World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Assessment food insecurity levels among household's farmers in Garsila locality of Central Darfur State-Sudan

Elkhalil Elnour Breima [1,*] and Ali Ahmed Dawoud [2]

[1] *Agricultural Research Corporation, Agricultural Economic and Policy Research Center, Zalingei Agricultural Research station, Zalingei-Sudan.*
[2] *Food and Agricultural Organization of the United Nations, Field Coordinator, West & Central Darfur states- Sudan.*

World Journal of Advanced Research and Reviews, 2026, 30(01), 2395-2405

Publication history: Received on 10 March 2026; revised on 20 April 2026; accepted on 23 April 2026

Article DOI: https://doi.org/10.30574/wjarr.2026.30.1.1017

Abstract

Food security exist when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. This study was carried out in Garsila locality of Central Darfur State during 2021/2022 cropping season. The required primary data regarding crops were collected via questionnaires to represent the households 'heads in the target area. Secondary information were collected from relevant institutions. Statistical analysis results revealed that 89% of respondents were educated and 11% were illiterate. Analysis also stated that 56% of households were farmers, 16% farmers/traders, 8% employers and 18% employers/farmers. Age/year was 46.3 with standard deviation of 12.20995, while average farm size was 7 feddan. Results also indicated that the household's annual income was SDG 194221, while the annual expenditures on food and nonfood items were SDG 1,542104. Millet and sorghum availability with respect to adequate and inadequate, was 11%, 89% and 7% and 93%, respectively. According to food accessibility, households access to only 3 and 4 sacks of millet and sorghum in the cropping rainy season, while remaining 6 to 8 months purchasing and suffering. The Household Economy approach results showed that, the weekly average food needs costs/year by household was recorded to SDG 1375661. However the kilo calories needed for food security per person per day was SDG 2069. With reference to food security level which indicates 2100 minimum calories per person per day, the study founded that households' in Garsila locality were moderately food insecure.

Study recommended, development and distribution of climate-resilient adapted improved seed varieties, conservation tillage and integrated pest management to boost yields.

Keywords: Food insecurity; Assessment; Farmers; Households; Garsilla; Questionnaires

1. Introduction

Many drivers influence the linkage between agricultural productivity with food and nutrition security. Empirical evidence confirms the role of agriculture for the improvement of incomes and food, which provides two capital dimensions of food security: the availability and accessibility of food and reduction of malnutrition [1].

Food security matters immensely; it is a topic of keen interest to policy makers, practitioners, and academics around the world in large part because the consequences of food insecurity can affect almost every facet of society. For example, the food price crisis and subsequent food riots in 2007–2008 highlighted the critical role of food security in maintaining political stability [2].

* Corresponding author: Elkhalil Elnour Breima

According to [3] agriculture has been the main economic activity of many people in Central Darfur State (CDS), and it has employed around 85 % of the population. Despite the involvement of a large proportion of population in the food production, food insecurity has been the main problem in which a large proportion of the population is undernourished or acquires food consumption below the minimum requirement.

