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TABLE OF CONTENTS

Page

Acronyms and abbreviations 4

Highlights 5

1. OVERVIEW 5

2. SOCIO-ECONOMIC CONTEXT 7
2.1 Population 7
2.2 Economy 8
2.2.1 Economic growth and national budget 8
2.2.2 Exchange rate and inflation 8
2.3 Agriculture 9

3. CEREAL PRODUCTION IN 2014 11
3.1 Cereal harvested area estimates 11
3.2 Factors affecting yields 16
3.2.1 Rainfall 16
3.2.2 Inputs in the traditional smallholder sector 23
3.2.3 Pests, diseases and weeds 24
3.3 Agricultural production in 2014 25
3.3.1 Cereal production 25
3.3.2 Other crops 31
3.3.3 Livestock 32

4. CEREAL SUPPLY/DEMAND SITUATION 34
4.1 Cereal balance 34
4.2 Cereal and livestock markets 35
4.3 Household and food assistance 39

5. HOUSEHOLD FOOD SECURITY SITUATION 40
5.1 Methodology 40
5.2 Main drivers of food insecurity in 2014/15 41
5.3 Recent food security situation and evolution 42
5.4 Household staple food supply: markets vs own production 43
5.5 Food expenditure: recent patterns and at-harvest situation 45
5.6 Household coping strategies 45
5.7 Estimated food assistance requirements in 2015 46

Annex I: Indicative Seasonal Cropping Calendar 48
Annex II: Harvest Missions Completed by Task Force Teams 49
Annex III: Situation by State 50

ABBREVIATIONS AND ACRONYMS

BOSS	Bank of South Sudan
CFSAM	Crop and Food Security Assessment Mission
CRS	Catholic Relief Services
DAP	Diammonium Phosphate
DLCO	Desert Locust Control Organization
EFSA	Emergency Food Security Assessment
FAO	Food and Agriculture Organization
FSMS	Food Security Monitoring System
FSTS	Food Security Technical Secretariat
GDP	Gross Domestic Product
GRSS	Government of Republic of South Sudan
ha	hectare (0.42 hectares = 1 feddan)
hh	Household
ICRC	International Committee of the Red Cross
IDPs	Internally Displaced Persons
IFDC	International Fertilizer Development Company
IOM	International Organization for Migration
JRC	Joint Research Centre (European Commission)
KI	Key Informants
MAFCRD	Ministry of Agriculture, Forestry, Tourism, Animal Resources, Fisheries, Cooperatives and Rural Development
MFEP	Ministry of Finance and Economic Planning
NBHS	National Baseline Household Survey
NBS	National Bureau of Statistics
NDVI	Normalized Difference Vegetation Index
NGO	Non-Governmental Organization
OCHA	Office for the Coordination of Humanitarian Affairs
PET	Pictorial Evaluation Tool (crop yield & livestock body condition-indicators)
RFE	Rainfall Estimate
RRC	Relief and Rehabilitation Commission
SMoA	State Ministry of Agriculture
SSP	South Sudanese Pound
UNHCR	Office of the United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States Dollar
WFP	World Food Programme

HIGHLIGHTS

- In 2014, generally favourable rains and absence of major outbreaks of pests and diseases supported first and second season cereal crop production in the traditional farming sector.
- Despite a significant decline in cereal harvested area in conflict-affected states, 2014 net cereal production in the traditional sector is estimated at about one million tonnes, about 13 percent above the previous year's output.
- The adoption of an improved assessment methodology has allowed gathering better information on yields, especially for first season crops in bimodal rainfall areas.
- Livestock conditions were generally good due to adequate pasture and water availability. However, unusual movements of livestock due to conflict/insecurity with concentration of animals in small areas have raised concerns about disease outbreaks, reduced access to resources and increasing tensions between herders and farmers.
- In most conflict-affected areas, market functioning was severely jeopardized during 2014 and, although some trade activities have recently resumed, local food prices remain generally high due to insecurity, high formal and informal taxation, roadblocks, checkpoints and fuel shortages.
- In non-conflict-affected areas, food prices peaked in January when the conflict flared up, but soon started to decline as imports resumed, food assistance was available and first and second season crops became accessible for local consumption.
- With a projected population of about 11.4 million people in mid-2015, which is half a million less than the population estimated for mid-2014 due to refugees leaving the country, the overall cereal deficit until the next harvest in late 2015 is estimated at nearly 249 000 tonnes, some 150 000 tonnes less than the revised deficit estimate for 2014.
- Prior to the start of the conflict in late 2013, South Sudan had made significant progress in improving food security. However, by late 2014, about 38.3 percent of the population was considered food insecure compared to 33.4 percent in late 2013 and the level of severe food insecurity increased to 6.0 percent from 3.4 percent in 2013.
- At the beginning of 2014, when the conflict was most intense and widespread, food insecurity reached record levels across the country, including Greenbelt areas where food insecurity is usually not an issue.
- In spite of notable improvements by early 2015 compared to one year before, serious concerns remain for the rest of 2015. Conflict affected areas have registered very large cereal deficits against a backdrop of deficient market functionality. A large number of the displaced populations will depend mainly on food assistance and only to some extent on market supplies. States neighbouring the conflict areas still register high rates of food insecurity.
- Unless market functionality and supply of food commodities improve significantly during 2015, recovery will remain fragile as South Sudan's agriculture remains highly vulnerable to adverse weather conditions.
- In 2015, WFP plans to assist 3 million people providing just under 261 000 tonnes of food; though a large component (1.4 million) concerns people directly affected by conflict, WFP assistance will also focus on school feeding, nutrition interventions and food for assets programmes.
- FAO plans to assist livelihoods and food production of about 477 000 households in 2015 through distribution of seeds, tools, fishing equipment, post-harvest processing and marketing inputs as well as protection of livestock.

1. OVERVIEW

An FAO/WFP Crop and Food Security Assessment Mission (CFSAM) visited South Sudan from 2 to 14 February 2015 to estimate cereal production during 2014 and assess the overall food security situation. The CFSAM reviewed findings of eight crop assessment missions conducted at harvest time in the different agro-ecological zones of the country from August 2014 to January 2015 in nine states[1]. All assessments were carried out by Task Force teams that comprised agriculturalists from the Ministry of

[1] No Task Force assessment was conducted in Unity State because of high insecurity due to the conflict. Completing extensive transects and case studies, Task Force-led teams covered the first and second harvests in Western, Central and part of Eastern Equatoria; main harvests in Northern and Western Bahr el Ghazal and Warrap; late-maturing sorghum harvest in Lakes and Western Bahr el Ghazal; and spot checks on production in four accessible locations in Jonglei and Upper Nile States.

Agriculture, Forestry, Tourism, Animal Resources, Fisheries, Cooperatives and Rural Development (MAFCRD), the National Bureau of Statistics (NBS), Central/Western Equatoria Ministries of Agriculture (CEMAF and WEMAF) and FAO South Sudanese staff. They were joined on one mission by an observer from the European Commission's Joint Research Centre (EC/JRC). Before the harvest assessments, Task Force team leaders, who had been selected on the basis of their performance on CFSAM field teams in previous years, combined to conduct three missions from March to July to provide information and data at planting time.

During the harvest assessment missions, which encompassed 46 counties in nine states, the Task Force–led teams completed 466 transects by vehicle through agricultural areas. Following Pictorial Evaluation Tool (PET) standard operating procedures, the teams recorded about ninety thousand spot yield estimates of growing crops and conducted 670 farmer case-studies. The information gained from transects and case-studies was triangulated with 80 key informant interviews with senior staff in State Ministries of Agriculture (SMoA), county and payam officials as well as staff of NGOs, agricultural banks and international agencies based in the field. Growing conditions reported in case-studies and interviews were compared against remote sensed meteorological data.

In Juba, the CFSAM Mission held meetings with the MAFCRD, the National Food Security Council, the Ministry of Finance and Economic Planning (MFEP), the NBS, the Bank of South Sudan (BOSS), the Agricultural Bank of South Sudan, the World Bank, the European Commission, USAID/FEWSNet, the UN Office for the Coordination of Humanitarian Affairs (OCHA) and the International Organization for Migration (IOM) as well as with resident staff of FAO and WFP. Cereal and livestock prices in main markets were analysed using FAO's and WFP's price databases.

This year the most significant effect on production has been the conflict that erupted in December and, through violence, destruction and displacement precluded production in several farming areas of Unity, Jonglei and Upper Nile states. Ongoing conflict and threats of conflict prevented Task Force access in Unity State and substantially reduced access in parts of Jonglei and Upper Nile States, causing estimates in these areas to be based on secondary sources, extrapolations from neighbouring counties and historical CFSAM assessments made during years with similar rainfall patterns.

In general, crop growing conditions in 2014 were better than in 2013. Following an early onset of rain across the country, rainfall levels were similar or just below long-term average for most decades until December. Rainfall was well distributed during the season with positive short dry spells that allowed access in most areas without prompting re-planting or threatening grain-filling later in the season. Heavier rains in flood-prone areas mostly occurred after the main harvest, with minimal loss of planted areas.

Crop pest and disease levels were noted to be mild in all areas, with no reported outbreaks of migratory pests. Apart from the main areas of conflict, regular breakdowns of law and order through inter and intra-communal conflicts in parts of Lakes, Warrap and Western Bahr el Ghazal states have disrupted activities throughout the year reducing the chances of optimising the country's agricultural potential.

Regarding the traditional sector, the estimated cereal area harvested in 2014 decreased by about 10 percent compared to 2013 revised estimates at one million hectares, bringing the average household cereal area estimate to 0.87 ha. Harvested area dropped significantly in the three conflict-affected states, from 57 percent in Upper Nile state to 73 percent in Unity and Jonglei states, where in seven counties it has been assumed that no cereal farming took place at all due to high insecurity levels. Average cereal yield is estimated at 1.25 tonnes/ha, representing a 30 percent increase as compared to 0.96 tonnes/ha in 2013. The increase in yields was due to favourable weather conditions, but also to the adoption in 2014 of an improved assessment methodology that allowed more accurate estimates, especially regarding the first season crops harvested in bimodal rainfall areas.

Net cereal production in 2014 from the traditional sector, after deduction of post-harvest losses and seed use, is estimated slightly over one million tonnes, about 17.3 percent above the 2013 revised estimate of 865 000 tonnes. With a mid-2015 projected population of about 11.4 million people, which took into consideration that about half a million people fled the country in 2014 due to the conflict, consuming on average about 110 kg of cereals per capita per year, the cereal requirement in 2015 is estimated at about 1.3 million tonnes. Accordingly, an overall cereal deficit of nearly 249 000 tonnes is estimated in the 2015 marketing year. Net cereal production from the mechanized sector in Upper Nile State is tentatively estimated at a low 43 500 tonnes, due to reduced planted area and late onset of rains. Although some sorghum produced by Sudan-based farmers is expected to be commercialized across the border in the Sudan, some amounts are expected to be marketed internally, which would offer options for local purchases.

Trade flows have been severely disrupted in most conflict-affected areas during the first months of 2014. Although the situation has recently improved in some areas, local food prices in most markets in the Greater Upper Nile remain generally high due to insecurity, high formal and informal taxation, roadblocks, checkpoints and fuel shortages. In most non conflict-affected areas, particularly in Juba, food prices abruptly increased in January as a reaction to the start of conflict, but soon declined as imports resumed, food assistance was delivered and first and second season crops were commercialized.

Based on the latest available Integrated Phase Classification, FAO plans to assist livelihoods and food production of about 477 000 households (more than 2.8 million people) through distribution of crop/vegetable seeds and tools, fishing equipment, inputs for post-harvest processing and marketing as well as protection of livestock assets.

The conflict situation and its effects interrupted a trend of improving food security. By late 2013, just prior to the start of the conflict, food insecurity in South Sudan had reached the lowest levels in the available record. One year later, food insecurity had increased again, though the magnitude of the increase was probably lower than what might have been expected. In October 2014, 38.3 percent of the population was food insecure (an increase from the 33.4 percent of late 2013), with severe food insecurity up to 6.0 percent from 3.4 percent. However, a worse scenario was saved by the sustained and widespread humanitarian assistance effort and the ideal conditions for crop development. During early 2014, when the conflict was most intense and widespread, food insecurity reached record levels across all of the country, including Greenbelt areas where food insecurity is usually not an issue. In the Greater Upper Nile region, severe food insecurity reached extreme levels of 30 to 40 percent in February 2014.

Markets remain the major supplier of staple cereals to local households, except around harvest time in the most productive areas of the country. Conflict impact on market infrastructure and trade routes led to major decreases in the contribution of markets to the households' staple food supply, in particular in the Greater Upper Nile region. The slack was taken up by own production, which increased across the country, and by food assistance, only in the conflict states, with 25 to 50 percent of households in Greater Upper Nile States reporting it as their main source of sorghum in June and October 2014. Problems in market commodity supply led to a mid-2014 spike in the proportion of households with high food expenditure to record levels, though a normalization of prices and the good harvest led to a drop in the figure to a record low of 25 percent by late 2014.

Although there have been notable improvements relative to the first half of 2014, the food security perspectives during 2015 remain a cause for concern. Even though households in non-conflict areas have larger stocks as a result of the 2014 good harvest, states neighbouring the conflict areas still register high rates of food insecurity. Vast numbers of displaced populations will be largely dependent on food assistance and market supplies. As South Sudan's agriculture remains highly vulnerable to adverse weather conditions, if market functionality does not improve during 2015, recovery will remain fragile and dependent on a favourable 2015 rainfall season.

In 2015, WFP plans to assist 3 million people in South Sudan providing just under 261 000 tonnes of food, depending on levels of funding; though a large component (1.4 million) concerns people directly affected by conflict, WFP assistance will also focus on school feeding, nutrition interventions and food for assets programmes.

2. SOCIO-ECONOMIC CONTEXT

2.1 Population

Since the conflict started in mid-December 2013, South Sudan's population size and geographical distribution had significant changes. According to OCHA and UNHCR, by early February 2015, about 2 million people were forced to flee their homes due to insecurity, including 1.5 million IDPs and half a million people seeking refuge in neighbouring countries (Ethiopia, Uganda, the Sudan and Kenya). Most South Sudanese refugees originate from Jonglei (mainly from South Bor, North Bor and Akobo counties) and Upper Nile states (especially from Latjor county) and the bulk of the exodus, with over 400 000 people leaving the country, took place during the first semester of 2014. Regarding IDPs, about 270 000 people are registered in Greater Equatoria, Western Bahr el Ghazal, Lakes and Warrap states, while the majority of IDPs remain in the Greater Upper Nile. Population movements have affected farming activities as only a minimal fraction of displaced households were able to farm in 2014 and the abnormal concentration of IDPs in some counties have significantly increased the local food demand with consequent higher food deficits.

Before the start of the conflict, the population for mid-2014 was estimated at about 11.6 million, including about 1.8 million people that returned to South Sudan since 2008. In order to take into account the number of people that fled the country in 2014 as refugees, the Mission adopted the population estimate of 11.1 million people as it was used also during the December 2014 IPC exercise. This new figure has been used by the Mission to revise previous estimates for food consumption requirements and food gaps in 2014. Given the implicit annual increment of 3 percent, as suggested by the National Bureau of Statistics (NBS), the population for mid-2015 is estimated at about 11.4 million people.

2.2 Economy

2.2.1 Economic growth and national budget

The country's 2013 nominal gross domestic product (GDP) was estimated at about SSP 35 billion, about 14 percent higher than the previous year, essentially due to the resumption of oil production in April 2013 after the decision to suspend it in January 2012 following tensions with the Sudan on pipeline transit fees. According to IMF estimates, the real GDP is expected to shrink by about 7.5 percent in 2014, essentially as a consequence of the current conflict in main oil producing states. In fact, by early 2014, just at the onset of the conflict, oil production has been completely shut down in Unity state oilfields, with a loss of around 45 000 b/d, while oil production in Upper Nile has been severely disrupted by local insecurity. As a result, oil production in 2014 averaged at about 160 000 b/d, compared to the country's output of 240 000 b/d in 2013 and 330 000 b/d before the 2012 shut-down.

The impact of low oil production is currently compounded by the decline in international oil prices which dropped by more than 50 percent by mid-2014 onwards. The declines in international oil prices severely affected the South Sudanese economy by substantially reducing the export revenue also because the transit fees to be paid to the Sudan are calculated on a volume basis, without considering fluctuations of international prices. Under the agreement signed in September 2012, oil transit fees for the use of the pipeline to Port Sudan were negotiated at USD 24-26 per barrel. Consequently, the weight of transit fees have changed from about one quarter of the international oil price at the moment of the agreement with Sudan at the end of 2012 (about USD 100 per barrel) to more than half the price at the beginning of 2014 (less than USD 50 per barrel).

Approved last August, the 2014/15 Budget forecast total revenues at SSP 11.3 billion, about 8 percent more than the previous year. Main areas of expenditure are salaries and transfers to states and counties in order to allow the government to continue functioning and service delivery to be maintained during the current crisis. Allowances to government personnel have been restored to their pre-austerity levels, determining an increase by 24 percent in salary expenditure. Conversely, capital expenditures have been cut by about 30 percent. Regarding allocations by sectors, security and law enforcement still account for about 50 percent of the overall budget, while capital intensive sectors such as infrastructure show a substantial decline in financing (Table 1). Funds for natural resources and rural development are expected to double in 2014/15 if compared to the previous year, financing in particular salaries, wages and operating costs, while capital expenditures are expected to be reduced from SSP 61 million in 2013/14 to only SSP 7.4 million in 2014/15.

Table 1: South Sudan - Expenditure by sectors in 2013/14 and 2014/15 (million SSP)

Sectors	2013/14 (suppl.)	2014/15 (plan)	Change (%)
Accountability	298	302	1
Economic functions	333	399	20
Education	620	622	0
Health	395	451	14
Infrastructure	536	393	-27
Natural resources and rural development	163	363	123
Public administration	1 023	822	-20
Rule of law	1 437	1 573	9
Security	3 642	3 970	9
Social and humanitarian affaires	97	110	14
Block transfers to States	971	964	-1
Interest payments	170	260	53
Emergency contingency funds	219	250	14
Arrears fund	500	800	60
Total	**10 403**	**11 279**	**10**

2.2.2 Exchange rate and inflation

The South Sudanese Pound (SSP) was introduced following independence in July 2011 and it operates under a managed float, which is initially intended to have parity with the Sudanese Pound (SDG). With the aim to unify official and parallel exchange rates, the GRSS announced, on November 2013, a devaluation of the official exchange rate by 34 percent, from SSP 2.95 per USD to SSP 4.5 per USD. However, as the devaluation was going to affect the rent of those with preferential access to the official rate, including government staff, foreign exchange bureaux, commercial banks and importers, the National Assembly forced the Central Bank of South Sudan to immediately reverse the decision to devaluate the local currency. Rationing of foreign exchange since September 2011 has led to a parallel market where the exchange rate trades at a premium compared to the official rate. Currently, the exchange rate in the parallel market is at about SSP 5 per USD and it is unlikely to strengthen as foreign-exchange reserves are very low (accounting to two-three weeks of imports at the end of December 2014), limiting severely the ability of the Central Bank to intervene in the currency market.

According to the NBS, year-on-year national inflation was negative (deflation) between April and December 2013 as a consequence of the reduced demand following the implementation of the austerity measures, affecting in particular salaries of the public administration. In January 2014, inflation started to rise again, averaging 2 percent in Juba during the whole year. Inflationary pressures have been particularly intense in the Greater Upper Nile, where supply routes have been seriously disrupted by the conflict. On a monthly basis, the Consumer Price Index decreased by 15.5 percent between November 2014 and January 2015 driven by a substantial decrease in food prices, especially fruits, dairy products, alcoholic beverages and tobacco.

2.3 Agriculture

South Sudan's diverse ecology provides a growing season ranging from 280-300 days in the southwestern parts (known as the Greenbelt) to 130-150 days per annum in the northern states due to bimodal and unimodal rainfall regimes. The bimodal areas cover much of the Greater Equatoria (Western, Central and parts of Eastern Equatoria), while the rest of the country has a unimodal regime. Agricultural performance consequently varies markedly depending primarily on latitude, with the possibility of two and even three harvests per annum from the same plots in the Greenbelt in the Greater Equatoria, and a single harvest in the unimodal areas further north.

With almost all agricultural production being rainfed, rainfall variability in terms of quantity and distribution is the major factor in determining crop performance. Usually, rainfall increases in a north-easterly to south-westerly *direction* culminating in the Greenbelt along the border with the Central African Republic, the Democratic Republic of Congo and Uganda; but there are considerable variations in rainfall from year to year and from location to location within the same year in all areas. In lowland areas, flooding/water-logging is a common occurrence, while many areas, especially those towards the northern border with the Sudan and southeast corner of the country, are susceptible to prolonged dry periods. Hence, good soil and water management are keys to increased crop yields.

Crop production is mostly conducted on small, hand-cultivated plots farmed by women-headed households, with a membership of five to seven persons that belong to larger family aggregations, reflecting the polygamous nature of most communities. Notwithstanding an abundant availability of land throughout the country, the area cultivated by households has, hitherto, been limited by a combination of (a) the size of the household labour force and/or the ability of households to provide in-kind payment (essentially food/beer) for the mobilization of traditional working groups (*nafeer)* and (b*)* security of access.

In recent years, average farm sizes are noted to have increased with steadings-based farm areas merging with far-fields as communities adopt animal traction (e.g. Lakes and parts of Warrap states); and, with the emergence of commercially-orientated farmers cultivating larger areas of cereals, groundnuts and cassava for sale using combinations of tractor services, labour gangs and pairs of oxen, depending on location (e.g. in Central Equatoria state from Yei to Terekeka). During the past 20 years, animal traction has been promoted by FAO and many NGOs in Central Equatoria, Eastern Equatoria, Lakes, Warrap and Bahr el Ghazal states in attempts to facilitate an increase in the area cultivated by each household. At last, previously noted constraints to its adoption appear to be lifting, with requests for increased access to purchase units reported in Lakes and Central Equatoria states. However, lack of spare parts, skills to

maintain mould-board ploughs, raw materials for local blacksmiths and low levels of operator skills still limit expansion; as does lack of resources to capitalize on the increased area through improved weeding[2].

In 2014, secure access to land throughout the season has been the defining characteristic of farmed areas in the Greater Upper Nile and in their bordering counties where large numbers of IDPs have sought refuge. Access often was denied in many counties in Unity, Upper Nile and Jonglei states where communities fled their homes and, even if they remained *in situ*, they were too frightened to farm. However, in the seven states not directly affected by the conflict, planting assessments noted an expansion in both numbers of farming households and cultivated areas to all crops.

Rainfed mechanized cereal production is normally practised on a large scale in the Upper Nile counties of Renk, Manyo, Melut, Baliet, Fashoda and Malakal following patterns of land occupancy established before independence by traders/farmers from both South Sudan and the Sudan. Elsewhere, limited numbers of both private and GRSS tractors provide ploughing services to individuals and farmer-groups at prices ranging from SSP 50 (GRSS subsidized) to SSP 350 per feddan for a single pass. Mechanization applies only to one pass preparation and sowing on a second pass with a seed drill positioned over the ubiquitous disc harrows. Other operations to harvesting are done manually. Major problems related to the supply of fuel and spare parts, operator skills and maintenance, and repair capabilities persist, severely limiting the efficiency of the tractor service. Pilot programmes to introduce and support the use of two-wheeled walking tractors offer a financially sustainable alternative to the distribution of large four-wheeled units that are prematurely scrapped due to inadequate maintenance.

Three planting assessments were conducted from March to July 2014 as part of the CFSAM Roadmap and they confirmed that sorghum is the main crop cultivated by the traditional sector, comprising some 70 percent of the area sown to cereals. Regarding sorghum, preferred seeds are the many local landraces with lengths to maturity fitting agro-ecological niches[3] ranging from short-season (<90 days) to very long-season (>220 days). There are also several improved, short-term varieties of sorghum from the Sudan that have become well-established in the northern states of the country in both large-scale mechanized farms of Upper Nile State and hand-cultivated farming areas with cross-border access to the Sudan located from Renk to Abyei to Aweil[4]. Maize is estimated to be planted in about 27 percent of the cereal area. However, this percentage breakdown is not universally applicable to product availability due to regional differences. Maize is the most popular cereal in the Greenbelt, where Longi varieties are grown in series in two crops per year on the same land. Maize is also the main cereal in south-central parts of Unity State (also Longi varieties), along the Sobat River in Upper Nile State and in eastern Jonglei counties near the Ethiopian border, where mixed Longi and local landraces and Ethiopian releases are noted. Elsewhere, maize is only cultivated in very limited areas close to homesteads, where it is consumed green with the first early sorghums in August-September.

Bulrush millet, finger millet and rice make up the remaining 3 percent of the cereal area. In Northern and Western Bahr el Ghazal, Warrap and Lakes states, sorghum is intercropped with bulrush millet; whereas finger millet and upland rice are mostly found in the Greater Equatoria. Other crops of most importance to food security include cassava and groundnuts, sweet potato and yams. Cassava is estimated to make up 30 percent to 40 percent of the planted area in Western and Central Equatoria states and 27 percent of the cultivated area in Western Bahr el Ghazal State. Groundnut areas range from 5 to 15 percent according to location. Groundnut is usually cultivated on sandier soils and, after cereals, makes the most important contribution to household diets throughout the northern states, where it is also the main cash crop[5].

Okra, cowpea, green-gram, pumpkin, Bambara nut and tobacco are also widely grown around homesteads in all areas. Vegetables such as onions or tomatoes are not commonly grown in rural areas, but are increasingly cultivated near cities to supply urban markets.

With the exception of farmers close to the borders with the Sudan or Uganda and vulnerable households receiving timely NGO distributions, mostly all farmers use their own seed saved from the previous year's harvest or local seeds purchased from markets or borrowed from relatives.

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[2] The transfer of donkey plough (*scuffler*) technology from Darfur to West Bahr el Ghazal offers an immediate solution for inter-row cultivation including weeding and thinning of broadcast crops.

[3] Short-season landraces provide an early harvest in August/September, while long-season landraces, able to withstand both dry spells and water logging, are harvested in December/January.

[4] Afargadamek, Wad Ahmed, Gadam el Hammam.

[5] Sesame, often intercropped with sorghum in traditional systems in all states, is increasing in popularity in the north as markets in the Sudan open up.

Chemical inputs such as commercial fertilizers[6], pesticides or herbicides are not used by small farmers on field crops, although some use of herbicides has been noted in previous CFSAM reports on some of the large-scale mechanized farms in Upper Nile State with access to supplies from Kosti (the Sudan). Regarding pest-control campaigns, before South Sudan's independence, aerial spraying of nesting sites routinely controlled migratory *Quelea quelea* bird populations near the mechanized areas. Although the practice was resumed in 2013, with aerial spraying conducted by the Desert Locust Control Organization (DLCO) based in Nairobi, no actions have been reported in 2014 as areas concerned are exclusively in conflict-affected states.

Livestock are very important assets throughout the country, the main species being cattle, goats and sheep raised extensively mostly under transhumant systems of management. The sale of livestock, especially small ruminants, provides a significant contribution to incomes and, therefore, the household food security of both transhumant pastoralists and sedentary livestock rearers.

3. CEREAL PRODUCTION IN 2014

In the absence of any nationally-generated, crop-yield estimates and empirical data from annual cropped land surveys disaggregated by crop, cereal production for the smallholder sub-sector is assessed using estimates of the following variables: (1) estimates of the numbers of farm households actively farming in each county, based on a) total county population figures, and b) average household size and estimated proportion of household farming per county reflecting the proportion of rural to urban dwellers and access to land; (2) standard estimates of the average area per farm household under cereals for each county, adjusted according to Mission observations made during field visits; (3) estimates of average cereal yield for each county, based on Mission transect observations made using: a) PET photo indicators and associated protocols; b) farmer case studies and; c) information from semi-structured interviews with key informants from State Ministries of Agriculture, NGOs and others involved in agriculture.

Combining the products of each of these three sources of information gives cereal production estimates for each county. The county figures are then added to provide cereal production figures for each of the ten states and for South Sudan as a whole. The number of assumptions incorporated into this methodology means that the final production figures should not be regarded as necessarily exact, but rather as best estimates under the prevailing circumstances.

In previous years, the actions noted above have all been undertaken by a CFSAM Rome-based team of specialists during six-week missions to South Sudan in November-December, working with staff from MAFCRD, NBS and FAO national staff. In 2014, in a departure from the usual one-off CFSAM at harvest time, teams led by members of a Task Force of selected specialists from MAFCRD, NBS and FAO national staff conducted a series of intermediate missions at planting time (three missions including seven states) and at harvest time (eight missions including nine states). All missions were timed to match the pertinent agricultural activities that occur at different times of the year in different agricultural zones in accordance with a *Roadmap*[7] for activities prepared at the beginning of 2014.

The effect of the change in approach is noticeable in a greater coverage obtained including: i) a proper assessment of production from the first season harvest in the Greenbelt and ii) being able to timely assess standing crops in Warrap State for the first time in several years. Unfortunately, the ongoing conflict prevented or restricted access of field teams in Upper Nile, Jonglei and Unity states. In addition, local insecurity delayed planned missions to Lakes State at the time of the main harvest. Nevertheless, the improvement made in data collection is significant and ownership of the initial findings is much more complete. In any case, the Mission stresses the need for a rigorous agricultural survey in order to establish a more accurate baseline with regard to cropped areas. In the meantime, there is a clear need to extend the training in rapid assessment techniques used by the Task Force to staff of all State Ministries.

