

National Nutrition Strategy Paper
Sudan

English Version

FAO / WHO
Second International Conference on Nutrition
ICN2

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Foreword

The Second International Conference on Nutrition (ICN2), an inclusive inter-governmental meeting on nutrition jointly organized by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO), in cooperation with the High Level Task Force on the Global Food Security Crisis (HLTF), IFAD, IFPRI, UNESCO, UNICEF, World Bank, WFP and the WTO, will be held at FAO Headquarters, in Rome on 19th – 21st November 2014. In addition to this important international event on nutrition, this report was prepared to inform the high-level ministerial conference and as a tool to propose a flexible policy framework to address today’s major nutrition challenges and identify priorities for enhanced international cooperation on nutrition.

This ICN2 report was prepared under the leadership of the Federal Ministry of Health and the Ministry of Agriculture and Irrigation with support from United Nations agencies.

This report documents progress made towards improving nutrition since 1992 focusing on nutrition problems that remain critical as well as on the new challenges and opportunities for improving nutrition presented by changes in the global economy, in food systems, advances in science and technology and identifying policy options for improving nutrition.

The key objectives include:

1. Progress made since the 1992 ICN including country-level achievements in scaling up nutrition through direct nutrition interventions and nutrition-enhancing policies and programmes;

2. Relevant policies and institutions on agriculture, fisheries, health, trade, consumption and social protection to improve nutrition; and
3. Institutional policy coherence and coordination to improve nutrition, and mobilize resources needed to improve nutrition;

The report also addresses nutrition challenges while addressing all forms of malnutrition, focusing on the poorest and most vulnerable households and on women, infants and young children in deprived, vulnerable and emergency contexts.

ICN2 report is designed to provide information that can be used to build ongoing global political processes and initiatives to contribute to the post-2015 UN development agenda including identifying priority areas, nutrition development goals as well as the policies that are required to achieve, measure and account for them.

Acknowledgments

This document was prepared by the leadership of the Federal Ministry of Health and the Federal Ministry of Agriculture and Irrigation for the Second International Conference on Nutrition (ICN2), which is an inclusive inter-governmental meeting on nutrition jointly organized by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), to take place in Rome from 19th to 21st November 2014. The drafting of this document was a joint effort between the MoH, the MoAI, the FAO, the WHO, the World Food Programme (WFP) and the United Nations Children's Fund (UNICEF) in Sudan.

The document was prepared by efforts from a special committee formed for this purpose, MOH and MOA are extending their thanks and acknowledgment to the committee members:

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Executive Summary

Since the last century, Sudan continues to suffer from poor nutrition, which the single most important threat to health; limiting education achievements and opportunity for economic development of the country.

The secession of South Sudan from the Republic of Sudan in 2011 resulted in a reduction of 30 percent of the government budget due to the loss of oil revenue (World Bank, 2011). Poverty remains widespread with 46.5% of the population living below the poverty line according to the national definition of poverty (3.8 SDG/person/day).

In 2014, it is estimated that more than 5 million people in Sudan are food insecure with many of the most vulnerable suffering from malnutrition. The 2013/2014 harvest was 68% lower than the 5 year average, plus food prices in 2013/2014 have reached an all-time high of 150% increase over the last 5 years (FAO, 2014). The nutrition situation in Sudan is characterized by chronically high levels of acute malnutrition (16.4%), which remains consistently above the international 'emergency' thresholds of 15%. Severe acute malnutrition (SAM) rates are also worryingly high at 5.3%, which amounts to 550,000 children suffering from SAM, with a greatly increased risk of death. Furthermore, it is estimated that 2.2 million children are stunted annually (S3M, 2013). Stunting and other forms of under nutrition reduce a child's chance of survival, and also hinder optimal growth and development. Not surprisingly, stunting is the most challenging nutrition problem in Sudan. Malnutrition in Sudan is a manifestation of multiple factors contributing directly or indirectly to the problem of high vulnerability. These factors are related to; low health status and health services coverage, availability of adequate and good-quality water, food insecurity including but not limited

to low production and fluctuating food prices, minimal safety nets expansion and poor economic and education status at all levels coupled with degradation of natural resources and demographic pressure . The impact of these factors is significant despite the efforts from their respective sectors in term of existing policies and implementation strategies. There is a huge gap between the actual coverage of the basic services and the actual needs for the targeted population. The fragmentation in policies, strategies and services provision limits the positive impact of sector interventions. . Overall, the situation in Sudan, has a negative effect that hampers a child's growth, well-being and ultimately national productivity.

Summary table

<i>General Indicators</i>	<i>n/%</i>	<i>Sources / Year[i]</i>	<i>n/% in 1992</i>	<i>Sources 1992[i]</i>
Total population	37,400,000	CBS National Census, 2008	25,600,000	CBS National Census, 1983
National birth rate	34%	UNICEF, 2014	42%	UNICEF, 1992
Total number of live births	1,263,000	UNICEF, 2014		
National life expectancy (males, females)	62.95 years	Census, 2008	56 years	UNICEF, 1992
Human Development Index Rank	171	UNDP, 2013		
Population % below international poverty line	46.5%	Poverty Reduction Strategic Paper, 2012	??	??
Under-five mortality rate (per 1,000 live births)	83	SHHS2010	135	SERISS, 1986/87
Infant mortality rate (per 1,000 live births)	61	SHHS2010	77	SERISS, 1986/87
Maternal mortality ratio /100 000 live births (reported)	216	SHHS2010	552	SERISS, 1986/87
Primary school net enrolment or attendance ratio	31.6%	SHHS 2010	??	??
Primary school net enrolment -ratio of males /females	1.1	SHHS 2010	??	??
Access to improved drinking water in rural areas - %	55%	UNICEF, 2014	??	??
Access to improved sanitation in rural areas - %	24%	UNICEF, 2014	??	??

<i>Food availability</i>				
Arable land area – %	7.1	World Bank	??	??
Average dietary energy requirement – Kcal	2220	FAOSTAT	??	??
Dietary Energy Supply (DES) - Kcal	2180	NBHS 2010	??	??
Total protein share in DES - %	12.4	NBHS 2010	??	??
Fat share in DES - %	21.9	NBHS 2010		

<i>Food consumption</i>	<i>n/%</i>	<i>Sources / Year[i]</i>	<i>% in 1992</i>	<i>Sources 1992[i]</i>
Average daily consumption of calories per person - Kcal	2180	NBHS 2010	??	??
Calories from protein - %	12.4	NBHS 2010	??	??
Calories from fat - %	21.9	NBHS 2010	??	??
Average daily fruit consumption (excluding wine) (g)	55.9	Annual Report of the Food Security 2010 food security department	??	??
Average daily vegetable consumption (g)	78.8	Annual Report of the Food Security 2010 food security department	??	??
<i>Nutritional Anthropometry (WHO Child Growth Standards)</i>				
Prevalence of stunting in children < 5 years of age	35%	SHHS 2010	32%	SERISS, 1986/87
Prevalence of wasting in children < 5 years of age	16.4%	SHHS 2010	15.8%	SERISS, 1986/87
Prevalence of underweight children < 5 years of age	32.2%	SHHS 2010	20%	SERISS, 1986/87
Prevalence of obesity >30 BMI	NA	SHHS 2010	N/A	??
Women (15-49 years) with a BMI < 18.5 kg/m ²	NA	SHHS 2010	N/A	??
<i>Infant and young child feeding by age</i>				
Exclusive breastfeeding under 6 months %	41%	SHHS 2010	??	??
Breastfeeding with complimentary foods (6-9 months)	51.5%	SHHS 2010	??	??
<i>Micronutrients</i>				
Households consuming adequately iodized salt (> 15ppm) -%	9.5%	SHHS 2010	??	??
Vitamin A supplementation coverage rate for children aged 6-59 months-%	83%	UNICEF, 2014	??	??
Percentage of children age 6-59 months with anemia	88%	WHO 2005	??	??
Percentage of women age 15-49 with anemia (pregnant)	81%	WHO 2005	??	??

[i] Refer to the year of data applicability

Acronyms

<i>Acronym</i>	<i>Explanation</i>
AFRACA	African Rural and Agricultural Credit Association
AIDS	Acquired Immuno-Deficiency Syndrome.
ARI	Acute Respiratory Infection
ARP	Agricultural Revival Program
BCC	Behavior Change Communication
BCG	Bacillus-Cereus-Geuerin
BMS	Breast Milk Substitutes
BSFP	Blanket Supplementary Feeding Programme
CBO	Community Based Organizations
CMAM	Community Management of Acute Malnutrition
CSB	Corn Soya Blend
CTC	Community based Therapeutic care
CPD	Continuing Professional Development
DPT	Diphtheria, pertussis, tetanus vaccine
ENP	Essential Nutrition Package
FAO	Food and Agriculture organization
FEWSNET	Famine Early Warning System Network
FHCs	Family Health Centers
FHUs	Family Health Units
GDP	Growth Domestic Product
GFD	General Food Distribution
GMP	Growth Monitoring and Promotion
HRD	Human Resource Development
HRH	Human Resource for Health
IBSFP	Integrated Community-based Blanket Feeding Programme
ICN	International Conference on Nutrition
IFAD	International Fund for Agricultural Development
IMCI	Integrated Management of Childhood illnesses
IMR	Infant Mortality Rate
INGOs	International Non-Government Organizations
IPC	Integrated food security Phase Classification
IYCF	Infant and Young Child Feeding
LLITNs	Long lasting Insecticides Treated bed Nets
MAM	Moderately Acute Malnourished
MDGs	Millennium Development Goals
MCH	Maternal and Child Health
MDD	Micronutrient Deficiency Disorder
M&E	Monitoring and Evaluation
MICS	Multi Indicators Cluster Survey
MNP	Maternal Nutrition Programme
MOA	Ministry of Agriculture and Irrigation

MOH	Ministry of Health
MUAC	Mid-Upper Arm Circumference
NAPA	Sudan National Program of Action
NIPP	Nutrition Impact and Positive Practice
NND	National Nutrition Directorate
NHS	National Health Sector
NHSSP	National Health Sector Support Programme
NIS	Nutrition information system
NNSP	National nutrition strategic plan
OTP	Outpatient Therapeutic Programme
OPD	Outpatient Department (of hospitals)
PHC	Primary Health Care
PLW	Pregnant and Lactating Women
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SERISS	Sudan Emergency & Response Information & Surveillance System
SFP	Supplementary Feeding Programme
SHHS	Sudan Household Health Survey
SMCHS	Sudan Mother & Child Health Survey
SPFS	Special Program for Food Security
SSMO	Sudanese Standards and Meteorology Organization
TSF	Targeted Supplementary Feeding
TFC	Therapeutic Feeding Centre
UNFPA U	United Nation Population's Fund
UNICEF	United Nations Children's Fund
WASH	Water and Sanitation Hygiene
WFFC	World Fit For Children
WFP	World Food Program
WHA	World Health Assembly resolution
WHO	World Health Organization

1. Country context since 1992

1.1. Geographic information

Sudan is located in the northern Africa region, with 853km of coastline along the Red Sea. It has land borders with Egypt in the north, Eritrea in the north east, Ethiopia in the east, South Sudan in the south, Central African Republic in the south west, Chad in the west and Libya in the north west. Sudan is the third largest country in Africa (after Algeria and Democratic Republic of Congo) with an area of 1,886,068 km². It is the sixteenth largest country in the world. Sudan lies between latitudes 8° and 23°N.

Physically, Sudan is characterised by predominantly flat plains with a few mountains and hills. In the western part of the country, the Deriba Caldera (3,042 m) of the Marrah Mountains is the highest point in Sudan. The Blue and White Nile rivers are the two perennial rivers that form a unified River Nile at Khartoum and flows northward through Egypt to the Mediterranean Sea. The Dinder and Rahad Rivers are the two major tributaries that join the Blue Nile between Sennar and Khartoum while the White Nile has no significant tributaries within Sudan.

Sudan enjoys a diverse ecology that defines climatic conditions and rainfall seasonality for different parts of the country from the Nubian Desert that receives about three months (July to September) of rainfall to the south that gets about six months (June to November) of rainfall. Soil moisture content increases towards the south while the temperature increases from south to north of the country. Agriculture production is predominantly along the River Nile in the southern and eastern parts of the country. However, semi-arid western parts of the country depend on rain fed crop production (70% of staple crop production) and livestock husbandry as their source of food and income. Several dams on the Blue and White Nile Rivers, are major sources of both energy and food crop and fish production. Among them are the Sennar and Roseires Dams on the Blue Nile; the Jebel Aulia Dam on the White Nile; the Merwi dam on the Nile and the Girba dam on the Atbra River. There is also Lake Nubia on the Sudan-Egypt border.

The country is also endowed with natural resources that are a source of employment and international investment. Mining operations exploit metals including cobalt, copper, gold, iron, lead, manganese, nickel, silver, tin, uranium and zinc. Also extracted are minerals such as asbestos, chromite, granite, gypsum, kaolin and mica.

With such geo-physical potentials for development in general and food production in particular, Sudan's capacity to feed its population has been compromised by a combination of natural (climate changes) and man-made phenomena that have led to prolonged droughts, conflicts and displacement that undermine food security the country, state, locality and household levels. The World Health Organization considers poor nutrition to be the single most important threat to the world's health. In many developing countries like Sudan, it is an underlying cause of 45% of all child deaths and 20% of maternal mortality each year. Adequate nutrition and a healthy, productive population are increasingly recognized not only as resulting from but also as an important prerequisite for poverty reduction and economic and social development of which Land Rights plays the central part of household income that influences access to food. Improvements in family food

dietary diversity and children's nutritional status globally are thus imperative for achieving the Millennium Development Goals (MDGs) related to the eradication of extreme poverty and hunger (MDG 1) and increasing child survival (MDG 4). Given evidence that children's nutrition affects their health, intelligence and educational performance and their economic status in adulthood, enshrining Land Rights to food production and access to dietary diversity at household and community level plays an important role in reducing childhood malnutrition. Rights to land as a source of food and income also influences achievement of the MDGs related to universal primary education, gender equality and women's empowerment.

Poverty throughout rural Sudan and underlying land rights issues that are leading to complex conflicts coupled with degradation of natural resources, declining per capita food production, high food prices, limited livelihood diversification options affecting livelihood base, rapid population growth, poor access to clean water and slowly diminishing capacities of health facilities exacerbates some of the prevailing challenges that affect nutritional status of populations in Sudan. Thus strategies to improve Land Right issues that would lead to better nutrition outcomes should seek to purposefully include contributions of all relevant sectors and establish synergistic linkages between food security, nutrition and other sectors.

1.2. What are the main population, health and human development issues since 1992?

As part of the Sahel belt, Sudan suffers from years of recurring droughts and poor harvests. The rainfall in 2011 was sub-optimal in terms of timing and quantity, resulting in a 50 percent reduction in average annual harvest (FAO, 2012). However, in 2012, good rains resulted in above average harvest and thus improved food security in the conflict-free parts of the country. On-going conflicts and displacement in South Kordofan, Blue Nile and Darfur regions have negatively impacted the livelihoods and coping strategies of communities. Thus improvements in food security are predicted to be minimal (Sudan Food Security Outlook, 2012).

The secession of South Sudan from the Republic of Sudan in 2011 resulted in a reduction of 30 percent of the government budget due to the loss of oil revenue (World Bank, 2011). As a result, it is estimated that more than 5 million people in Sudan are food insecure with many of the most vulnerable suffering from malnutrition. Poverty remains widespread with 46.5% of the population living below the poverty line according to the national definition of poverty (3.8 SDG/person/day).

The nutrition situation in Sudan is characterized by chronically high levels of acute malnutrition (16.4%), which remains consistently above the international 'emergency' thresholds of 15%. Severe acute malnutrition (SAM) rates are also worryingly high at 5.3%, which amounts to 550,000 children suffering from SAM, with a greatly increased risk of death. Furthermore, it is estimated that 2.2 million children are stunted annually (S3M, 2013). Stunting and other forms of under nutrition reduce a child's chance of survival, and also hinder optimal growth and development. Not surprisingly, stunting is the most challenging nutrition problem in Sudan. It has permanent negative effect that hampers a child's growth, well-being and eventually national productivity.

The persistently high levels of wasting and stunting compounded by factors described above, directly or indirectly undermine the population's well-being and their resilience to shocks. The under-five

mortality rate stands at 78/1,000 live births, while maternal mortality ratio was 216/100,000 live births (SHHS, 2010). Between 1990 to 2010 the maternal mortality ratio in Sudan was estimated to have decreased to 70 maternal deaths per 100,000 live births in 2010.

There are gross inequities between the poorest and the richest households in access to and utilization of health services. This includes contraceptive use: 1% versus 22%; at least one antenatal visit: 63% versus 92%; and receiving antimalarial drugs for fever: 24% versus 71%. Less than half (45%) of the population use unimproved water sources; and 76% use unimproved sanitation facilities.

The measles vaccination coverage was about two third of the target group and only 39% of children had received the full immunization doses (SHHS, 2010). Given that 45% of child deaths are due to malnutrition (Lancet, 2013), the risk of preventable child mortality in Sudan will remain high as long as the high malnutrition levels and the accompanying aggravating factors are not addressed.

It is crucial to recognize that the determinants of malnutrition are multi-sectoral. In this regard, the conceptual framework of malnutrition developed by UNICEF (1990) identifies three levels of interrelated causes of under-nutrition: (i) immediate causes, (ii) underlying causes, (iii) and basic causes (causes related to the political, social, economic, and ecological context). Accordingly, in Sudan the immediate causes of mal nutrition are inadequate dietary intake and disease. The S3M survey shows high prevalence of diarrhea diseases, ARI and malaria among children in the two weeks preceding the survey. Sub-optimal infant and young child feeding practices exacerbate the situation.

The underlying causes of malnutrition are influenced by many cultural practices that undermine the nutrition well-being, These include: (i) low rates of exclusive and continued breast feeding for 2 years (40% for both); (ii) limited dietary diversification either due to lack of food varieties or limited knowledge of food preparation; (iii) and intra-household food distribution which gives priority to men. Additionally, early marriage, negative perceptions on family planning (CPR 9%) and high illiteracy levels among Sudanese women (0%) are key challenges to good nutritional outcomes. These cultural beliefs hinder positive social and behavioral practices, which are necessary for improving the nutrition situation of children and their mothers.

Access to basic services is another underlying cause. Although there are many efforts to expand health, nutrition and sanitation services, still less than half of the population has access to the basic health services, which are provided in a fragmented and inconsistent manner. There is an ongoing national effort to promote integration of health care services however; this has not yet reached the implementation level.

