INTERNATIONAL CONFERENCE ON
FOOD AND AGRICULTURAL ECONOMICS

PROCEEDINGS BOOK
(Full Texts-Abstracts-Posters)

27th -28th April 2017
Alanya Alaaddin Keykubat University, Turkey

ISBN
978-605-65814-6-5

ASSESSING THE SOCIO-CULTURAL FACTORS THAT AFFECT WOMEN'S CONTRIBUTION TO HOUSEHOLD FOOD SECURITY AMONG SMALL SCALE FARMERS IN GEDARIF AND RAHAD LOCALITIES OF EASTERN SUDAN

Faiez Ahmed Mohamed Hamed ElNeel
Gedarif University-Sudan, Faculty of Economics and Administration Sciences, Department of Economics, Sudan

Abstract

The study aims to assess the impact of socio-cultural factors affect household food security including women participation among small scale farmers in Gedarif and Rahad localities "high agriculture production area" from eastern Sudan. Data used relies heavily on the results of sample survey of 336 households covered 8 villages collected during 2014. Analytical techniques employed included descriptive statistics, and multinomial regression model to examine the impact of socio-cultural factors (including participation of women in household food security) affect food security among the households surveyed. The study has shown that,significant positive effect of household who have a woman contributing in food processing and a household who live in Gedarif locality have significant potential importance for increasing food security in the study areas. However, a household who have a women contributing in farm activities, a household who live in Gedarif locality and a household head who employing in agriculture are statistically significant for decreasing middy household food insecurity access. An increasing in household wealth has significant impact of reducing middy household food insecurity access. Moreover, a household who have a woman contributing in food processing and engaging in income generation activity; and a household who live in Gedarif locality have significant potential importance for reducing moderately household food insecurity access. Furthermore, a household who have a woman contributing in food processing and a household who live in Gedarif locality have significant potential importance for reducing severity of household food insecurity access. Gedarif locality exhibits better food security compared to Rahad due to the fact that, Gedarif characterized by nonfarm activities which allows women to diversify their income sources and food; and hence reducing food insecurity of households. Therefore, based on the findings in this study, the major policy implication is that the crucial role of women in this context can greatly be enhanced through adoption of supportive national and local development policies, such as agriculture reform, create non-farm income opportunity for women, especially in rural areas where most of population live. Moreover, access land in support of women, micro credit, technology, extension, training, empowering and advocacy of women, and raising their capacity building; as well as the enhancing horticulture and livestock sector in favour of women, should be recommended to reduce food insecurity in perspective of women contribution. Increasing farm and off-farm opportunities are significant policy that might reduce food insecurity in perspective of women contribution. Raising capabilities and train women in means of empowering woman are most significant policy that reducing food insecurity through access to credit and training to raise their capacity building to manage their small income generation activities and follow- up.

Key words: Household food security, socio-culture factors, the role of women, small scale farmers, Eastern Sudan

Introduction

Food security and insecurity are terms used to describe whether or not households have access to sufficient quality and quantity of food. Food security issues gained prominence in the 1970s and have since been given considerable attention. Food security is perceived at the global, national, household and individual levels. Food security at global level does not guarantee food security at the national level. Moreover, food security at the national level does not guarantee food security at the household or even the individual level.

The agricultural sector in Gedarif area is the first largest contributor to the GDP, yet it is

characterized by low productivity and limited competiveness. It is a source of livelihood for majority of population. It is the source of raw materials for industries; a major foreign exchange earner and also the main source of food security for the population. Despite it is the main employer of rural households in our study area. It is the small scale farmers who produce for incomes, food and employment.

The study is highly motivated by the fact that although Gedarif State is one of Sudan's major crop-producing there is significant evidence find there is temporary food insecurity in Gedarif that can change to chronic food insecurity, The last nutrition survey conducted in Gedarif by UNICEF and the State Ministry of Health in 2013 found in nine out of twelve localities in the state chronic malnutrition rates (stunting) among children less than five years higher than 20%. In five localities rates were higher than the state average rate of 30%, with East Galabat recording the highest, 45.5%. Likewise, the survey found very high and alarming rates of acute malnutrition, at serious levels for half of the state localities, and at critical level in three localities.

It is not far from this, women play a very vital role in household food security in most developing countries including Sudan; especially in Gedarif State. However, they are constrained by a variety of socio-cultural and economic as well as institutional barriers. This study therefore seeks to assess women's contribution to household food security in Gedarif and Rahad localities with some decomposition of socio-cultural factors affect food security. The debate on the role of women in societies and their participation in economic activity has sparked a lot of controversy for a considerable time. Different groups of people-women groups, government, development partners, and civil society groups have forwarded many arguments to support their stand on access by all people at all times to adequate food of good quality for active and healthier life. Even though different women from different communities play different roles at home and outside the home, yet, the contribution of women to household food security in the study area needed investigation.

The main objectives of the study were to:

- Determine the food insecurity access among households in the study area, and;
- Examine the socio-cultural determinants of household food insecurity access in the study area; presenting the women participation in food security.
- To find out the policies related issue that might be reducing food insecurity.