Consequently, the involvement of the CFSAM team from Rome in the compilation of production data has been reduced to the collation of Task Force returns, audit of the main findings and production of this report. The collations and computations were completed in Juba with full participation of the Task Force members. Before departure to Rome the CFSAM Mission team members de-briefed the UN Humanitarian Aid Group, the European Union and WFP on the main findings, while a tele–debriefing was organized for the FAO Representative.

[6] IFDC trials noted in Central Equatoria stopped two years ago.

[7] Prepared under the ToRs of a specific mission from 23 March-12 April 2014 in the "Agriculture and Food Security Information and Analysis" Programme Area.

3.1 Cereal harvested area estimates

The Mission's estimates for harvested cereal area in the smallholder sub-sector by county have been calculated this year on the basis of updated revisions during 2014 of the 2008 census data, initially adjusted for population growth to mid-2014. The updates to the county population estimates have been made to account for net conflict-induced population movement involving numbers of persons (both rural and urban) per county, recorded as incoming or outgoing IDPs and refugees.

The figures used for the proportion of settled households farming in each county have been developed over several years by FAO, WFP and others, based on historical data, extensive observations and interviews. This year, the percentage of farming households has been further adjusted to accommodate an influx of temporarily non-farming households in what are usually homogenous farming areas.[8] In the seven settled non-conflict states, where Task Force planting assessments were possible from March to July 2014, conservative upward adjustments to the cultivated area have been made as a step towards recognising expansion of farm sizes in the Greater Bahr el Ghazal and the important contribution made by first and second harvests in bi-modal rainfall areas. By contrast, lack of access to the three conflict-affected states has caused the Mission to severely reduce estimated percentages of households that were able to farm in the past year as well as the size of average cultivated land by each household. However, the effect of the decline at national level is less than might be expected due to increases elsewhere, particularly the inclusion of better estimates of second cropping in the Greenbelt.

The Mission estimates the total area of cereal harvested in the smallholder subsector in 2014 at about 1 million hectares, about 10 percent less than in 2013. Table 2 presents the breakdown of area cultivated by State and County.

[8] Census figures were adjusted for mid-2014 on the assumption of a population growth rate of 3 percent per annum. Numbers of returnees per county have been updated based on the most recent information provided by the International Organization of Migration (IOM) and movement of IDPs obtained from OCHA.

Table 2: South Sudan - Estimated settled population, farming households and harvested cereal area in 2014

State/County	Population mid-2014	Households mid-2014	Farming households (percent)	Farming households mid-2014	Average cereal area (ha/hh)	Total cereal area (ha)
Central Equatoria	**1 509 171**	**244 248**	**64.0**	**156 238**	**1.27**	**198 926**
Juba	476 336	74 746	50	37 373	1.00	37 373
Kajo Keji [1/]	262 684	43 534	80	34 827	1.60	55 723
Lainya [1/]	140 893	22 059	75	16 545	1.30	21 508
Morobo [1/]	188 106	28 521	55	15 687	1.60	25 099
Terekeka	183 910	32 873	80	26 298	0.70	18 409
Yei [1/]	257 243	42 514	60	25 509	1.60	40 814
Eastern Equatoria	**1 062 903**	**181 851**	**76.5**	**139 067**	**1.09**	**150 962**
Budi	109 119	18 450	92	16 974	1.30	22 066
Ikotos	127 649	24 914	85	21 177	1.10	23 295
Kapoeta East	179 811	32 280	54	17 431	1.00	17 431
Kapoeta North	110 975	17 196	56	9 630	1.00	9 630
Kapoeta South	88 854	13 248	56	7 419	1.00	7 419
Lafon	118 758	19 238	85	16 352	0.90	14 717
Magwi [1/]	195 546	30 253	90	27 228	1.40	38 119
Torit	132 191	26 271	87	22 856	0.80	18 285
Jonglei	**1 500 645**	**211 884**	**23.2**	**49 236**	**0.64**	**31 268**
Akobo	151 857	19 747	40	7 899	0.50	3 949
Ayod	154 707	18 756	10	1 876	0.50	938
Bor South	194 591	27 594	10	2 759	0.80	2 208
Duk	104 938	16 386	0	0	0	0
Fangak	93 085	12 317	30	3 695	0.70	2 586
Khorflus/Pigi/Canal	170 131	20 544	15	3 082	0.70	2 157
Nyirol	135 054	18 977	40	7 591	0.50	3 795
Pibor	112 867	17 287	50	8 644	0.70	6 050
Pochalla	63 850	10 074	71	7 153	0.70	5 007
Twic East	117 785	19 839	10	1 984	0.70	1 389
Uror	201 780	30 362	15	4 554	0.70	3 188
Lakes	**1 083 182**	**145 116**	**72.5**	**105 181**	**0.89**	**93 477**
Awerial	105 041	16 704	35	5 846	1.00	5 846
Cueibet	173 073	25 403	88	22 354	0.80	17 883
Rumbek Centre	230 193	25 211	74	18 656	0.80	14 925
Rumbek East	182 414	23 039	76	17 510	0.80	14 008
Rumbek North	48 715	5 558	72	4 002	1.00	4 002
Wulu	68 283	10 974	75	8 230	1.00	8 230
Yirol East	122 129	16 257	65	10 567	1.00	10 567
Yirol West	153 332	21 971	82	18 016	1.00	18 016

State/County	Population mid-2014	Households mid-2014	Farming households (percent)	Farming households mid-2014	Average cereal area (ha/hh)	Total cereal area (ha)
N Bahr el Ghazal	**1 330 991**	**247 903**	**67.1**	**166 371**	**0.77**	**127 730**
Aweil Centre	103 954	22 570	44	9 931	0.60	5 958
Aweil East	521 189	95 648	72	68 867	0.80	55 093
Aweil North	265 625	51 205	66	33 795	0.75	25 346
Aweil South	143 238	27 271	62	16 908	0.70	11 836
Aweil West	296 985	51 209	72	36 871	0.80	29 497
Unity	**988 427**	**120 767**	**29.2**	**35 205**	**0.42**	**14 786**
Abiemnhom	17 558	1 864	60	1 118	0.42	470
Guit	30 949	3 030	0	0	0	0
Koch	133 182	14 152	45	6 368	0.42	2 675
Leer	139 083	18 476	30	5 543	0.42	2 328
Mayendit	85 400	10 492	60	6 295	0.42	2 644
Mayom	156 407	19 715	0	0	0	0
Panyijar	94 585	16 178	45	7 280	0.42	3 058
Pariang	135 559	17 200	50	8 600	0.42	3 612
Rubkona	195 704	19 659	0	0	0	0
Upper Nile	**1 094 710**	**161 251**	**20.5**	**33 104**	**1.09**	**36 040**
Baliet	22 056	3 334	15	500	0.60	300
Fashoda	38 348	6 193	32	1 982	0.50	991
Longochuk	68 719	9 006	15	1 351	0.50	675
Luakpiny/Nasir	243 634	33 679	15	5 502	0.60	3 031
Maban	53 0944	11 536	60	6 921	0.50	3 461
Maiwut	99 343	13 098	15	1 965	0.50	982
Malakal	144 008	19 233	0	0	0	0
Manyo	45 454	7 640	0	0	0	0
Melut	75 015	10 828	30	3 248	1.70	5 522
Panyikang	23 476	3 756	0	0	0	0
Renk	172 811	28 216	35	9 875	2.00	19 751
Ulang	108 752	14 733	15	2 210	0.60	1 326
W Bahr el Ghazal	**510 070**	**89 785**	**78.2**	**70 243**	**0.98**	**69 015**
Jur River	195 014	31 701	75	23 775	1.00	23 775
Raga	81 817	15 356	80	12 285	0.90	11 056
Wau	233 239	42 729	80	34 183	1.00	34 183

State/County	Population mid-2014	Households mid-2014	Farming households (percent)	Farming households mid-2014	Average cereal area (ha/hh)	Total cereal area (ha)
Warrap	**1 283 656**	**223 215**	**65.8**	**146 881**	**0.85**	**124 301**
Abyei	62 941	9 398	40	3 759	0.60	2 256
Gogrial East	131 867	23 643	65	15 368	0.70	10 758
Gogrial West	314 631	58 029	80	46 423	0.90	41 781
Tonj East	121 928	20 739	65	13 480	0.80	10 784
Tonj North	200 523	36 032	65	23 421	0.80	18 736
Tonj South	100 383	16 856	90	15 171	0.90	13 654
Twic	351 384	58 518	50	29 259	0.90	26 333
Western Equatoria	**736 511**	**137 520**	**87.7**	**120 610**	**1.39**	**167 340**
Ezo 1/	99 895	22 485	90	20 237	1.40	28 332
Ibba 1/	45 237	11 320	90	10 188	1.40	14 264
Maridi 1/	97 093	15 446	90	13 901	1.50	20 852
Mundri East 1/	54 237	7 656	75	5 742	1.20	6 891
Mundri West 1/	49 573	5 875	80	4 700	1.50	7 050
Mvolo	55 713	7 592	70	5 314	1.10	5 846
Nagero	10 975	2 335	90	2 101	1.10	2 311
Nzara 1/	71 381	17 727	94	16 663	1.40	2 329
Tambura 1/	68 295	16 426	90	14 783	1.40	20 696
Yambio 1/	184 112	30 658	88	26 979	1.40	37 770
SOUTH SUDAN	**11 100 266**	**1 763 539**	**58.0**	**1 022 137**	**0.99**	**1 013 845**

1/ First and second harvest areas combined.

Increases in cereal area in Central Equatoria State of 23.6 percent are due to better estimates of numbers of farmers in the counties of Kajo Keji, Morobo, Lainya and Yei which planted a second cereal crop (either maize or sorghum) on the same areas of land after the first harvests in August. Similar improved estimates in Magwi are reflected in the 8.8 percent increase in estimated cereal area in Eastern Equatoria State. No such increases are noted in Western Equatoria State, where estimates since 2006 have already included both harvests. Increases in cereal area (sorghum) in Northern Bahr el Ghazal and Western Bahr el Ghazal states of 10.8 and 11.3 percent, respectively, reflect the data collection of Task Force-led missions at planting time.

In Warrap (-1.6 percent) and Lakes (-13 percent) states, the area estimated at county level is confounded by reduced access during both planting and harvesting missions to the counties adjacent to conflict states. In such cases, conservative estimates of the number of farming households and average cereal area per household have been applied.

In conflict-affected states, it has been estimated that harvested cereal area dropped by about 57 percent in Upper Nile State, by about 73 percent in both Unity and Jonglei states, on the basis of some Task Force-led team spot-checks in a few accessible areas, information gathered from other food security assessments and telephone conversations with key informants such as Directors–General of State Ministries of Agriculture. These estimated reductions connect to fewer households cultivating and smaller areas cultivated. As shown in Table 2, in seven counties it has been assumed that no cereal farming took place at all.

Although mixed cereals still form the basis of the quantitative estimates of production in the cereal balance, disaggregated areas of sorghum, maize and other cereals (upland rice, paddy rice, finger millet and bulrush millet) were estimated in the past two years, using information from Mission teams.

This year's data have been compiled based on the proportions of other crops noted during transects conducted by Task Force–led assessment missions at planting and harvest in the seven states where such

exercises were possible. The incomplete results, i.e. no detailed returns for Upper Nile, Jonglei and Unity states are shown in Table 3.[9]

Table 3: South Sudan - Tentative estimates of cropped areas (ha) per household (hh) in 2014

State	Sorghum (ha/hh)	Maize (ha/hh)	Other cereals[1/]	Total cereals (ha/hh)	Groundnuts (ha/hh)	Cassava 2 years (ha/hh)	Cultivated area (ha/hh)
Central Equatoria[2/]	0.47	0.78	0.02	1.27	0.13	0.87	2.27
Eastern Equatoria	0.88	0.14	0.07	1.09	0.04	0.29	1.42
Western Equatoria[2/]	0.62	0.74	0.04	1.4	0.28	1.16	2.84
Jonglei	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Upper Nile	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Unity	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lakes[3/]	0.77	0.12	0	0.89	0.35	0.1	1.41
Warrap	0.71	0.07	0.05	0.84	0.10	0.02	0.96
Western Bahr el Ghazal	0.85	0.12	0.01	0.98	0.15	0.57	1.70
Northern Bahr el Ghazal	0.71	0.01	0.05	0.77	0.10	0.00	0.87

1/ Bulrush and finger millets, upland rice and paddy rice.
2/ Two seasons for cereals and most annual field crops.
3/ The harvest mission in Lakes State delayed was until January 2015 because of insecurity and case studies were not possible in most areas. Therefore, groundnut estimates are based on a conservative interpretation of Task Force planting mission observations and late-maturing sorghum only.
n/a: Not enough or contradictory information collected.

3.2 Factors affecting yields

3.2.1 Rainfall

The Normalized Difference Vegetation Indices (NDVIs), rain gauge data and farmers' opinions provide a picture of early-starting rains across the country, following the established isohyets which increase in quantity (and duration) from northeast to southwest. The season developed into a better-than-average year in which both the quantity and the distribution of rain were conducive for both crop and pasture growth in all but the far corner of the South–East zone, which is usually the driest area in the country. Short breaks in May and August are noted in most states which, in some cases, prompted replanting, but also reduced water-logging and rain-based flooding in areas naturally prone to inundations. Consequently, no early flooding with associated land loss was reported this year to Task Force-led teams. Flooding, reported in Tonj South in Warrap State, may have affected some late-planted crops (groundnuts), but appears to have occurred after the early harvests (*nanjung*-type sorghum and groundnuts) and is unlikely to have affected the performance of late-maturing landraces of sorghum which withstand water-logging.

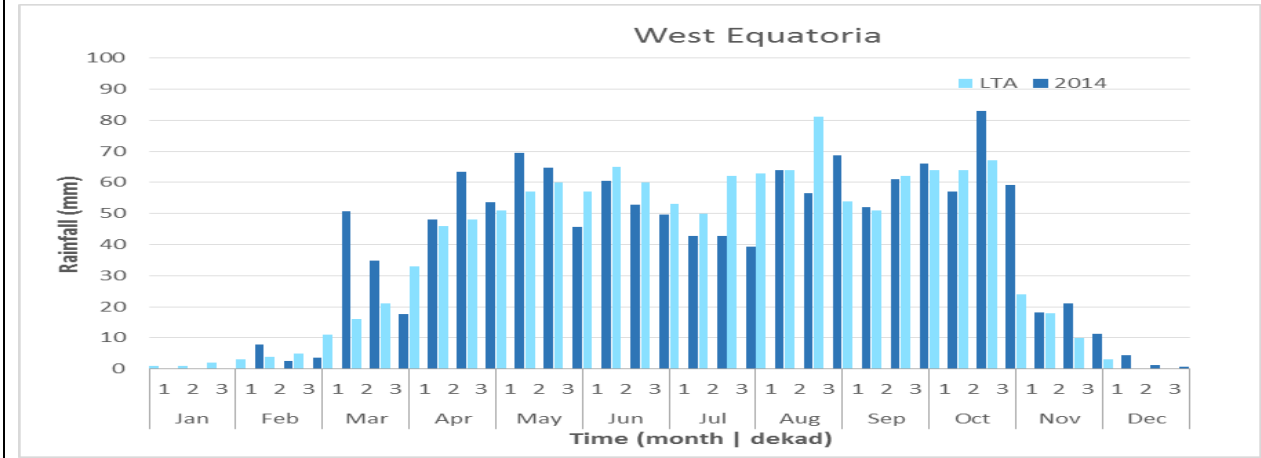
The series of Figures 1 to 3 below provide representations of vegetation development over the 2014 year and rainfall estimates by dekad in the arable areas of each state. Clustered into the three Regions of the Greater Equatoria, Greater Bahr el Ghazal and Greater Upper Nile, the remote sensing-derived NDVI images show that the vast majority of farming households have benefitted throughout the season from significant rains, distributed advantageously.

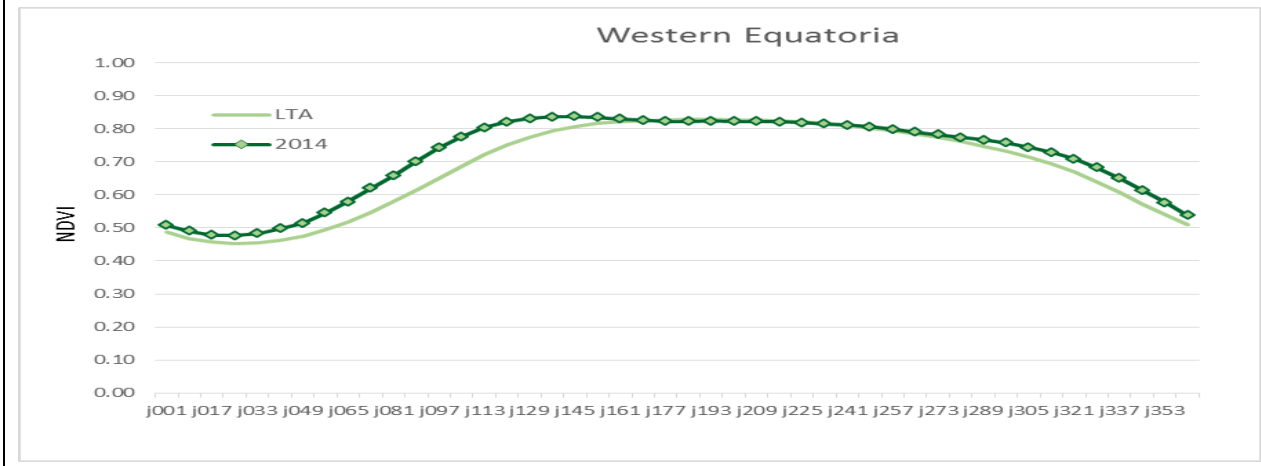
More specifically, Figure 1 presenting decadal rainfall data and NDVI patterns for the three states in the Greater Equatoria shows a rainfall pattern with a timely start followed by heavy rainfall early in the season boosting NDVIs. In all western and central states, one to two decadal, significantly drier-than-normal spells are noted in April and again in August. However, the figures also show that biomass development monitored through the NDVIs is normal or better-than-normal in both areas, suggesting that soil moisture content remained adequate throughout the season. As in 2012 and 2013, rain continued in the Greater Equatoria until the end of October 2014, supporting the second and third plantings and ratoons.

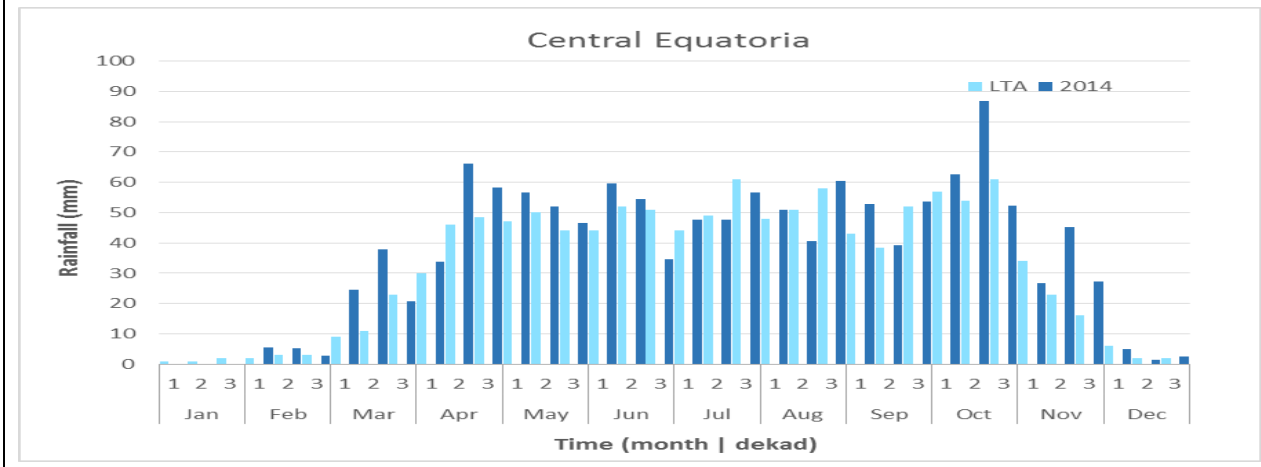
[9] Cassava varieties harvested within one year of planting are available on many of the cassava growing farms; but no further details were captured by this year's Mission teams. The main system noted is the two-year system involving planting from May to August and harvesting between 18-24 months afterwards so the average cassava area shown is two times the area expected to be harvested in any one year or 0.58 ha in Western Equatoria; 0.44 ha in Central Equatoria; 0.15 ha in Eastern Equatoria; 0.28 ha in Western Bahr el Ghazal.

In Eastern Equatoria State, rainfall breaks in April and (to a lesser extent) in June appear more significant, prompting some replanting in May (Kapoeta South) and June (Kapoeta East). In all states, the continuation of rain supported the growth and fruition of both late (all counties) and second planted cereals and oilseeds.

Figure 1: South Sudan – Rainfall estimates and NDVI summaries
Western, Central and Eastern Equatoria states







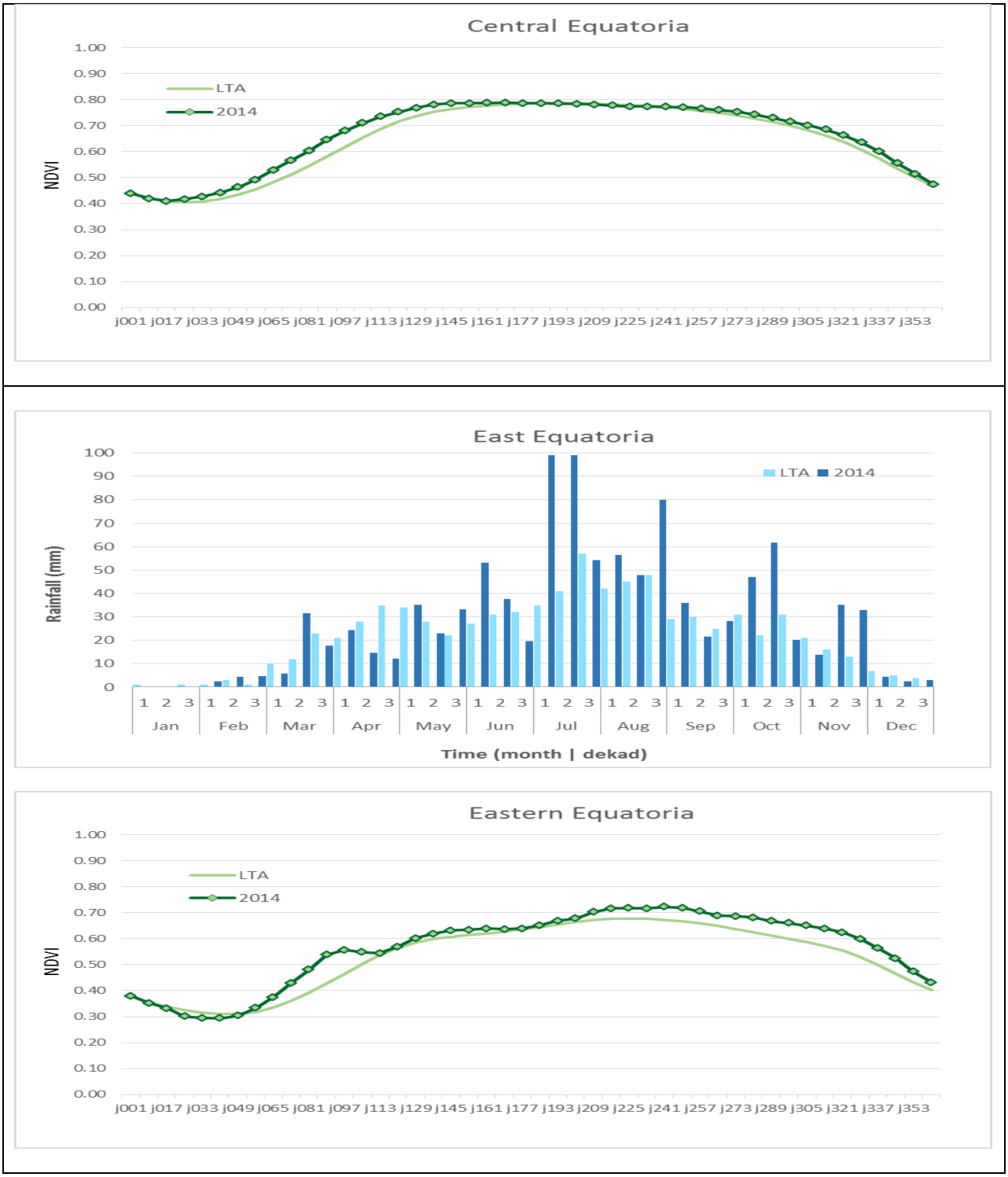
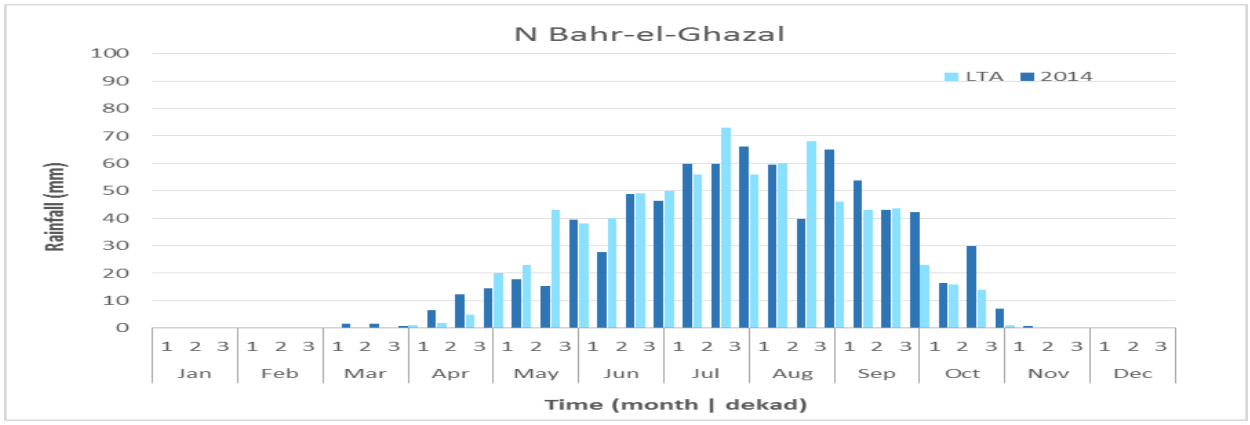
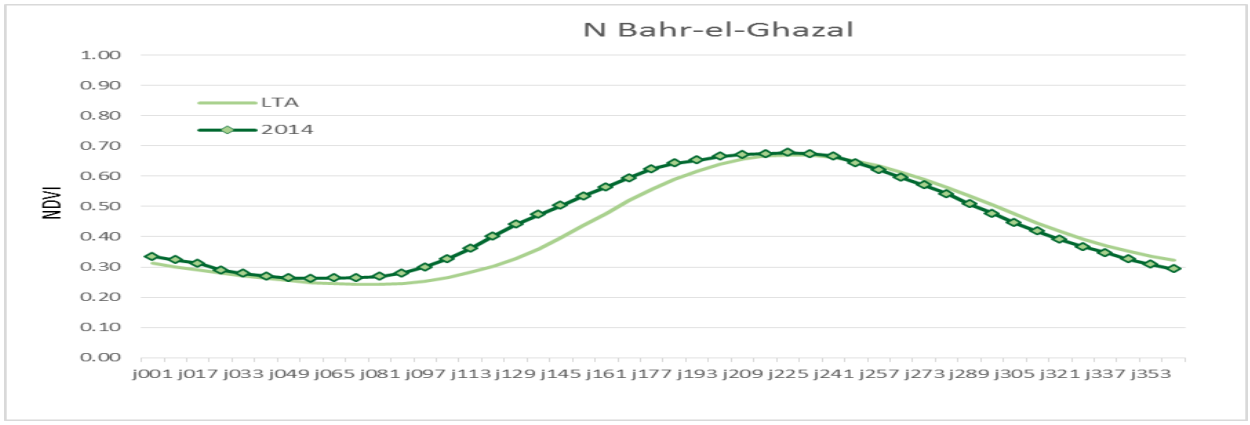
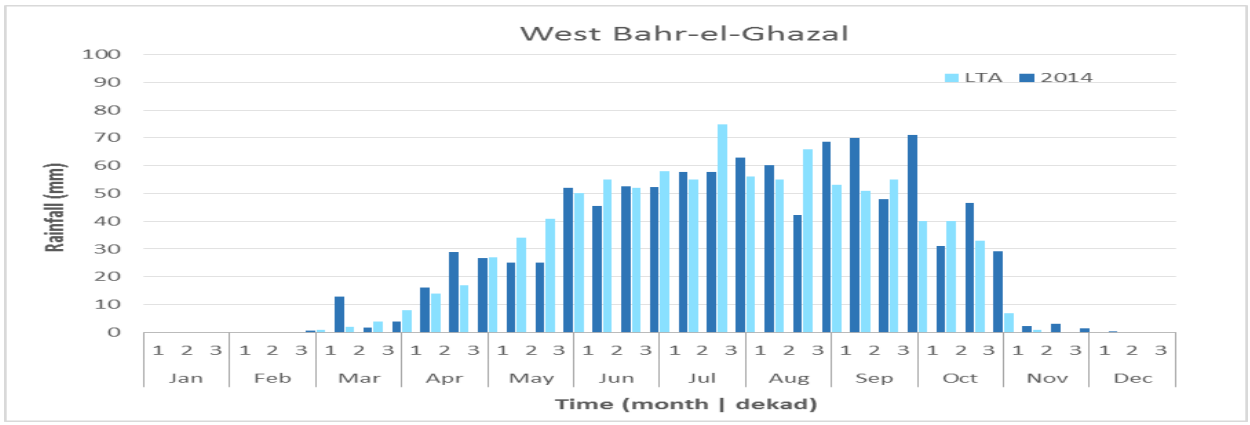


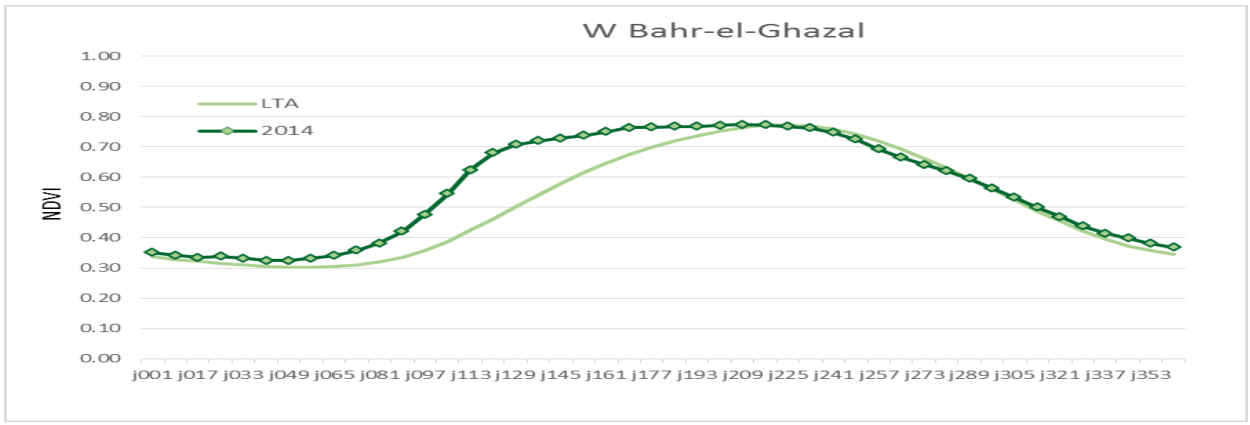
Figure 2 shows that, in each state of the Greater Bahr el Ghazal, rains started earlier than normal, encouraging land clearing, early cultivation and planting of a higher proportion of late-maturing sorghums (*kec)*. Apart from the lower-than-expected rainfall during the last dekad of May, evenly-distributed rainfall until August sustained crop performance, with NDVIs above or at average levels until August, when lower rainfall caused NDVIs to drop slightly below normal across the region. At the same time, according to key informants and farmers' interviews, reduced water-logging in vulnerable areas was less than usual.

