S P E C I A L R E P O R T

FAO/WFP CROP AND FOOD SECURITY ASSESSMENT MISSION TO SOUTH SUDAN

20 February 2014

IMPORTANT: This report is based on information gathered in South Sudan from 18 October to 29 November 2013, prior the start of the conflict in mid-December. Although the situation in the country is still very volatile, a final section on the likely impact of the conflict on food security prospects, including food requirements has been added.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME

WORLD FOOD PROGRAMME, ROME

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Acronyms and abbreviations

ANLA	Annual Needs and Livelihoods Analysis
BOSS	Bank of South Sudan
BQ	Black Quarter
CBPP	Contagious Bovine Pleuropneumonia
CCPP	Contagious Caprine Pleuropneumonia
CFSAM	Crop and Food Security Assessment Mission
CPA	Comprehensive Peace Agreement
DAP	Diammonium Phosphate
DLCO	Desert Locust Control Organization
ECF	East Coast Fever
EU	European Union
FAO	Food and Agriculture Organization
FMD	Foot and Mouth Disease
FSMS	Food Security Monitoring System
GDP	Gross Domestic Product
GRSS	Government of the Republic of South Sudan
ha	hectare (0.42 hectares = 1 feddan)
hh	household
HS	Haemorrhagic Septicaemia
IDPs	Internally Displaced Persons
IFDC	International Fertilizer Development Company
IOM	International Organization for Migration
JRC	Joint Research Centre (European Commission)
MAF	Ministry of Agriculture and Forestry
MCI	Ministry of Industry and Commerce
MFEP	Ministry of Finance and Economic Planning
mm	Millimetres
NBHS	National Baseline Household Survey
NBS	National Bureau of Statistics
ND	Newcastle Disease
NDVI	Normalized Difference Vegetation Index
NGO	Non-Governmental Organization
NPA	Norwegian People's Aid
OCHA	Office for the Coordination of Humanitarian Affairs
PET	Pictorial Evaluation Tool (crop yield and livestock body condition)
PPR	Peste des Petits Ruminants
RFE	Rainfall Estimate
SMoA	State Ministry of Agriculture
SP	Sheep Pox
SSP	South Sudanese Pound
SSRRC	South Sudan Relief and Rehabilitation Commission
t	Tonne
ToT	Terms of Trade
USAID	United States Agency for International Development
USD	United States Dollar
VAM	Vulnerability Assessment and Monitoring
VITO	Vision on Technology
VSF	Vétérinaires Sans Frontières
WFP	World Food Programme

Mission highlights

- In 2013, despite the impact of floods and insecurity in some areas, generally favourable rains and absence of major outbreaks of pests and diseases favoured cereal crop production in the traditional farming sector of South Sudan.
- Accordingly, total cereal harvested area in the traditional sector increased by about 2.8 percent resulting in an estimated net cereal production of about 892 000 tonnes, about 13 percent above the revised 2012 estimates and 22 percent above the average of the previous five years.
- Net cereal production from the rain-fed large and small scale mechanized sector in Upper Nile State is estimated at a reduced 57 000 tonnes due to a decline in planted area and a late onset of rains.
- Livestock conditions were generally good due to adequate pasture and water availability.
- Prices of locally produced cereals have declined in most markets since August 2013 and were below or around their levels in November 2012. Livestock prices, especially for small ruminants, were stable or increasing during the second half of 2013 in most markets. Terms-of-trade for pastoralists have generally improved.
- With a projected population of about 11.9 million people in mid-2014, which includes about 2 million returnees from 2008, the overall cereal deficit until the next harvest in late 2014 is estimated at nearly 409 000 tonnes, about 60 000 tonnes less than the revised deficit estimate for 2013.
- At the time of the Mission, food insecurity in South Sudan had reached a five-year minimum; just over 3.7 million people (33.4 percent of the population) had inadequate food consumption in October 2013, compared with 40 percent at the same time last year.
- The conflict is reversing these recent gains in food security. By end of January 2014, an estimated 863 000 people had been displaced, of which 123 000 were in neighbouring countries. Military confrontation has been most severe in Jonglei, Unity, Upper Nile, states which had higher levels of severe food insecurity, the highest cereal deficits in the country and very high dependency on markets for staple food purchases.
- Preliminary IPC analysis of late January 2014 estimates about 6 million people are in stress, crisis and emergency phases, an increase of 2 million people relative to pre-conflict levels. Of this total, 3.2 million are in emergency or crisis phases. These numbers exclude the 740 000 IDPs within South Sudan.
- Continuing insecurity is affecting trade routes from Uganda, through which food supplies are brought to other wider areas of South Sudan. The impact on markets of this restriction in food supplies is taking place as households exhaust their stocks and enter the period when dependency on markets for food supplies becomes greater. This will affect negatively the food security status of populations even in regions far from direct conflict.