Gedarif Overview

Gedarif State falls between longitudes 33º 30‘ and 36º 30‘ to the East and latitudes 12º 40‘ and 15º 46‘, with total area of e around 71,000 km². The State is bordered by Ethiopia from the eastand south and by the states of Kassala and Khartoum from the North, Gezira from the west and Sinnar State from the South. Rainfall in the State ranges between 500-900 mm from north to south, falling mainly between July and October. Because of the seasonality and variability of rainfall and the Basement Complex underlying rock, the State suffers acute water deficit.

According to the 2008 population census, the total population is about 1.4 million and with one of the highest annual growth rates in the country standing at 3.9%. Over two-thirds of the population is classified as rural or nomadic. The total population of Gedarif State was estimated in 2013 at 1,756,871; and 49.3% of the population were male. The average population density of Gedarif area was estimated at approximately 18 persons per square kilometer. The population is very diverse and composed of a number of ethnic groups, such as Shukriyya, Bawadra, Dhabyna, Fur, Masalit, Fellata and Haussa from West African origin. The most densely populated towns in the state are Gedarif city, Hawatta, Fau, Doka and Mafaza. Gedarif city is a trade centre dealing mainly in agricultural cash crops, such as sesame, millet, sunflower, Gum Arabic, in addition to sorghum. The majority of citizens in the city of Gedarif and Rahad work in agriculture or in agriculture-related activities; other main activities include trade, and breeding livestock.

Crop production and livestock rearing are the main income sources in addition to other non-farm income sources such as formal employment, selling wood, day labor, small business, fishing, permanent and seasonal labor moving to other parts of farming activities in the country. Household income is characterized by seasonal fluctuations, which enforce people to engage in many activities like selling fuel wood and charcoal and migration…etc. these resulted in environmental degradation and rural area

evacuation, thereby curtailing the expected impact of development program in the country. Soil erosion is the most important aspect of soil degradation, causing substantial costs to agriculture and these problems are contributing to low agricultural productivity, poverty and food insecurity (FAO, 2014).

The main activity in Gedarif State is agriculture, this can be justified by relying to the fact that all the factors behind the successfulness of this sector is secured. For instance the cultivated areas is about 10 million feddans of an improved and fertile land, beside that the rate of rain falling is estimated at 100-500 mill, in year at the northern and western area of the state, and about 500-900 mill in the east and south areas, which lay in the rich Savannah region. In addition to this, there are two major types of agricultural systems in the state; the irrigated agriculture which exists in Rahad Scheme (shared between Gedarif and Gezira states), the second type is the tradition and mechanized farming and the main produced crops is sorghum, sesame, millet, cotton, groundnuts, sunflower and others (Ministry of Finance and Economy of Gedarif State, 2006). Economically, Gedarif is among a handful of economically rich States in Sudan.

As an agricultural state, Gedarif receives large numbers of seasonal workers who come to work in the different agricultural activities, especially the harvesting operations. The workers come mostly from western Sudan, but also a large number of Ethiopian workers work in the agricultural schemes in the eastern part of the state. Being a border state, the state is actively engaged in border trade with Ethiopia. It is estimated that about 70% of the working force in the state of Gedarif work in the field of agriculture or are involved in works related to agriculture; in 2008, about 60% were classified as farmers engaged in settled agriculture, either in traditional or large-scale mechanized farming. In more detail, 54.44% were working in subsistence crop farming, 4.20% in subsistence animal husbandry, 11.36% with wages and salaries, 16.03% in own business enterprises and 13.97% in other sectors. 71.9% of the total population were living in rural areas.

Literature Review

All over the world women's contributions to household food security is enormous. In Asia, women account for more than two thirds of food production and some 45 percent in Latin America and the Caribbean. Women farmers in Sub-Sahara Africa produce more than three-quarters of the region's basic food, manage some two-thirds of marketing of farm produce and at least one half the activities required for storing food and raising animals. In addition, they are now cultivating crops and taking on tasks traditionally undertaken by men, and the women are also increasingly making decisions on the daily management of farms and households. With few exceptions, women fulfill these multiple jobs with little or no access to productivity enhancing resources and services such as credits and health care (Mutua, 2010).

Women compose the poorest segment of rural population and make up to more than70% of all people living in absolute rural poverty. Food security can be explained as an access by all people at all times to adequate food of good quality for active and healthy life. However, not all people have access to adequate food at all times for active and healthy life. Hunger and food insecurity are widespread in our world today, especially in the developing countries including Sudan. There is a growing recognition that men and women often have very different rights and responsibilities with respect to resource use and decision making in the process of agricultural production. This recognition has resulted in a number of studies documenting the roles of women and men in various farm, non-farm, food preparation, household maintenance and child care activities. The rural sector in many developing countries is increasingly characterized by the prevalence of poverty and food insecurity. In Sub-Sahara Africa, women head 31 percent of the households. The traditional gender division of labour, intra-household rights and obligations is weakening, the gender-based division of labor breaking down and farm women are increasingly undertaking tasks which were hitherto said to be undertaken by men (Wambua, 2008).