2. Rational/Purpose/Needs

Research and policy considerations are needed to better understand underlying mechanisms, associated risks, and effective strategies to mitigate the adverse impact related food insecurity on households' health. On the other hand the population of the study area is predominantly rural consisting of their main source of about 89 per cent of the total with the main occupation of the people being agriculture, as food and income. The farming systems in the area are predominantly rain-fed, traditional, and operate with limited resources. They are characterized by the small size of holdings, being dependent on manual family labour, and using few or no external inputs such as fertilizers, chemicals or seeds. Farmers have poor access to information and relevant research results, yields obtained are very low and supply of certain seed crops is limited in rain-fed subsector. Identifying the causes of the problem has been vague as it involves complex characteristics such as; lack of improved crops, pests and diseases, erratic rainfall and soil/land degradation etc. which affects our understanding of the main structure. Previous research has pointed out the causes of the food insecurity as; insufficient agricultural production, imperfect market, rapid population growth etc. According to [10] food security is a broad term, which is defined in different ways by a number of organizations around the world. The basic definition of food security also is that it refers to the ability of individuals to obtain sufficient food on a day-to-day basis. However, the analysis of most of the research undertaken has not been integrated to include all of the factors in the study and able to provide comprehensive analysis of the problem. Moreover, the analysis has not address access of food at household and per-capita level. Most people on the planet currently have enough food to eat. The vast majority of undernourished people live in developing countries (medium evidence, medium agreement), when estimated based on aggregate national calorie availability and assumptions about food distribution and nutritional requirements. More precise estimates are possible with detailed household surveys, which often show a higher incidence of food insecurity than estimated by FAO. Using food energy deficit as the measure of food insecurity. While there is medium evidence, medium agreement on absolute numbers, there is robust evidence, high agreement that sub-Saharan Africa has the highest proportion of food-insecure people, with an estimated regional average of 26.8% of the population undernourished in 2010–2012, and where rates higher than 50% can be found. The largest numbers of food-insecure persons are found in South Asia, which has roughly 300 million undernourished. In addition to common measures of calorie availability, food security can be broadened to include nutritional aspects based on the diversity of diet including not only staple foods but also vegetables, fruits, meat, milk, eggs, and fortified foods. There is robust evidence and high agreement that lack of essential micronutrients such as zinc and vitamin A affect hundreds of millions of additional people. Food insecurity is closely tied to poverty; globally about 25 to 30% of poor people measured using a US$1 to US$2 per day standard, live in urban areas. Most poor countries have a larger fraction of people living in rural areas and poverty rates tend to be higher in rural settings (by slight margins in South Asia and Africa, and by large margins in China). In Latin America, poverty is more skewed to urban areas, with roughly two-thirds of the poor in urban areas, a proportion that has been growing in the past decade (medium evidence, medium agreement). Rural areas will continue to have the majority of poor people for at least the next few decades, even as population growth is higher in urban areas (medium evidence, medium agreement) [11].

Therefore food security is essential in order to provide policymakers with the necessary information to mobilize adequate responses at the local, national, regional, and international levels.

3. Description

3.1. Goal

This project will help reduce the impact due to the negative effect of crop production on food security. The purpose is to strengthen the existent of livelihoods security status that aimed at addressing food insecurity problems among households in the study area.

3.2. Specific objectives

- To know the food insecurity levels in the study area
- To investigate how agriculture crop production influences food security of household farmers
- To develop plan for research intervention in order to solve food insecurity situation in the entire area.

4. Research methodology

4.1. Data collection

This study was carried out at Garsila locality of Central Darfur State during 2021/2022 cropping season. The required primary data regarding crop will be collected via questionnaires to represent the households 'heads in the target area. Yields of major crops will be identified. Secondary information will also collected from relevant institutions.

4.2. Sample size

With reference to higher homogeneity in the entire study area, the sample size in the selected area was 60 household.

4.3. Sample techniques

The study used clustered random sampling procedures which covered all the study area.

4.4. Data analysis

Data analyzed to drive frequency percentages, mean, and standard deviation. Household Economy Approach applied to know food insecurity level in the whole study area.

4.5. Concept of food security and food insecurity

Food security is defined as a situation that when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Four dimensions of food security have been identified in line with different levels. 1) Availability. 2) Accessibility. 3) Utilization d Individual. 4) Stability, considered as a time dimension that affects all the levels. All four of these dimensions must be intact for full food security. More recent developments emphasize the importance of sustainability, which may be considered as the long-term time (fifth) dimension to food security. Food security is best considered as a causal, linked pathway from production to consumption, through distribution to processing, recognized in a number of domains, rather than as four "pillars". Food security and food insecurity are dynamic, reciprocal and time dependent and the resultant status depends on the interaction between the stresses of food insecurity and the coping strategies to deal with them. Universal indicators for measuring food security are challenging. Different indicators may be applied to different levels of food security. Measuring food security at the household level involves five categories of indicator dietary diversity and food frequency, spending on food, consumption behaviors, experiential indicators and self-assessment measurements. Food security, nutrition and sustainability are increasingly discussed in the same context. The integration of food security as an explicit part of the sustainability agenda would go a long way towards such a goal. The final common pathway of all these efforts is towards sustainable food security and nutrition for our planet. However food Insecurity (FINS), on the other hand, will occur when there are problems at any one level in the food production-consumption pathway. The upstream dimension/level of FINS largely affects those downstream. The definition of FINS is "whenever the availability of nutritionally adequate and safe foods, or the ability to acquire acceptable foods in socially acceptable ways, is limited or uncertain. Food insecurity, as practically measured in the United States, is experienced when there is (1) uncertainty about future food availability and access, (2) insufficiency in the amount and kind of food required for a healthy lifestyle, or (3) the need to use socially unacceptable ways to acquire food [8].