1. OVERVIEW

An FAO/WFP Crop and Food Security Assessment Mission (CFSAM) visited South Sudan from 18 October to 29 November 2013 to estimate cereal production and assess the overall food security situation. As well as staff from FAO, WFP and the Ministry of Agriculture, Forestry, Tourism, Animal Resources, Fisheries, Cooperatives and Rural Development (MAF), the Mission field teams included representatives from the National Bureau of Statistics (NBS), the South Sudan Relief and Rehabilitation Commission (SSRRC) and participating observers from the United States Agency for International Development (USAID) via FEWSNet and the European Union (EU) via the European Commission Joint Research Centre (EC/JRC). In Juba, the Mission held meetings with officials of MAF, the Ministry of Commerce and Industry (MCI), the Ministry of Finance and Economic Planning (MFEP), the NBS, the SSRRC, 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.

Mission participants were provided with intensive training in CFSAM field techniques over a five-day period at the start of the Mission. At the end of the training, participants were divided into six field teams to visit 55 counties in all ten states of South Sudan. Location-specific information was obtained from 491 key

informant interviews and farm case studies. Key informants included relevant state and local authorities, including the SSRRC, the State Ministries of Agriculture (SMoA), county and *payam* officials as well as staff of NGOs, agricultural banks in Juba, Unity, Renk and Malakal and international agencies based in the field. Case studies of farming households were selected on a random basis. In addition, studies were made of the performance of groups of farmers working together as well as large-scale farming operations of individual farmers, farm companies, market traders and brokers. The information was triangulated with field observations during transects driven and walked across the farming areas of rural communities and individual farm case studies. Normalized difference vegetation index (NDVI) data and analysis, provided by WFP-VAM (Rome), for all States for 2013 were compared with local rain-gauge data and local accounts of seasonal rainfall this year. The Mission observed market supplies and prices in the main centres, in addition to analysing WFP's market price data.

In accordance with the approach adopted in previous years, the Mission's calculation of cereal production per county is based on estimates of three variables: (1) estimates of the numbers of farm households in each county adjusted for flood affected households (using data from the latest OCHA analyses) and by the latest advice by IOM concerning the number of farming households among the returning refugees; (2) estimates of the average area per farm household under cereals for each county, adjusted according to Mission observations made during field visits; and (3) estimates of average cereal yields for each county being the long-term data, adjusted by the trends identified during the Mission transects and case studies. These data are then compiled to provide production figures for each county, state and, ultimately, for the whole country.

Crop growing conditions were generally better in 2013 than they were in 2012. Following a pattern involving a slow onset in the north-east that became increasingly more timely moving south and west, rainfall levels are similar to or higher than the long-term average. Distribution during the season follows a similar pattern of farmer friendliness with, alternately, dry spells and heavy spells of precipitation noted to be more dramatic in the north-east than in the south west. In August and September, localized floods affected crops and settlements in Warrap, North Bahr el Ghazal, Upper Nile, Unity, Jonglei, and Lakes States, but, in most cases, not to the exclusion of harvests of the early crops nor to the continuing development of late-maturing and late-sown sorghums.