In order to ensure food security, provide adequate nutrition for the population and impact positively on poverty, education and human development, investment is needed. Those living in the rural areas, especially, women must have access to productive resources such as land, credit and inputs to grow enough food for their households. Research evidences show that empowering rural women increasing economic assets that women control has a positive impact on the family, particularly on food and nutrition security, health and education. Despite the economic gains that Sudan has made over the decade, poverty and household food insecurity remain a persistent and pressing social concern, and are

generally discriminated against in personal and social relationships and all these combine to making their households more food insecure. The current study therefore sought, among other things, to establish the underlying relationship between household food security and the role of women as regards the socio-cultural factors affecting women's contribution in providing household food security in the Gedarif and Rahad localities from eastern Sudan (Mutua, 2010).

There are two main dimensions to analyse food security issues. The first concern is the level of analysis. Food security can be analysed at individual, household, community, regional or national level. The second direction relates to the time frame; individuals or groups of people may suffer from inadequate food consumption all of the time .The focus of the analysis in this situation is on the level of food consumption and the factors that determine it. In other circumstances the level of food consumption may be adequate when compared with some measures of need but variations imply that people do not have enough to eat some of the time. In this case the concentration of analysis concentration should be in the variability of food consumption, typically between seasons and between years, and the main consequences of this variation. A working definition of food security can only be specified when the level and time frame of the desired analysis is also specified (Wambua, 2008).

Food security has also been defined in the World Food Summit in 1996 as the situation 'when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life'. This definition encompasses four main dimensions of food security, namely physical availability of food, economic and physical access to food, ability of food utilisation and stability of the other three dimensions over time.

By this definition, food security is a broad and complex concept which is determined by the interaction of a range of agro-physical, socioeconomic, and biological factors. A sustainable food security status cannot be attained unless all those four dimensions are fulfilled; they are interlinked and their multiple determinants are in a continuous dynamic, vivid state of motion. Attempts to investigate them have to come up with scientific, reliable and relevant procedures, as well as holistic and complementary methods and tools to capture all aspect of its diversity as no single indicator could provide the information needed to determine the state of food security in a given population.

Food Availability

Food availability reflects the supply side in general, the overall availability of food at national, regional and household levels which is influenced by trade and domestic food production, including local sources of agricultural food production, livestock and fisheries, as well as collected wild foods. Commercial food imports and food stocks are highly influenced by the presence of well-functioning market systems able to deliver food to the area on a consistent basis and in adequate quantity and quality. At household level it reflects the availability of food for household in local markets and shops. Food availability is influenced by many underlying determinants such as macro-economic trends and events, government policies (subsidies), the functioning of international and domestic markets, exchange rates and the state of the physical economic infrastructure.

Food Access

Food access, which represents the demand side, is considered to be achieved when a household has the opportunity to obtain food of sufficient quantity and quality to ensure a safe and nutritious diet. Food access is widely influenced by determinants such as prices and household resources that allow households to obtain their food, typically either: (a) by growing it and consuming from their own stocks; (b) by purchasing it in the marketplace; (c) by receiving it as a transfer from relatives, members of the community, the government, or foreign donors; or (d) by gathering it in the wild. Household or individual ability to access those sources of food depends mainly on "their asset endowment and the social, economic, policy, physical, and natural environments, which define the set of productive activities they can pursue in meeting their income and food security objective" (LIFT, 2013: 4).

At the same time, abundant and available food at household level does not guarantee equal share within the household because there may be a tendency to serve the highly nutritious food in larger quantities to the males in the family or working members to the disfavour of other household members. In other words, bias in intra-household distribution patterns, such as gender inequality, can negatively

influence the food security of some of the household members (Pieters et al., 2013: 13).

Food Utilization

Food utilisation requires a healthy diet, a healthy body, and a healthy physical environment. It represents an individual's food consumption and the ability to absorb nutrients contained in the food that is eaten, bearing in mind the importance of both the quantity and quality of food, in addition to good health practices, food safety, food storage, food preparation, diet diversification, food preferences, proper feeding practices, proper hygiene, sanitation and clean water supply, which all indicate the importance of non-food input for meeting all physiological needs and achieving the physical and mental development of an individual. Thus food utilization requires a practical understanding of proper health care, food storage, food preparation, and feeding practices, along with the associated behaviour.

This implies that even if a household has access to a sufficient amount of food, in term of quantity, but it is not of a good nutritious quality, this diet will not provide the body with nutritional ingredients that provide the body with its energy requirements. On the other hand, if the health condition of an individual is not good, then her or his body cannot benefit physiologically even from a balanced and adequate diet. Furthermore, if a household's income improved but knowledge about best nutritional practices and individual nutritional needs does not exist, then income will not be spent to increase food security. Intra-household decision patterns could also hinder the most vulnerable groups (children and women) from acquiring their dietary needs for a healthy and productive life, just as cultural and personal preference for various food groups could highly influence the nutritional status.

Food Stability

Since food security status has to be sustained, its fourth dimension is stability over time. Stability is ensured when households and all individuals within have adequate and preferred food at all times to maintain a healthy living, therefore adverse effects of sudden shocks, such as an economic or climatic crisis or cyclical events such as seasonal food insecurity, have to be taken account in any assessment of food security..

