

## Socio-Economic Aspects Influencing Food Consumption Patterns Among Children under Age of Five in Rural Area of Sudan

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**Abstract:** A secondary analysis of data for 150 children under the age of five was carried out in three villages of El Fau rural area of Gadarif state. The community mainly consists of farmers of a semi nomadic nature who own different sizes of herds and agricultural lands; they are the farmers of the Arabic pedigree. The rest of the community is workers from western Sudan, who were brought from their original areas to enhance the nomadic settlement strategy of the Sudanese government in the mid seventies. These worker groups comprise of different tribes namely *Tama*, *Hawsa*, *Birgid*, *Masalet* and *Folany*. Farming is the major activity practiced almost by all the community members and the government controls the farming system. The study was carried out to investigate some of the social and economic factors, which have a direct and indirect effect on feeding patterns and nutritional status of children under age of five. Mothers were interviewed with a semi-structured questionnaire, about the social norms affecting both mother and child's nutritional and health status, in addition to the feeding habits of the children (including breastfeeding and weaning practices). In addition, information was collected about the socio-economic status of the family. The income of the family was assessed. The results revealed low parental education (76.7% of the mothers and 54.0% of the fathers are illiterate), socioeconomic-demographic factors and poor nutrition of knowledge of mothers as well as and feeding practices led to the prevalence of nutritional anaemia (65.3% of the children with haemoglobin concentration of 50% or below) in addition to the prevalence of wasting, where 6% of the children are moderately malnourished and 3.3% of them are severely malnourished. It is recommended that an improvement in societal infrastructure, better maternal education and nutrition are needed to maintain the children's nutritional status in several rural areas of Sudan.

**Key words:** Socio-economic, social norms, food consumption, nutritional anaemia, children under five, rural area, Sudan

### INTRODUCTION

Annually 10.6 million children under 5 years die worldwide. The mortality rates and causes of death in children under age of five are an indicator of social progress and inequalities within and between societies (Razum and Breckenkamp, 2007). The major causes of disease are malnutrition (Ezzati *et al.*, 2002). In sub-Saharan Africa, about 2% of deaths and 3% of disability-adjusted life occurred in children under-five years (Nemer *et al.*, 2001). It is well known that socio-economic and environmental conditions, in addition to the feeding patterns, are important determinants of malnutrition in developing countries (Nyovani and Mpoma, 1997). Thus, the relationship between socio-economic status, illness and death is observed to be inverse, with morbidity and mortality concentrated in those at the lowest end of the socio-economic scale (Zere and McIntyre, 2003). On the other hand, the nutritional status of children under-five is one of the determinants of household well-being and child survival (Thomas *et al.*, 1990). Many factors seriously affect child growth status, specially in developing countries, such

as: family size, educational status, parent's job, parents socio-economic status, their knowledge about proper nutrition, prenatal care, mother's age, mother's weight, newborn's sex, etc. (Majlesi *et al.*, 2001).

Generally in Africa and particularly in Sudan, the increasing mortality rates due to malnutrition require strong governmental policy for combating such situations, more participation by international agencies and more health education and public awareness regarding immunization and nutrition, which will help to reduce the incidence and mortality of malnutrition in Sudan (John and Tigani, 2007). There is an urgent need of health education regarding nutrition and diet and various nutritional supplementation schemes need to be implemented in Africa to combat the mortality rates due to malnutrition (Kumari, 2005).

In Sudan, >60% of the population live in rural areas lacking the basic services and over-burdened by poverty particularly women and children (Yonos, 2001). The available data about nutritional status of children under 5 years in Sudan reflects the worse and miserable situation of children under 5 years, especially in the

marginalized rural areas. Due to these there is a need for research and studies to highlight the problem and draw attention to the children's situation.

The objectives of the present report was to address some of the social and economic factors, which have a direct and/or indirect effect on feeding patterns and nutritional status of children under age of five in El Fau rural area as a representative model for the miserable situation in various rural areas in Sudan.

## MATERIALS AND METHODS

**Study area:** This cross-sectional study was undertaken from end of March to end of April 2003 in villages' number 11, 14 and 15 in El Fau rural area of Gadarif state. El Fau rural area is a part of the Rahad Irrigated Agricultural Scheme, which was established in 1972, by Rahad Agricultural Corporation research unit in order to cultivate the area between the Blue Nile and El Rahad River by settlement of the nomadic tribes in this area.