Figure 2: South Sudan – Rainfall estimates and NDVI summaries
Northern and Western Bahr el Ghazal, Warrap and Lakes states









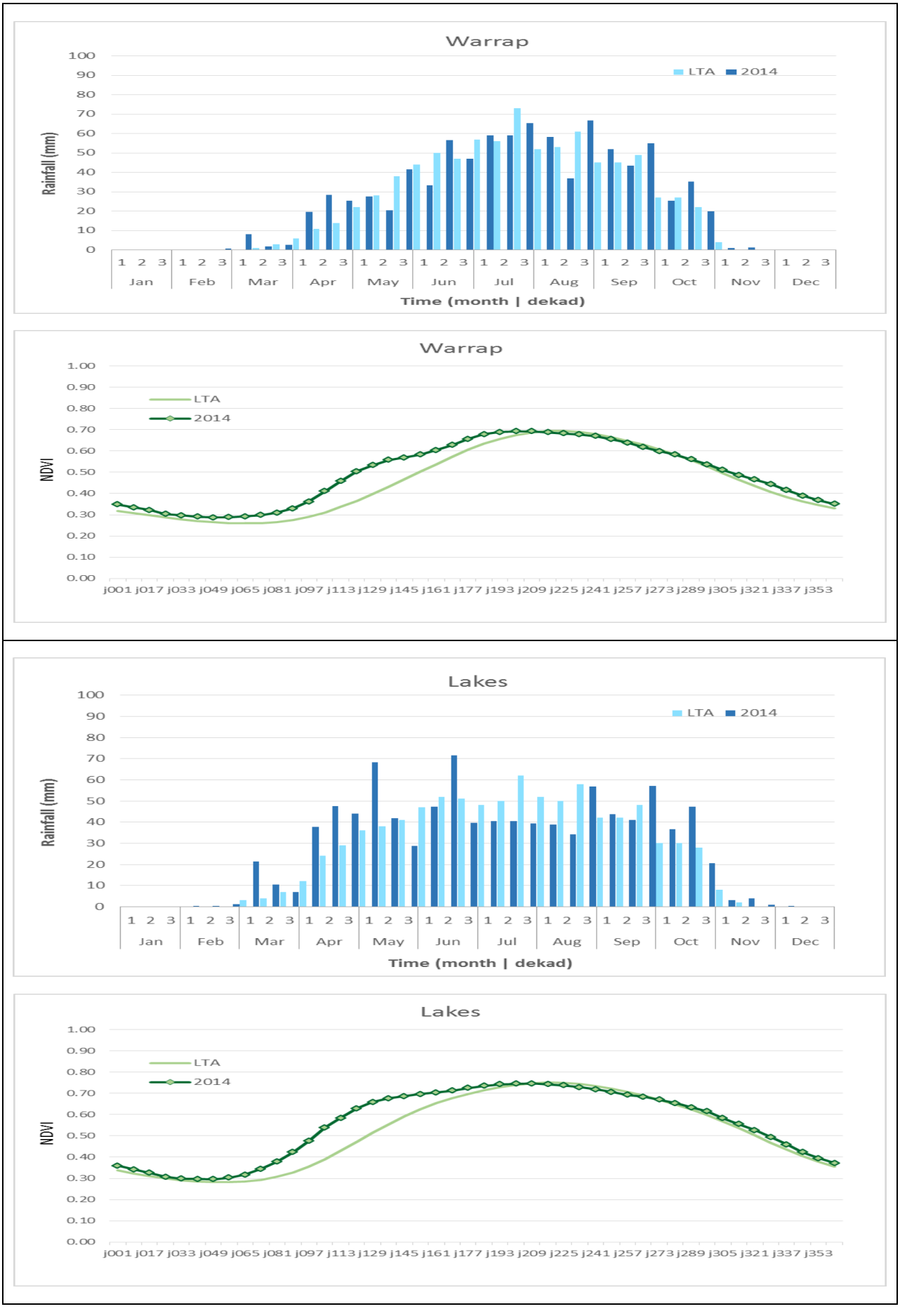
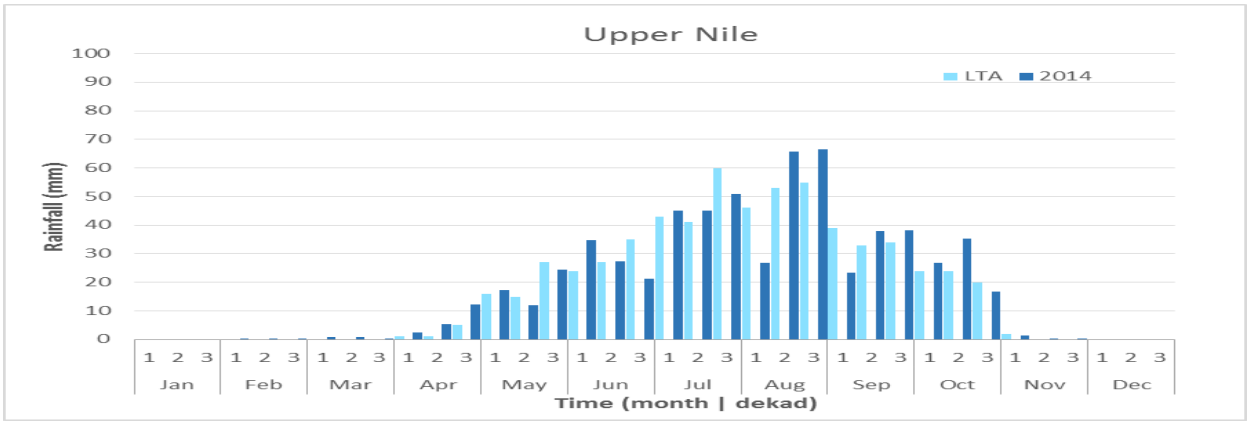
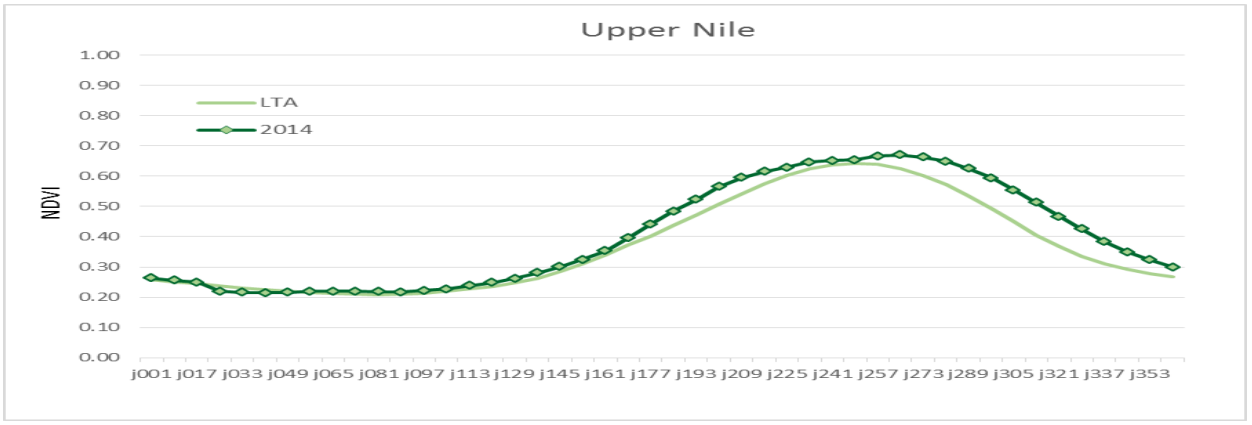


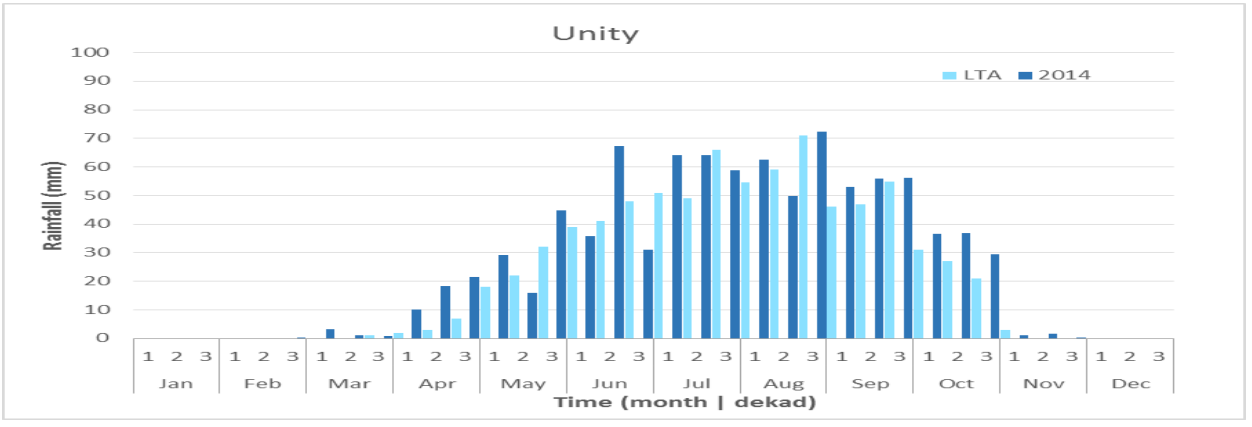
Figure 3 shows rainfall estimates that sustain vegetation development above normal until the end of July in all three Greater Upper Nile states. Given the nature of most of the soils throughout the region, reduced rains

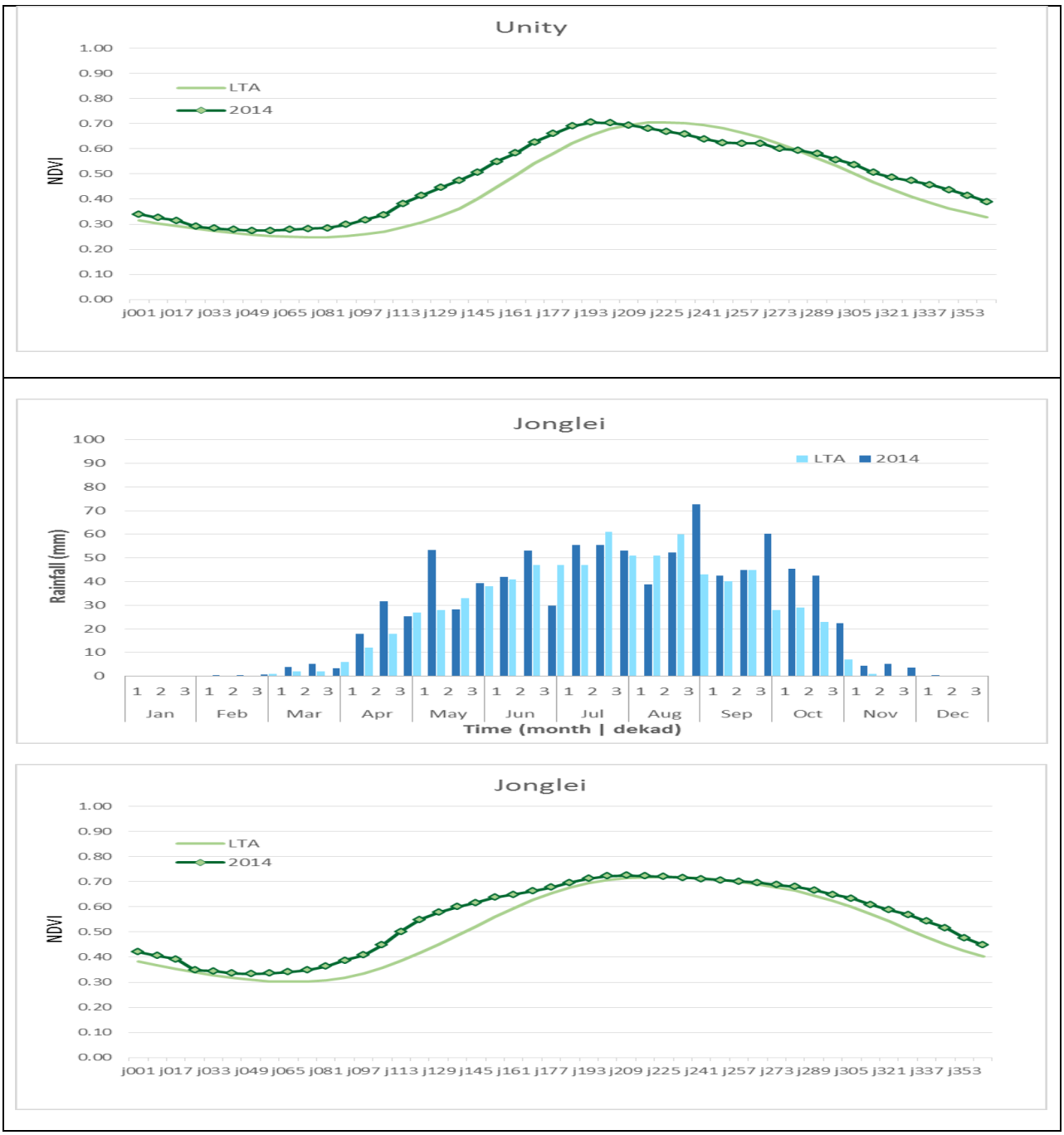
after July have likely allowed better access for mechanized farmers and reduced water-logging throughout the states. The continuation of rains into October supported late-sown crops, second cropping in areas such as Pochalla and extensive ratooning of sorghum throughout the zone.

Figure 3: South Sudan – Rainfall estimates and NDVI summaries
Upper Nile, Unity and Jonglei states









Overall, Figures 1, 2 and 3 match the information collected by the Mission from farmers and State Ministry key-informants as well as transect observations made during the Task Force‘s eleven planting and harvesting field missions undertaken from March 2014 to January 2015.

The general effects of this year’s rain may be summarized as follows:

- An earlier-than-normal start to the rains in all states.
- Short dry spells in April/May caused some replanting and gap-filling needed to overcome patchiness in germination of early/middle-cycle sorghums and to reinforce ratooning crop densities.
- Average or better-than-average vegetation growth from late June onwards in all states except Unity.
- Much reduced early flood/water logging damage this year compared to previous years.
- As noted last year, as the rains have continued into the autumn: a) crops from the extended planting of long-cycle sorghums have been sustained; and b) late planting of short–cycle sorghum and maize crops for December/January harvesting in all areas where such systems are traditionally practised has been sustained.
- Good ratooning of earlier maturing sorghums that were harvested in September-October is noted again this year.

Regarding the mechanized farming sector in Upper Nile State, the earlier rainfall allowed more timely cultivation in Renk, Melut and Maban, compared to last year but as assessor-team access to the main areas has been considerably reduced due to the continued conflict in the State, the information is scanty and speculative.

3.2.2 Inputs in the traditional smallholder sector

The two main inputs in the traditional sector are manual labour and local planting material (seeds and cuttings). Declining soil fertility is addressed by shifting and fallowing within a recognizable farm area and, in some states, by the use of homestead animal dung. In the northern states of Northern Bahr el Ghazal and Warrap, contracted dunging by pastoralists' herds and flocks on private farmland is a traditional way of sustaining fertility in areas where shifting opportunities are limited. Plant protection is limited to bird-scaring and guarding fields at critical times of the day or night and weeding of broadleaf and grass weeds, often several times in the same spot throughout the season.

Traditionally, hand tools and people to use them are the most significant limiting factors for agricultural activities. For the majority of households, farm size is limited to the area of land the farming families can clear, cultivate and weed with the ubiquitous cutlass and the flat-bladed, long-handled hoe called the *maloda,* or the local short–handled, bent hoe, called the *toriah,* or the East African hoe or *jembe.* This is clearly not the case in the Greater Upper Nile this year with the conflict-induced estimated reductions in cereal area of 57-73 percent. However, returns from the Task Force transect–based assessments at planting time suggest that, in the seven states visited, cultivated areas are increasing, due to: a) the acceptance of animal traction in all counties in Lakes State where the uptake of the technology is at its highest, with bullock ploughing rates at around SSP 150/feddan; b) the expansion of the use of *nafeer* (using food and beer-funded labour groups); c) self-help groups of farm families working in day-by-day cycles to clear, cultivate and weed each other's farms at no cost to one another; and d) increased incidents of entrepreneurs hiring labour gangs at attractive piece-rates, e.g. labour rates in Western and Central Equatoria states in 2014 ranged from SSP 300 to SSP 700/feddan for clearing and digging, depending on workload, compared to reports of SSP 300/feddan for tractor ploughing in similar locations.

Such area increases are not necessarily through planting more areas to cereals. Although cereal areas are noted to have increased in Northern and Western Bahr el Ghazal states and in the Greater Equatoria, they are estimated to have fallen in Lakes State or remained constant in Warrap State. The area increases in Lakes and Warrap states as well as in northern counties of Central Equatoria State seem to be due to an increased interest in producing groundnuts as cash crop for sale locally and in Juba.

As a response to the new emergency situation caused by the conflict, FAO provided seeds from the middle of the second quarter and into the third quarter of 2014 to partner NGOs who were then responsible for distribution to the end-users. Quantities leaving FAO warehouses are compared to actual FAO distributions in 2013 in Table 5 and indicate that in 2014 double the tonnage of seeds was disbursed to NGOs. Information of parallel distribution of seeds made by ICRC and CRS was not available to the Mission.

Reports from case studies and key informants suggest that attention to the new programmes caused pre-season (March) distributions of tools and seeds to vulnerable families *already programmed to take place before the crisis*, to be seriously affected. Consequently, at the time of the planting assessment missions ending in May, no distributions of seeds had occurred except for those made by local NGOs distributing local seeds (e.g. Head in Northern Bahr el Ghazal). It is worth noting that CFSAM teams, over the past 15 years, have always reported a firm reliance of all settled farmers on local landraces, either farm-produced and carried over from one year to the next (supplied by kinship connections) or purchased in local markets. This year, the only NGO distributing seeds available in time for planting in the Greater Equatoria and Greater Bahr el Ghazal were locally purchased seeds. However, as the seasons were prolonged, opportunistic planting is likely to have been possible for farmers with access to more land/cultivating power.

Table 4: South Sudan - Summary of staple crop seeds distributed through FAO programmes in 2013/14

State	Assorted Field Crop seeds[1/] (tonnes)	
	Actual 2013	**Actual 2014**
Northern Bahr el Ghazal	203	0.3
Upper Nile	27	120
Unity	63	291
Jonglei	279	381
Warrap	9	154
Lakes	123	144
Central Equatoria	47	252
Eastern Equatoria	184	321
Western Equatoria	0	96
Western Bahr el Ghazal	16	29
Total	**924**	**1 788**

1/ Sorghum: local and Sekado; Maize: Longo 5; Groundnuts: Serenut 4 (from Uganda); Cowpeas: local; Sesame: local (Sudan vars.)

As the Aweil Rice Scheme in Northern Bahr el Ghazal State had no budget for fertilizers in 2014 and the IFDC trials in Central Equatoria State ended in 2013, no chemical fertilizers were used on field crops. In any event, retail prices at about five times international rates, plus no difference between selling price of DAP and urea, makes the unsubsidized use of fertilizer a doubtful economic proposition for any emerging farmers, who by shifting cultivation are able to sustain reasonable yields. However, the use of organic fertilizer is noted through contract "on-the-hoof" dunging of farm fields by local and migratory cattle in Northern Bahr el Ghazal and Warrap states, where also household goat dung is noted to be differentially distributed to combat the effects of falling fertility and/or striga infestation. In fact, animal dung/household waste spreading on valued crops/vegetables close to the homestead is practised in most states. Planting of valuable crops in cattle camps was noted in Boma and is a practice likely to have been done also in areas unaffected by the conflict in Jonglei State.

No other uses of chemical inputs in the form of pest or weed control sprays are noted this year.

3.2.3 Pests, diseases and weeds

As in 2013, neither the traditional smallholder sub-sector nor the large-scale mechanized sub-sector reported any infestations of migratory pests to the Task Force missions. *Quelea quelea* birds, the main threat to late-maturing sorghum, does not usually materialize until January and it is not noted to have occurred, despite no spraying of nesting sites by DLCO contractors in 2014.

Common non-migratory pests noted include in order of significance: local birds, grasshoppers, monkeys, rodents, termites, millipedes, stem-borer and durra-bugs (*um sharaba/manu*). Their impact is noted in all states to have been mild this year. Weeds are noted to have been the main problem, as confirmed by early rainfall and average or greater-than-average vegetation indices throughout the main growing season. Weeding once, twice and even three times was conducted throughout the traditional sector to get the best possible crops from improved weather conditions. Where farmers had no access to new plots and continued to dig or plough exhausted plots, the plant parasite *striga* remains a problem that may be addressed by the use of fertilizer and manure or by transplanting seedlings at three-four weeks old from nurseries or from *striga* free fields.

As in previous years, the major plant diseases comprise rosette virus and leaf spot of groundnuts, mosaic virus of cassava and sorghum smut.

3.3 Agricultural production in 2014

3.3.1 Cereal production

A. Traditional smallholder sector

Each year the Mission derives an estimate for the weighted average yield of cereal in each state built up from disaggregated data compiled at county level. The process involves studying the factors that have affected yields during the season, such as rainfall, seed supply, cultivation and weeding (timing and methods), use of inputs, pest and disease challenges, local security conditions and access to credit for mechanized farming. Such information this year has been gained from 670 detailed, on-farm case studies with sample farmers and 80 key informant interviews with staff from state ministries, NGOs and projects. Such information is combined with Mission observations using South Sudan's Pictorial Evaluation Tool (PET) during vehicle and walking transects. PET-based observations are cross-checked by weighing of crop-cut samples during case studies. This empirical data is then reviewed in the context of secondary data from reports from GRSS and NGO sources; and satellite images for the current season compared with previous seasons and the long-term average.

Cereal production is determined by multiplying yield per unit area by the disaggregated area estimates described in section 3.1. In 2014, Task Force-led teams estimated yields of crops during the following missions:

a) In August, mission to assess yields of the first maize harvest in Western Equatoria and Central Equatoria states and in Magwi County (Eastern Equatoria State).
b) In September, mission to assess yields of cereal crops in Northern Bahr el Ghazal and Warrap states, including short-cycle sorghum landraces *Cham*, *Nanjung*, *Rapjung, Abele* plus medium-cycle sorghum landraces *Alep Cham*, *Nyethin*, *Nyandok, Rabdit, Aleul, Aiyella* and the very limited maize areas around the steading.
c) In October/November, mission to assess yields of cereal crops of sorghum (*Mabior*) harvests in Western Bahr el Ghazal State. It included some spot checks of sorghum yields in parts of Upper Nile and Jonglei states, with local landraces, *Leuwarding, Agono* and improved *feterita*-type sorghums from the Sudan, such as *Afargadamek, Wad Ahmed, Gadam el Hammam* in Upper Nile State.
d) In December, mission to assess yields of the second maize and main sorghum harvests in Western, Central and Eastern Equatoria states, including *Serena*, *Bedele, Barre* and *Nyrangu* (Western Equatoria); *Lodoka*, (Central Equatoria); *Gude* sorghum and pearl millet (Eastern Equatoria).
e) In December (until January 2015), mission to assess yields of the long-cycle sorghum landraces (*Kec*) in Lakes and Western Bahr el Ghazal states.

Estimates of 2014 cereal production in the traditional sector, disaggregated by states and counties, are presented in Table 6. National gross cereal production in 2014 is estimated at 1.27 million tonnes. Post-harvest losses and retention of seed for sowing in 2014 are assumed to account for 20 percent of this total, leaving a net amount of about 1.02 million tonnes available for local consumption. This result is 17 percent more than last year's net output of 865 000 tonnes and is some 28 percent above last four-year average.

As shown in Table 5, average gross cereal yield is estimated at 1.25 tonne/hectare, about 30 percent higher than last year's estimate of 0.96 tonne/hectare. The increase reflects far better estimates of yield of the first harvest in the Greenbelt; better rainfall generally and a reduction in cereal areas in Greater Upper Nile states with lowest long-term average yield estimates that usually bring down the national (weighted) average.