Crop pest and disease levels were mostly normal this year with no reported outbreaks of migratory pests and with the most recognised pest of concern being local birds, wild animals and domestic livestock. As reported last year, insecurity remains a major constraint to optimising the country's agricultural potential. Incidents of armed cattle rustling, inter and intra-communal conflicts and the activities of militia groups continue to inhibit farmers in affected areas from expanding the cultivated area.

Regarding the traditional sector, the estimated cereal area harvested in 2013 increased by 2.84 above last year's revised Mission estimates at 1.17 million hectares, bringing the average household cereal area estimate to 0.88 ha. Average cereal yield is estimated at 0.95 tonnes/ha, representing a 9.2 percent increase as compared to 0.87 tonnes/ha in 2012. Net cereal production, after deduction of post-harvest losses and seed use, is estimated to have increased by about 12.84 percent, from 790 439 tonnes in 2012 to 892 000 tonnes in 2013.

With a mid-2014 projected population of about 11.9 million people, which includes about 2 million returnees from 2008, consuming on average about 109 kg of cereals per capita per year, the cereal requirement in 2014 is estimated at about 1.3 million tonnes. Accordingly, an overall cereal deficit of about 408 500 tonnes is estimated in the 2014 marketing year.

Net cereal production from the mechanized sector is tentatively estimated at about 71 000 tonnes and although some sorghum, produced by Sudan-based farmers, who are cultivating both sides of the border, is expected to be commercialized across the border in Sudan, a significant amount is expected to be marketed internally, which offers options for local purchase.

Prices of locally produced maize and sorghum have declined in most markets beginning from August 2013 due to increased supplies from the newly harvested crops for both local markets and own household consumption. At the end of 2013, prices were below or around their levels of twelve months earlier in most monitored markets. Livestock prices, especially for small ruminants, were stable or increasing during the second half of 2013 in most markets; this, coupled with declining cereal prices, has substantially improved the terms-of-trade for pastoralists and consequently their purchasing power.

South Sudan's food security situation had shown broad improvements before the conflict started. Food insecurity affected 33.4 percent population (just over 3.7 million people), with severe food insecurity levels at

a record low of 3.4 percent, after remaining stable at around 10 percent since 2009. This was due to a sequence of two good harvests coupled to lower market prices.

Serious conflict erupted in mid-December 2013 in Juba, which quickly spread across Central Equatoria into the eastern regions of Jonglei, Unity and Upper Nile. Direct military confrontations remained confined to these states, with other states have been indirectly affected, e.g. by influx of displaced populations and disruption of trade routes.

By end of January 2014, conflict resulted in the displacement of an estimated 863 000 people, of which 123 000 in neighbouring countries. Unity harbours most displaced (188 000) with an additional 290 000 in the other conflict affected states and a further 108 000 in the neighbouring Lakes and Warrap.

The regions directly affected by conflict had the worst food security conditions in the country – prior to the conflict, in Unity and Jonglei food insecurity had actually risen throughout 2013, with Unity reporting the highest levels of severe food insecurity in the country (8 percent). These two states made up to 60 percent of the total population in IPC phase 3 (Crisis) and together with Upper Nile, account for over 60 percent of a national cereal deficit of around 400 000 tonnes. The dependency on markets for staple food supply is the highest in the country.

Against this poor pre-conflict backdrop, confrontations in Jonglei, Unity and Upper Nile, led to widespread losses of household stocks, increased the cereal deficits through impacts on the late harvested mechanized sorghum crops and caused widespread destruction of market infrastructure and disruption of trade routes. Negative impacts on the next agricultural season are increasingly likely, unless displaced populations return in time for the start of planting and inputs are provided in a timely fashion. If not, cereal deficits in the next harvest will increase, even under favourable weather conditions.

