EXAMINATION OF THE DETERMINANTS OF FOOD UTILIZATION IN NIGERIA: ARDL COINTEGRATION APPROACH.

Muaz Muhammad Lawal

Department of Economics
Umaru Musa Yar'adua University, Katsina

08034890899

muazmuhammadlawal@yahoo.com

ABSTRACT

This paper examines the determinants of food utilization in Nigeria. It employed Auto Regressive Distributed Lag (ARDL) cointegration approach on annual time series data. The results of the study reveal the existence of long run relationship between food security index, level of education, food exports, educational attainment, rural and urban population. The results further indicate that educational attainment and urban population have a positive and statistically significant effect on educational attainment on food utilization while both food exports and the share of rural population to total population have a negative effect e on food utilization. This study recommends that policies geared towards increasing school enrolment and enhancing food enhancing food availability for domestic and exports should be implemented.

Keywords: Educational Attainment, Food Export, Food Security, Food Utilization, Rural and Urban Population.

1. INTRODUCTION

Food is a basic necessity of life. It is a basic means of sustenance and an adequate food intake, in terms of quantity and quality, is a key for healthy and productive life. The importance of food is also shown in the fact that it accounts for a substantial part of a typical Nigerian household budget. Various foods serve as important "vehicles" for taking nutrients into the body and bringing about human pleasure; hence the need for food to be taken in the right quantity and quality. To measure the quality of any food taken, there are classes of essential nutrients, which must be

combined, in appropriate proportion to ensure a balanced food intake. These include carbohydrates, protein, fats and oils, vitamins and minerals (Omonona, Bolarin Titus and Agoi, Grace Adetokunbo, 2007).However, in order to ensure food availability, accessibility and utilization, a number of Agricultural Development Institutions (ADIs) and specialized programs and projects (SPPs) were established and initiated in Nigeria. They include the National Agricultural Development Fund (NADF) in 1974and Nigerian Agricultural Cooperatives and Rural Development Bank (NACRDB) established in 2000, the National Accelerated Food Production Program (NAFPP) in1973, Agricultural Development Projects (ADPs), National Agricultural Development Fund (NADF) in 1974, the National Fadama Development Project (NFDP) introduced in 1992, the National Economic Empowerment and Development Strategy (NEEDS) in 2004 and the 7-points agenda 2013,Agricultural Transformation Agenda (ATA) 2016, Anchor Borrowers Program (ABP) up to 2022 aimed at enhancing food security in the countryamong others.

As observed by Ihomodu (2004), empirical records show that many of these programs and projects are not impressive enough to bring about the expected transformation in the agricultural sector. Further, argued that owing to food shortages and inadequate food productivity, Nigerians are considered as food insecure and are unable to meet the minimum calorie intake to maintain a healthy and active life. In addition, the UNDP Human Development Index (HDI, 2021)and the Global Hunger Index (GHI, 2021) have ranked Nigeria103rd out of 116 with scores of 28.3 saying Nigeria has a level of hunger that's serious and 40 out of 79 countries, respectively. More worrisome challenge facing Nigeria is the prevalence of hunger in the rural areas where about 80 percent of the populace lives on far less than a dollar per day (Matemilola and Elegbede, 2017).

However, the aforementioned issuesclearly stated how food insecure Nigeria is with some available data which in turn affects food utilization. The utilization of food is about how the human body make use of various nutrients in food. Some of the determinants include a person's health, feeding practices, food preparation, diversity of diet and intra-household distribution of food at all affect of person's nutrition status. Increasing utilization requires improving nutrition and food safety, increasing diversity in diets, reducing post-harvest loss and adding value to food(Centre, 2014).

It is against this background that this study seeks to examine the determinants of food utilization in Nigeria using Autoregressive Distributed Lag (ARDL)

cointegration approach on annual time series data from 1976 to 2017 so as to draw stakeholders' attention to those variables considered important to enhancing adequate food supply in the country. This study, which investigates the demand side of the determinants of food security (utilization) in Nigeria, differs from the previous studies such as Girma (2012)which concentrated on some small sections of food utilization, especially educational attainment, and Adenegan, Oladele & Ekpo's (2004) joint demand and supply models. This paper is organized as follows introduction, food security situation, literature review, methodology, results and discussion and finally conclusion and recommendations.

