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# Prevalence of Food Insecurity in Eastern Part of Libya: A Study of Associated Factors

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**Abstract** **Original Research Article**

Food security refers to the food availability and the ability to access it by each individual in the community. Food security can be measured by daily calorie intake by a person per day, which accessible and available on a household budget. Several factors affect the level of family food security. This paper aims to describe the prevalence of food insecurity in the eastern part of Libya, and its relationship with household and individual socioeconomic and demographic characteristics. It also provides estimates of dietary energy consumption and inequality in food consumption among the eastern part Libyan population. Tobrouk city has the highest average dietary energy consumption while Darnah city has the lowest average dietary energy consumption. Only (25%) of the subjects consume adequate daily energy consumption; (11%) and (63%) of the subjects consume low and high daily energy consumption respectively. Gender, family size, and living area are the factors associated with the level of food adequacy among the subjects of this study at $P$ (< 0.05). Management of food insecurity in Libya requires comprehensive, well designed, and thoughtful food security policies.

**Keywords:** Dietary, Eastern Libya, Energy, Food Security, Food insecurity.



## INTRODUCTION

Food security refers to the food availability and the ability to access it by each individual in the community. Food security is defined as the availability of adequate, diverse, balanced nourishing food to maintain stable food consumption and to prevent fluctuations in prices and production at all times [1-3]. Food security happens when all individuals, at all times, have economic and physical access to safe, sufficient, and nutritious food to meet their food preferences and dietary needs for an active and healthy life. Family food security occurs when all family members, at all times, have access to enough food for an active, healthy life. Family members who are food secure do not live in hunger and saturation. [4] On the other hand, food insecurity is defined as a status of limited or uncertain availability of safe and nutritionally adequate foods [2, 5]. Between the years of 2011–2013, an estimated 842 million people were suffering from chronic hunger [6]. The Food and Agriculture Organization of the United Nations (FAO) determined the four components of food security as utilization, availability, access, and stability. In 1948, The United Nations (UN) recognized the Right to Food in the Declaration of Human Rights, as all other rights [7]. Food security can be measured by daily calorie intake by a person per day, which accessible and available on a household budget. The food security measurement tools include a. Household Food Insecurity Access Scale (HFIAS) which measures the degree of inaccessibility in food insecurity in the household in the previous month; b. Household Dietary Diversity Scale (HDDS): it measures the number of consumed different food groups over a specific period (24hours/48hourrs/7days); c. Household Hunger Scale (HHS); it measures the household food deprivation; d, Coping Strategies Index (CSI) – it measures how households cope with food shortages [8]. In the years 2010–2012; the FAO stated that about 870 million people had chronic under-nutrition. This percentage represents about 12.5% of the world population, which equals to 1 in 8 people. During 2018 prevalence of world food insecurity decreased, for the first time, to the pre-recession (2007) level of 11.1%. Developing countries have higher rates of food insecurity. In the developing countries, about 852 million people (which equals to 15% of the population) are categorised as chronically undernourished. Asia and Latin America