**Population and tribal composition:** The total population of the three target villages is estimated to be 18,000 inhabitants (3000 households according to United Nations standards). The major tribal groups are *Tama* 41%, *Kawahla* 27%, *Mussalamia* 15%, *Shokria* 10%, *Folany* 3% and others. Considering the gender distribution, 48% of the population is males while females represent a round 52% of the total (NIDAA, 2001).

**Sample size:** The population in the study area is heterogeneous in terms of ethnic and tribal composition, thus a sample of 5% was chosen to represent the community. From the 18,000 inhabitants in the area who form 3,000 households, 150 families (50 families from each village) were selected as a representative sample and the eldest child from the children under five was chosen from each family to indicate the nutritional status of the rest of the children. These families were selected randomly.

**Research team:** The research was carried out with the help of four enumerators of whom 2 are nutritional technicians and the others a lab technician and a physician.

**Field survey:** The survey was covered by the distribution of 150 questionnaires designed to collect data about the Socio-economic factors affecting the food consumption patterns of children under the age of five. The form was composed of 44 questions to collect data about age, sex, level of education of parents, number of the family members and other questions concerning the socio-economic and socio-cultural status to assess the dietary patterns. Mothers were questioned about breast-feeding, complementary-feeding and weaning practices

and the type of consumed diet was determined using dietary recall method. They were questioned about childhood diseases and vaccinations. In addition to questionnaire, open group discussions and observations were held to collect information about life style and other cultural norms related to the topic.

**Anthropometric measurements:** Anthropometric measurements of 150 children were done and data were transformed into height-for-age, weight-for-age and weight-for-height ratios.

**Clinical assessments:** The children were examined by a physician to check the clinical signs of malnutrition, nutritional anaemia and vitamin A deficiency.

**Haemoglobin concentrations:** Haemoglobin was measured for children using Sahli method (acid haematin) to assess the nutritional anaemia.

**Analysis of the main food:** Approximate analysis of food was done according to the protocols of AACC (1980) and AOAC (1975, 1984).

**Analysis of drinking water:** Coliform bacterial test was carried out according to the presence-absence test for total coliform as described by WHO (1998).

## RESULTS AND DISCUSSION

**Demographic data:** Considering gender distribution among the selected children, 48.7% of the children were males, while 51.3% were females. Additionally, 36% of the children were of the age 37-48 months, 34% (25-36 months), 4% (49-60 months) and 6% were infants (6-12 months) (Fig. 1). Concerning the family type 54.7% of the children lived with their extended families and 44.7% lived with nuclear families.

**Socio-economic and socio cultural status:** The educational level in the area was comparatively low, with 76.7% of the mothers and 54.0% of the fathers having received no formal schooling (Fig. 2). Illiteracy is highly prevailing among El Fau community, particularly among women, this could be attributed to factors related to the cultural norms, especially of the Arabic tribes, where girls are not allowed to go to school or complete their education. Only 19.3 and 39.9% of the mothers and fathers respectively have attended or completed primary school and very few of them received intermediate schooling or secondary education. None of the mothers and only 0.7% of the fathers obtained university education (Fig. 2). The major source for the economic earns of the family fathers was distributed between agricultural (39.3) and labour (38%) activities while the rest (19.4%) involved in other minor occupations (Fig. 3). On the other hand the majority of the mothers have no