IFAD (2012) rates Nigeria as a major producer of yam, cassava and cowpea globally yet Nigeria remains a food insecure nation and heavily depends on importation of grains, livestock products including fish. Rural farmers engage in subsistent farming and over relying on seasonal rainfall. In 1940s, 1950s and early 1960s, food insecurity was not a common issue the country had to deal with. The farm products then sustained the populace and even had surplus to export. The decline was suspected to have begun around 1956 when oil was discovered and exportation of oil products started in 1958.this brought cost of food items. For instance, the price of rice rose by over 100 percent from 2006. According to Nigeria's Minister of Agriculture and Water Resources, 2.5 metric tons of rice is required to sustain Nigeria yearly. But only a half million metric tons is produced domestically. This implies a deficit of 2 million metric tons, thus need import to meet up with food demand (Matemilola and Elegbede, 2017).

2. LITERATURE REVIEW

2.1 Food Utilization

Food utilization is defined by USAID as: "food is properly used; proper food processing and storage techniques are employed; adequate knowledge of nutrition and child care techniques exists and is applied; and adequate health and sanitation services exist." Utilization is often used interchangeably with nutrition, yet while utilization focuses on nutrition; it also includes also food storage, processing, health and sanitation as they relate to nutrition (USAID, 20015).

Utilization has a socio-economic and a biological aspect. If sufficient and nutritious food is both available and accessible the household has to make decisions

concerning what food is being consumed (demanded) and how the food is allocated within the household. In households where distribution is unequal, even if the measured aggregate access is sufficient some individuals may suffer from food deficiency.

2.2 Food Security Situation in Nigeria

Nigeria is facing two key gaps in agriculture today; inability to meet domestic food requirements and to export at quality levels required for market success (Federal Ministry of Agriculture and Rural Development FMARD, 2016). The former problem is a productivity challenge driven by an input system and farming model that is largely inefficient. As a result, the aging populations of farmers do not have enough and efficient seeds, fertilizers, irrigation facilities, crop protection, and related support to be successful. The later challenge is driven by equally inefficient system for setting and enforcing food quality standards, as well as poor knowledge of target markets, insufficient food testing facilities, weak inspectorate system in FMARD and poor coordination among relevant federal agencies (FMARD, 2016).

2.3   Theoretical Review

Ester Boserup's Theory of Population

Utilization is a measure of populations ability to obtain sufficient nutritional intake and nutrition absorption during a giving period. So therefore, theory of population is linked here to food utilization. According to this theory of population, agricultural methods depend on the size of the population. Shefurther argued that in times of pressure people will find ways to increase the production of food by increasing labour force, machinery, fertilizers and so on. By 1978, her theory of agricultural change began to reframe as more generalized theory. The basic idea behind this theory is that while human population grows rapidly, people have always adapted their agricultural practices to adjust. This theory, unlike the Malthusian theory, is optimistic in nature and it is linked to the modern ways of food production using technology to produce even more than the food required. This increase food productions and supply. When population grows, people do not panic; instead, new innovations and advanced technologies, increase in labour force are used to increase food production.

2.4   Empirical Literature

Factors determining food security have been extensively studied across the globe. For example, Anila and Adiqa (2011) studied the determinants of food security at households' level in Pakistan using a logistic regression procedure. They employed five main variables out of other demographic indicators that affect food security. These include: place of residence, dependency ratio, social capital, employment status and educational attainment level of the head of family. The results showed that place of residence (urban) has a significant and negative effect, dependency ratio has a significant and negative impact on food security, educational attainment level of household's head beyond intermediate level has also significant and positive impact on food security status respectively, while social capital and employment did not have any significant effect on household's food security significantly.

Girma (2012) used binary logistic regression model to examine the determinants of food insecurity among households in Addis Ababa city, Ethiopia. He used household size, age of household head, household head's education, and access to credit, household asset possession, access to employment, dependency ratio, food aid and gender of household head and household access to various services. The results indicated that six (6) out of the ten variables namely household size, age of household head, household head education, asset possession, access to credit and access to employment were found to be statistically significant as determinants of food insecurity in the study area. Seydou, Liu and Baohui (2014) also investigated the factors affecting household food security in Niger by using survey data covering 500 households and the results revealed that the gender of the head of household, diseases and pests, labour supply flooding, poverty, access to market, the distance away from the main road and food aid are significant factors influencing the odds ratio of a household having enough daily intake.