4.6. Food security levels

[4] The World Health Organization (WHO) and the U.S. Committee on International Nutrition recommend that an average of 2,100 kcal per person/per day be used as an initial planning figure. This estimate covers the energy needs of a typical population in a developing country, assuming a standard population distribution, body size, ambient temperature, pre-emergency nutritional status and light physical activity level (PAL).

According to [5] data were collected on household expenditure, quantities and type of foods, and number of days certain foods are consumed over a seven-day recall period, throughout the survey period. This information allows a calculation of household food security, based on kilocalorie (K.cals) intake data. Furthermore, thresholds of calorie consumption are used to categorize the severity of food insecurity in five groups from very severely food insecure to food secure, table 1.

Table 1 Levels of food security

Levels of food security	Kcal intake per person per day
Very severely food insecure	Less than 1500
Severely food insecure	1500 to 1799
Moderately food insecure	1800 to 2099
Borderline (marginally insecure)	2100 to 2399
Food secure	2400 and more

Source: Author, 2021

4.7. Household's Economy Approach (HEA)

[9] the Household Economy Analysis approach (HEA) is a unique approach to understanding household economy i.e. the economic decisions households make. Understanding how households live helps us determine how they will respond and cope in the event of a shock, such as a drought. HEA can:

- Quantify access to food and income for households across the wealth spectrum;
- Clearly identify who needs what kind of intervention and when;
- Predict when and where households will require assistance.

Households Economy Approaches also establishes: How people in different social and economic circumstances get the food and cash they need. 2. Their assets, opportunities and the constraints they face; and; 3. The options available to them in times of crisis like a drought or a rise in food prices.

4.8. Food security dimensions

According to [7] an integral part of the multi-dimensional nature of food security is the nutritional dimension; in addition, as the 1996 World Food Summit declared and subsequently reconfirmed in 2002, food security consists of four essential parts: 1) food availability, 2) food access, 3) food utilization 4) stability.

4.8.1. Availability

The World Food Programme defines availability as "The amount of food that is present in a country or area through all forms of domestic production, imports, food stocks and food aid "confirms that the term tends to be applied to food available at a regional or national level rather than at the household level, which can lead to some confusion as the word "availability" sometimes is used at the micro-level.

4.8.2. Access

The World Food Summit defines access as having "physical, economic and social access". Access is still not commonly accepted as an essential part of food security despite Amartya Sen's introduction of the concept in the early 1980s. Many people only consider access within an economic or financial context, particularly since the 2005 Niger food crisis and the start of food price volatility in 2008.

4.8.3. Utilization

The World Food Summit's definition of utilization (the third element of food security) is "safe and nutritious food which meets their dietary needs". The availability of and access to food on their own are not enough, people have to be assured of "safe and nutritious food". The food consumed has to provide sufficient energy to enable the consumer to carry out routine physical activities. Utilization also covers factors such as safe drinking water and adequate sanitary facilities to avoid the spread of disease as well as awareness of food preparation and storage procedures. Utilization therefore covers a range of aspects that hinge on the consumer's understanding of what foods to select and how to prepare and store them. It is often a mistake to assume that the members of so-called traditional societies know how best to use food resources and it is also a fact that dietary habits (breast-feeding, weaning foods) change very quickly, even for traditional societies.

4.8.4. Stability

The World Food Summit says that stability must be present "at all times" in terms of availability, access and utilization for food security to exist. The literature distinguishes between chronic food insecurity where food needs cannot be met over a protracted period of time and transitory food insecurity, where the time period is more temporary

4.8.5. Household income & household expenditure

Farm household incomes are generated mostly from more than one source namely on-farm (rice farming), off-farm (non-rice farming), and non-agricultural activities (non-farm). [6] support the statement by describing that the sources of farmer incomes are from the farm income, off-farm labor income, and non-labor income or income from the non-agricultural sector. Farmers in the rain-fed areas work in their land or garden and nonagricultural businesses. With respect to ***Household food expenditure,*** farmer household expenditure consisted of food and nonfood expenditure and production costs. Food expenditure consisted of un-purchased food, namely rice and some vegetables produced from their farms, and purchased food or other foods that were not cultivated in their farms.

