

NUTRITION COUNTRY PROFILE

REPUBLIC OF THE SUDAN



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Summary

Situated in the north-eastern part of Africa, Sudan has a climate ranging from very arid in the northern parts to equatorial in its most southern parts. The central part is occupied by savannah. The population of the country is approximately 33 million, living in an area of 2.5 million km². Although urbanization rate is high, the country is still predominantly rural.

More than 90% of the population suffer from poverty and food insecurity. After two decades of civil war, the Comprehensive Peace Agreement signed in early 2005 between the government and the Sudanese Population Liberation Movement, if it is consolidated, could open a new era of stability. Increased revenue from oil exports could boost the economy and have a positive impact on the food security and nutrition situation.

Sudan is both a least developed and low-income food-deficit country. Conflict in the south and western parts of the country compounded by climatic problems such as drought and floods have caused severe food deficits, loss of livelihoods and major population displacements. Moreover, seasonal food shortage often evolves into chronic food insecurity. At the beginning of 2004, WFP and FAO estimated that 3.6 million inhabitants were in need of food assistance, with internally displaced people, refugees and returnees particularly exposed to food insecurity, health problems and insecurity.

Malaria and diarrhea lead the list of endemic diseases along with pneumonia and tuberculosis. Guinea worm infestation is a major health problem across the southern part of the country, where 70% of world cases have been reported. Prevalence of HIV/AIDS is increasing. Populations affected by civil strife are deprived of access to health services and are consequently more vulnerable to diseases and malnutrition.

According to national food balance statistics, the food supply, essentially based on cereals, meets population energy requirements. Vegetable foods are complemented with a substantial supply of milk. Nevertheless, national statistics mask large inequalities in access to food in the country. The prevalence of undernourishment is high. Data on actual food consumption are not available.

Among children under 5 years of age, the prevalence of malnutrition is very high. Based on WHO epidemiologic criteria, the prevalence of stunting and wasting are classified as very high.

Although recent survey data are lacking, there is clear evidence that micronutrient deficiencies are a major public health problem. Prevalence of vitamin A deficiency is high, as observed in 1995 among preschool children. Areas most affected are Southern Darfur and Gezira. Some supplementation campaigns have been conducted but coverage of the population is still low. Prevalence of iodine deficiency is high, as observed among school-age children in 1997. States most at risk were the Upper Nile Zone, Kordofan Zone and Northern Zone. A salt iodization programme has been started but coverage is still very low. Iron deficiency anemia is also highly prevalent among children under 5 years and among women of reproductive age.

Important note: The data presented in this profile pertain to the whole country as regards basic indicators (part I) and food supply data, but most survey data are relevant to northern Sudan only, unless otherwise noted, and sometimes include data from southern cities aggregated as a cluster¹.

¹ For specific information on southern Sudan, refer to the following document: New Sudan Centre for Statistics and Evaluation in Association with UNICEF. 2004. Towards a baseline: best estimates of social indicators for Southern Sudan. NSCSE Series Paper 1/2004, available on Internet at: <http://www.reliefweb.int/rw/RWB.NSF/db900SID/KHII-6365Q7?OpenDocument>

Summary Table				
Basic Indicators				Year
Population				
Total population	32.902	million		2000
Rural population	64	%		2000
Population under 15 years of age	41	%		2000
Population growth rate	1.9	%		2000
Life expectancy at birth	56	years		2000/05
Agriculture				
Agricultural area	56	%		2002
Arable and permanent cropland per agricultural inhabitant	0.9	Ha		2002
Level of development				
Human development and poverty				
Human development index	0.505	[0-1]		2002
Proportion of population living with less than 1\$ a day (PPP)	MDG1	n.a.		
Population living below the national poverty line	MDG1	n.a.		
Education				
Gross primary enrolment ratio	MDG2	60	%	2002/03
Youth literacy (15-24 years)	MDG2	78	%	2001
Ratio of girls to boys in primary education	MDG3	0.85	girl per 1 boy	2001
Health				
Infant mortality rate	MDG4	63	‰	2003
Under-five mortality rate	MDG4	93	‰	2003
Maternal mortality ratio (adjusted)	MDG5	590	per 100 000 live births	2000
Malaria-related mortality rate in under-fives	MDG6	408	per 100 000 deaths	2000
Environment				
Sustainable access to an improved water source in rural area	MDG7	64	% of population	2002
Nutrition indicators				Year
Energy requirements				
Population energy requirements	2 110	kcal per capita/day		2001
Food supply				
Dietary Energy Supply (DES)	2 270	kcal per capita/day		2001
Prevalence of undernourishment	MDG1	27	%	2000/02
Share of protein in DES		13	%	2000/02
Share of lipids in DES		26	%	2000/02
Food diversification index		46	%	2000/02
Food consumption				
Average energy intake (per capita or per adult)		n.a.		
Percent of energy from protein		n.a.		
Percent of energy from lipids		n.a.		
Infant and young child feeding				
	Age			
Exclusive breastfeeding rate	<6 months	16	%	2000
Timely complementary feeding rate	6-9 months	47	%	2000
Bottle-feeding rate	0-11 months	n.a.		
Continued breastfeeding rate at 2 years of age		40	%	2000
Nutritional anthropometry				
Stunting in children under 5 years		43	%	2000
Wasting in children under 5 years		16	%	2000
Underweight in children under 5 years	MDG1	41	%	2000
Women with BMI<18.5 kg/m ²		18	%	1995
Micronutrient deficiencies				
Prevalence of goitre in school-age children		22	%	1997
Percentage of households consuming adequately iodized salt		0.5	%	2000
Prevalence of clinical vitamin A deficiency in preschool children		3	%	1995
Prevalence of vitamin A supplementation in children		44	%	2000
Prevalence of vitamin A supplementation in mothers		22	%	2000
Prevalence of anemia in women		n.a.		
Prevalence of iron supplementation in mothers		n.a.		

MDG: Millennium Development Goal; n.a.: not available

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Acronyms	
BMI	Body mass index
CBS	Central Bureau of Statistics
CDC	Center for Disease Control and prevention
CED	Chronic energy deficiency
DES	Dietary energy supply
DPT3	Diphtheria, pertussis (whooping cough) and tetanus vaccine – three doses
ECOSOC	Economic and Social Council of the United Nations
ENN	Emergency Nutrition Network
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Statistical Databases
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
FMH	Federal Ministry of Health
GDP	Gross domestic product
GIFA	Geneva Infant Feeding Association
GNP	Gross national product
GOS	Government of Sudan
HIV/AIDS	Human immunodeficiency virus/ acquired immuno deficiency
ICCIDD	International Council for the Control of iodine Deficiency Disorder
IDA	Iron deficiency anemia
IDD	Iodine deficiency disorders
IDP	Internally displaced person
ILO	International Labour Organization
IRIN	United Nations' Integrated Regional Information Network
ITU	International Telecommunication Union
MAF	Ministry of Agriculture and Forestry
MICS	Multiple Indicator Cluster Survey
MOH	Ministry of Health
NSCSE	New Sudan Centre for Statistics and Evaluation
PPP	Purchase power parity
SSC	Southern Sector Counterparts
SPDF	Sudan People's Democratic Front
SPLM/A	Sudanese Population Liberation Movement / Army
SuRF	Surveillance of chronic disease Risk Factors
UNAIDS	Joint United Nations Programme on HIV/AIDS
UN	United Nations
UNDP	United Nations Development Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissariat for Refugees
UNICEF	United Nations Children's Fund
UNPD	United Nations Population Division
UNSTAT	United Nations Statistics Division
VAD	Vitamin A deficiency
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization

I.1 Context

Located in north-eastern Africa, the Republic of the Sudan is the largest country in Africa (2 505 000 km²). The landscape is a basin-like plain with an elevation between 300 to 900 meters, crossed by the Nile River and its tributaries. There are a few groups of hills and a mountain range in the south, the Imatong Mountains, rising to over 1 500 m, the Djebel Mara mountain (3 090 m) in Darfur province in the west and the Red Sea Hills (over 2 000 m) in the north-east near the coast. The highest point in Sudan, Kinyeti (3 187 m), is in the southeast. Generally speaking the country can be divided into three natural regions. The north of Khartoum is primarily desert. The central part of the country is mostly a grass-covered plain. The south contains a vast swamp, the Sudd, and rain forest.

The country has a range of tropical and continental climates with large daily and seasonal fluctuations in temperature. In the desert, winter minimum temperatures as low as 5°C are common at night, while summer maximum temperatures often exceed 44°C. Dust storms occur frequently. In the vicinity of Khartoum the average annual temperature is about 27°C. Temperatures, humidity and rainfall are all higher in the south. There is a large variation in annual rainfall, from less than 75 mm in the desert, 75 mm to 300 mm in the semi-desert, 300 mm to 1 500 mm in the forests and savannas and to over 1 500 mm in the mountains (FAO, Forestry Division).

Sudan is both a least developed and low-income food-deficit country, which has been ravaged by civil strife across the south for two decades. A very long civil war between government forces and the Sudanese People's Liberation Movement/Army (SPLM/A) has killed an estimated two million people, mostly from hunger and disease, and displaced an estimated of four million. In 2003, a new conflict emerged in West Darfur (WFP, 2005a). Although a Comprehensive Peace Agreement was signed between the Government and the SPLM/A in January 2005, the situation in the South and in Western Darfur remains unsettled (UN, 2005).

The death, on July 31, 2005, of the Sudanese vice president and key actor of the peace process John Garang has brought back unrest and violence throughout the country.