Table 5: South Sudan - Estimated cereal harvested area, yield, production, consumption and balance (traditional sector) in 2014

State/County	Cereal area 2014 (ha)	2014 gross yield (t/ha)	2014 gross cereal production (t)	2014 net cereal production (t)	Population mid-2015	2015 cereal req't (t)	2015 surplus/ deficit (t)
Central Equatoria	**198 926**	**1.40**	**278 586**	**222 869**	**1 554 446**	**197 673**	**25 196**
Juba	37 373	1.10	41 110	32 888	490 626	68 688	-35 800
Kajo Keji	55 723	1.50	83 585	66 868	270 564	32 468	34 400
Lainya	21 508	1.50	32 262	25 810	145 120	17 414	8 395
Morobo	25 099	1.60	40 158	32 126	193 749	23 250	8 877
Terekeka	18 409	1.10	20 250	16 200	189 427	22 732	-6 532
Yei River	40 814	1.50	61 221	48 977	264 960	33 120	15 856
Eastern Equatoria	**150 962**	**1.18**	**177 682**	**142 146**	**1 094 791**	**135 808**	**6 338**
Budi	22 066	1.20	26 480	21 184	112 392	13 487	7 697
Ikotos	23 295	1.20	27 953	22 363	131 479	16 435	5 928
Kapoeta East	17 431	0.80	13 945	11 156	185 205	23 151	-11 995
Kapoeta North	9 630	0.80	7 704	6 163	114 304	14 288	-8 125
Kapoeta South	7 419	0.80	5 935	4 748	91 520	11 897	-7 149
Lafon	14 717	1.00	14 717	11 774	122 321	14 679	-2 905
Magwi	38 119	1.50	57 178	45 742	201 413	24 169	21 573
Torit	18 285	1.30	23 770	19 016	136 157	17 701	1 316
Jonglei	**31 268**	**0.92**	**28 885**	**23 108**	**1 545 664**	**172 846**	**-149 738**
Akobo	3 949	0.70	2 765	2 212	156 413	17 206	-14 994
Ayod	938	0.70	656	525	159 348	17 528	-17 003
Bor South	2 208	0.90	1 987	1 589	200 429	23 049	-21 460
Duk	0	0	0	0	108 086	11 889	-11 889
Fangak	2 586	0.70	1 811	1 448	95 877	10 546	-9 098
Khorflus/Pigi/ Cnl	2 157	0.70	1 510	1 208	175 235	19 276	-18 068
Nyirol	3 795	0.80	3 036	2 429	139 106	15 302	-12 873
Pibor	6 050	1.30	7 866	6 292	116 253	13 950	-7 658
Pochalla	5 007	1.30	6 509	5 207	65 765	7 892	-2 685
Twic East	1 389	0.60	833	667	121 319	13 345	-12 679
Uror	3 188	0.60	1 913	1 530	207 834	22 862	-21 331
Lakes	**93 477**	**1.23**	**114 892**	**91 914**	**1 115 677**	**122 726**	**-30 812**
Awerial	5 846	0.90	5 262	4 209	108 193	11 901	-7 692
Cueibet	17 883	1.20	21 460	17 168	178 266	19 609	-2 441
Rumbek Centre	14 925	1.40	20 895	16 716	237 099	26 082	-9 366
Rumbek East	14 008	1.40	19 611	15 689	187 887	20 668	-4 979
Rumbek North	4 002	1.40	5 602	4 482	50 177	5 519	-1 038
Wulu	8 230	1.20	9 876	7 901	70 331	7 736	165
Yirol East	10 567	1.00	10 567	8 454	125 793	13 838	-5 384
Yirol West	18 016	1.20	21 619	17 296	157 932	17 373	-78

State/County	Cereal area 2014 (ha)	2014 gross yield (t/ha)	2014 gross cereal production (t)	2014 net cereal production (t)	Population mid-2015	2015 cereal req't (t)	2015 surplus/ deficit (t)
N Bahr el Ghazal	**127 730**	**1.10**	**140 608**	**112 486**	**1 370 920**	**150 801**	**-38 315**
Aweil Centre	5 958	1.20	7 150	5 720	107 073	11 778	-6 058
Aweil East	55 093	1.00	55 093	44 075	536 825	59 050	-14 976
Aweil North	25 346	1.10	27 881	22 305	273 593	30 095	-7 790
Aweil South	11 836	1.20	14 203	11 362	147 535	16 229	-4 867
Aweil West	29 497	1.23	36 281	29 025	305 895	33 648	- 4 624
Unity	**14 786**	**0.70**	**10 320**	**8 256**	**1 018 080**	**88 554**	**-80 298**
Abiemnhom	470	0.40	188	150	18 085	1 537	-1 386
Guit	0	0	0	-	31 877	2 709	-2 709
Koch	2 675	1.00	2 675	2 140	137 178	11 660	-9 520
Leer	2 328	0.60	1 397	1 117	143 255	12 178	-11 061
Mayendit	2 644	0.60	1 586	1 269	87 962	7 477	-6 208
Mayom	0	0	0	-	161 099	13 693	-13 693
Panyijar	3 058	0.40	1 223	978	97 422	8 281	-7 303
Pariang	3 612	0.90	3 251	2 601	139 626	11 868	-9 268
Rubkona	0	0	0	-	201 576	19 150	-19 150
Upper Nile	**36 040**	**0.67**	**24 091**	**19 273**	**1 127 551**	**98 215**	**-78 942**
Baliet	300	0.80	240	192	22 717	1 931	-1 739
Fashoda	991	0.80	793	634	39 499	3 357	-2 723
Longochuk	675	0.60	405	324	70 781	6 016	-5 692
Luakpiny/Nasir	3 031	0.60	1 819	1 455	250 943	21 33	-19 875
Maban	3 461	0.60	2 076	1 661	54 687	4 648	-2 987
Maiwut	982	0.60	589	472	102 324	8 698	-8 226
Malakal	0	0	0		148 329	14 091	-14 091
Manyo	0	0	0		46 818	3 980	-3 980
Melut	5 522	1.00	5 522	4 418	77 265	6 568	-2 150
Panyikang	0	0	0	-	24 180	2 055	-2 055
Renk	19 751	0.60	11 851	9 480	177 995	16 020	-6 539
Ulang	1 326	0.60	796	636	112 014	9 521	-8 885
W Bahr el Ghazal	**69 015**	**1.37**	**94 243**	**75 395**	**523 373**	**59 351**	**16 044**
Jur River	23 775	1.30	30 908	24 726	200 864	22 096	2 631
Raga	11 056	1.40	15 479	12 383	84 272	8 427	3 956
Wau	34 183	1.40	47 857	38 285	240 236	28 828	9 457

State/County	Cereal area 2014 (ha)	2014 gross yield (t/ha)	2014 gross cereal production (t)	2014 net cereal production (t)	Population mid-2015	2015 cereal req't (t)	2015 surplus/ deficit (t)
Warrap	**124 301**	**1.24**	**153 686**	**122 949**	**1 322 166**	**127 856**	**-4 907**
Abyei	2 256	1.30	2 932	2 346	64 829	5 834	-3 488
Gogrial East	10 758	1.00	10 758	8 606	135 823	12 903	-4 297
Gogrial West	41 781	1.40	58 493	46 794	324 070	34 028	12 767
Tonj East	10 784	1.00	10 784	8 627	125 586	12 558	-3 931
Tonj North	18 736	1.00	18 736	14 989	206 539	20 653	-5 664
Tonj South	13 654	1.30	17 750	14 200	103 395	9 305	4 895
Twic	26 333	1.30	34 233	27 386	361 925	32 574	-5 187
Western Equatoria	**167 340**	**1.47**	**245 957**	**196 765**	**758 607**	**109 998**	**86 767**
Ezo	28 332	1.60	45 331	36 265	102 892	14 919	21 345
Ibba	14 264	1.40	19 969	15 975	46 594	6 756	9 219
Maridi	20 852	1.50	31 278	25 022	100 006	14 501	10 521
Mundri East	6 891	1.25	8 613	6 891	55 864	8 100	-1 210
Mundri West	7 050	1.70	11 985	9 588	51 060	7 404	2 185
Mvolo	5 846	1.00	5 846	4 676	57 384	8 321	-3 644
Nagero	2 311	1.00	2 311	1 849	11 304	1 639	210
Nzara	23 329	1.50	34 993	27 994	73 522	10 661	17 334
Tambura	20 696	1.40	28 975	23 180	70 344	10 200	12 980
Yambio	37 770	1.50	56 656	45 324	189 635	27 497	17 827
SOUTH SUDAN	**1 013 845**	**1.25**	**1 268 951**	**1 015 161**	**11 433 274**	**1 263 826**	**-248 666**

Table 6: South Sudan - Cereal harvested area and net production in the traditional sector, 2010-2014

Zones/States	2010			2011			2012			2013			2014		
	Area (000 ha)	Net Prod. ('000 t)	Net Yield (t/ha)	Area (000 ha)	Net Prod. (000 t)	Net Yield (t/ha)	Area (000 ha)	Net Prod. (000 t)	Net Yield (t/ha)	Area (000 ha)	Net Prod. (000 t)	Net Yield (t/ha)	Area (000 ha)	Net Prod. (000 t)	Net Yield (t/ha)
UPPER NILE	**261**	**156**	**0.60**	**230**	**99**	**0.43**	**243**	**112**	**0.46**	**254**	**136**	**0.53**	**82**	**50**	**0.61**
Upper Nile	78	49	0.63	68	26	0.38	83	38	0.46	84	40	0.48	15	8	0.53
Unity	40	24	0.60	34	8	0.24	47	15	0.32	54	26	0.48	36	19	0.53
Jonglei	143	84	0.59	128	65	0.51	113	59	0.52	116	70	0.60	31	23	0.74
BAHR EL GHAZAL	**319**	**254**	**0.82**	**263**	**166**	**0.63**	**448**	**287**	**0.64**	**451**	**310**	**0.69**	**414**	**400**	**0.97**
N Bahr el Ghazal	79	60	0.76	68	40	0.59	119	78	0.66	115	85	0.74	128	112	0.88
W Bahr el Ghazal	37	34	0.92	41	35	0.86	61	48	0.79	62	50	0.81	69	73	1.06
Lakes	76	66	0.87	70	45	0.65	99	70	0.70	107	75	0.70	93	92	0.99
Warrap	126	94	0.75	84	46	0.55	169	91	0.54	167	100	0.60	124	123	0.99
GREATER EQUATORIA	**343**	**284**	**0.83**	**366**	**297**	**0.81**	**451**	**391**	**1.15**	**468**	**445**	**0.95**	**517**	**564**	**1.09**
Central Equatoria	127	93	0.73	123	78	0.63	155	114	0.92	160	150	0.94	199	223	1.12
Eastern Equatoria	103	79	0.77	115	99	0.87	135	116	1.07	139	116	0.83	151	142	0.94
Western Equatoria	112	112	1.00	129	120	0.93	161	161	1.25	169	179	1.06	167	199	1.19
SOUTH SUDAN	**921**	**695**	**0.75**	**860**	**563**	**0.65**	**1 141**	**790**	**0.69**	**1 173**	**892**	**0.76**	**1014**	**1014**	**1.00**

B. Mechanized sector

South Sudan's rainfed mechanized sector includes (1) demarcated, large-scale farmers in Upper Nile State with multiple aggregations of 500 feddans (about 200 ha) known as *mushroor,* in locations from Renk to Malakal, (2) un-demarcated *traditional* farmers, cultivating units up to 50 feddans (about 20 ha) along-side the large-scale farmers, hiring their tractors and equipment, (3) a recorded rice scheme (Aweil Rice Scheme in Aweil West) and (4) a mechanized sorghum area (Tonchol, Aweil East) in Northern Bahr el Ghazal State. There are also mechanized areas in other states, particularly in the Greater Equatoria, but they are unaccounted for in the assessments, as are the emerging commercial farms in the Greater Bahr el Ghazal, expanding through the use of labour gangs, digging fields by hand or by using animal traction. Of these groups, by far the most important potential contributors to the national harvest are the demarcated and un-demarcated farmers in Upper Nile State. Their degree of mechanization is limited to land preparation and drilling of seed using seed boxes placed over ubiquitous disc harrows. All other operations to harvesting are carried out by hand, with the exception of a few farmers using herbicides sourced from Kosti in White Nile State in the Sudan.

This year Task Force-led missions visited sites in Renk, Melut, Fashoda and Malakal (Upper Nile State) and found that, despite the conflict, mechanized farming was being undertaken by farmers based on both sides of the Sudan-South Sudan border. Official statements about mechanized farming area this year tend to quote cultivable areas similar to those used before the independence. Although this connection was not confirmed as the Task Force-led missions had limited opportunities for both transects and case studies, areas farmed ranged from none in Malakal to areas similar to last year in Gusrom in Renk and greater than last year in Melut. Consequently, estimates of the area used to determine this year's production in Table 8 have erred on the side of caution.

All inputs for this sub-sector are sourced from Kosti, including seeds other than home grown seeds, seed dressing, fuel and tractor spare parts. No seasonal loans have been issued this year by South Sudan-based banks. However, trader-farmers based in Kosti may have received seasonal loans from the Khartoum-based banks that support activities on this side of the border, as they did during 2013.

Mission transects, farm visits and observations from the air over Renk, Fashoda and Melut suggest that, this year, many of the South Sudanese trader-farmers have moved southwards and eastwards away from Renk towards Melut and Maban, avoiding the more intense conflict zones for places with fewer security risks.

On all the large-scale farms, harvesting is opportunistic insomuch as at harvesting, the farmer will assess which parts of the crop to harvest and which parts to abandon, taking into consideration the cost of manual harvesting[10], the estimated yield and the prevailing market price. This year the CFSAM team have estimated that some 50 percent of the planted area has been harvested in each location.

Factors affecting yield, apart from access at planting and harvest time, connect to timing and quality of cultivation, seeds used, weeding frequency and pest and disease profiles. This year, rains were conducive. Seeds were available for sowing in June, July and August for the short-maturing improved sorghum varieties of *Afergadamek, Wad Ahmed and Gaddam el Hammam* that covered most of the planted area, instead of the long-maturing local landrace *Agono* or the local short-maturing landrace *leuwarding*, that dominated planting ten years ago. As a consequence, much of the harvest was collected (if not threshed) before the migratory *Quelea quelea* bird threats in January. Task Force-led team yield estimates drawn from the transects and case studies are greater than last year due to the early rains. Consequently, the overall yield of sorghum in the mechanized farms in all locations is estimated at 0.58 tonnes/ha, while the average yield in traditional farms (up to 20 ha) is around 0.65 tonnes/ha. The area and production estimates for sorghum in the mechanized sub-sector for the 2014 planting season are given in Table 7.

Cereal production from the rainfed mechanized sector in Upper Nile State is put at a very low level of about 24 384 tonnes. The mechanized small farmer, mostly un-demarcated, sub-sector is likely to add a further 27 700 tonnes. Mechanized farms elsewhere include the Aweil Rice Scheme, with yields expected at 2.5 tonnes/ha from 844 hectares adding a further 2 110 tonnes to the cereal balance, and the mechanized farming in Tonchol producing about 200 tonnes of sorghum. This gives a total of approximately 54 400 tonnes, about 24 percent below last year's estimates, which connects to an extra 43 500 tonnes net (considering 20 percent post-harvest losses and seed use).

[10]Picking and collecting sorghum heads "more than sowing, less than weeding, depending on the crop".

Table 7: South Sudan - Area and production estimates of the mechanized sub-sector

Location	Tractor-active 2013[1/] (units)	Area cultivated (ha)	Area harvested (50% cultivated)	Yields (tonne/ha)	Expected production (tonnes)
Renk	80	33 473	16 736	0.54	9 037
Melut	77	19 250	9 625	0.54	5 197
Manyo	100	0	0	0	0
Baliet	23	0	0	0	0
Akoka	4	4 200	2 100	0.65	1 365
Maban	2	20 500	10 250	0.54	5 535
Fashoda	7	10 000	5 000	0.65	3 250
Malakal	7	0	0	0	0
Panikang	3	0	0	0	0
Total large scale (a)	*303*	*87 423*	*43 711*	*0.58*	*24 384*
Total small scale (b)		*56 000*	*38 000*	*0.65*	*27 700*
Total Upper Nile State (a+b)					**52 084**
Aweil Rice Scheme (c)			844	2.50	2 110
Tonchol (d)			200	0.80	200
Grand Total (a+b+c+d)					**54 394**

1/ No information available for 2014.

3.3.2 Other crops

Groundnuts, with a short growing season and the possibility to be used as both staple or cash crop for sale, offer an important safety-net for family farms north of Raga and Wau in Western Bahr el Ghazal State, insomuch as they are often planted as an alternative to sorghum if the first planting of sorghum fails. Groundnuts also provide lucrative cash crops further south where seasons are longer and a second planting is possible.

Cassava is the major safety-net and the preferred staple in the Greenbelt. Its importance increases towards the south and west from being of very limited interest in Greater Upper Nile, Warrap and Northern Bahr el Ghazal states. In the three Rumbek counties (Lakes), the crop is planted around plots and household boundaries. In Wau and Raga counties (Western Bahr el Ghazal), two-year cassava is planted either as a sole crop or intercropped with groundnuts, sorghum and sesame. In Western and Central Equatoria states, two-year cassava is intercropped with a wide range of crops including cereals, sesame, groundnuts, pigeon-peas and beans during the first year of its development. In the second year, it is left un-weeded until harvesting. As it is usually the last crop in a rotation, it may well be left to a third year depending on need; or later, at which stage it becomes inedible. Although one-year varieties of cassava are planted for sale as fresh tubers, most farms in the main growing areas follow the two-year cycle, harvesting tubers from 18-24 months, which are traded locally in the form of tubers for processing and farther afield from the farms as dried cassava chips or cassava flour. Yields vary significantly with the agro-ecology and, based on PET photo-indicators (plant densities, crowns and occasional cross-check sample weights), are noted by Task Force-led teams this year to fall between 15-25 tonnes of fresh tubers per hectare in both Central and Western Equatoria states.

Table 8 shows the estimates of area and production for both cassava and groundnuts that might be harvested in 2014 in the seven states that were assessed at planting time.

Table 8: South Sudan - Indicative performance estimates of cassava and groundnuts by states visited by the Task Force at planting times

State	Cassava (2 years)			Groundnuts		
	Area (ha)	Yield (t/ha)	Potential[1/] production (fresh, t)	Area (ha)	Yield (t/ha)	Production (unshelled, t)
Central Equatoria	20 000	15	300 000	20 280**	0.6	12 168
Eastern Equatoria	14 210	12	170 520	5 560	0.6	3 336
Western Equatoria	32 000	17	544 000	33 600[2/]	0.6	20 160
Jonglei	n/a	n/a	n/a	n/a	n/a	n/a
Upper Nile	n/a	n/a	n/a	n/a	n/a	n/a
Unity	n/a	n/a	n/a	n/a	n/a	n/a
Lakes	800	12	7 200	36 750	0.6	22 050
Warrap	0	0	0	14 600	0.6	8 760
W Bahr al Ghazal	8 900	11	97 900	7 000	0.6	4 200
N Bahr al Ghazal	0	0	0	16 600	0.6	9 960
SOUTH SUDAN	**75 910**	**14.7**	**1 119 100[3/]**	**134 390**	**0.6**	**80 634**

1/ Not all cassava crops are harvested in Western Equatoria State as some return to forest.
2/ Including two harvests of groundnuts.
3/ Equivalent to about 329 000 tonnes of cereals at 42 percent tuber dry matter and 30 percent losses in processing.

Regarding other field crops grown at household level, information on oilseeds (sesame, safflower and sunflower) is too scanty to try deriving production figures. However, the mechanized sector in Upper Nile State might be expected to produce some 5 000 tonnes of sesame that is likely to be purchased immediately from the field by Sudanese traders.

3.3.3 Livestock and fishing

The most recent documented estimate of cattle numbers, made by FAO in 2009, suggests a cattle population of 11.7 million heads, similar to contemporary population estimates of sheep and goats at around 12 million heads each. Last year's Mission observations suggested that, for cattle: 1) with the age at first calving being at least 3 years; 2) with retention of male sales/slaughter stock for several years (<5 years) before sale or slaughter and; 3) a death rate of adult cows at 10 percent per annum, breeding cows were unlikely to make up more than 30-35 percent of the estimated numbers noted above. Furthermore, with calving intervals of 3 years as noted by Mission teams and a potentially high death-rate of young stock (15-20 percent), any unit of 100 heads is unlikely to produce more than seven viable heads per annum, a replacement rate that matches herd adult mortality and off-take may occur in any one year. Therefore, the conservative livestock population growth rates used in Ethiopia for cattle at 0.06 percent may also be applied for South Sudan. Table 9 shows estimates of cattle numbers obtained using the above-mentioned growth rate up to December 2013.

However, in the draft FAO Livestock Strategy Paper, the cattle population is estimated at 11 817 000 suggesting that the annual cattle population growth rate is 0.44 percent. Therefore, the 2014 numbers (for that year only) have been calculated from 2009 using the higher rate.

The same draft paper estimates the population of small ruminants at 13 974 135 heads for goats and 12 611 522 heads for sheep, providing a combined small ruminant population of about 26.6 million heads, over 2 million heads higher than the figures in the 2013 CFSAM report.

The unprecedented displacement of millions of cattle that began in December 2013 has set in motion a number of dynamics that have seriously worsened the condition of livestock and livestock-dependent populations across the country. Most importantly, it has significantly disrupted the traditional seasonal livestock migration patterns. According to extensive field assessments conducted by FAO livestock experts throughout 2014, there has been a large-scale and long-distance displacement of livestock from the conflict-affected states into safer zones outside their traditional pastoral domains, mainly into the Greater Equatoria, Greater Bahr el-Ghazal and the north-eastern tip of Upper Nile State. Livestock have often concentrated in

small and mostly agricultural areas, increasing competition with local farming communities over access to natural resources, altering disease patterns and challenging local power structures. As a result, tribal conflicts, cattle raids and disease outbreaks have intensified on an unprecedented scale, threatening the health of the national herd and tearing at the social, political and economic fabric of South Sudan.

Table 9: South Sudan - Revised cattle numbers by state, 2009-2014 (thousands)

State	2009	2010	2011	2012	2013	2014
Central Equatoria	878	879	879	880	881	885
Eastern Equatoria	888	889	889	890	891	895
Western Equatoria	675	675	676	676	676	679
Jonglei	1 465	1 466	1 467	1 468	1 469	1 475
Upper Nile	983	984	984	985	985	989
Unity	1 180	1 181	1 181	1 182	1 183	1 188
Lakes	1 311	1 312	1 313	1 313	1 314	1 320
Warrap	1 528	1 529	1 530	1 531	1 532	1 539
Western Bahr el Ghazal	1 248	1 249	1 249	1 250	1 251	1 257
Northern Bahr el Ghazal	1 579	1 580	1 581	1 582	1 583	1 590
SOUTH SUDAN	**11 735**	**11 744**	**11 749**	**11 757**	**11 765**	**11 817**

Source: Mission (CFSAM, 2013) from FAO livestock population estimate (2009), except for 2014 where the more recent estimates have been proportionally allocated to the states.

The following migrations have been reported from conflict-affected states into different states:

- In Eastern Equatoria State, movement of livestock has been concentrated in the Madi corridor of Magwi, where more than 250 000 heads of cattle moved into the eastern part of the country in April 2014.
- In Western Equatoria State, also in April, official sources reported early migrations of cattle in Tambura (with arrival of over 3 000 heads from Jonglei State), in Mvolo (with arrival of 25 000 heads from Lakes State), in Maridi (North) (with arrival of 45 000 heads from Jonglei State) and in Mundri West (with arrival of 2 900 heads from Jonglei State) for a total of 76 000 heads of cattle.
- In Awerial County in Lakes State, during an investigation of a disease outbreak in October 2014, FAO and partners estimated local and migrating herds from other states to reach some 750 000 heads of cattle and more than 1 million heads of sheep/goats.

As livestock production systems in South Sudan are defined by established transhumance migrations, any changes to regular and negotiated patterns is likely to cause changes to livestock performance. In fact, the earlier-than-usual migration of about 76 000 cattle in Western Equatoria State (with an increase by 11 percent of the local population) has been more easily accommodated as this migration occurred also in past years and arriving pastoralists are welcomed locally for their tribe affiliation. By contrast, the movements into Central Equatoria and Lakes states, with increases of 30 and 75 percent of local cattle population, respectively, may be considered as unusual and abnormal, with highly disruptive impacts to both animal performance and relationships between herders and farmers.

Given the nature of CFSAMs, Task Force-led mission teams collect information from settled livestock systems and those elements of transhumant herds and flocks kept close to the steadings. This year, the assessments have been mostly in zones unaffected by the conflict. The teams reporting from such locations confirm that water and pasture were available in adequate quantities at the time of the visits (up to January 2015). Small ruminant and non-milking cattle with average to good body condition (scoring 3-4) in most places substantiate this view. In common with previous years, incidents of endemic diseases reported in Task Force case studies and key-informant interviews include Haemorrhagic Septicaemia, Black Quarter, Contagious Bovine Pleuropneumonia, Anthrax, East Coast Fever, Peste des Petits Ruminants, Sheep Pox, Newcastle Disease, Contagious Caprine Pleuropneumonia, Foot-and-Mouth Disease, lumpy-skin disease and the presence of internal and external parasites.

The deterioration in animal health across the country is complicated by a limited response capacity. Veterinary services remain very weak due to lack of means and inadequate human resources. To counteract the threats of disease outbreaks, exacerbated by the changes to movements noted above, FAO provided about 2.5 million doses of vaccines for domestic livestock (6 percent of the estimated livestock population) to NGOs for distribution from January 2014 to January 2015. According to the details shown in Table 10,

45 percent of the vaccines went to the three conflict-affected states. However, as Lakes State is noted to be the location under the most severe challenge from incoming herds and flocks estimated to be increasing the State livestock population *tenfold*, the percentage of vaccine allocated seems inconsistent with the implied threat.

Table 10: South Sudan - Livestock vaccines distributed to NGOs January 2014-January 2015

State	Cattle	Sheep and Goats	Total	Percent
Abyei	40 500	60 000	100 500	4.0
Warrap	268 000	65 000	333 000	13.3
Northern Bahr el Ghazal	270 000	103 100	373 100	14.8
Western Bahr el Ghazal	15 000	0	15 000	0.6
Lakes	127 500	55 000	182 500	7.3
Upper Nile	145 000	130 000	275 000	10.9
Unity	185 000	158 900	343 900	13.7
Jonglei	341 500	230 000	571 500	22.7
Central Equatoria	70 000	25 000	95 000	3.8
Western Equatoria	37 500	10 000	47 500	1.9
Eastern Equatoria	75 000	101 000	176 000	7.0
SOUTH SUDAN	**1 575 000**	**938 000**	**2 513 000**	**100.0**

No developments are noted regarding production from non-ruminant livestock. Poultry and pig production occurs at backyard level. Any development from small-scale laying/broiler or pig production units into commercial enterprises remains undocumented, but their emergence will depend on identifying reliable sources of locally-produced carbohydrates. A maize growing/processing unit in Kajo Keji in Central Equatoria State is an example of enterprise looking to diversify in such directions. In this regard, it is surprising that more attention is not given to the availability of cassava grown in quantity in the Greenbelt.

Fishing is considered to have a significant effect on the diet throughout the riverine and swamp counties. Nationally, the annual catch is estimated to be between 40 000 and 45 000 tonnes. With household food security under threat from military action, theft and destruction in the conflict zones stretching along the Nile banks from Terekeka to Renk and along the Sobat River, FAO provided 168 386[11] fishing kits for distribution by NGOs through 35 Letters of Agreement. Of these kits, 83 percent are expected to have been distributed in conflict-affected areas (with 37 percent in Jonglei, 30 percent in Unity and 16 percent in Upper Nile states).

4. CEREAL DEMAND/SUPPLY SITUATION

4.1 Cereal balance

As previously shown in Table 5, total cereal consumption in 2015 is estimated at about 1.26 million tonnes, using a projected 2015 mid-year population of about 11.4 million people and an average per capita consumption of about 110 kg of cereals per year. Estimates of cereal per capita consumption are based on information provided by the 2009 National Baseline Household Survey (NBHS) at state level and adjusted at county level to take into account differences between urban and rural areas and the relative importance in local diets of other crops (notably cassava and groundnuts), livestock and wild foods. The estimated production of 1.12 million tonnes of fresh cassava and 80 634 tonnes of unshelled groundnuts is expected to provide some 393 000 tonnes of grain equivalent, boosting estimated average per capita consumption to 144 kg of cereal equivalent per year, suggesting a level fairly close to the estimates for neighbouring countries.

With an estimated net cereal production from the traditional sector slightly above 1 million tonnes, a cereal deficit of about 249 000 tonnes is forecast for the 2015 marketing year, about 47 percent less than last year's

[11] CFSAM recalculation.

revised estimate[12]. Table 11 summarizes the estimated cereal supply situation for each state in 2015 and compares it with the Mission's estimates for the previous two years. The largest shortfall is forecast in the three most conflict-affected states of Jonglei, Unity and Upper Nile, with an aggregate cereal deficit of about 320 000 tonnes. A moderate cereal deficit is forecast in Lakes (30 800 tonnes) and Northern Bahr el Ghazal (38 300 tonnes) states, while some surplus is estimated in the Greater Equatoria (about 120 000 tonnes, aggregate) and Western Bahr el Ghazal State (16 000 tonnes).

At county level, substantial cereal deficits are expected in Akobo, Ayod, Bor South, Khorflus/Pigi/Canal and Uror counties in Jonglei State, in Mayom and Rubkona counties in Unity State, in Malakal and Luakpiny/Nasir counties in Upper Nile, in Aweil East county in Northern Bahr el Ghazal State and in Juba county in Central Equatoria state. Conversely, largest cereal surpluses are expected in Kajo Keji and Yie counties in Central Equatoria State, in Magwi county in Eastern Equatoria State and in Yambio, Nzara and Ezo counties in Western Equatoria State. It is important to stress that the significant decline in the overall cereal deficit estimates in 2015 compared to the previous years is in part due to favourable weather conditions across the country during both cropping seasons, but also to more detailed information gathered in 2014, especially about production of the first season harvest which was systematically under-estimated in the past.

Table 11: South Sudan - Estimated cereal surplus/deficit in 2013-2015

State	2013	2014 (revised)	2015
Central Equatoria	-84 183	-46 077	25 196
Eastern Equatoria	-23 846	-18 383	6 338
Western Equatoria	47 778	69 657	86 767
Jonglei	-129 793	-101 205	-149 738
Upper Nile	-63 269	-56 182	-78 942
Unity	-72 030	-64 347	-80 298
Lakes	-35 167	-48 553	-30 812
Warrap	-34 885	-50 149	-4 907
Western Bahr el Ghazal	-9 387	-11 965	16 044
Northern Bahr el Ghazal	-63 093	-67 214	-38 315
SOUTH SUDAN	**-467 875**	**-394 418**	**-248 666**

Cereal production from the rainfed large and small mechanized sector in Upper Nile is expected to provide an additional 43 500 tonnes of cereals. Although some sorghum, produced by the Sudan-based farmers who cultivate both sides of the border, is expected to be commercialized across the border in the Sudan, some amounts are expected to be marketed internally, depending on security conditions, transportation costs of shipping grains to main local markets as well as changes of the exchange rates between currencies in the Sudan and South Sudan which may affect the direction of trade flows. This production represents also an interesting option for local purchases by international institutions providing food assistance.

4.2 Cereal and livestock markets

Food and livestock markets in South Sudan are highly fragmented as a consequence of the poorly developed road network. The tarmac road connecting Nimule, on the Ugandan border, with Juba is virtually the only all-season trading route in the country. All other roads, including those in the western corridor connecting Juba with Rumbek to Wau up to Aweil, are subject to significant constraints during the rainy season (May-October) when they may become impassable undermining the stability of supply flows. In general, the further markets are from the capital city, the higher are transportation costs due to multiple taxation (both official and unofficial), time spent at customs, check points and road blocks as well as increasing risk of looting. During the rainy season, when road conditions deteriorate, trucks are often forced to carry small loads over long distances, thus increasing the average unit cost of transportation. In addition, as a result of the low density and poor condition of roads, distribution of fuel within the country can be easily delayed and disrupted, causing shortages and high price differentials (as much as four times) between different parts of the country. At the end of 2014, the average price of 1 litre of diesel fuel was SSP 6 in Juba, between SSP 10 and SSP 15 in Bor, Wau, Aweil, Renk, Kuajok and Rumbek, about SSP 20 in Malakal and SSP 25 in Maban. With the exception of Juba's market, which can rely on regular supplies of locally produced and imported commodities, food and livestock prices record a high volatility in all monitored

[12] Last year's food gap has been recalculated using the revised population figures that took into consideration people's movements in 2014.

markets in the country, as local economies are always very shallow and prices tend to quickly react to situations that may be contingent and short-lived such as a one-day road block, or the delivery of food assistance even in limited quantities or an isolated episode of violence.