Jean (2015) used probit model to explore the determinants of food insecurity among rural households in Rwanda. The empirical results show that rural households are more exposed to food insecurity than urban households. The results also found that household size, household's farm animal, household asset index, household food acquisition level, household food acquisition problem, household spending level, monthly food expenditure and land suitability per cell are the significant factors which determine food security in Rwanda. Self-sufficiency in food production has eluded Nigeria for a long time despite so many efforts by governments through a

series of policies. The food importation of food to close the gap between demand and supply of food by the government is worth N1 billion annually. It shows that in the general world enough food is produced to serve the entire global population at the level sufficient that all can be freed of starvation and acute hunger. No person whosoever should starve due to economic hardship or social strata, is the basic goal (Adenegan, et al, 2004).

Food insecurity and health problems are inseparable, taking this into consideration, Tamara, Emily and Areej (2015) examined the determinants of food insecurity and the burden of health-related social problems in an Urban Youth Population in Boston Massachusetts USA. Patients aged 15-25 years completed a web-based screening tool. Validated questions were used to identify problems in seven health-related social domains, namely food insecurity, health care access, education, housing, income insecurity, substance use, and intimate partner violence. Chi-square and Kruskal-Wallis tests and logistic regression models controlled for age, sex, race/ethnicity, assessed the association between food insecurity and health-related social problems. Predictive values of a two-item food insecurity screen compared with the United States departments of Agriculture food security survey were calculated. The study finds that one-third of youth in the sample experienced food insecurity, which was strongly associated with presence of other health-related social problems. The two-item screen effectively detected food insecurity. Food insecurity screening may lead to identification of other health-related social problems that when addressed early may improve adolescent health.

In Nigeria, Nuruddeen (2013) used descriptive statistics and regression analysis to examine the socio-economic and demographic data of the households, while regression analysis was used to determine the food security and insecurity status of the households in Nigeria. The results of the study showed that households' size, level of education as well as per capita income have significant effect on status of food security in the study areas.Abdullahi, Hassan and Ayanlere (2015) analysed the determinants of food security status among rural farm households in North-western Nigeria using logit regression model. The empirical results indicated that age, extension contact, source of labour and per capita income were the main determinants of food security in the study area. The results also showed that food security among the households was more responsive to a change in age than to extension contact, source of labour and per capita income.

3. METHODOLOGY

3.1 Variables Description and Data Sources

The study investigates the determinants of food utilization in Nigeria.The dependent variable is Food Security Index (FSI)while Rural Population (RP), Urban Population (URP), Educational Attainment (EDU) and Food Export (FEXP) are the independent variables. The data used for this study were sourced from the World Development Indicators, WDI, (2018). All the variables, except the Food security index were transformed in natural logarithms so as correct heteroskedasticity.

3.2 Model specification

Adenegan et al. (2004) model which used only demand side factors is adopted and re-modeled to arrive at our baseline model which is specified in functional form as follows:

$$FSI = f(EDU, \quad FEXP, RP \quad URP), \tag{1}$$

The model in equation (1) can be representing l into econometric form as follows:

$$FSI_t = \alpha_0 + \alpha_1 \ln(EDU)_t + \alpha_2 \ln \quad (FEXP)_t + \alpha_3 \ln(RP)_t \alpha 4 + \ln(URP)_t + \mu_t \tag{2}$$

Where;

FSI = Food Security Index (Food Utilization)

EDU = Educational Attainment

FEXP = Food Export

URP = Urban Population

RP= Rural population

μ_t = error term

ln = natural logarithm, and α_0, α_1, α_2, α_3 are the parameters to be estimated.

It is expected that Food Export and Rural Population will have a negative impact on food utilization while Educational Attainment and Urban Population to have positive effect on Food Utilization.