The food needed by households classified into three categories which are the food consumed in summer, autumn and winter as it is expected that people consumed different quantities of food among the different seasons. According to the annual income and expenditures, the net household income found to be negative (SDG 1347883) which indicates that food security situation in the study area is not good.

4.8.6. Household coping strategies index

The reduced Coping Strategy Index (CSI) is considered a proxy indicator of the food access component of food security and it is calculated on the basis of a specific set of behaviors each with its own universal severity weighting. The five standard coping strategies and their severity weightings are:

- Eating less preferred/expensive foods
- Borrowing food or relying on help from friends and relatives
- Limiting portion sizes at meal times
- Limiting adult intake so that small children can eat
- Reducing the number of meals per day

5. Study area and methodology

This study was conducted in Garsila locality during 2021/2022 cropping season. [5], Garsila is the head quarter of Wadi Salih locality Lies between coordinates of Latitudes N 12, 23 and Longitudes E 23 degree 07 feet and to the south direction of Zalingei locality. The main field crops were sorghum, millet groundnut and sesame, while horticultural crops were onion, potatoes, tomatoes and other leaf and root crops. Questionnaires survey was distributed to households in order to know their idea on crop production and food security. Due to highly homogeneity in the study area, 45 households were randomly selected to represent the study area. The study used clustered random sampling technique. Data analyzed by household Economy Approach, frequency distribution and descriptive statistical analysis.

6. Results and discussions

6.1. Socioeconomic characteristics of households

6.1.1. Frequency distribution of households

Statistical analysis revealed that 89% of respondents were educated and 11% illiterate. This result indicated, education expected to have positive impact in understanding extension and technical packages. Household results according to marital status showed that 75% married, 7% single and 7% widowed. Analysis also stated that 56% of households were farmers, 16% farmers/traders, 8% employers and 18% employers/farmers. This is highlighted that farming practices tend to enhance farmers income as well as food security situation. Strategies adopted by farmers in case of food care showed that 40% eat less food, 44% migrate for off-farm income and 16% change the production with another, (Table 2).

6.1.2. Descriptive statistics

Age

Descriptive analysis founded that, the average household age was 46.3 year with standard deviation of 12.20995. This result entails that respondents have to some extent a productive age which expected to have positive impact on food security, (Table 3).

Family size

Household size has implications on labor availability and it has a positive impact on crop production. Large family size may be an indicator for availability of labor provided that there are more people within the age range of active labor force. Result showed that the average family size in Garsila locality was 9 person with standard deviation of 2.88885. This implicated that the availability of enough labor positively enhance food security. This result coincides with what have said by Breima 2019 larger family size will positively impact food availability, (Table 3).

Farm size

Study recorded that the average farm size in the study area was 7 feddan which indicates that household have ability to ensure food availability as well as food security, (Table 3).

6.1.3. Sources of income and households expenditures

Households recorded that the annual income was SDG 194221, while the annual expenditures on food and nonfood items were SDG 1,542104. This result indicated that the household net income is negative (1347883) which implies in-secured food in the study area, (Table 4).

Table 2 Frequency distribution of households

Variables	**Frequency**	**Valid %**
Education		
Illiterate	5	11
Khalwa	8	18
Elementary	8	18
Primary	7	15
Secondary	8	18
University	8	18
Post graduate	1	2
Total	45	100
Marital status		
Married	34	75
Single	5	11
Divorce	3	7
widow	3	7
Total	45	100
Occupation		
Farmer	25	56
Trader	1	2
Farmer/trader	7	16

Employer	4	8
Employer/farmer	8	18
Total	45	100
Copping strategies		
Consume little	18	40
Migrate for off-farm income	20	44
Change the production with another	7	16
Total	45	100

Source; HH survey, 2021

Table 3 Descriptive statistics of age, family and farm size

Variable	**N**	**Min.**	**Max.**	**Sum.**	**Mean**	**Stdv.**
Age	45	15.00	76.00	2084	46.311	12.20995
Family size						
Male	45	2.00	17.00	414.00	9.2	2.88885
Farm size						
Total land area	45	2.00	3.00	295.00	6.5556	4.8829