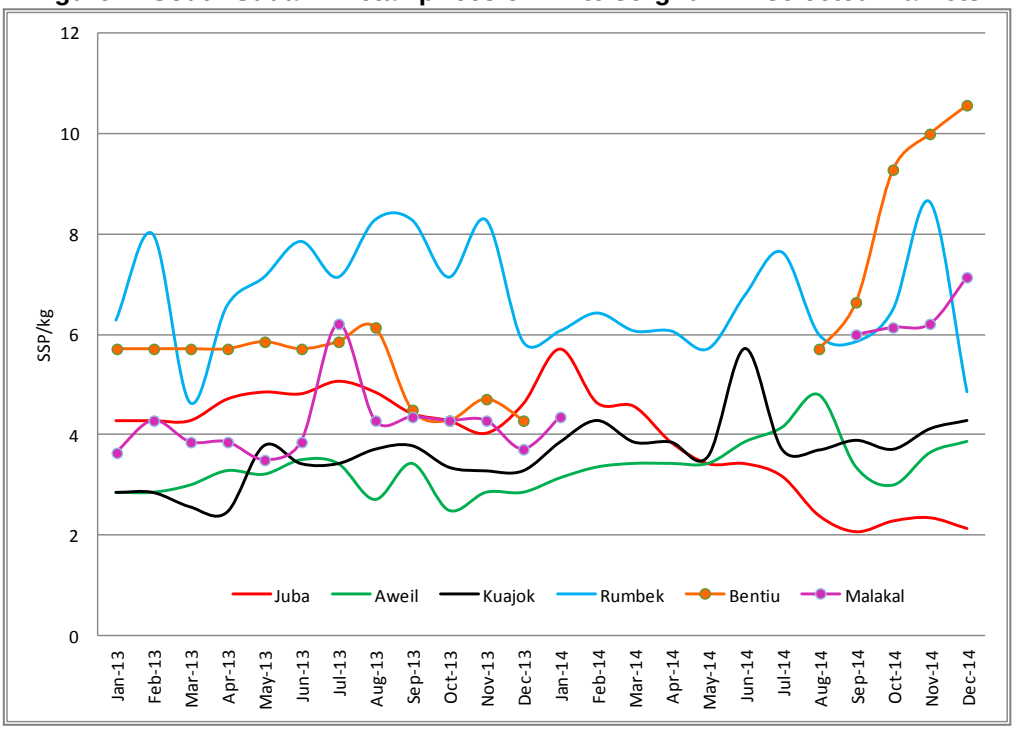
In most markets, retail prices of white sorghum seasonally dropped at the end of 2013, following the commercialization of the above-average 2013 crop production that had just been harvested, but abruptly increased in January 2014 reacting to the widespread violence and high political uncertainty as a result to the start of the conflict. Between December 2013 and January 2014, average sorghum prices increased by 25 percent in Juba's main market and by 14-18 percent in Wau, Kuajok and Malakal. Similarly, the retail price of wheat flour increased by over 40 percent in Juba due to the temporary suspension of imports. As the situation relatively stabilized in Juba during the first months of 2014, prices of sorghum steadily declined until late 2014 as a result of the resumption of imports from Uganda, the increased availability of food assistance and the commercialization of 2014 first and second season crops.

Similar trends were observed in most markets in the Greater Equatoria and Greater Bah el Ghazal, where the conflict had generally a minimal impact. Here, main price fluctuations were essentially due to road accessibility problems during the rainy season and to the number of road blocks and check points which makes transportation expensive and cumbersome. As December 2014, price differentials for sorghum are significant across the country, from SSP 2-3 per kg in the Greater Equatoria as well as in Renk in Upper Nile, to SSP 4-5 per kg in Malakal, Bor, Rumbek, Wau and Aweil, up to a record high SSP 11 per kg in Bentiu. Throughout the year, commodities from Uganda and Kenya have continued to supply markets in the Greater Equatoria, such as Kapoeta, Torit, Juba, Yei, Maridi, Yambio and Tambura as well as Wau and Aweil in Greater Bahr el Ghazal, also served by Sudanese traders.

In major conflict-affected areas in the Greater Upper Nile, market functioning was severely jeopardized during 2014, due to the destruction of infrastructures, looting of commodity stocks and a sharp reduction in the number of traders and customer attendance. Major trade disruptions, often leading to minimal availability of staples, were reported in most markets of Unity State (Bentiu, Mayom, Abiemnom, Mayendit, Nyal), in Malakal in Upper Nile State and in northern areas of Jonglei State (Fangak, Ayod, Duk). Most of these markets have been virtually isolated for several months, with low supplies and/or high prices. The massive displacement of people in these areas has also depressed the local demand and reduced business incentives for traders as most IDPs in camps rely essentially on food assistance. In addition, especially at the beginning of 2014, most traders that were displaced in conflict-affected areas decided to move south towards safer areas, increasing competition in local markets.

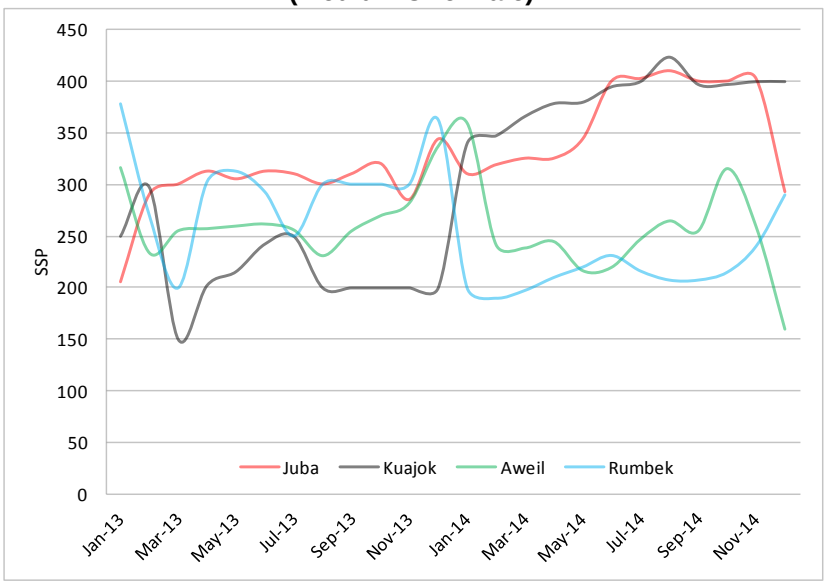
By the end of 2014, market functionalities have slightly improved in some markets in Unity State, such as Koch, Mayendit and Nyal, where some traders have returned improving local availability of staples, although prices remain high as a consequence of high transportation costs and high taxes at check points. More significant improvements are reported in Renk and Melut in Upper Nile State where markets are almost back to normal functioning as harvesting of local crops and informal cross-border trade from the Sudan are improving food availability and access. In December 2014, sorghum was traded in the Renk retail market at about SSP 8 per kwacha, compared to SSP 10 the month before, very similar to the average price registered in Juba's market at the end of 2014.

Figure 4: South Sudan - Retail prices of white sorghum in selected markets



Livestock forms an integral part of South Sudanese livelihood systems and sales of small ruminants represents a principal source of income that largely determine pastoralists' capacity to purchase food items. As shown in Figure 5, in Juba and Kuajok markets, goat prices (male medium size) were at record high levels of about SSP 400 per head during the whole second half of 2014. In particular, goat prices increased by about 70 percent at the end of 2013 in Kuajok at the onset of the conflict and steadily continued to grow until the end of 2014. Goat prices had a spike of about 20 percent in January 2014 also in Aweil and Rumbek, but immediately dropped to average levels as herders increased sales in order to buy cereals and continued throughout the year following seasonal patterns. Prices of sheep have followed trends similar to goat prices in most markets, with the exception of Juba where prices started to decline earlier in April.

Figure 5: South Sudan - Retail prices of goats in selected markets (medium size male)

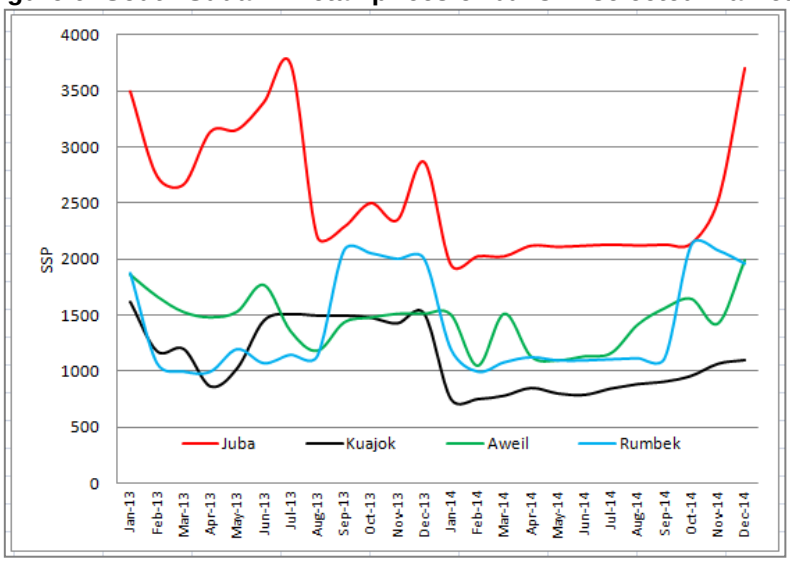


Comparing markets of small ruminants during the first two weeks of December 2013 (prior to the conflict) and the first two weeks of December 2014, prices of goats and sheep have doubled in Kuajok and increased by about 30 percent in Bor, while they dropped by 50 percent in Aweil and by 20-30 percent in Juba. The significant price differentials, even between closely located areas, show high market fragmentation that could

be attributed to the structural high transportation costs and poor road conditions compounded by the risk of looting and violence episodes which heavily constrained trade flows.

As shown in Figure 6, prices of bulls in 2013 were at different levels and followed different trends in monitored markets due to the high market fragmentation prevailing in the country: for instance, the average price of a bull in Juba in 2013, at about SSP 2900, was more than double than in Kwajok (SSP 1400). Subsequently, as the conflict erupted in December, prices of bulls declined in all monitored markets by about 30 and 50 percent between December and January/February as herders had to recur to distress sales to cope with the widespread insecurity. Subsequently, prices remained stable in Juba and Rumbek for most of 2014, but increased sharply during the last quarter of the year (about 75 percent between September/October and December). In Aweil, prices started to rise in July, increasing by 70 percent between July and December, while in Kwajok they started to rise soon after the sharp declines that followed the eruption of the crisis, increasing by about 45 percent between January and December 2014.

Figure 6: South Sudan - Retail prices of bulls in selected markets



The terms of trade for pastoralists in South Sudan greatly vary across markets due to high market fragmentation (Figures 7 and 8). In 2013, up to the eruption of the conflict in December, one medium size bull was equivalent to about 600 kg of white sorghum in Juba, 500 kg in Aweil, 400 kg in Kwajok and only 200 kg in Rumbek, where low prices of livestock were coupled with high prices of cereals. Similarly, one medium size male goat was equivalent to about 90 kg of white sorghum Aweil, 70 kg in Juba and Kuajok and only 45 kg in Rumbek. The terms of trade for pastoralist sharply deteriorated at the onset of the crisis as livestock prices plummeted between December and January. Subsequently, they improved in all monitored markets as the increase in livestock prices was coupled with declining prices of coarse grains. The sharpest increase was recorded in Juba market, where terms of trade increased by three/four times between February and September 2014. During this period, the exchange of one bull in Juba's market passed from about 400 kg of white sorghum to about 1 700 kg, while the equivalent of one medium size goat passed from 60 to over 190 kg. Similarly, purchasing power for pastoralists selling bulls in Rumbek almost doubled between February and December 2014 and increased over the same period by 50-65 percent in Kwajok and Aweil.

Figure 7: South Sudan - Terms of trade in selected markets (kg of sorghum per one medium size male goat)

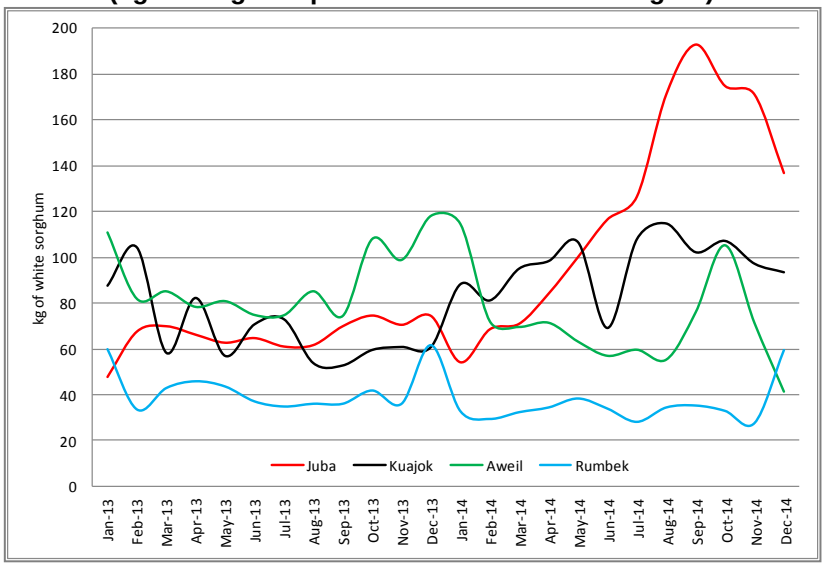
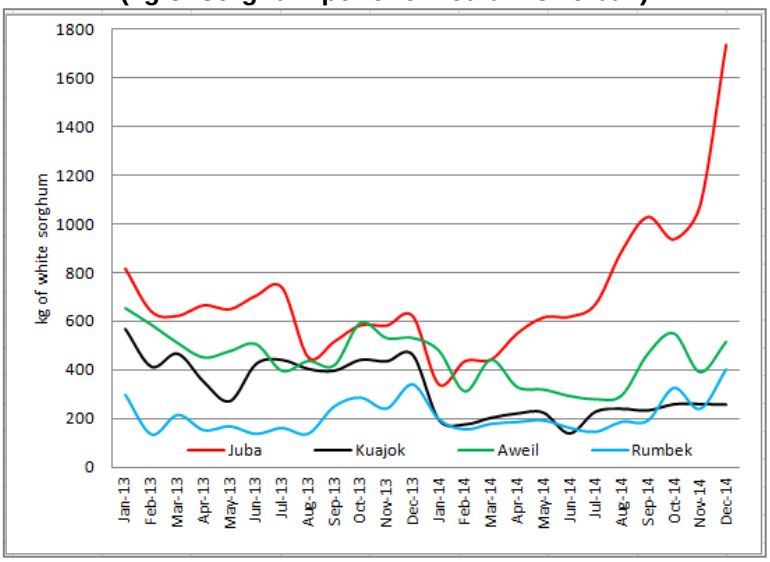


Figure 8: South Sudan - Terms of trade in selected markets (kg of sorghum per one medium size bull)



4.3 Household and food assistance

In 2015, FAO plans to assist about 477 000 households (more than 2.8 million people) with livelihood assistance in the form of crop seeds and tools, vegetable seeds and tools, fishing equipment, including post-harvest processing and marketing inputs as well as protection of livestock assets. The target population is composed of food insecure households and the target figures are based on the IPC outlook January-March 2015. At Food Security and Livelihood Cluster level, it was decided to target 100 percent of the population living in IPC phases 4 and 3 ("crisis" and "emergency") and 12 percent of the population living in IPC Phase 2 ("stressed").

Access to FAO's emergency livelihood kits will be through direct distribution by partners or FAO staff or, as conditions permit, through vouchers mechanisms and inputs trade fairs. Based on assessed needs, FAO and its partners will deliver crop, vegetable, animal health and fishing kits and related services to improve food security, dietary diversification and nutrition.

FAO will also have a special attention to environmental protection through its natural resource sector programme. FAO will upscale the distribution of fuel efficient stoves (FES) to better protect women and girls against the risk of sexual violence associated with collected firewood. These and other efforts aim at easing

pressure on forests and woodlands in IDP settlements, for example, through promoting coppicing and pollarding for selective collection of firewood to mitigate the impact of concentrated demand for fuel.

The composition of the crop kits is adapted by region (states and counties), according to agro-ecological and social conditions. Based on assessments of seed production in the Greater Equatoria and Greater Bahr El Ghazal, FAO has procured locally about 30 percent of its required seeds, as part of FAO's "Seeds for Peace Initiative".

Where conditions permit, FAO will focus on resilience building activities for IPC 2 ("stressed") households to promote livelihood recovery, food production and contribute to restoring the functionality of markets. Support will also be provided to the adoption of improved agricultural production systems, post-harvest processing and access to market the crop, livestock, fishery and forestry sectors. More specifically, FAO will promote improved agricultural practices, seed fairs, support to seed multiplication, mitigation of post-harvest losses through improved handling and storage, and as well as the promotion of and training on improved equipment such as ox-ploughs. FAO will support animal health services through the training of Community Based Animal Health Workers (CBAHW) and targeted introduction of cost-recovery to ensure the durability of service provision. In additional to animal health protection, FAO will undertake targeted restocking, training on improved animal husbandry, including fodder production and storage for dry season supplements, as well as milk and meat handling and processing. FAO will contribute to reducing fish post-harvest losses and increase incomes of fishing households through training on efficient basic fish processing techniques, supported by portable storage capacities and insulated bicycles, scales and tarpaulin. Awareness and capacity building on natural resource management in all the relevant livelihood sectors is an overall priority for FAO and will be systematically promoted in its interventions.

Thanks to the timely contributions made by donors, FAO has been able to procure all the pipeline inputs and constitute a buffer stock for specific livelihood kits for future responses. FAO has re-established its field presence and storage capacity in Bor, Bentiu and has strengthened its storage capacity in its existing hubs. Prepositioning of emergency inputs has been done in a timely manner in order to make best use of the dry season. However, some roads in the most affected states were still flooded from last years' rains and access to some areas in opposition held areas is still limited due to insecurity. All these conditions require the transport of inputs through air assets, which are costly and limited.

5 HOUSEHOLD FOOD SECURITY SITUATION

5.1 Methodology

This section examines food security trends in South Sudan, the evolution of its drivers and how they relate to the agricultural production statistics presented in previous sections. The analysis is based on data from the FSMS (Food Security Monitoring System) run by WFP and partners (FSTS, UNICEF, FAO, MAFCRD, NBS, RRC and NGOs).

The FSMS was initiated in 2010 and over time it has become an important source of information on the food security situation in South Sudan. The FSMS holds three rounds per year, February, June and October, reflecting the key food security stages during the season; most favourable, October, right after or at harvest time; the least favourable, June, at the peak of the lean season; and February, mid-way between the two stages. Each FSMS round covers all ten states. In each State, ten sentinel sites have been purposely selected through a consultative process at the State level, taking into account the representation of different livelihood and administrative zones within each State. The same sentinel sites are revisited in each round (unless there are severe access constraints). In each site, 25 households are interviewed, resulting in a total of about 2 500 households across the country.

By late 2014, 14 rounds of data collection had been completed, the latest round in November 2014, providing a solid base to distinguish the effects of seasonality from those of shocks. Data collection was carried out through 2014 in spite of the conflict situation and resulting insecurity. In the Greater Upper Nile region, where the conflict was mostly concentrated, the February FSMS round was replaced by an Emergency Food Security Assessment (EFSA); this led to a small reduction in the variety of data collected, but with little bearing on the amount of information available for analysis.

Table 12: South Sudan – List of datasets used for the food security analysis

Data	Date	State
ANLA 2008/2009	October 2008	
ANLA 2009/2010	October 2009	CES[1/], WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 2	October 2010	EES, WBS, NBS, Warrap, Lakes Upper Nile, Unity, Jonglei
FSMS 3	February 2011	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 4	June 2011	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Jonglei
FSMS 5	October 2011	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 6	February 2012	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 7	July 2012	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 8	October 2012	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 9	February 2013	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 10	July 2013	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 11	October 2013	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 12[2/]	February 2014	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 13	July 2014	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei
FSMS 14	October 2014	CES, WES, EES, WBS, NBS, Warrap, Lakes, Upper Nile, Unity, Jonglei

1/ Taken March 2010.
2/ EFSA for the Greater Upper Nile.

5.2 Main drivers of food insecurity in 2014/15

The conflict situation looms large in the list of factors that will drive food security patterns in South Sudan during 2015. Yet other factors also need to be considered given that conflict was primarily restricted to the Greater Upper Nile region of South Sudan (states of Upper Nile, Unity and Jonglei).

Conflict in 2014 – The major factor influencing the general food security situation for South Sudan during 2014 was the violent conflict that started in late December 2013 and thus far not resolved.

Conflict affected mostly the Greater Upper Nile region (states of Upper Nile, Unity and Jonglei). Central Equatoria remained by and large unaffected after the early stages of the conflict. However, the conflict had geographically widespread repercussions through its impact on markets and trade routes. The widespread displacement of populations both inside South Sudan and into neighbouring countries was also severe.

Neighbouring states (Lakes, in particular, and Warrap, to a lesser degree) also saw an increase in violence often associated with inter-communal conflict and cattle raiding.

Crop Production in 2014 – The growing season of 2014 was characterized by early and abundant rains during the initial stages of the season. Favourable weather conditions lasted throughout the season, in spite of some short-lived drier periods in mid-season. Aggregated planted area dropped by 17 percent relative to last year, mostly due to a two-third reduction in planted area in the Greater Upper Nile from the pre-conflict level. However, favourable weather conditions contributed to significant increases in crop yields, resulting in an estimated production of 1 million tonnes, an increase of 13 percent relative to last year's favourable production (see Table 6).

The current cereal deficit is estimated at just under 250 000 tonnes. This is a significant improvement on last year’s deficit of around 400 000 tonnes. Still, this improvement conceals a worsening deficit in the Greater Upper Nile, where the deficit for 2015 increased by almost 50 percent from 222 000 to 307 000 tonnes, against a backdrop of yet unresolved conflict and subsequent impact on commodity supplies and market infrastructure. Elsewhere, an overall surplus in the Greater Equatoria and a deficit reduced by two-thirds in the Greater Bahr-el-Ghazal and Warrap and Lakes States, offer a more optimistic perspective for 2015.

Market Prices – The onset of conflict in late 2013 had a major impact on staple commodity prices. After independence, as a result of the closure of the border with the Sudan, a new pattern of supplies coming from Uganda (mostly) and Ethiopia (to a lesser degree and more confined to the eastern states) was established. The long distances over a poor road network, very expensive fuel, unfavourable exchange rates, taxes both official and unofficial, led to the poor integration of South Sudan’s domestic markets, resulting in high prices, volatile prices and significant price differences between markets in different states, in the past couple of years.

Conflict further complicated this unfavourable situation. It affected the supply of commodities to households both directly through impacts on market infrastructure and through disruption of trade flows into and within

South Sudan. The latter affected mostly households in the Greater Upper Nile states, while the former had a more widespread effect across the country.

Population displacements: IDPs, refugees and returnees - A major impact of conflict was the displacement of some 2 million people from their homes (see section 2.1 for details), with 1.5 million remaining in-country and 500 000 settling in neighbouring countries. The IDPs mostly remained within the conflict states, presenting an additional need for food while by and large not being able to farm.

The country also hosts close to one-quarter of 1 million refugees (mostly) from the Sudan with small numbers from the Republic of the Congo, Ethiopia and Central African Republic. Returnees from the Sudan are now a very small fraction of the population influx (32 000 this year), having consistently decreased over the past few years.

5.3 Recent food security situation and evolution

The household food security status is determined by three components:

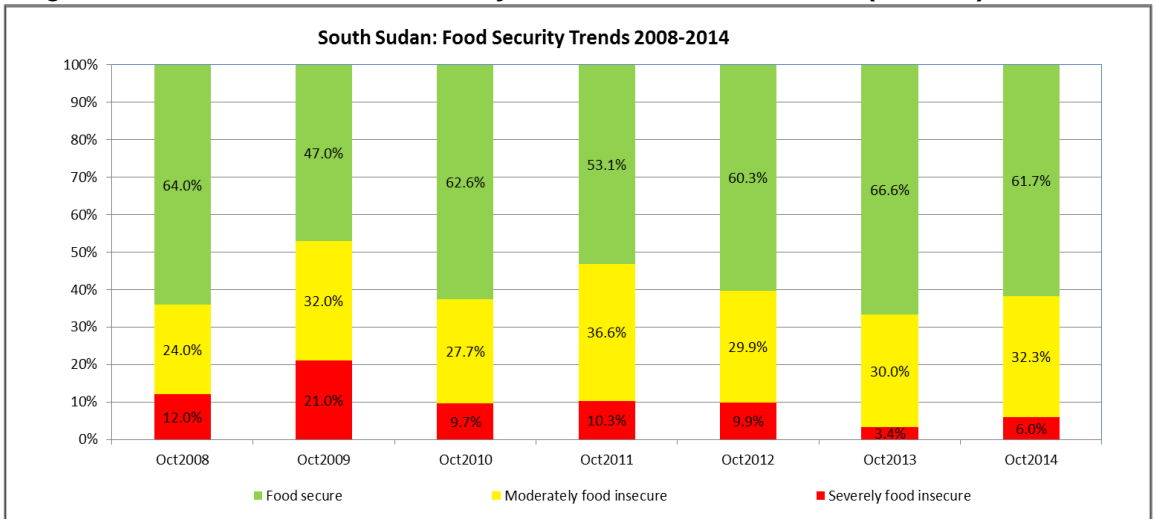
1. Food consumption, based on dietary diversity and food frequency.
2. Food access, based on the share of food expenditure and the reliability and sustainability of income activities pursued by households.
3. Coping strategies derived from the frequency and severity of different coping strategies employed by households.

Based on these factors, households are classified into three categories: severely food insecure, moderately food insecure and food secure. The first two levels grouped together are referred to as “food insecure” for short.

In October 2014, just over 38 percent of the population of South Sudan were moderately to severely food insecure (see Figure 9). This is worse than at the same time last year, when South Sudan’s food insecurity rates reached 33 percent. However, it still is favourable when compared with the levels of 2008-2012. Severe food insecurity increased from 3.4-6 percent, also better relative to the period 2008-2012. This shows that the Greater Upper Nile conflict at the end of 2014 had only a relatively moderate impact upon food insecurity at the aggregate national level.

A concerted and sustained humanitarian effort in conflict areas and a good harvest in other regions, limited what might have been an extremely serious food security situation. This is evident from the way the food insecurity situation changed along the year. In February 2014, extreme levels of severe food insecurity were recorded across the Greater Upper Nile region (above 30 percent in Jonglei and Upper Nile and exceeding 40 percent in Unity, a 2-4 fold increase) and in the neighbouring states of Warrap (23.5 percent) and Lakes (20.6 percent). Overall, food insecurity was in excess of 65 percent in these states. Even the states not directly involved in the conflict reached remarkably high levels of food insecurity in the first half of 2014 (nearly all above 50 percent) including the Greenbelt regions, through impacts on commodity supplies and market prices.

Figure 9: South Sudan – Food security status around harvest time (October) 2008-2014



By October 2014, the situation had improved remarkably, with food insecurity rates at or below pre-conflict levels in Central Equatoria, Eastern Equatoria, Western and Northern Bahr el Ghazal states. However, in the Greater Upper Nile, food insecurity remained higher than in the pre-conflict period, particularly so in Jonglei and Unity states, where it reached 50 and 41 percent of the population, respectively (of which about 10 percent severely food insecure). Food insecurity is also higher than it was pre-conflict in Warrap and Lakes states, as a result of insecurity spill over and market imperfections.

A favourable cropping season was the main driver of improved food security in places unaffected by the conflict. In the Greater Upper Nile, the improvements were driven by the swift and sustained humanitarian intervention, a degree of normalization of market prices and the conflict becoming more localized due to the rainy season.

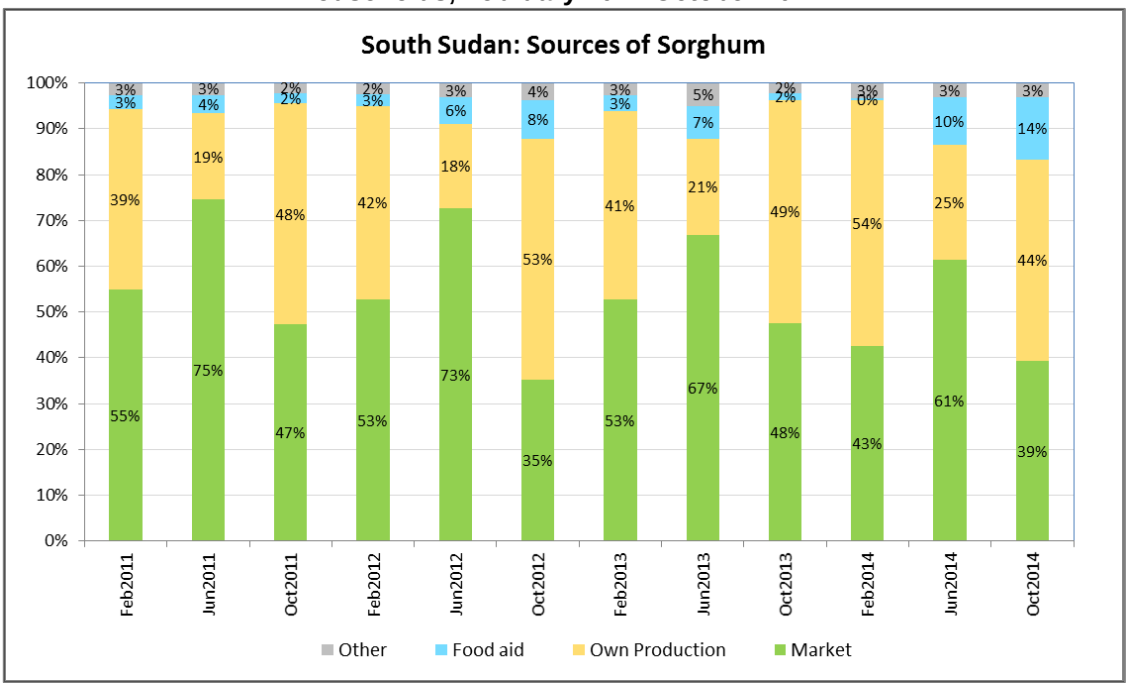
5.4 Household staple food supply: markets vs own production

This section analyses the importance of markets in the supply of staple foods to the households and how this changes across the country, along the season and from season to season.

