

EFFECTS OF SOCIO-ECONOMIC CHARACTERISTICS ON HOUSEHOLDS FOOD INSECURITY ALONG THE URBAN-RURAL CONTINUUM IN MOROGORO AND IRINGA, TANZANIA

Ubalodus J. Tumaini^{1*} John M. Msuya²

¹. Department of Business Administration, College of Business Education, P.O Box 1968, Dar es Salaam, Tanzania

². Department of Food Technology, Nutrition and Consumer Sciences, Sokoine University of Agriculture, Morogoro, Tanzania. * Corresponding Author: ujtumaini@yahoo.com

ABSTRACT

The study on which this paper is based assessed the socio-economic characteristics that influence prevalence of food insecurity among urban, peri-urban and rural households in Morogoro and Iringa, Tanzania. A cross-sectional research design was employed whereby a sample of 300 households was selected using a multi-stage cluster sampling procedure. The primary data were collected through interview schedules using the Household Food Insecurity Access Scale (HFIAS) tool. Descriptive analysis was carried out to examine the variation of food access as a measure of food insecurity and socio-economic characteristics that influence the prevalence of food insecurity among urban, peri-urban and rural households. Ordinal logistic regression model was employed to determine the influence of household's socio-economic characteristics on food access. Generally, the results show that food access as a measure of food security was higher among urban households (53.9%) compared to peri-urban (47.3%) and rural households (25.8%) ($p \leq 0.001$). Also, whereas age, education of household head and location of the household were directly associated with food access security, non-employment of household head was inversely related with food access security. It is concluded that household food access insecurity is a widespread phenomenon along the continuum although it is more prevalent in rural as compared to urban settings. Thus, it is recommended that appropriate interventions be carried out to improve household food access security mostly in rural areas.

Key words: Socio-economic characteristics, food insecurity, food access, urban-rural continuum.

INTRODUCTION

Globally, an estimated 795 million people experienced food insecurity in 2014 (FAO *et al.*, 2015), defined as a state of 'limited or uncertain ability to acquire acceptable foods in socially acceptable ways' (Crush and Frayne, 2011). This means that just over one in every nine people in the world are currently unable to consume enough food to conduct an active and healthy life. The vast majority of the hungry people live in developing countries, where an estimated 780 million, or 12.9% of people, were chronically underfed during the same time. In these regions, the prevalence of undernourishment has dropped by 44.4 percent since 1990-92. Despite the notable progress, large differences remain across regions, including Southern Asia, Eastern Asia, South-Eastern Asia, Africa and Latin America. According to FAO, IFAD and WFP (2015), Sub-Saharan Africa remains the region with the highest prevalence of one in four people chronically.

In Tanzania, basic needs poverty declined from 34.4% to 28.2% between 2007 and 2011/12, and food poverty declined from 11.7% to 9.7% (URT, 2014). These poverty figures were estimated using, respectively, the national basic needs poverty line of TZS 36,482 per adult per month and the national food poverty line of TZS 26,085 per adult per month. Basic needs poverty implies that a person cannot meet his/her basic consumption needs while an extremely poor individual cannot afford to buy basic foodstuffs to meet the minimum nutritional requirements of 2,200 kilocalories (Kcal) per adult per day. Despite this significant progress, extreme poverty is particularly pervasive in rural areas, whereby 1.9 million people as compared to 0.75 million people in urban areas are estimated to be living in extreme poverty (URT, 2014).

The estimates of the proportion of people whose expenditures are below the extreme poverty line in Morogoro and Iringa regions, respectively, were 14 percent and 10 percent in 2011/12 (URT, 2014). Accordingly, it has been

revealed that chances of a household being extremely poor are associated with its demographic structure and its socio-economic characteristics (URT, 2014). For example, large household size, lower level of education of household head coupled with being economically inactive, and dependence entirely on a natural resource based livelihood such as farming tend to be food insecure. On the other hand, households tend to be food secure when they are part of the formal sector or has a member who receives wages, salaries, or earns an income from business (WFP, 2013).