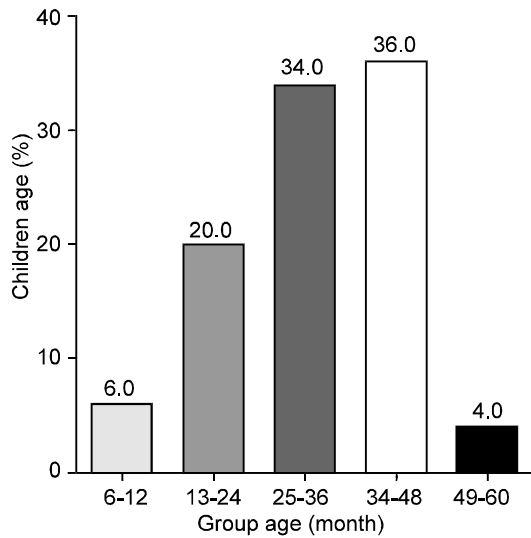


Fig. 1: Children age group in El Fau rural area

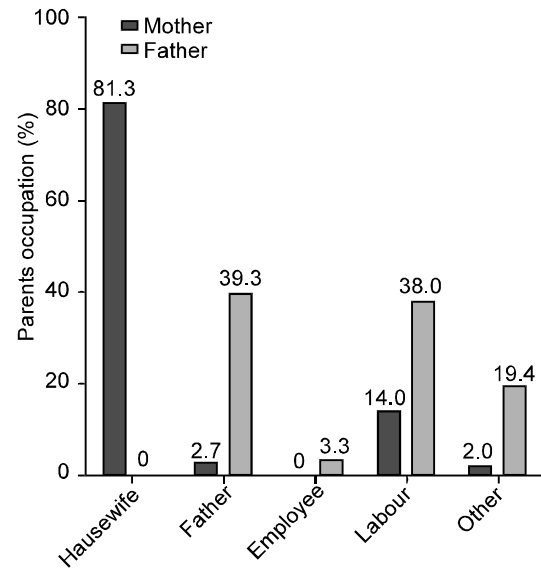


Fig. 3: Parents' occupations in the rural area of El Fau

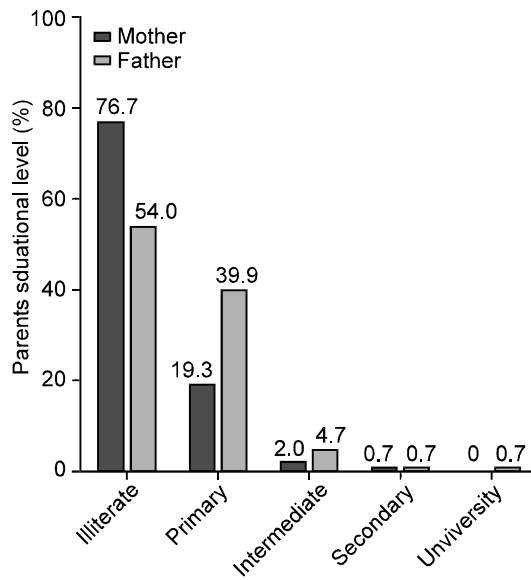


Fig. 2: Parents educational level in the rural area of El Fau

real occupations (81.3%). Accordingly, most the families were depending mainly on the fathers (74.0%) for covering all the financial responsibilities (Fig. 4). Certainly such status wouldn't be sufficient for fulfilling all or most of the obligations for the families due to the low income of such occupations. Furthermore, when the mothers were inquired about the major source of income, it was found mostly among the Arabic tribes that 20% of the children's family own farms, 36% have livestock and 44% own both. From all of that it was clear that most of the community members' practice subsistence farming and only few of them had surplus

production. This was due to the agricultural policies adopted by Rahad Agricultural Corporation. Moreover, the area suffers as well as all the other rural areas from seasonality, physical weakness and sickness. The comprehensive study of Magboul and Mohamed (2003) have revealed that most if not all of rural areas face low access to diversified food in quality and quantity either due to seasonality, nature of food production and availability, poor transportation from surplus areas or low purchasing power. It was also obvious that the markets of the studied area were very poor, lacking fresh fruits and vegetables, containing some handicrafts and other commodities. Such terrible situation could be attributed to the low purchasing power, since most of the families depend mainly on their own storage stuffs, which consist of sorghum and dried okra as well as milk. Contrary to the fact that the families income among the lands and herds owners of the Arabic origin is better than non Arabic peasants, the purchasing power of those Arabian was comparatively lower than the non Arabic peasants who used to provide fruits, vegetables and other foods for their children.