The analysis focuses on the sources of sorghum as this is the staple cereal consumed across most of the country. Data for maize and pulses was also examined and shows similar patterns. Other food items have by far more fixed supply sources, e.g. for vegetables, the major source is own production complemented by gathering, cassava is mostly own-produced, while fish, meat, oils and fats are overwhelmingly sourced from markets. Dairy products are from own production, particularly in the states with significant livestock holdings (Unity, Warrap, Eastern Equatoria, Jonglei to a lesser degree).

Figure 10 shows the households' main sources of sorghum and seasonality patterns during 2011-2014. As expected, the two dominant sources for households are markets and own crop production. There is a clear overall pattern: household own production is only a dominant source of sorghum around harvest time (October); at all other times markets are the dominant supplier, between 60-70 percent of the households in June, as most households exhaust their stocks a few months after harvest.

Figure 10: South Sudan - Relative importance of different sources of sorghum consumed by households, February 2011-October 2014



Year-on-year patterns are largely dictated by variations in the harvests: favourable harvests at the end of the year lead to smaller market dependency during the lean period the following year.

In 2014, a combination of a favourable 2013 harvest, conflict-related market and commodity supply disruptions and a greater contribution of food assistance, led to the lowest lean season market dependency, 61 percent in June 2014. In fact, throughout 2014 market dependence has been the lowest compared to the

most seasonally adjusted past years. However, these factors do not change the overall high households' dependence on markets. The record contribution of food assistance in October 2014 is a direct result of the assistance provided to the conflict regions of the Greater Upper Nile (see below) coupled with reduced production in these areas.

The pattern of sorghum supply has some noticeable geographical variations both in terms of overall market dependence and its seasonality. In 2014, the conflict in the Greater Upper Nile region introduced new changes in these patterns.

In Upper Nile State, where households were typically almost exclusively dependent on market supplies throughout the year (constantly above 80 percent since February 2011), market dependency fell to historical lows of 46-54 percent. This is clearly linked to the impacts on market infrastructure and trade routes. The slack was taken up by increased importance of own production (from 10-25 percent) and more significantly of food assistance (from negligible contributions to 25 percent).

In the other conflict-affected states of Unity and Jonglei, changes are also clear – before the conflict these states showed very high market dependence except around harvest time, which has been severely reduced. In Jonglei, market contributions in June 2014 decreased to under 50 percent from over 70 percent in June 2013 and in October 2014 to a record low of 12 percent from around 30 percent in previous years. Food assistance correspondingly increased its contribution to 33 percent in June and 50 percent in October. The pattern is similar in Unity, where food assistance increased from residual levels to 30 percent (June) and 43 percent (October). Food assistance also became a major source of pulses, oils and fats in conflict states.

This increase in food assistance is exclusive to the Greater Upper Nile region; in the neighbouring states of Lakes and Warrap, food assistance remained low as in other states.

In Central and Western Equatoria states, there was a noticeable increase in the market share, reaching relatively high proportions in June 2014. Here, food assistance, usually absent, made a small contribution from mid-2014 (about 10 percent). On the other hand, an increased contribution of household production is noted for Lakes, Eastern Equatoria and Warrap states to a lesser degree.

5.5 Food expenditure: recent patterns and at-harvest situation

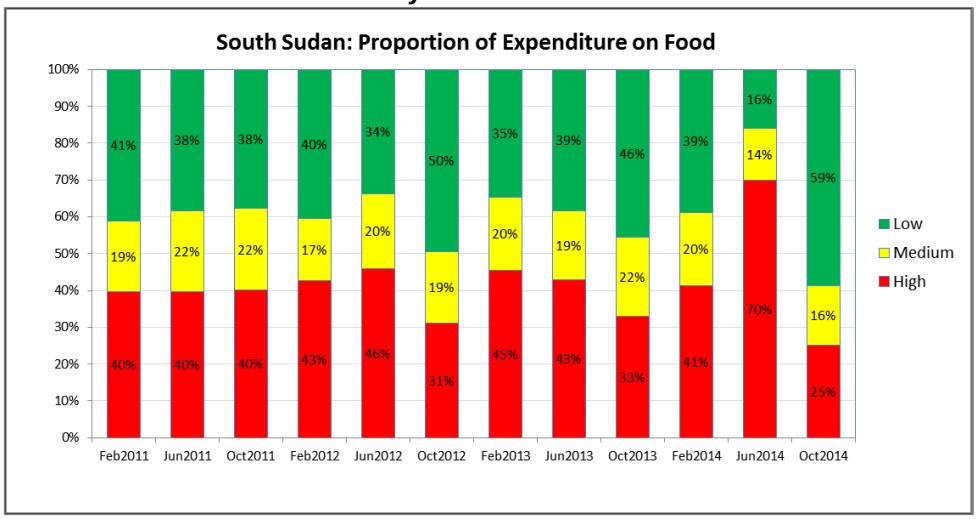
Households in South Sudan spend a large proportion of their incomes on food, given the high degree of market dependence for staples and the high food prices of the recent past. Households with high expenditure on food are more vulnerable to market price volatility as their purchasing power is limited to absorb large price shocks. They are, therefore, more likely to engage in coping activities with detrimental impacts on their nutritional status and food security.

Based on available FSMS data, households are classified in terms of their expenditure on food:

1. High food expenditure: More than 65 percent of expenditure allocated to food.
2. Medium food expenditure: Between 50 and 65 percent of expenditure allocated to food.
3. Low food expenditure: Less than 50 percent of expenditure allocated to food.

The proportion of households in each food expenditure class between February 2011 and October 2014 is shown in Figure 11. As expected, household food expenditures are the lowest around harvest time (October), which tends to be more pronounced when the harvest is good (2012 and 2013). As households significantly rely on markets and generally exhaust their stocks around the second quarter of the following year, usually the prevalence of high food expenditure peaks in June.

Figure 11: South Sudan - Proportion of households in food expenditure class February 2011-October 2014



The impact of the 2014 conflict on the supply of food and other commodities to local markets led to a sharp increase in overall food expenditure in mid-2014. The countrywide proportion of households with high food expenditure reached an all-time high of 70 percent versus the previous record of 46 percent in June 2012. Food assistance in the Greater Upper Nile and the favourable 2014 harvest elsewhere, decreased reliance on markets, which coupled with an improvement in market functionality, brought high food expenditures down to a record low of 25 percent.

The July 2014 peak in high food expenditure was generally across the country reflecting the effect of conflict on a much wider area than just the Greater Upper Nile region. However, there were still geographical variations depending on the location's closeness to entry points and trade routes – highest values (92 percent) were recorded in Northern Bahr-el-Ghazal state, the state furthest from the major commodity sources (Uganda, Ethiopia) and still under the effect of the closed border with the Sudan; conflict-affected Jonglei and Unity also registered very high values (82 and 78 percent, respectively). The lowest values conversely were seen in Western Equatoria state, a state with high crop production and neighbouring Uganda, a major source of imports.

5.6 Household coping strategies

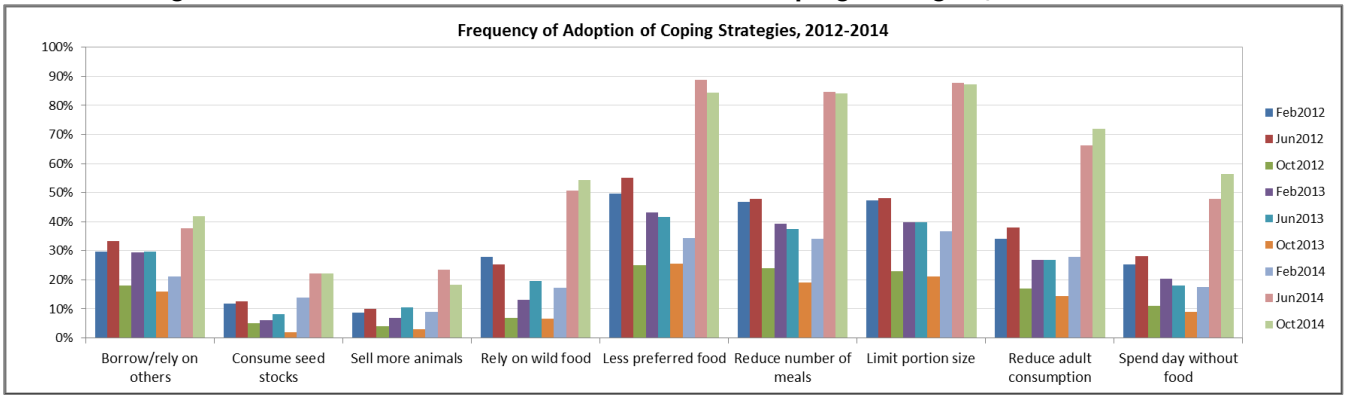
In South Sudan, the most widely and frequently adopted coping strategies involve changes in food intake (see Figure 12): eating less preferred foods, eating fewer meals, limiting portion size. The least favoured (and last resort) coping strategies are the sale or consumption of resources such as animals and seed stocks.

The degree of adoption of coping strategies is linked to seasonal availability and access to food by the households, leading to a very pronounced seasonal pattern in the intensity of coping, which increases from an October minimum to a peak in February/June, as household food stocks decrease and market prices increase.

Towards late 2013, the frequency of all coping strategies had reached record low levels within the past four years, mirroring the tendencies in food insecurity described previously. This decrease, though more marked at harvest time, was also verified through the whole season, including the lean period.

The conflict that developed throughout 2014 had its clearest effects on the degree of coping by households (Figure 12). At the national level, conflict did not lead to an immediate rise in adoption of coping strategies by households, as rates of adoption in February 2014 were mostly similar or lower than those of a year ago. However, by June 2014, they had reached high record levels, for all types of coping strategies and remained high during October, in spite of the favourable harvest and the improvements in market functionality, lower prices and lower levels of food expenditures and food insecurity.

Figure 12: South Sudan - Prevalence of different coping strategies, 2010-2013[1/]



1/ The 3 leftmost strategies imply reduction in household assets, while the 4 rightmost strategies imply decrease in food intake.

At state level, in conflict-affected Greater Upper Nile and neighbouring states of Lakes and Warrap, use of coping strategies rose immediately, reaching record levels by February 2014. Although all states reached record levels, coping strategies were less severe in the more productive states of Western and Central Equatoria, closer to the sources of commodity imports and benefitting from better road links. Highest levels were verified in the states of Northern Bahr-el-Ghazal and Warrap, which suffered indirect effects of the conflict on commodity supply.

5.7 Estimated food assistance requirements in 2015

In 2015, WFP aims to assist 3 million people in South Sudan (Table 13). This includes life-saving emergency assistance for 1.4 million people directly affected by the conflict, mainly in the states of Jonglei, Upper Nile and Unity as well as Protection of Civilians (PoCs) areas and other large IDP-hosting centres. Under the Protracted Relief and Recovery Operation, WFP plans to reach the remaining 1.6 million people with the following activities:

- Food and nutrition assistance for 230 000 refugees and the 140 000 Abyei displaced population.
- School meals and girls' take-home rations for 220 000 children.
- Food for assets for 465 000 people, of which 50 000 with cash/voucher transfers.
- Treatment of moderate acute malnutrition for 300 000 children and 80 000 pregnant women and new mothers.
- Programmes to help prevent malnutrition in 450 000 children.

Table 13: South Sudan - Estimated food assistance requirements in 2015

State	Max Beneficiaries	Tonnage
Central Equatoria	142 431	9 032
Eastern Equatoria	116 650	4 848
Jonglei	563 986	48 429
Lakes	240 959	15 799
Northern Bahr El Ghazal	259 306	8 764
Unity	662 550	71 575
Upper Nile	689 529	71 383
Warrap	256 288	24 493
Western Bahr El Ghazal	92 069	5 213
Western Equatoria	25 847	1 417
SOUTH SUDAN	**3 049 615**	**260 954**
Unique Beneficiaries	**2 470 539**	

Annex I

South Sudan - Indicative Seasonal Cropping Calendar

		Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Unimodal rainfall zone	Rainfall	Dry season		Wet season						Dry season			
	Main crop		Land preparation and planting		Growing season			Harvest					
	Long-cycle crops				Growing season					Harvest			
Bimodal rainfall zone	Rainfall	Dry season	Wet season								Dry season		
	First crop	Land preparation and planting		Growing season			Harvest						
	Second & third crops						Land preparation and planting		Growing season		Harvest		

Annex II

South Sudan - Harvest Missions Completed by Task Force Teams (August 2014 to January 2015)

Region	State	Counties visited		Number of case studies (farmers) and number of Key Informant (KI) interviews	Number of 30-minute transects and number of PET scored fields
Greater. Bahr el Ghazal	**Northern Bahr el Ghazal**	5/5	Aweil Centre, Aweil East, Aweil North, Aweil South, Aweil West	85 farmers and 7 KIs	28 transects and 6 150 PET scored fields
	Western Bahr el Ghazal	3/3	Raja, Wau, Jur River	95 farmers and 4 KIs	39 transects and 4 490 PET scored fields
	Warrap	3/6	Gogrial West, Twic, and Abyei (only accessible parts)	70 famers and 6 KIs	36 transects and 11 800 PET scored fields
	Lakes	7/8	Rumbek East, Rumbek Centre, Wulu, Cuibet, Yirol West, Yirol East, Awerial	28 farmers and 9 KIs	21 transects and 1 060 PET scored fields
Greater Equatoria	**Western Equatoria**	7/10	Mundri, W; Mundri East, Maridi, Ibba, Yambio, Nzara and Ezo	47 farmers and 9 KIs (1st harvest) 53 farmers and 5 KIs (2nd harvest)	47 transects and 17 870 PET scored fields (1st harvest) 65 transects and 8 690 PET scored fields (2nd harvest)
	Central Equatoria	6/6	Kajo Keji, Terekeka, Juba, Lainya, Yei, Morobo	38 farmers and 3 KIs (1st harvest) 65 farmers and 10 KIs (2nd harvest)	48 transects and 19 650 PET scored fields (1st harvest) 86 transects and 9 270 PET scored fields (2nd harvest)
	Eastern Equatoria	6/8	Torit, Magwi, Kapoeta East, Kapoeta South, Ikwoto, Budi	5 farmers and 1 KI (1st harvest, incomplete); 112 farmers and 10 KIs (main harvest)	10 transects and 1 260 PET scored fields (1st harvest, incomplete) 61 transects and 8 910 PET scored fields (main harvest)
Greater Upper Nile	**Jonglei**	4/11	Pibor, Pochalla, Nyirol, Akobo, Uror	51 farmers and 7 KIs	10 transects and 420 PET scored fields
	Unity	0/9	None	None	none
	Upper Nile	5/12	Renk, Melut, Malakal, Fashoda	21 farmers and 9 KIs	15 transects and 640 PET scored fields
SOUTH SUDAN	**All**	46/78		670 case studies (farmers) and 80 KIs	466 transects and 90 210 PET scored fields

Annex III

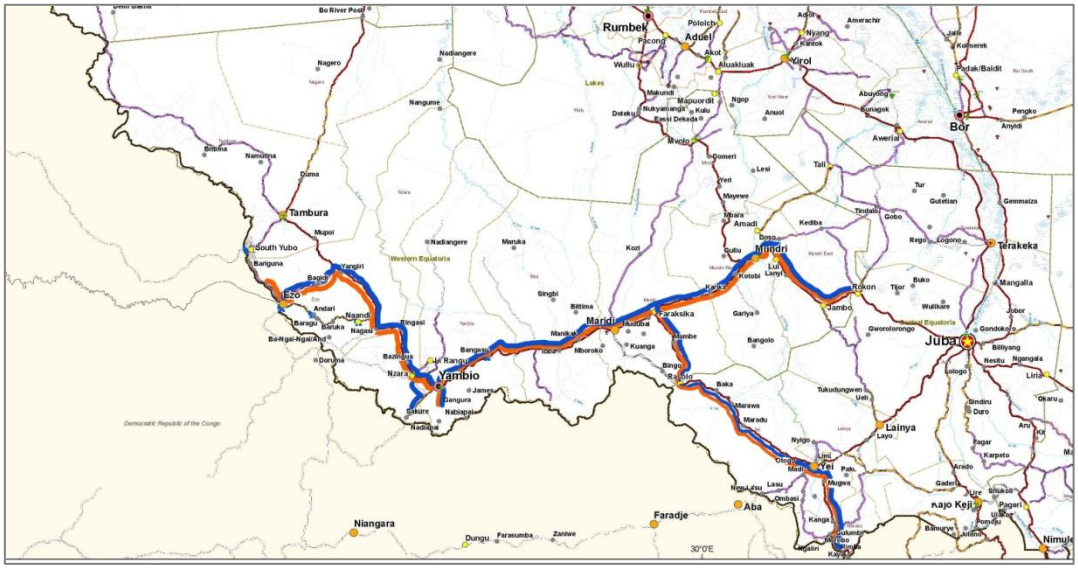
Situation by State

GREATER EQUATORIA

Western Equatoria State

Task Force teams undertook the following assessment missions in Western Equatoria State, a planting assessment plus a first and second harvest assessment mission in August and December, respectively. Combining all harvest time actions shows that 110 case studies, 14 key informant interviews and 112 x 30-minute transect sheets were completed in the state. The main transect routes taken in both missions are shown in Figure III-1.

Figure III-1: South Sudan - Transect Routes - Western Equatoria combined first and second harvests



Transects placed in parallel to roads taken by the planting assessment team

Growing conditions

The 2014 rainfall estimates and vegetation index graphs are shown in juxtaposition with long-term averages in Section 3.2.1 of this report. From Figure 1 it may be seen that rains in Western Equatoria State began early, were very encouraging in April and adequate, if a little lower than normal, until November. No extreme events have blighted either of the two seasons with the NDVIs showing average or above average vegetation development throughout the year until the end of December.

Maize is noted to be the main cereal grown in the first season and a close second to sorghum in the second season, with locally produced Longi 5, the preferred variety this year. Seeds used are mostly own seeds carried over from the previous harvest or purchased in the local markets. As noted by Task Force teams in March, Famers' Associations had hundreds of tonnes of seed for sale at planting time that could have met the emergency demands from other areas of the country[13]. Of the other crops, cassava is grown at levels similar to cereals in all the Greenbelt counties. A summary of area estimates of crops planted is given in Table III-1.

With less than 30 tractors estimated to be working in the state and a low uptake of animal traction, hand-digging is the normal method of cultivation. Labour hiring rates for digging and weeding are high and vary from SSP 250-700 per feddan depending on the nature of the work. Crop pest and disease levels were again mild this year with principal problems being local birds, monkeys and ants.

[13] Not certified seeds; but seeds regularly used throughout the maize belt.

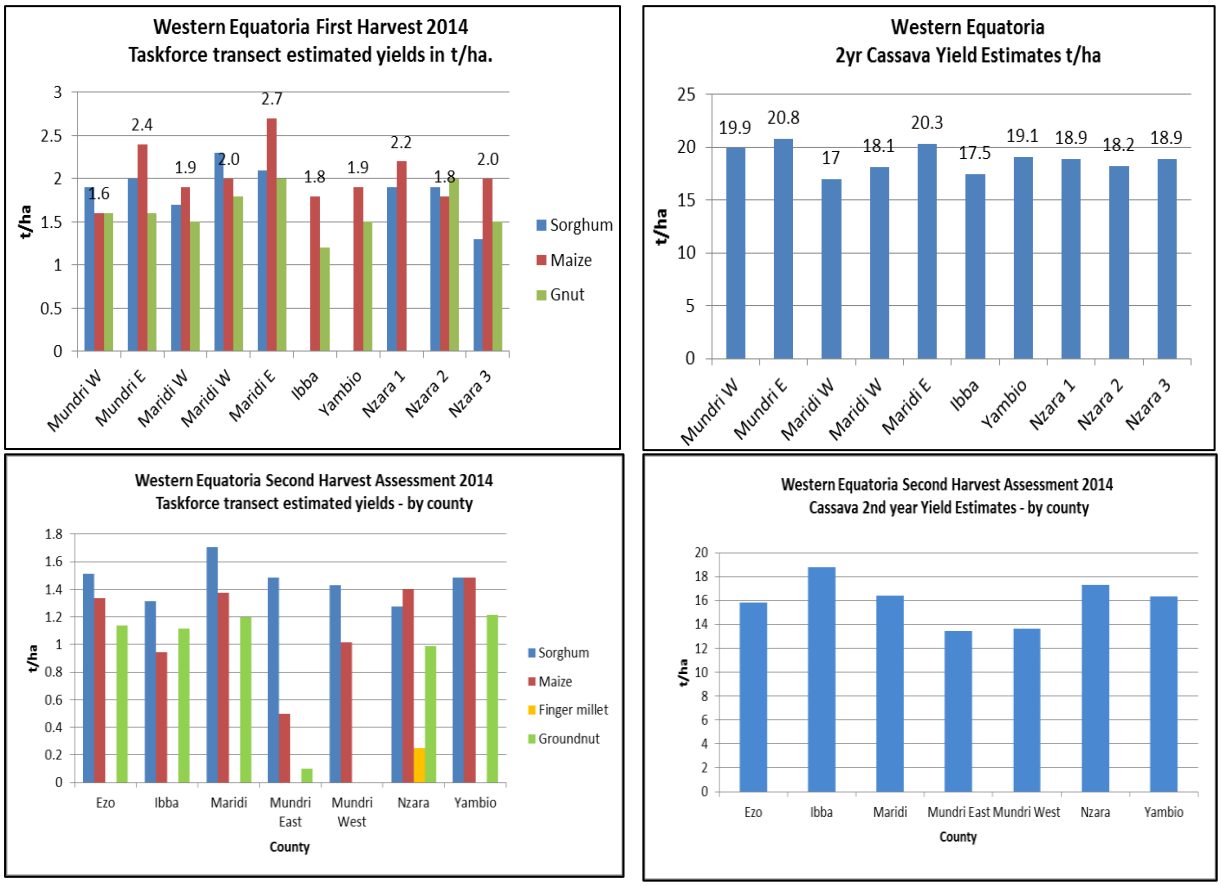
Table III-1: South Sudan - Estimated crop proportions from Transects in Western Equatoria

Crop	First harvest (%)	Second harvest (%)	Combined first and second (%)
Maize	51	22	37
Sorghum	5	25	15
Cassava	37	40	38 (but 19% likely to be harvested)
Groundnuts	5	9	7
Others	2	4	3
Total	**100**	**100**	**100**

Production

Production estimates have been made on the basis of 26 830 transect PET scores with frequent cross–check crop cuts during case studies. The returns from the transects, averaged by county for the main field crops, are summarized in Figure III-2.

Figure III-2: South Sudan - Production estimates by county of crops and second year cassava from transects for first and second harvests



All crops performed reasonably well with cereals showing an average yield of 1.47 tonne/ha across all cereals and both harvests, 11 percent greater than last year's yield estimates due to a better understanding of the first harvest maize yields. Areas are similar to last year as access was not seen to have been impeded. Consequently, gross cereal production is estimated at 245 957 tonnes.

The contribution of cassava to the households' food economy at state level is clearly significant at an estimated 158 000 tonnes of cereal equivalent at 42 percent dry matter and a gross processing efficiency of 70 percent, if all 2nd year crops are harvested. Groundnuts may also add an estimated 20 000 tonnes of gross dry matter (unshelled).

Only counties in the northeast of the state may be considered as livestock areas due to tse-tse infestation in the forested zones that dominate the remaining counties. Livestock numbers are low and only slight increases in transhumance were reported to the Task Force teams in April. The body condition scores (PET) throughout the counties was noted to range from 3-4 for all species in January 2015 suggesting sufficient

water and browse/pasture. Although all endemic diseases were reported, no significant outbreaks of animal diseases are noted. With the good late rains, pasture and water availability for the coming dry season are considered to be satisfactory, and firm livestock prices noted reflect this.

Central Equatoria State

The Task Force teams undertook a planting assessment mission in March and two harvest assessment missions in August and December to cover the production from both first and second harvests in Central Equatoria. Combining actions from the two harvest assessments show that 103 case studies, 13 key informant interviews and 134 x 30-minute transect sheets were completed in the state. The main transect routes taken in both missions are shown in Figure III-3.

Figure III-3: South Sudan - Transect Routes - Central Equatoria first and second harvests

Transects placed in parallel to roads taken by the planting assessment team

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with long-term averages in Section 3.2.1 of the report. From Figure 1 it may be seen that the rains in Central Equatoria State began early, were substantial and encouraging in March, lower-than-average in the first two dekads in April, above-average in May and June and exhibited some fluctuations, below-average in single dekads in July, August and September. The NDVIs show that rains have generated average vegetation development throughout the two seasons until the end of December.

Maize is noted to have been the preferred cereal in the first harvest with *Longi* varieties (5 and 4) being the most commonly used throughout the state. Seed sources are noted to be mostly local/own seeds carried over from the previous harvest. *Longi* varieties are also being provided by seed companies and NGOs promoting commercial agriculture. Significant areas of second plantings of maize using seeds from the first harvest are noted in the Task Force second harvest returns, however, these December mission transects clearly show that sorghum areas were greater than maize this year. A summary of area estimates of crops planted is given in Table III-2.

Table III-2: South Sudan - Estimated crop proportions from Transects in Central Equatoria

Crop	First harvest (%)	Second harvest (%)	Combined first and second (%)
Maize	59	16	38
Sorghum	5	37	21
Cassava	28	38	33 (16% harvested)
Groundnuts	7	5	6
Others	1	4	2
Total	**100**	**100**	**100**

Central Equatoria State boasts more tractors than any other state except Upper Nile State, nevertheless there are still only 30-40 functioning. These units are concentrated mostly in counties nearer to the border. Tractor ploughing hiring rates at SSP 250-350 for one pass per feddan and SSP 240 for harrowing are similar to last year. Such charges are easily reconciled this year with mission-assessed yields in case studies frequently noted at 3-4 tonnes per hectare for maize, although the averages used in calculating production follow the transects and are much lower. Seed rates for planted crops are again as expected on commercial farms with maize at 24 kg/ha. However, local sorghum is noted to be remarkably over sown in the second season, with little attempts at thinning noticed. No significant need to replant was reported in either season.

The mission case studies and key informant interviews note that despite the IFDC trials, fertilizer use has not increased and with prices 4-5 times international retail rates and no difference noted between DAP and urea prices, this is hardly surprising.

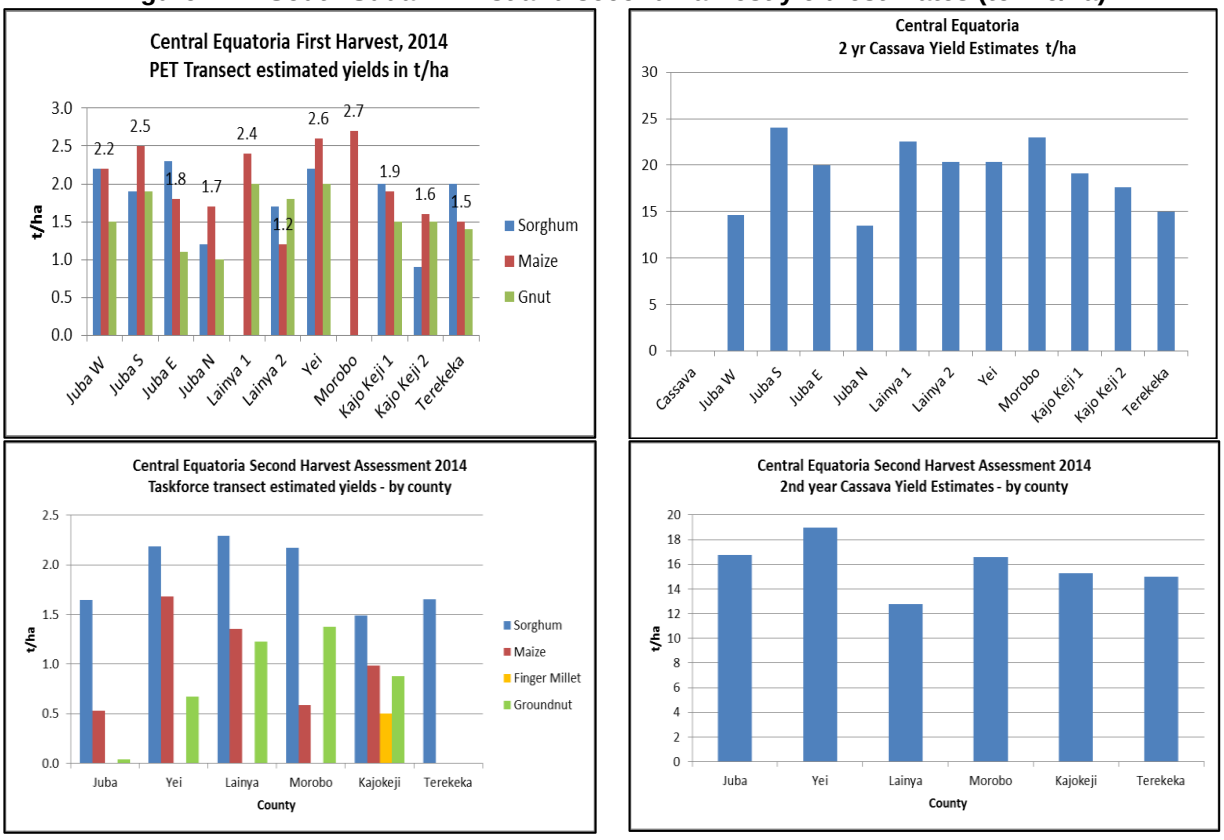
Weeds, pests and diseases have remained at mild levels this year. The most troublesome pests noted are grass weeds, stalk-borers in maize in the second season, local birds, termites, grasshoppers and rodents. Striga is noted to be of concern to farmers in the over-used areas in Terekeka.