2. Comparison of the current food and nutrition situation with that of 1992

2.1. Provide an analysis of the current food and nutrition situation and compare it with the situation in 1992 to determine the progress made since the last ICN.

In 2009, Sudan was the third largest producer of crude oil in Sub-Saharan Africa, behind Nigeria and Angola and was expected to be one of the Sub-Saharan African countries with the highest growth rates in terms of per capita income and per capita Gross Domestic Product (GDP) of USD 1,500¹ which is about 25 percent higher than the Sub-Saharan Africa average. However, after the secession of South Sudan in 9 July 2011, the country's economy slowed down dramatically with a loss of about 62.7 billion USD, signaling a 6 percent drop in GDP, affecting a rapidly increasing population by 0.9 to 4.0 percent per annum in addition to new economic and political realities facing the country till present day.

The agriculture sector is a key element in contributing to food security in Sudan. The annual average production in the country is between 4-5 million tonnes of cereal which satisfies much of the demand in the rural areas. The variability in production, particularly under rain fed conditions, has been the subject of several studies in the past and remains a major concern in the context of food crises, drought conditions, rural livelihoods, migration, etc. With the growing level of urbanization the consumption of wheat and other food products is rapidly rising which makes it vulnerable to severe price swings and escalations in international markets as observed since the 2008 global economic crisis.

The food insecurity situation in Sudan has been the result of several inter-related factors which collectively resulted in what has been known as a "complex emergency" although the main catalysts varied in time and space. The key among these causes is the conflict and civil insecurity and the subsequent displacement of the population, climatic variability resulting in recurrent droughts and floods, inadequate investment in small-holder farming, inadequate rural infrastructure and weak rural markets.

Limited access to basic public services, combined with the above chronic and transient factors, has resulted in more than three million people requiring humanitarian assistance every year. Parts of the country remain in protracted civil conflict which increases the number of people below the poverty line where the prevalence of under-nourishment remains significantly high.

The national strategy for development excludes food security policy catalysts and fundamentally hinders the achievement of sustainable national food security. Thus, there is a need to streamline food security agendas in the country's development endeavors.

The improvement of the nutrition status of the Sudanese population is a key component of the essential health care package with a special focus on maternal, child and at-risk populations. Health and nutrition is well predictable in the national policies and strategies.

¹ IPRSP Sudan 2011

Anthropometric country indicators

Chart 1, indicates the prevalence of wasting by state. Four states have acute malnutrition levels above the WHO threshold for a critical situation - North Darfur (28%), Red Sea (20%), Blue Nile (19%) and South Darfur (18%). It also indicates acute malnutrition been wide-spread public Health problem affecting every state – only four of the 18 states have acute malnutrition levels below 10%. In addition to this, the prevalence of GAM is higher by MUAC than by weight-for-height, which is unusual for the Sudan context and highlights the critical situation in the country in terms of the number of children at increased risk of mortality. The prevalence of acute malnutrition is above the WHO emergency threshold of ≥ 15 percent in 7 of the 18 states in Sudan (S3M Survey, 2013)

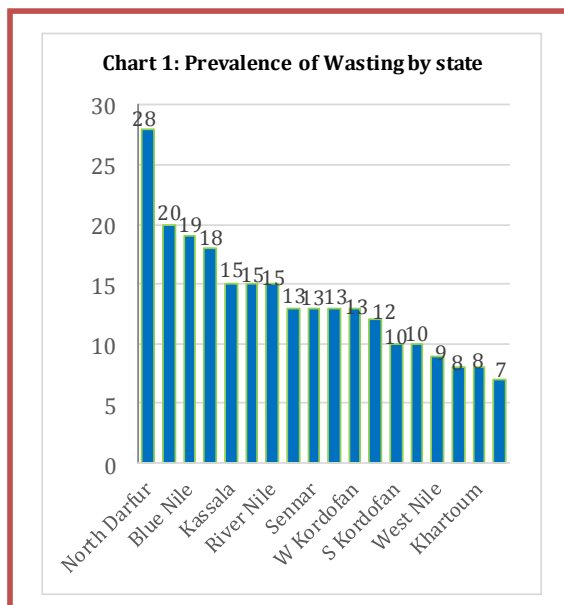


Chart 2, indicates the prevalence of stunting by state. Over three-quarters (14) of Sudan’s 18 states have a stunting rate classified as high (above 30%), while in 7 of the 18 states the stunting levels of more than 40 percent of children are above the WHO threshold; “very high” prevalence cut off point of ≥ 40 percent – Kassala (55%), Gedaref (52%), Blue Nile (50%), Red Sea (46%), Central Darfur (45%), North Kordofan (42%) and East Darfur (40%). Five of the states have critical levels of both wasting and stunting – Kassala, Blue Nile, Red Sea, Central Darfur and East Darfur.

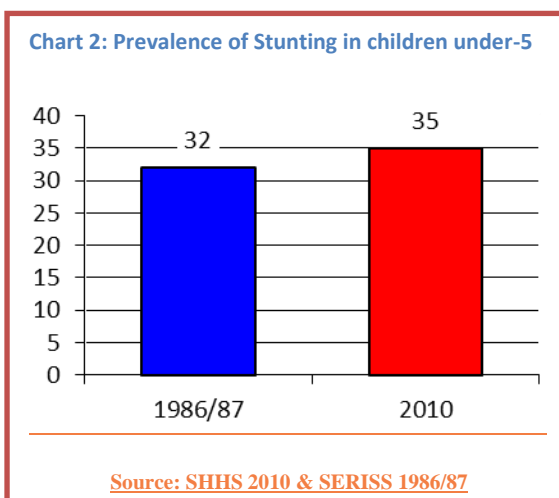
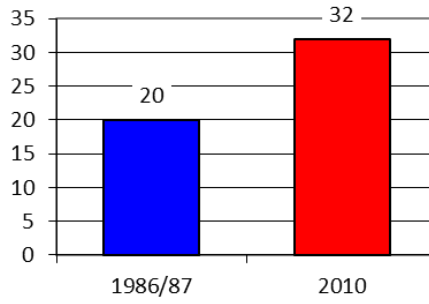
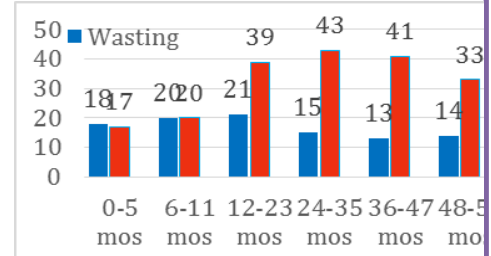


Chart 3: Prevalence of Underweight in children under-5

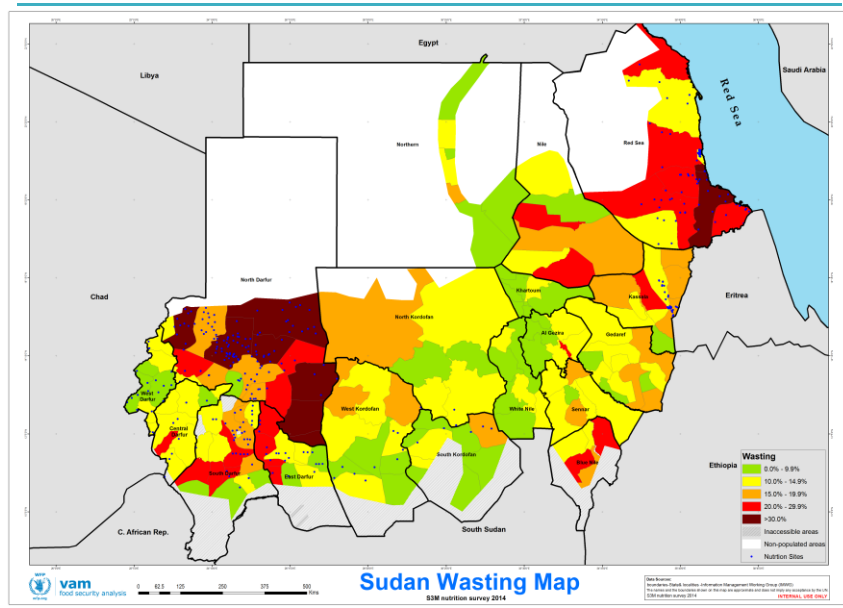
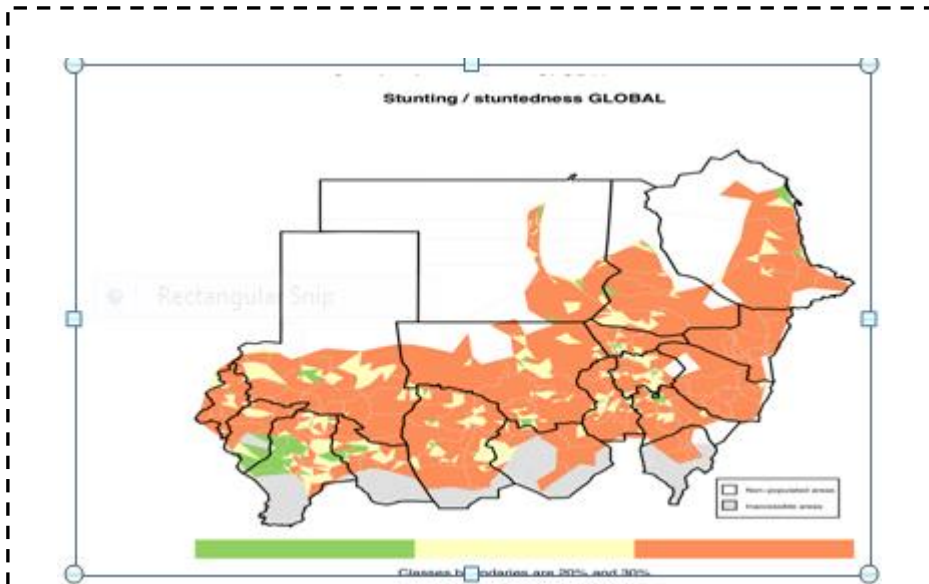
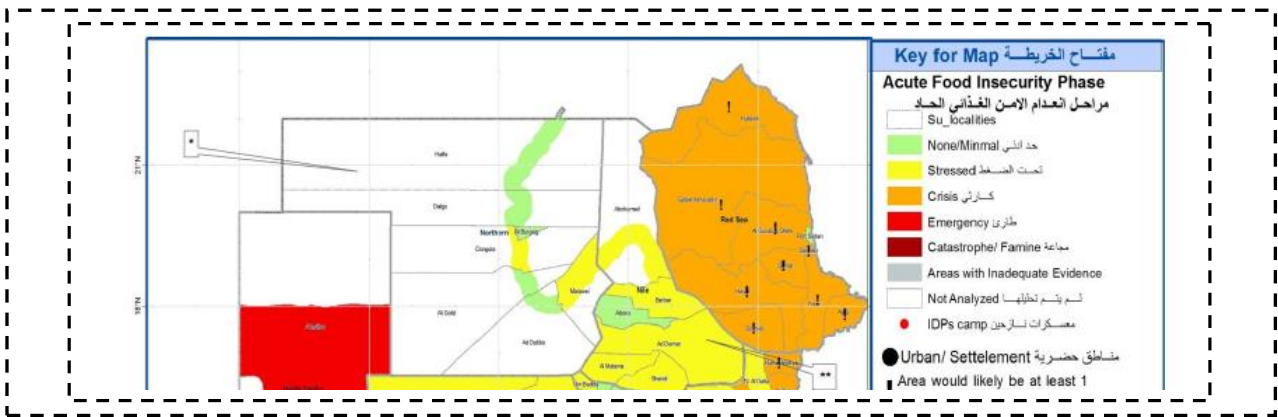


Chart; 4 Prevalence of stunting and underweight by age



Source: S3M survey, 2013

2.2. Mapping malnutrition and food insecurity



*Suggest to include the IPC map here as well (July-Sept 2014 projection)
 Map: Prevalence malnutrition / food insecurity/ other indicators of nutritional status among by region*

2.3. Regional analysis of malnutrition and food insecurity

The Global Hunger Index (GHI) considers Sudan's food insecurity situation as "alarming" and ranks it at 74 of 78 analyzed developing countries, making it the most food insecure country in the MENA region (IFPRI, et al 2013). The GHI is a tool developed by IFPRI for regularly describing the state of global hunger.

Inadequate dietary intake and diseases are fundamental to food and nutrition insecurity. Many surveys have repeatedly shown a high prevalence of diarrheal diseases, Acute Respiratory Infection (ARI) and malaria, low coverage of measles vaccination and food deprivation. Statistics show that average available calories from all foods in Sudan varied from 2187 to 2282 Kcal per capita per day during 2003-2007 which put the country at the margin of standard energy requirements of 2100-2200 Kcal per person per day. These levels are way below the world average of 2749-2798 Kcal as well as averages reported in various regions of the world, e.g., North Africa (2948-3016), Southern Africa (2884-2918) and West Asia (3037-3104). Moreover, they obscure great disparities among states illustrated by high levels of under nutrition as described above.

Overall, a third of Sudan's population, about 13 million people, suffered from food deprivation². Most Sudanese earn their living from agriculture and agriculture-related activities. Most rural households, including farming families, buy most of their food from the market. An indicator of problematic food access is the portion of households' income allocated to food purchases. The higher the amount spent on food, the more critical access to food is. In 2009, expenditure on food was about 61% of the total national household consumption expenditure, which was higher in rural areas (66%) than in urban areas (56%). On the other hand, about 81% of the national dietary energy consumption was from purchases, which was lower in rural areas (81%) than in urban areas (92%). Only 7.6% of the overall dietary energy consumption came from own production. And it was unsurprisingly higher in rural (11%) than in urban areas (1.4%). Furthermore, a significant percentage of households depended on food aid in conflict-stricken areas.

Poverty is closely associated with food and nutrition insecurity. Yet poverty is perhaps more closely associated with food access – probably also food utilization. Analyses in 2009 put poverty prevalence at 46.5%, with 26.5% of the urban population and 57.6% of the rural population falling below the poverty line. Huge disparities exist among states, e.g., rural poverty prevalence was especially high in nine out of Sudan's 18 states, which range from 59% to 80%. Sudan ranks number 171 out of 179 countries in International Human Development Index (UNDP, 2013). There are national policies and projects for poverty reduction and social protection but they have their limitations. Health insurance was mainly targeting the formal sector but currently it is expanding all over the country to cover the poor population. Nevertheless, this expansion faces difficulties in expanding to the poor due to the absence of clear national monetary pro-poor policies. Although *Zakat* is a fund dedicated to the poor, it is inadequate- <1% of total national expenditure (PHC Policy Brief, 2012). The social protection project is a promising project, it includes direct cash payment and micro-financing but, it is not sustainable and hampered by lack of dedicated government support. Significant levels of food deprivation are revealed by low HPI for Sudan in 2006, which ranged from 41% to 58% in nine out of

² NBHS 2009

the 18 states, with West Darfur, South Kordofan, South Darfur and Blue Nile recording the highest levels. The four relatively better-off states comprised Khartoum, Gezira, North and River Nile. Other important food utilization influencing factors are food quality as determined by nutritional content, safety and processing attributes, all of which face various challenges. Major factors behind that are; the weak country infrastructure in terms of transportation, poor use of technology, insufficient market management, limited investment in agriculture that the share of agriculture in the financial sector allocations dropped from 33% in 1998 to only 8% in 2007 (ICARDA, 2012).

In addition to the above-mentioned issues, malnutrition prevention strategies directed towards stunting reduction are not yet among national priorities. In the national 5-year strategic plan for health 2012-2016 the presence of nutrition is very limited and presented only as Vitamin A supplementation indicators (JANS, 2013). The current nutrition policy focuses on treatment of acute malnutrition with minimum attention to preventive strategies and limited integrated approaches. It is also good in mortality reduction but not helpful for addressing the high malnutrition situation in Sudan or the widespread prevalence of stunting.

Influence of Climate Change on Food Security and Nutrition

Sudan's inherent vulnerability to climate change is exemplified by the fact that food security is mainly determined by rainfall, particularly in rural areas where more than 65% of the population lives. In the Kordofan Region for example, climate monitoring models predict that millet production will decline between 15% and 62%, and sorghum yield between 29% and 71% in the period 2030-2060. Mainstreaming of climate adaptation efforts in the face of such risks will require a national land use plan and reform of land tenure system; policies and strategies that guarantee food security and the provision of a social safety net, potable water; strategies that enhance agricultural productivity; and a national early warning system that monitors changes in food security and nutrition key indicators among others (Nimir, 2011).

Vulnerability to climate change

An examination of Sudan's ecological zones indicates that the majority of its land is quite vulnerable to change in temperature and precipitation. The country's inherent vulnerability may best be captured by the fact that food security is mainly determined by rainfall, particularly in the rural areas where more than 65% of the population lives (Nimir, 2011).

Mean annual temperature lies between 26° to 32° but in some places it reaches 47° C. . Rainfall is erratic and varies significantly from the North to the South. The unreliable nature of rainfall together with its abundance during the short growing season increases the vulnerability of the rain-fed agricultural system. The trend of decreasing annual rainfall in the last 60 years (0.5%) and increased rainfall variability is contributing to drought conditions in many parts of the country. This pattern has led to serious and prolonged drought episodes. For example, Sudan experienced a succession of dry years from 1978 to 1987 resulting in severe social and economic impacts including many human and livestock fatalities and migration and displacement of unspecified number of people estimated in several millions. Drought related problems such as the one mentioned above will increase vulnerabilities and livelihood uncertainties (Nimir, 2011).

Sudan also experienced many devastating floods, of two specific types, during the past several decades. The first type occurs during torrential rain when high levels of water overflow the River Nile and its tributaries, usually due to above normal rainy seasons in the Ethiopian Plateau. Severe floods were reported in 1946, 1988, 1994, 1998 and 2001. The other type of flood occurs as a result of heavy localized rainfall during the rainy summer season and such incidents were reported in 1952, 1962, 1965, 1978-1979, 1988 and 1997. In addition to drought and floods, there are other climate extreme events such as dust storms, thunderstorms and heat waves whose occurrence though less frequent, still pose serious threats to local livelihood (Nimir, 2011).

Beside the adverse economic impacts of these climate changes related phenomena there are also associated social impacts. For example, during drought events conflicts occur due to competition over diminished natural resources. Also as observed many times, famine lead to food shortages, followed by displacement and refugees which in turn leads to destructive coping mechanisms where natural resources becomes primary sources household income. During floods and droughts, people typically move to cities straining already at-capacity basic services. The displaced also live in dire conditions that can lead to criminality that undermines stability and security (Nimir, 2011).