I.2 Population

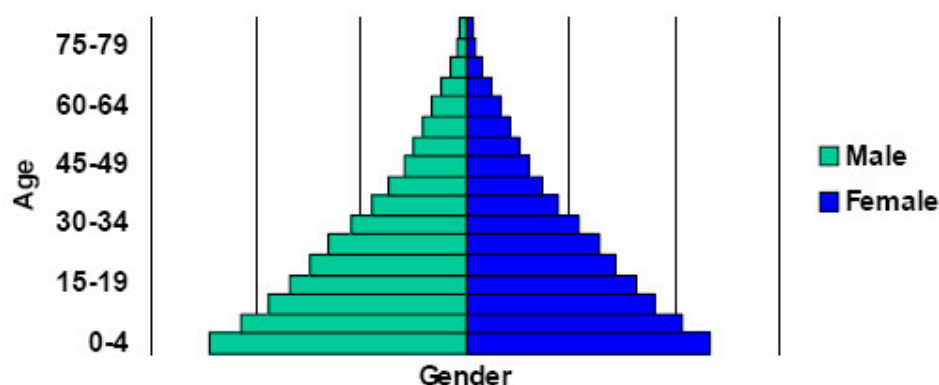
Population indicators

The Sudanese population is very young: 40% is less than 15 years of age. Although the country is still predominantly rural, urbanization is progressing rapidly and is a major concern for policy makers and planners. The civil war, drought, and poverty have further reinforced the population concentration in towns. Moreover, Sudan hosts a considerable number of internally displaced people (IDP) (about 700 000 as per end of 2004) and refugees from neighbouring countries (about 200 000 as per end of 2004) (UNHCR, 2004 & 2005).

Table 1: Population indicators

Indicator	Estimate	Unit	Reference Period	Source
Total Population	32 902	thousands	2000	UNPD
Annual population growth rate	1.9	%	2000	UNPD
Crude birth rate	33.5	‰	2000	UNPD
Population distribution by age:			2000	UNPD
0-4 years	15.2	%		
5-14 years	25.3	%		
15-24 years	20.4	%		
60 and over	5.3	%		
Rural population	64	%	2000	UNPD
Agricultural population	61	%		FAOSTAT
Population density	13	inhabitants per km ²	2000	UNPD
Median age	19	years	2000	UNPD
Life expectancy at birth	56	years	2000-2005	UNPD
Population sex ratio	101.2	males per 100 female	2000	UNDP
Net migration rate	-3	‰	2000-2005	UNPD
Total dependency rate	78	%	2000	UNPD

Population pyramid for 2001



Source : UNAIDS, 2002

1.3 Agriculture

The agricultural sector plays a pivotal role in the economy of the country. It consists of five interdependent sub-sectors, namely irrigated, traditional rain-fed, mechanized rain-fed, livestock, and forestry (Kambal, 1997; Abdel Ati, 2001a).

The irrigated farming system covers 1.9 million ha, irrigated mainly by the Nile and its tributaries. Public corporations (Gezira, Rahad and New Halfa) dominate the sector (about 68% of the total irrigated area). The main crops grown under irrigation are cotton, wheat, sorghum, groundnuts, pulses, green fodder, fruits and vegetables, and sugar cane (Kambal, 1997; Abdel Ati, 2001a).

The mechanized farming system is practiced in the central clay plains. Mechanization is still only partial, covering land preparation, seeding, harvesting, and threshing of sorghum. Sorghum and sesame are the main crops grown in this sector, while sunflower and guar have recently been introduced (Kambal, 1997; Abdel Ati, 2001a).

The traditional rain-fed farming system is practiced on about 3.75 million ha located mainly in western Sudan (Kordofan and Darfur), the southern region, and some parts of the central region (Kambal, 1997; Abdel Ati, 2001a). As farming in this sector depends mainly on family labour using hand tools, the area farmed by each family is usually small. Some crops are cultivated every year without rotation or addition of fertilizers. Consequently, soils are poor and yields are low. It is estimated that 75% of the agricultural population in Sudan live in the traditional sub-sector.

About 47% of the land resources are under arid and semi-arid conditions with serious drought risks (FAO, FAOSTAT Database). Of the total agricultural area of the country, 64% is degraded. The principal causes of degradation are soil erosion, siltation and flooding, deterioration of soil fertility, exhaustion of water supplies and deforestation. About 80% of agricultural land is deficient in nitrogen, phosphorus, and organic matter, the main limiting factors in agricultural production. About 200 000 ha of natural woodlands and forests are annually replaced by dry land mechanized agriculture (FNC, 2000). Apart from the visible signs (erosion, siltation and flooding), common indicators of degraded land are declining yields, increased weeds, declining recharge to wells and boreholes, and poor ground water quality (Abdel Ati, 2001a; FAO/WFP, 2002).

Land use and irrigation statistics

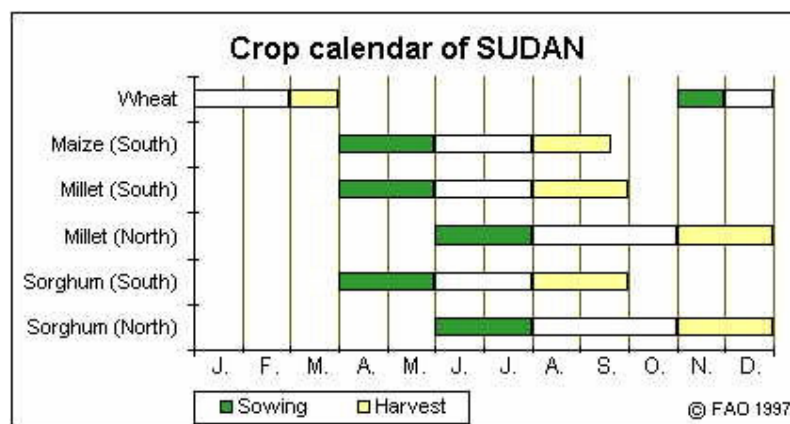
Table 2: land use and irrigation

Type of area	Estimate	Unit	Reference period	Source
Total Land Area	237 600	1000 Ha	2002	FAO
Agricultural Area	56	%	2002	FAO
Arable lands & Permanent Crops	7	%	2002	FAO
Permanent Crops	<1	%	2002	FAO
Permanent Pasture	49	%	2002	FAO
Forested land areas	26	%	2000	FAO
Irrigated agricultural land	<1	%	2002	FAO
Arable & Permanent cropland in Ha per agricultural inhabitant	0.9	Ha	2002	FAO

N.B. Percentages are calculated on total land area.

Main food crops, agricultural calendar, seasonal food shortage

The major food and agricultural commodities produced in Sudan in 2002 were sugar cane, sorghum, cow and goat milk, groundnuts, millet and tomatoes (FAO, Statistics Division). All these commodities are mainly destined to local human consumption (FAO, FAOSTAT Database).



Source : GIEWS

The food shortage season in Sudan corresponds to the rainy season, which ranges from August to October in the north and June to August in the south.

Livestock production and fishery

Livestock production contributes significantly to the Gross Domestic Product (GDP) and to the food security of the country. It is mainly nomadic, based on free utilization of rangelands through seasonal movements. Due to the long distances covered, the productivity is rather low. The semi-nomadic pastoral system is based on the utilization of crop residues remaining from rain fed agriculture in the Savannah region, as well as on natural grazing in the area, and the sedentary one is based on sheep and goats raised in small villages in western Sudan.

The major constraints facing livestock rearing in Sudan include feed shortage, overgrazing, desertification, lack of breed resources and lack of adequate veterinary services (FAO, 2000; Abdel Ati, 2001a).

Table 3: Livestock and fishery statistics

Livestock production and fishery	Estimate	Unit	Reference period	Source
Cattle	38 183 000	number of heads	2002	FAO
Sheep and Goats	89 621 000	number of heads	2002	FAO
Poultry Birds	37 000	thousands	2002	FAO
Fish catch and aquaculture	59 600	tons	2002	FAO

The contribution of fisheries to the Sudan GDP is presently marginal (0.4%). The per caput supply was only 1.6 kg /year in 2000, mostly obtained by capture fish. The inland fisheries are based on the Nile River and its tributaries, contributing over 90% of the estimated production potential of the country. Marine fisheries consist mainly in harvesting of wild molluscs and finfish, activities of a traditional and subsistence nature (FAO, 2002).

I.4 Economy

The economy of Sudan is based on agricultural production, which represents a major share of the GDP. Oil production is becoming an important sector of the economy.

Lack of transport infrastructure is a serious constraint to economic development. The country's vast area and the availability of only one major outlet to the sea, Port Sudan, place a heavy burden on limited facilities, especially on the government-owned Sudan Railways and on the road network. The government-owned Sudan Airways airline operates domestic and international services from Sudan's main airport in Khartoum. There are several smaller airports (mainly Al-Ubayyid and Port Sudan). An oil pipeline goes from the oil fields in the South via the Nuba Mountains and Khartoum to the export terminal in Port Sudan on the Red Sea (UNDP, 2003).

The main non-agricultural commodities exported in 2001 were oil and petroleum products. The main non-agricultural products imported were manufactured goods, refinery and transport equipment, medicines, chemicals and textiles (WB, 2003).

The infusion of foreign investment as well as increased revenue from oil production (in 1999-2000 Sudan recorded its first trade surplus) injected new capital into some sectors of the economy. The country has taken some steps to move from a socialist to a market-based economy and has started to reform its finance and foreign exchange systems. The public sector remains however dominant in the economy (Abdel Ati, 2001a).

Table 4: Basic economic indicators

Indicator	Estimate	Unit	Reference Period	Source
Gross Domestic Product per capita	1 970	PPP US \$	2001	UNDP
GDP annual growth	6	%	2002	WB
Gross National Income per capita	400	\$	2002	WB
Industry as % of GDP	18	%	2002	WB
Agriculture as % of GDP	39	%	2002	WB
Services as % of GDP	43	%	2002	WB
Paved roads as % of total roads	36	%	1999	WB
Internet users	0.3	per 10 000 people	2002	ITU
Total debt service as % of GDP	1	%	2002	WB
Military Public expenditure	2.8	% of GDP	2002	UNDP

I.5 Social indicators

Health indicators

Health problems in Sudan are acute and complex. Large-scale population displacements due to the long-lasting conflict, natural disasters such as drought and floods, the cycle of poverty, malnutrition and loss of productivity expose populations to serious diseases such as malaria, tuberculosis and meningitis. After floods and other natural disasters, diarrhea is a common occurrence. Guinea worm infestation is a major health problem across the southern part of the country, where 70% of world cases have been reported. The disease is highly debilitating (UNICEF, 1999; UN, 2000).