have achieved reductions in rates of food insecurity [9, 10]. In Libya, the Bureau of Statistics and Census measures and reports food security status in collaboration with the United Nations World Food Program. The Libyan food consumption, security and subsidy regime has become a major topic of interest to the economy, and nutrition researchers [11]. Looking at food insecurity worldwide, in Afghanistan, about 35% of households are food insecure. In India, almost thirty million people have been added to the segment of the food insecurity since the mid-1990s up to now. In Mexico, at least 10 percent of the population in every Mexican state suffers from food insecurity. In Singapore, during 1965, it was able to produce 60% of vegetables, 80% of its poultry, and 100% of eggs. During 2019, Singapore produced only 13% of leafy vegetables, 24% of eggs, and 9% of fish. This depletion in production is classified as food insecurity. In the United States of America (USA); it was estimated that 14.5 percent of USA households had food insecurity at some point during 2012. In the Democratic Republic of Congo, about 33% of households have food insecurity [12, 14]. The Middle East and North Africa (MENA) region is considered one of the most food-insecure regions worldwide, with 11·8 % experiencing severe food insecurity in 2016. The high prevalence of food insecurity in the MENA region has been attributed to low agricultural production, heavy dependence on food imports, social inequities, economic instabilities and unstable political situations [15]. In Tunisia, there is a low level of hunger, with a 2018 score of 7.9 out of 50 on the Global Hunger Index (GHI). In Egypt, 13.7 million Egyptians (or 17 percent of the population) suffered from food insecurity in 2011, compared to 14 percent in 2009. In Algeria, the 2018 Food Security Assessment confirmed the dependence on food assistance: 30% of the population is food insecure, while 58% is vulnerable to food insecurity. In Jordan, 0.5 percent of Jordanian households are considered food insecure and an additional 13 percent vulnerable to food insecurity. Food insecurity in Libya is defined by FAO as the proportion of the population whose daily dietary energy intake is lower than the minimum dietary energy requirement [16, 20]. This paper aims to describe the prevalence of food insecurity in the eastern part of Libya, and its relationship with number of household and individual socio economic and demographic characteristics. It also provides estimates of dietary energy consumption and inequality in food consumption among the eastern part Libyan population.

## METHODOLOGY

It is a cross- sectional study was carried out in the period between July to September 2019 in the eastern part of Libya. This study follows a two stage stratified cluster sample design which ensures demographic and geographic representation, where respondents were randomly selected from within primary sampling units comprising of approximately 100 households. The sample distribution is compatible with the general sampling frame of the population based upon the 2019 population census from World Bank which divided Libya into 22 areas separate geographic areas. [21] Data were collected from seven cities from the eastern part of Libya using a validated questionnaire. According to the data available with the World Bank official website and the offices of the civil registration for population of the selected cities, there were a total of 1549518 subjects consist of male to female ratio of 102.48 males per 100 females. Based on statistical sampling techniques a sample size of at least 1584 subjects will be considered to be enough for the current study as shown in table 1. Out of 1,584 questionaries, 1033 were return and completely filled. This given response rate of (65.21%). The distribution of the sample between the various cities is in accordance with their proportional size. The cities included in the study are Benghazi, Al-baidha, Almarj, Ejdabia, Tobrouk and Darnah as shown in table (1). The prevalence of food insecurity in this study is estimated by measuring of average dietary energy consumption; Inequality in Dietary Energy Consumption; and minimum Dietary Energy Requirements. Food insecurity is measured at sub national population groupings such as income levels, region and residential environment, as well as characteristics and composition of households and the characteristics of the household head. All data was coded prior to being entered in a computer. Description and analysis of data was carried by SPSS version 22. Level of significance was set at p value < 0.05.

## RESULTS

A sample of 1033 subjects included 575 (55.66%) females and 458 (44, 33%) males were enrolled in this study. Table (1) shows the distribution of the subjects and their representation by region. Benghazi city makes the highest proportion of the sample (40.9%) and the lowest segment from Darnah (6.4%). Table 2 shows the age distribution; subjects were predominantly between the ages 40-59 years old (52.2 %). The remaining half was between 18-39 years (31.2 %) and 60-70 years old (16.6 %). The total means age + standard deviation (SD) was 50.8 years + 13.5. Table (3) shows the distribution of the subjects according to area type (urban or rural). (60%) of the subjects live in urban area. (31%) of the family heads have preparatory education; while only (2%) have higher education. Regarding family size more than half of the family consists of 3-5 members (60%). More than have of the subjects receive more than 1000 Libyan diner. Figure (1) shows the average dietary energy consumption, measured in kilocalories per person per day. Tobrouk has the highest the average dietary energy consumption (3200kcal/day) while Darnah has the lowest the average dietary energy consumption (2600 kcal/day). Benghazi and Ejdabia has the same average (2900 kcal/day). Al-baidha and Almarj have similar consumption average (2700 and 2800 kcal/ day respectively) It is an important indicator of adequacy of diet and food security. This indicator offers important insight for national institutions and international

