farmer organization representatives. These were purposively selected because they were easily accessible and comprised of a small number that never had time to fill the questionnaire.

Data collection methods and instruments

A self-administered questionnaire consisting of structured questions was used to collect quantitative data. A structured questionnaire based on a five-point Likert scale design. The options were scaled from five to one (Strongly Disagree-5, Disagree-4, Not Sure Agree-3, Strongly Agree-2, and Agree-1). To control for the limitation of language barrier, the researcher hired two research assistants well conversant in both Luo and English to assist in translating and

administering the questionnaire. Brislin (1980) asserts that proper translation of the tools into a different language does not change the meaning. The tools were therefore translated using a translation back translation approach where different persons participated in the translation process and later discussions held to arrive at a consensus. The questionnaire was preferred because it saves time, money, and gives respondents a chance to answer questions at their convenient time. Besides, questionnaires protect the anonymity of respondents thus increasing the response rate and truthful responses (Amin, 2005).Face-to-face interviews were conducted by a trained research assistant guided by a face-to-face interview guide as recommended by Karim (2017). Each face-to-face interview lasted for 20-30 minutes, guided by a semi-structured Face to face to interview guide.

Validity and Reliability

Validity and Reliability for Quantitative Data

Both content and construct validity tests were conducted to arrive at better conclusions. Content validitywas addressed by pilot testing the questionnaire. Further, the studywas also given to five domain expertise to evaluate the relevance of each item in the tool. The study retained only constructs that yielded a content validity index (CVI) above the cut-off point of 0.7 (Amin, 2005). CVI was determined by obtaining the proportion of items rated as relevant to the total number of items per construct using the formular below;

$$CVI = \frac{\text{Number of items rated relevant}}{\text{Total number of items}}$$

Furthermore, construct Validity was confirmed by testing convergent and discriminant validity **(**Fornell & Larcker, 1981). Convergent validity was confirmed given thatall constructs had average variance extracted (AVE) above the minimum 0.5. Additionally, discriminant validity was confirmed given that the square root of the AVE for each construct washigher than the correlations among other constructs,(Fornell et al., 1981).

The reliability of the questionnaire was tested using an internal consistency approach to ascertain its consistency in measuring the study variables on the scales used. Cronbach's alpha coefficients were generated using SPSS program to establish the extent towhich items in the instrumentwerehomogeneousand revealed theoriginalconstructs (Cooper & Schindler, 2006). All constructs exhibited alpha values above the minimum 0.7, as recommended by Bryman and Bell (2011) hence revealing the internal consistency of the instrument.

Validity and reliability for Qualitative Data

Validity tests on the qualitative data was conducted to give assurance that the intended phenomenon was captured. This was based on the premise that data was meant to capture authentically, the live experiences of people as regards food security and to represent them in a substantial manner (Lukka & Modell, 2010). Three tests of confirmability, credibility and transferability were ensuredand confirmed as suggested by (Hirschman, 1986; Miles & Huberman, 1994; Robson, 1993) to establish the quality in qualitative research design. Validity was achieved by checking the recorded interviews and field notes to ensure logical inferences and quality of findings; employing two carefully trained research assistants to collect the data

(Lincoln & Guba, 1985); logically and cautiously coding and analyzing responses (Miles et al., 1994).

In this study, reliability for qualitative data was achieved by conducting a dependability audit. This involved an independent examination of the interview process. Consistent with the recommendations of Patton (2002), the study provided a full account of ideas for each phase, and recorded observations and actions as concrete as possible, using an interview protocol and two credible research assistants.

Measurement of Study Variables

The study employed a multidimensional approach in measuring household food security (the dependent variable) as recommended by (Mahadevan & Hoang, 2015; Maxwell et al, 2013; Maxwell et al, 2008). The study conceptualized household food security in terms of diaterydiversity, coping mechanism, and level of food production (Pangaribowo, 2013; Maxwell et al, 2008). Furthermore, road network (the independent variable) was measured in terms of the nature of road, distance, and travel time to a community market (Ahmed, 2017). All items were anchored on five-point Linkert scale (i.e., Strongly Disagree-1, Disagree-2, Neutral-3, Strongly Agree-4, and Agree-5).