HIV/AIDS prevalence is growing rapidly. Most of the cases reported were from the south, east, and Khartoum State regions (UN, 2000). In late 2004, UNICEF and UNFPA expressed concern that increased mobility of the population, as stability returned to the southern region, could accelerate the spread of HIV infection to rural communities, which had remained isolated during the war and retained low infection rates. The phenomenon could be exacerbated by the lack of HIV/AIDS awareness among this population, coupled with the already high HIV prevalence in some garrison towns (IRIN, 2004).

Immunization rates are low, especially among pregnant women, as well as use of Oral Rehydration Therapy, reflecting the lack of access to health care services. The level of infant and underfive mortality is probably underestimated.

In the north, the infrastructure network and the workforce are quite developed in absolute numbers. However, up to a third of health facilities are reported not to be fully functional. In the south, overall coverage is estimated at only 25% of the population. Infrastructure is inadequate, geographically concentrated and in poor condition. Most health services are supported by international Non-Governmental Organizations (NGOs) under humanitarian programmes (IRIN, 2004).

Table 5: Health indicators

Indicator	Estimate	Unit	Reference Period	Source
<i>Mortality</i>				
Infant mortality	63	‰	2003	UNICEF
Under-five mortality	93	‰	2003	UNICEF
Maternal mortality ratio :				UNICEF
reported	550	per 100 000 live births	1985-2003	UNICEF
adjusted	590	per 100 000 live births	2000	UNICEF
<i>Morbidity</i>				
Malaria-related mortality rate in under-fives	408	per 100 000 deaths in under-fives	2000	UNSTAT
Percent of under-fives sleeping under a treated bed net	0.4	%	2000	UNSTAT
Prevalence of diarrhea in the last 2 weeks in under-fives	30	%	1990	UNICEF/MICS
Oral Rehydration rate among under-fives	38	%	2000	UNICEF/MICS
Percentage of under-fives with acute respiratory infections in the last 2 weeks	5	%	2000	UNICEF/MICS
Tuberculosis prevalence	372	per 100 000 people	2000	UNSTAT
<i>AIDS/HIV</i>				
Prevalence in adults	2.3	%	2003	UNSTAT
Percent of women (15-24) who know that a person can protect herself from HIV infection by consistent condom use	12	%	2000	UNSTAT
<i>Immunization</i>				
Percent of infants with immunization against tuberculosis at 1 year of age	53	%	2003	UNICEF/WHO
Percent of infants with DTP3 immunization at 1 year of age	50	%	2003	UNICEF/WHO
Percent of infants with immunization against measles at 1 year of age	57	%	2003	UNICEF/WHO
Percent of pregnant women immunized against tetanus	35	%	2003	UNICEF/MICS

Water and sanitation

The situation regarding access to an improved water source and sanitation facilities varies strongly from one region to another. The situation in Darfur for example is considerably worse than in other states: only 26 % of the population have access to an improved water source compared to an average of 64% in rural areas of the country taken together (Table 6) (FMH, CBS & UNICEF, 2001).

In 2002, 24% of the population of rural areas had access to adequate sanitation facilities, while the proportion was 50% in urban areas (UNICEF, information by country).

Table 6: Access to safe water and sanitation

Indicator	Estimate	Unit	Reference period	Source
<i>Sustainable access to an improved water source:</i>				
Urban	78	% of population	2002	WHO
Rural	64	% of population	2002	WHO
<i>Access to improved sanitation:</i>				
Combined urban/rural	34	% of population	2002	UNICEF

Access to health services

Health services are concentrated in urban areas while, in terms of health personnel and facilities, rural areas still suffer from inadequate preventive and curative services (UNICEF, 2004). The expansion of health facilities has not matched population growth, and civil strife has destroyed many previously operating health facilities. Ineffective coverage is manifested in lack of infrastructure, insufficient stocks of drugs and medical equipment, and lack of skilled health personnel (UN, 2003).

About 60% of women receive some sort of antenatal care (UNICEF, 2004). Nevertheless, the limited and inequitable access to essential child and mother health care services accounts for the high maternal mortality rates.

Table 7: Access to Health Services

Indicator	Estimate	Unit	Reference Period	Source
Health personnel: number of physicians	16	per 100 000 people	1990-2003	WHO
Population with sustainable access to affordable essential drugs	very low access*		1999	UNDP
Percent of births attended by skilled health personnel	86	%	1993	UNICEF
Public expenditure on Health	0.6	% of GDP	2001	UNESCO

* estimated at 0-49%

Education

The Government provides free primary education from the ages of 7 to 12 years and aims at expanding it to all school age children by the year 2010. However, many obstacles remain, such as economic circumstances leading to high drop-out rates (24% in 1999) in primary schools and low enrolment in secondary schools. School structures are inadequate and deficient in terms of classroom furniture, water supply and sanitation (UN, 2003).

Around 45% of schools in southern Sudan function in the open, under trees and in this region the percentage of permanent classroom structure is just 11%. Of these, more than half do not have a source of safe drinking water and almost three quarters are without latrines (UN, 2003). The south remains the most educationally deprived region of the country, with less than one-seventh of the total number of primary schools of the country, despite a population representing more than one-quarter of the total population of the country (ECOIN, 2003). According to the Ministry of Education, overall enrolment was 40% at national level, while in the southern states it was only 11% (UN, 2002a; UNICEF, 1999).

The disparity in literacy rates between boys and girls has narrowed in recent years, presently the adult literacy ratio is 69% for males and 46% for females (UNICEF, 2004).

Table 8: Education

Indicator	Estimate	Unit	Reference Period	Source
Adult literacy	59	%	2001	UNESCO
Adult literacy rate : females as % of males	68	%	2001	UNESCO
Youth literacy (15-24 years)	78	%	2001	UNESCO
Gross primary enrolment ratio	60	%	2002-2003	UNESCO
Grade 5 completion rate	84	%	2002	UNESCO
Ratio of girls to boys in primary education	0.85	number of girls per 1 boy	2001	UNESCO
Public expenditure on education	1.4	% of GNP	1995-97	UNESCO

Level of development, poverty

Poverty is widespread in Sudan, and the poorest regions are those of Darfur, Kordofan as well as Blue Nile and rural Red Sea (Abdel Ati, 2001b). The situation was furthermore aggravated in the past two decades by government military spending pre-empting other social and economic investment (UNDP, 2003), and civil strife causing the progressive dismantling of traditional coping strategies.

Progress to reduce poverty is typically measured through the percentage of the population living on less than \$1 a day and under the national poverty line. In Sudan, reliable data on both variables are not available, however, based on proxy measures, there is consensus amongst all observers that income poverty has increased in the 1990's (UN, 2002a).

Table 9: Human development and poverty

Indicator	Estimate	Unit	Reference period	Source
Human development index (HDI)	0.505	value between 0-1	2002	UNDP
Proportion of population living with less than 1\$ a day (PPP)	n.a.			
Population living below the national poverty line	n.a.			
Human poverty index (HPI-1)	31.6	%	2002	UNDP

n.a. : not available

Other social indicators

Because of male military enrolment and disappearances during the conflict, women have been left with a greater burden than traditionally, which includes child care, working in the fields, and any activity bringing a minimal financial income. Most IDPs are women, children and elderly. Women have been the preferential victims of sexual abuse and violence (ECOSOC, 2004).

Incidents of forced military recruitment of children of both sexes occurred during the conflict, combined with voluntary enrolment of children trying to escape conditions of extreme poverty (UNICEF, 2002a). Between 2001 and 2003, 20 000 child soldiers both in northern and southern Sudan were demobilized from the SPLM/A and the SPDF with the support of a special UNICEF/WFP task force. The demobilization of children from government forces and allied militia is also needed (Robertson & McCauley, 2004).

Table 10: Other social indicators

Indicator	Estimate	Unit	Reference period	Source
Gender related development index (GDI)	0.485	Value between 0-1	2002	UNDP
Women's wage employment in non-agricultural sector as % of total non agricultural employees	19 (estimate)	%	2003	UNSTAT
Ratification of ILO Convention 182 on The Worst Forms of Child Labour	ratified		2003	ILO

II.1 Qualitative aspects of the diet and food security

Food consumption patterns

Differences in food availability, climate, as well as regional food habits and traditions result in considerable regional variation in food consumption patterns in Sudan. Sorghum is the main staple of a major part of the rural population. Millet, along with sorghum, is especially important in western Sudan, while wheat, mainly consumed as bread, is of increasing importance to the diet in urban areas and in the north. Cassava, yams and sweet potatoes are the main staples in the southern region. In many areas of the south, maize and milk contribute substantially to the diet, and in some tribal areas, as much as 40% of all food consumed is milk and dairy products. For the nomadic population, milk (from cows, sheep, goats and camels) is sometimes the main source of energy, protein and other nutrients (Dirar, 1993).

Legumes, grown and consumed mainly in the northern part of Sudan, include beans, peas and cow-peas. In urban areas, broad beans are generally eaten as a main dish for both breakfast and dinner. The consumption of fresh vegetables, especially green leafy varieties, and of fruit, with the exception of dates, is limited. Okra is eaten in dried form and tomatoes and onions are eaten in urban areas.

Mutton and beef are favoured over other types of meat. Consumption of fish is low. Most of the fish eaten is inland freshwater fish, while sea fish is consumed only along the Red Sea coast. Groundnuts and sesame are the main sources of local vegetable oils (MAF, 2001).

Food security situation

As defined by FIVIMS, food security is defined as “A situation that exists 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”. Food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity may be chronic, seasonal or transitory.

Many areas in Sudan have suffered from recurrent periods of acute food insecurity for at least a generation. Drought and other climatic variations are only one factor among many that have contributed to food insecurity. War and underdevelopment have resulted in high underlying vulnerability and a reduced ability to fall back on alternative sources of food or income when times are hard (UNICEF, 2003). In 2004/05, the overall food security situation throughout the country deteriorated, mainly because of erratic and unevenly distributed rainfall experienced during 2004. In general, the most vulnerable are people recently displaced who have extremely limited access to land and other income generating opportunities (WFP, FAO, NGOs, GOS & SSC, 2005). Poverty is also a major factor of food insecurity in Sudan. Most of the poor are rural residents but urban poverty is also increasing because of population displacement.