Urban food insecurity in Africa is emerging as an important development agenda (Crush and Frayne, 2011). This is challenging the long standing thinking that food insecurity is primarily a rural problem requiring a massive increase in smallholder production (AU, 2006; World Bank, 2008). The key argument is that in a continent undergoing rapid urbanization, the issue of urban food security has been neglected by governments, international agencies, donors, NGOs and researchers. It is from this seemingly opposing development thinking that the current study was undertaken to assess prevalence of household food access insecurity along the urban-rural continuum with inclusion of intermediary stage i.e. peri-urban. Equally, the influence of socio-economic characteristics on household food access security was also sought. The approach of taking the continuum was considered important since it allows for comparison of related variables within similar socio-cultural backgrounds. This has avoided the possibility of selecting subjects from different population backgrounds.

Urban-Rural Continuum in Morogoro and Iringa

Both Morogoro and Iringa towns are surrounded by vast arable land and are linked with wide road networks. The two towns have experienced rapid growth in both population size as well as area coverage in the last decade (URT, 2013). Much of the surrounding rural areas have been converted into peri-urban conditions and there is high inter linkage of livelihood activities among the people living in these settings (i.e. urban, peri-urban and rural) (Tacoli, 2003). Therefore, the two areas provided excellent study sites for assessing the urban-rural continuum.

Given the complexity of food security, especially in the urban settings, the study findings will be of great aid to the policy makers and other practitioners in designing context-specific strategies for improving food accessibility in the increasing urbanization conditions facing the Tanzanian society and the whole of sub-Saharan Africa.

Defining Urban-Rural Continuum

Urban-rural continuum, the merging of town, suburb and country, is a term used in recognition of the fact that in general there is rarely, either physically or socially, a sharp division, or a clearly marked boundary between the three, with one part of the population wholly urban, the other wholly peri-urban and the rest rural (Simon *et al.*, 2006; White *et al.*, 2008). Based on continuum conceptualization, urban, peri-urban and rural cannot be seen simply as dichotomous entities. They are interlinked and yet distinct from each other. This study aimed at investigating whether this applies to the issues related to household food access as well.

Demographic and economic criteria on which definitions of urban, peri-urban and rural areas are based can vary widely between different nations, making generalizations problematic (Whitaker, 1983). According to Tacoli (1998), some authors differentiate these areas based on population size and density. Others base their definitions on the availability of services such as post office, tax office, public treasury, banking, running water supplies, electricity, and health and education facilities. However, the combination of criteria applied can vary greatly. Even the population thresholds used can be different. For example, in many African nations, it is 5,000 inhabitants, while for most Latin American and European nations it can be as low as 2,000 or 2,500, or even just a few hundred inhabitants (Tacoli, 1998). In the context of this research, the working definitions of urban, peri-urban and rural areas were established based on relevant reviewed literature (Moustier, 2001; Erenstein *et al.*, 2004; Drechsel *et al.*, 2006). The work of Iaquina and Drescher (2000) strongly helped in the distinction of the urban, peri-urban and rural areas based on theoretical length of travel time (by car) from the town center. Accordingly, urban area is an area within a range of up to five travel minutes from the town center, peri-urban covers an area between 5 and 20 minutes from the town center and rural area is an area which travel time is more than 20 minutes from the town center. This approach has been applied by Schlesinger (2013) in other medium-sized towns in Africa and has worked well

Food security and its dimensions

In the 1980s, following the success of the green revolution which helped to increase food production (food availability), it was recognized that food emergencies and even famines were not caused as much by catastrophic shortfalls in food production as by sharp declines in the purchasing power of specific social groups. Following this observation, food security was defined as “access by all people at all times to enough food for an active and healthy life” (World Bank, 1986). This definition was afterwards improved by the World Food Summit (WFS) in November 1996 to include the nutritional value and food preferences whereby food security was defined as a situation “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996). Based on this definition, four food security dimensions can be identified: food availability, physical, economic and socio-cultural access to food, food utilization and stability over time.

Food availability is the physical presence of food in the area of concern through all forms of domestic production, commercial imports and food aid (WFP, 2009). Food availability is usually applied at a regional or national level rather than at the household level (Riely *et al.*, 1999). Food availability is determined by production (food produced in the area) trade (food brought into the area through market mechanisms), stocks (food held by traders and in government reserves) and transfers (food supplied by the government and/or aid agencies).