Data Management, Processing and Analysis

The study used SPSS V.22 program for data management and processing. The exercise entailed checking for impossible values, missing values, identification, and management of outliers as recommended by (Podsakoff *et al*., 2012). Frequency distributions were generated to screen the data to identify wrong entries and missing values to reduce the error variance and increase the power of statistical tests (Allen & Bennett,2010). A missing value analysis revealed that missing values were less than 5%, and; a non-significant (P>.05). Little's missing completely at random (MCAR) test indicated that values were missing completely at random. This warranted application of multiple imputation technique in managing missing values (Feild, 2006). The study further generated and inspected box plots (Tabachnick & Fidell, 2001) to identify outliers. Outliers as a result of errors were removed while genuine outlying values were changed to less extreme values hence including such cases in the analysis but not allowing outlying scores to distort results (Allen & Bennett, 2010).

Exploratory factor analysis (EFA) through principal component analysis (PCA) was conducted to identify clusters of variables and reduce of dataset items to a manageable level while retaining the original information as much as possible (Podsakoff *et al*., 2012; Bennett, 2011). In extracting principal components, the varimax rotation approach was used because of its ability to maximize the dispersion of loadings within factors where it loads a smaller number of variables onto each factor (Podsakoff *et al*., 2012; Tabachnick & Fidell, 2001). Moreover, KMOs were above 0.6, and Bartlett's test of sphericity was highly significant (p< 0.01) for all constructs, depicting a good model fit to the data (Tabachnick et al., 2007)

Following the recommendations of Tabachnick et al., 2007, parametric assumptions of normality, homogeneity of variance, linearity and independence of errors were checked and found tenable. Kolmogorov-Smirnov and Shapiro-Wilks tests results were nonsignificant (p>.05), implying a normal distribution of data. Furthermore, levenes test results were nonsignificant (p>.05) implying equality of variance. Additionally, correlations between the

study variables were significant thus confirming linearity among variables (Podsakoff *et al*., 2012). Consequently, the study adopted Pearson correlation and regression analytical techniques to test and confirm the relationship between road network and household foo security. Parametric analytical techniques were preferred due their high statistical power thus yielding credible results (Tabachnick et al., 2001). Qualitative data was assessed using thematic analysis approach as recommended byO'Connor and Gibson (2003)

RESULTS

Demographic Characteristics

Frequency distributions were generated to assess the demographic characteristics of households in Acholi subregion, northern Uganda as shown in table 2.

Table 2: Gender of respondents

Gender	Frequency	Percentage frequency (%)
Male	175	47.3
Female	197	52.7
Total	370	100

Source: Primary Data (2018)

Table 1: Age of respondents

Age	Frequency	Percentage frequency (%)
Below 18	11	3
18-35	231	62.4
36-60	106	28.6
Above 60	22	6
Total	370	100

Source:Primary Data (2018)

Table 2: Education of respondents

Level of Education	Frequency	Percentage frequency (%)
No schooling	49	13.2
Primary	121	32.7
Secondary	154	41.6
Tertiary	37	10
Other (Non formal)	9	2.5
Total	370	100

Source: Primary Data (2018)

Findings (Table 2) indicate that 47.3% of the respondents were male and 52.7% were female. This implies that few men spend time at home; the majority spend time in the fields working and this could explain the low number of male respondents in the study. Nevertheless, the results show that the opinions of both men and women on the study were considered and hence gender balance was promoted. Women are more concerned about the nutritional status of their household members especially the children; having a big number of female household heads thus implied high chances of being food secure.

Findings (Table 3) further showed that respondents were mature enough to answer for themselves. Age distribution was 62.4% for those between 18 and 35 years, 28.6% between 36 and 40 years, 6% were above 60 years of age, and only 3% were below 18 years. The findings indicated that the respondents were mature enough to take up the right decisions and make meaningful contributions to the study. The youth are in their productive stage of production. A composition of 62% of the population in their youthful age implied that the community was capable of increasing food security.

Moreso, results (Table 4) indicated that a significant number of respondents (42%) attained secondary education, followed by primary 32.7%, followed by no schooling 13.2%, tertiary 10% and, lastly, no formal education 2.5%. These results imply that majority of the respondents (86.8%) were literate and capable of making the right decisions in responding to the study research questions. Further, an educated population is likely to adopt better agricultural and livelihood practices than the illiterates.