In the agricultural sector, food security is based on consumption of own production, with farmers selling their surplus for cash in good years and using a variety of other livelihood strategies to reduce vulnerability to recurrent drought and food deficit. The livelihood systems, which vary greatly according to specific locations, encompass livestock, agriculture, fishing, gathering of wild foods and trade. However, due to civil strife, these livelihood systems have experienced frequent stress.

Insufficient availability of food is a major cause of food insecurity. In 1983/84 drought caused a decline in cereal supply (particularly for sorghum and millet). After this period, there have been fluctuations in cereal supply (Guvele et al, 2004). Recent food security assessments have highlighted the reduced cereal food production throughout Sudan. For 2004/05, the level of cereal production is estimated about half of the bumper cereal crop harvested in 2003/04 and 28% below the average of the last five years.

Another major cause of food insecurity in certain regions of Sudan is the absence of physical access to food due to civil insecurity. Conflicts, violence and internal displacement limit access to food (WFP, 2004b). In many areas, harvests have been destroyed, livestock has been looted and food stocks have reduced rapidly since residents often share their resources with IDPs. In conflict affected areas, cereal stocks in markets are low and prices increase sharply in times of strife. Moreover insecurity drastically reduces food commodity flows from surplus to deficit areas (WFP, 2005b).

In addition, diseases such as Guinea worm infestation and malnutrition debilitate populations, affecting their physical capacity to produce food and causing improper utilization of nutrients (Guvele et al, 2004).

II.2 National food supply data

Supply of major food groups

Table 11: Trends in per capita supply of major food groups (in g/day)

Major food groups	Supply for human consumption in g/day					
	1965-67	1972-74	1979-81	1986-88	1993-95	2000-2002
Cereals (excl. beer)	286	359	337	380	426	380
Starchy roots	70	45	38	23	14	13
Sweeteners	38	51	55	58	42	51
Pulses, nuts, oilcrops	33	25	25	23	27	34
Fruit and vegetables	205	207	187	174	160	165
Vegetable oils	16	29	29	21	19	19
Animal fats	3	3	4	4	3	4
Meat and offals	63	63	71	52	60	67
Fish, seafood	4	4	4	3	4	5
Milk and eggs	239	217	325	338	394	417
Other	58	72	65	4	4	5

Source: FAOSTAT

Cereals, and milk and eggs constitute the main food groups in terms of supply for human consumption. Milks and eggs are the major group, which increased from 239g/per capita/day in 1965/67 to 417g/per capita/day in 2000/02. This increase is probably due to the growing number of dairy farms, particularly around Khartoum. Overall, the per capita supply of cereals (mainly wheat, sorghum and millet) has increased over the same period, from 286g/day to 380g/day respectively. However, the supply has decreased in 2000/02 compared to the level of 1993/95.

Starchy roots, such as cassava, yams and sweet potatoes, are the main staples in the southern region. Their supply declined drastically from 70g/per capita/day in 1965/67 to 13g/per capita/day in 2000/02.

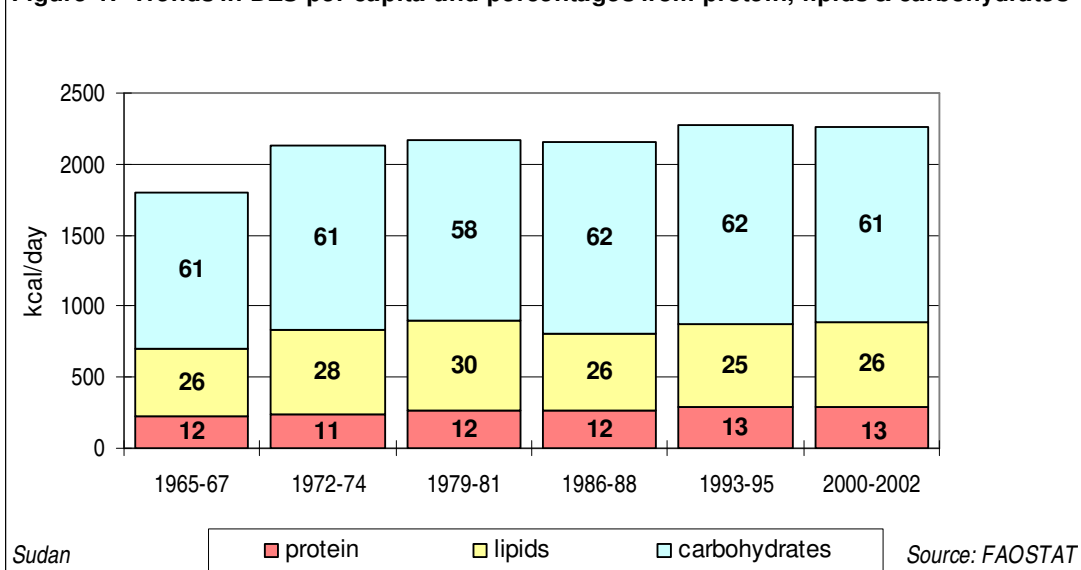
Pulses and oilcrops are grown and consumed mainly in the northern part of the country. Their per capita supply was about 34g/day in 2000/02. Fruit and vegetables supply has been decreasing moderately since 1979/81. The meat supply, principally bovine, mutton and goat meat, has been fairly stable from 1965 to 2002.

The Sudanese diet is essentially composed of cereals, milk, eggs, fruit and vegetables. Fruit and vegetables provide good sources of micronutrients, but the supply of meat and fish, which are other good sources of micronutrients, is limited.

Dietary energy supply, distribution by macronutrient and diversity of the food supply

- Figure 1: Dietary energy supply (DES), trends and distribution by macronutrient

Figure 1: Trends in DES per capita and percentages from protein, lipids & carbohydrates



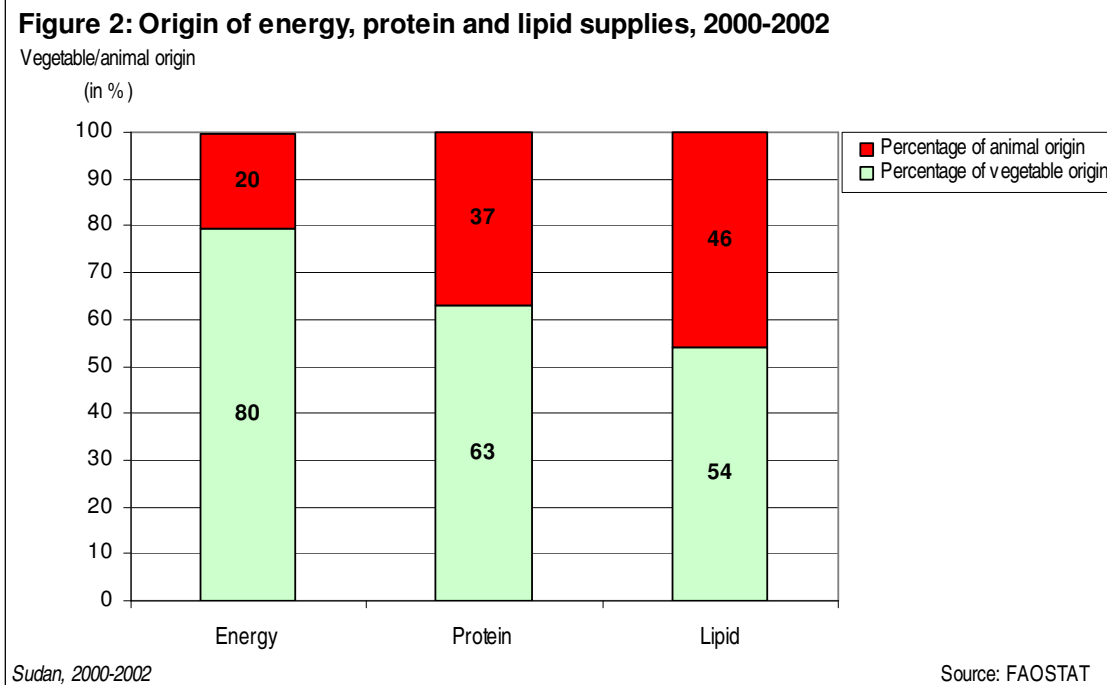
In 2001, the dietary energy supply (DES) was 2 270 kcal/per capita/day, a level barely meeting population energy requirements of 2 110 kcal per capita/day². According to “*The State of Food Insecurity in the World*” (SOFI) the prevalence of undernourishment was 27% in 2000/02 (FAO, 2004b).

The share of protein, lipids and carbohydrates in the dietary supply has remained stable from 1965/67 to 2000/02. Currently, the share of lipids is adequate in comparison to recommendations (energy from lipids not exceeding 30%) (WHO, 2003).

² Energy requirements are for a healthy and active lifestyle calculated using the FAO software (FAO, 2004a). Software default values attribute to 90 % of the urban adult population a light physical activity level (PAL=1.55) and greater than light activity to the remaining 10% (PAL=1.85), and to 50% of the rural adult population a light activity (PAL=1.65) and greater than light physical activity (PAL=1.95) to the other 50%.