**Social norms:** The social restrictions in these rural areas have a negative implication for all the family members and in particular the mothers and their expected babies. Such social restrictions impose girls' early marriage and consequently early delivery (Fig. 5). Moreover, our investigation revealed that the biggest share of the children (93.3%) was born at home under the hand of traditional or illegal midwives. The lack of the proper medical care would be expected to affect negatively both the mothers and their children in the short and/or long time frame. Such situation triggers the

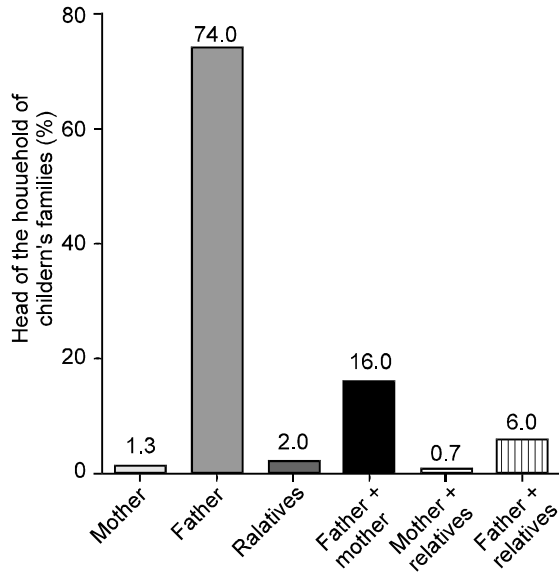


Fig. 4: Head of the household of the children's families in El Fau rural area

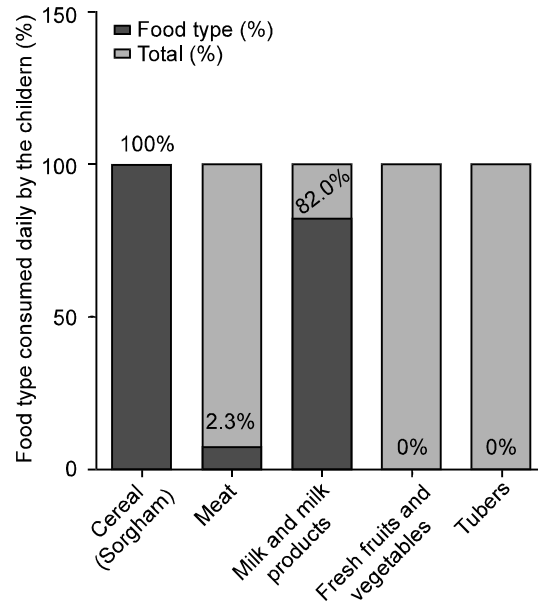


Fig. 6: Food type consumed daily by the children under age of five in El Fau rural area

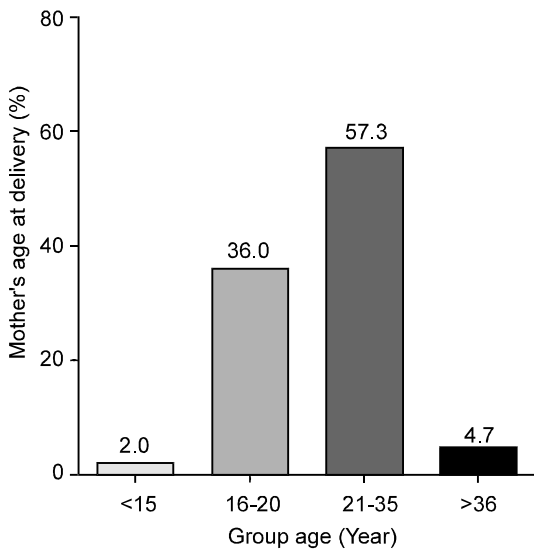


Fig. 5: Mothers age at delivery of the children under age of five in El Fau

project of the Sudan Village Concept II in the middle of 1990s, which has encouraged women education and established women development centers.

**Feeding patterns of the children under five:** Concerning the feeding procedure which had been applied by the mothers for their children, it was noticed that all mothers started breast-feeding immediately after the delivery. This process takes part spontaneously, which indicated that the importance of early and continuous breast-feeding was well understood.