organizations for the formulation of policies and interventions aimed at improving food security conditions and in combating inequality in access to food. Figure (2) shows the distribution of the subjects according to level of satisfaction in consuming adequate daily dietary energy requirements. Only (25%) of the subjects consume adequate daily energy consumption; (11%) and (63%) of the subjects consume low and high daily energy consumption respectively. Figure (3) shows family methods to cope with food shortage and food in security. (30%) of the subjects borrow foods and / or money to solve issues of food insecurity. (45.4%) of the subjects use low price foods. (8.7%) of the subjects depend on family and friends help and support. (15.9%) of the subjects decrees their consumption rate. Distribution of those who have low daily energy consumption according to subjects characteristics are shown in table (4). Gender, family size and living area are the factors that associated with level of food adequacy among the subjects of this study at P (< 0.05). Males have higher percentage of subjects with adequate and high daily energy consumption than females. Females have higher percentage of subjects with low daily energy consumption than male. Subjects who live in urban area have better food security status than those who live in rural area. Education of family head and family income do not have any clear association with adequacy of daily energy intake. Families with smaller size have better food security status.

**Table-1: Distribution of the subjects and their representation by region**

| City | Population Size | Sample size | Response rate N (%) |
|---|---|---|---|
| Benghazi | 650,629 | 665 | 422(40.9) |
| Al-baidha | 380000 | 388 | 287(27.8) |
| Ejdabia | 134,358 | 137 | 89(8.6) |
| Tobrouk | 120000 | 123 | 88(8.5) |
| Almarj | 184531 | 189 | 81(7.8) |
| Darnah | 80000 | 82 | 66(6.4) |
| Total | 1549518 | 1,584 | 1033 |

**Table-2: Subject characteristics**

| Age (Years) | Total No. (%) | | Total |
|---|---|---|---|
| | Male | Female | |
| **18-39** | 145(14) | 177(17.1) | 322(31.2) |
| **40-59** | 250(24.2) | 289(28) | 539(52.2) |
| **60-79** | 63(6.1) | 109(10.5) | 172(16.6) |
| **Total** | 458(44.33) | 575(55.66) | 1033(100) |
| **Age (Years)**Mean + SD | 50 + 2.3 | 49 + 1.9 | 50.8 + 13.5 |

**Table-3: Subject characteristics by**

| Characteristics | Subjects |
|---|---|
| **Area** | |
| Urban | 620 (60%) |
| Rural | 413 (40%) |
| **Total** | **1033 (100%)** |
| **Education of family head** | |
| Illiterate | 227(22%) |
| Elementary | 155(15%) |
| Preparatory | 320(31%) |
| Secondary | 124(12%) |
| University | 186(18%) |
| Higher Education | 21(2%) |
| **Total** | **1033 (100%)** |
| **Family Size** | |
| 1-2 | 186(18%) |
| 3-5 | 620(60%) |
| ≥6 | 227(22%) |
| **Total** | **1033 (100%)** |
| **Total family Income (Libyan Dinner)** | |
| <500 | 114(11%) |
| 500 - 100 | 341(33%) |
| >1000 | 578(56%) |