Correlation and Regression Results

The study employed Pearson correlation analysis to determine the strength and direction of the relationship between the study variables while regression analysis was adopted to determine the predictive power of road network on household food security. The study tested the hypothesis that "road network is positively associated with household food security". The following regression model was estimated in testing the predictive power of road network on household food security.

$HFS = B_o + B_1RdNet + e$

Where; HFS= Household food security; RdNet = Road network; e= error term; B_0= Constant, B1RdNet = beta coefficient of road network.

Table 5: Pearson Correlation and Standard Regression Results

a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.32	.10	.10	.56

b) ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	13.15	1	13.5	41.77	.000
	Residual	115.84	368	.315		
	Total	128.98	369			

c) Coefficients

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.02	.10		19.74	.000
	RdNet	.28	.04	.32	6.46	.000

Source: Primary Data (2018)

From the results (Table 5b), it was observed that the regression model was significant (F (1,368) =41.77, p<.01), indicating that results were not generated by chance thus, indicating a good model fit and confirming road network as a valid predictor of household food security. Results (Table 5a) further showed a positive and significant relationship between road network and household food security (r=.32, p<.01). These results imply that an improvement in the road network to the market in terms of improved quality of the road and reduced travel time is associated with an increase in households' food security. Moreover, results (Table 5c) further indicated that road network accounts for 10% of the variance in household food security with a unit change in road network leading to a change in household food security by .28 units (b =.28, p<.01). This concretized road network as a predictor of household food security. The above results therefore support the hypothesis that road network to the market is positively associated with household food security (H1).

Congruently, the association between road network to the market and households' food security was overemphasized in all the face-to-face interviews. Interviewees were in agreement that road network highly determines access to market and households' food security in return. Moreover, one of the interviewees stated that *"When a road network is good, transport is expected to be made easier and cheap. Everybody will be able to sell food in the market, increasing households' income and food varieties,"* said a member from Amuru District.

While qualitative results indicate that the majority of the roads to market were paved, the state of other road network indicators justified the mild correlation coefficients (Table 5a) above. One of the interviwees in Amuru District noted that *"The road network is characterized by long distances between the village access roads and the main tarmac roads, making it difficult to connect rural areas to town".*

Further, the cost of travel was cited to be very high especially during rainy seasons. Participants commonly highlighted the challenge of inadequate transport means in rural areas. One of the participants from Amida Sub County once narrated that *"Distance to the main market is like four miles from the village. Getting transport to town is very difficult. The only way to reach town is to ride a bicycle. But many people have no bicycles and have to move on foot and it is very tiresome."*

Overall, interview results revealed that the majority of the roads to markets were paved and passable in dry seasons. However, these were impassable during rainy seasons and were far from the main roads with no reliable transport means. Nevertheless, the above results affirm the importance of road network to the market in improving household food security as hypothesized in this study.

DISCUSSION OF RESULTS

It was hypothesized that road network to market is appositively associated with households' food security in the Acholi sub region. As observed, study findings confirmed that road network positively relates with food security. The positive correlation coefficient impliesthat households with a good road network to the market stand more chances of being food secure compared to those with a bad road network to market. Moreover, a good road network to the market enhances market accessibility and households' food security to the rural community as indicated (Olusogo, 2018; WFP, 2017; Mosa, 2014). Mosa (2014) noted that road network is effective in transporting food from areas of deficit to those of surplus. Households closer to a well-seasoned road have access to larger food markets than those far from the road. This was supported by Gafarso and Nigussie (2019) in his study on accessibility of rural public infrastructures and food security among rural households in Kersa District, south western Ethiopia; he affirmed a positive and significant relationship between infrastructure and household food security. Gafarso further indicated that good road networks promote transportation of food from areas of supply to those of deficit and enhance food security by reducing market cost.