Vegetable/animal origin of macronutrients

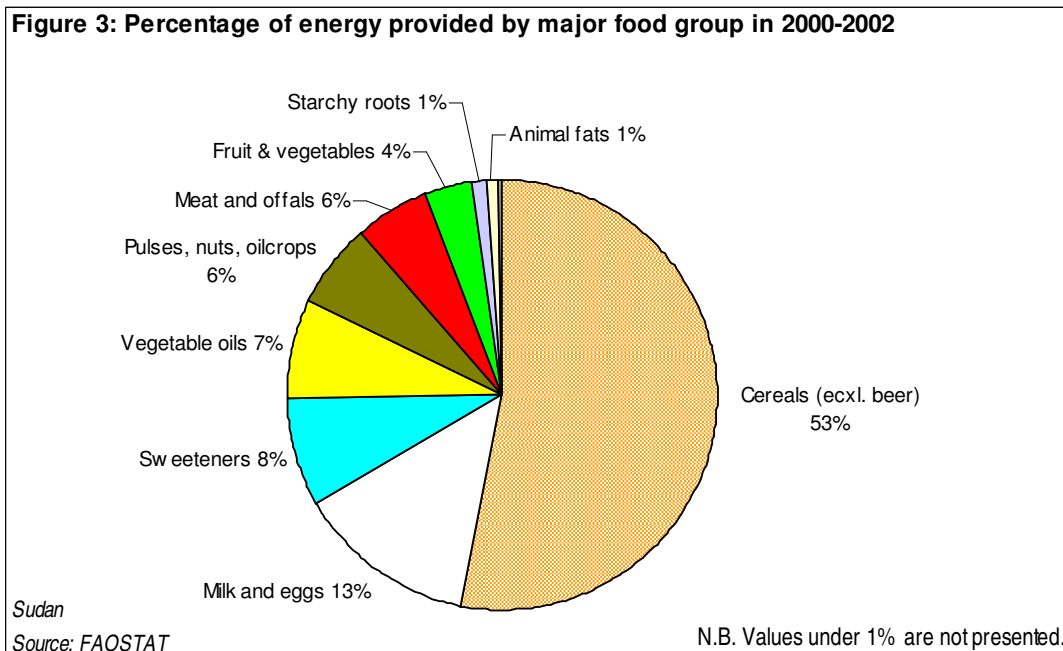
- Figure 2: Vegetable/animal origin of energy, protein and lipid supplies



Macronutrients are essentially of vegetable origin, ranging from 80% for energy to 54% for lipid. This is due to the importance of vegetable food groups (cereals, sweeteners, oil, pulses, fruit and vegetables) in the DES.

Dietary energy supply by food group

- Figure 3: Dietary energy supply by food group



Cereals provide more than half of the DES in Sudan (53%). Milk and eggs rank second (13%) and sweeteners provide 8% of the DES. Thus, almost ¾ of the energy supply comes from 3 foods groups, cereals, milk and sweeteners.

Table 12: Share of the main food groups in the Dietary Energy Supply (DES), trends

Food groups	% of DES					
	1965-67	1972-74	1979-81	1986-88	1993-95	2000-2002
Cereals (excl. beer)	50	53	49	55	58	53
Starchy roots	4	2	2	1	1	1
Sweeteners	7	8	9	10	7	8
Pulses, nuts, oilcrops	8	5	5	5	5	6
Fruit and vegetables	5	4	4	3	3	4
Vegetable oils	8	12	12	9	7	7
Animal fats	1	1	1	1	1	1
Meat and offals	7	6	6	5	5	6
Fish, seafood	<1	<1	<1	<1	<1	<1
Milk and eggs	9	7	11	11	13	13
Others	1	1	1	<1	<1	<1

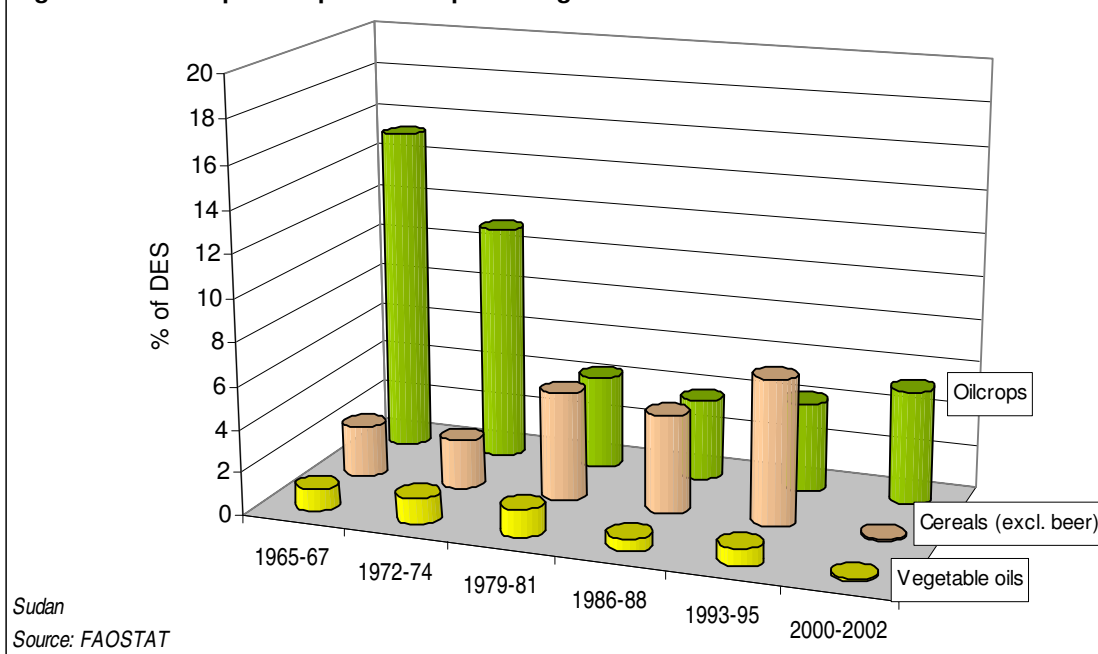
The share of cereals in the DES has globally increased from 1965/67 to 2000/02, with a slight decrease during the last period (2000/02). There was a drop in the DES provided by starchy roots from 4% to 1% during the period from 1965/67 to 2000/02. The part of non staple food groups in the DES has decreased during the same period. This decrease concerned pulses, fruit and vegetables, vegetable oils and meat. Only the DES provided by milk and eggs and by sweeteners has increased. The food diversification index remained stable between 1965/67 and 2000/02 (46% for both periods). Lack of progress in the level of the diversification index can be attributed to the many problems the country faces periodically, namely drought, conflict and food insecurity.

Food imports and exports

Overall, exports have declined during the period from 1965/67 to 2000/02. Oilcrops represented a major share in 1965/67, but have since declined significantly. Exports of cereals have slightly increased from 1965/67 to 1993/95 but fell considerably in 2000/02.

- Figure 4: Major food exports as percentage of Dietary Energy Supply (DES), trends

Figure 4: Food exports expressed as percentage of DES. Trends from 1965-67 to 2000-2002.

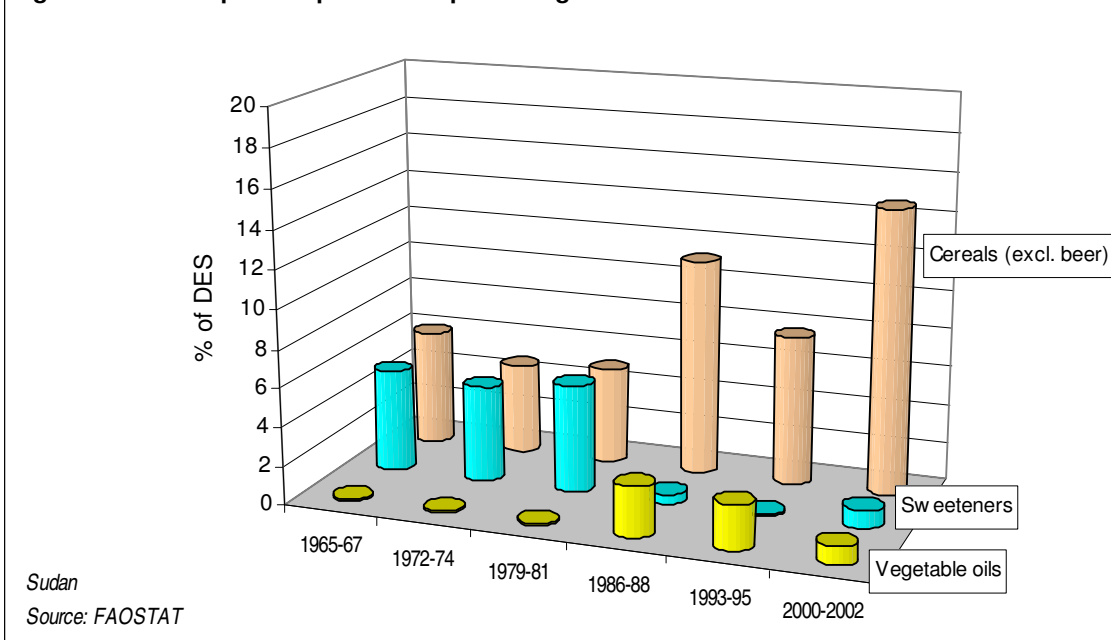


Note that only the 3 most important food groups are shown

There were major shifts in imports over the period 1965/67 to 2000/02. Imports of cereals have increased considerably and represented about 14% of DES in 2000/02. Imports of sweeteners were reduced because of the increasing production capacity of the local sugar cane industry. Imports of vegetable oils have increased since the mid-1980s.

- Figure 5: Major food imports as percentage of Dietary Energy Supply (DES), trends

Figure 5: Food imports expressed as percentage of DES. Trends from 1965-67 to 2000-2002.



Note that only the 3 most important food groups are shown.

Food aid

In 2003, Sudan received a total food aid of 252 311 t. Eighty-six percent were cereals (distributed as 61% of coarse grains, 33% of wheat flour and 6% of blended/fortified commodities) and 14% were other foods (distributed as 57% of pulses, 38% of oils and fats, and 5% of various other commodities). This food aid was mainly delivered as emergency food aid (91%), with a small part delivered as project food aid (9%). No programme food aid was delivered³ (WFP, 2004).

The Sudan emergency operations posed a major challenge in ensuring timely and cost-effective deliveries. Lack of basic infrastructure, seasonal lack of access to roads, insecurity because of conflict and access restrictions by parties of the conflict were the main issues in transport and logistics (WFP, 2004).