Food Insecurity

The Technical Consultation on Food Insecurity and Vulnerability Information and Mappings Systems (FIVIMS) stated that food insecurity exists when people are undernourished as a result of the physical unavailability of food, their lack of social or economic access to adequate food, and/or inadequate food utilization. Food insecure people are those individuals whose food intake falls below their minimum calorie (energy) requirements, as well as those who exhibit physical symptoms caused by energy and nutrient deficiencies resulting from an inadequate or unbalanced diet or from the body's inability to use food effectively because of infection or disease(FAO, 2000: 1).

There are differences in the duration and severity of the way in which people experience food insecurity. Two types of food insecurity can thus be distinguished: chronic food insecurity, a long-term or persistent form of insecurity that occurs when people are unable to meet their minimum food requirements over a sustained period of time, often the result of extended periods of poverty, lack of assets and inadequate access to productive or financial resources; transitory food insecurity which is defined as short-term and temporary form where there is a sudden drop in the ability to produce or access enough food to maintain a good nutritional status and occurs due to short-term shocks and fluctuations in food availability and food access, including year-to-year variations in domestic food production, food prices and household incomes. Seasonal food insecurity falls between chronic and transitory food insecurity. It is similar to chronic food insecurity as it is usually predictable and follows a sequence of known events. However, as seasonal food insecurity is of limited duration it can also be seen as recurrent, transitory food insecurity. It occurs when there is a cyclical pattern of inadequate availability and access to food. This is associated with seasonal fluctuations in the climate, cropping patterns, work opportunities (labour demand) and disease (EC-FAO, 2008: 1).

Data Measures and Methodology

Food security is indicating the ability of people to acquire their dietary intake required for a healthy productive life on a day-to-day basis. There are different concepts of food security that had been developed over time. The World Bank defined food security in 1986 as secure access by all people at all times to enough food for an active and healthy life. This definition implies that access to adequate food is subject to threats of different types and that the analysis of risk of inadequate access is an important concern.

Data were collected from 336 households (146 of Gedarif and 190 for Rahad) out of 406 HHs [1]quantified as small scale farmer who have land size 20 feddans and less where all most are rural; randomly selected through the use of household survey. Out of 235,000 households of Gedarif State according to 5th Sudanese censes in 2008, and 7,654 households out of two selected localities; which the sample represents about 8% of the households in selected localities; somewhere the data collected during April up to December 2014.

The selected localities were Central Gedarif and Rahad. Eight villages were selected from each locality depending on the ecological zone, to reflect the livelihood of households in Rahad locality where the Rahad River allows household to diversify their income sources and food such as vegetables, fruits and fish, as well as in Gedarif locality the urbanization patterns are also be reflected. Rain becomes heavier northwards, being lowest in the northern part of the state. All most of villages selected are rural areas; from Gedarif locality, the villages of Rawashda, Eid Elteen, Eshimliab and Ghiraigana were chosen to represent the central, northern and southern parts of the locality, respectively, and from Rahad locality, Wad Elshaeer, Borbur, Garamie and Bazoora East with the same pattern. Stratified sampling was used to select respondents randomly from each village. The total population was drawn for the 8 villages from the official statistics; the number of respondents was determined depending on the percentage within the sum of the 4 selected villages per locality. Both primary and secondary data were collected through personal interviews with the use of structured questionnaires.

Both qualitative and quantitative data analysis techniques were utilised. Food security indicators were used as first assessment of the households' situation; in addition, a correlation test was conducted to identify the relationship between food insecurity indicator and some of its socio-economic characteristic including women participation in household food security, this study used the standard indicator which is a Household Food Insecurity Access Scale (HFIAS).

The selected localities were Central Gedaref and Rahad. Three villages were selected from each locality depending on the ecological zone. Rain becomes heavier northwards, being lowest in the northern part of the state. From Central Gedarif locality, the villages of Rawashda, Eid Elteen and Ghiraigana were chosen to represent the central, northern and southern parts of the locality, respectively, and from Rahad locality, Wad Elshaeer, Barbar and Bazoora East with the same pattern. Stratified sampling was used to select respondents randomly from each village.

The study used two standard indicators of food security:

a)The Household Food Insecurity Access Scale (**HFIAS**) is measurement of household behaviour, asking nine questions which concern quality and quantity of food insecurity over the past four weeks, as well as anxiety caused by this insecurity. As a result, a HFIAS Score between 0 and 27 is calculated. Based on this, households are categorised as Food Secure, Mildly Food Insecure, Moderately Food Insecure, Severely Food Insecure (see details in Coates et al., 2007). Furthermore, different statistical procedures were employed, including descriptive statistics, for the purpose of reflecting a more complete picture of the food security status. This analysis required intensive use of frequency distributions, cross tabulations, means and averages. As a result, a comparison of food security among various farmers' livelihood groups was carried out. Data analysis procedures involved the use of the software SPSS.

