Assessment of Food Security Status for Gash Area, Kassala State, Sudan

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ABSTRACT

The aim of this research paper was to assess food security status in Gash area in Kassala State, Sudan. It depended mainly on a family budget field survey conducted for the season 2016/2017. Descriptive statistics and quantitative analysis were employed to achieve the study objectives. Food security indicators, dependency ratio were estimated for the period 2005-2015. Results indicate that the majority of the households of Gash (78.5%) suffering from sever and chronic malnutrition undernourishment and a high dependency ratio (310%). The paper recommends, adoption of a set of actions include, provision of agricultural production and livestock-based- livelihoods support services and strengthen capacity buildings programs for providing a sustainable food security.

Keywords: Food Security, Gash, Poverty line, Undernourishment, Capacity building programs.

1. Introduction

The climatic changes in Sudan affected food production and productivity especially in the traditional rain fed agricultural sector. Furthermore, during the last decades a continuous conflict in the eastern region of the Sudan, including parties not involved in the Comprehensive Peace Agreement, (CPA) posed a serious ongoing threat to food security. Food insecurity is chronic in some areas of eastern Sudan, and has become a structural problem for some segments of the population in that area. The delivery of social services remains inadequate and uneven, with many areas being underserved, and the basic infrastructures is often in poor conditions, (Elbashir and Ahmed, 2006).

Kassala State is located in eastern Sudan and borders Eritrea to the east, the states of Red Sea and River Nile to the north, Khartoum to the west, and Gedaref to the south. The estimated population of Kassala state 1.789.806 people, (Reports Census, 2008). The main agro-ecological zones are agricultural, pastoral and agro- pastoral. Income sources revolve around rural subsistence activities such as seasonal farming, livestock production; woodcutting, charcoal production, petty trade and border trade World Food Summit, (WFS, 2016). The area plays an important role in the economical and social development in the Sudan. The Internally Displaced Persons (IDPs) settled in area in three Camps: Togli, Matateeb, and Hadalia since 2002. The 2008 census accounted IDPs as resident population. There is no adequate land to absorb all these IDPs, and hence they shared crop with other settled crop producers in the area. The majority of IDPs were engaged in wood cutting and charcoal making. They suffered from food unavailability and depended on food aid supplied by World Food Program (WFP) and Sudanese Red Crescent Society (SRCs). Even this food aid was not able to meet their needs. According to Annual Needs Assessment (ANA, 2016) as a result of insecurity. The DPs had a limited services and resources, lack the ability to access land, and still feared from returning to their place of origin. A second influx began in late 2002 resulting in approximately 13,000 IDPs settling in three main camps. While the 'older' IDPs have developed a fragile safety net system, the new IDPs have little assets or resources, and are totally dependent on outside aid, together constituted about 10 percent of the total

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population of the state.

Gash area has been confronted with a large-scale displacement of civilian population part of them became IDPs, a large-scale destruction of homes and livelihoods, disruption of economic structures, food production, which .exposed the majority of the population to extreme poverty and food insecurity. The main objective of this study is to assess the food security indicators for the area,

2. Research Methodology
2.1 The study area

Gash area is located in a semi-arid environment with marked differences of rainfall range between 280 mm in the southern part of the area and only 160 mm in the north. Agriculture and livestock are the main economic activities It was selected as a study area based on the assumption that agricultural production of Gash agricultural scheme which is described as one of the most important agricultural scheme in the Sudan, that satisfy the local demand for food as well as the demand for regions around. The most popular crop for the farmers is sorghum, which is the main staple food. During the last decade some horticultural crops were practices, specially watermelon. Lately some more interest shifted to other oil crops like Sunflower, Groundnut, Sesame and Cotton, (Ali, 2013).

