

Households Food Insecurity and Related Factors in North Localities, Kassala State, Eastern Sudan

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Abstract Background: Eastern Sudan suffered from poverty, drought and climatic changed that increase the burden of food insecurity. **Method:** This is a cross sectional study conducted in a remote locality in Kassala State (Eastern Sudan), to determine the magnitude and relating factors of household food insecurity. We studied 445 households in 16 villages. We used specially designed structured questionnaire. We used food consumption score (FCS) to measure household food insecurity . Data were analyzed using SPSS version 20.0 statistical package. Frequencies and Chi² were performed. Multivariable logistic regression was used to develop the final model indicating the predictors of the outcome variable. **Results:** Food insecurity and vulnerability for food insecurity is found in 181 (38.7%) of household studied. Eating habits and avoidance of certain types of food was found among other contributing factors. The study included 445 households, 181 (38.7%) of them were food insecure or vulnerable to be insecure. A high percentage (67.2%) was reported in Hamishokreib locality. There were significant associations ($P < 0.001$) between household's food insecurity and income, household size, number of children, eating habits and avoidance of certain types of food. **Conclusion:** According to the study findings, more attention is needed to improve household food security in the study area .Good eating habits can be achieved by designing education programs to improve knowledge, skills, and attitudes related to healthy eating and food preparation and overall, increasing household income through improving the farming methods, and finding the alternative sources of income.

Keywords: households, food insecurity, related factors, Kassala state, Eastern Sudan

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1. Introduction

Food security exists when all people at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preference for an active and healthy life [1]. Food security is measured by food availability, accessibility, and utilization, alongside the stability of the factors mentioned above overtime in the face of a variety of natural, economic, social and policy shocks and stresses [2]. In spite of global development of food security, still both developed and developing countries suffered the problem of food insecurity with various challenges [3,4,5,6]. The developing

countries suffered the difficulties of affordability and accessibility to nutritious food due to political risk, and climatic changes. Conflict is one of the main drivers of food insecurity in 18 countries, where 74 million people need urgent humanitarian assistance [7]. On the other side in developed countries, where the condition differs, as lower economic growth rates have eroded affordability and created complexities in adapting to urbanization, changes diet lead to low consumption of micronutrients that may contribute to the growing obesity [7].

Globally, more than eight hundred million people were unable to meet their dietary energy supplies in 2012- 2014 [5]. In developing countries, 791 million people live in hunger, which means 13.5% of the overall population remains tirelessly underfed.

In Africa, the proportion of the population that has experienced food insecurity is increasing. Food insecurity was mainly due to the impact of conflict and adverse climatic conditions, such as repeated droughts, often linked to the El Niño phenomenon, which resulted in poor harvests and the loss of livestock [8].

Sudan as a part of Africa, the situation does not differ. It remains low in human development. Approximately 5.5 million people were food insecure in early 2018. It is estimated that more than 80 percent of the population may already be unable to afford the food they need daily to live a healthy life. The chronic malnutrition rate is 38 percent, with 11 out of 18 states recording the stunting prevalence among children at above 40 percent [9]. Many factors are accountable for this, including limited access to food, due to the low productivity of crops and severely increase of food prices [10]. Climatic change with conflict and economic downturns are accountable for food insecurity worldwide [11].

Kassala state, which relies heavily on agriculture and agro-pastoral activities, has long suffered chronic poverty, lack of adequate access to essential services such as healthcare and education, high levels of malnutrition and widespread unemployment. Furthermore, the state suffered the reduction of livestock production due to low rainfall and climatic changes that affect economic opportunities and contribute to the chronic vulnerability in the region [12]. The fodder gap in the state is estimated at around 3.5 million ton [13]. In 2012, an estimated 22% of the households were suffering from chronic food insecurity, while 26% are chronically moderately food insecure.

In Kassala State, there are localities with chronic food insecurity. all are remote, bordering a country with local conflicts. Additionally, the limited food resources are not well utilized by the local community due to dietary habits [14]. In this study we aim at determining the important factors in food insecurity.