The study relays heavily on HFIAS as indicator of food security to estimate the household food

[1]604 HHs data are proprietor to FAO,2014; when I happen to main researcher of the study titled impact of farmers activities on food security in Gedarif and Rahad localities,2014).

security status in the study area. Moreover, all econometric relationship and associations were based on this indicator. The final indicator is a categorical indicator of food insecurity status, the Household Food Insecurity Access Scale (HFIAS).

b)The Coping Strategy Index (CSI) has been established as an assessment of households' reaction to experienced or expected food insecurity. The tool has been described in Maxwell et al., 2001, as follows: The CSI enumerates both the frequency and severity of coping strategies of households faced with short-term insufficiency of food. The CSI goes beyond commonly used caloric indicators to incorporate elements of future vulnerability, and the deliberate decisions of households faced with food insufficiency. In brief, the CSI enumerates all consumption-related coping strategies commonly used by a population. Four general categories of coping are measured, with individual strategies defined specifically according to location and culture:

1. Dietary change (e.g. eating less preferred but less expensive food etc.);
2. Increasing short-term food access (borrowing, gifts, wild foods, consuming seed stock etc.);
3. Decreasing numbers of people to feed (short-term migration etc.);
4. Rationing strategies (mothers prioritizing children/men, limiting portion size, skipping meals, skipping eating for whole days etc.).

The information is weighted according to the perceived severity of each behavior. The weighted scores are combined into an index that reflects current and perceived future food security status. Monitoring fluctuations in the index can give a rapid indication of whether food security is improving or deteriorating.

Analytical Model:

First, a HFIA category variable calculated for each household by assigning a code for the food insecurity (access) category in which it falls. The data analyst should have coded frequency-of-occurrence as 0 for all cases where the answer to the corresponding occurrence question was "no" (i.e., if Q1=0 then Q1a=0, if Q2=0 then Q2a =0, etc.) prior to assigning the food insecurity (access) category codes. The four food security categories should be created sequentially, in the same order as shown below, to ensure that households are classified according to their most severe response.

Calculate the Household Food Insecurity Access category for each household. 1 = Food Secure, 2=Mildly Food Insecure Access, 3=Moderately Food Insecure Access, 4=Severely Food Insecure Access.

HFIA category = 1 if [(Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q_8=0 and Q_9=0] HFIA category = 2 if [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1)

and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0] HFIA category = 3 if [(Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0] HFIA category = 4 if [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3] .

The multinomial regression model was used to investigate the relationship between socio-economic characteristics of household and food security among the households surveyed. The survey was used to disaggregate the households into food secure, mildly food insecure access, moderately food insecure access and severely food insecure access. The dependent variable in this case, food security, is categorized four values shown in the methodology. A variety of models can be used to establish the relationship between women participation and its determinants on food security. The study employed the multinomial regression model can be econometrically stated as:

$$HFIAS= \beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+ \beta_8X_8+ \beta_9X_9+ \beta_{10}X_{10}+£$$

Where:

HFIAS= (1= food secure, 2= mildly food insecure, 3= moderately food insecure, and 4= severely food insecure).

X1 = Women make food processing (if yes =1, otherwise=0).

X2 = Women has income generation activities IGA (if yes =1, otherwise=0).

X3 = Women participated in farm activities (if yes =1, otherwise=0).
X4 = Household headed by female (Gender) (female =1, male =0).
X5= Education level of Household Head (educated=1, otherwise=0)
X6 =Gedarif locality dummy (a household live in Gedarif locality =1, otherwise=0).
X7 = Coping Strategy Index of household (not coped =1, coped =0).
X8= Wealth index dummy (wealthy =1, otherwise=0).
X9=Household head occupied in off-farm employment (off-farmer =1, otherwise=0).
X10 = Household head occupied in farm employment (farmer =1, otherwise=0).
The parameters of the regression model were estimated using the multinomial regression.

Results Discussion

From our sample of 336 households considered rural and small scale farmers, table 1 indicates that 56.5% of our sample of study area are in Rahad locality, while, 43.5% are in Gedarif locality.

Table (1). Distribution of Households by Locality

Locality	Freq	Percent
Gadarif	146	43.5
Rahad	190	56.5
Total	336	100.0

Source: Field Survey, 2014.

Food security in rural areas in Gadarif State is determined, in part, by land holding structures, systems of land tenure, the organization of agricultural production, availability of complementary inputs, access to credit and markets, opportunities for off-farm employment, and the accumulation of surplus value. Social relations in agriculture are in turn determined by land tenure systems. Table 2 shows, 83% of households in study area owned agricultural land for areas about five and less feddans, (84.2% in Gedarif and 82.1% in Rahad); while 17% owned land for areas about 5-10 feddans, (15.8% in Gedarif and 17.9% in Rahad). The results presented in the table indicate that, a higher percent of households owning small land size (5feddans and less) which considered being by means of land less; with no great variation between localities.

Table 2. Distribution of Agricultural Land Owned

Land recoded	Both		Gedarif		Rahad	
	Freq	Percent	Freq	Percent	Freq	Percent
5 feddans and less	279	83.0	123	84.2	156	82.1
5-10 feddans	57	17.0	23	15.8	34	17.9
Total	336	100.0	146	100.0	190	100.0

Source: Field Survey, 2014.