Traditionally, the inhabitants of the area are livestock owners, practicing a nomadic or ranch habitat with few settled residents. Livestock, together with sorghum production, dominated the economy and animal production was the major, if not only, source of cash income. According to IFAD, (2013), communities in Gash area suffer from insufficient and unreliable potable water supply, with the consequence that many households lack reasonable access to water, especially in the dry season. There is no supply provided by the National Electricity Corporation (NEC). Diesel generators owned and operated by Gash Agricultural Scheme (GAS), supply electricity for some parts of the town of Aroma, Wager and some villages around. Hadendawa is the major group in area they are about 70%, and Hausa tribe 20% (Mustafa, 2008).

2.2 Data collection and sampling

The population of the area was more or less homogenous in their customs and they grow similar crops. A sample of 237 households was selected from a population of 23984 households using simple random sampling method. Primary data was collected by means of direct questionnaire technique. Secondary data collected from previous studies, different ministries reports, offices and websites. Descriptive statistics and quantitative analysis was employed using the statistical package of social science program (SPSS). Nutritional status estimated according to ANA, (2016) calculated as follows:

Daily energy kcl per capita =

$$\frac{\text{Nutrition factor per 100gm x quantity consume per kg per household}}{10 \text{ x family size (6) x week days}}$$

Incidence of Food Insecurity: According to Mahrajan and Khatri-Chhetri, (2006),
Incidence of food insecurity calculated as follows:

$$|F| = \frac{FIH}{TH} \text{ x } 100$$

|F| = Incidence of Food Insecurity.
FIH = No of Food Insecure Household.
'FH = Total Households under the Study.
TH = Total Households under the Study.

Food Insecurity Gap: According to Mahrajan and Khatri-Chhetri, (2006) food insecurity gap calculated as follows:

$$F|G| = \frac{TCRi - TCCi}{TCRi}$$

F|G|= Food insecurity Gap of the food insecure households.
TCRi = Total Calorie Requirement for the food insecure households.
TCCi = Total Calorie Consumption by the food insecure households.

Estimation of Dependency Ratio
Dependency ratio = number of dependent people (not of working age) / number of people of working age.
= number of children (>15 years) + number of persons > 65 years / number of working age (16 - 65years)
Many people aged (16- 65) were effectively economically inactive:
Student- sickness people - unemployed (given up looking for work) – early retirement - mothers (or fathers) looking after children at home.

3. Results and Discussion

3.1 Socioeconomic characteristics of the surveyed sample 3.1.1. Occupation

Fig. 1. Illustrate that Farming is the main occupation for about 34.2% of the respondents, and pastoralist for about 17%. Considerable percentages were laborers (30.8%), and very few were government employees (11.8%). The majority of the respondents are farmers and agricultural labor as main occupation.

Fig. 1: Frequency distribution according to occupation
Source: Prepared by the Authors based on the field survey data 2017. 3.1.2 Family size:

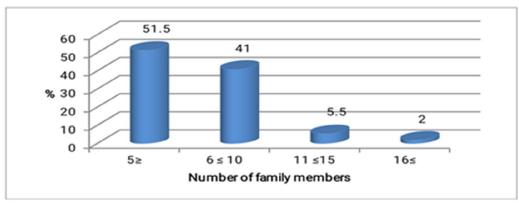Fig.2 shows that 51.5% of the household -heads their family members was 5\> and 41% was 6 <10 while only 2% was 16<.

Fig. 2: Frequency distributions according to farmer's family size.
Source: Prepared by the Authors based on the field survey data 2017.

3.1.3. Health Status

The majority of the household-heads (75.5%), were in poor health status, 5.5% in a very poor health status while 2.5% in a very good, 16.5% in good health status (Fig. 3). As mentioned by (Mustafa, 2008), the diseases occurring in the study area were Malaria, Diarrhea and Tuberculosis. Such diseases have pushed many people into poverty.