Following Pesaran, Shin and Smith (2001), the model in equation (3) can be represented into ARDL form as follows:

$$\ln(FSI)_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \ln(FSI)_{t-i} + \sum_{i=0}^{q} \beta_2 FEXP_{t-i} + \sum_{i=0}^{r} \beta_3 \ln(LRP)_{t-i} + \sum_{i=0}^{s} \beta_4 \ln(LEDU)_{t-i} +$$

$$\sum_{i=0}^{t} \beta_5 \ln(LURP)_{t-i} + v_t \qquad (3)$$

Equation (4) represents our ARDLmodel which assumes that the relationship between food securityindex or food utilization (FSI), educational attainment (EDU), food export (FEXP), UrbanPopulation (URP) and rural population (RP). We adopted the ARDL model because unlike the standard cointegration models(Engle& Granger, 1987and Johansen, 1988 and later approach in 1991)it (ARDLmodel)does not enforce anyrestraint on the integration order of the series. This means that ARDLmodel can be employed irrespective of whether the series are all I (0), I (1) or jointly co-integrated. Secondly, it produces robust estimates even in small samples. Thirdly, it provides simultaneous estimates of both the short and long run coefficients (Pesaran et al., 2001).

In order to conduct the ARDL cointegration test, the following restricted error correction model specified in equation (5) will be estimated. The tests involve the following null hypothesis: H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$. Having established the existence of long run relationship using the ARDL procedure, the parameters computed as given in the following model:

$$\Delta \ln(FSI)_t = \alpha_0 + \alpha_1 \ln(FSI)_{t-1} + \alpha_2 FEXP_{t-1} + \alpha_3 \ln(LRP)_{t-1} + \alpha_4 \ln(LEDU)_{t-1} + \ln(LURP)_{t-i}$$

$$+ \sum_{i=1}^{p} \beta_1 \Delta \ln(FSI)_{t-i} + \sum_{i=0}^{q} \beta_2 \Delta FEXP_{t-i} + \sum_{i=0}^{r} \beta_3 \Delta \ln(LRP)_{t-i} + \sum_{i=0}^{s} \beta_4 \Delta \ln(LEDU)_{t-i} +$$

$$\sum_{i=0}^{t} \beta_5 \Delta \ln(LURP)_{t-i} + \mu_t \qquad (4)$$

However, once co-integration is established among the variables of interest, the error correction model (ECM) specified in equation (6) can be estimated and its estimates show the extent to which short run shocks are adjusted to the long run equilibrium path.

$$\Delta \ln(FSI)_t = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta \ln(FSI)_{t-i} + \sum_{i=0}^{q} \beta_2 \Delta FEXP_{t-i} + \sum_{i=0}^{r} \beta_3 \Delta \ln(LRP)_{t-i} + \sum_{i=0}^{s} \beta_4 \Delta \ln(LEDU)_{t-i} +$$

$$\sum_{i=0}^{t} \beta_5 \Delta \ln(LURP)_{t-i} + \varphi ECT_{t-i} \tag{5}$$

4. RESULTS AND DISCUSSION

The analysis started with unit root tests and the Augmented Dicker Fuller (ADF) and Phillips Perron (PP) unit root tests were used. The results of the unit root tests reported in Table 1 depict that food exports (FEXP) and urban populations (LURP) have no unit root at their levels and therefore are stationary at level or integrated of order zero, $I\ (0)$. However, food security index (FSI), educational attainment (LEDU) and rural population (LRP) have unit roots at their levels therefore are not stationary at level but they became stationary at first difference, which means that theyare integrated of order one, I (1). The mixed order of integration of these variables gives a reliable backing for the adoption of ARDL approach in this study.

Table 1. Results of Unit Root Tests

Variables	ADF Test		PP test		Stationary Status
	Level	First Difference	Level	First Difference	
FSI	-1.250	-5.029	-1.465	-5.029	1.000
FEXP	-3.069		-2.903		5.000
LURP	-3.392		-3.527		5.000
LRP	-1.444	-6.801	-5.567		1.000
LEDU	0.680	-4.229	0.245	-4.403	1.000

Notes: Lag lengths are selected based on Schwarz Bayesian Criterion. The test statistics are compared with critical values from McKinnon (1996); [***],[**] and [*] denotes significance at 1%, 5% and 10% respectively.

Overall, the result of the ARDL bounds test revealed that the dimension taken on food availability in Nigeria is co-integrated with the identified determinants. This means that even though their relationship may be distorted in the short run equilibrium will be attained in the long run.