Food access concerns a household’s ability to acquire adequate amounts of food, through one or a combination of own home production and stocks, purchases, barter, gifts, borrowing and food aid. Food access consists of three elements, which are physical, economic and socio-cultural. Physical dimension can be illustrated by a situation whereby food is being produced in one part of a country but cannot be delivered to another part suffering from a lack of food due to an inefficient and non-existence transport infrastructure. From the economic viewpoint, food insecurity exists when people cannot afford to buy sufficient food. Socio-cultural dimension arises when food may be physically available and the potential consumer has the money to buy the food but is prevented from doing so for being a member of a particular social group or even gender.

Food utilization refers to households’ use of the food to which they have access and individuals’ ability to absorb and metabolize the nutrients – the conversion efficiency of the body (WFP, 2009). Among others, food utilization includes the ways in which food is stored, processed and prepared, including the water and cooking fuel used, and hygiene conditions and feeding practices, particularly for individuals with special nutrition needs, such as babies, young children, the elderly, sick people, and pregnant or lactating women. The availability of and access to food on their own are not enough, people have to be assured of safe and nutritious food which meets their dietary needs.

With regard to stability which is underlined by the phrase “all people, at all times...” integral to the WFS’s definition of food security, this dimension emphasizes the importance to reduce the risk of adverse effects on the other three dimensions: food availability, access or utilization (FAO, 1996). To be food secure, a population, household or an individual must be guaranteed of availability of food, of access to adequate food and of its proper utilization at all times, in other words, in a stable way.

Whereas the main concern of consumers of developed countries is about the effects of the food they eat on their health in terms of their nutritional needs as well as wholesome and tasty, developing countries including Tanzania are mostly concerned with availability of and access to a nutritious diet throughout the year at relatively low costs (FAO, 2002). This means that household food access insecurity remains a major challenge for the country and that policy interventions are needed to address the problem.

Socio-economic Characteristics of Households and Food Security

Generally, food security is a complex phenomenon that manifests itself in numerous physical conditions resulting from multiple causes. Food security has four dimensions namely: food availability or supply, food accessibility, food stability and food utilization. Each of these dimensions can be measured by a set of specific indicators at individual, household, and national levels. This paper focuses on the food accessibility dimension at the household level. This is because according to FAO *et al.* (2015), the main concern in the Sub-Sahara African countries and Tanzania in particular is poor food access.

The socio-economic characteristics of individual households have been identified to be among the basic factors influencing the food security status of households (Sanusi *et al.*, 2006). A study in Addis Ababa city found that the socio-economic characteristics that influence household food insecurity status include household size, age and education level of household head, asset possession, access to credit service and access to employment (Gebre, 2012). A study by Babatunde *et al.* (2007) among farming households in Kwara State of North-Central Nigeria found that household income, ability for own production, education status of household head and household size were important in influencing their food access security. Leyna *et al.* (2008) and Knueppel *et al.* (2010) reported factors such as age, marital status, education, occupation, and religion to be important in influencing food security in rural settings of Tanzania. What is very clear from the review of the above studies is that inclusion of urban-rural continuum in the empirical analyses of factors that influence household food access has not been attempted, something that makes this study quite unique and important.

METHODOLOGY

Description of the study area

The survey was conducted in Morogoro Municipality, which covered the urban and peri-urban while the rural part extended to two surrounding districts of Morogoro and Mvomero. On the other hand, Iringa Municipality covered the urban and peri-urban part while the rural area extended to two surrounding districts of Iringa and Kilolo. According to the recent 2012 Population Census, Morogoro Municipality had a population of 315 866 while Iringa Municipality had a population of 256 348. Both Morogoro and Iringa Municipalities are facing rapid influx of new residents causing major urban challenges in managing social and economic changes, whereby growing poverty is of particular importance (UN-HABITAT, 2009).

Research design and sampling procedure

A cross-sectional research design was employed whereby data were collected once from sampled households. Households were randomly selected through a multi-stage cluster sampling design. The first stage involved a purposive selection of two sites, namely Morogoro and Iringa. In stage two, three districts in both sites were purposively sampled to form the urban-rural continuum. Grid cells were then created on maps of the study sites using Geographical Information System (GIS) whereby random sampling was employed to select 10 grid cells each in urban, peri-urban, and rural settings. Further, the GIS-based random sampling was used to select five households in each grid cell. Accordingly, the sample size in each site was 150 households meaning that 50 households were, respectively, sampled in urban, peri-urban and rural settings. This approach was desired because it avoids human selection biases of locations and households. The sample size was pre-determined by the Livelihood Urbanization and Natural Resources in Africa (LUNA) project, which supported this study by establishing that a sample size of 150 households in each of the two study areas was sufficient for reasonable analysis, using experience from previous projects (Schlesinger, 2013).