3.1.4. Nutritional status

70% of the household -heads their daily common diet is Dura they have it more than one time a day while 30% have it one time a day, to some extend they use sugar with Coffee On the other hand, a little proportion of the farmers have others type of food in one time a day or more than one time a day, as appear in Fig.4.
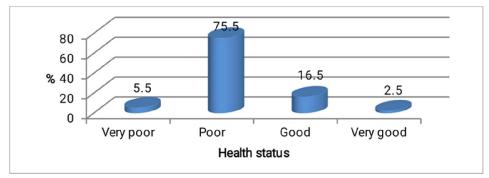

Fig. 3: Frequency distribution of household -heads according to the health status.
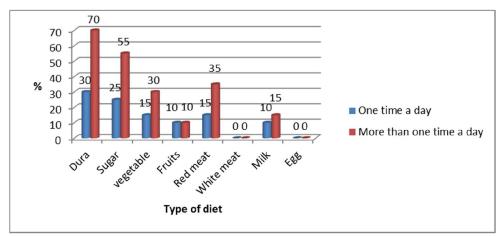**Source:** Prepared by the Authors based on the field survey data 2017.

Fig. 4: Frequency distribution according to the type and time of daily diet.
Source: Prepared by the Authors based on the field survey data 2017.

3.1.5. Availability of Food

Both home and imported food are unavailable for 73% of the household -heads, while some food items were available for 27% of the household during the year 2016 as appear in fig. 5.

3.1.6. Land ownership

From Fig. 6 it was clear that, the majority of the household-heads (91.2%) owned land, while 4.2% share cropping and 4.6% have no land.

3.1.7 Total cultivated area

From Fig. (7) we observed that, the majority of the household -heads (88.5%), grown crops in area ranges between 1 to 5 feddans, while a very few proportion (1%) cultivate land reaches up to 20 feddans.

Fig. 5: Frequency distribution of household–heads according to food availability
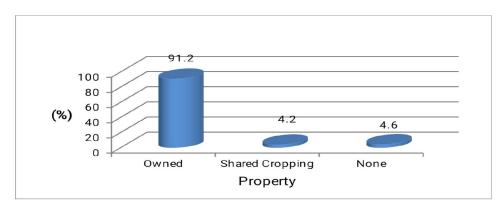**Source:** prepared by the Authors based on the field survey data 2017

Fig. 6: Frequency distribution of Households by Land ownership
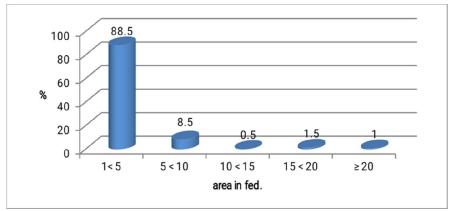**Source:** prepared by the Authors based on the field survey data 2017.

Fig. 7: Distribution of household-heads according to the cultivated area.
Source: prepared by the Authors based on the field survey data 2017.

3.1.8. Total production cost

Fig. (8): Shows that the total production cost ranged between less than 500 SDG for 75.1% of the surveyed households and more than 2000 SDG for 1.3% of them. The average total production cost among the households was 390.4 SDG.

3.1.9. Sorghum production

Fig. 9 indicates that 42.2% of respondents produced less than 10 sacks per feddan of Sorghum. The crop productivity among the farmers ranges between less than 10 to more than 70 sacks per fedaan.
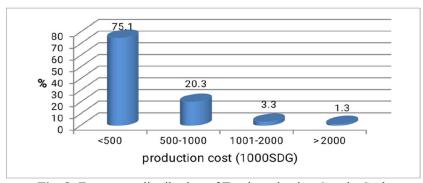
Fig. 8: Frequency distribution of Total production Cost in Gash
Source: prepared by the Authors based on the field survey data 2017.
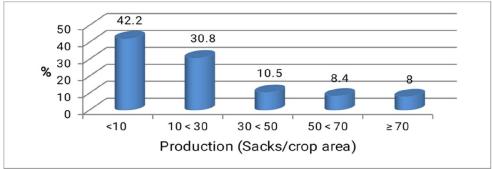

Fig. 9: Frequency distribution of households according to Sorghum production in Gash
Source: prepared by the Authors \based on the field survey data 2017.