4.1 Result of ARDL Bounds Test for Co-integration

Having ascertained that none of our variables of variables of interest is I (2), which is a condition necessary for conducting implementing ARDL co-integration approach, our next task is conduct co-integration test so as to determine whether the presence or otherwise of long run relationship(co-integration) between of food utilization and its potential determinants. In this regard, we use the calculated F-statistics of 7.746, which is greater than the 1% upper critical bound of 5.610. Following this outcome, it t is concluded that a long run equilibrium relationship exists between food security index on one hand and level of education, rural population, urban population and food export on theother hand.

Table 2. Results of Bounds F-test for Co-integration

	Utilization	
F-statistics	7.746	
K	4	
N	37	
Selected ARDL Model	(4,4,2,1,0)	
	I(0)	I(1)
1%	3.29	4.37

2.50%	2.88	3.87
5%	2.56	3.49
10%	2.2	3.09

Note: Lag lengths are automatically selected based on Swartz Bayesian Criterion (SBC). The lower and upper critical bounds are as provided by EViews 9.

4.2 Results of Short Run Dynamics and Error Correction Mechanism (ECM)

The results of the short run dynamics/error correction model (ECM) reported in Table 3 indicate that both the educational attainment and urban population have a contemporaneous negative and statistically insignificant impact on food utilization. Nonetheless, the results show that one, two and three lagged periods of level of education are found to have a negative and statistically significant on food utilisation in the short run.

Table 3: Results of the Error Correction Model (ECM)

	Utilization	
Variables	Coefficients	p-value
D(LFSI(-1))	-0.23	0.075
D(LFSI(-2))	-0.287	0.013
D(LFSI(-3))	-0.581	0.000
D(LEDU)	-0.022	0.864
D(LEDU(-1))	-0.375	0.015
D(LEDU(-2))	-0.687	0.000
D(LEDU(-3))	-0.352	0.019
D(FEXP)	-0.004	0.085

D(FEXP(-1))	0.007	0.027
D(LRP)	11.378	0.000
D(LURP)	0.337	0.276
ECM(-1)	-0.231	0.000

On the other hand, food exports and rural population as a share of total population have a significant contemporaneous negative and positive effect on food utilization respectively. More importantly, the coefficient of -0.231 of the error correction mechanism (ECM) carries an expected sign(negative) and is found to be statistically significant by reference to the probability value (0.000). This finding confirm the presence of co-integration(long run relationship) between food utilisation, level of educational attainment, food exports, rural population and urban population that was already established by the result of the ARDL bounds test for co-integration as reported in Table2. Secondly, it indicates the presence of long run unidirectional causality, which runs from the level of educational attainment, food exports, rural population and urban population to food utilisation among others.

4.3 Long Run Estimates and Diagnostic Tests

The results in Panel A of Table 4 show that, as expected, educational attainment has positive effects on food utilization. Specifically, a one percent increases in school enrolment increases food utilization by 1.4% other things being equal. Similarly, as anticipated, both food exports and the share of rural population to total population carry a negative sign and are statistically significant at 5% and 10% levels respectively. This means as more food is exported out of Nigeria less is left for the populace to utilize.

Table 4. Estimated Long Run Result

Panel A : Long run Coefficients

Variables	Beta	p-value
LEDU	1.356	0.041

FEXP	-0.084	0.01
LRP	-8.601	0.058
LURP	1.798	0.052
Constant	115.376	0.053

Panel B –Results of the Diagnostic Tests		
R-Squared	0.799	
F-Statistic	5.550	0.000
Autocorrelation	2.183	0.140
Normality	1.006	0.604
Heteroscedasticity	1.277	0.297

In particular, a 1% increase in food export will lead to a decrease of about 0.08 in food utilisation while an increase of 1% in rural population will cause food utilisation to decrease by about 0.06%, other things being equal. In the same vein, the share of urban population to total population has positive relationship with food utilization. This result is logically justifiable given that urban population is more educated and has access to wider varieties of food items when compared with the rural population.