Women's Role in Food Security and Nutrition:

There are many socio-economic factors that affect food security at household level for different livelihood groups, which denote the importance of research in this area. Socioeconomic characteristics that have a major role in determining household food security status reported in the analysis are; in additional to home work, women participation in food processing, income generation activities and farm activities, gender head of household, Education level of household head, wealth index and occupation, both formal and informal.

The well-known marginalization of women in Gedarif State due to cultural constraints has recently been extenuated by a number of factors which have led to further deterioration in their conditions. These include: a) the introduction of large-scale modernized agriculture which has overlooked women's needs; b) environmental deterioration as a result of drought which has increased women's burdens, e.g. in gathering water and wood for fuel; and ; c) the out-migration of male family members, leaving many

female-headed households. However, in responding to women's needs, account must be taken of large variations among tribes in the traditional division of labour, especially in agricultural activities and handicrafts, in which women often play a predominant role. Furthermore, most of women's work is devoted to agriculture. Women are involved in every stage of food production, especially in secondary crops such as legumes and vegetables, but they face many problems due to gender bias, for instance in land ownership and access to credit. It is evident that women's status relative to men has a great impact on the household food security, children's nutritional status and health condition.

This study yielded a number of indicators that women play a crucial role in providing and improving household food security. Women are more likely than men to use available resources and skills to further improve the welfare of their family especially the nutrition and health aspects; this has been revealed by this study as shown in table 3and 4 where women have a vital role in household food security in term of home work, food processing, income generation activities and farm activities which is significant higher in Rahad locality compared to Gedarif.

Table 3. The Role of Women in Welfare of Their Family

Women role in welfare of their family	Both		Gedarif		Rahad	
	Adult woman	Young girls	Adult woman	Young girls	Adult woman	Young girls
Cook for the family	94.6	5.4	92.5	7.5	96.3	3.7
Serve food for the family	78.3	21.4	82.9	16.4	74.7	25.3
Fetching water	29.8	8.6	64.4	12.3	3.2	5.8
Clean the house	70.2	29.2	67.1	32.9	72.6	26.3
Take burden of patient and child care	95.5	3.0	95.9	2.7	95.3	3.2
Search fire wood for fuel	23.2	3.0	49.3	3.4	3.2	2.6
Make household laundry	67.3	20.8	50.0	24.0	80.5	18.4
Wash dishes	66.4	33.6	69.2	30.8	64.2	35.8

Source: Field Survey, 2014.

Table 4. Women's Role in Different Economic Activities

Women Participation	Both	Gedarif	Rahad
Food Processing			
Meat dry	40.2	20.5	55.3
Onion dry	23.8	2.1	40.5
Tomatoes dry	28.6	2.7	48.4
Okra dry	57.7	30.8	78.4
Waikab made	22.9	6.2	35.8
Homemade Jam	.6	0.0	1.1
Other	.6	1.4	0.0
Income Generation Activities			
Handcraft	15.5	2.7	25.3
Ice cream	.9	1.4	.5
Kissra made	9.8	1.4	16.3
Sale cosmetics	7.4	1.4	12.1
House par timer	4.2	0.0	7.4
Other	3.9	0.0	6.8
Farm Activities			
Cleaning land	10.1	2.7	16.3
Planting	11.3	4.1	17.9
Weeding	12.7	6.2	19.5
Harvesting	23.8	31.5	20.0

Source: Field Survey, 2014.

In the case of farm activities as shown in table 4, women attempt to do that through increasing the capacity of the productive resources family farm, backyard plot (called juburaka in most rural Sudan),

and domestic animals, in addition to post harvest activity (processing and preserving food products), and collecting of forest and wild food. In addition, women work longer hours than men due to their multiple roles in food production and income activities and house chores, besides their role in collecting of water and firewood and this seems to be significant. Preparing food and baking kisra and porridge absorb number of hours daily; particularly women usually use firewood and crop residues for cooking.

Table 5.Summary of Some Socio-Economic Factors and Household Food Security

Some socio-economic factors		**N**	**Marginal Percentage**
Women processing food	No	131	39.0%
	Yes	205	61.0%
Women has income generation activities(IGA)	No	260	77.4%
	Yes	76	22.6%
Women participated in farm activities	No	244	72.6%
	Yes	92	27.4%
Female headed of household	No	334	99.4%
	Yes	2	0.6%
Education of household head	Educated	208	61.9%
	Not educated	128	38.1%
Gedarif locality as a dummy variable	Rahad	190	56.5%
	Gedarif	146	43.5%
Copping strategy index (CSI) of HH	No	153	45.5%
	Yes	183	54.5%
Wealth index of HH	Poor	244	72.6%
	Wealthy	92	27.4%
Off- farm employment of HHH	No	284	84.5%
	Yes	52	15.5%
Farm employment of HHH	No	42	12.5%
	Yes	294	87.5%
Valid		**336**	**100.0%**

Source: Field Survey, 2014.