Non climatic factors also contribute to increased vulnerability, especially in rural areas and local communities. Studies from the preparation of the Sudan National Program of Action (NAPA) show that in five states representative of the country's five ecological zones, non-climatic factors that increased vulnerability included: deep poverty; a lack of income diversity; a lack of agricultural inputs; resource mismanagement; decreased cultivation; fragile land and water resources; poor soil fertility; deforestation; resource based conflicts; poor extension services; community displacement and poor sanitation and health services (Nimir, 2011)

Expected Impacts of Climate Change

Climate scenarios analysis conducted as part of the preparation of Sudan's First National Communication in one of the Sudanese Administrative Regions (Greater Kordofan) indicates that the average temperature is expected to rise significantly relative to baseline expectations. By 2060 projected temperature ranges from 1.5° C to 3.1° C during August and between 1.1° to 2.1° during January. Results from some models show that average rainfall decreases about 6mm/month (5%) during the rainy season. Such changes in temperature and rainfall will affect adversely the most important sectors in Sudan, namely agriculture, water resources and health (Nimir, 2011).

Population of Sudan

The population of Sudan increased from 14.4 million in 1980 to approximately 35.7 million in 2010. It is expected to increase by about 2.16% of projection rate which make the population of Sudan to reach 77.1 million in 2050. The growth rate of the population in Sudan decreased from 3.41% for the period 1980-1985 to 2.42 % in 2005-2010. It is projected that the growth rate of the Sudanese population will keep on decreasing to reach 2.16% per cent in the period 2045-2050 (UN, 2012).

Life Expectancy: Life Expectancy at Birth in Sudan gained 6.4 years from the period 1980-1985 to the period 2005-2010, increasing from 54.5 years to 60.9 years. It is projected to reach 67.7 years for the period 2045-2050 (UN, 2012).

Infant Mortality: The Infant Mortality Rate (IMR) of the Sudanese population was estimated at 87.0 infant deaths per 1,000 live births in 1980-1985 and decreased to 59.7 infant deaths per 1,000 live births in 2005-2010. It is projected to continue this downward trend to reach 34.3 infant deaths per 1,000 live births in 2045-2050 (UN, 2012).

Under-Five mortality: The under-five mortality rate was estimated at 143 deaths under age five per 1,000 live births in 1980-1985, and has decreased to 93 deaths under age five per 1,000 live births by 2010. It is projected to continue decreasing to reach 48 deaths per 1,000 live births by 2050 (UN, 2012).

Fertility Rate: The total Fertility Rate in Sudan declined from 6.63 children per woman in 1980-1985 to 4.83 children per woman in 2005-2010. Projections show that total fertility will decline further to reach 2.81 children per woman in 2045-2050 (Replacement level fertility is 2.1) (UN, 2012).

Contraceptive Prevalence: The prevalence of contraceptive use among married or in-union women aged 15 to 49 was estimated at 11.8 per cent in 2010 and increased to 13.4 per cent in 2012. Contraceptive use among women aged 15 to 49 is projected to increase to 16.0 per cent in 2015³.

Internal Migration: The percentage of urban dwellers increased from 20.0 percent in 1980 to 33.1 per cent in 2010. Population projections show that this percentage is expected to reach 50.8 per cent by 2050.

Sudan's Population Age Composition: The proportion of the population under 15 years of age has been decreasing since 1980 and is projected to continue this downward trend to the year 2050. At the same time, the proportion of the working-age group (15-64) has been increasing since 1980, where it rose from 50.1 per cent to reach 54.8 percent in 2010. It is projected to continue this upward trend and will reach 64.1 per cent by 2050. The proportion of the elderly (65+) population has been increasing at a very slowly since 1990 where it stood at 2.9 per cent to get to 3.1 per cent in 2010. Projections show that the elderly population is expected to continue this upward trend to reach 6.0 per cent in 2050 (UN, 2012).

Urbanization: Sudan is one of the fastest urbanizing countries in the world. Population figures show that the country was already 40% urbanized in 2005—and that figure excludes conflict displaced people of Darfur and the large numbers of unregistered migrants and squatters in Khartoum. Darfur today is approximately one third urban, one third rural and one third displaced. The CIA Fact book indicates that:

- a. **Urban population:** 33.2% of total population (2011)

³ United Nations, World Contraceptive Use 2012

<http://www.un.org/esa/population/publications/WCU2012/MainFrame.html>

- b. Rate of urbanization:** 2.6% annual rate of change (2010-15 est.) This urbanization processes is occurring without social and political pressure (African Arguments, 2008).

Biofuels:

In Sudan, biofuel is in its infancy as a by-product of sugar factories in Kenana and White Nile. Biofuels provide important new opportunities for income and employment generation, in addition to bringing much needed capital, technology and knowledge to developing country agriculture. Other analyses have identified negative impacts of biofuels on poor farmers and their communities either directly in the form of land expropriations or indirectly through the concentration of resources on large-scale farming operations.

2.4. Identify major constraints to implement the 1992 National Plan of Action for Nutrition and identify challenges and opportunities for improving food and nutrition security.

Challenge and opportunities for improving food and nutrition:

Opportunities:

There are multiple unexploited opportunities in Sudan that can improve its food and nutrition security. These include:

- a) **Open market economy system:** The change toward an open economy system creates an environment conducive for international partnership and investors in general that avails opportunity for advancement and transfer of technologies for every sector. This allows competitive production system including agriculture production, training and access to niche markets for high value and organic products.
- b) **Harnessing surface water run-offs:** Every year, Sudan loses an estimate of billions cubic liters of water to both neighboring countries and red-sea. Application of water harvesting technologies on a large geographical scale potentially creates an opportunity to increase agriculture and fishery productivity, avail portable water for household use and create artificial micro-climate that regenerates bio-diversity.
- c) **Improved agriculture productivity:** Through Public awareness and trainings, improvement of the country's agriculture production system can lead to balanced economic growth through linking agriculture production to industrial development; hence improve food security and reduce malnutrition among children and breast feeding mothers.
- d) **Optimal use of shared Water resources:** Strategic utilization of Sudan's share of the Nile waters efficiently and effectively for development (food security and energy) could potentially change the lives and livelihoods of significant part of the country's population.
- e) **Sudan is geographically placed:** The strategic location of Sudan in Africa and the Arab World and its proximity to Europe makes it a potential country for opportunities, trade and investment.

Challenges:

- a. The policies, institutions and procedures which control financing are not suitable for financing small scale agricultural producers, nor is it appropriate for financing infrastructure.
- b. Impacts of climatic changes resulting in fluctuations of production and productivity.

- c. 85% of the animal resources depend on pastoral and transhumant system of production, which render the provision of services and the transfer of technology needed for the improvement is difficult.
- d. Trade barriers established by developed countries to protect their producers limit access to their markets.
- e. The continuous deterioration of natural resources has a negative impact on the agriculture and competition between settled farmers and pastoralists over land and water resources is associated with insecurity and tribal conflicts.

Major challenges impeding the nutrition program implementation have been identified as follows:

- a. Absence of legislations on food fortification, Marketing of Breast Milk Substitutes (BMS), and maternal and IYCF protection;
- b. Poor program management, frequent staff turnover, poor coverage, inadequate supplies, and low prioritization of funding to nutrition;

Routine nutrition service delivery is further compromised by the fact that nutrition educators who are basically assigned to PHC centers only implement it, which leaves the community level deprived of this service. There are 1603 nutrition educators in the country carrying out growth monitoring, health education and other basic nutrition services, but cover only 36% of PHC facilities. There are 727 Nutrition Officers (university graduates) who provide more specialized nutrition services as well as program management at federal and state levels. The ENP is implemented across Sudan, covers all 18 states; however only 36% of the health facilities provide nutrition services (NIS, 2013), mainly due to climatic vagaries, but also due to deficient use of improved production practices. Current Information shows that Sudan continues to have a wealth of livestock in terms of numbers even after the separation of South Sudan; exceeding 100 million heads of cattle, sheep, goats and camels. Livestock contribute about 13% to the country's GDP, Both livestock numbers and their productivity is vulnerable to dry seasons, drought episodes and climate change.

Fruits and vegetables production is widely spread in the country but encounters many problems that impede sustainable supply, thus leading to frequently high prices and limited access by many households, especially poor families. In addition to the inherent seasonality, fruits production suffers from scarcity of healthy planting material, poor pest and disease management, deficient input use impairing fruit suitability for long-term storage or export, and high harvest and post-harvest losses. Aquaculture and fisheries opportunities in Sudan are vast and require attention for investment to improve food and nutrition security in the country.

1. Long-term Quarter Century Strategy of the Agricultural Sector (LTS) during the Period 2003 – 2027 :-

The Main Objectives:-

- a) To ensure Food availability at reasonable prices, stable quantities of safe and nutritious food accessible to all citizens at all times. It was also intended to gradually build a grain reserve equivalent to the consumption requirements of one year.
- b) Promotion of agricultural exports through enhancing the competitiveness of the commodities in which the Sudan enjoys a comparative advantage.
- c) Sustainable development of natural resources and control of desertification.

- d) Poverty reduction through generating employment opportunities, improving living conditions and contributing the overall growth of the economy.
- e) Forward linkage with those sectors supplying agriculture with inputs and backward linkage with those sectors receiving agricultural products and raw materials.
- f) The strategy also included detailed objectives for each sub-sector.

2. The National Plan for the Year 2005-2006:

The cores of these policies were devoted to enhance the Ministry of Agriculture and Irrigation and other related ministries in the following areas: (i). Increasing of participation umbrella; (ii); Ensuring of Federal Governance policies and distribution of roles and (iii) Coordination between the Ministry of Agriculture and Forests and other related ministries focusing on food security:

2.1. Food Security and Poverty Reduction Policies:- (i). Empowerment of Strategic food Reserve Authority; (ii). Approval of Self-sufficiency from Wheat production and approval of policy of wheat and yellow sorghum; (iii). Establishment of Food security nets and rural development and reactivation of Early Warning System; (iv). Establishment of Agriculture network and (v). Establishment of Agriculture Information Network,

3- Agricultural Revival (2008-2011)

The Government Establish National Plan for the Year 2007 called Green Mobilization which was later on replaced by Agricultural Revival, in 2008-2011 (A part from Quarter Century Plan), Agricultural Revival Plan was the main branch from the general economic policy.

The government's political will was in support of the general recognition of agriculture as one of the major divers of the economy. In the Agricultural Revival Plan, agriculture was given the highest priority over the other production and service providing sectors. Increased resources was mobilized to effect agricultural transformation which would have result in the transfer of the agricultural sector from a traditional to a progressive modern sector attracting employment, contributing to poverty reduction and sustainable agricultural development and improvement of the nutritional status of the population.

3.1. Strategic Objectives of the Agricultural Revival Plan: The agricultural transformation plan aims at achieving sustainable and balanced economic and social development to reduce poverty and achieve the welfare of the people of Sudan.

3.2. Direct Objectives:

- a) Increasing the productivity and efficiency at the production and processing stage.
- b) Promotion of the exports of crops and livestock with a view to safeguarding against the risks of collapse of the whole economy as a result of the distortions emanating from over-dependence on oil revenues.
- c) Realization of food security.
- d) Reducing poverty to 50% by 2015, generation of job opportunities and increasing per capita income.
- e) Achievement of a balanced growth in all regions of the country with the view to encouraging settlement in the rural areas.
- f) Development and protection of natural resources to ensure its renewal and sustainability.

3.3. Strategies of Agricultural Revival Plan: poverty reduction strategy, food security strategy...etc.:

Food security strategy: Adoption of the food security strategy based on the following:

- i. Avail adequate food for consumption through policies encouraging the small producer to produce more and particularly the small farmers in the areas away from the markets.
- ii. Take necessary steps towards reducing the big variation in the prices of the main food crops.
- iii. Strengthening the capacity of the Strategic Reserve Corporation so that it provides for a reserve of the basic foods adequate for two years and also provides for the needs of the victims of the drought, the displaced, the elderly and widows etc.

Policies Required to Achieve the Agricultural Transformation: Achieving the agricultural transformation requires sustained macro and sectoral policies with commitment for its application by all the government agencies among them are the FSP policy as shown below:

Food security policies: (FSP)

a) Policies to support Food Access

- 1) Market and trade policies to stabilize food prices,
- 2) Food and fiber processing industries,
- 3) Social and humanitarian interventions (in close cooperation with NGOs and regional and international organizations),

b) Policies to support Food Utilization

- 1) Medical and health care in designing programs to incorporate food security information,
- 2) Educational and nutritional law,
- 3) Water and sanitation,
- 4) Other food utilization interventions,

c) Food Security action plan

- 1) It targets the improvement of food and nutrition situation, through promoting smallholder based agriculture and food production and
- 2) Improving food access, food quality and stability, strengthening rural services and improving the policy and institutional environment for food security

Most supportive agricultural policies of the Year 2012-2013-2014 are:

- a. To complete the institutional reform of the irrigated projects,
- b. To reduce the cost of production through the electrification of irrigation projects,
- c. Work on policy of diversification and agricultural intensification,
- d. Introduction of new crops in the agricultural cycle in both irrigated and rain-fed,
- e. Seeking to enhance the performance of existing projects,
- f. Increase the use and application of the most technical harmonization packages for commercial production include plant density, fertilizer, land preparation and improved seeds,
- g. Linking agricultural production of plant and animal,
- h. Agricultural industrialization,

- i. Encouraging wheat and cotton growers to increase production by setting incentive prices,
- j. Raising the efficiency of agricultural operations using modern technologies (e.g. laser flatness),
- k. Provide different services to the agricultural sector (irrigated and rain-fed) e.g., information, modern technologies, training and capacity building),
- l. Adoption of water harvesting techniques to stabilize and increase production,
- m. Complete the structures of organizations of producers to help them to improve their access to technologies, funding and better opportunities for marketing,
- n. Expansion in the introduction of technologies and successful models, like the system of (Zero-tillage) as a successful system in certain areas of Sudan,
- o. Increase in agricultural research and extension and localization technologies,
- p. Seek to provide improved seeds of high-yield crops (Peanuts -sesame-millet-wheat),
- q. The importance of the using different type of fertilizers beside the urea,
- r. Increased interest in strategic partnerships in general, especially with companies from other countries in the introduction and cultivation of new crops, such as Brazil, China...Etc.

3.1 Food Security Policies, Strategies and Action Plans:-

The process of formulating the food security policy in Sudan: -

- 1) Address the Ministry of Agriculture for the importance of national policy for food security in Sudan,
- 2) Formation of a special committee to write policy and participate in meetings of each relevant actors,
- 3) Finalize the preliminary draft and enlightenment workshop for the experts in the field of food security,
- 4) Issuing of the final draft of the document and displayed it in national work shop with the participation of FAO, sponsored by the Presidency of the Council of Ministers

Policies and key strategies addressing food and nutrition are taking place in various ministries, including the Federal Ministry of Agriculture and irrigation, Federal ministry of health, the Federal Ministry of Education and Federal Ministry of Water Resources. However each sector has a separate policy and strategy to solve the problems of malnutrition and food security.

- a) In June 2008, the FMOH published the National Nutrition Policy and key strategies for the period 2008 -2012, settings out guidelines for implementation that establishes the type of structure and working methods that are required for realizing the vision.
- b) The national nutrition strategic plan (NNSP) 2013-2016, intended to transform the overall national health sector strategy into a clear guiding document to facilitate operational planning and resource mobilization taking into account the Sudan context and its commitment to reach the MDG target of reducing the number of people suffering from hunger by 2015 by 50%, and the Global Nutrition targets endorsed by the sixty fifth World Health Assembly resolution WHA65.6.

- c) It aims to support the country in establishing and implementing nutrition interventions, according to the local situation and resources to protect and promote healthy child and maternal nutrition, prevent acute, chronic and micronutrient under-nutrition. It also addresses emerging issues of over-nutrition to overcome increasing rates of obesity and diet-related non-communicable diseases. The main strategic objectives is to create a supportive environment including political commitment, multi-sectoral coordination; management of acute malnutrition; both severe and moderate malnutrition; prevention of malnutrition through improving infant and young child feeding practices and services and increase micronutrient uptake as well as to build capacity for programme management in general and for emergency preparedness in nutrition and adopt the life-cycle approach for ensuring good nutrition to all age groups .
- d) Nutrition is also among the core programs addressed through the National Maternal and Child health Acceleration plan 2013-2015. It is an integral part of the PHC expansion plan which aims at operationalizing the National Health Strategic Plan for 2012-16. It sets out key targets for newborn, maternal and child health interventions in line with global and regional commitments; supported by our partners WHO, UNICEF, and UNFPA.

The National nutrition program developed the national manuals of diet therapy to promote health and good nutrition for all Sudanese; It's an essential guide to the key principles of dietetics and a core text for healthcare professionals looking to develop their expertise and specialist skills. It covers the professional practice, nutrition in specific groups, nutritional status and non-clinical areas of dietetic practice, with focusing on clinical dietetic practice, including nutrition support, and dietetic practice. The Supplementary Feeding Programs (SFP) Guidelines usually provide food supplement to the normal diet for moderately malnourished in emergency and non-emergency context to prevent individuals that are at-risk of malnutrition and those that are moderately malnourished from becoming severely malnourished; as well as treat those with moderate malnutrition. It's also intended to be used by health and nutrition managers and health care providers working at different levels of health and nutrition service provision in all states, as well as national training institutions and implementing partners. CMAM manual for Sudan addresses the community-based management of severe acute malnutrition (CMAM) in children 6-59 months. The manual provides practical and easy-to-follow guidance based on evidence and best practices in community-based management of SAM in children 6-59 months, based on Ready – to- use Therapeutic Food (RUTF).

The Government of Sudan has committed itself to actions required to improve and monitor the improvement of conditions for children. These commitments include:

- a) The Millennium Declaration and the Millennium Development Goals, adopted by all 191 United Nations Member States in September 2000,
- b) The Plan of Action of A World Fit For Children (WFFC), adopted by 189 Member States at the United Nations Special Session on Children in May 2002,

- c) The Arab World Fit for Children, the Arab charter for child rights, the second Arab childhood strategy and plan of action, and the programme of action adopted in 2004 at the International Conference on Population and Development.
- d) The National Constitution of the Republic of Sudan (2005) states that the “State shall promote public health, establish, rehabilitate, develop basic medical and diagnostic institutions, provide free primary health care and emergency service for all citizens”.

The nutrition programmes are mainly provided through routine health services. Health policy and the performance of health system are therefore critically important for improving the delivery of nutrition services.

The NHSSP outlined the current status of Sudan’s health system according to the WHO six building blocks of health systems summarized below along with the special features for nutrition.