3.1.10. Total Annual Income

Farmers annual income generates from two main sources. farm income and off-farm income. As observed in Fig. 10 and 11, total annual income varies between less than 100 thousands to more than 400 thousands SDG among the farmers. 71% of the farmers generate off-farm income100 < 200 (1000SG) While 63% generate total income 300 < 400 (1000SG) only 23% generate total income 700 < 1100 (1000SG). The mean annual income was found to be 486.58(1000SG).
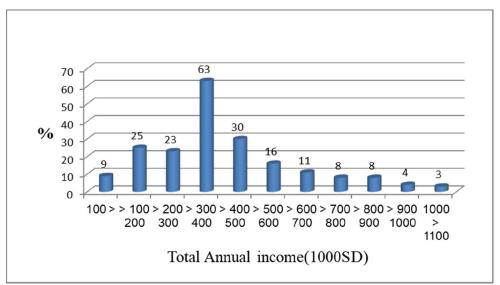

Fig. 10: Frequency distribution of household -heads according to Total annual income
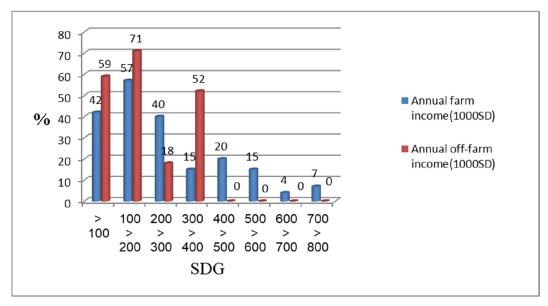**Source:** prepared by the Authorsbased on the results offield survey data 2017**.**

Fig. 11: Frequency distribution of household -heads according to farm annual income and off-farm annual income
> **Source:** prepared by the Authors based on the results of field survey data 2017.

3.1.11. Total living expenditure

74.3% of the households spend 200-400 SDG /month as total living expenditure, 40.5% spend it on food, a little proportion (1.7%) spend more than 1000SDG per month as total living expenditure. The rest of the expenditure was spend on non food items (housing, clothes, health, education, transportation, etc). The average sampled households' consumption from the family sorghum production was found to be 0.95 kg per day compared to total consumption which was found to be 2.2kg per day, the sorghum is the main food in area.
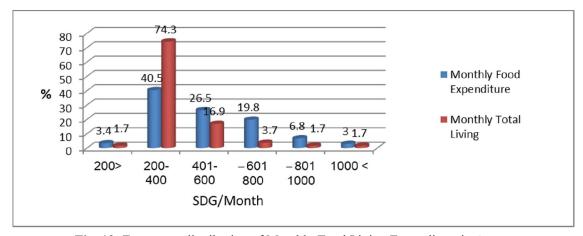

Fig. 12: Frequency distribution of Monthly Total Living Expenditure in Area

3.1.12. Monthly total net income

Monthly total net income of the sampled households ranged between less than SDG 500 to more than SDG 2000. The mean monthly income was found to be SDG 342.9 (Fig. 13).
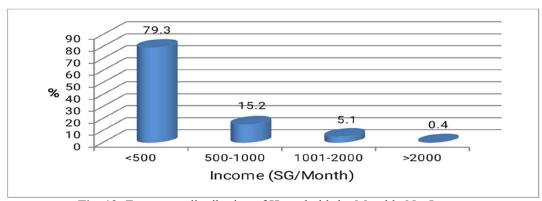
Fig. 13: Frequency distribution of Households by Monthly Net Income
Source: Prepared by the Authors based on the results of field survey data .2017

3.2. Quantitatives Analysis
The key food security that have occurred during the season 2016/ 2017.
Were computed and summarized as follows:

Crop production Indicators: Crop production can be estimated as:
CP =b0+b1 AgriCst+b2 livNo+b3 MonInc+b4 SeQu
Were:
CP = Crop Production
AgriCst= total agricultural cost
LivNo= livestock number
MonInc= monthly income
SeQu= seeds quantity

Table 1: Results of crop production function

Variable	Coefficient	T value	Sig.
Constant	-0.476	-300	0.764
Total agricultural cost	0.014	10.370	0.000
Livestock number	-1.092	-0.275	0.006
Monthly income	0.004	2.513	0.013
Seeds quantity	0.909	2.416	0.016
F = 41	$R^2 = 41\%$		

Source: calculated by the Authors based on the field survey 2017.