On the other hand, descriptive findings suggested that while over fifty per cent of the roads in Acholi sub region were paved, these roads got muddy and impassible during rainy season. This was supported by qualitativefindings from Kitgum district indicating that, during rainy season, movement was affected as roads got muddy and bridges flooded. Olusogo et al.,, 2018 found that increased access to a paved road increases household food security by 2%. The study further revealed that most of the households suffer a challenge of long distances to the market. Descriptive findings pointed out that a sizeable number of households in the Acholi sub region travel long distances to access markets. Ahmed (2017); Kirimi and Milicent, (2018) found that distance affects both access to market and food security. Kirimi et al., (2018) established that distance is associated with households' food security. Kirimi et al., (2018), further found that better transport network enhances market access and households' food security. Similarly, Amy (2012) found that distance to market plays a key role in determining the type of crops grown.

Olunfemi et al., (2016) found that a poor road network affects access to output markets, transport cost and household income. Tunda and Adeniyi (2012) found that a bad road increases transport cost to market, which equally affects consumption and food security. The findings are constituent with the study's qualitative findings that road network is still poor in rural areas characterized by muddy roads during rainy season and are further confirmed by the observation results.

Qualitative results further showed that households spend much time and transport cost in accessing input and output markets. A study by Ahmed (2017) shows that travel time is correlated with market accessibility and households' food security. Ajiboye (2016) and Feline (2017) further suggests that high transport cost reduces market participation and increases food waste. Furthermore, research shows that better road network promotes access to input markets and use of fertilizers. Aggarwal et al., (2017) found that travel time and transport cost affect market access and use of fertilizers. Moreover, the above results are consistent with the entitlement theory by Sen (1981) which suggests that famine can exist amidst food availability as long as an identifiable group of people have limited access to available food or suffer a food exchange failure. In line with the present study, the theory recognizes the role of infrastructure, and social systems in food security.The above results therefore suggest enough evidence to accept the hypothesis that road network to the market is positively associated with household food security.

CONCLUSION

From the theoretical underpinnings, empirical literature and the study findings, it can be concluded that road network to market has a positive and strong significant effect on households' food security in the Acholi sub region. Unfortunately, households in Acholi sub region have not fully tapped this benefit as indicated by low correlation results. Low prediction (10%) pointed to the fact that accessibility of these roads is conditioned to the state of weather at the time. Although the majority of the roads are paved, they are impassible during the rainy season which constrains transportation of goods to markets.

RECOMMENDATIONS

This study has identified the need for government to upgrade community access roads to link the rural community to urban areas. It is also important to upgrade dilapidated bridges for easy movement during rainy seasons. Tarmacking rural roads connecting to towns would cut down transport cost, time spent on the road, reduce waste, and increase access to external markets hence improving food security.

THEORETICAL IMPLICATION

From the entitlement theoretical underpinnings, although there are conflicting views on the predictors of food security among households, the present study has confirmed thatroad network plays a critical role in influencing food security among households in Acholi subregion. From the findings, the study has highlighted a significant positive effect of road network on food security among households in Acholi subregion in Northern Uganda, thus serving its purpose.

STUDY LIMITATIONS

The study followed a cross-sectional research design where the time frame was short thus limiting deep engagement of respondents and seasonal comparisons. Besides, the researcher could not penetrate deeper in villages due to the high transport cost involved considering the nature of roads and long distances from centers thus leaving other areas untapped. Additionally, study found that road network accounts for only 10% of the variance in food security implying there are other factors that account for the remaining 90% of variance which were not investigated in this study.

AREAS FOR FURTHER RESEARCH

Future studies could explore a longitudinal research design to assess the trend of food security as a function of road network overtime. Future studies should also investigate other predictors of food security beyond road network to obtain a comprehensive view of the phenomenon.

REFERENCES

Adefalu(2016.)Perceived Effects of Poor Road Transportation Network on Crop Production in Kaiama Local Government Area of Kwara State, North Central Nigeria}.International Journal of Agricultural Management and Development,2016,volume6,497-503

Aggarwal, S.. Giera.B., Jeong.D., Robinson.J., Spearot.A.(2017). Market Access, Trade Costs, and Technology Adoption: Evidence fromNorthern Tanzania. *International Scholastic Journal of Science.*

Ahmed, U. (2017). Status and determinants of small farming households' food security and the role of market access in enhancing food security in rural Pakistan. *PLoS ONE 12(10). eO185466.*

Ajiboye, Araoye(2016)The effects of transportation system on food marketing and security in Nigeria DO - 10.13140/RG.2.1.5075.0488

Allen, P., Bennett, K., & King, J. (2010). *PASW statistics by SPSS: A practical guide, version 18.0*. National Library of Australia.