Source; HH survey, 2021

Table 4 Sources of income and expenditures

Income source	**SDG**	**% share**
Field crop production	31500	16
Horticultural production	40200	21
Animal production	32541	17
Forest income	4200	3
Wood lands	9800	5
Straw income	6780	3
Charcoal making	11200	6
Small scale industries	2300	1
Salaried labors	20300	10
Free work	35400	18
Total	194221	100
Expenditures		
Food and nonfood expenditures		
Male cloths	15600	
Female cloths	10200	
Children cloths	9150	
Family shoes	2950	

Education costs	23800	
Health costs	20224	
Telephone costs	5200	
Blanket costs	620	
Furniture costs	15200	
Wedding costs	20400	
Other social events	6200	
Water costs	4500	
Houses maintenance costs	17900	
Car costs	12000	
Electricity costs	1200	
Shaving costs	750	
Others costs	650	
Total-nonfood expenditures	166,544	
Food expenditures	1,375,560	
Total expenditures	1,542,104	

Source; HH survey, 2021

6.1.4. Food utilization

Table 5 shows utilization of millet sorghum in the study area. Result revealed that household produced 3 and 4 sacks of millet and sorghum, respectively, while the same quantity consumed. This result entails that the availability of food is not sufficient for household to fulfill and satisfy the daily and subsistence needs, (table 5).

6.1.5. Food availability

[12] availability refers to the physical existence of food either from own production or on the markets. Households stated that 11%, 89% and 7% and 93% of millet and sorghum is adequate and not adequate, respectively. This result entails that the availability of food is insufficient for household to fulfill and satisfy the daily and subsistence needs, (Table 6.)

6.1.6. Food accessibility

Result of table 7 indicated that household produced only 3 and 4 sacks of millet and sorghum, respectively in cropping season, while the remaining 6 to 7 months of the year, household suffering purchasing food. This entails that the food security is bad and household have no ability to acquire and access to enough food.

Table 5 Food utilization

Variable/crop	**Quantity/sack**
1. Millet	
production	3
quantity sold	0
quantity saved	0
quantity consumed	3
2. Sorghum	

production	4
quantity sold	0
quantity saved	0
quantity consumed	4

Source: HH survey 2021

Table 6 Food availability distribution

Food availability	Frequency	Valid %
1. Millet		
adequate	5	11
not adequate	40	89
Total	45	100
2. Sorghum		
adequate	3	7
not adequate	42	93
Total	45	100

Source: HH survey 2021

Table 7 Food accessibility distribution

Food accessibility	Number of months
1.Millet	
production	3 sack
number of months under purchased	7
time of purchasing	7
Average purchased	1
average price	22200
2. Sorghum	
production	4 sack
number of months under purchased	6
time of purchasing	6
Average purchased	1
Price	20000

Source: HH survey 2021

6.2. Food security situation and the Household Economy Approach

Table 8 and 9 shows the weekly average food needs costs/ year by household was recorded to be SDG 1375661. However the kilo calories needed for food security per person per day was SDG 2069. With reference to food security level which indicates 2100 minimum calories per person per day, the study founded that households' in Garsila locality were moderately food insecure.

Table 8 The weekly food need per household and average costs in SDG, Nertiti locality

Item	Summer			Autumn			Winter		
	Q. Kg	Price	T. Cost	Q. Kg	Price	T. Cost	Q. Kg	Price	T. Cost
Sorghum	10	200	2000	8	200	1600	11	200	2200
Wheat	5	650	1300	5	650	1300	5	650	3250
Millet	10	240	2400	10	240	2400	11	240	2640
Meat	2	2000	4000	2	2000	4000	2	2000	4000
Milk	2	250	500	2	250	500	2	250	500
Sugar	5	450	1800	6	2700	1800	6	2700	16200
Tea	0.5	2700	1350	0.5	2700	1350	0.75	2700	2025
Coffee	0.5	3375	1688	0.5	3375	1688	0.75	3375	2531
Oil	2	1350	2700	2	1350	2700	2	1350	2700
Salt	1	225	225	1	225	225	1	225	225
Okra	0.5	2250	1125	0.5	2250	1125	0.5	2250	1125
Fruit	1	400	400	1	400	400	1	400	400
Vegetables	4	200	800	2	200	400	4	200	800
Onion	2	500	1000	2	500	1000	2	500	1000
Total			21288			20488			38471
Average									26749
Cost/HH/year									1375661

Source: HH survey 2021

Table 9 Weekly minimum food need and the equivalent Kilo Calories per person per day