South Sudan's households, particularly in conflict affected states, largely depend on markets for their basic staple food needs. Markets and trade routes have suffered considerable impact within conflict areas. Recent price information shows that the expected post-harvest price drop was short-lived and prices are rising again as the lean season approaches.

The supply of commodities to most of South Sudan mainly takes place overland from Uganda; this corridor is therefore vulnerable to a wider spread of insecurity. Should this happen, markets would be affected in the large areas of South Sudan that rely on Ugandan trade flows, precisely at a time when households enter the period when they source their food predominantly from the markets

Preliminary post-conflict IPC analysis estimates that a total of about 6.4 million people are now in phases 2, 3 and 4 (stress, crisis and emergency), with an increase of 2 million people relative to pre-conflict levels. Of this total, 1.1 million are in emergency phase and 2.1 million in crisis phase.

2. SOCIO-ECONOMIC CONTEXT

2.1 General

Following the referendum held at the beginning of 2011, South Sudan became an independent nation on 9 July, marking the conclusion of the Comprehensive Peace Agreement (CPA) that had been in place since 2005. Despite significant improvements since the inception of the CPA and continuing efforts to unify and stabilise the country, insecurity is still widespread in the northern border regions with Sudan and in areas affected by inter and intra-tribal communal conflicts. The majority of violence incidents in 2013, as reported by OCHA, occurred in Jonglei, Unity, Lakes and Warrap States. In particular, the inter-communal conflict in Pibor County of Jonglei State has affected tens of thousands of civilians, forcing them to flee from key population centres, and hampered the delivery of humanitarian assistance. Currently, about 228 000 refugees, mainly from South Kordofan and Blue Nile States in Sudan, are hosted in camps in Upper Nile and Unity States.

The 2008 Population and Housing Census of South Sudan estimated population at 8.26 million, with more than 50 percent below the age of twenty. Given the implicit annual increment of 3 percent, as suggested by the National Bureau of Statistics (NBS), and including about 1.8 million people that returned to South Sudan since 2008[1], the population for mid-2014 (including a forecast of 50 000 new returnees in 2014, according to IOM) is estimated at about 11.9 million. While the population has increased, population density still remains one of the lowest in subtropical countries, with on average of about 23 inhabitants per square km.

[1] Data from the IOM Tracking and Monitoring Database.

2.2 Economy

2.2.1 Economic growth and national budget

The country's 2012 nominal gross domestic product (GDP) was estimated at about SSP 30 billion, about 48 percent higher than previous year, essentially due to loss of revenues and foreign exchange receipts following the closure of oil production. In fact, South Sudan's economy is heavily dependent on oil revenue, which traditionally accounts for 98 percent of government revenue (excluding foreign aid) and 70 percent of GDP. The decision to suspend oil production in January 2012, following tensions with the Sudan on oil production and pipeline transit fees, caused large deficits in the budget and in the balance of payments, with a significant contraction of GDP in 2012. Initially, the wider impact of oil shutdown on local economy has been cushioned by financing imports and public expenditure by drawing on foreign reserves. Then, the implementation of austerity measures with large spending cuts (especially in salaries as well as infrastructures, health and education sectors) together with domestic borrowing from commercial banks, advances from the central bank, some external financing, forward oil sales and revenues from non-oil sectors have contributed to cover the reduced 2012/13 budget. Public expenditure has been progressively skewed towards current expenditure, mainly salary payments and security. Overall, consumption and investment levels have dropped markedly in 2012/13 as a consequence of the austerity measures.