Amin,M.(2005).*Social science research, conception, methodology and analysis.* Kampala, Makerere University Printery.

Anderson and Cook. (1999). Community food security: Practice in need of theory. *Agriculture and Human values, Vol. pp. 141-150.*

Asif,F.(2012). The promise of rural roads: Review the role of low volume roads in rural connectivity, poverty reduction, crisis management, and Livability.TRB Low volume Roads Committee. Transportation research board 500 Fifth Street, NW Washington, D.C.

Brislin, R.W. (1980) Translation and content analysis of oral and written material. In: Triandis, H.C. and Berry, J. W., Eds., Handbook of cross-cultural psychology: Methodology, Allyn and Bacon, Boston, 389-444.

Bryman. (2008). *Social Research Methods. Third* Edition. Oxford University Press.

Fornell.C, and David F. Larcker(1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. Journal of Marketing Research. Vol. 18, No. 1, Feb., 1981, pp. 39-50 (12

Cooper, D.R. and Schindler, P.S. (2006) Business Research Methods. 8th Edition, McGraw Hill, Tata.

Creswell, J. W. (2014). Research design:Qualitative, quantitative, and mixed methods approaches (4th ed.). Thousand Oaks, CA: Sage publications.ER

Creswell, J. W. (2009). Mapping the field of mixed methods research. *Journal of mixed methods research*, *3*(2), 95-108.

FAO, IFAD, UNICEF, WFP and WHO. (2019). The State of Food Security and Nutrition in the World 2019. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. Rome, FAO. https://doi.org/10.4060/cb4474en

FAO, IFAD, UNICEF, WFP and WHO. 2021. The State of Food Security and Nutrition in the World 2021. Transforming food systems for food security, improved nutrition and affordable healthy diets for all. Rome, FAO. https://doi.org/10.4060/cb4474en

FAO.(2002).*State of food insecurity in the world 2001*. Rome.

FAO.(2011).Building networks for Market access: Lessons learned from the Rural Knowledge Network Pilot Project for East Africa (Uganda Kenya and Tanzania). Office of Knowledge Exchange, Research and Extension, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

Field, A. (2006) Discovering Statistics Using SPSS. 2nd Edition, Sage, London

Gafarso, H. & Nigussie, B. (2019). Accessibility Of Rural Public Infrastructures And Food Security Among Rural Households In Kersa District, South Western Ethiopia.

Maarouf(2019) Pragmatism as a Supportive Paradigm for the Mixed Research Approach: Conceptualizing the Ontological, Epistemological, and Axiological Stances of Pragmatism. International Business Research; Vol. 12, No. 9; 2019 ISSN 1913-9004 E-ISSN 1913-9012

Hirschman, E. C. & Holbrook, M. B., 1986. Expanding the Ontology and Methodology of Research on the Consumption Experience. In: L. R. Brinberg D., ed. Perspectives on Methodology in Consumer Research. New York: Springer, pp. 213-251

Huberman, A. M., & Miles, M. B. (1994). Data management and analysis methods.

International Food Policy Research Institute (IFPRI); and Asian Development Bank (ADB). 2019. Ending hunger in Asia and the Pacific by 2030: An Aasessment of investment requirements in agriculture. Manila, Philippines: Asian Development Bank (ADB). http://dx.doi.org/10.22617/TCS190499-2

IPC 2019.Uganda: Acute Food Insecurity Situation October - December 2018 and Projection January - March 2019

IPC Global Partners. (2019). Integrated Food Security Phase Classification Technical Manual Version 3.0. Evidence and Standards for Better Food Security and Nutrition Decisions. Rome.

IPC. (2017). Report of the Integrated Food Security Phase Classification Analysis for Uganda. Uganda IPC Technical Working Group November 2014.

Johnson, B. and Turner, L.A. (2003) Data Collection Strategies in Mixed Methods Research. In: Tashakkori, A.M. and Teddlie, C.B., Eds., Handbook of Mixed Methods in Social and Behavioral Research, SAGE Publications, Thousand Oaks, 297-319.