Despite the additional demands on her time as housewife and mother, woman in area of study have successfully increased the diversification of their livelihood system. As shown in table 5 more than 60% of women make food processing, 22.6% has income generation activities and 27.4% are participated in farm activities. However, 61.9% of household head are not educated, whereas education is very important of income and food diversification and hence reducing the household food insecurity status. In case of copping strategy where women are taken in case of lack of food, in this regard, 54.5% of household in the study area are applying the copping strategy which is considered to be food insecure according to this indicator. Moreover, about 80% of population are employed in agriculture in the study area which is characterized by low earning as well as led more than 70% of household are not wealthy.

As shown in Table 6, 25.9% of household in the study area was found to be food secures (19.9% in Gedarif and 30.5% in Rahad locality);(25.6%) were found to be mildly food insecure access (32.2% in Gedarif and 20.5% in Rahad); (39.9%) were found to be moderately food insecure access (36.3% in Gedarif and 42.6% in Rahad) ,and only 8.6% were severely food insecure access (11.6% in Gedarif and 6.3% in Rahad). Rahad locality exhibits better food security compared to Gedarif due to the fact that Rahad River allows women to diversify their income sources and food such as vegetables, fruits and fish. This means that an engaging and empowering woman in farm income generation activities are most significant policy that reducing food insecurity through access to credit and training to raise their capacity building.

Table6. Household food security measure

HFIAS Category	**Both**	**Gedarif**	**Rahad**

	Freq	Percent	Freq	Percent	Freq	Percent
Food secure	87	25.9	29	19.9	58	30.5
Mildly food insecure access	86	25.6	47	32.2	39	20.5
Moderately food insecure access	134	39.9	53	36.3	81	42.6
Severely food insecure access	29	8.6	17	11.6	12	6.3
Total	**336**	**100.0**	**146**	**100.0**	**190**	**100.0**

Source: Field Survey, 2014.

Table 7 provides the parameter estimates for the multinomial model. From the maximum likelihood estimates of the model, the Pseudo R^2 were 0.75 which implies that about 75% of the likelihood of a household being food secure or insecure is strongly explained by the independent variables. The marginal effects of the independent variables were estimated because they are very important for policy and decision making.

The study reveals significant (5%) positive effect of household who contain a woman contributing in food processing (1.754)and a household who live in Gedarif locality (4.110) have significant (1%) potential importance for increasing food security in the study areas. However, a household whose women contributing in farm activities are statistically significant (1%) for decreasing middy household food insecurity access (-1.654), a household who live in Gedarif locality are statistically significant (1%) for decreasing middy household food insecurity access (-1.756), a household who employing in agriculture are statistically significant (5%) for decreasing middy household food insecurity access (-.804). An increasing in household wealth has significant (10%) impact of reducing middy household food insecurity access (-.607). Moreover, a household who contain a woman contributing in food processing and income generation activity (-1.301 and -1.616) at significant level (5% and 10%), respectively; and a household who live in Gedarif locality (-2.529) have significant (1%) potential importance for reducing moderately household food insecurity access. Furthermore, a household who contain a woman contributing in food processing (-1.745) at significant level (5%) and a household who live in Gedarif locality (-4.110) have significant (1%) potential importance for reducing severity of household food insecurity access. However, education of household head are statistically significant and more likely to increase the severely of household food insecurity in the study areas.

This is suggested that the women's earning from agriculture and non agriculture activities, especially in Gedarif locality are more significant to reducing household food insecurity. Thus, farm and off-farm activities are significant policy that might reduce food insecurity in perspective of women contribution. Moreover, land, agriculture, credit, technology, empowerment and advocacy of women and extension, including the horticulture and livestock sector should be recommended to reducing food insecurity in area of study.

Table 7. Multinomial Regression Estimation

Household Food Insecurity Access Scale (HFIAS)		B	Sig.
Food secure	Intercept	26.043	.984
	Women food processing	1.745	.094
	Women has IGA	.372	.756
	Women participated in farm activity	.169	.883
	Female headed of HH	.441	1.000
	Education of HH	-3.222	.018
	Gedarif locality as dummy	4.110	.002
	Copping strategy index(CSI)	-39.333	.904
	wealth index	-12.152	.915
	Off- farm employment	-.887	.548
	Farm employment	.865	.515
Mildly food insecure access	Intercept	1.741	.313
	Women make food processing	-.321	.417
	Women has IGA	-.861	.126
	Women participated in farm activity	-1.654	.000
	Female headed of HH	1.814	.262

	Education of HH				.776 .099
	Gedarif locality as dummy				-1.756 .000
	Copping strategy index(CSI)				11.084 .948
	wealth index				-.607 .113
	Off- farm employment				-.804 .091
	Farm employment				-.277 .618
Moderately food insecure access	Intercept				-25.875 .986
	Women make food processing				-1.301 .089
	Women has IGA				-1.616 .127
	Women participated in farm activity				1.682 .105
	Female headed of HH				11.181 .994
	Education of HH				2.003 .096
	Gedarif locality as dummy				-2.529 .034
	Copping strategy index(CSI)				27.100 .895
	wealth index				13.712 .904
	Off- farm employment				.814 .551
	Farm employment				-1.638 .151
Severely food insecure access	Intercept				-26.043 .926
	Women make food processing				-1.745 .094
	Women has IGA				-.372 .756
	Women participated in farm activity				-.169 .883
	Female headed of HH				-.441 .004
	Education of HH				3.222 .018
	Gedarif locality as dummy				-4.110- .002
	Copping strategy index(CSI)				39.333 .904
	wealth index				12.152 .915
	Off- farm employment				.887 .548
	Farm employment				-.865- .515
Model Fitting Information	**Model Fitting Criteria**	**Likelihood Ratio Tests**			**Pseudo R-Square**
	-2 Log Likelihood	Chi-Square	df	Sig.	Cox and Snell=.747
Intercept Only	675.939				Nagelkerke = .810
Final	213.981	461.958	30	.000	McFadden = .538

Source: Field Survey, 2014.