Around 68% of the children started to drink water before four months or even after days from the birth. The main source of the drinking water for all the family members including new born babies was the canal water (96%), while tap water was used by 6% of them. Our investigation (coliform bacterial test) for the samples of canal water which feeds the three villages indicated that this water was not healthy due to the high level of contamination by *E. coli* and other types of thermotolerant bacteria. A recent report by Abdel Rahman (2003) gives strong evidences that the surface water, which originates from rivers, tanks, lakes and man-made reservoirs is prone to contaminate by the human and animal wastes. As such it is never safe for human consumption unless subjected to sanitary production and purification before use. As a result, most of the children were sick suffering from diarrhoea (41.3%), fever (54%), vomiting (9.3%), malaria (25.3%) and respiratory tract infection (24.7%).

During the period of breast-feeding, 97.3% of the children were found to take complementary food. The main items of the food consumed by infants were a mixture of *kisra* (made from fermented sorghum) and water, *Aceda* (porridge cooked from sorghum), *Weika* (dried okra) and *Roub* (sour milk) (Fig. 6). It's obvious from the results (Fig. 6) that none of infants consumed fresh fruits, vegetables and tubers. Getahun *et al.* (2001) stated that in developing countries early introduction of complementary foods is associated with an increased risk of diarrhoea due to poor sanitary conditions and lower quality of supplements. Moreover complementary foods afforded to children were often cereal-based and

Table 1: Diet consumed daily by the children under age of five during three consecutive days in El Fau rural area

	Weika + cereals	Meat + cereals	Eggs	Milk and milk products	Legumes + cereals	Milk + cereals	Dates	Cereals	Tubers
<b>First day</b>									
Breakfast	26	41	Nil	13	4	46	Nil	19	1
Lunch	57	44	Nil	1	9	12	Nil	24	11
Dinner	8	1	Nil	105	4	23	Nil	9	Nil
Snacks	Nil	Nil	1	Nil	5	2	2	3	Nil
Mean	22.70	21.50	0.25	29.75	5.50	20.75	0.50	13.75	3.00
Percentage	15.2%	14.3%	0.2%	19.8%	3.7%	13.8%	0.3%	9.0%	2.0%
<b>Second day</b>									
Breakfast	32	37	1	9	6	46	Nil	18	1
Lunch	41	47	1	3	11	29	Nil	8	8
Dinner	3	5	2	97	2	22	Nil	16	Nil
Snacks	Nil	Nil	1	Nil	3	2	3	1	Nil
Mean	19.00	22.25	1.25	27.25	5.50	24.75	0.75	10.75	2.25
Percentage	12.7%	14.8%	0.8%	18.2%	3.7%	16.5%	0.5%	7.2%	1.5%
<b>Third day</b>									
Breakfast	48	35	1	4	7	33	Nil	22	Nil
Lunch	62	34	Nil	4	4	31	Nil	10	Nil
Dinner	8	1	Nil	114	Nil	13	Nil	12	4
Snacks	Nil	Nil	2	Nil	5	Nil	1	1	Nil
Mean	29.50	17.50	0.75	30.50	4.00	19.25	0.25	11.25	1.00
Percentage	19.7%	11.7%	0.5%	20.3%	2.7%	12.8%	0.2%	7.5%	0.7%
Mean 3 days	23.75	20.40	0.75	29.16	3.00	21.58	0.50	11.83	2.08
Percentage	15.8%	13.6%	0.5%	19.4%	3.3%	14.4%	0.3%	7.9%	1.39%

Table 2: Protein energy malnutrition and nutritional anaemia among children under age of 5 in El Fau rural area

Nutritional disorders	Percentage (%)
<b>Protein energy malnutrition (wasting)</b>	
Normal	50.7
Mild	40.0
Moderate	6.0
Severe	3.3
<b>Nutritional anaemia (Hb concentration)</b>	
#50	65.3
50-70	34.0
>70	0.7