The increase in the amount of horticultural and cash crop production (sweet potato, groundnut, sesame) noted by last year's mission, is confirmed by observations this year, especially amongst farms closer to Juba.

Production

Production estimates have been made on the basis of 28 920 transect-based PET scores and cross checking of crop cuts during the case studies. The returns from the transects, averaged by county for the main field crops, are summarized in Figure III-4.

Figure III-4: South Sudan - First and second harvest yield estimates (tonne/ha)



With a 24 percent increased estimate of the area harvested, incorporating both expansion and realistic estimates of double cropping and the better yield estimates for the first harvest, gross production is some 48 percent greater than last year's estimates at 278 586 tonnes.

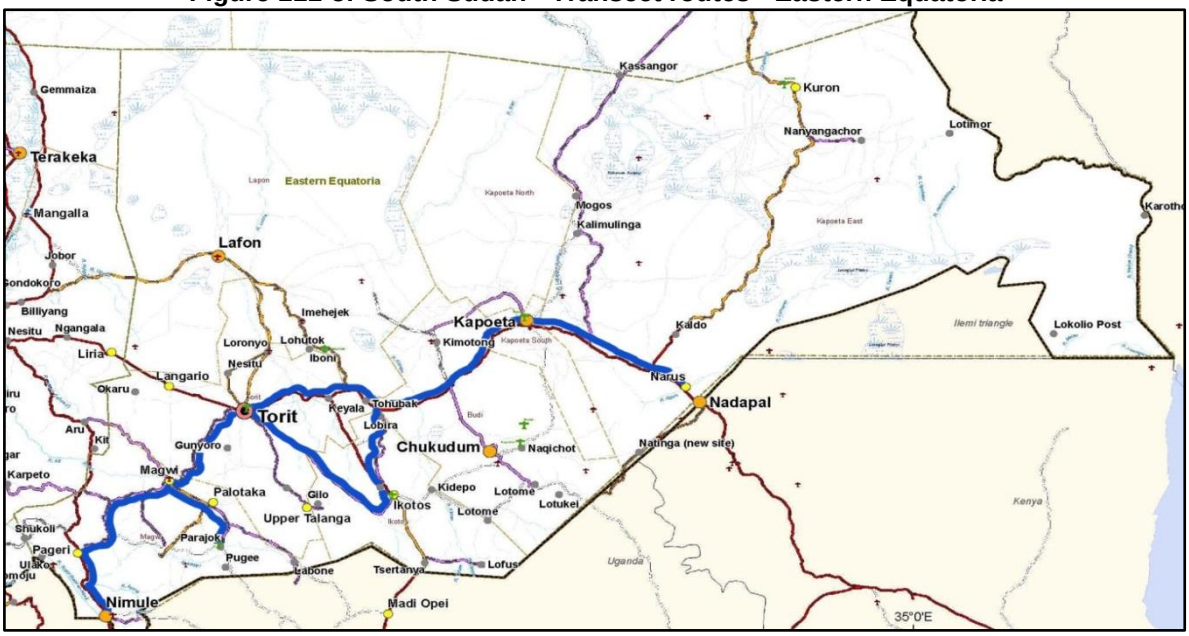
The contribution of cassava is clearly significant, estimated at 90 000 tonnes of cereal equivalent assuming 42 percent dry matter and 30 percent losses in processing. Groundnuts will also add an estimated 12 000 tonnes (gross dry matter unshelled) of saleable product to the household food economy of the state.

Livestock condition and pasture/browse and water supply are noted to be good, with no reported significant outbreaks of livestock disease.

Eastern Equatoria State

The Task Force teams undertook the following assessment missions in Eastern Equatoria State, a planting assessment and first harvest assessment mission (Magwi and Torit counties only) in August and a main harvest assessment in December. Combining all harvest time actions show that 117 case studies, 11 key informant interviews and 71 x 30-minute transect sheets were completed in the State. The main transect routes taken in both missions are shown in Figure III-5.

Figure 111-5: South Sudan - Transect routes - Eastern Equatoria



Transects placed in parallel to roads taken by the planting assessment team

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with long-term averages in Section 3.2.1 of this report.

From Figure 1 it may be seen that the rains in Eastern Equatoria State began early, were encouraging until late April when a two-dekad drier-than-normal spell caused some replanting/gap filling. Fluctuating rains in June and July were not enough to create any reported extreme event but may have been challenging to some growing crops depending on soil types. Thereafter, rainfall has been plentiful, well-distributed and has sustained vegetation and crop development at above average levels until the end of December.

Sorghum is noted to be the main cereal, with *Lonyang* and *Lodoka* being the preferred landraces. Seeds used are mostly local/own seeds carried over from the previous harvest or purchased in the market. Maize growing is more prominent in Magwi and parts of Torit. Of the other crops, cassava is grown in the higher rainfall zones to the south and west of the State and pearl millet is most significant in Ikotos and drier areas to the east. A summary of area estimates of crops planted is given in Table III-3.

Table 111-3: South Sudan – Estimated crop proportions from Transects in Eastern Equatoria

Crop	Combined first and second (%)
Sorghum	61
Maize	10
Cassava	21 (10% may be harvested)
Groundnuts	2
Others	6
Total	**100**

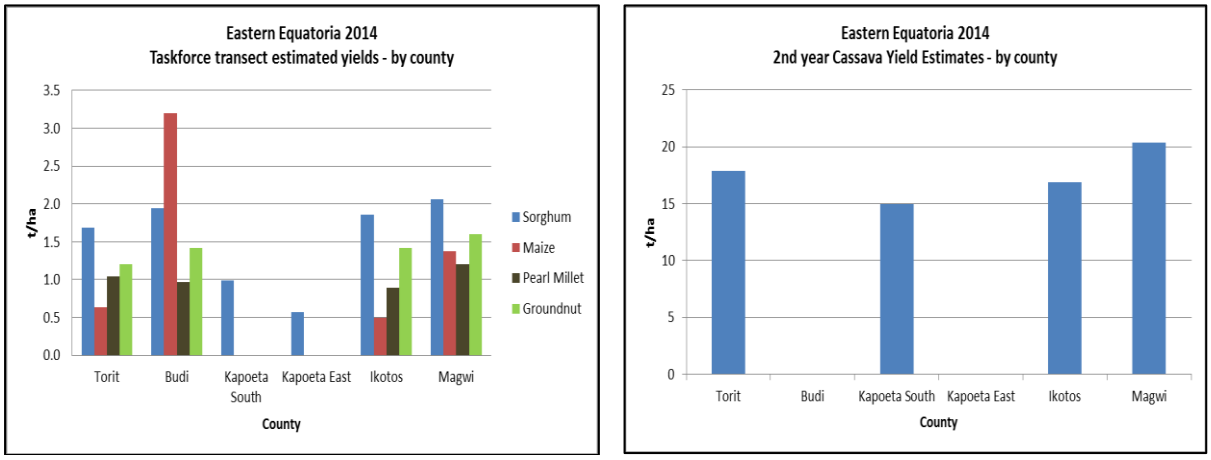
With no more than three tractors noted to be functioning in the state and no widespread use of animal traction, hand-digging is the normal method of cultivation. Labour hiring rates for digging and weeding are

similar to 2013 at SSP 210-215 per feddan. Crop pest and disease levels were again mild this year with principal problems being local birds, monkeys and ants.

Production

Production estimates have been made on the basis of 10 120 transect PET scores and cross checking crop cuts during case studies. The returns from the transects, averaged by county for the main field crops, are summarized in Figure III-6.

Figure III-6: South Sudan - Production estimates by county of crops and second year cassava from transects for main harvest



All crops performed reasonably well with cereals showing an average yield of 1.18 tonne/ha, 10 percent greater than last year's estimates from an 8.8 percent increase in area, as access was not seen to have been impeded. Consequently, gross cereal production is estimated at 177 682 tonnes.

The contribution of cassava to households food economy at state level is significant at an estimated 50 000 tonnes of cereal equivalent, at 42 percent dry matter and a gross processing efficiency of 70 percent, if all second year crops are harvested. Groundnuts may also add a further, conservatively estimated 3 000 tonnes of gross dry matter (unshelled).

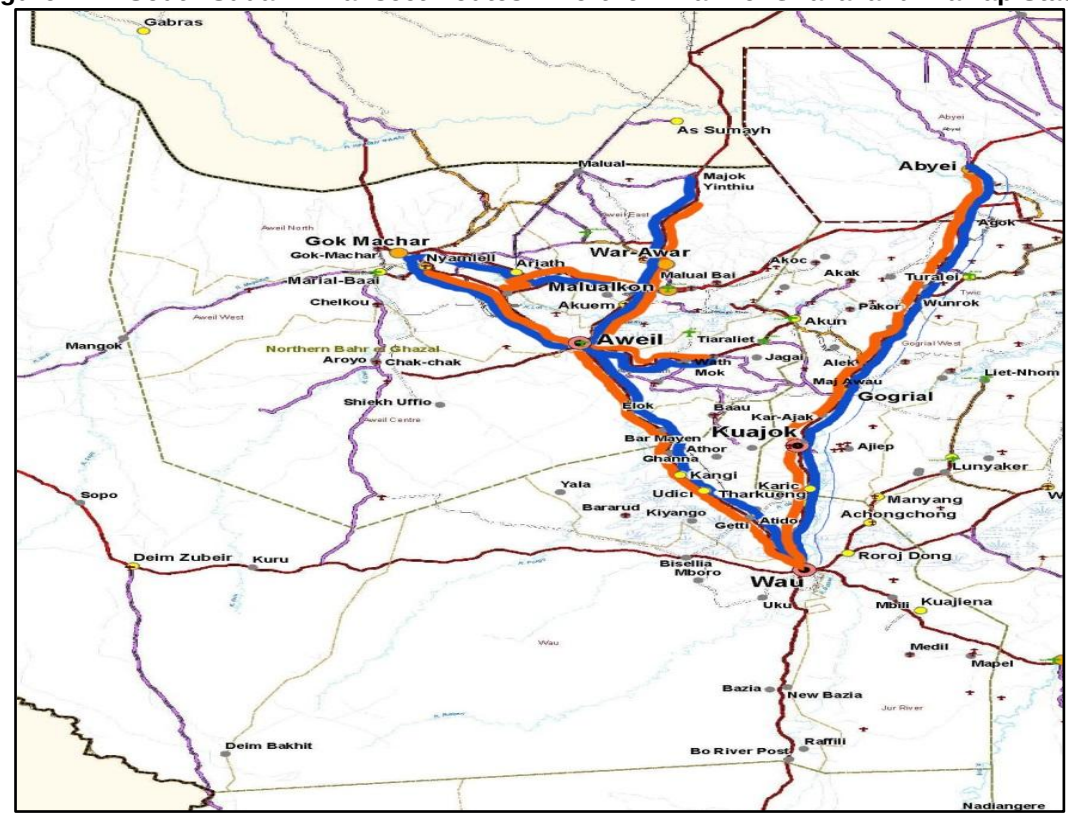
Livestock condition is good with PET scores "3" most commonly noted for all species. Numbers are expected to have risen due to favourable conditions, although farmers in Kapoeta East County reported widespread raiding amounting to tens of thousands of heads. Although all endemic diseases were reported to the Task Force-led teams, no significant outbreaks of animal diseases are noted. With the good late rains, pasture and water availability for the coming dry season are considered to be satisfactory and firm livestock prices noted reflect this.

GREATER BAHR EL GHAZAL

Northern Bahr el Ghazal State

The Task Force teams undertook a planting assessment mission in May-June and a harvest assessment mission in September to cover the production of the main harvest in the State. The harvest time action comprised 85 case studies, 7 key informant interviews and 28 x 30-minute transects in all five counties in Northern Bahr el Ghazal State. The main transect routes are shown in Figure III-7 alongwith the main routes followed in Warrap State.

Figure III-7: South Sudan - Transect Routes – Northern Bahr el Ghazal and Warrap States



Transect placed in parallel to roads taken by the planting assessment team

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with the long-term averages in Section 3.2.1 of the report. From Figure 2 it may be seen that the rains in Northern Bahr el Ghazal State began in April, were lower than average in the third dekad in May, but were evenly-distributed at expected levels until the last dekad in August. The NDVIs show that the rains have supported the above-average vegetation development until August and at just below-average levels, concomitant with reduced water-logging and flooding as noted in transect and case studies, until the end of December.

Sorghum is by far the preferred cereal throughout the State. Seed sources are noted to be mostly local/own seeds carried over from the previous harvest for early to main-crop sorghum known collectively as *cham, alep cham* and *nyanchung* or *athel.* Only seeds from NGOs accessing local sorghum sources were available for timely planting this year. Local groundnuts and sesame seeds were planted at the same time as the early sorghums plus small areas of local maize. Late-arriving groundnut seeds were planted on arrival, but it is doubtful if any other exotics were planted. A summary of area estimates of crops planted is given in Table III-4.

Table III.4: South Sudan - Estimated crop area proportions from 28 Transects in Northern Bahr el Ghazal

Crop	Main harvest (%)
Sorghum	82
Pearl millet	7
Maize[1/]	<1
Groundnuts	10
Sesame	<1
Total	**100**

1/ The preferred seeds for emergency planting are groundnuts, local sorghum landraces and improved varieties of sorghum from the Sudan.

Twenty tractors are noted to be working in the State but performance is reduced by the poor supply chains for fuel and spare parts. The conditions are epitomized by tractors in Aweil Rice Scheme. In 2012/13, at hand-over from GIZ, seven tractors were working; at the Task Force planting assessment visit in May 2014 only four units were working. Similarly, in the State MoA mechanized sorghum project in Tonchol, Aweil East

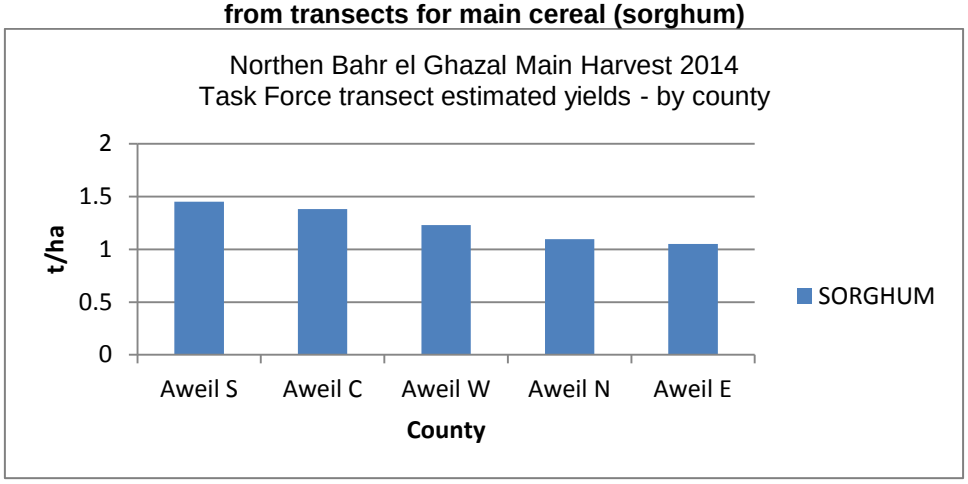
only 500 feddans out of a possible 5 000 feddans have been cultivated. Six new tractors provided this year by the Agricultural Bank were distributed to groups in the counties but without equipment or spare parts, suggesting that nothing appears to have been learnt from the experience gained in the past 13 years with regard to equipment supply. Tractor ploughing hiring rates at SSP 350-500+ for one pass/feddan are greater than last year, fuel is more expensive arriving from the north in 20 litre jerry-cans, carried in sets of 4 or 6 on motor bikes. Oxen ploughing are expanding but more slowly than in Lakes or Warrap States, therefore, hand labour still prevails in all counties with family and *nafeer* systems, the most usual sources of man-power. In an interesting development, donkey ploughing on sandier soils is expanding with farmers hiring donkeys for SSP 20 for 30-minute stints mostly for groundnut planting in Aweil East. No significant need to replant was reported this year in any county. Grazing over farmland by local and transhumant herds is practiced throughout the state and, other than shifting location which is easier in Aweil West and South than in Aweil East and North, is the most common way of maintaining soil fertility.

Pests and diseases have remained at mild levels this year. Most troublesome pests noted are grass weeds, local birds, termites, grasshoppers, stalk-borers in sorghum and rodents. Striga is noted to be of concern to small household units in the over-used areas with no livestock and no means of shifting.

Production

Production estimates for sorghum only have been made by Task Force-led teams on the basis of 6 150 transect-based PET scores and cross checking crop cuts during the 85 case studies. The returns from the transects, averaged by county, are summarized in Figure III-8.

Figure III-8: South Sudan - Production estimates by county from transects for main cereal (sorghum)



Gross cereal production in Northern Bahr el Ghazal State is estimated at 140 382 tonnes showing an increase of 32 percent due to a wider area planted, very few areas lost to floods this year and better estimated yields.

The ecology of Northern Bahr el Ghazal State does not support the widespread growth of cassava, which may be found in isolated pilot trials in Aweil West. Groundnuts, however, make a substantial contribution to households' food economies and may augment the harvest by an estimated 6 154 tonnes of unshelled product. In addition, as in Warrap State, there are unknown numbers of *commercial groundnut farms* cultivated under *nafeer* and tractor-hire schemes that are not accounted for in this estimate, therefore, the contribution of groundnuts to State production is probably much higher. It behoves local staff of FAO and State MoA to try to assess the numbers and scope of such farms over the coming year.

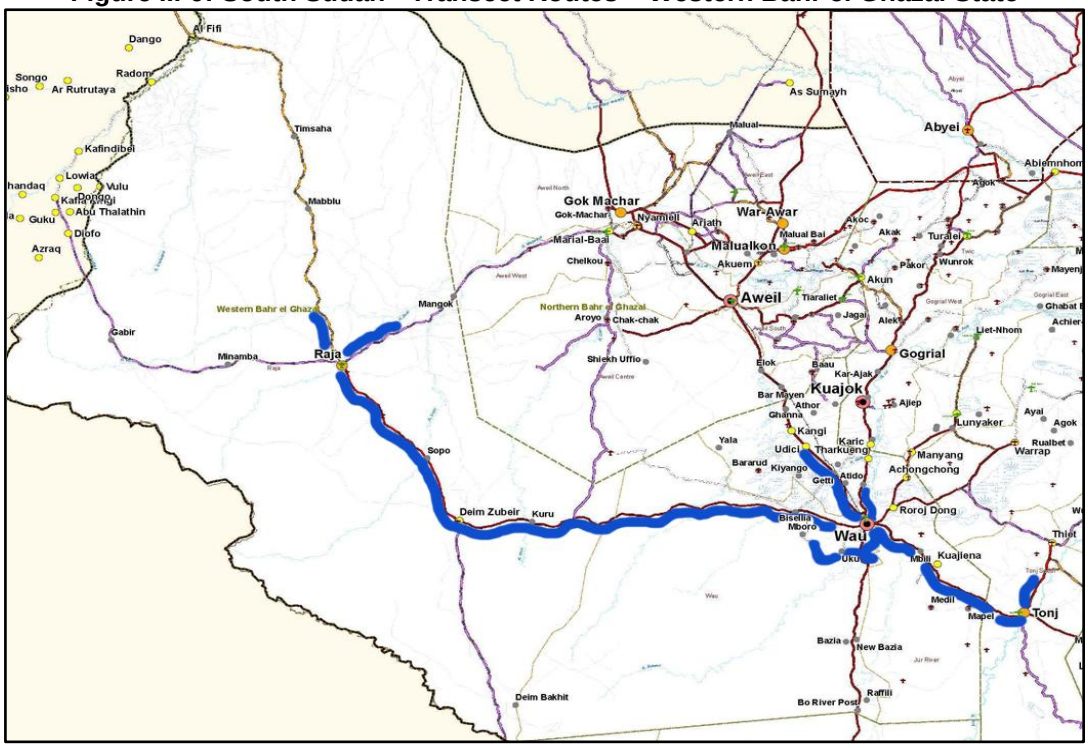
Cattle population in Northern Bahr el Ghazal State is estimated at about 1.59 million in 2014. Cattle condition is generally good with PET Body Condition scores 3-4 noted by the Task Force in all counties. Similar scores are noted for sheep and goats and no outbreaks of disease are noted. Due to well-distributed good rains, pasture and water are abundant.

Western Bahr el Ghazal State

The Task Force teams undertook a planting assessment mission in May–June and two harvest assessment missions, one in October, for the main harvest and one in January, to cover the production of the late-

maturing (*kec)* sorghum harvest in the state. The joint harvest time actions comprised 85 case studies, 7 key informant interviews and 39 x 30-minute transects along the main transect routes shown in Figure III-9.

Figure III-9: South Sudan - Transect Routes – Western Bahr el Ghazal State



Transects placed in parallel to roads taken by the planting assessment team

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with long-term averages in Section 3.2.1 of the report. From Figure 2, it may be seen that the rains in Western Bahr el Ghazal State began early in March and were sustained throughout April; were lower-than-average in the second and third dekads in May, but were well-distributed at-or-above expected levels until November. The NDVIs show that the rains have supported an above-average vegetation development until July, followed by average levels of development until the end of December.

Sorghum is by far the preferred cereal throughout the state. Seed sources are noted to be only local/own seeds carried over from the previous harvest with a preference for the long-maturing landrace (*kec)* this year, which prompted a return of the Task Force mission in January 2015.

Only seeds from NGOs accessing local sorghum sources were available for timely planting this year. Local groundnuts and sesame seeds were planted at the same time as *kec*; the early sorghums *(bende)* and main-crop sorghum *(mabior)* plus small areas of local maize. Late-arriving groundnut seeds were planted on arrival, and it is possible that other exotics were planted as the rains were well-distributed and lasted until December. A summary of area estimates of crops planted is given in Table III-5.

Table III-5: South Sudan - Estimated crop proportions from 39 Transects in Western Bahr el Ghazal

Crop	Main harvest (%)
Sorghum	46
Cassava	27 (13% may be harvested)
Groundnuts	10
Maize	6
Sesame	11
Total	**100**

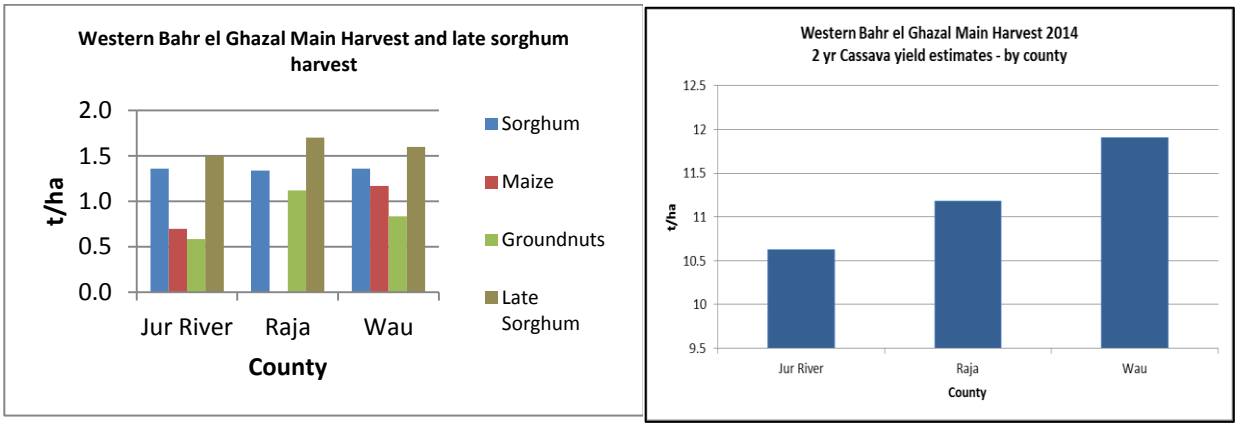
Only three tractors are noted to have been functioning in the state at planting time. The six newly-presented tractors from the Agricultural Bank arrived without equipment or spare parts and had not been allocated in June. Except for a few pairs of oxen used in Jur River County and the use of donkeys in parts of Raja, where

refugees from Darfur are farming, animal traction is not practised; therefore, hand digging by families, by *nafeer*[14]and by labour gangs digging at piece rates of SSP 300-350 per feddan, is the normal practice. This year, weather supported good timing, unrestricted access and no significant outbreaks of pests and diseases means that areas are expanding and yields are higher than last year.

Production

Production estimates have been made for sorghum only on the basis of 6 150 transect-based PET scores and cross checking crop cuts during the 85 case studies. The returns from the transects, averaged by county for the main field crops, are summarized in Figure III-10.

Figure III-10: South Sudan - Production estimates by state of crops and second year cassava from transects for main harvest



Cereal production (mostly sorghum – all types) is estimated at 96 243 tonnes. Cassava grows in Kpale, Wau County and Raja. The two-year system of production is most common. Production this year is noted to be normal but conservatively estimated at 11 tonnes per hectare following the Task Force-led team returns. Groundnut production is satisfactory this year, especially on lighter soils, no significant disease problems were reported. The contribution of cassava to food security in the State is estimated at 28 783 tonnes of cereal equivalent (gross dry matter). Groundnuts at household level will possibly add to an estimated 4 000 tonnes of unshelled product.

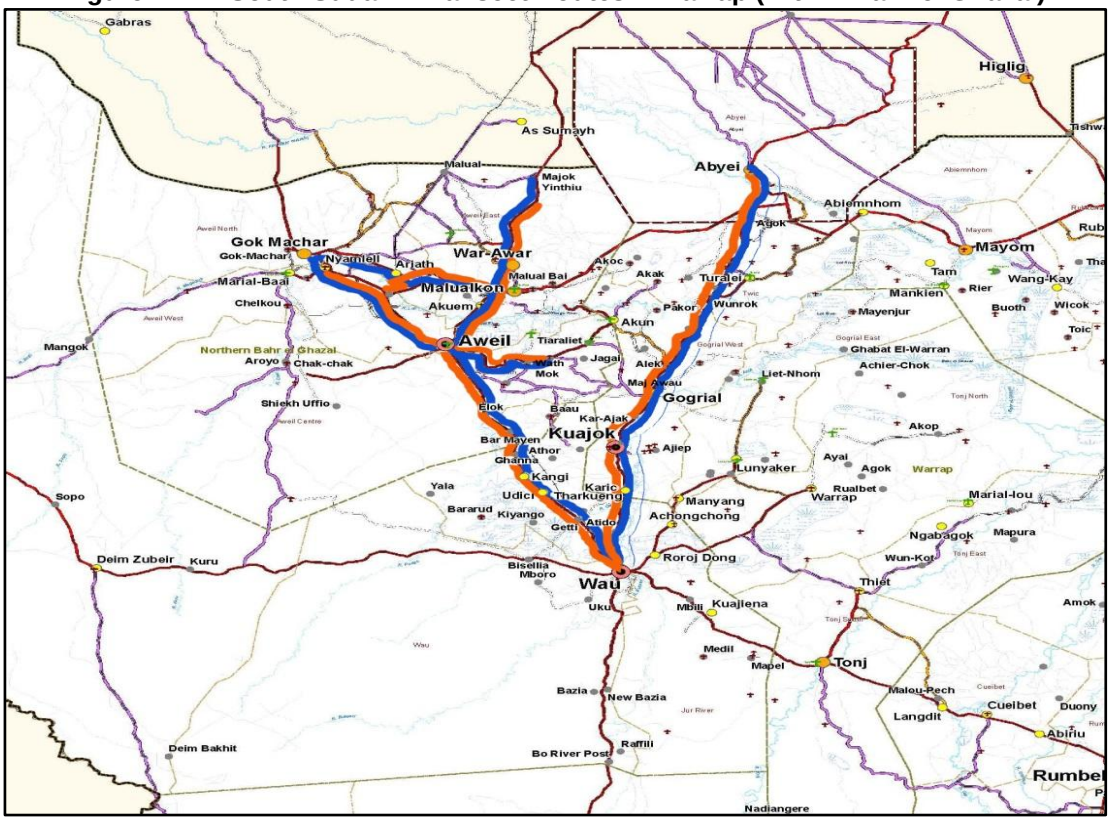
The indigenous households of Western Bahr el Ghazal State are not cattle owners. The condition of cattle and goats noted is very good with the dominant PET Body Condition Score 4 for both species and no significant pest and disease outbreaks recorded. In all areas, pasture and water availability are generally adequate.

Warrap State (including Abyei administrative area)

The Task Force teams undertook a planting assessment mission in May–June and a harvest assessment mission in September-October to cover the production of the main harvest in the state. A late mission to Tonj South was mounted in January 2015 to capture the late sorghum harvest (*kec).* The harvest time actions comprised 70 case studies, 7 key informant interviews and 36 x 30-minute transects along the main transect routes shown in Figure III-11.

[14] Beer and food groups.