Item	Summer			Autumn		Winter	
	K. cal	Q. kg	Total costs	Q. kg	Total costs	Q. kg	Total costs
Sorghum	3250	10	32500	8	26000	11	35750
Wheat	3320	5	16600	5	16600	5	16600
Millet	3350	10	33500	10	33500	11	36850
Meat	2020	2	4040	2	4040	2	4040
Milk	660	2	1320	2	1320	2	1320
Sugar	4000	5	20000	6	24000	6	24000
Tea	1080	0.5	540	0.5	540	0.75	810
Coffee	685	0.5	343	0.5	343	0.75	514
Oil	8840	2	17680	2	17680	2	17680
Okra	350	0.5	175	0.5	175	0.5	175
Onion	410	2	820	2	820	2	820
Total			127518		125018		138559
Per person per day (9)							2069

Source: HH survey 2021

7. Conclusions

This study was conducted in Garsila locality during 2021/2022 cropping season. Statistical analysis revealed that 89% of respondents were educated and 11% illiterate. Descriptive analysis founded that, the average household age was 46.3 year with standard deviation of 12.20995. This result entails that respondents have to some extent a productive age which expected to have positive impact on food security. The annual household income was SDG 194221, while the annual expenditures on food and nonfood items were SDG 1,542104. Results indicated that, the availability of food is insufficient for household to fulfill and satisfy the daily and subsistence needs. Results also revealed that, food security is bad and household have no ability to acquire and access to enough food. The weekly average food needs costs/ year by household was recorded to be SDG 1375661. However the kilo calories needed for food security per person per day was SDG 2069. With reference to food security level which indicates 2100 minimum calories per person per day, the study founded that households' in Garsila locality were moderately food insecure.

Compliance with ethical standards

Acknowledgments

My thanks is due to all my authors for their help and unlimited valuable comments.

Disclosure of conflict of interest

There is no conflict of interest shown by authors

References

[1] Adama, D., Omonlola, N. W., Agathe, D., Felix, B., Richard, K.D, Sidi, T., Amadou, S. Baloua, N. and Ramadjita, T. (2022). Impact of Crop Diversification on Household Food and Nutrition Security in Southern and Central Mali. Sec. Nutrition and Sustainable Diets. Original Research Article, Volume 5-2021.

[2] Andrew, J., Francis, M. N., Gretel, P. and Sera, Y. (2013). What Are We Assessing When We Measure Food Security? A Compendium and Review of Current Metrics. Advances in Nutrition. Volume4, issue 5.

[3] Breima, E. E. (2018). Annual report. Impact of crop production on food security, Zalingei locality of Central Darfur State

[4] Breima, E. E. (2019). Annual report. Impact of crop yields on food security in Nertiti locality of Central Darfur State

[5] Dawoud, A. A. and hamid, O. I. (2012). Impact of Darfur Conflict on Livestock Population in West Darfur State. Asian Journal of Agricultural Research, 6: 46-51.

[6] Hartoyo, B. K., and shara, D. (2021). Analysis of income and expenditure of farmers' household in the rain-fed area of Boyolali district. Earth and Environmental Science 653. Central Java Assessment Institute for Agricultural Technology press.

[7] Mazziotta, M., marion, N. and muro, De. (2010). MASTER IN HUMAN DEVELOPMENT AND FOOD SECURITY towards a Food Insecurity Multidimensional Index (FIMI)

[8] Peng, W., Berry, E.M., 2019. The Concept of Food Security. In: Ferranti, P., Berry, E.M., Anderson, J.R. (Eds.), Encyclopedia of Food Security and Sustainability, vol. 2, pp. 1–7. Elsevier. ISBN: 9780128126875 Copyright © 2018 Elsevier Inc. All rights reserved ElsevierSave the children (2016). HOUSEHOLD ECONOMY ANALYSIS, Common approaches

[9] Toit, D. C. du. , Ntushelo, L. V. and Ramonyai, M. D. (2011). Food Security by Directorate Economic Services Production Economics. Agriculture and forestry and fisheries, Department of south Africa

[10] Travasso, M. I., Challinor, A. J., Cochrane, K., Howden, M., Iqbal, M. M. and Lobel, D. B. (2014). Food security and food production systems.

[11] Weingartner, L. (2000). International Training Course Food and Nutrition Security Assessment Instruments and Intervention Strategies. The Concept of Food and Nutrition Security