Conclusion Remarks

The study aims to assess the impact of socio-cultural factors affect household food security including women participation among small scale farmers in Gedarif and Rahad localities "high agriculture production area" from eastern Sudan. Data used relies heavily on the results of sample survey of 336 households covered 8 villages collected during 2014. Analytical techniques employed included descriptive statistics, and multinomial regression model to examine the impact of socio-cultural factors affect household food security including women participation among the households surveyed. The study has shown that, majority of the household surveyed .The study reveals significant positive effect of household who have a household who have a woman contributing in food processing (1.754) and a household who live in Gedarif locality (4.110) have significant potential importance for increasing food security in the study areas. However, a household who have a women contributing in farm activities , a household who live in Gedarif locality and a household head who employing in agriculture are statistically significant for decreasing middy household food insecurity access (-1.654, -1.756 and -.804, respectively). An increasing in household wealth has significant impact of reducing middy household food insecurity access (-.607). Moreover, a household who have a woman contributing in food processing and engaging in income generation activity (-1.301 and -1.616), respectively; and a household who live in Gedarif locality (-2.529) have significant potential importance for reducing moderately household food insecurity access. Furthermore, a household who have a woman contributing

in food processing (-1.745) and a household who live in Gedarif locality (-4.110) have significant potential importance for reducing severity of household food insecurity access. However, education of household head are statistically significant and more likely to increase the severely of household food insecurity in the study areas. Gedarif locality exhibits better food security compared to Rahad due to the fact that Gedarif characterized by nonfarm activities which allows women to diversify their income sources and food and hence reducing food insecurity status of households.

References

Department of Statistics, (2008): 5th Population and Housing Census, Gadarif State, Sudan.

EC-FAO Food Security Programme. 2008. An introduction to the basic concepts of food security. (Food Security Information for Action: Practical Guides). http://www.fao.org/docrep/013/al936e/al936e00.pdf.

FAO, IFAD and WFP. 2014. The State of Food Insecurity in the World 2014. Strengthening the enabling environment for food security and nutrition. Rome, FAO.

FAO. 2000. FIVIMS (Food Insecurity and Vulnerability Information and Mappings Systems). Rome.

LIFT (Livelihood and Food Security Technical Assistance), FHI 360. 2013. Livelihood and food security conceptual framework. Washington.

Ministry of Finance and Economy, Gedarif State. 2006. Second Economic Review. Gedarif.

Mutua, T.M (2010). The impact of socio-economic and institutional factors on the food security situation in Kenyan dry lands: a case study of Tseikuru division of Mwingi district. Unpublished M.A thesis, Department of Geography and Environmental Studies, University of Nairobi, Kenya.

Pieters, Hannan, Andrea Guariso and AnneleenVandeplas. 2013. Conceptual framework for the analysis of the determinants of food and nutrition security. (FOODSECURE Working Paper 13). The Hague: FOODSECURE Project, LEI Wageningen UR.

Pieters, Hannan, Andrea Guariso and AnneleenVandeplas. 2013. Conceptual framework for the analysis of the determinants of food and nutrition security. (FOODSECURE Working Paper 13). The Hague: FOODSECURE Project, LEI Wageningen UR.

UNICEF, 2013. Monitoring the Situation of Children and Women. Multiple Indicator Cluster Survey Manual, New York.

Wambua, B. N. (2008). Food Insecurity in Semi-Arid Areas: An analysis of socio-economic and Institutional factors with reference to Makueni District, Kenya. Ph.D Thesis, Department of Geography, University of Nairobi, Kenya.

World Bank. 1996. Poverty and Hunger: Issues and Options for Food Security in Developing Countries. Washingtonv.

Appendix

Household Food Insecurity Access Scale (HFIAS)

	Occurrence Questions	Yes	No	Rarely (1-2 days)	Sometimes (3-7 days)	Often (7-10 days)
1	In the past four weeks, did you worry that your household would not have enough food?	|___|	|___|	|___|	|___|	|___|
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	|___|	|___|	|___|	|___|	|___|
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	|___|	|___|	|___|	|___|	|___|
4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	|___|	|___|	|___|	|___|	|___|
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	|___|	|___|	|___|	|___|	|___|
6	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	|___|	|___|	|___|	|___|	|___|
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	|___|	|___|	|___|	|___|	|___|
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	|___|	|___|	|___|	|___|	|___|
9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	|___|	|___|	|___|	|___|	|___|