For 2013/14, total government expenditure is estimated at about SSP 17.3 billion, including SSP 7.9 billion of mandatory spending (mainly oil transit fees and agreed transfer payments to Sudan, loan repayment and rebuilding reserves) and SSP 9.2 billion for agency spending (with an increase of SSP 2.5 billion compared to 2012/13). Oil production resumed in April/May 2013, after the adoption of the Implementation Matrix between the governments of the Sudan and South Sudan, and gross oil revenues in 2013/14 are forecast at SSP 10.6 billion. As oil revenues increased only gradually and due to overall macro-economic uncertainty, spending limits have been prudently kept at the austerity level of SSP 555 million per month from July to December 2013 and are expected to be lifted at SSP 985 per month from January 2014. Priority areas for major increases in spending are social services (such as health, education, water, especially in rural areas), infrastructures (roads and power), agriculture and reversing selected austerity cuts such as housing allowances and block grants to the States. In particular, the budget foresees additional resources of SSP 130 million for agriculture and job creation, financing the implementation of a national effort for agricultural transformation aimed at eliminating the food deficit. Overall, the 2013/14 budget has a much better development balance than in 2012/13, with a decreasing share of spending on security and law enforcement (from 58 to 50 percent) and an increasing share of spending on capital investment (from 7 to 16 percent). However, to cover a remaining financial gap, the Government of the Republic of South Sudan (GRSS) plans to borrow SSP 4.5 billion, mainly from the IMF, the AfDB, the World Bank/IDA and the EU.

Table 1: Expenditure by sector, 2013/14 (million SSP)

Sector	2013/14	Percent
Accountability	270	2.9
Economic functions	420	4.5
Education	612	6.6
Health	385	4.2
Infrastructure	566	6.1
Natural resources	162	1.8
Public administration	833	9.0
Rule of law	1 498	16.2
Security	3 142	34.0
Social and humanitarian	93	1.0
Block transfers to States	961	10.4
Interest payments	170	1.8
Contingency funds	130	1.4
TOTAL	**9 242**	**100.0**

2.2.2 Exchange rate and inflation

The South Sudanese Pound (SSP) was introduced following independence and operates under a managed float, which initially intended to have parity with the Sudanese Pound (SDG). With the aim to unify official (SSP 2.96 per USD) and parallel (SSP 4.5 per USD) exchange rates, the GRSS announced on 11 November 2013 a devaluation of the official exchange rate by 34 percent, fixing it at SSP 4.5 per USD. As most commodities were priced at the parallel market exchange rate, the devaluation was expected to have

only a minor impact on the general level of prices. However, as the devaluation was going to affect the rent of those with preferential access to the official rate, including government staff, foreign exchange bureaus, commercial banks and importers, on 13 November, the National Assembly forced the Central Bank of South Sudan to reverse the decision to devaluate the local currency.

According to the NBS, year-on-year national inflation has gradually declined since end-2012 (about 41 percent in November 2012) and it reached negative levels between May and September 2013, essentially as a consequence of the reduced demand following the implementation of the austerity measures, especially on salaries of the public administration. On a monthly basis, the consumer price index increased by 1.6 percent between September and October 2013, driven by a 6 percent increase in prices of food and non-alcoholic beverages and a 19.5 percent increase in prices of transport services. Higher levels of annual inflation are reported in most northern border areas, such as Malakal, where traditional trade flows from Sudan have been disrupted and the local supply of basic commodities is often scarce. During the last twelve months, average inflation rate was about 14 percent in Malakal, while it was about 6 and 1 percent in Juba and Wau, respectively.

2.3 Agriculture

South Sudan's diverse ecology provides a growing season ranging from 280-300 days in the south-western 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 Greater Equatoria (Western, Central and 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 Greater Equatoria, and a single harvest in the unimodal areas further north.

With almost all agricultural production being rainfed, rainfall variability is a 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 is considerable variation in rainfall from year-to-year and from location-to-location within the same year. In lowland areas, flooding is a common occurrence, while many areas, especially those towards the north and south-east of the country, are susceptible to prolonged dry periods.