Kari Lukka and *Sven Modell*, (2010), Validation in interpretive management accounting research, *Accounting, Organizations and Society*, **35**, (4), 462-477

Kirimi, L., Sitko, N. J., Jayne, T. S., Karin, F., Muyanga, M., Sheahan, M. & Bor, G. (2011). A Farm Gate-to-Consumer Value Chain Analysis of Kenya's Maize Marketing System (No. 101172).

Krejcie & Morgan. (1970). *Determining Sample Size of Research Activities, Educational and psychological measurement*. 30,608, Sage Publications.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. sage.

Lukka, K., & Modell, S. (2010). Validation in interpretive management accounting research. *Accounting, organizations and society*, *35*(4), 462-477.

Mahadevan,R.,and Hoang,V.(2015). Is there a link between poverty and food security? *Springer Science and Business Media Dordrecht 2015.*

Maxwell, D., Sadler, K., Sim, A., Mutonyi, M., Egan, R., & Webster M. (2008) Emergency Food Security Interventions. London: Humanitarian Practice Network, Overseas Development Institute. Good Practice Review (10).

Maxwell,D., Jennifer, C., and Bapu, V.(2013).How do different Indicators of Household food security compare?Empirical Evidence from Tigray. Feinstein International Center, Tufts University, Medford,USA.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Sage Publications, Inc Northern Tanzania. *International Scholastic Journal of Science.*

Mosa,S.(2014).The effect of infrastructural challenges on food security in Ntambanana, Kwazulu Natal, South Africa. *African Journal of Hospitality, Tourism and Leisure Vol 3(1)-2014 ISSN: 223 814X*

O'Connor, H & Gibson, N. (2003). A step by step guide to qualitative data analysis (2003). *Pimatiziwin: A journal of Aboriginal and Indigenous Community Health, 1(1), 64-90.*

Olusogo; *Ajibola*; *Oluwafemi* and *Olufolakemi*, (2018), Influence of road transport infrastructure on agricultural sector development in Nigeria, *Logistics & Sustainable Transport*, **9**, (1), 39-50

OPM GOU. (2017). National Food Security Assessment January 2017, Department of Relief, Disaster Preparedness and Management Office of the Prime Minister. https://reliefweb.int/report/uganda/national-food-security-assessment-january-2017

Patton MQ. *Qualitative research and evaluation methods*. 3rd Sage Publications; Thousand Oaks, CA: 2002.

Podsakoff.P.M, Scott B. MacKenzie, and Nathan P. Podsakoff(2012). Sources of Method Bias in Social Science Research and Recommendations on How to Control It.Annual Review of Psychology 2012 63:1, 539-569

Robson, P. (1993). The new regionalism and developing countries. *J. Common Mkt. Stud.*, *31*, 329.Sasidharan, Manu. (2017). Better Rural Transport is Key to Food Security and Zero Hunger. Sen, A. (1981). *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford: Clarendon Press.

Shively, G., Thapa,G.(2017). Road and Market access, And Household Food Security in Nepal. World Food Program (WFP).

Tabachnick, B. G. (7). & Fidell, LS (2001). Using multivariate statistics. *Bost. Allyn Bacon. Bamberger*, *31*.

Tunde A., Adeniyi E. Impact of road transport on agricultural development: a Nigerian example. *Ethiop. J. Environ. Stud. Manag.* 2012;5:232–238.

UBOS. (2017). Health status and associated factors. Thematic Series based on the national population and housing census 2014. Kampala Uganda, UBOS

UBOS. (2018). Uganda National Household Survey 2016/2017.Kampala Uganda, UBOS Uganda Bureau of Statistics (UBOS) and ICF. (2018). Uganda Demographic and Health Survey 2016. Kampala, Uganda and Rockville, Maryland, USA: UBOS and ICF.

USAID.(2018).Countryprofile:Uganda.Available*https://www.usaid.gov/sites/default/files/.../Uganda Nutrition-profile-Aps 2018-508.pd*

World Food Programme (2018). Road And Market Access, And Household Food Security In Nepal. World Food Program Nepal.