Levels of food aid for 2005 are not yet published but are expected to be very high. At the beginning of 2005, it was estimated that 5.8 million people would be in need of food aid, including both parts of the country (WFP, FAO, NGOs, GOS & SSC, 2005).

II.3 Food consumption

National level surveys

Information on food consumption is limited. No national surveys have been carried out. A study conducted by the Ministry of Health and the World Health Organization (1997), based on household food frequency questionnaires, showed that in the six states surveyed (Kassala, South Darfur, North Kordofan, Red Sea, Gezira and Nahr El Neil), 24% of the total population consumed meat daily and 38% consumed it 2 to 3 times a week. This study revealed that 73% consumed milk every day. Only 12% of the households consumed green leafy vegetables daily and the same percentage consumed other vegetables daily. It also showed that only 8% consumed fruit daily. Most of the population (86%) had three meals per day and 13% had only two meals (MOH & WHO, 1997).

II.4 Infant and young child feeding practices

Infant and young child feeding practices are documented through a national survey conducted in 2000. Among infants under four months of age, about a fifth were exclusively breastfed. This proportion decreased to 16% for infants under six months. Between 6 and 9 months, less than half of the infants received complementary food in addition to breastmilk (FMH, CBS & UNICEF, 2001).

Typically, infants and young children receive complementary foods only once or twice a day. Basic porridges are often given, based on the local staple food. Such porridges are generally prepared with water of uncertain quality, causing diarrhea (ENN & GIFA Project, 2003). Approximately 84% of children continued to be breastfed at age 12-15 months and 40% at age 20-23 months (FMH, CBS & UNICEF, 2001). Among children under three years, the median duration of breastfeeding was about 19 months in 1990 (ORC Macro, StatCompiler).

While breastfeeding is a rather common practice in Sudan, progress must still be done to promote exclusive breastfeeding up to 6 months, and encourage a timely complementation of breastmilk with nutritious foods at 6-9 months.

³ *Emergency* food aid is destined to victims of natural or man-made disasters; *Project* food aid aims at supporting specific poverty-alleviation and disaster-prevention activities; *Programme* food aid is usually supplied as a resource transfer for balance of payments or budgetary support activities. Unlike most of the food aid provided for project or emergency purposes, it is not targeted to specific beneficiary groups. It is sold on the open market, and provided either as a grant, or as a loan.

Table 13: Type of infant and young child feeding

Survey name/date (Reference)	Type of feeding in the 24 hours preceding the survey		
	Indicator by age	Sample size	Percentage of children
Multiple Indicator Cluster Survey, 2000 Sudan Final Report (FMH, CBS & UNICEF, 2001)	Exclusive breastfeeding rate		
	0-1 month	670	25.6
	2-3 months	964	18.5
	4-5 months	983	6.0
	<4 months	1 634	21.4
	<6 months	2 617	15.6
	Timely complementary feeding rate		
	6-9 months	1 896	46.6
	Bottle-feeding rate		
	0-11 months	n.a.	n.a.
	Continued breastfeeding rate		
	12-15 months (1 year)	1 710	83.5
	20-23 months (2 years)	591	40.4

n.a.: not available.

The number of hospitals or maternities officially designated by UNICEF as “Baby Friendly” (i.e. having fulfilled the 10 criteria supportive of breastfeeding) is 25 out of a total of 215 hospitals (UNICEF, 2002b). In 1998, the International Code of Marketing of Breastmilk Substitutes was enforced to end free distributions of infant formula to new mothers.

II.5 Nutritional anthropometry

Low birth weight

In 2000, the prevalence of low birth weight (less than 2500g) was high, 31% of neonates in northern Sudan and 17% in the towns of the south. A survey estimated that 87% of births were assisted by skilled health personnel in the year prior to the survey (FMH, CBS & UNICEF, 2001), but this proportion seems improbably high given the limited number of health facilities and personnel, thus the validity of the prevalence of low birth weight is unsure. The Sudan Declaration for Safe Motherhood signed in August 2001 by the Federal Ministry of Health and the States Ministers of Health calls for a reduction of maternal and neonatal morbidity and mortality through increasing percentage of deliveries attended by skilled persons and providing emergency obstetric care (WHO & FMH, 2004).

Anthropometry of preschool children

A national survey, conducted in 2000, provides data on prevalence of stunting, underweight and wasting among underfives from 16 regions of northern Sudan (FMH, CBS & UNICEF, 2001). Another earlier survey provided data with less extensive regional coverage (MOH & WHO, 1997).

In 2000, the prevalence of malnutrition among children under five years was very high, reflecting the critical nutrition situation inherited from the past decades. Overall, 41% of children were underweight and 15% were severely underweight. There were regional variations in prevalence, with the highest prevalence observed in Northern Kordufan (50%). Children of mothers with no education were more likely to be underweight than those of mothers with higher education (45% and 35% respectively) (FMH, CBS & UNICEF, 2001).

Stunting (chronic malnutrition) affected 43% of underfives and 24% were severely stunted. In general, children residing in rural areas and those born to mothers with low education were more likely to be affected by chronic malnutrition. There were significant regional variations in the prevalence of stunting, ranging from 31% in River Nile to 59% in Kassala (FMH, CBS and UNICEF, 2001). Stunting

prevalence was higher than 40% in the eastern states (Red Sea, Kassala, Al-Gadarif, Sinnar and Blue Nile), and some central and western states (all Darfur states and Northern Kordofan and Western Kordofan). Most of these states are not affected by conflict, but the eastern part of the country receives refugees from bordering countries, which disrupts livelihoods of the resident population.

Overall, 16% of the children were wasted (acute malnutrition). Severe acute malnutrition affected 4% of the children. The prevalence of wasting varied by region, and levels were particularly high in Northern Darfur, where 23% of the children were wasted (FMH, CBS & UNICEF, 2001).

A comparison between data from 1995 (MOH & WHO, 1997) and 2000 (FMH, CBS & UNICEF, 2001) is only possible for 5 regions. The comparison shows that stunting increased in all regions except Gezira, and the increase was important, up to approximately 20 percentage points in Kassala for example. Such large changes in stunting prevalence occurring over a short period of time are unlikely, therefore they could be due to differences in methodology or in sampling. Thus the trends must be interpreted with caution. Moreover changes in prevalence of wasting are also inconsistent, as wasting increased in 3 regions and decreased in 2, and the 1995 survey report does not specify the season when the survey was conducted (MOH & WHO, 1997; FMH, CBS & UNICEF, 2001).

Few data are available after 2001, but significant increases in malnutrition rates were observed in the Darfur region (CDC & WFP, 2004). A survey was carried out in September 2004 in a crisis-affected population residing in an area covering all three states of Darfur, among 842 children 6-59 months. The prevalence of wasting among these children was 22%. The high child malnutrition rates in the Darfur were directly linked to the on-going crisis, loss of livelihoods and internal displacement (CDC & WFP, 2004).

Another survey conducted among children 6-59 months in rural Red Sea and Kassala States in 2004, which were not affected by conflict, also showed persisting high rates of stunting (respectively 39 and 44%). The surveys were conducted before the hungry season (February-March), thus the observed rates of wasting (respectively 19 and 18%) could be lower than those following the period of food shortage (WFP, FAO, UNDP & UNICEF, 2005).

In conclusion, national data from the year 2000 and some regional data from 2004 show that many states not affected by conflict have a critical nutrition situation with high prevalences of wasting and stunting. Some of the factors contributing to this situation are chronic food insecurity, poor access to water and sanitation, poor dietary and infant feeding practices, and a high incidence of infectious and parasitic diseases such as malaria and diarrhea, among others. Low birth weight is highly prevalent, and both stunting and wasting prevalences are high from birth, indicating that poor nutritional status of mothers is probably a very important determinant of malnutrition in the country.

Table 14: Anthropometry of preschool children

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
Total		0-4.99	M/F	18 043	23.7	43.3	3.8	15.7	14.7	40.7	3.4
Sex		0-4.99	M	9 018	23.9	43.6	4.4	16.9	14.6	41.6	3.0
		0-4.99	F	9 025	23.5	43.1	3.2	14.5	14.7	39.7	3.9
Age											
		0-0.49	M/F	1 838	5.9	11.7	3.6	11.3	1.7	6.2	11.3
		0.5-0.99	M/F	2 001	15.0	29.5	4.4	18.3	11.2	32.0	5.3
		1-1.99	M/F	2 898	24.7	46.7	6.6	24.6	19.6	50.5	3.3
		2-2.99	M/F	3 918	29.3	49.6	4.8	17.3	23.1	51.7	1.6
		3-3.99	M/F	3 978	30.1	52.7	2.2	12.2	13.7	43.6	2.4
		4-4.99	M/F	3 411	23.5	47.5	2.0	11.2	10.9	39.9	1.6
Residence											
urban		0-4.99	M/F	9 098	19.4	38.5	3.7	14.4	11.3	36.0	3.7
rural		0-4.99	M/F	8 945	28.0	48.2	3.9	16.9	18.0	45.4	3.2
Region											
Northern		0-4.99	M/F	326	17.9	35.8	3.4	17.4	10.8	36.9	3.7
River Nile		0-4.99	M/F	508	13.0	30.5	3.6	20.2	11.3	38.9	0.6
Red Sea		0-4.99	M/F	220	23.2	41.7	3.2	15.6	18.2	42.3	3.6
Kassala		0-4.99	M/F	1 599	36.2	59.4	2.5	8.6	9.6	31.6	6.1
Al-Gadarif		0-4.99	M/F	874	28.5	48.7	4.9	16.1	20.9	48.8	1.8
Al-Gazira		0-4.99	M/F	1 402	19.5	38.4	5.7	20.2	14.8	41.8	2.4
Sinnar		0-4.99	M/F	857	25.2	49.1	4.0	15.0	17.0	44.5	2.5
White Nile		0-4.99	M/F	1 637	18.4	36.0	5.8	21.8	16.7	43.3	1.8
Blue Nile		0-4.99	M/F	593	25.8	47.4	3.1	13.8	16.0	43.9	4.0
Khartoum		0-4.99	M/F	2 596	15.3	32.1	1.9	13.9	10.4	36.3	2.3
Northern Kordufan		0-4.99	M/F	1 126	24.3	45.5	3.0	19.3	19.1	49.9	0.9
Southern Kordufan		0-4.99	M/F	883	21.0	39.1	2.1	10.7	10.7	32.8	2.6
Western Kordufan		0-4.99	M/F	871	31.0	49.3	5.1	18.2	18.9	43.8	6.5
Northern Darfur		0-4.99	M/F	1 378	22.4	44.3	5.9	22.5	18.8	47.4	2.2
Southern Darfur		0-4.99	M/F	2 338	26.7	46.7	3.6	12.4	14.3	39.4	4.7
Western Darfur		0-4.99	M/F	835	32.2	51.2	3.8	8.8	14.4	37.4	10.5
Mother's education											
no education		0-4.99	M/F	10 270	28.5	49.3	4.1	16.6	17.8	45.4	n.a.
primary		0-4.99	M/F	327	29.4	53.8	1.6	9.5	12.0	39.9	n.a.
secondary or higher		0-4.99	M/F	7 158	17.2	35.4	3.5	14.8	10.8	34.7	n.a.