Data collection

Primary data were collected through interview schedules using a structured questionnaire whereby both quantitative and qualitative information were sought. The questionnaire included standardized Household Food Insecurity Access Scale (HFIAS) questions consisting of a list of 9 specific questions about accessibility to food in the household during previous 30 days (Coates *et al.*, 2007). Study respondents were preferably the spouse in charge of food provisioning and cooking in the household or the head of household. The Household Food Insecurity Access Prevalence (HFIAP) status indicator was used to categorize the interviewed households into four levels of household food access insecurity namely: food secure, mildly insecure, moderately insecure or severely food insecure.

Before the questionnaire was administered to a respondent, verbal consent was sought after the local government official had introduced the researcher. Each participant was made aware that participation was entirely voluntary and that he/she could withdraw at any time if felt uncomfortable.

Data analysis

Data processing involved editing, coding, and entering data by using the Statistical Package for Social Sciences (SPSS) software. Data were generated and presented via frequencies, percentages, means, and standard deviations.

Ordinal logistic regression model was used to examine the influence of household socio-economic characteristics on food access security. The dependent variable (Y) was the four HFIAP outcomes, that is, food secure, mildly, moderately, or severely food access insecure. The independent variables included age, sex, education level and main economic activity of the head of household. Others were household size and the location of household (whether the household was located in urban, peri-urban or rural setting). Ordinal logistic regression model was considered to be the most appropriate for this research because the dependent variable is a ranked one with ordered categories. In addition, the model was employed because it estimates the net effects of a set of explanatory variables on the dependent variable (Morgan and Teachman, 1988). The ordinal logistic regression model took the following form:

$$P(y) = \frac{e^{\alpha + \beta_1 x_1 + \dots + \beta_k x_k}}{1 + e^{\alpha + \beta_1 x_1 + \dots + \beta_k x_k}} \dots \dots \dots (1)$$

Where P(y) = the probability of the success alternative occurring, e = the natural log, α = the intercept of the equation, β₁ to β_k = coefficients of the predictor variables, and x₁ to x_k = predictor variables entered in the ordinal regression model.

Specifically, in this study:

P(y) = the probability of a household being food secure, α = the intercept of the equation, β₁...β_k= regression coefficients, x₁ = age of household head (in years), x₂ = sex of household head (1=male and 0=female), x₃ = highest education grade attained by household head (number of years of schooling), x₄ = main economic activity of household head (0=none, 1=farming activity, 2=non-farming activities), x₅ = household size (number of people who sleep under same roof and take meals together at least four days a week), and x₆ = location of household (3=urban, 2=peri-urban, 1=rural).

RESULTS AND DISCUSSION

Out of the 300 sampled households, only 279 households completed the data collection procedure. Of these households, 132 (or 47.3%) were in Morogoro study site while the remaining households were in Iringa site. Moreover, in Morogoro site, 31.1% of the households were situated in urban area compared to 33.3% and 35.6% in peri-urban and rural areas, respectively. On the other hand, 32.7% of the households in Iringa site were located in urban settings compared to 33.3% and 34% in peri-urban and rural settings respectively. Overall, 26% of the households in urban areas were headed by a female as compared to 14% and 22.7% in peri-urban and rural settings, respectively. Generally, the distribution of respondents was equal among the three locations of interests i.e. urban, peri-urban and rural.

Household demographic characteristics

Characteristics of household's heads are presented in Table 1. The mean age of the household's heads in urban areas was 40.51(±12.18) years as compared to 42.12(±12.31) and 42.50(±12.76) years in peri-urban and rural areas, respectively. Analysis using one-way ANOVA test, proved that the mean age of the head of household from the three spatial entities of the continuum were not statistically different (p > 0.05). The mean years of schooling for the heads of households in urban areas was 9.19(±3.56) as compared to, respectively, 8.63(±3.93) and 5.79(±3.34) in peri-urban and rural settings. The majority of household's heads in rural areas have not completed seven years of primary school education as compared to their counterparts in urban and peri-urban areas who have gone to post-primary school education (p ≤ 0.001).¹ One explanation is that in most cases parents in rural areas do not put much emphasis in education as compared to those in urban settings. A report by URT (2014) affirms that the number of unschooled people in Tanzania is higher in rural areas as compared to the urban areas. Also, Table 1 shows that the surveyed households had an average of five members per household along the urban-rural continuum. Household size is an important variable which determines the state of household food security and expected to be inversely related with household food access security whereby an increase in household size implies more people to be fed from the limited resources (Garrett and Ruel, 1999; Beyene and Muche, 2010).