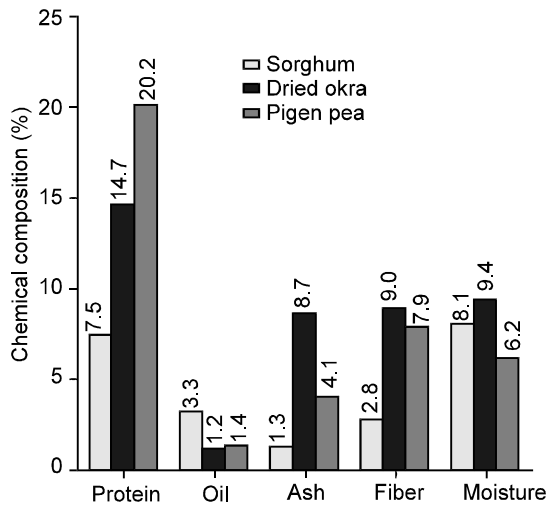


Fig. 7: Approximate analysis of the main types of the food of the local community in El Fau rural area

mainly deficient in protein and the bioavailability of minerals such as iron and zinc is low. These foods are bulky in nature and have lower nutrient density; therefore, they wouldn't fulfill nutritional requirements of the growing infants (Fig. 7).

Regarding the weaning regime of the infants, it was found that the biggest percentage of the infants was weaned gradually (56%), while the rest either weaned suddenly (23.3%) or still suckling (20.7%). Moreover, it was also noticed that there was a remarkable variation regarding the weaning age of the infants. Most of the infants were weaned between 19-24 months (60.7%), 0.7% were weaned at 6 months or less, 3.3% were weaned at 7-12 months and 8% were weaned at more than 24 months. Such habits have traditional origins and would have a negative impact on the infants' health. Lack of food diversification for children after weaning age could be recognized from Table 1. In which the food stuffs (three meals per day) for three consecutive days were obtained from the children under question. The data survey reflected that *aceda*, *kisra* and *nasha* which were made from fermented sorghum, in addition to milk were basically taken in large quantities during the whole day. From a nutritional point of view, such food types could be considered as energy and protein sources for the growing children, however it does not supplement them with the full nutritional ingredients and remains insufficient as a balanced diet. Previous studies concerning the grain sorghum nutritional quality and the main products manufactured from it (e.g., *kisra*) had revealed that sorghum is basically deficient in lysine amino acid and therefore have a low biological value

(Eggum *et al.*, 1983). Moreover, it was proved that fermentation of cereals as a food processing methodology improves the protein quality, although the protein availability might be adversely affected (Yousif, 2000; Fageer and El Tinay, 2004).

Table 2 describes the nutritional assessment of the protein energy malnutrition as well as the nutritional anaemia among children under age of five. While, almost half (50.7%) of the children were found normal, 40.0, 6.0 and 3.3% of them had shown mild, moderate and severe clinical signs of protein energy malnutrition respectively. The prevalence of various malnutrition degrees could be attributed partially to the high rate of illiteracy among the mothers accompanied by the insufficient food supply.

Getahun *et al.* (2001) stated that the highest prevalence rate of wasting was mainly observed in children, whose mothers has no education and as a result of insufficient and inappropriate supplementary foods and recurrent infectious (e.g., diarrhoea) due to unsanitary environment.

Based on the results, the present study clearly indicates the prevalence of nutritional anaemia which is mainly attributed to the absolute dependency on sorghum and dried okra based food, which has low bioavailability of iron. Additionally, Getahun *et al.* (2001) was found that other causes of iron deficiency anaemia include malaria and congenital hemolytic disease such as thalassaemia. Recently it has been recognized that the consumption of the alternative pulse crop (pigeon pea; *Cajanus cajan*) among the children of El Fau area had started to increase. The Nutritional Directorate of Gadarif State had great efforts to encourage people for the consumption of pigeon pea, which is available in lower prices and contains sufficient iron and therefore would an ideal alternative for solving the chronic nutritional anaemia among children and their mothers (H. El Mahi, personal communication). On the other hand, none of the investigated children were found suffering from the night blindness and other clinical signs of vitamin A deficiency and only 12.7% of the rest family members had such complains. The absence of these clinical signs among the children could be partially due to the continuous national campaign of vitamin A supplementations.

**Conclusion:** Educated, well-nutritional mothers who have control over the purchase of the dietary items would be more qualified and capable for taking care for their children properly. This will be reflected in the better nutritional status of their children and the vice versa for the illiterate mothers.

The lack of the basic needs (e.g., healthy water for drinking) leads spontaneously to the usage of the unsanitary environment resources (e.g., canal water). Poverty and insufficient income for the family-household

result in the lack of the food diversification was in principle the main cause of nutritional anaemia among the children under age of five in the study area.

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