* Category <2 Z-scores includes <3 Z-scores / Data on overweight taken from WHO Global Database on Child Growth and Malnutrition / n.a.: not available.

Table 14: Anthropometry of preschool children (cont.)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition							
					Percentage of children with							
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height	
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores	
Comprehensive nutrition survey, 1995 (MOH & WHO, 1997)	Total	0-4.99	M/F	3 099	16.1	34.8	3.4	17.1	13.1	38.5		1.6
	Sex											
		0-4.99	M	1 633	16.8	34.6	3.7	18.4	13.2	38.1		1.3
		0-4.99	F	1 466	15.3	35.0	3.1	15.6	13.1	38.9		2.0
	Age											
		0-0.49	M/F	188	0.5	5.9	2.7	6.9	1.6	7.4		9.0
		0.5-0.99	M/F	466	9.2	24.7	2.4	13.3	8.6	26.8		3.0
		1-1.99	M/F	835	16.4	39.8	6.1	26.5	16.2	45.0		1.3
		2-2.99	M/F	726	18.0	36.1	3.0	17.5	16.7	44.8		0.4
		3-3.99	M/F	522	22.4	39.3	1.9	13.0	12.5	41.0		1.0
		4-4.99	M/F	326	19.6	42.9	1.8	10.1	11.3	37.7		0.3
	Residence											
	urban	0-4.99	M/F	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.
	rural	0-4.99	M/F	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.
	Region											
	Gezira	0-4.99	M/F	507	21.9	38.3	2.2	17.6	14.6	39.6		2.6
	Kassala	0-4.99	M/F	555	14.4	35.5	2.9	17.3	10.3	38.7		1.1
	Nahr El Neil	0-4.99	M/F	413	19.6	40.0	6.8	23.0	17.7	39.7		3.6
	North Kordofan	0-4.99	M/F	562	12.3	31.9	1.8	15.1	10.3	39.9		1.4
	Red Sea	0-4.99	M/F	520	17.9	36.5	6.5	23.8	19.8	45.8		1.3
	South Darfur	0-4.99	M/F	556	12.4	28.8	1.3	7.7	7.9	28.2		0.4
	Mother's education											
	no education	0-4.99	M/F	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.
	primary	0-4.99	M/F	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.
	secondary or higher	0-4.99	M/F	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.

* Category <2 Z-scores includes <-3 Z-scores.

Note: Category "Total" includes 6 states pooled (Kassala, South Darfur, North Kordofan, Red Sea, Gezira and Nahr el Neil).

* Data taken from WHO Global Database on Child Growth and Malnutrition.

n.a.: not available.

Anthropometry of school-age children and adolescents

No data are currently available on anthropometry of school-age children and adolescents.

Anthropometry of adult women

Few data are available on anthropometry of adult women. The Comprehensive Nutrition Survey (MOH & WHO, 1997) provides some information on anthropometry of mothers. In 1995, the prevalence of chronic energy deficiency (CED) among 3 586 mothers (age not specified) was 18%. The highest prevalence was among mothers from North Kordofan (32%) and the lowest was in the Gezira State and in South Darfur (5% for both) (MOH & WHO, 1997).

According to the SuRF report, the mean BMI of women (≥ 15 years of age) was 22.5 kg/m² in 2002. The prevalence of overweight among women was 27% and that of obesity was 4% (WHO, 2005). Nevertheless representativeness of the data is not documented.

Anthropometry of adult men

According to the SuRF report, in 2002, the mean BMI of men (≥ 15 years of age) was 21.5 kg/m². The prevalence of overweight was 16% and that of obesity was 1% (WHO, 2005). Representativeness of the data is not documented.

II.6 Micronutrient deficiencies

Iodine deficiency disorders (IDD)

Prevalence of goitre and urinary iodine level

A survey conducted in 1997 in seven regions of northern Sudan among school-age children revealed that goitre was widespread except in two regions where prevalence was low (Eastern Zone and Khartoum State). Overall, 22% of school-age children were affected by goitre (MOH & WHO, 1999).

The median level of urinary iodine was the lowest in the Darfur Zone (median 20µg/L) and the highest in the Eastern Zone (median 98µg/L). Low urinary iodine was extremely common (<100µg/L which defines mild IDD), as at least half of school-age children had low levels, and virtually all the children had low levels in the Upper Nile Zone (98%) (MOH & WHO, 1999).

Osman & Fatah (1981) suggested that the presence of goitrogens in the diet could be a cause of IDD, but the main cause remains low iodine intake.

Table 15: Prevalence of goitre and level of urinary iodine in school-age children

Survey name/date (Reference)	Background characteristics	Age (years)	Sex	Prevalence of goitre		Level of urinary iodine		
				Sample size	Percentage with goitre [Total Goitre]	Sample size	Median (µg/L)	Percentage with urinary iodine <100µg/L
IDD Baseline Survey Report, (1997) (MOH & WHO, 1999)	Total	SAC	M/F	40 922	22.0	n.a.	n.a.	n.a.
	Region							
	Darfur Zone	SAC	M/F	4 835	27.6	240	19.9	89.2
	Kordofan Zone	SAC	M/F	4 503	39.1	600	48.2	79.8
	Upper Nile Zone	SAC	M/F	1 874	42.2	311	40.3	97.8
	Northern Zone	SAC	M/F	5 773	38.1	600	90.5	54.9
	Eastern Zone	SAC	M/F	7 937	8.2	594	97.9	52.0
	Khartoum State	SAC	M/F	8 135	5.4	600	92.6	55.0
	Central Zone	SAC	M/F	7 865	22.7	599	70.4	74.5

SAC: School-age children.

n.a.: not available.

Iodization of salt at household level

A specialized unit for IDD treatment, control and prevention was formed by the Ministry of Health with support of UNICEF in 1989, together with a national programme of endemic goitre control (Elnagar, 1996; Khattab, 1996). The major activities of the IDD unit include prevalence surveys, iodized oil distribution in endemic areas, laboratory monitoring and training.

Legislation on salt iodization exists in Sudan since 1994, but large-scale salt iodization only started in 2000. All salt (73 000 tons in 2000) is produced in the private sector, is not refined, and contains impurities. It needs to be washed before iodization to be pure enough to retain the iodine, which is a costly procedure. Salt marketing is said not to be controlled. Very little salt reaches the west of the country. UNICEF recently donated 11 iodizing machines and a semi-manual unit for Darfur state (ICCIDD, 2002).

A survey conducted in 2000, showed that consumption of properly iodized salt was very rare, except in the South Darfur region where 3% of households used it (FMH, CBS & UNICEF, 2001).

Table 16: Iodization of salt at household level

Survey name/date (Reference)	Background characteristics	Number of households where salt was available for testing	Iodine level of household salt		Percentage of households tested
			Inadequate (<15 ppm)	Adequate (≥15 ppm)	
Multiple Indicator Cluster Survey, 2000 Sudan Final Report (FMH, CBS & UNICEF, 2001)	Total	24 067	99.5	0.5	97.1
	Residence				
	Urban	12 072	99.2	0.8	97.4
	Rural	12 009	99.8	0.2	96.9
	Region				
	Northern	680	100.0	0.0	98.8
	River Nile	959	100.0	0.0	99.3
	Red Sea	907	99.8	0.2	99.9
	Kassala	1 269	99.1	0.9	98.2
	Al-Gadarif	1 237	99.8	0.2	93.2
	Al-Gazira	3 247	100.0	0.0	98.8
	Sinnar	1 183	99.9	0.1	99.1
	White Nile	1 463	100.0	0.0	99.0
	Blue Nile	488	99.9	0.1	99.1
	Khartoum	3 207	100.0	0.0	99.0
	North Kordufan	1 717	99.9	0.1	99.3
	South Kordufan	833	100.0	0.0	97.9
	West Kordufan	846	100.0	0.0	73.6
	North Darfur	1 590	99.7	0.3	99.6
	South Darfur	2 653	97.1	2.9	97.3
	West Darfur	1 798	99.1	0.9	96.4

Note: ppm: parts per million.

Vitamin A deficiency (VAD)

Prevalence of sub-clinical and clinical vitamin A deficiency

In 1995, a survey conducted in six regions of the country showed a prevalence of 8.5% of night blindness in children under five years. Three percent of the children presented Bitot spots (classification X1B). There were, however, important variations by region, ranging from 7.4% in South Darfur to 0.2% in Kassala. Corneal xerosis (classification X2) occurred among 0.1% of the children. The prevalence of corneal xerosis was higher in South Darfur (0.5%) and in Red Sea (0.2%) (MOH & WHO, 1997).

A survey carried out in the Darfur zone in 2004, in the population affected by the crisis (IDP and residents), did not find any Bitot spots in a sample of 844 children 6-59 months, but 16% of their mothers reported having experienced night-blindness during their last pregnancy (CDC & WFP, 2004).