¹ According to the Tanzanian education system, a person spends the first seven years of formal education, which is considered as primary school. Then follows the next four years of ordinary level secondary school and two years of advanced level secondary school (also known as high school), before a person goes to University or other tertiary level education.

Table 1: Distribution of study population by mean age, education, and household size along the continuum (n = 279)

Variable	Mean (and Standard Deviation)			P-Value
	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)	
Age (Years)	40.42(±12.18)	42.01(±12.31)	42.5(±12.76)	0.517
Years of schooling	9.26(±3.58)	8.84(±4.16)	5.79(±3.33)	0.000*
Household size (persons)	4.72(±2.15)	5.09(±2.12)	5.13(±2.19)	0.365

* indicates the mean difference is significant at the $p \leq 0.001$ level.

Main economic occupations

Table 2 shows that quite a huge proportion (86.6%) of the household's heads in urban area were involved in non-farming activities as compared to 75.3% and only 22.7% in peri-urban and rural areas, respectively. On the other hand, rural household's heads were more involved in farming activities (77.3%) compared to, respectively, 20.9% and 6.7% in peri-urban and urban settings ($p \leq 0.001$). Although, these findings are consistent with the findings of a survey conducted in Tanzania Mainland (URT, 2014), this proportion is somewhat lower than the national statistics. This implies that the number of rural households shifting from farming to non-farming activities is probably increasing.

Table 2: Percentage distribution of household's heads based on main economic occupations (n = 279)

Main economic occupation	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)
Farming activities	6.7	20.4	77.3
Non-farming activities	86.6	75.3	22.7
Unemployed	5.6	4.3	0

Chi-square value = 1.235; $p \leq 0.001$

Household food access along the urban-rural continuum

Using the categorical measure of household food access insecurity along the urban-rural continuum, there was statistical significant relationship ($p \leq 0.001$) between spatial location of the household and food access security status (Table 3). In that respect, household food access insecurity is more prevalent in rural households whereby almost three quarters (74.2%) were having at least a form of food access insecurity as compared to less than half (46%) of urban and about a half (52.7%) of the peri-urban households. In other words, urban and peri-urban households are more food access secured as compared to rural households. Generally, urban households have higher living of standards essentially because they have superior endowments in terms of family size and composition, education, assets, and access to services and employment opportunities as compared to rural households (World Bank, 2015). These results are consistent with the findings of a survey conducted in Tanzania Mainland (URT, 2014).

Table 1: Percent distribution of households according to their household food insecurity access category along the continuum (n = 279)

Categories of food access security	Urban (n=89)	Peri-urban (n=93)	Rural (n=97)
Food secure	53.9	47.3	25.8
Mildly food-insecure	11.2	17.2	12.4
Moderately food-insecure	19.1	23.7	34.0
Severely food-insecure	15.7	11.8	27.8

Chi-Square value = 22.471; $p \leq 0.001$

Household socio-economic features and food access security

To determine the influence of household socio-economic characteristic on the status of household food access, ordinal logistic regression was employed whereby β -coefficients (positive or negative) were computed to obtain the directions of the predictor variables' impacts, as indicated in Table 4. Five variables among seven were observed to be statistically significant, indicating that the variables contributed to the chances of the households having food security. The overall model fit was statistically significant ($X^2 = 44.461$, $p = 0.000$), implying that the model was able to predict household food access security. A non-significant p-value of Goodness of Fit ($X^2 = 760.885$, $p = 0.634$) shows that the model fits well with the data, which is the case with this study.