2. Methods

A cross-sectional community-based study was conducted during 2017 at North Kassala localities as part of the project titled "Effect of Household food security on Nutritional status of women and children in North Kassala localities" that was funded by Ministry of higher education and scientific researches, Sudan 2016.

Kassala is one of the eastern Sudan states, bordering Eritrea in the east. The state covers an area of 242,330 km² with an estimated population of 2283054, according to 2015 population projections. Administratively the state is divided into eleven localities; all of them are rural, except Kassala and New Halfa. The climate is dry, hot climate, with low rainfall about 264 mm per year, the primary livelihood strategy is small-scale farming, in addition to animal production. Livelihoods are suffering from underdevelopment and the effects of climate change [14].

The sample size was calculated using the equation $N = Z^2pq/d^2$ [15] assuming food insecurity in the population taken as 50% from the study done in Kassala State [14] and confidence limit fixed as 95%, 10% as non

response rate. The calculated sample size was 423 households (minimum sample size). A sample size of 445 households with children less than five years and women in reproductive age were included in the study. They were selected from sixteen villages from three localities in the north state. Specially designed data collection questionnaire was used, data was collected by well-trained members including local persons .

General information including demographic characteristics, socioeconomic status, dietary habits, and pattern of food consumption, and housing assets were collected. All participating households were informed that their responses would remain confidential.

The household food consumption score (FCS) was used as an indicator of households food security. Food consumption score (FCS) was measured based on dietary diversity, food frequency, and the relative nutritional importance of nine different food groups. Dietary recall questionnaires were used to collect information on the consumption of selected food groups common in Sudan.

The respondents were asked about the frequency of consumption (in days) over a recall period of the past seven days. FCS was calculated using the formula proposed by Interagency Workshop Report WFP - FAO Measures of Food Consumption [16]. In this formula, FCS was derived by multiplying the weight for each food type by the frequency (number of days). The values for all food types consumed during the seven days were summed up to give the FCS.

The information collected was analyzed with the SPSS version 20.0 (SPSS Inc, Chicago, IL) software. Descriptive analyses performed including, frequencies, percentages, means, and standard deviations (SD). Binary logistic regression was applied to examine the association of a single variable with food insecurity (outcome). Finally, multivariable logistic regression was carried out to identify predictors of food insecurity.

3. Results

3.1. General Characteristics of Households (HHs)

A 445 households with total populations of 2,437 individuals were enrolled in the study. They ranged between 3 and 15 per households with the average size of 5.5 and a median of five members. The ratio of males to females in the studied groups is approximately 1: 1.

Analysis of the educational level of head of households, which is significantly correlated with localities ($P = .000$), is determined as; only 104 (23.4%) had got formal education (primary, 14.4%, secondary 5.8%, university, 3.1%), while the remaining 341 (76.6%) had informal education or illiterate.

Poverty is prevalent in this community, with 31.5% were nomads, 28.8% unskilled workers either locally or in neighborhood urban areas. They are living in small houses (93.5%) composed of two rooms. Almost all houses are constructed from local material (Brish) - local material including palm leaves and wood- and mud are the main constructions of houses for 420 (94.3%) of HHs, only 7 (1.6%) made from brick, the others 17 (3.8%) had used

different materials for their houses construction. Poor assets were observed in the houses. The house was provided by a big bed made of palm wood. Only 5 (1.1%) houses had television, gas cooker was recorded in 10 (2.2%). 162 (36.4%) had nothing besides the bed.

38 (8.6%) of HHs depend on general electricity or generators as a source of light, while, 138 (31.0%) of them had no source of light. The remaining 269 (60.4%) used different sources as a candle and torch.

3.2. Food Security

3.2.1. Household Food Consumption Score

Food security was reported in 274 (61.6%) of HH, while 171 (38.4%) were food insecure or vulnerable to be insecure.