Figure III-11: South Sudan - Transect Routes – Warrap (with N.Bahr el Ghazal)



Transect placed in parallel to roads taken by the planting assessment team

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with long-term averages in Section 3.2.1 of the report. From Figure 2 it may be seen that the rains in Warrap State began early in March, were encouraging and promoted planting in April until the last dekad of May. From June to the last dekad in August rainfall fluctuated around the norm, but were essentially well-distributed until the end of August when a dry spell prevented water logging/flooding. The rains then continued until November supporting the development of late–maturing sorghums and late-planted groundnuts distributed in June/July by NGOs. The NDVIs show that the rains have supported an above-average vegetation development throughout the year until the end of December.

Sorghum is by far the preferred cereal throughout the state. Seed sources are noted to be only local/own seeds carried over from the previous harvest with a preference for the short landraces (*yaar, athel and nyanjung*) that were scored in October and with late-maturing sorghum *(kec)* sown in Tonj South the yields of which were captured by a Task Force team in January 2015. Only seeds from NGOs accessing local sorghum sources were available for timely planting in 2014. Local groundnuts and sesame seeds were planted at the same time as sorghum plus small areas of local maize. Late-arriving groundnut seeds were planted on arrival, but it is unlikely that any exotic sorghum and maize seeds, provided late by NGOs, were planted at all. A summary of area estimates of crops planted is given in Table III-6.

Table III-6: South Sudan - Estimated crop proportions from 36 Transects in Warrap State and Abyei

Crop	Main harvest (%)
Sorghum	95
Pearl Millet	<1
Maize	<1
Groundnuts	3
Total	**100**

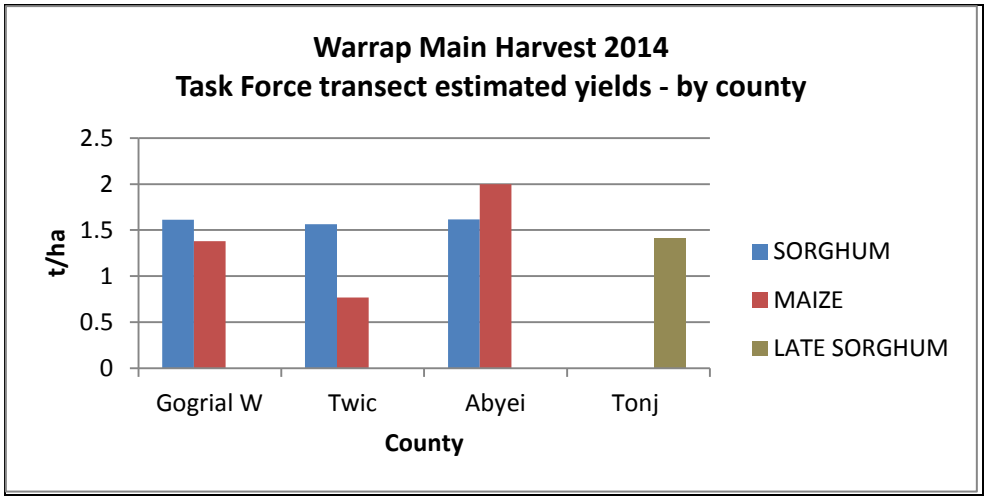
Some 30 tractors are estimated to be functioning in the state and Abyei. The six newly-presented tractors from the Agricultural Bank, which arrived without equipment or spare parts, were allocated to individual farmers. The use of oxen appears to be spreading north through the State and is noted in Tonj South and

Gogrial West, but for the moment hand-digging by families, by *nafeer*[15] and by labour gangs digging at piece rates of SSP 250-500 per feddan depending on location, is the normal practice. This year, the weather supported good timing, and in locations with unrestricted access in the three counties and Abyei that were visited by the Task Force, areas harvested are expanding. With no significant outbreaks of pests and diseases, yields are higher than last year. However, counties next to the conflict zones were not visited, consequently, areas harvested in such zones have not increased above last year's levels despite the better conditions, but yields have been adjusted upwards to more realistic levels than before.[16]

Production

Production estimates have been made for sorghum only on the basis of 11 800 transect-based PET scores and cross checking of crop cuts taken during the 70 case studies. The returns from the transects, averaged by county for the main field crops, are summarized in Figure III-12.

Figure III-12: South Sudan - Production estimates by county of crops from transects for main harvest



Gross cereal production in Warrap State (with Abyei) this year is estimated at 153 686 tonnes, 61 percent greater than year's estimates that were provided post-harvest with no planting assessments with which to work[17]. Warrap State agro-ecology does not support the widespread growth of cassava, which is found only around the edges of fields and pathways. Groundnuts, however, make a much more substantial contribution and may add an estimated 8 700 tonnes of unshelled product to the household food economies. There are also unknown numbers of commercial groundnut farms that are not being captured by the system, so their contribution to the State production is probably much higher. It behoves local staff of FAO and SMoA to try to assess the numbers and scope of such farms over the coming year.

Livestock condition is good, noting body condition scores of 3-4 for all classes of stock. Pasture and water availability are noted to be seasonally more than adequate. No outbreaks of pests and disease were noted in the counties visited.

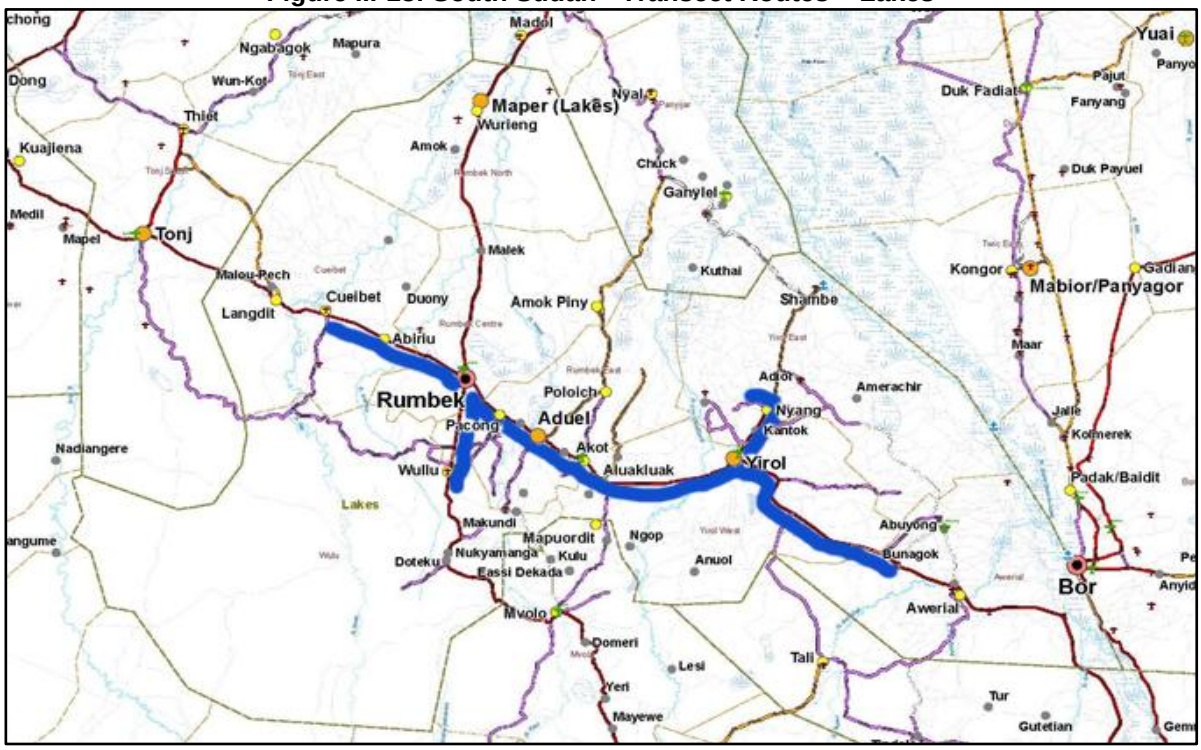
Lakes State

The Task Force teams undertook a planting assessment mission in May–June and a harvest assessment mission in October to cover the production of the main harvest in the state. Unfortunately, a breakdown in law and order in most counties in October prevented Task Force-led teams from working. The teams returned in January 2015 and again attempted to conduct an assessment of the late-maturing sorghums. Again, they were thwarted in their progress, this time by community–based vigilantes settling recent scores and older blood feuds. Consequently, the harvest time action comprised only 28 case studies, 9 key informant interviews and 21 x 30-minute transects along the main transect routes shown in Figure III-13. The planting time assessments were conducted properly in 7/8 counties, only Awerial was missed. They were

[15] Beer and food groups
[16] Extrapolation from other Warrap counties scores, also underestimated by previous missions.
[17] This year's Task Force estimates are based transects through growing crops and case studies, not forensic field observations and interviews with households expecting food assistance.

sufficient to indicate that cultivation of all crops was increasing as farm sizes are expanding and reaching stages where *far fields* are now part of the main holdings.

Figure III-13: South Sudan - Transect Routes – Lakes



Transects placed in parallel to roads taken by the planting assessment team

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with long-term averages in Section 3.2.1 of the report. From Figure 2 it may be seen that the rains in Lakes State began early in March, were encouraging and promoted planting in April until the last dekad of May. From June to the last dekad in August rainfall was below the norm, which was to the advantage of farmers in most locations, reducing rain-based, water-logging and flooding threats. As the rains have continued until December, the late-maturing sorghums and second or late groundnut plantings benefitted greatly. The NDVIs show that the rains have supported an above-average vegetation development throughout the year until the end of December.

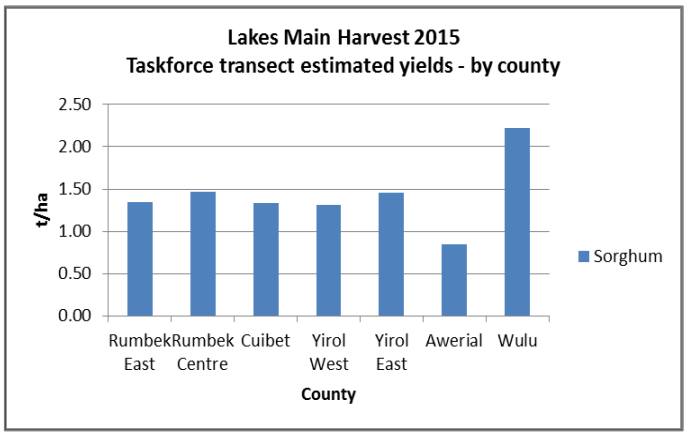
Sorghum is the preferred cereal throughout the State. Seed sources are noted to be only local/own seeds carried over from the previous harvest with a preference for the main crop landraces (*nyangjung, mabior)* and late–maturing landraces (*kec*).

Only eight tractors are reported to be functioning in the state, however, unlike any other state in the country, animal traction in the form of oxen ploughing has really become established. In all counties in Lakes, animal traction is the main means of cultivation and in half of the counties, 100 percent of the farmers are reported to be using their own teams or are hiring pairs of oxen to plough. Ploughs and spare parts are appearing in local markets but this embryonic trade is fragile and may easily be shattered by ill-thought-out interventions by NGOs. With the increase in animal traction, farm area is increasing and the planting assessments identified that, in most places, the significant expansion was being sown with groundnuts, planted for sale. Unfortunately, the insecurity at the time of the harvest mission in October did not allow the Task Force to verify this conclusion or to obtain many other husbandry details of the season. When the Task Force teams eventually undertook harvest transects in January 2015, it was too late and still too risky to determine cropped areas in any detail or to stay too long in most locations for case studies to be properly conducted that would have shed more light on groundnut planting, harvesting and sale.

Production

Production estimates have been made for sorghum only on the basis of 1 600 transect-based PET scores and 28 case studies without cross checking cut and weigh verifications. The returns from the transects, averaged by county for the main field crops, are summarized in Figure III-14.

Figure III-14: South Sudan - Production estimates by county of sorghum from late harvest transects



Gross cereal production is estimated at 114 892 tonnes reflecting a 22 percent increase from more realistic better yield estimates. Groundnut production is expected to have been greater than the estimated 22 050 tonnes of unshelled product arising from two crops over the year. The ecology of Lakes State does support the growth of cassava as well as groundnuts but cattle keeping is preventing its expansion in all counties, therefore, cassava is estimated to only make a minor contribution of 7 200 tonnes of fresh tubers or 2 116 tonnes of cereal equivalents.

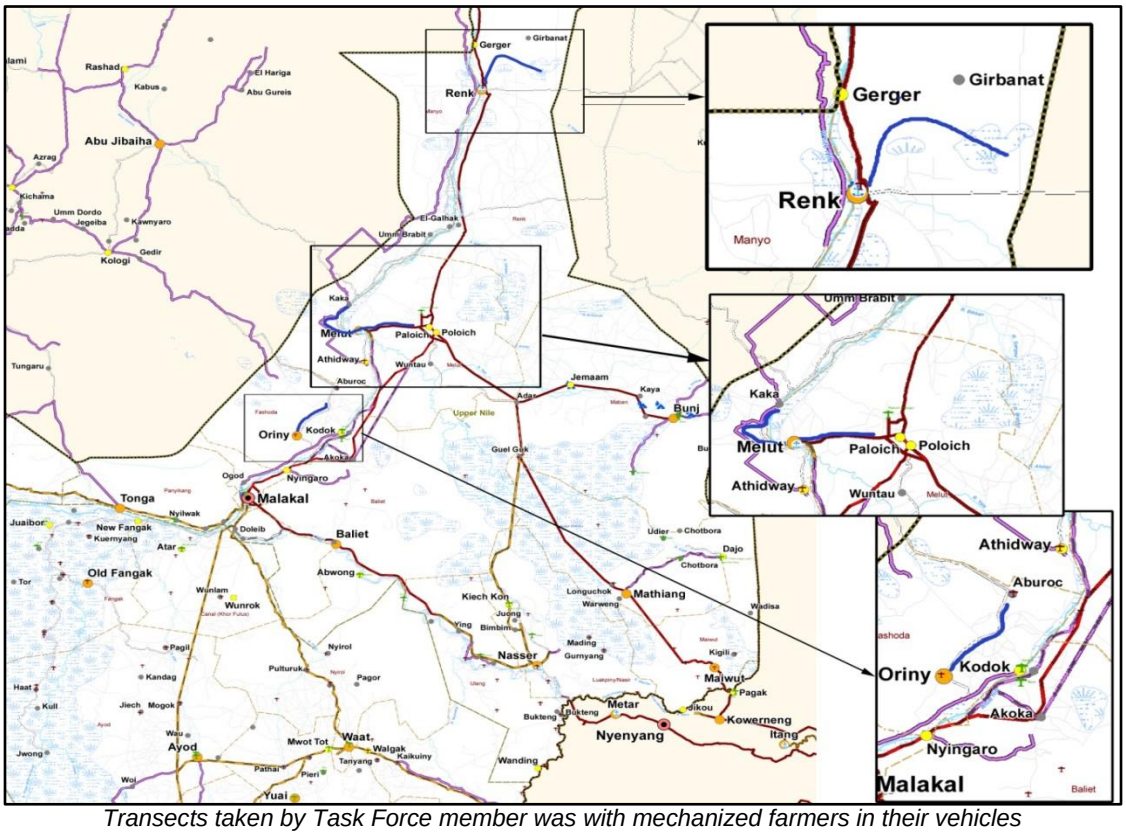
Livestock condition is fair and the outlook for pasture and water is variable depending on access, Reports of an ingress of 1.75 million heads of livestock into the state from Jonglei were not confirmed by Task Force-recorded observations during the transects in June and January 2015 in the counties visited at the time of the missions.

GREATER UPPER NILE

Upper Nile State

Access to information from Upper Nile State has been severely limited by the conflict. Short visits to three counties out of the twelve enabled Task Force members of more general food security teams to carry out 15 transects and conduct 21 case studies and 9 key informant interviews. The routes taken are shown in Figure III-15.

Figure III-15: South Sudan - Transect Routes - Upper Nile



Transects taken by Task Force member was with mechanized farmers in their vehicles

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with long term averages in Section 3.2.1 of this report.

From Figure 3 it may be seen that rains in Upper Nile began on time. The rains in May and early June allowed the vertisols (cracking heavy clay soils) to be worked and lower-than-expected rains later in June allowed continued access. July rains were as expected, however, lower-than-average rain in the second dekad of August reduced water logging, sustained access allowing cultivation in the mechanized sector and access for weeding. Average or better-than-average rainfall until the end of November sustained plant growth and development well above normal until the end of December. As almost all soils are water retentive vertisols (high carrying capacity) intermittent shortages of one dekad are easily evened-out resulting in average or above-average vegetation development throughout the season. No extreme events are noted, however, conflict-induced access to land reduced the opportunity of an estimated 60 percent of farmers in the traditional sector to farm and, although not stated in the official releases for Upper Nile State, MoA mechanized farming sections are likely to have reduced area planted and harvested by some 50 percent compared to last year.

In the areas visited by Task Force members[18] that only have county–by–county relevance and do not include the maize growing areas along the Sobat River, sorghum is noted to be the main cereal grown with sesame the second crop. Seeds used are mostly own seeds carried over from the previous harvest or borrowed from relatives. In the traditional sub-sector this means *leuwarding* (short-maturing) and *agono* (long-maturing) sorghum landraces. In the mechanized sub-sector, sorghum varieties used are now *Wad Ahmed, Afargadamek* and *Gaddam el Hammam*, improved *feterita* types from the Sudan are also finding their way into the traditional sector. Sesame seeds are provided by traders from the Sudan and the product returns to the Sudan, usually straight from the field after threshing. A summary of area estimates of crops planted in the counties visited, not including the Sobat Corridor, is given in Table III-7.

[18] Not teams- this is significant because standard operating procedures could not be applied in such mixed teams. In this case the Task Force member joined locally-based, mechanised farmer and conducted transect in Renk, Melut and Maban.

Table III-7: South Sudan - Estimated crop proportions from 15 transects in Upper Nile

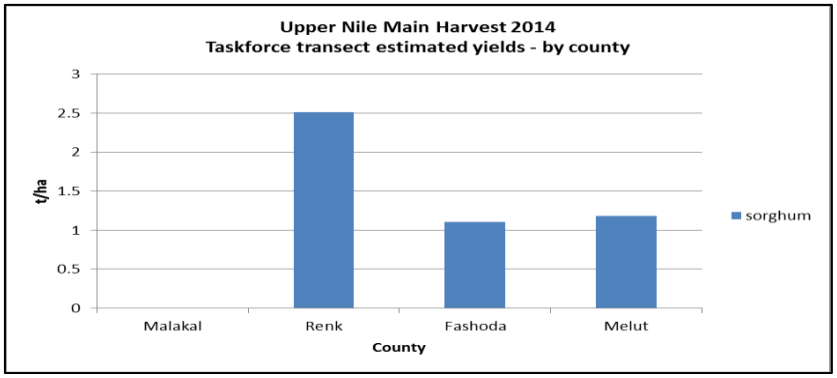
Crop	Main harvest (%)
Sorghum	78
Sesame	21
Total	**100**

Two hundred and ninety-nine tractors were noted to be functioning Upper Nile State in December 2013, with a distribution that matched the estimated area under cultivation by the mechanized sub-sector at that time. Traditional farmers hire such tractors for primary cultivation. The conflict with its associated destruction and looting is assumed to have changed the whole picture. The Task Force-farmer transects show that many tractors have moved east, away from Manyo and Malakal to Melut and Maban. Numbers of tractors in Fashoda appear to have been sustained or even increased for reasons that remain unclear. All farmers are subject to severe supply chain difficulties with spare parts and fuel coming from the north subject to increased pressures of extortion from requisitioning troops of both traditions[19]. Crop pest and disease levels are again reported as mild this year with no major infestations noted.

Production

Yield estimates from 640 PET scores from 15 transects *without any cross checking cuts and weighing of samples* are indicators of what may have been produced that suggest a much better level of production per hectare this year. Returns from the 51 case studies and 7 key informant interviews also point to a better yield than last year; however, reduced areas are responsible for a significant reduction in production from the State from both sub-sectors. Areas where no assessment has been conducted along the Sobat Corridor have been assigned nominally low levels of production based on phone calls and needs assessment returns. The returns from the transects, averaged by county for the main field crops, are summarized in Figure III-16 showing yield estimates far greater than used in the CFSAM calculations.

Figure III-16: South Sudan - Production estimates by county of sorghum from transects for main harvest



Cereal production in Upper Nile Sate is estimated at 24 091 tonnes due to a reduction in area harvested by 52 percent and nominal yields. The production does not include the main mechanized sub-sector, nor “traditional” mechanized sub-sector that have been reported in Section 3.3.1 B of this report.

Upper Nile State is a comparatively minor livestock producing area, production systems are based on transhumance and the herds/flocks are exceptionally mobile, closely linked to the grazing pastures in the Sudan and well-used to conflict. It is likely that the herds and flocks would have moved to safer areas away from direct action casualties, looting and raiding by troops. In the secure counties, visited by Task Force members, body condition scores (PET) was noted to be “3” as elsewhere at this time of year. Water and browse/pasture levels were reported to be normal but herds were reported to have “moved away” from usual riverine pastures. Although all endemic diseases were reported as present, no significant outbreaks were noted. Livestock price ranges appear to be volatile depending on buyers and conditions on the day.

[19] Similar levels of extortion are practised along the marketing value chains. Such practices existed before December 2013 but are now considered to be much worse and embrace looting of stocks.

Unity State

No transect data available; no case studies available; key informant information from phone calls only.

Growing conditions

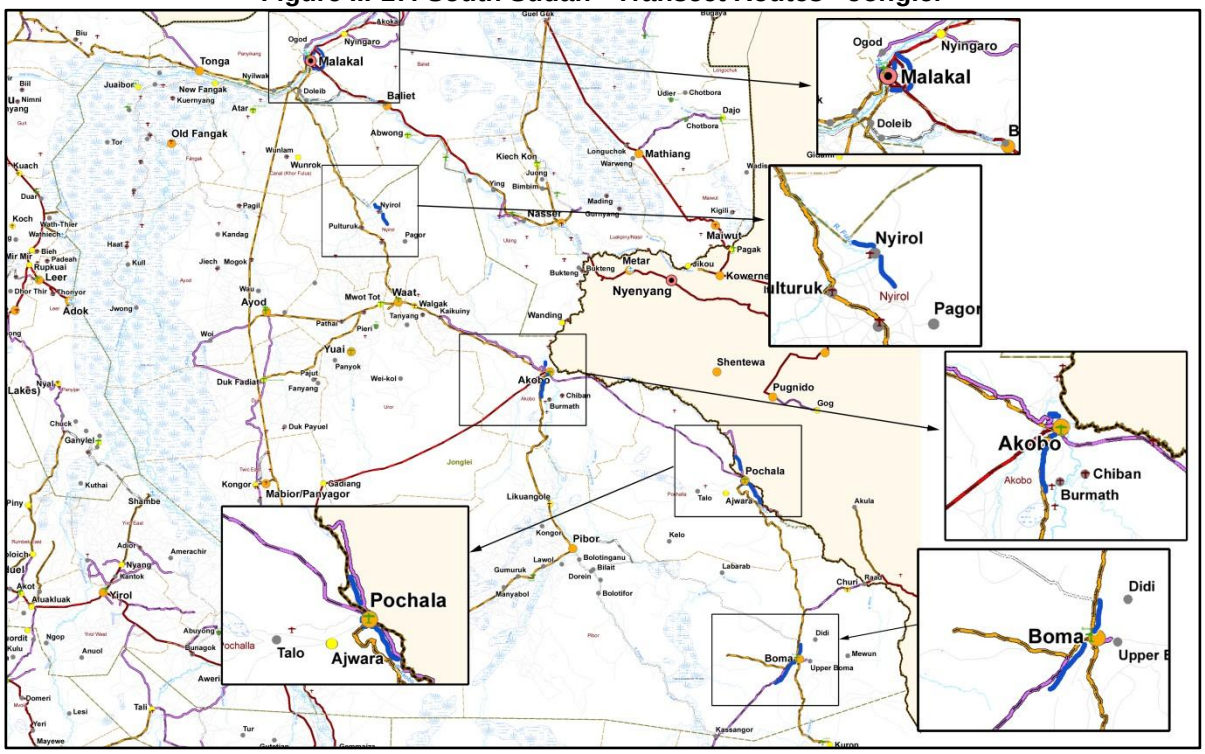
Rainfall graphs are shown in Section 3.2.1 of this report. In Unity State rains started early in April with above average growth of vegetation noted until the end of July, despite a short break in rainfall at the end of June. Thereafter, the NDVIs show a below-average vegetation development, picking up in August to be sustained above normal until the end of December.

As no other details are available, CFSAM production estimates are conservative at 10 800 tonnes of cereals from the early maize and later sorghum harvests reflecting key informants' phone statements (i.e. people requiring/expecting assistance) rather than objective assessments of what has been produced and its availability for use.

Jonglei State

Access to information from Jonglei State has been severely limited by the conflict. Short visits to five counties out of the eleven enabled Task Force members of more general food security teams to carry out 39 short transects and conduct 51 case studies and 7 key informant interviews. The routes taken are shown in Figure III-17.

Figure III-17: South Sudan - Transect Routes - Jonglei



Transects taken by the planting assessment team were within the areas. No vehicle transects for Jonglei.

Growing conditions

The 2014 rainfall estimates and vegetation indices graphs are shown in juxtaposition with long-term averages in Section 3.2.1 of this report.

From Figure 3 it may be seen that rains in Jonglei State began early in April, were very encouraging until mid-August when lower-than-expected rains are noted. The lower-than-expected rains relieved threats of non-riverine water logging and allowed better access than usual to vertisols that dominate the soil type. No extreme events have blighted either of the two seasons with the NDVIs showing an average vegetation

development until the end of December. However, conflict-induced access to land reduced the opportunity of an estimated 73 percent of farmers to take advantage of a good season.
In areas visited by Task Force members[20] that only have county–by–county relevance, sorghum is noted to be the main cereal grown. Seeds used are mostly own seeds carried over from the previous harvest or borrowed from relatives. Of the other crops, cassava is noted to be grown in the areas visited in Pochalla, but such cropping is not representative of most of the Jonglei counties. A summary of area estimates of crops planted is given in Table III-8.

Table III-8: South Sudan - Estimated crop proportions from 39 short transect in Jonglei

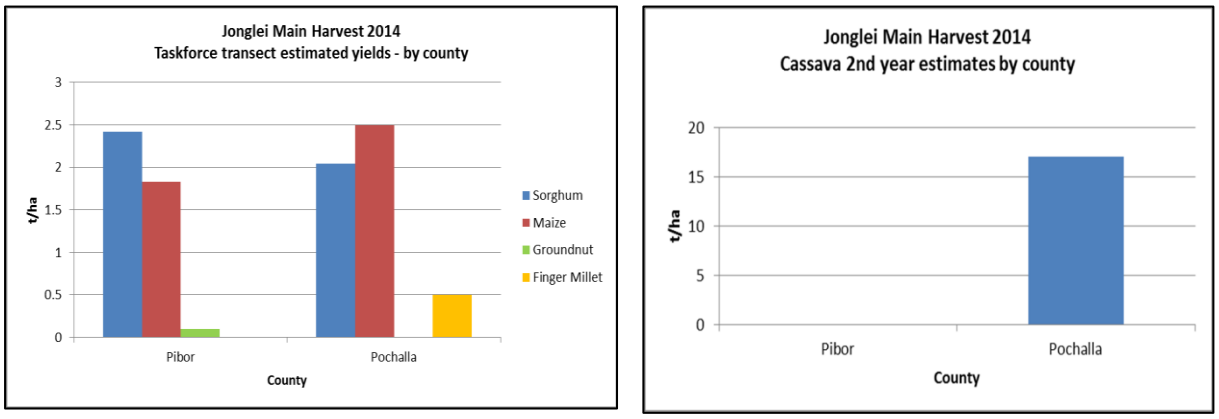
Crop	Main harvest (%)
Sorghum	31
Maize	29
Cassava	36
	(18% may be harvested)
Groundnuts	2
Others (finger millet)	2
Total	**100**

No tractors and very little animal traction are noted in the assessment returns. Hand-digging is the normal method of cultivation accomplished by family or labour-sharing groups. Ratooning of sorghum is prevalent but generally goes unreported. Crop pest and disease levels were again mild this year with principal problems being local birds, monkeys and ants.

Production

Yield estimates from 420 PET scores from 11 transects *without any cross checking cuts and weighing of samples* are indicators of what may have been produced, but are not considered representative enough to be used in the full county estimates. By the same token, returns from the case studies are obviously influenced by the needs assessment nature of the greater mission. The returns from the transects, averaged by county for the main field crops are summarized in Figure III-18 showing yield estimates far greater than those stated by households seeking assistance. However, as the number of locations and number of observations per location are so small, nominal figures for yields, based on previous CFSA missions to the area under similar rainfall conditions, have been used in the CFSAM production calculations.

Figure III-18: South Sudan - Production estimates by county of crops and second year cassava from transects for main harvest



Cereal production in Jonglei is estimated at 28 885 tonnes due to a reduction in the area harvested by 73 percent. The production includes conservative estimates of areas per household that actually farmed with yield reflecting more than one harvest and ratooning. Cassava production is observed in Pochalla only, so it is not included as a possible significant addition to estimates of the State supply of staple foods. Groundnuts may, however, add a further 500-600 tonnes to households' food economy at state level.

Jonglei State is a major livestock producing area, production systems are based on transhumance and the herds/flocks are exceptionally mobile and well-used to conflict. As most of Jonglei State's huge grazing areas are in partisan territory, claims of losses away from the immediate counties in the war–zone are hard to

[20] Not teams- this is significant because standard operating procedures could not be applied in such mixed teams.

understand. In the secure counties visited by mission teams, body condition scores (PET) was noted to be “3” as elsewhere at this time of the year. Although all endemic diseases were reported as present, no significant outbreaks were noted. Livestock price ranges appear similar to elsewhere, although distress selling is to be expected.