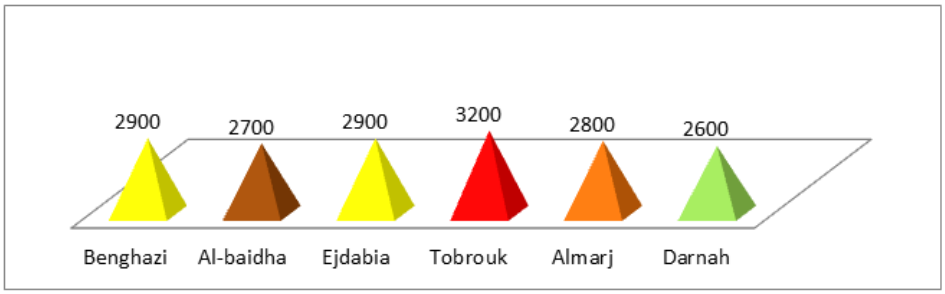


**Fig-1: Average Dietary Energy Consumption by Region**

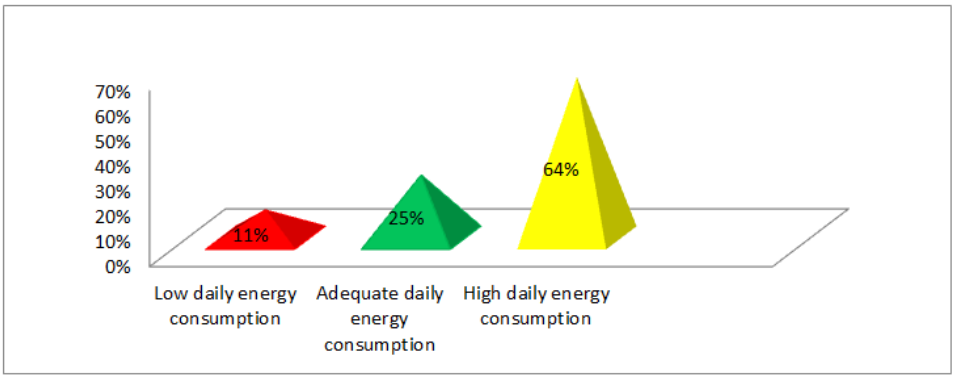


**Fig-2: Distribution of the subjects according to level of daily energy intake**

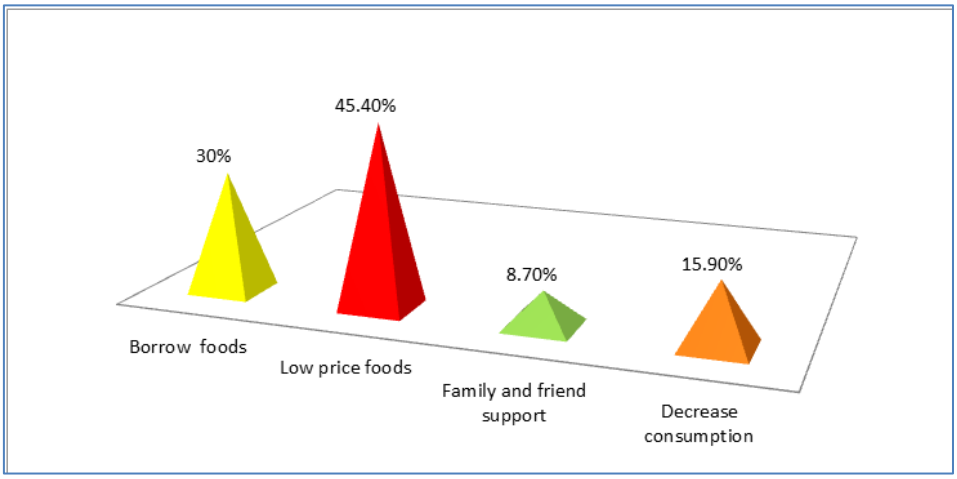


**Fig-3: shows family methods to cope with food shortage and food in security**

| Characteristics | Daily energy intake | | |
|---|---|---|---|
| | Low | Adequate | High |
| **Sex** | | | |
| Male | 11 | 32 | 57 |
| Female | 19 | 30 | 51 |
| **Area** | | | |
| Urban | 21 | 54 | 25 |
| Rural | 34 | 47 | 19 |
| **Family Size** | | | |
| 1-2 | 0 | 42 | 58 |
| 3-5 | 9 | 41 | 50 |
| ≥6 | 10 | 39 | 51 |

## DISCUSSION

Eleven out of every 100 Libyans in eastern part of Libya are estimate to have been food unsecured in 2019, which is higher than the prevalence estimated for Arabian countries during the period 2017-2019 [22]. Tobrouk city has the highest average dietary energy consumption while Darnah city has the lowest the average dietary energy consumption. Only (25%) of the

subjects consume adequate daily energy consumption; (11%) and (63%) of the subjects consume low and high daily energy consumption respectively. The analysis presented in this paper reveals significant variation in food insecurity prevalence between population groups. Most affected groups by food insecurity are females, family with large size and those who live in rural area. The paper also reveals that there is no significant daily calories consumption between different cities. Using of low price foods was the most common used strategies by the less food secured subjects [21].