3.2.2. Factors Affecting Households Food Security

Expectedly the source of light, which is measured by using electrical supply, and HH size appear to be positively and profoundly significant indicating that using electricity as a source of light improves the HH food security. On the other hand, avoiding the consumption of certain types of food (chicken and fish) and increase the number of children/ HH appear to be negatively and profoundly significant. Regardless of the source of protein, all the HH have consumed food rich proteins and also food rich vitamin A. However food rich heme was positively affecting the HH food security with high significance as shown in (Table 1).

Table 1. Factors affecting HH food security

Dependent variable: food security	Coefficient	Std. Err.	Z	P>z
Education	0.428	0.3106	1.38	0.168
Household size	1.975**	0.7822	2.53	0.012
Number of children/ household	-1.566**	0.5650	-2.77	0.006
Source of light	2.136***	0.2733	7.82	0.000
Eating habit	0.996***	0.2716	3.67	0.000
Avoiding consumption of certain food	-1.001***	0.2789	-3.59	0.000
Income	1.284**	0.4532	2.83	0.005
Consumption of food rich heme	0.279***	0.447	6.11	0.000

4. Discussion

This study shows a high prevalence of food insecurity (38.4%) in the study area. It confirms the previous survey conducted by WFP 2012 which reported that 22% of the households in Kassala state as general are food insecure where the studied areas were the most chronic food insecure [14]. Deterioration of food security in the studied areas may be attributed to climatic changes that affect the livelihood, besides the shortage of rainfall in some areas and El-Gash flood that results in loss or damage of local production. Additionally, the continuous increase in food price and low income, lower purchasing power that leads to inadequate food consumption. Moreover, the state was affected by the instability in Eritrea that increases the burden of food insecurity. Other factors such as household income, household size, number of children, eating habits,

in addition to avoidance of particular type of food had an impact on food security in the studied population. Analogous finding was reported in Kenya and Ethiopia [17,18,19]. However, the prevalence of food insecurity was 5.3% among all households studied in the Republic of Korea [20] and 58.8% in Southeastern Iran [21]. One study conducted in the Northeast of Iran reported that the prevalence of food insecurity was 40.9% related to income, infrastructure and rural distance [22]. Also in the Southeast Iran [21], who related the food insecurity to the socioeconomic status of the households, ethnicity, education, age, and employment status of the head of the household and the mother of the household. Same findings were reported in Ethiopia [19]. Unemployment, low household income and living in a leased or rented home was found associated with HH food insecurity [20]. Households with larger family size was more secure than those of small size which is unlike the finding of [18], who showed HH of small family size was more secure compared to large one. Increase the HH size in studied areas; increase the number of workers that increase the HH income as the studied population depends on agriculture and pasture as the primary source of income or they depend on unskilled works.

5. Conclusion

Food insecurity was reported in 38.7% of the studied population in the selected areas. Household income and size, number of children per household, eating habits, in addition to avoidance of particular type of food had an impact on food security in the studied population. More attention is needed to improve HH food security in the North localities. It can be conducted by designing education programs to improve knowledge, skills, and attitudes related to healthy eating and food preparation and overall, increasing HH income through improving the farming methods, and finding other alternative sources of income.

Abbreviations

HH: household/s, FCS: food consumption score

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Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' Contributions

MAD, FAK, AKM, MAA and AAM had contribution on Study design. Data collection: AMH, SSM, AOA, IMM, FAK and MAD. Data management and analysis were performed by FAK and MAD. Analyzed data were revised and approved by all the authors. Manuscript was written by FAK and MAD, revised by AAM and approved by all authors.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from the University of Kassala and health office (Ministry of Health, Kassala State, Sudan). Communication was through formal official letters to localities under study that provided an official letter to local authorities of all selected areas. Informed verbal consent was obtained from each participant before the interview. The rights of members not to take part and not to answer the query they do not want to answer were ensured. To ensure the confidentiality of participants, anonymous coding was used.

Competing Interests

No conflict of interest.

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