Health system governance is led by FMOH with oversight from a multi-sectoral National Health Sector Coordination Council, chaired by the President and including state governors. This provides a mechanism for encouraging cross-sector coordination and addressing issues affecting the states. The FMOH leads on policy development however implementation of policies and strategic plans is challenged by the capacity of the states and locality levels.

The National Health Policy (2007), the 25 years national strategic plan 2007, and the nutrition policy 2008 emphasized the nutrition of one of the priority national agenda. Implementation of the nutrition policy is not yet evaluated. Furthermore, Nutrition is emphasized within the current NHSS 2012-2016. The NHSS focuses on 1) increasing access to a basic package of PHC services including nutrition 2) strengthening referral care; and 3) ensuring social protection. All of these issues will substantially affect access to, and quality of, nutrition related services.

Multiple partners support the MOH (Federal and State level) to implement and coordinate nutrition response in Sudan. The major UN agencies providing support include WFP, UNICEF, WHO and FAO. A host of guidelines and protocols have been developed to assist with the standardization and provision of quality interventions, including CMAM, hospital management of SAM, Essential Nutrition Package (ENP), (IYCF), etc.

ENP is implemented across Sudan, covering all 18 states; however only 36% of health facilities are providing nutrition services.

Nutrition information system (NIS)

Nutrition information is collated through various sources; programmatic data, health facility data and through regular or ad-hoc surveys. The data can however sometimes be fragmented, delayed and for the national surveys, is generally limited as it is collected from regional level only. Early warning data can provide useful information for impending droughts such as those experienced during the Horn of Africa food crisis 2012, which affected some of the eastern states.

The MoH hospitals generally report regularly but there are gaps in reporting from PHC facilities in many states and low coverage of other sectors including private providers. An improved system for routine data collection has been put in place under the National Nutrition Directorate (NND) at FMOH. A web-based system is also under development. Currently all the states (18) reports regularly on almost all districts except for security compromised areas; however facility reports are perceived to be much lower (data base results is under process).

Nutrition surveillance system was established with support of concerned United Nations (UN) agencies in conflict affected areas and is planned to be expanded to other states.

2.5. Food and agriculture programmes and interventions being implemented to improve nutrition.

2.5.1. Agriculture Programs and Projects

a. Special Program for Food Security

For concerns of the rural sector in Sudan, FAO has supported the Government of Sudan in the field of sustainable agriculture and food security since 1997, when the Special Program for Food Security (SPFS) was initiated on a pilot scale in North Kordofan on water control. Building on the positive experiences, the program has expanded and is currently active in four states, supported by FAO through trust funds with Libya, OPEC and Spain. It supports food security at the community and household level on irrigation and water development, land improvement, crop intensification and small ruminants production.

Other programs are summarized in the table below.

Table XX

	1. Project Description	Name: Cultivation of vegetables for the development of forest in Guli village Duration of the project: Donor: FAO Implemented By: Federal Ministry of Agriculture Beneficiaries: Farmers
	General/ Specific Objective	To supports food security at the community and household level on irrigation and water development, land improvement, crop intensification and small ruminants' production.
	Program component	1) Intensification of Crops. 2) Diversification of Production. 3) Water Control and Management. 4) Constraints Analysis.
	Program Objective	a. To improve and boost livestock and crop production through enhancing and sustaining local technologies and practices that proved successful. b. To eliminate or reduce the large year-to-year variation in livestock and crop production. c. To improve and/or introduce income-generating activities for the low-income groups. d. Identify and analyze the causes of food insecurity and the production constraint. e. Identify and quantify the issues concerning poverty levels in each site. f. Promoting social equity and conservation of the natural resources base and assessment of accessibility and other poverty issues in the process of interventions, implementation and technology transfer. g. Intervention whenever possible would target the poor and be gender sensitive. To ensure the sustainability of any successful intervention, participation of local farmers, community, and institutions is essential.
	Summary Results	i. Productivity increased in the project area compared with that of the agricultural research which was estimated at 58 kg i.e. a noticeable increase in productivity, this means productivity/ <i>feddans</i> improved this due to the training of farmers and seasonal training of the beneficiaries of the program. ii. Increased revenues from crop production in the program sites compared to the traditional system as the following ratios:

		<ul style="list-style-type: none"> • An increase in the average revenue by 301% in water harvesting. • The average net return of the beneficiaries in the gravity and pumps in Khor Abu habil, increased despite the rising of the production costs because high productivity and higher returns had achieved than traditional means. <p>iii. Increase in average net return of the beneficiaries in the gravity supplementary irrigation compared with that of the traditional farmers. Also, increase of that of beneficiaries with pumping sets compared by the traditional farmers.</p> <ul style="list-style-type: none"> - Increase of households' income for those using irrigation through pumping leading to many farmers requesting for expansion in pumping irrigation. <p>iv. Recommended research increasing the acreage of the vertical expansion in the program sites to contribute in increasing the income of farmers.</p> <p>v. Number of farmers' in field schools is 59% of who were men and 49% are women.</p> <ul style="list-style-type: none"> - Training program included the training of trainers and training of farmers, 60% of who are men, and 40% for women. <p>vi. Consumption rates of main crops exceeded the standard rate in all program sites and this shows that the program had provided food to beneficiaries and therefore contributed to food security and improved nutrition levels.</p> <ul style="list-style-type: none"> - Nutrition improved from availability of food and diversification of production. <p>vii. The implementation of the revolving fund increases the number of beneficiaries.</p> <p>viii. The farmers' organizations enhance the process of technologies application and facilitate the availability of services.</p> <p>ix. In line of food security, Sudan's program comprise emergency response and recovery activities that aim to rebuild the food security and livelihoods of households affected by conflict and natural disasters (returnees, host communities and the displaced). Rehabilitation activities run parallel to the FAO's longer-term recovery program, which aims to build institutional capacity for improved policy, rural service delivery and local private sector development.</p>
	1. Project Description	<p>Name: National Project for wheat, Duration of the project: 1997-2017</p> <p>Donor: Ministry of Finance and Economy</p> <p>Beneficiaries: Farmers</p>
	General/ Specific Objective	<p>General objective:: Contribute to achieving food security through self-sufficiency of wheat crop and boost agricultural development for expansion in the cultivation of other crop in the wheat cycle.</p> <p>Specific objectives::</p> <p>a. Optimal utilization of resources to take advantage of climatic conditions and comparative advantage of the States for agricultural production.</p>

		<ul style="list-style-type: none"> b. Increase production of other crops such as beans, spices, horticulture and fodder. c. Enhancement of the agricultural development and increase the income of producers to contribute to the reduction of migration from the rural to the urban. d. Electrification of agricultural projects to reduce the cost of production. e. Raising the level of the use of technologies and create appropriate conditions for investment. f. Import substitution and improvement of the trade balance.
	Project Component	<ul style="list-style-type: none"> • Irrigation electrical units. • Irrigation equipment and installations • Agricultural mechanisms preparations.
	Project Outputs	<ul style="list-style-type: none"> a. Increase the area cultivated from different crops. b. Self-sufficiency from wheat crop. c. Increase the productivity of the crop by improvement in agricultural research, production of improved seeds, technology transfer and extension and development of irrigation techniques. d. Expansion in cultivation of other crops e.g. vegetables like potato, tomato, beans, spices and fodder, this help in increasing in the areas cultivated by mango and dates. All these crops affect the nutritional status of the people in the area. e. The farmers benefit from the byproducts of the crops in feeding their animals. f. The using of the modern technology in the area of irrigation like the pivot irrigation. g. The ability of the project to provide a suitable number of tractors and accessories in addition to combines cars...etc.
	2. Project Description	<p>Project Name: Development of seeds produced and achieved the value added in Sudan</p> <p>The project area: the state of North and South Darfur</p> <p>Date of the beginning of the project: December 2013</p> <p>Date of completion of the project: November 2015</p> <p>The executing agency for the project: the Ministry of Agriculture and Irrigation</p> <p>Donor: Food and Agriculture Organization (FAO)</p> <p>The size of the funding: 37,000 USD</p>
	General/ Specific Objective	The project aims to provide the local genetic origins for development of agricultural crops of corn, millet, groundnut, sesame seeds and a group of vegetables,
	Project Component	Activities: implementation of the control system of seeds certification,

		<p>Improve crop production technologies with increase of the quality and quantity of crops (such as groundnut, sesame, maize, millet, vegetable crops),</p> <p>Seeds industry by collecting certified seed produced through cooperatives and producer groups and then cleaning and packaging of seeds certified by the Agricultural Research Center.</p> <ol style="list-style-type: none"> 1. Partnerships between NGOs and the Ministry of Agriculture, Agricultural Research Center, the Food Agriculture Organization the World Bank agricultural cooperative producers group 2. Monitoring and evaluation (ARC): The Ministry of Agriculture to collect field data through the extension officers and farmers through communications, technology transfer and field data collection,
	Project Outputs	<ol style="list-style-type: none"> i. Established permanent farm research Centre with a total area of 100 acres for seed production, ii. Infrastructure prepared for water harvesting and water points (excavation and groundwater wells), iii. Trained staff, extension officers, farmers and cooperatives, communications, producers by the Federal Ministry of Agriculture and the Ministry of Finance.
	3. Project Description	<p>Project name: Albutana Project for Integrated Rural Development</p> <p>Project Area: The project area is about 65,000 square meters, Bordered by the River Nile, Atbara from the north-east, the River Nile from the north-west, the Blue Nile from the south west of Kassala and of Gedaref road from the south-east</p> <p>Funding:</p> <p>IFAD 24,799,233 USD</p> <p>The federal government: 03,233,377 USD</p> <p>The state governments: 01,055,906 USD</p> <p>Target beneficiaries: 766.462 USD</p> <p>The target groups: The project targets families of farmers, nomadic pastoralists from the smallholder sector in irrigated and rain-fed agriculture.</p>
	General/ Specific Objective	To improve the livelihoods of rural households.
	Project Component	<ul style="list-style-type: none"> • Institutional support and project management. • The development of agriculture, forestry and pasture. • Animal Development and Marketing. • Society Development.
	Project Outputs	<ul style="list-style-type: none"> • Strengthen community-based organizations.

		<ul style="list-style-type: none"> • Social skills. • The development of traditional cultivation gears. <p>Results of the project: Improve crop production technologies with increase of the quality and quantity of crops (such as groundnut, sesame, maize, millet, vegetable crops) and to achieve food security and nutrition.</p>	
	4. Project Description	<p>Project for supporting small-scale producers for rainy - sector Sinnar state</p> <p>Work area of the project: area covers three of the seven localities among the population in the project, area 390,000 people (representing 30% of the total population of the state).</p> <p>Funding for the project: Funding for the projects a partnership between the Government of Sudan and the International Fund for Agricultural Development (IFAD)</p> <p>The size of the funding: 90000 USD</p>	
	General/ Objective	Specific	<p>The purpose of the project is to reduce rural poverty, increase food security and increased income to the number of 20,000 households in the project area. The project aims basically three sets of social and economic characteristics of the following:</p> <ol style="list-style-type: none"> 1. smallholders (less than 9 acres) and /or 5 small ruminants. 2. Settled pastoralists. 3. The Poor women
	Project Component	<ol style="list-style-type: none"> a. Technology Transfer: Remove impediments to productivity of field crops and livestock. b. Access to markets and management of post-harvest operations c. Capacity building and institutional support make arrangements for the capacity building of producers and the development of laws that help to use the land and water resources in a sustainable manner and to establish an effective administration 	
	Project Outputs	Increase food security and nutrition, increased income to the number of 20,000 households in the project area	

B. Nutrition Programs and Projects

Interventions under the emergency response for management of malnutrition have been implemented in Sudan. One of such nutrition programs is Community Management of Acute Malnutrition (CMAM) program and has been widely implemented in the 3 Darfur states since 2001, mostly through NGOs until 2009 when operational licenses of some of the NGOs implementing CMAM were revoked and expelled out of the country. CMAM were mainly implemented in Darfur until 2010. Currently MAM has been scaled up to cover 7 other states in addition to the 5 Darfur States. Almost 29,000 children have been treated for severe acute malnutrition, giving coverage of approximately 11% of children with SAM. This means that 90% of children still do not have access to this life-saving treatment.

Prevention of malnutrition: micronutrient initiatives & Infant and young child feeding. The issue of infant and young child feeding (IYCF) has attracted great attention over years; particularly the Baby-friendly Hospital Initiative, the International Code of Marketing of Breast-milk Substitutes, and Protection, Promotion and Support of Breastfeeding. This work is now starting to support exclusive breastfeeding, including training health staff using approved WHO training packages, and training for mothers and community support groups including training on counseling skills.

Essential Nutrition Package: The essential nutrition package is implemented at National scale, covering all 17 states of Sudan. It includes routine interventions implemented through all health clinics including growth monitoring, micro-nutrient supplementation for pregnant and post-partum women and monitoring of low birth weight. Over the last 2 years there has been a large amount of investment in training staff to carry out these activities. Coverage of growth monitoring is approximately 6% (Jan-Jul 2011) of children less than 5 years across all 17 States, and this proportion falls when considering the proportion who returned for the correct number of follow-up visits.

Child health days are also implemented twice per year and ideally include Vitamin A supplementation and de-worming for all children 6 months to 5 years. So far in 2011, the Ministry of Health has not permitted mass de-worming to be carried out due to fears of the un-safety of tablets for children. Vitamin A coverage in accessible areas is high according to campaign data; however there remain pockets of hard-to-reach areas and national coverage was shown to be 60.5% on the 2010 SHHS.

Nutrition Surveillance: The National Nutrition Information System comprises information from selective feeding centers (CMAM program), routine nutrition services (including growth monitoring and vitamin A supplementation), National level and localized nutrition surveys, and a sentinel site surveillance system that is operational in Darfur. The National Nutrition Directorate, with the support of partners, has strengthened the nutrition information system to ensure the availability of high quality information. Nutrition program data bases have been developed including a data base for routine reports, a CMAM data base, a nutrition surveys data base and recently a web-based system for monthly data collection and reporting. The nutrition surveillance system draws on nutrition survey data, monthly feeding center reporting data, routine food security, nutrition, and health information collected from sentinel sites, and input from secondary data on food security, health, security and population movement.

In addition to these, there has been good progress at passing the federal level food act or salt iodization laws although there is significant governmental commitment for these laws. Five states now have state laws on universal salt iodization. Talks have been initiated with major flour millers in country to fortify all flour with iron and folic acid, and with sugar producers to fortify sugar with

Vitamin A. However national level legislation and high level government commitment is now needed to move these interventions forward.

2.7. What are the success stories, best practices and lessons learnt from implementing food and agriculture-based programmes aimed at improving nutrition?

Success Stories

- i. The Central Bank of Sudan (CBS) with the Ministry of Agriculture and the World Food Program are implementing the Farmers to Markets (F2M) project for the last four years. The project is aimed at increasing productivity of small holders and increasing their access to markets for their agricultural products. Since poverty, ignorance and conflict are some of the main reasons behind the nutrition crisis in Sudan, the project has contributed to addressing these underlying and basic causes through: i) reducing the poverty among targeted poor small farmers, thus by linking them to main service providers and providing them with the inputs that enabling them increase their productivity and ; ii) empowering women in conflict areas through building their capacity, be part of the executive committees and enabling them to take decisions. The African Rural and Agricultural Credit Association (AFRACA) described F2M as the best project sponsored by the Central Bank of Sudan. The African Union in coordination with Ministry of Agriculture and Ministry of Foreign Affairs have chosen F2M as best practice aiming at reducing rural poverty in 2013-14.
- ii. **Rural Development and Poverty Alleviation:** Livestock project helped organize 84 rural communities into “development committees”, trained on business management and microfinance issues;
- iii. **Water:** Half a million people provided with clean water after 451 water points constructed/rehabilitated and hand pump and yard operators trained.
- iv. **Income earning skills:** Introduction of improved technologies to farmers and provision of agricultural hand tools covering 16,900 farmers
- v. **Home gardening** is widely practiced in Sudan and has a significant impact on the nutritional status of children and other household members through dietary diversification, and income generation. Several nutrition, food, and agriculture projects have capitalized on this practice such as the Nutrition Impact and Positive Practice (NIPP) approach implemented by several Non-Governmental Organizations (NGOs). The NIPP was designed to prevent and treat mild cases of acute malnutrition through the promotion of micro-gardens, use of nutrient dense locally available foods, promotion of best feeding and caring practices. Another practice adopted in small scale is the school based gardens, which is also a good source of food diversification for children and has a good impact in improving students’ nutritional status, however, some obstacles are facing like lack of sufficient plot of land to establish this activity specially in urban areas in addition to lack of proper implementation and endorsement by education authorities in the country. Well established school based gardens will allow food diversification and thus

improving children health status and also students will learn how to grow vegetables and raise small animals.

Below are some success stories in the field of nutrition:

CMAM expansion services including nutrition services to the targeted communities. CMAM programme started in Sudan 2001 by NGOs in Darfur states but expanded until 2009 according to national guideline. The program used Simple Spatial Sample methodology survey provides information about the real need at lower level locations to inform and redirect the collective resources to address malnutrition. One of the uses of the S3M is to aid in deciding the most deteriorating sites at state level and hence prioritizing these locations in setting up CMAM programs in a consolidated way and also helped to identify the need in other cross cutting sectors like WASH and Health.

The policy brief on Malnutrition problem in Sudan has created a platform for consensus about importance of multi sectorial planning and sensitized all the related sectors to plan for contributing to reduction of stunting in the country. This early Involvement of sectors from planning stage has created sense of ownership and obligation among the sectors regarding finding solution to the problem of malnutrition.

Chart 1 below indicates the progress made in expanding the program to reach significant number of beneficiaries.