One of the most common causes of food insecurity is gender inequality. According to literatures women make up 60% of the world's food insecurity. Many studies justify that female's face discrimination both in education and employment and consequently in accessing to foods. Mothers tend to be responsible for food preparation and childcare within the family and are more likely to be spent their income on food and their children's needs rather than meet their own needs. The gendered issues of food insecurity are notable along the four pillars of food security: availability, access, utilization and stability, as determined by the FAO. Furthermore, the number of female-headed households is increasing significantly in rural areas in many developing countries as rural men migrate due to the lack of employment and other income-generating opportunities. In Sub-Saharan Africa, 31% of households in rural areas are headed by females, while in Latin America and Asia, female's head 17 %, and 14 %, respectively. Female-headed households are concentrated among the poorer strata of society and often have lower income than male-headed households. The problems of female-headed households in rural areas vary according to their degree of access to productive resources. The FAO has identified. For example, the potential consequences of the absence of male labour both in terms of declining yields and outputs or shifts in production toward less nutritious crops requiring less labour and in terms of increased reliance on child labour which, in turn, has further implications for the family and for the human capital of the country. Therefore in these cases, women's access to labour-saving technology is of particular importance. Despite the role as the source of food production and provision for family consumption in developing countries, women have limited access to critical resources as food. Women's access is more limited than men due to sociological, cultural, and traditional factors [22-25].

Increased family size may adversely affect the nutritional status of every member of the household. It may be associated with decreased per capita human inputs. In other words, the allocation of food per family member is likely to decrease with the increase in the number of members, which, in turn, may adversely affect the nutritional status of family. Increased family size also causes acceptance of lower quality/ quantity types of food. One may also note economies of scale in nutrition because of less waste and the possibility to purchase in bulk associated with larger family size. It should be further noted that it is not family size per se but the number of adults relative to children in a household that is the crucial factor influencing nutrient intake of children. In other words, the lower the dependency ratio, the higher the nutrient intake of family members. Size of a family is among the major factors contributing to the food insecurity of the rural families, especially when the dependency ratio is higher. The larger the dependency ratio, the higher is the burden to the active members of the family to feed the household, and hence there will be higher probability of being food-insecure. In many developing economies, high family sizes are always associated with high dependency ratio, the dependency coming from Haddad and Co-authors showed that large family sizes are always associated with higher odds of being food-unsecured [26- 29].

There are substantial variations between rural and urban areas in economic vulnerable population's density, access to financial markets and service facilities all of which are likely to affect the lives of people in many dimensions, including food security. Dwellers that live in rural usually are able to produce their own food, while urban population is entirely reliant on food purchased from markets. Most socioeconomic studies consider rural and urban settings differently. The same justification is extended to the study of food insecurity. For rural populations, the emphasis should be placed on the socioeconomic and agro-ecological situations and performance of small-holder farmers, while in urban economies the focus additionally considers issues such as price volatility and market stability. Access to food may be limited by financial constraints or other factors in rural areas, such factors include transportation challenges. Rural households cannot rely on access to sufficient affordable and nutritious food at all times, increasing the risk of poor health outcomes. Factors that influence the diet quality of individuals and communities in rural areas include store availability, restaurant availability, food prices, access and proximity to a grocery store, food assistance and socioeconomic characteristics [30- 32].

## CONCLUSION

The issue of food security has continued to be an important agenda worldwide. Food security is likely to be a problem that mankind will have to address in the near and long-term future and Libya in not an exception. Eleven out of every 100 Libyans in eastern part of Libya are estimate to have been food unsecured in 2019. Management of food insecurity in Libya requires comprehensive, well designed, and thoughtful food security policies.

**Consent**

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

**Competing Interests**

Authors have declared that no competing interests exist.

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