The results in Panel B of Table 4 reveal that the value of the R-square, 0.799 indicates that about 80% of the variations in the dependent variable that are explained by the independent variables. Moreover, the results reveals that calculated F-statics for the model is statistically significant, which implies that all the independent variables (level of educational attainment, food exports, rural population and urban population) in the model have jointly explained the variations in the dependent variable(food utilisation) during the period of the study. Furthermore, the probability values of 0.0140, 0.604 and 0. 297, which are below 5% level suggest that the residuals of the long run model are normally serially independent, homoscedastic and normally distributed. By satisfying these underlining assumptions of regression analysis; it can be concluded that the estimated parameters are best, linear and unbiased as well as efficient. This means policy implications can be drawn from the results of this study. Finally, the results of the stability tests conducted show that the plots of the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of recursive residuals squares (CUSUMSQ) reported in APPENDIX, show that the estimated parameters of the model are stable over the sample period as the recursive residuals and the squares are contained within the 5% critical bounds (the red lines). This result has reinforced the results of the diagnostic tests obtained earlier. Overall, the model is well fitted, stable and good for policy recommendations.

5. Conclusion and Recommendations

This paper examines the determinants of food utilization in Nigeria. It employed Auto Regressive Distributed Lag (ARDL) co-integration approach on annual time series data from 1976 to 2017.The results of the study reveal the existence of long run relationship between food security index, level of education, food exports, educational attainment, rural and urban population. The results further indicate that educational attainment and urban population have a positive and statistically significant effect on educational attainment on food utilization while both food exports and the share of rural population to total population have a negative effect e on food utilization. This study recommends that policies geared towards increasing school enrolment and enhancing food utilization for domestic use and exports should be implemented. Adequate food storage, sanitation and processing techniques should be employed, since food utilization also determines individual's health status, government and other stakeholders should ensure ideal food utilization to have healthy human capital.

REFERENCES.

Abid, H., Golam, R., Bidhubhusan, M., Sabranee, T,. (2016). Household food security in the face of climate change in the Hindu Kush Himalayan region. *Spranger, 8*(5), 921-937.

Adenegan, K.O., Oladele, O.I., & Ekpo, M.N. (2004): Impact of Agricultural Export on Food Security in Nigeria. *Food Agriculture and Environment .2(1):107-114(2004)*

Adesina F., (2016). Building on the Successes of the ATA, Closing Key Gaps. Policy and Strategy Document. Federal Ministry of Agriculture and Rural Development, FMARD, Abuja, Nigeria.

Agwu & Irohibe. (2014). Assessement of Food Srcurity Situation Among Farming Household. *Journal of Central European Agriculture* , vol.15(1):94-107.

Ajayeoba, A. (2010). Concerning Food Security in Nigeria: West Africa Insight. Available at *westafricainsigh.org/articles/PDF/8.*

Centre, A. I. (2014). Food Security and Why It Matters. *Australian Centre for International Agricultural Research.*

FMARD. (2016). Building on the Successes of the ATA, Closing Key Gaps. Policy and Strategy Document. Federal Ministry of Agriculture and Rural Development, FMARD, Abuja, Nigeria.

IFAD (2012) Annual Report Stresses Growth, Transparency and Response to Food Security Challenges.

Girma G. G. (2012). Determinants of food insecurity among households in Addis Ababa city, Ethiopia. *Interdisciplinary Description of Complex Systems,* 10(2), 159-173

Global Hunger Index 2021: Nigeria

Ihimodu, I.I. (2004): Marketing of Agricultural Products and the Food Security Programmed in Nigeria. Paper Presented at the 13th Annual congress of The Nigeria Rural Sociological Association at LAUTECH, Ogbomosho Nigeria. November 25-28, 2003

Mukhtar (2011) Determinants of food insecurity in Nigeria: Application of binary choice modelling technique. Bayero University, Kano. A Paper presented in the Department of Economics

Nwajiuba, C. (2014). Nigeria's Agriculture and Food Security Challenges. *Agriculture and food security,* 45 to 53.

Omonona, B., Titus, A & Grace, A. (2007). An analysis of food security situation among Nigerian urban households; Evidence from Lagos stste, Nigeria. *Journal of European Agriculture*, 397-406.

Pesaran, M. H. Shin, Y. & Smith, R.J. (2001).Bounds testing approaches to the analysis of

    level relationships. *Journal of Applied Econometrics*, 16: 289-326.

Riely, F., Mock N., Cogill, B., Bailey, L.,& Kenefick E. (1999). Food security indicators and framework for use in the monitoring and evaluation of food aid programs. USA: Food and Nutrition Technical Assistance.

USAID. (2015). Overview of Food Utilization and the Value Chain Approach. Chicago: Market Links.

APPENDIX