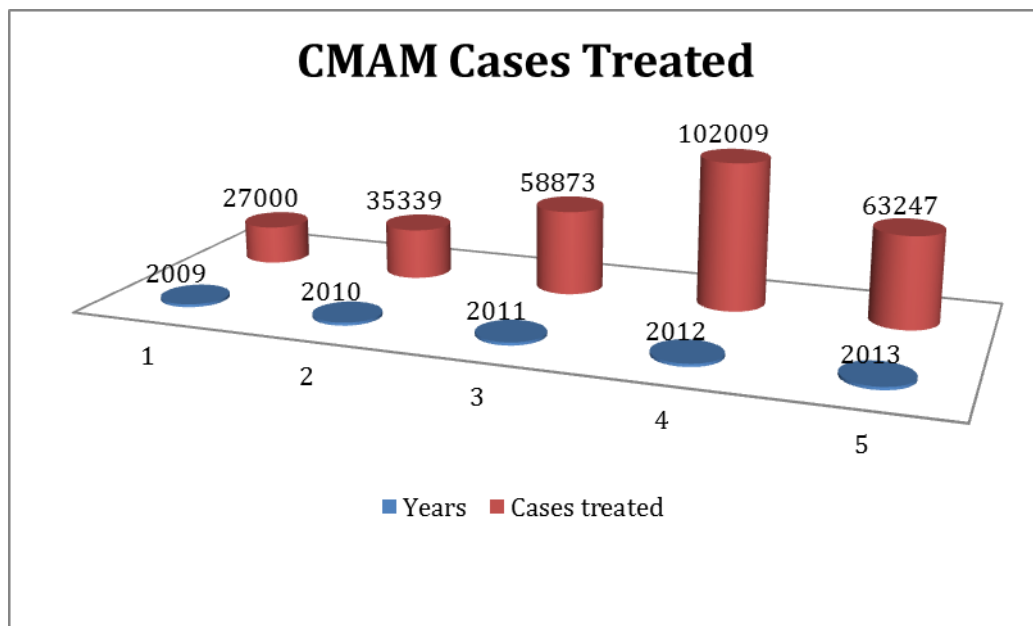
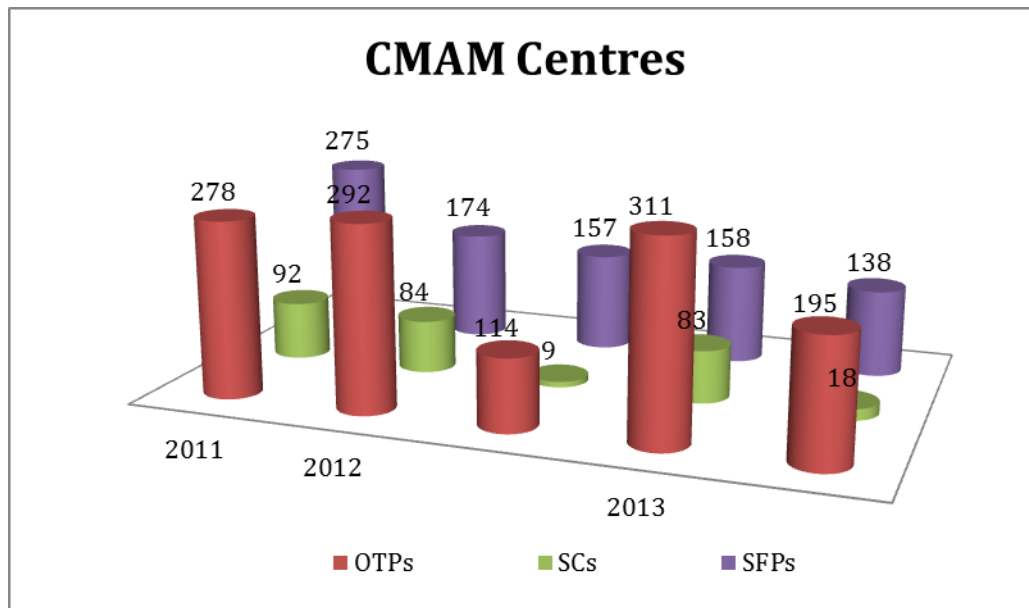


Chart 2 indicates the number of function CMAM Centres.



2.8. Describe the policy and programme implementation mechanisms in your country for improving food and nutrition security.

Given that malnutrition is a manifestation of multiple factors and requires a multi-sector approach (Bhutta, et.al, 2008), equal attention and adequate resources should be given to the various determinants (causal factors of malnutrition) and the potential for synergy across the determinants should be exploited. Furthermore, delivery of an integrated response in areas of high vulnerability to under nutrition is paramount in Sudan to improve the respective nutrition indicators of acute malnutrition in the short term and stunting in the medium/longer term.

It is important to note that the global community now concurs that increasing investment in nutrition will accelerate progress on a range of Millennium Development Goals (MDGs), especially MDGs 1 (poverty reduction), 2 (education), and 4 and 5 (maternal and child health). Nutrition investments have the potential to augment GDP in developing countries by at least 2-3%. A recent analysis shows that in Sudan, an investment of \$103 per child aged 0-23 months to reduce stunting pays back \$23 (Hoddinott, 2013).

With regard to malnutrition prevention and management, in June 2013, the line Ministries at Undersecretary-level endorsed a policy document to support improving the nutrition situation in the country through four strategic directions. These directions are complementary to each other and act at different levels and among different sectors to deal with the different factors behind the problem of malnutrition in Sudan.

Strategic direction 1: High level multi-sectorial coordination

Nutrition is a multi-dimensional problem that needs a multi-sectoral approach. The multi-sectoral action can strengthen nutrition outcomes through accelerating actions on determinants of malnutrition like water, sanitation and hygiene, health services, food security or through redirection of programs from other sectors to improve nutrition. Such programs might be larger in scale such as social safety net programs. Also, the multi-sectoral approach is good for policy coherence through

drawing wider attention to policies and strategies, introduction of new concepts and monitoring frameworks.

Strategic direction 2: Improve food security and livelihood

This strategic direction focuses on improving the underlying determinants of nutrition; adequate food access and social protection programs. Agriculture plays a major role in nutrition and vice versa so that investment in one will improve the other. Expansion of social protection programs is essential for improving income, access and link with services and targeting of the vulnerable.

Strategic direction 3: Scale up maternal and child health interventions and services

This strategic direction focuses on maintenance and scaling up of some cost effective interventions of the on-going acute malnutrition (prevention and management) services. This should be bolstered by the introduction of new services that are important for prevention of chronic and acute malnutrition. Furthermore, this option addresses the issue of convergence and integration of services directed towards children and mothers' health and eventual improvement of nutrition status for both.

Strategic direction 4: Community behavior change and social mobilization:

This strategic direction focuses on raising awareness to improve dietary practice, food preparation and intake. Community involvement is necessary for improvement of the nutrition situation. Actors working with communities are important stakeholders for this option's implementation. This option is feasible, cost effective but needs innovation and coordination.

As the spectrum of issues indicates, food and nutritional security is not the sole domain of one body but generally a concern of a wide range of actors in various areas such as agriculture, industry, markets, trade, food aid, health, education, water provision, community and natural resource management. It is therefore important that food and nutrition security be mainstreamed into high-level planning and national policies and that the government demonstrates its commitment towards food and nutrition security and its recognition in policy formulation.

In most recent agricultural planning and strategy formulation in Sudan, food security issues have comprised the core and main objectives for these plans and strategies. For instance, food security is one of the six strategic objectives of the recently devised and adopted Agricultural Revival Program (ARP) (2007-2011) as well as being an integral part of targeted macro and agricultural strategies and plans. The National Nutrition Policy Brief Report with its broad definition of food and nutrition security also set the guidance for government interventions to promote coordination and resource mobilization to improve the national response towards the problem of under nutrition and food insecurity in the country. Although information on many of the on-going agricultural policies could be perceived from the Agricultural Revival Program (government-approved plan), various other existing agricultural and non-agricultural policies, including non-food issues, will need to be considered and gaps identified so that efforts are likely to promote multi-sectoral efforts towards achieving sustainable food-security.

3. Analysis of past and current nutrition actions in the country

3.1. What progress has been made in terms of political commitment since the 1992 International Conference on Nutrition (ICN)?

It is important to note that; in 1992 the political climate in Sudan was very different, which means that national priority was not on social programmes. Hence, there were no clearly defined roles and responsibilities for the implementation of the document presented at the ICN. In addition, the government was centralized, which did not facilitate the implementation of social programmes including nutrition interventions. Besides, there was lack of awareness on the importance of nutrition as being central to national development.

The country is currently preparing to formulate policies that would be conducive to enabling Sudan to pursue a consistent approach towards a state of food and nutrition security.

The government of Sudan represented by the Federal Ministry of Health has made considerable efforts to address under nutrition, in order to reach the MDG target of halving the number of people suffering from hunger by 2015. Nutrition is emphasized within the current NHSS 2012-2016 as part of the basic package of PHC service. Nevertheless, nutrition is among the core programs addressed through the Maternal and Child Health Acceleration Plan, in consideration of the benefits of intervening during the gestational period and children under-5 years old. The plan was developed by FMOH and partners to close the gap towards 2015 MDGs. Different nutrition guidelines and protocols have been developed including CMAM, hospital management of SAM, Essential Nutrition Package (ENP), Infant and Young Child Feeding (IYCF) to provide an enabling environment to improve service provision. Although, the current nutrition interventions focus on treatment of acute malnutrition, there is gradual shift towards prevention of stunting with wider multi-sectorial coordination.

The ENP includes, promotion of maternal nutrition and child spacing; promotion of IYCF including optimal breastfeeding and complementary feeding practices; growth monitoring and health education with referral of severe and moderate malnutrition cases; control of micronutrient deficiencies (promote and provide supplementation, promote dietary diversification and fortification); and promotion of immunization, family nutrition, dietary diversification and optimal hygiene and sanitation.

3.2. What progress has been made in terms of operational capacity since the 1992 ICN?

There is static high prevalence of acute and moderate malnutrition during the last 25 years that prevalence of Severe Malnutrition and Global Acute Malnutrition in 1987 was 2.2, 15.8% and steadily increasing to reach 5.1, 16.1 in 2010, respectively which put Sudan in status of continuous emergency. Furthermore, the national figures with regards to stunting over the last 25 years show that limited progress is made up to now. Addressing stunting as key nutrition problem facilitate long term inter-sectorial actions with effective collaboration and coordination to address the multiple underlying causes of malnutrition and integrate nutrition interventions within health, line ministries, private sector, community, and other relevant sectors. Government structures are having the responsibilities to lead and promote the implementation process within their institutes as part of a

respective government development plan and priorities. Multi-sector nutrition coordination committee will be established under the umbrella of The National Food & Nutrition Security Council. It will facilitate cross sector information sharing, coordination and collaboration on nutrition related activities as identified through the bottle neck and stakeholders analysis.

In strong collaboration between United Nations agencies such as FAO, WHO, UNICEF, WFP, UNFPA, , NGOs and CBOs working to improve nutritious dietary intake for all people and maternal and child nutrition in particular as well as strengthening mechanisms to ensure minimum package of essential services is delivered; Private sector has an important potential contribution towards improving nutrition situation; one of the key areas is fortifications in particular flour, salt and oil fortifications as well as Community volunteers and nutrition educators are the key delivery mechanisms of nutrition services in the areas where MOH have no access and also play vital role in ensuring utilization of nutrition education, counseling and social mobilization efforts.

The nutrition situation in Sudan is poor, characterized by high levels of underweight and chronic malnutrition, as well as persistently elevated levels of acute malnutrition⁴. Nationally, one third (31%) of children under the age of five in Sudan are moderately or severely underweight (<-2 Z score, weight for age). Almost one third of children (32.5%) suffer from moderate or severe chronic malnutrition (<-2 Z score, weight for height), underlining the long term and prevalent under-nutrition and morbidity throughout the country. Nationally, the level of global acute malnutrition (wasting) (14.8% <-2 Z score, weight for height) is just below internationally recognized standards for indicating a nutrition emergency. These figures vary significantly between states. It is unlikely that these indicators of the Millennium Development Goals will be halved by 2015 without substantial reductions in levels of poverty.

The majority of localized nutrition surveys report an increased risk for malnutrition in children 6-29 months relative to children 30-59 months old, indicating that sustained efforts to address the nutrition needs in this age group are critical. Current international guidance suggests that nutrition interventions to address deficiencies are limited beyond two years of age.

While data is limited, available information suggests that the micronutrient status of the population is poor. Localized surveys have reported night blindness due to vitamin A deficiency from less than 1% to 4.8%. Although vitamin A deficiency has dropped significantly due to repeated supplementation during national polio days, it still remains high in western parts of the country⁵. The national prevalence of goiter, indicating iodine deficiency disorders, was 22% in 1997. Intake of iodized salt, which is a key action in the prevention of iodine deficiency disorders, is low. In 2010, only 11% of households where the iodine content was tested had adequately iodized salt (e.g. greater than or equal to 15 ppm).⁶

⁴ Please note that nutrition outcomes are generally presented based on data from children 6-59 months old. The Sudan Household Health Survey, 2006, reports nutrition outcomes based on children 0-59 months old.

⁵ Review of the Millennium Development Goals for Health, Nutrition and Population, Republic of Sudan, 2003.

⁶ Sudan Household Health Survey, Government of National Unity/Government of South Sudan, 2006

Control and elimination of micronutrient deficiencies is one of the priority activities of Federal Ministry of Health, led by the National Nutrition Directorate. This is reflected in the recent Policy and strategy which states in its objectives:

“Objective 1: Ensure the prevention and treatment of nutrition related disorders in emergency and non-emergency situations.

- *Prevent, detect and treat Iodine Deficiency Disorders (IDD) through Universal Salt Iodization*
- *Prevent, detect, and treat Micronutrient Deficiency Disorders (MDDs) through a combination of supplementation, fortification, education, and food based approaches.”*

While vitamin A is distributed nationally through National Immunization Days, progress remains limited in addressing other key micronutrient deficiencies (e.g. iron deficiency anemia) as well as addressing micronutrient deficiencies among groups other than children under five years owing to lack of evidence-based data and financial and technical resource of MOH and its partners. For example, antenatal supplementation with iron and folic acid, as well as postpartum supplementation with vitamin A remains limited, contributing to poor maternal nutrition status.

3.3. Managerial capacities of line ministry staff at the national, provincial and district levels?

Ministry Of Health (MOH)

The recruitment and promotion of health workforce generally follows the Civil Service Rules promulgated under Public Service Act, 1994. The federal and state levels mostly exercise recruitment, promotion and transfer of staff.

Recruitment and retention of management staff are a particular challenge when going down from the federal to States and localities level. The qualification, experience and skills of the incumbents of managerial positions vary and are not standardized. Recently, a career pathway for doctors and allied health professionals was defined. When implemented, it would help regulate and improve leadership functions.

A recent study to determine management and organization capacity of the health system found that 86.9% of managerial posts at state level were occupied compared to only 53.7% in case of localities clearly highlighting the serious managerial capacity limitations at the locality levels and the situation is worse in conflict affected areas.

Most of the managers at state level are well qualified with over 80% having professional degree or masters' qualification in medicine, public health or allied sciences. While at the Locality level (81.4%) are either graduates or had some postgraduate qualification but are usually with short term experience in management. Most important hindrance to leadership functions especially at the States and locality levels are the limited budget for management and development, lack of control over financial resources and their fragmentation. Other problems include unfamiliarity with managerial functions, structures and health care and referral systems.

Low motivation among managerial staff due to the above constraints, as well as low remuneration at the public sector contribute to the high turnover and vacancies in management positions. The major strategies for addressing these issues include:

- Building capacity and revising roles and responsibilities at state and locality levels to enable effective planning and management of resources for health
- Capacity development in policy analysis and development of mechanisms to facilitate policy implementation
- Establish national and state level coordination mechanisms and joint planning arrangements to improve coordination, efficiency and consistency in order to maximize impact in the health sector
- Strengthen accountability to communities at local level and to stakeholders at national level.
- Reinforce policy implementation arrangements and institute mechanisms for their monitoring

Governance and leadership

The Sudan health system is a three-tier system. The federal level is concerned with policy making, planning, supervision, co-ordination, international relations and partnership. The state governments are concerned with planning, policy making and implementation at state level while the localities are concerned mostly with policy implementation and service delivery. Some responsibilities remain shared between the different levels like early preparedness and response to disasters and epidemics, monitoring and supervision and tertiary level specialized centers.

In the context of Sudan, key domains of health system governance are: policy development, partnership, laws and legislation, governance information, allocation and pooling of resources, leadership, and accountability. These domains have attributes, from the perspective of inputs and processes to achieve the specified outputs/outcomes.

The national health sector strategic plan (2007-11) with the goal to improve governance of the health system had two strategic objectives: to strengthen the governance and institutional capacity of the decentralized health system at all levels; and to promote research for evidence based policy and decision making. Progress was made towards achieving these objectives, and is described in the following sections together with the different domains of governance.

The **major issues** that emerge out of the HRH situation are:

- Inequitable distribution of health workforce and imbalance in the skill mix at facility, locality, state and national level; especially in conflict and emergency affected areas;
- HRH management system is not well functioning in improving the performance, motivation and retention of health workforce;
- Insufficient linkage between education and training (pre-service and in-service including postgraduate) and health services/needs;
- Inadequate capacity (knowledge, skills and leadership) of HRD directors/managers (both in ministries and institutions) in human resource development (HRH planning management and training) affecting the discharge of HRH functions at decentralized levels.
- Less engagement of stakeholders in HRH issues;
- Deficient institutionalization of CPD of health workers;
- HRH policies and strategies are not fully based on evidence-based data and information;

The major strategies for addressing these issues include:

- Direct HRH production towards the needed numbers and the skill mix with the involvement of stakeholder (specially ministry of higher education) to direct training and education towards HS needs;
- Institutionalize capacity building focusing on States' HRH addressing both accredited programmes and CPD and link the latter to licensing and relicensing;
- Conduct HRH projections exercise to guide planning for education and training based on needs and affordability;
- Foster the evidence-based HRH policies and strategies including establishing the norms, standards and comprehensive accreditation systems for all cadres;
- Strengthen HRH management system ;

3.4. Assessment of the Managerial Capacities of the Ministry of Agriculture Staff at the National, State and district levels

Evaluation at the Ministry in the national level:-

The Ministry of Agriculture is characterized to have vast experiences in the administrative capabilities and ability to direct national agriculture development and related services including development planning, programing, initiation and implementation of projects and coordination of all relevant actors towards its strategic objectives. It has also the ability to formulate budgets corresponding to the development plans and linking them to specific outputs that contributes to different strategic objective of the Ministry.

But, in the areas of polices, monitoring and evaluation (M&E), there are limited capacity due to undermining of fresh agriculture graduates who could bring innovations into these two departments for 20 years. Agricultural policies section is housed in the general administration of planning and agricultural economics department and it is under-staffed.

However, within the Ministry, there are departments implementing externally funded projects with effective M&E like Gezira, Rahad, Suki and Halfa projects. General Administration of International Cooperation and investment for monitoring projects unit within the Ministry, which is externally funded through grants and loans also have effective M&E system. These weaknesses in administering the overall mandate of the Ministry and implementation of effective M&E is attributed to limiting recruitment of young public personnel with up to date knowledge of scientific advancement within the Ministry, limited trainings opportunity for the staff in general and M&E staff in particular, limited budgetary resources and lack of coordination and cross-fertilization of knowledge between departments and units within the Ministry.