Table 4: Influence of socio-economic characteristics variables on household food access security (n = 279)

Variable	B	SE	Wald	df	Sig.	95% C.I for EXP(B)	
						Lower Bound	Upper Bound
Age of household's head	0.021	0.010	4.664	1	0.031*	0.002	0.041
Education of household's head	0.488	0.156	9.846	1	0.002**	0.183	0.793
Household size	0.020	0.055	0.127	1	0.721	-0.089	0.128
Male headed household	0.155	0.279	0.309	1	0.578	-0.392	0.702
Non-employed	-1.707	0.650	6.895	1	0.009**	-2.980	-0.433
Urban setting	0.904	0.303	8.924	1	0.003**	0.311	1.498
Peri-urban setting	0.734	0.294	6.244	1	0.012*	0.158	1.310

** and * indicate significance at the $p \leq 0.01$ and $p \leq 0.05$ level respectively

Age of household head showed positive significant impact ($p \leq 0.05$) on household food access security. This means that as a household head's age increases there is a tendency to have more access to food, and vice versa. This is consistent with other studies by Leyna *et al.* (2008) and Knueppel *et al.* (2010), respectively, in Kilimanjaro and Iringa, Tanzania. It is also consistent with other studies conducted elsewhere in the world (Radimer *et al.*, 1992; Kendall *et al.*, 1995; Studdert *et al.*, 2001; Nnkwe and Yegammia, 2002). Higher age could be attributed to more and wealth accumulation which is important to improving household food access security.

Education level attained by the household head showed a positive significant effect ($p \leq 0.01$) on household food access security. The possible explanation is that household head education largely contributes on working efficiency, competency, diversify income, adopting technologies and generally earning higher incomes than illiterate ones. These results are in conformity with studies conducted by Tingay *et al.* (2003), Hadley and Patil (2006), Hadley *et al.* (2007) and Leyna *et al.* (2008), which reported similar links between education attainment and household food security. They are also consistent with the results of the study conducted by Knueppel *et al.* (2010) in Tanzania and Sanusi *et al.* (2006) in Nigeria. In their study, Sanusi *et al.* (2006) reported that the households of secondary school teachers were more food secure than those of the teachers who were teaching in primary schools. The reason for this is clear, the former receive higher pay than the latter.

In addition, household's head being not employed showed negative impact ($\beta = -1.707$) on household food access security. This is evidenced by many studies conducted in developed and developing countries. A study conducted in slum areas of Bangkok found that households with unemployed household's heads were at greater risk of food insecurity. Similarly, other studies (Sanusi *et al.*, 2006; Leyna *et al.*, 2008; Knueppel *et al.*, 2010; Mende *et al.*, 2015) have come up with similar results.

CONCLUSIONS AND RECOMMENDATIONS

This study assessed the prevalence of household food access insecurity along the urban-rural continuum in Morogoro and Iringa, Tanzania. Equally, the study determined the relationship between a household's socio-economic

characteristics and its food access security. Based on the findings it can be concluded that household food access insecurity is a widespread phenomenon along the continuum although the proportion of households that are moderately and severely food access insecure is higher among rural households than among those in peri-urban and urban areas. Similarly, food access security was found to be higher in urban households as compared to peri-urban and rural households. In addition, based on the findings of the ordinal regression model, it can be concluded that a household's food access security improves as a household head's age and level of education increase. Moreover, households located in areas regarded as urban and peri-urban are more likely to be food access secure than those situated in rural areas. Similarly, as expected, a household whose head has no employment is likely to experience food access insecurity and vice versa.

Possible areas of intervention emanating from the results of this study can be summarized as follows. Since household food access insecurity is more prevalent in rural areas as compared those in urban and peri-urban areas, context-specific interventions are needed to improve food access security particularly in rural households. Similarly, as advancement in age is usually associated with wealth accumulation, young household heads should be supported to diversify their sources of income so as to improve food access security in their households. The effect of education on household food access security confirms the significant role of the variable in consideration for betterment of living condition. Thus, adult education should be introduced and household heads be sensitized to attend it. As food access security among urban households could be linked with improved service provision in urban settings, infrastructure and services such as roads, electricity, and industries should be improved in rural areas so as to open more opportunities for rural households. As expected, household head being not employed was negatively related with food access security. Therefore, it is recommended that more employment opportunities be created and the existing ones be strengthened to supplement what households currently have. Access to jobs helps households to diversify their incomes which in turn improves access to food.

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