CP = -0.476+0.014 AgriCst - 1.092 livNo+0.004 MonInc+0.909 SeQu
R =41%, the model was able to capture 41% of reality.
F > 1 implied that the overall are significance of the model.

Total production cost indicator: Total production cost can be estimated as:
ProCt=b0 + b1LabCst+ b2 CrPr+ b3 ClAr
were:
ProCt= total production cost
LabCst= total labour cost
CrPr= crop production
ClAr= cultivated area

Table 2: Results of total production cost function

Variable	Coefficient	T value	Sig.
Constant	76.479	2.511	0.013
Total labour cost	0.750	19.486	0.000
Crop production	8.589	5.600	0.000
Cultivated area	51.811	3.042	0.003

F = 248	R^2 = 76%

Source: calculated by the Authors based on the field survey 2017.

Table (2) indicate that, Production cost was estimated as on based:

ProCt = 76.479 + 0.750 LabCst + 8.589 CrPr + 51.08 ClAr

R + 76%the model was able to capture 76% of the reality

F > 1 that the overall are significance of the model.

Kilo eirolacs indicator kilo calories was estimated as:

Kcl =b0+ +b1 Naginc+b2 Aliinc+b3 HuDs

Were:

Kcl= Kilo calories

NagInc= Non agricultural income

AliInc =annual livestock income

HuDs= human diseases.

Table 3: Results of kilo calories function

Variable		Coefficient	T value	Significance
Constant		1311.557	11.526	000
Non	agricultural	0.118	14.120	000
income				
Annual	livestock	0.101	5.586	000
income				
Human diseases		-100.307	-4.366	000
F = 83		R = 60%		

Source: Calculated by the Authors based on the field survey 2017.

Kcl=1311.557 +0.118NagInic + 0.101 AliInc- 100.3HuDs

R = 60%, implies that the model was able to capture 60% of reality.

F= 83 > implies that the overall significance of the model.

Increasing in non agricultural income, and annual livestock income will encouraged spending more in food, which increase the kilo calories. According to United State Development Association, (USDA, 2014), the insufficient purchasing power- a function of income and prices- is the most important cause of chronic nutrition among developing countries. Human diseases led to un utilization of the nutrients in the accessed food.

Food Security Indicators

Table 4 summarized the food security indicators, 78.5% of the sample were undernourishment and food insecurity, dependency ratio 3.1, Food insecurity gap 0.39, this means the total calorie requirement gap is 0.39. According to the poverty measurement based on the poor who has less than $1 per day, the persons under poverty line about 78.5%, had less than SDG 2.7 per day.

Table 4: Indicator of food security in Study area.

The indicator	Percent (%)
Undernourishment	78.5%
Incidence of Food Insecurity	78.5%
Food Insecurity Gap	39%
Dependency Ratio	3.1%
People below poverty line based on spending less than 1 Dollar per person per day	78.5%

Source: Calculated by the authors based on the field survey 2017.

4. Conclusions and Recommendations

The study result reveals that there is a chronic food insecurity due to undernourishment, high

incidence of Food insecurity, high Food Insecurity Gap, malnutrition, high dependency ratio, high food cost compared to income, poor people are vulnerable to illness. Estimation of food balance sheet (secondary data), underlying low yields obtained by the target group of the study area. The paper recommend, adoption of a set of actions include, provision of agricultural production and livestock based livelihoods, support services and strengthen capacity buildings providing programs for sustainable food security.

Acknowledgement

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