Table 17: Prevalence of clinical vitamin A deficiency in children under 5 years

Survey name/date (Reference)	Background characteristics	Age (years)	Sex	Clinical signs of xerophthalmia		
				Sample size	Type of sign	Percentage
Comprehensive nutrition survey 1995 (MOH & WHO, 1997)	Total	0.49-4.99	M/F	3 576	Bitot's Spots	3.2
		0.49-4.99	M/F	3 576	Corneal Xerosis	0.1
	Region					
	South Darfur	0.49-4.99	M/F	596	Bitot's Spots	7.4
	Gezira	0.49-4.99	M/F	597	Bitot's Spots	7.0
	Kassala	0.49-4.99	M/F	599	Bitot's Spots	0.2
	North Kordofan	0.49-4.99	M/F	599	Bitot's Spots	1.8
	Nahr El Neil	0.49-4.99	M/F	594	Bitot's Spots	1.7
	Red Sea	0.49-4.99	M/F	591	Bitot's Spots	1.4
	South Darfur	0.49-4.99	M/F	596	Corneal Xerosis	0.5
	Gezira	0.49-4.99	M/F	597	Corneal Xerosis	0.0
	Kassala	0.49-4.99	M/F	599	Corneal Xerosis	0.0
	North Kordofan	0.49-4.99	M/F	599	Corneal Xerosis	0.0
	Nahr El Neil	0.49-4.99	M/F	594	Corneal Xerosis	0.0
	Red Sea	0.49-4.99	M/F	591	Corneal Xerosis	0.2

The high occurrence of VAD in the country is related to dietary patterns and lack of access to good food sources of vitamin A, compounded by a high prevalence of malnutrition. Consumption of animal products and fruit and vegetables, especially green leafy varieties, is limited (MAF, 1991). Although the national supply of milk is abundant, not all population groups have access to dairy products.

Vitamin A supplementation

The MICS survey of 2000 documents Vitamin A supplementation in the northern part of the country (FMH, CBS & UNICEF, 2001). In the six months before the survey, 44% of children aged 6-59 months had received a high dose supplement. Coverage was slightly higher in urban areas but there were very large regional variations, from 18% in Southern Darfur to 67% in Khartoum. Only 22% of mothers received supplements within 2 months postpartum. In Southern Darfur, only 13% of mothers received supplements, the lowest figure among all regions (FMH, CBS & UNICEF, 2001).

A more comprehensive strategy has been developed by the government to control and prevent VAD. It includes prophylactic and treatment doses in Mother and Child Health (MCH) centres. There are plans to integrate the activities of MCH with the extended programme of immunization (EPI) and the acute respiratory infection programme (ARI). The Ministry of Agriculture promotes production and consumption of fruit and vegetables, and nutrition education programmes emphasize the importance of a mixed and varied diet, particularly among mothers (MOH & WHO, 1997).

Table 18: Vitamin A supplementation of children and mothers

Survey name/date (Reference)	Background characteristics	Children				Mothers		
		Age (months)	Sex	Number of children	Percent of children who received vit. A supplements in the 6 months preceding the survey	Age (years)	Number of mothers ¹	Percent of mothers who received vit. A supplements within 2 months postpartum
Multiple Indicator Cluster Survey, 2000 Sudan Final Report (FMH, CBS & UNICEF, 2001)	Total	0.49-4.99	M/F	20 639	44.3	n.a.	6 872	21.9
	Sex							
		0.49-4.99	M	10 359	44.6			
		0.49-4.99	F	10 276	43.9			
	Residence							
	Urban	0.49-4.99	M/F	10 162	48.9	n.a.	3 477	26.8
	Rural	0.49-4.99	M/F	10 477	39.8	"	3 395	16.8
	Region							
	Northern	0.49-4.99	M/F	408	35.6	"	133	28.5
	River Nile	0.49-4.99	M/F	541	61.5	"	192	23.9
	Red Sea	0.49-4.99	M/F	402	33.4	"	160	20.9
	Kassala	0.49-4.99	M/F	1 607	59.1	"	519	23.4
	Al-Gadarif	0.49-4.99	M/F	1 063	31.9	"	247	20.0
	Al-Gazira	0.49-4.99	M/F	2 558	43.2	"	667	19.3
	Sinnar	0.49-4.99	M/F	889	52.3	"	326	17.6
	White Nile	0.49-4.99	M/F	1 713	57.1	"	440	18.3
	Blue Nile	0.49-4.99	M/F	574	62.0	"	166	18.7
	Khartoum	0.49-4.99	M/F	2 661	67.4	"	849	45.5
	Northern Kordufan	0.49-4.99	M/F	1 162	33.3	"	430	18.3
	Southern Kordufan	0.49-4.99	M/F	852	41.8	"	367	12.6
	Western Kordufan	0.49-4.99	M/F	998	30.2	"	408	16.9
	Nothern Darfur	0.49-4.99	M/F	1 446	47.2	"	623	20.2
	Southern Darfur	0.49-4.99	M/F	2 466	18.2	"	833	12.7
	Western Darfur	0.49-4.99	M/F	1 298	27.8	"	514	20.7

¹ Women with a birth in the 12 months preceding the survey. For women with two or more births during that period, data refer to the most recent birth.

n.a.: not available.

Iron deficiency anemia (IDA)

Prevalence of IDA

Nutritional anemia is among the ten major causes for hospital admission in Sudan. However, nationally representative data on iron deficiency are limited in the country.

In 1995, the prevalence of anemia (defined as hemoglobin<11.0g/dL) in children under five years was very high, and in almost all states surveyed, more than 80% of children were anemic. In Khartoum the prevalence was the lowest but affected almost one third of children (MOH & WHO, 1997). In 2004, in the crisis-affected population of Darfur, the prevalence of anemia was 55%. Severe anemia affected more than 1% of children (CDC & WFP, 2004).

Table 19: Prevalence of anemia in preschool children

Survey name/date (Reference)	Background characteristics	Age (years)	Sex	Sample size	Percentage of children with
					Any anaemia (Hb<11.0 g/dL)
Comprehensive nutrition survey 1995 (MOH & WHO, 1997)	Region				
	South Darfur	0-4.99	M/F	300	86.4
	Gezira	0-4.99	M/F	300	82.9
	Kassala	0-4.99	M/F	300	81.7
	North Kordofan	0-4.99	M/F	300	90.8
	Nahr El Neil	0-4.99	M/F	300	92.1
	Red Sea	0-4.99	M/F	300	89.1
	Khartoum	0-4.99	M/F	n.a.	32.0

Hb: Hemoglobin.
n.a.: not available.

The 1995 survey also showed that prevalence of anemia was high among women of childbearing age. More than half of the women 15-45 years of age were anemic in the states of the Red Sea and Gezira (56%). Prevalence was much lower in Khartoum compared with all the other regions (21%) (MOH & WHO, 1997).

In Darfur in 2004, 28% of non-pregnant mothers were anemic (Hb<12g/dL) and 1% had severe anemia. Nineteen percent of pregnant mothers were classified as anemic (Hb<11g/dL). There was no case of severe anemia identified among pregnant women. The mean hemoglobin concentration was 13g/dL and 12g/dL for non-pregnant and pregnant mothers, respectively (CDC & WFP, 2004).

Table 20: Prevalence of anemia in women of childbearing age

Table 26. Prevalence of anemia in women of childbearing age				
Survey name/date (Reference)	Background characteristics	Age (years)	Sample size	Percentage of women with
				Any anemia (Hb<12.0 g/dL)
Comprehensive nutrition survey 1995 (MOH & WHO, 1997)	Region			
	South Darfur	15-45	150	39.2
	Gezira	15-45	150	55.6
	Kassala	15-45	150	37.4
	North Kordofan	15-45	150	44.9
	Nahr El Neil	15-45	150	53.1
	Red Sea	15-45	150	56.4
	Khartoum	15-45	n.a.	20.8

Hb: Hemoglobin.
n.a.: not available.

IDA can be caused by diets with low bioavailability of iron. The limited consumption of meat is probably a major cause of anemia. In 1995, 24% of the households surveyed were consuming meat daily, the majority (38%) were consuming meat only 2 or 3 times a week (MOH & WHO, 1997). Moreover, the Sudanese diet is mainly composed of cereals with a high phytate content which limits bioavailability of iron.

Parasitic diseases are very common and are also an important cause of IDA. Schistosomiasis is one of the main endemic water-borne diseases in Sudan. It is endemic in all states except Red Sea. Twenty four million people are at risk of contracting the infection. The prevalence ranged between 28 and 80% among school children surveyed in central states in 2001 (FMH, 2003). Moreover, malaria is widespread in the country. In 2000, the malaria-related mortality rate in underfives was 408 per 100 000 deaths (UNSTAT).

Interventions to combat IDA

Control measures through the distribution of iron and folic acid tablets to pregnant and lactating mothers is widely practiced at the Ministry of Health centres, coupled with nutrition and health education.

II.7 Policies and programmes aiming to improve nutrition and food security

Regarding the nutritional situation of the country, especially that concerning children, there is a lack of nutritional policy to set priorities and guide the work (WHO & FMH 2004).

The health policy system in Sudan has experienced marked reform, although still not fully shaped, in its strategic direction (WHO & FMH, 2004). The government is developing a strategic plan for health promotion. The Strategic Plan for the Health Sector defines the priorities for the coming 25 years. Health policy priorities are focused on provision of essential health care, achievement of health for all through a broadened primary health care concept, focus on the poor and vulnerable and development of human resources. Health priorities include improving health service coverage and accessibility, eliminating geographic and financial barriers, building capacity and improving management of the health system (FMH, 2003). This strategic plan aims to achieve the Millennium Development Goals.

The Ten-Year National Comprehensive Strategy plan for 1992–2001 aimed to ensure food security by increasing livestock production. The key elements of the strategy were increased production and export of livestock, diversification of animal and crop production, encouragement of a gradual shift towards permanent settlement of migrant pastoralists, development of extension, training and information services, privatisation of public enterprises, improvement and expansion of fisheries and aquaculture industries and improvement in marketing (Fadlalla & Ahmed, 2003).

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