Threats:

1. A little attention of the decision makers to the importance of monitoring and evaluation as a system helping in the management.
2. The difficulty in the flow of information from the states and the various departments and projects for both irrigated and rain-fed sectors.
3. There is no research to develop policies, but are reviewed by committees that are to be adjusted.
4. There is a difficulty in coordination between computer systems in some departments as well as no network connection between Centre & States for the exchange of information.

As for the administrative capabilities at the state level is better than that at the local level.

Recommendations for Ministry of Agriculture:-

- i. Ministry of Agriculture should strategically position its programs in giving due attention to reducing stunting among other strategic objectives,
- ii. Formation of a special unit for monitoring and evaluation in the General administration of the planning and the agricultural economics,
- iii. To attract the necessary budgetary support for this unit from the Ministry of Finance and international bodies.
- iv. Facilitating the flow of information to the unit from the different projects and programs and from the States by networking.
- v. Raise awareness among stakeholders about the magnitude of food insecurity and malnutrition problems and ways of addressing it.
- vi. Support agricultural production, including animal production with the necessary inputs and income generating projects to increase household income and increase household food security.
- vii. Raise the capacity of producers and workers: (Program of agriculture transformation) law was passed for agricultural and livestock production owners for the year 2011 as an alternative to the Law of Farmer Union in Sudan and the pastoralists' Union in 1992. The aim of the law was to transform of the quality of farmers and pastoralists production system through the leadership of well trained professionals that will mentor producers into professionalism that are capable of managing standard production system. The application of institutional reform in the Gezira project was considered to be a good starting point where producers would shoulder the responsibility of providing both the production and administrative costs. Program began in raising the capacity of producers and professionals through training and rehabilitation. Training and capacity building of agricultural engineers, veterinarians and professionals in government institutions to improve their efficiency exercise lead to the training of about 5912 producers and 1630 professionals (Agricultural Revival 2014).

3.5. Technical capacities of Ministry staff, agriculture service providers and R&D sector?

A. Ministry of Agriculture and Irrigation and Agricultural Research corporation

Agricultural Technology transfer by MoAI

At national level, the Technology Transfer and Extension Administration are responsible for agricultural extension matters. The objectives of TTEA include the development of agriculture; improvement in the production quality; enhancement of farmers' income through rational exploitation of natural resources; comprehensive human prosperity via profitable, sustainable agriculture; and making agricultural products competitive in international markets with the aim of assuring food security and increasing agricultural revenues.

The mandate of the TTEA covers the transfer of research-endorsed technologies to the farmers for adoption; development of agricultural institutions; mobilization and participation of stakeholders

including farmers, financiers, scientists, private input dealers, service providers, marketing specialists and agricultural practitioners in the process of agricultural development.

The TTEA comprises Seed Division (seed certification, monitoring of seed import and export, development of seed production and processing, and technical advice on seed matters), Agricultural Engineering Division (technology transfer, farm machinery feasibility tests, training in the use of machinery, encouraging local manufacturing of machinery and tools, adapting modern irrigation equipment to local conditions, resolving issues related to post-harvest agricultural products, upgrading of agro-based and cottage industries, and promotion of locally available intermediate technologies), Agricultural Information Division (production of radio and television programs in support of extension, coverage and documentation of formal training events, field days, festivals, etc., and organization of permanent exhibition to diffuse information of interest to producers and investors), Agricultural Extension Division (extension research studies, evaluation of extension events, support to states' extension programs, capacity building of extension staff and other stakeholders, improving rural livelihoods, field supervision, institutional coordination, and exchange of Sudanese experiences nationally and internationally), and Human Resources Development Division (organization of training activities at various levels). Each division is headed by a director. The TTEA also maintains a Technology Transfer Centre and relevant Station whose mandate is to transfer technical information to stakeholders including farmers.

Pre-service education and in-service training in extension is provided by all major universities which have faculties of agriculture and/or livestock. The examples are Sudan University of Science and Technology, and University of Khartoum, both located in Khartoum. The University of Khartoum's Development Studies and Research Institute (DSRI), and Shambat Agricultural Training also offer training programs. In the area of research, Veterinary Research Institute and Agricultural Research Corporation organize training activities. The Technology Transfer & Extension Administration also organizes training programs for the extension staff.

Research and Development (R and D) – ARC and ARRC

During the 1990s, agricultural research and development (R&D) investments in Sudan declined rapidly, but this trend has reversed in more recent years due to increased recognition by the national government of the importance of agricultural R&D to agricultural development. Various reforms have led to increased R&D investments, resulting in an increase in agricultural R&D expenditures.

Public agricultural research and development (R&D) investments doubled during 2001–08 following increased government support, but the country's total agricultural R&D investments as a percentage of agricultural GDP remained among the lowest in Sub-Saharan Africa.

Human resource capacity in agricultural R&D also increased steadily after the turn of the millennium, reaching 1,020 fulltime equivalent (FTE) researchers in 2008. Agricultural R&D is largely funded by the national government; donor funding is limited.

In the years to come, Sudan's key challenges will be maintaining high quality research and avoiding capacity erosion as increasing numbers of experienced senior scientists trained abroad retire and are replaced with locally trained junior scientists. An important strategic objective for the Agricultural Research Corporation (ARC) and other Sudanese agricultural R&D agencies will be intensifying the intake of junior scientists and ensuring that they receive high level training.

The institutional structure of agricultural R&D in Sudan has changed little since the turn of the millennium. ARC and ARRC continue to dominate the country's agricultural R&D system, although

the relative contribution of the higher education sector has gradually increased over the past two decades in terms of expenditures and staffing. Some important changes have taken place, however, to research coordination. Ministry of Science and Technology (MOST) was established in 2001, taking over administrative responsibility for the country's (agricultural and non-agricultural) R&D agencies. ARC, ARRC, and NRC were all transferred to MOST, but in light of low (and falling) agricultural productivity in the past decade, along with weak linkages between agricultural research under MOST and extension, which had remained under MAF, the research agencies were returned to their original supervising ministries in 2010 to ensure functional relationships with other relevant departments and stakeholders.

B. Ministry of Health

The technical capacity in the Health services in Sudan are provided by the public sector, private sector both for profit and non for profit, sectors allied to health e.g. army, police, ministry of higher education etc. and traditional sector.

Within the public sector, service delivery is organized at primary, secondary and tertiary levels. Primary care is provided through health facilities (Family Health Centers and Family Health Units); Community Health Workers, and Village Midwives at the community level.

Family Health Centers (FHCs) are staffed by medical officer and paramedics (i.e. medical assistants, health visitor, nutrition educator and vaccinator) in urban areas, and by paramedics only in rural areas. Family Health Units (FHUs) are outpatient facilities providing basic primary health care services. These facilities are staffed by a medical assistant and/or a nurse.

The rural hospitals (locality hospital) are the first referral care with indoor and diagnostic facilities with at least one in each locality. Within the public sector, curative services include the secondary and tertiary hospitals. 30% of PHC facilities provide the PHC essential service package.

Fourteen percent of primary care facilities are not fully functional mainly due to staff shortages or poor physical infrastructure. Physical accessibility to PHC facilities varies substantially between States, with a national average of 1:6,816 compared to the planned 1:5,000 population.

The private for-profit sector has expanded, focusing mainly on curative care and is concentrated in urban areas, especially Khartoum and Gezira States.

The not-for-profit sector, i.e. Non-Governmental Organizations and Faith Based Organizations, is mainly concentrated in Darfur, the war affected areas, Red Sea, Kassala, Blue Nile and South Kordofan States, and to a lesser degree in Khartoum in camps for internally displaced people.

3.6. Monitoring and Evaluation Mechanisms

Monitoring and evaluation M&E

Food security and nutrition information system

Institutions operating at Federal level have essentially a regulatory and policy mandate, whilst implementation functions are delegated to the other government tiers and to the States in particular. At federal level, five government institutions seem to be particularly relevant to food security in Sudan. These are the Ministry of Agriculture, Ministry of Animal Resources and Fisheries (mandated with the supply/availability aspects of the food security equation), Ministry of Humanitarian Affairs, Ministry of Social Development and Welfare, the Strategic Reserve Corporation (under the Ministry of Finance) and the Nutrition Division of the Ministry of Health that deals with social protection issues (the demand/access side aspect of food security).

Lack of reliable data and information which would help decision makers to prioritize their decisions and allocate resources wisely has often been cited as a chronic problem in Sudan. Food security issues require information and data in various fields ranging from health and nutrition to agro-climatology and marketing. The sources of these information & data should be fairly reliable and such information and data should be communicated from the source to analyzing centers and then communicated to decision makers. Only recently has a developmental and integrated food security information system begun to emerge with the support of EU. The Sudan Integrated Food Security Information for Action (SIFSIA) a program of the Federal Ministry of Agriculture funded by EU and implemented by the FAO has put in place basic food security information analysis and dissemination mechanisms to decision makers and other user groups.

The institutions mentioned above involved in food security related data and information collection activities in Sudan. In addition, there are a number of non-governmental actors that include UN agencies and International non-governmental organisations who involved in one way or another in generating and disseminating food security information that often in connection with their organisation's operational objective and interest. Below, it has been tried to put briefly the roles and responsibilities of the government institutions for what concern food security data and information collection, analysis and dissemination activities.

Ministry of Agriculture and Irrigation: Within the Ministry of Agriculture and Irrigation, a key role in food security planning and information is played by the Directorate of Agricultural Economics, Planning and Policy Analysis that is structured in a number of Departments: Economic, Statistics, Planning and Policy Analysis, and Food Security. The Ministry also produces seasonal harvest estimates. The methodology usually differs from the FAO/WFP crop and food security assessments. The MOAI uses a crop cutting survey methodologies for the regular crop estimates. The MAF in collaboration with CBS is also doing State by State Agricultural Census.

Ministry of Animal Resources and Fisheries: The Ministry of Animal Resources and Fisheries has also a Planning Department with similar functions of MOAI but with a simpler structure. In most State, the two ministries and related planning functions are merged within the State Ministry of Agriculture and Animal Resources.

The Strategic Reserve Corporation (SRC): The SRC (operating under the Ministry of Finance) plays a price stabilization function. It is mandated with the management of buffer stocks (mainly sorghum) to ensure the consumers' access to basic food staple at affordable prices and at the same time

support crop producers through the purchase of their produces when prices are low. It also has Market Monitoring Systems for regularly updating prices.

The Central Bureau of Statistics: The CBS produces regular information on Consumer Price Index (CPI) and also supports Agricultural survey activities. It is a lead Government institution that coordinates national census and all kinds of surveys such as the recently conducted poverty and household budget surveys.

The Sudan Meteorological Agency: The SMA is the most responsible Government institution involved in metrological data collection and dissemination. Data is collected through its various metrological stations available scattered throughout the country. FAO through SIFSIA project and WFP/VAM provided strong support for renewing SMA capacity in terms of generating and disseminating quality information to a variety of users. SMA is able to generate a wide range of agricultural monitoring products such as maps/surfaces of rainfall, vegetation index, their comparisons to reference/average scenarios, timings of the growing season and crop water use indexes. This is based on a range of inputs ranging from ground station data to satellite imagery.

Ministry of Finance and Economic Planning: Under the Ministry of Finance and Economic Planning there is also the Poverty Reduction Unit mandated with the coordination of line ministries and mandated institutions efforts in the preparation, implementation and monitoring of the poverty reduction strategy (PRSP).

Ministry of Humanitarian Affairs (and the Humanitarian Aid Commission) is mandated with the responsibility of providing food aid and assistance to vulnerable groups in collaboration with international organisations and NGOs.

Ministry of Social Welfare, Women and Child Affairs: The Ministry is divided in a number of autonomous or semiautonomous structures, such as the National Population Council, the Poverty Fighting Centre, Zakat Chamber and Child Welfare Council. A particularly relevant role in providing assistance and social protection to vulnerable groups is played by the Zakat Chamber. This is a semi-autonomous civil society organisation, run by an elected Board. In 2009 the Zakat Chamber disbursed SDG307.8 million providing support to four categories of needy people forming close to 70% of collected amount, up from SDG76 million in 2000.

The Ministry of Health (MOH). The Ministry of Health manages regular nutrition and health related information both at the Federal and State level and in some cases to locality level. In addition, the MoH in collaboration with UNICEF manages the Nutrition Surveillance system, based on sentinel sites. It has also a monitoring role with respect to the policies and plans related to health and nutrition. The Department depends to a great extent on the support of international organisations.

Nutrition information system (NIS)

Nutrition information is collated through various sources; programmatic data, health facility data and through regular or ad-hoc surveys. The data can however sometimes be fragmented, delayed and for the national surveys, is generally limited as it is collected from regional level only. Early warning data can provide useful information for impending droughts such as those experienced during the Horn of Africa food crisis 2012, which affected some of the eastern states.

The MoH hospitals generally report regularly but there are gaps in reporting from PHC facilities in many states and low coverage of other sectors including private providers. An improved system for routine data collection has been put in place under the national nutrition directorate (NND) at

FMOH. A web-based system is also under development. Currently all the states (18) reports regularly on almost all districts except for security compromised areas; however facility reports are perceived to be much lower (data base results is under process).

Nutrition surveillance system was established with support of concerned United Nations (UN) agencies in conflict affected areas and is planned to be expanded to other states.

- Existence of frameworks for monitoring and evaluation for nutrition interventions
- Sustained availability of timely and quality nutrition information through; nutritional surveillance, HIS, periodic surveys and other routine and non-routine data systems
- Strengthened the evidence base for nutrition policy and programming
- Research implementation to provide necessary additional information for nutrition planning and research findings disseminated to inform best practice

Monitoring and Evaluation Framework					
Outcome	Output	Activity	Indicators	Source and method of Verification	Assumptions
.1 Develop frameworks for monitoring and evaluation for nutrition interventions	Appropriate framework of indicators to monitor reduction in malnutrition is developed, using the intergenerational cycle of malnutrition and building off existing information sources	Review and strengthen M&E framework and analysis systems for the nutrition sector including ad hoc information (e.g. special surveys) Conduct data audits at all levels of service provision, through capacity building for all relevant bodies. Integrate core nutrition indicators into the routine health information system Review develop and disseminate guidelines and tools on M&E	Proportion of health facilities conveying accurate and complete nutrition monitoring data to state and national level Number of nutrition M&E tools disseminated Number of core nutrition indicators included in routine HIS	M&E framework, guidelines and tools Data records HIS reports	Good collaboration with relevant MoH departments to prioritize nutrition indicators Good understanding of M&E processes by relevant staff Regular, timely and accurate report submission
	Supervision visits conducted at each administrative level of the MoH; national, state, locality and administrative units	Supportive supervision visits provided to each level on a quarterly basis	Proportion of localities and admin units conducting and/or receiving scheduled supportive supervision visits	Supervision reports	Capacity allows line managers to conduct regular visits Staff understand principles of supportive supervision
.2 Sustained availability of timely and quality nutrition information through; nutritional surveillance, HIS, IPC approach, periodic surveys and other routine	Nutrition surveillance is strengthened and reviewed on a timely basis to inform the targeting of vulnerable populations with the appropriate responses Routine Nutrition Information System is strengthened, expanded and reviewed on a timely basis to inform the targeting of vulnerable populations with the	Quality improvement of the nutrition information database Develop and disseminate quarterly nutrition bulletins Strengthen the nutritional surveillance system Update of IPC information twice a year and conduct refreshment training for IPC. Review stakeholder needs for nutrition information (type, timeliness) to feed into the development of national budgets for programme	Number of nutrition reports/bulletins produced annually, according to schedule Database developed by 2015 Proportion of nutrition related information available online Number of IPC reports and maps produced	Reports/bulletins Surveillance updates Database records Online information Plausibility checks Nutrition information within MOH Website URL and search results	Timely and accurate flow of information from affected areas Capacity sufficient to analyze and mobilize resources, as necessary

and non-routine data systems	appropriate responses	implementation Develop a national nutrition website to house all related information and guidelines	Website established by 2015		
	Special surveys conducted to obtain specialized data on nutritional status and other contextual data	Ensure all nutrition surveys are conducted using the national nutrition guidelines and with quality assurance checks Conduct special surveys (e.g. S3M) to increase depth and understanding of the nutritional landscape Conduct nationwide micronutrient survey Provide support for the next round of the SHHS data collection	Number of high quality nutrition surveys conducted per year Number of special surveys conducted each year Micronutrient survey results by 2016 SHHS results 2015	Survey reports	Security situation allows sufficient access to affected areas Timely permission to conduct surveys is granted by relevant government departments
.3 Strengthen the evidence base for nutrition policy and programming	Research implemented to provide necessary additional information for nutrition planning and research findings disseminated to inform best practice	Define appropriate collaboration mechanisms and focal institutions to prioritize the national nutrition research agenda Conduct a gap analysis to identify research priorities Conduct operational research studies according to priorities identified Compile lessons learned for nutrition and nutrition related efforts to form a foundation for further investigations and interventions Disseminate findings of research to strengthen the evidence base in Sudan Document and publish successes and challenges to consolidate institutional knowledge management and learning	Number and type of research studies conducted Number of dissemination meetings Number of agencies and institutions making decisions based on empirical evidence provided by research studies Number and quality of best findings and practices documented, disseminated and published and applied	Study reports Meeting minutes Published documents	Relevant departments willing and able to collaborate Sufficient capacity exists to conduct studies, analyze and publish and apply best practices
	Resources mobilized to address critical gaps in nutrition research	Develop a strategy and framework for more effective use of nutrition information as the basis for resource mobilization	Strategy developed by 2014 Proportion of resource gap identified that is filled number of interventions based on nutrition based research information	Strategy and framework document Financial records	Resources are available and can be accessed
	Institutions conducting research supported (e.g. equipment, laboratory supplies, technical support)	Provide necessary equipment, supplies and capacity building to academic institutions and others conducting research	Proportion of facilities equipped for conducting research, data entry and analysis	Facility records	Resources are available and can be accessed Necessary supplies and equipment can be sourced

3.7. Consideration of sustainability issues (e.g. environmental degradation, food biodiversity loss, intensification of production and monoculture agriculture)

There is a strong link between the state of the environment and food production, apart from the natural environment being the entire platform upon which all life is based. For crops, the state of the environment directly influences soil nutrient, water availability, and seasonal climatic and weather phenomenon, availability of insects for pollination and prevalence of certain pests (pathogens, insects and weeds) which have major impact on crop product worldwide, without which there would be no any crop production without such catalytic environment. Thus, ecosystem services enhance agro-ecosystem resilience and sustain agricultural productivity. Therefore, promoting the healthy functioning of ecosystems ensures the sustainability of agriculture as it intensifies to meet the growing demands for food production.

In Sudan, most serious concerns are land degradation, the spread of deserts south wards by an average of 100 kilometers over the past four decades, and the overgrazing of fragile soils by a livestock population that have “exploded” from close to 27 million animals to around 100 million (IGAD/MLF&R, 2014). The increase of the natural hazards due to long-term regional climate change in several parts of the country accelerated the deterioration of the natural resources. This is demonstrated by “a very irregular but marked decline in rainfall” especially in Kordofan and Darfur states (UNEP, 2007).

There has been a growing trend of converting croplands to other uses all over the Sudan due to increasing urbanization, industrialization, and energy demand and population growth. The demand for irrigated land to meet the agricultural demand, without considering ecosystem services losses and setbacks in yields and available cropland is increasing.

The purpose of sustainable intensification crop production is to increase food production from existing farmland while minimizing pressure on the environment. It is a response to the challenges of increasing demand for food from a growing global population, in a world where land, water, energy and other inputs are in short supply, overexploited and used unsustainably. Any efforts to ‘intensify’ food production must be matched by a concerted focus on making it ‘sustainable.’ Failing to do so will undermine our capacity to continue producing food in the future.

Agricultural biodiversity is critical for food security throughout the world. At the genetic, species, and farming systems levels, biodiversity provides valuable ecosystems services and functions for agricultural production. How can the erosion of agro biodiversity be halted? How can it effectively be conserved and enhanced? These are critical challenges faced by Sudan, which needs immediate solution, for the country to achieve food self-sufficiency (Lori, Ann. 2002).

Understanding the role of sustainable environment, biodiversity and the food security and nutrition is essential. Biodiversity underpins to food security, sustainable livelihoods, ecosystem resilience, coping strategies for climate change, adequate nutritional requirements, insurance for the future and the management of biological processes needed for sustainable agricultural production. By providing a diverse range of foods, biodiversity underpins nutritious and sustainable diets, which are those diets with low environmental impacts which contribute to food and nutrition security. A growing awareness by consumers of the importance of diversified diets is a powerful instrument to

promote a higher diversity of foods. Diversity of foods and farming systems is also known to support economic diversity and increase resilience to local or global economic shocks, thereby supporting livelihoods and food security.

Nutritionally adequate food will need to be produced using less input per unit of produce. This can be done mainly by maintaining and enhancing the ability of ecosystems to underpin sustainable increases in productivity whilst simultaneously reducing impacts across the scales, from industrialized to smallholder farming. A basic challenge to improving food security by capitalizing on agricultural biodiversity is to balance relevance and realism. While there are many possible ways in which agricultural biodiversity could improve food security, they may not all be feasible in all production systems or they may prove uneconomic or too labor-intensive for adoption by farmers. New approaches based on increased reliance on biodiversity may fit uneasily with production practices based on continuing simplification of agro-ecosystems. Identifying what works in practice, taking into account regional differences and different scales of farming, as well as supporting change will therefore also be essential elements of using diversity to improve sustainability, and food security in the face of change. Successful approaches are likely to bring together positive aspects of sustainable intensification, to reflect the realities of small-scale farmers and to be supported by appropriate policy and economic frameworks.

Strategies, actions, agricultural and nutrition practices and approaches, and an enabling environment that promote the conservation and the sustainable use of biodiversity for food and agriculture is of utmost importance for meeting the food, health and other needs of the growing populations of Sudan (UNEP & FAO, 2013).

3.8. Nutrition objectives integrated into food and agriculture programmes or projects

In general, the goal of the food and agriculture programs is to help smallholder farmers be more productive, with the larger goal of reducing poverty and improving food security. The goal of the Nutrition program is to ensure that all people have access to food, health services, including improved water sources and sanitation facilities and adequate care to ensure survival, growth and development. The Nutrition strategy recognizes that combating under nutrition requires contributions from many sectors, including agriculture. The agriculture sector can ensure that rural families have access not only to more food but also to a wide variety of nutritious foods.

The country has exerted great efforts to increase agricultural productivity, which in turn can improve nutrition in various ways. Agricultural productivity growth leads to greater food availability and lower real food prices. At the smallholder farm level, productivity growth increases rural income and food availability, which enables improvements in dietary options. Nutrition interventions such as the promotion of a diverse diet, with the expectation of increased income and food availability at the farm level are translated into better nutrition for the whole household. Despite these efforts, only little is considered in understanding the agriculture-nutrition pathway at the population and household levels to ensure that all children have the nutrition they need for a healthy start in life. Improving nutritional outcomes along the agricultural value chain and measuring the nutritional impact of agricultural projects serves both purposes of achieving food security and nutrition in Sudan.

3.9. Targeting: Who is currently being targeted for nutrition action in the country? Who has been targeted in the past? Are nutrition actions currently reaching the intended target population groups throughout the country? How do current coverage rates compare to the past?

Although the targeting of nutrition interventions in Sudan takes into account the mother and child diet, more emphasis is placed on the child under-five than the mother. There is a need to shift the balance in order to strengthen maternal nutrition to better focus on reduction of stunting. As demonstrated by the most recent national nutrition survey (S3M, 2013), what is contributing to the high levels of child stunting are the high levels of maternal under-nutrition across the country. The survey results show that up to 62 percent of mothers in some locations are undernourished, which is classified as 'extreme' rate; besides, 14% of all childbearing begins in adolescence (SHHS, 2010), which contributes to the high prevalence of LBW

In addition, there is a high prevalence of night blindness during the last pregnancy, which suggests that maternal micronutrient status is poor. The WHO population level cut-offs classify a prevalence of $\geq 5\%$ as severe (WHO, 2009). The very high night blindness prevalence among pregnant women suggests that anemia in this group could be very high as well. In fact, anemia prevalence is estimated at 81% in pregnant women and 88% among children under-five. Yet, interventions to improve maternal nutrition are patchy if not off the radar screen.

The target groups for direct nutrition interventions are as follows:

1. Pregnant women

- a. Iron and folic acid prophylaxis from first the trimester,
- b. Promotion of household consumption of adequately iodised salt,
- c. Management of moderately malnourished pregnant women,

2. Lactating women

- a. Iron and folic acid prophylaxis in the first month after delivery,
- b. Vitamin A supplementation within the first 6 weeks after delivery,
- c. Promotion of iodized salt consumption,
- d. Management of moderately malnourished lactating women,

3. Children under-two years

- a. Promotion of early initiation of breastfeeding with the first hour of birth,
- b. Promotion of exclusive breastfeeding in the first 6 months of life,
- c. Promotion of timely introduction of nutrient-rich age-specific complementary foods,
- d. Home fortification of complementary foods with multiple micronutrient powders (MNPs),
- e. Promotion of continued breastfeeding up to 2 years of age,
- f. Promotion of timely immunization with measles and rotavirus vaccinations,

4. Children 6-59 months old

- a. Vitamin A supplementation every 6 months,
- b. Use of zinc supplements in the treatment of diarrheal diseases,

- c. Integrated Blanket Supplementary Feeding Programme for the prevention of moderate acute malnutrition,
- d. Management of severe acute malnutrition with complications (inpatient) and without complications (community-based),
- e. Community-based management of children with moderate acute malnutrition,

5. School age girls

- a. Use of zinc supplements in the treatment of diarrheal diseases,
- b. School Feeding Programme for the prevention of moderate acute malnutrition,
- c. Iron and folic acid prophylaxis

6. Whole population

- a. Use of Iodized salt and Use of fortified food

4 Developing a strategy for improving nutrition

4.1. Given the current food and nutrition situation, what is required to scale up and accelerate action within the food and agriculture sector and across sectors to improve nutrition?

- a. Ensure availability of food all over the year
- b. Ensure food diversity
- c. Support smallholder farmers.

Given the high prevalence of wasting and stunting in the country and the fact that under nutrition results from; a combination of immediate, underlying and basic determinants; a strategy to reduce under nutrition needs to address all the causal levels in order to achieve an improvement in the nutrition situation. This means that a multi-causal problem requires a multi-sectoral response. Therefore, it is important to implement two complementary approaches to reduce under nutrition: i) the direct nutrition actions - focusing on pregnant women and children aged less than two years with short-term direct interventions that are known to be effective; and ii) the broader multi-sectoral nutrition-sensitive interventions that offset the determinants of under nutrition.

In this regard, agriculture has a key role to play in both nutrition-specific (interventions that address the immediate causes of malnutrition), and nutrition-sensitive interventions (those that address underlying and basic causes of malnutrition and avoid negative impacts on nutrition). It can improve people's diets by increasing the availability, affordability, and consumption of diverse, safe, and nutritious foods and diets aligned with dietary recommendations and environmental sustainability. Agriculture needs to make nutrition an explicit objective and monitor progress towards it through measuring nutritional impact. For example, the agriculture sector needs to indicate a reduction in the prevalence of stunting and wasting as an objective. Food and agriculture interventions should, among other objectives, aim to improve diets, and the interventions' nutritional impact can thus be assessed with indicators such as dietary diversity.

In addition, there is a need to link food and agriculture with interventions with social protection measures for improving nutrition and strengthening resilience. For example, providing families with either cash, food or livelihood alternatives may be the best solution to protect families' nutritional

status when they cannot afford to buy nutritious food or cannot access health care. Linking food and agriculture with health, water and sanitation, and education for enhanced nutritional impact through joint situation and response analysis, and joint or harmonized targeting, as well as aligning delivery mechanisms of programs to address other determinants of malnutrition, to ensure that communities and households are reached with a complementary set of interventions.

Unfortunately, in Sudan multi-sectoral programming for nutrition is not on the cards yet. For their part, the Ministry of Health has developed a National Nutrition Strategic Plan 2014 – 2018.

Promoting smallholder based agriculture and food production

The traditional smallholder sector provides the main livelihoods basis for the great majority of rural population in Sudan; yet the sector has been widely neglected in terms of public investments, agricultural research and policy attention. The productivity of these systems has declined steadily over the past several years and the capacity of farmers and pastoralists to produce food in an efficient and sustainable manner is severely limited. The effects on the sector of policy, institutional and organizational problems are also compounded by the harsh environment where smallholder farmers live, characterized by recurrent drought, poor soil fertility, high levels of natural resources degradation and conflicts over resources.

Against this backdrop, it is crucial to work to promote a process of livelihoods diversification and assets accumulation by targeting the most food insecure groups and areas and needs to focus on the following three areas:

- Support to smallholder irrigation development and water management
- Support to smallholder crop production (intensification and diversification)
- Support to smallholder livestock and fisheries production

If implanted this is expected to result into an increase of agricultural production; preliminary assessments indicate that such increased level of production could be absorbed by the existing market demand, at the local and state level,

School gardening:

Schools are one of the main social contexts in which knowledge, behaviors, attitudes, values and life skills are developed. They offer an effective vehicle through which children are reached, when habits and attitudes are being formed. They have qualified personnel; they can spread the knowledge and skills that children acquire by involving families in their children's education; they can also serve as a channel for community participation and can provide cost-effective food and nutrition interventions. School gardens are cultivated areas around or near to primary and/or secondary schools. Activities in school gardens usually comprise horticultural crops but may include small-scale animal husbandry and fishery, beekeeping, fruit trees, ornamental plants and shading, as well as small-scale staple food production.

School gardens offer a great opportunity for improving the quality of education and for learning basic life skills. Gardens serve as a "laboratory" for teaching modern farming skills and nutrition, but they also are used for practical work related to biology, environmental studies, mathematics as well as reading, writing and arts. Ensuring that school gardens achieve a significant educational impact,

however, may require adjustments in the national school curriculum, the production of training materials, teacher training and provision of funds to meet physical and human resources costs for such activity.

School garden activities would include nutrition education, food preservation techniques, integrated pest management, integrated soil fertility management, sustainable natural resource management, recycling and composting, and environmental awareness-raising, especially in urban areas. The availability of technical skills to support school gardens needs to be considered. The charging of (usually over-burdened) school teachers with extra training and supervisory responsibilities needs to be carefully assessed against other possibilities involving the community and NGOs. Public-private partnerships, including sponsorship by firms, need to be explored. One option for engaging NGOs would be to link school gardens with NGO-driven community gardens. The use of volunteer services may also be a valuable source of agricultural skills, at least in the early development of school gardens.

It is essential that the knowledge and skills imparted to the school children be technically correct and sustainable to facilitate replication in the homestead. Local access to good quality seed or seedlings together with fertilizers and 'safe' pesticides appropriately packaged is essential to enable the technology demonstrated in the school garden to be transferred to the homestead. These inputs could be provided through the private sector or through a community based organization whose members would also require some initial training either through the Agricultural Extension Service or through a Volunteer Programme.

The promotion of micronutrient-rich vegetables, including indigenous varieties, fruits and other foods (e.g. small animals) in school, home and community gardens will diversify the local food base, generate income and add nutritional value to children's school meals, thus contributing to their nutritional status. As noted above, however, it is generally not possible for a school garden to generate much of the staple food required for a school feeding programme.

Finally, in secondary schools in particular, the familiarization of students with up-to-date methods for improved sustainable production of food that are applicable to their homesteads or farms is a potentially powerful tool for improving the household food security

Goal

The overall goal of the National Nutrition Strategic Plan is to improve the nutritional status of people throughout the lifecycle through encouraging Sudan to reposition nutrition as central to its development agenda. It aims to support the country in establishing and implementing nutrition interventions, according to the local situation and resources to protect and promote healthy child and maternal nutrition, prevent acute and chronic under-nutrition, and micronutrient deficiencies. It also addresses emerging issues of over-nutrition to combat increasing rates of obesity and diet-related non-communicable diseases.

Strategic Objectives

1. To create a supportive environment including political commitment, multi-sectoral coordination, and enhance nutrition assessment, monitoring and evaluation.

2. To strengthen health services and increase access to appropriate management of acute malnutrition; both severe and moderate acute malnutrition.
3. To promote prevention of malnutrition through improving infant and young child feeding practices and services and increase micronutrient uptake.
4. To build capacity for programme management in general and for emergency preparedness in nutrition.
5. Adopt the life-cycle approach for ensuring good nutrition to all age groups to ensure women and children well-being.

Targets

To improve the nutrition status of children and mothers

Indicators:

1. The rate of stunting in children under-5 years old will be reduced by 4% from 35% to 31% by 2018.
2. The prevalence of anemia in reproductive-aged women will be reduced by 50% by 2018.
3. The rate of low birth weight will be reduced by 20% by 2018.
4. The rate of exclusive breastfeeding in the first 6 months of life will be increased to at least 70% by 2018.
5. The prevalence of wasting in children under-5 years will be reduced to and maintained at less than 10% by 2018.
6. The prevalence of overweight in children under-5 years will be maintained at low levels by 2018.

To improve micronutrient status

Indicators:

1. The coverage of vitamin A supplementation twice a year in children 6-59 months will be increased and maintained above 90%.
2. The coverage of ferrous and folic acid prophylaxis in pregnant women will be increased to 70%.
3. The prevalence of anemia among children will be reduced to 50% by 2018.
4. By 2015, standardized iodized salt (≥ 15 ppm) will be regularly available throughout the country, with coverage of more than 90% of households.

4.2. Within food and agriculture, what can be done at policy, programme, operational or financial levels to improve food and nutrition security?

Support to a decentralized institutional framework for food security

Sudan's operated decentralized federal system of government since 1993 still suffers from substantial dependence on the federal government for financial resources and appointment of key civil servants.

With respect to food security, such an improvement in service delivery is hindered by two key factors: a) weak capacities of existing organizations operating at state and locality levels; and b) lack of coordination and existing duplication with respect to food security mandates and initiatives. Such

a situation is resulting in an overall inadequacy of the service delivery with respect to food security at state and locality levels, particularly in resource-poor states. Capacity building of relevant line ministries at state and locality levels and Non-state actors will be undertaken under another programme of the NFSAP, whilst this specific sub-programme aims at addressing those issues such as coordination that would contribute to the creation of a more conducive institutional framework for food security at the decentralized level. As mentioned before, the SIFSIA initiative aims at supporting the functioning of a Food Security Council and the existing Food Security Council Technical Secretariat that will be the highest decision making bodies for food security and whose key mandate will ensure the overall alignment and harmonization of food security initiatives and provision of guidance for national food security policies and programmes. SIFSIA will concentrate its efforts on developing a Food Security Council at the central level though a certain amount of resources towards the strengthening of the food security institutional environment at state level. The proposed project aims at building on SIFSIA efforts and at improving the institutional environment for food security at the decentralized level. Such an approach is also consistent with the IPRSP.

4.3. Who needs to be involved in scaling up action in nutrition? What is the role of other sectors e.g. social protection, education and employment?

As nutrition involves a number of sectors coordination among relevant sectors highly important. While ministry of Health, the key in addressing health related nutrition issues, other sectors involved in rural development, agriculture, livestock production are equally important in addressing the nutrition situation. As it is indicated in the draft food and nutrition security policy document, a number of Governmental and non-state actors are responsible to address problems related to nutrition in various degree. The draft food security and nutrition policy document indicated that a number of agencies are expected to be involved in implementation of the policy (see the table below)

Policies to support food utilization

Policies	Executing Institutions
Health and medical	
1. Design programs to incorporate food security information and awareness in both health and education services	Ministry of Health, Ministry of Education, Ministry of Social Affairs
2. Advance the setup of programs on knowledge and awareness raising about improved nutrition practices at health facility and community levels.	Ministry of Health, Ministry of Culture and Information, Civil Community Organizations
3. Develop legislation to respond to targeted emergency situations of specific population groups including needs assessment techniques and specifications, to safeguard food quality, to support salt ionization, to ensure food supplementation or fortification with necessary micro-nutrients.	Ministry of Health, World Health Organization, Ministry of Social Affairs, Ministry of Justice
4. Enhance health services to increase vitamin A distribution coverage and to increase intake of iron and folic acid supplementation for pregnant and lactating women (throughout RH services)	Ministry of Health, UNICEF
5. Implement national protocols to detect and treat vitamin “A deficiencies”.	Ministry of Health and World Health
6. Develop guidelines and practices leading to boost growth of the under- five children at the health facility and community levels.	Ministry of Health, Community
7. Initiate a program to improve technical and managerial capacity of nutrition educators, dieticians and nutritionists	Ministry of Health, Ministry of High Education, Research, FAO and WFP
8. Institutionalize and implement the Universal Salt Iodization (USI) Programme, incorporating support to increased high-quality iodine supply (production) and raise awareness to increase its use and demand	Ministry of Health, Ministry of Industry Ministry of Trade, Ministry of Culture and Information, Civil Community
Education and awareness	
1. Organize campaigns and forums to spread knowledge and establish a culture of nutrition within various communities with focus on rural areas	Ministry of Education, Ministry of High Education, Ministry of Health, Ministry of Social Affairs
2. Strengthen and support the programs on nutritional awareness raising undertaken by the Food Research Center	Food Research Center
3. Sensitize domestic food industries to spread information on nutritional foods and encourage demand via occasional concessional pricing and free donations to poor rural families.	Ministry of Industry, Ministry of Social Affairs
Water and sanitation	
1. Consolidate and enforce regulations preventing misuse of water at household level that causes development of diseases (malaria, bilharzias, and various microbes)	Ministry of Health

2. Encourage and facilitate the interventions of community-based organizations, NGOs and regional and international organizations to enhance sanitation facilities and waste disposal in rural areas	Ministry of Health, Ministry of Social Affairs
Other food utilizations interventions	
1. Conduct research to develop feasible community-level activities (e.g. home gardens, small animals, poultry, fish) to mitigate malnutrition	Ministry of Agriculture, Ministry of Education, Ministry of Health, Ministry of Social Affairs
2. Formulate, popularize and strictly apply regulations specifying rational and safe ways of use of chemical pest control in food crops	Federal and State Ministries of Agriculture, Private
3. Assess the commercial feasibility of fortification of flour mix with iron and set a policy for implementation by bakeries	Ministry of Agriculture (Food Research), State Governments,
4. Support research to diversify nutritive food recipes from local food material and to promote food preservation technology in plant and livestock products.	Ministry of Agriculture, Ministry of Industry(Food Research)
5. Develop organic food production and activate its registration	Ministry of Agriculture, Ministry of Animal Resources, Ministry of Justice
6. Consolidate legislation to comply with the provisions of the Sanitary and Phyto-Sanitary Agreement and	Ministries of the Agricultural Sector in cooperation

4.4. What kind of capacity-strengthening support is most urgently needed, in which sectors, and at what levels of government?

Strengthening the sub-national level instructions such as the State and the localities is important to address capacity gaps in terms of food security and nutrition programme design and development. Currently the EU funded Food Security Policy and Strategy Capacity Building programme provides support in strengthening capacities of State and non-State actors in food security and nutrition policy and strategy, strengthening food and nutrition information system, and food security and nutrition institutional setups. This programme covers only the four eastern States of Sudan and the other 15 States are not included in this programme. It is crucial that similar capacity strengthening support is provided to the other States by focusing in the following major areas

- **Capacity development to enhance inter-sectoral coordination**

Due to the multi-dimensional nature food security and nutrition issues, multi-sectoral coordination at all level of Government structure very important. It enhances joint programming, avoids duplication of efforts and creates energy for better impact. Creating inter-sectoral coordination frameworks would also help to promote food Integrated food security and nutrition analysis that involves all relevant stakeholders.

- **Capacity strengthening support to food security and nutrition programme design and policy development**

Designing and implementing programs that increase food and nutrition security requires strengthening the capacity to design and implement sound policies at the national and subnational.

Institution's (including governments) must be improved, short- and long-term training courses initiated, opportunities for dialogue developed, and information disseminated. To sustain their newly strengthened capacity, institutions must nurture and use it fully.

- **Food security information system**

Evidence based food security and nutrition programme design and policy development depends on availability of timely and accurate data and information on regular basis. Currently the capacity of State governments in collection of data and information are far from adequate and support is required to strengthening components of food security and nutrition information such as nutrition information system, agricultural information system (crop and livestock), natural resource monitoring, and market information system. The four eastern States which are currently supported by the EU funded and FAO implemented programmes are receiving various capacity development support and this needs to cover the other states which are not covered by this programme.

Recommendations:

Interventions: (Agriculture)

- Agricultural diversification and the integration of the plant with an animal (Fields, gardens, school gardening, home garden, forests, manufacturing, warehousing, cottage industry)
- Development and modernization of agricultural systems
- Protection and development of the natural resources (e.g. Tree belts)
- Agricultural industrialization
- The integration of nutrition education with the Agricultural Extension for the farmers to Improved Nutrition
- Consider nutrition issues in agricultural research
- Implementation of quality control and safety measures
- Enhancements to support food security and nutrition through useful information system
- advocacy with Government for the continued support for nutrition services across Sudan
- Government recognition of the importance of nutrition in tackling national poverty
- Coordination between the different sectors (agriculture, health, education, social welfare, etc.) so as to develop multi-sectoral plan to solve the food and nutrition problems
- The introduction of nutritional indicators in Agriculture

Definitions

Food and nutrition security 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. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.

Food insecurity exists when people do not have adequate physical, social or economic access to food as defined above.

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the long and short term (R. Chambers & G. Conway 1992).

Hazard: a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (FAO 2013).

Vulnerability: the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. (UNISDR 2007)

Mitigation: the lessening or limitation of the adverse impacts of hazards and related disasters. (FAO 2013)

Natural hazard: natural process or phenomenon that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. (FAO 2013)

Resilience: For FAO, “resilience to shocks” is the ability to prevent and mitigate disasters and crises as well as to anticipate, absorb, accommodate or recover and adapt from them in a timely, efficient and sustainable manner. This includes protecting, restoring and improving livelihoods systems in the face of threats that impact agriculture, food and nutrition (and related public health). (FAO 2012)

Sustainable Development (SD): The concept of sustainable development was introduced in the World Conservation Strategy (IUCN 1980) and had its roots in the concept of a sustainable society and in the management of renewable resources. Adopted by the WCED in 1987 and by the Rio Conference in 1992 as a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations. SD integrates the political, social, economic and environmental dimensions. (FAO 2013)

Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. In Article 1, the United Nations Framework Convention on Climate Change defines “climate change” as: “a change of climate which is attributed

directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (FAO 2013).

Nutrition is the intake of food, considered in relation to the body's dietary needs. Malnutrition refers to an abnormal physiological condition caused by deficiencies, excesses or imbalances in energy and /or nutrient necessary for an active, health life. The term encompasses under-nutrition, over-nutrition and micronutrient deficiencies.

Anthropometry - the study and technique of human body measurement. It is used to measure and monitor nutritional status in an individual or population group. Body measurements include: age, sex, weight, height, edema (fluid retention) and mid upper arm circumference (MUAC).

Blanket Supplementary Feeding (BSF) - feeding of specific age group during lean season irrespective to their nutrition status.

Body Mass Index (BMI) - a number that indicates a person's weight in proportion to height/length, calculated as kg/m^2 .

Caregiver – parent or guardian of the malnourished child.

Community Involvement (sometimes referred to as social or community mobilization) - term used to cover a range of activities that, help nutrition programme implementers (i.e. nutritionists, managers and health workers) build a relationship with the community and encourage programme uptake by community members.

Community-based Management of Acute Malnutrition (CMAM) - international term for timely detection of severe acute malnutrition in the community through outreach workers; provision of treatment to moderately acute malnourished, provision of treatment for those without medical complications (OTP) and combined with a facility-based approach for those malnourished children with medical complications (IP or SC).

Community Sensitization - a way to reach out to people in the community and teach the causes, signs and symptoms of malnutrition, and how to seek treatment opportunities and prevent healthy children from becoming malnourished.

Community-based Therapeutic Care (CTC) - international term used prior to the CMAM term.

Complementary Feeding: The process starting when breast-milk alone is no longer sufficient to meet the nutritional requirements of infants and therefore other food and liquids are needed along with breast-milk. The target age range for complementary feeding is generally 6-24 months even though breastfeeding can continue beyond 2 years.

Crude Mortality Rate (CMR) - the rate of death in the entire population, including both sexes and all ages. The CMR can be expressed with different standard population denominators and for different time periods, often commonly described as deaths per 10,000 populations per month/year.

Emergency Nutrition Intervention (ENI) - programmes set-up to manage malnutrition and to provide food to a population that does not have sufficient access to or quality of food. Emergency Nutrition Interventions can also be started in response to other factors such as disease outbreaks in populations with sufficient access to food.

Evaluation - a process that objectively determines appropriateness, relevance, effectiveness, efficiency and impact of activities in light of specified objectives.

Exclusive breastfeeding (EBF)- Breastfeeding while giving no other food or liquid, not even water and recommended for infants up to the age of 6 months.

Fortified Blended Food (FBF) - a precooked mixture of cereals and other ingredients such as pulses, dried skim milk and vegetable oil, which is fortified with micronutrients. Commonly marketed as CSB or Super Cereal (+ and ++), Famix or Unimix.

F-75 - Formula 75 (75kcal/100 ml) is the milk based diet recommended by WHO for the stabilization of children with SAM with inpatient care (those with medical complications and/or no appetite).

F-100 - Formula 100 (100kcal/100 ml) is the milk based diet recommended by WHO for the nutrition rehabilitation of children with SAM after stabilization in inpatient care, now is generally replaced by RUTF.

Global Acute Malnutrition (GAM): A population indicator that provides an aggregate of moderate and severe malnutrition, i.e. ≤ -2 Z-scores and edema. GAM is divided into moderate and severe acute malnutrition (GAM = MAM+SAM).

IBSFP – Integrated community base blanket supplementary feeding programme targeting children from 6 – 36 months by nutrition supplies and educations to address both wasting and stunting irrespective to the child nutrition status.

Inpatient Therapeutic Care - severely malnourished patients admitted to inpatient facility for treatment (IP or SC) of cases with complications and/or lack of appetite. If OTP is not available in the catchment area, IP offers full inpatient care with Phase 1, Transition Phase and Phase 2 with an average length of stay of 2-3 weeks. When OTP is available in the catchments area, only the complicated severe cases as defined by a lack of appetite and the presence of medical complications are admitted in IP. Usually, patients would only stay as long as they required Phase 1 treatment (2-7 days) and then would progress to outpatient care.

IYCF - describes the feeding of infants and young children (usually 0-24 months).

Malnutrition - a state in which the physical function of an individual is impaired to the point where s/he can no longer maintain adequate bodily performance processes.

Marasmus - severe weight loss and muscle mass leaving 'skin and bones'. Appearance can manifest as 'old man face' and 'baggy pants'.

Moderate Acute Malnutrition - description of malnutrition level in Sudan the definition encompasses children 6-59 months with < -2 to ≥ -3 z-scores and/or MUAC ≥ 11.5 to < 12.5 cm

Monitoring - periodic oversight of the implementation of an activity which seeks to establish the extent to which input deliveries, work schedules and targeted outputs are proceeding according to plan.

MUAC - Low MUAC is an indicator for wasting. For a child 6-59 months, MUAC < 11.5 cm indicates severe wasting or SAM, MUAC ≥ 11.5 to < 12.5 cm indicates moderate wasting or MAM. MUAC is a better indicator of morbidity and mortality risk associated with acute malnutrition than WFH.

Nutrition - study of food and its nutrients; its functions, actions, interactions and balance in relation to health and disease.

Nutrition Education - process of imparting knowledge, designed to improve people's attitude, habits, behavior, customs and beliefs that are related to food consumption

Outpatient Therapeutic Programme (OTP) - programme run from a health center or health post offering outpatient care to severely malnourished cases with no medical complications (this group usually represents > 90% of all the SAM cases). At admission, children receive a medical check to determine if they warrant direct referral to the nearest inpatient unit. If they are well enough to be treated as an outpatient they receive systematic treatment and a ration of RUTF. Patients are seen on a weekly, but caregivers are encouraged to return to the OTP if the child's condition deteriorates during that time. The average length of stay in OTP is 4-8 weeks.

Prevalence Rate - The proportion of the population that has the health problem under study (e.g. the prevalence of GAM).

Ready-to Use Foods (RUFs); Ready-to use Supplementary Food (RUSF) and Ready-to Use Therapeutic Food (RUTF) - energy dense, mineral and vitamin enriched food that does not require cooking or preparation or dilution with water and can be eaten directly from the packet. RUTF has been specifically developed for the recovery of severe acute malnutrition, while RUSF is for the recovery of moderate acute malnutrition.

Recommended Nutrient Intake (RNI): The daily intake which meets the nutrient requirements of almost all (97.5%) apparently healthy individuals in an age- and sex-specific population.

Selective Feeding Programmes: Programmes aiming to provide nutrition supplement to specific population group for treatment or prevention of malnourished individuals

Severe Acute Malnutrition (SAM) - description of malnutrition level encompassing children 6-59 months with < -3 z-scores, and/or MUAC < 11.5 cm, and/or bilateral pitting nutritional edema. Persons with SAM have higher morbidity and mortality risks.

Sphere Project - was launched in 1997 by a group of humanitarian NGOs, the Red Cross and Red Crescent movement. The Sphere humanitarian charter and minimum standards in disaster response, 3rd edition (2011) is the latest version; providing a set of recommendations that humanitarian projects should aim to meet.

Standard Deviation (SD) or z-score - the deviation of the anthropometric value (weight, height etc.) for an individual from the median value of the reference population.

Stunting - or chronic under-nutrition, is a form of under-nutrition that is defined by a height-for-age (HFA) z-score below two SDs of the median WHO standards. Stunting is a result of prolonged or repeated episodes of under-nutrition often starting before birth. This type of under-nutrition is best addressed through preventative maternal health programmes aimed at pregnant women, infants, and children under age 2. Programme responses to stunting require longer-term planning and policy development.

Supplementary Feeding Programme (SFP) - provision of nutrition supplement to rehabilitate or treat moderately malnourished individuals

Targeting - a method of delivering goods (such as food assistance) and/or services to a selected group of individuals or households, rather than to every individual or household in the population.

Triage of Acute Malnutrition - Refers to the selection/ sorting/classification of cases of acute malnutrition presented to fast track treatment and increase survival rates.

Under-nutrition - Is a consequence of a deficiency in nutrient intake and/or absorption in the body. The different forms of under-nutrition that can appear isolated or in combination are acute malnutrition (bilateral pitting edema and/or wasting), stunting, underweight (combined form of wasting and stunting), and micronutrient deficiencies.

Underweight - Underweight is a composite form of under-nutrition including elements of both stunting and wasting and is defined by a weight-for-age (WFA) z-score below 2 SDs of the median (WHO standards). This indicator is commonly used in growth monitoring and promotion (GMP) and child health and nutrition programmes aimed at the prevention and treatment of under-nutrition.

Vulnerable Groups – Groups of people who are ‘at risk’ of malnutrition, which vary in characteristic but are often defined by age, sex, ethnicity and location; can also include those with disabilities and stigmatized illnesses, such as mental ill-health and displaced persons such as refugees or migrant workers

WHO Growth Standards (WHO GS 2006) - Developed using data collected in the WHO Multi-centre Growth Reference Study in Brazil, Ghana, India, Norway, Oman, and the United States between 1997 and 2003 to generate new curves for assessing the growth and development of children from birth to five years of age under optimal environmental conditions. They are intended to be used to assess children everywhere, regardless of ethnicity, socioeconomic status and type of feeding.

Z-score - Indicates how far a measurement is from the median – also known as the standard deviation (SD) score. The reference lines on the growth charts (labelled 1, 2, 3, -1, -2, -3) are called **z-score lines**; they indicate how far the measurement is above or below the median (= z-score of 0).

5. References

Sources	Information	Internet link
<p>Country</p>	<p>key country political, policy and programme documents consulted to be added here</p> <p>Poverty Reduction Strategy Paper for Sudan, I and II PRSP (2011-2016)</p> <p>Country Programming Framework for the Republic of Sudan, 2nd 5 year development plan (2012-2016)</p> <p>AFRICAN DEVELOPMENT BANK GROUP Sudan: Country Brief – 2012-2014, 3 year Economic Salvation Programme (2012 to 2014)</p> <p>Agriculture Revival Programme (2006 to 2014)</p> <p>Darfur Development Strategy (2013 to 2019), A Recovery & Construction Strategy 2013 - 2019</p> <p>Sudan CPF (2014), Country Programming Framework for the Republic of Sudan</p> <p>UNDAF (2012-2015). United Nations Development Assistance Framework for the Republic of Sudan</p> <p>.....</p> <p>.....</p> <p>.....</p>	<p>http://documents.worldbank.org/curated/en/docsearch/document-type/540689</p> <p>ftp://ftp.fao.org/TC/CPF/Countries/Sudan/CPFSudanDraftApril2012.pdf</p> <p>http://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/2012-2014-Sudan-%20%20Country%20Brief.pdf</p> <p>http://www.cmi.no/sudan/resources.cfm?id=352-the-agricultural-revival-program-2008-2011</p> <p>http://www.sd.undp.org/content/dam/sudan/docs/DDS%20English.pdf</p> <p>http://coin.fao.org/coin-static/cms/media/19/13946356383550/cpf_sudan.pdf</p> <p>http://www.sd.undp.org/content/dam/sudan/docs/SUD%20UNDAF-FINAL%20%20July%202012.pdf</p>
<p>Country</p>	<p>Other national documents consulted to be added here</p> <p>.....</p> <p>.....</p> <p>.....</p>	

	the nutrition situation, programmes and policies	
SUN	Progress Report from countries and their partners in the Movement to Scale Up Nutrition (SUN)	http://www.scalingupnutrition.org/wp-content/uploads/2011/09/compendium-of-country-fiches-ROME-VERSION.pdf http://www.scalingupnutrition.org/events/a-year-of-progress/
WFP	Food security reports	http://www.wfp.org/food-security/reports/search
Other sources	<p>To be added here</p> <p>1)The demographic Profile of Sudan.....</p> <p>.....</p> <p>2)Urbanization and the future of Sudan</p> <p>.....</p> <p>3) FAO. 2013. Biofuels and Food Security, 2013; A Report by the High Level Panel of Experts on Food Security and Nutrition.</p> <p>UNEP, 2007. warns expansive environmental degradation in Sudan</p> <p>UNEP & FAO, 2013. Biodiversity for Food Security and Nutrition.....</p> <p>.....</p> <p>Lori, Ann. 2002. Linking Agricultural Biodiversity and Food Security: the Valuable Role of Agro biodiversity for Sustainable Agriculture. International Affairs, 2002.</p>	<p>1)http://www.escwa.un.org/popin/members/sudan.pdf</p> <p>2)http://africanarguments.org/2008/01/29/urbanization-and-the-future/</p> <p>3)http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/HLPE_Reports/HLPE-Report-5</p> <p>http://www.panapress.com/UNEP-warns-expansive-environmental-degradation-in-Sudan--13-506122-18-lang4-index.html</p> <p>http://www.cbd.int/doc/newsletters/development/news-dev-2015-2013-07-en.pdf</p> <p>http://onlinelibrary.wiley.com/doi/10.1111/1468-2346.00133/abstract.</p>

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