Crop production is mostly conducted on small, hand-cultivated plots farmed by women-headed households belonging to larger family aggregations, reflecting the polygamous nature of most communities. Notwithstanding an abundant availability of land, the area cultivated by households is limited by the size of the household labour force and/or the ability of the household to provide in kind payment (essentially food/beer) for the mobilisation of traditional working groups (*nafeer).* After many years of conflict and high levels of insecurity, farmers have been accustomed to cultivate only land close to their home or in group-farmed blocks of individual plots of land according to location. This attitude is gradually changing with increasing security and the emergence, initially of more far-fields (fields away from home) and with the development of commercially-orientated farmers cultivating larger areas of cereals, groundnuts and cassava for sale.

Cereal area per household is estimated this year at 0.9 ha and, in keeping with last year's attempt to disaggregate cereal areas made on the basis of information collected by the Mission teams, sorghum remains the main crop cultivated by the traditional sector in South Sudan comprising some 70 percent of the area sown. Maize is estimated to be planted in 27 percent of the area (including estimates of double cropping in the Greenbelt) and other cereals including bulrush and finger millet and rice make up the remaining 3 percent. Maize is the most popular staple in south-central parts of Unity State, in Upper Nile State along the Sobat River and in eastern Jonglei counties near the Ethiopian border. Regarding sorghum, there are a large number of local landraces and varieties ranging with lengths to maturity fitting agro-ecological niches[2] ranging from short-season to very long-season (more than 220 days) and from short stature to the very tall (more than 3 metres) in use throughout the country. It is the main staple food in all states except for the three Equatorias where the local diet also includes maize flour and cassava. Other crops increasing in popularity in Central and Western Equatoria include sweet potato, and yams. In Northern and Western Bahr el Ghazal, Warrap and Lakes, sorghum is regularly intercropped with sesame and some small amounts of bulrush millet. Maize is normally cultivated in limited areas close to homesteads and is often consumed green with the first early sorghums in August-September. Groundnut is cultivated on sandy

[2] Short season landraces provide an early harvest in August/September; long season landraces withstand dry spells and water logging and are harvested in December/January.

soils in most locations and makes an important contribution to household diet throughout the northern states; it is also the main cash crop in the northern states.

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.

Farmers commonly use their own seed saved from the previous year's harvest, and although virtually no commercial fertilizers, pesticides or herbicides are used throughout the bulk of the states, their use is noted to be increasing in Central Equatoria. Further north near the border with Sudan, the use of herbicides is noted on some of the large-scale mechanised farms in Upper Nile State. Regarding pest-control campaigns, before South Sudanese independence, aerial spraying of nesting sites routinely controlled migratory Quelea bird nesting sites near the mechanized areas. This year, the practice was resumed with aerial spraying conducted by DLCO (Desert Locust Control Organization, based in Nairobi), in all locations except Renk and Manyo. In the latter two cases, pre-spray aerial-surveys conducted by the same team, revealed that nest density did not warrant spraying.

Rainfed mechanized cereal production is practised on a large scale in the Upper Nile counties of Renk, Manyo, Melut, Baliet, Fashoda and Malakal following patterns of land occupancy-demarcation of leased land, established by both northern and southern trader/farmers before independence. Elsewhere, limited numbers of both private and GRSS tractors provide ploughing services to individuals and farmer-groups at prices ranging from SSP 50 (GRSS subsidised) to SSP 350 per feddan for a single pass. Mechanization applies only to land preparation and, in most cases, sowing on the second pass with a seed drill positioned over the ubiquitous disc harrows. Other operations to harvesting are done manually. Major problems related to 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 4-wheeled units that are prematurely scrapped due to inadequate maintenance.

During the past twenty years, animal traction has been promoted by the MAF, FAO and some 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. However, lack of spare parts, skills to maintain mould-board ploughs, raw materials for local blacksmiths and low levels of operator skill still limit expansion; as does a lack of resources to capitalise on the increased area through improved weeding[3].

Livestock are very important assets throughout the country, the main species being cattle, goats and sheep. The sale of livestock, especially small ruminants, offers significant income generation opportunities for both transhumant pastoralists and sedentary livestock rearers.

3. CEREAL PRODUCTION IN 2013

In the absence of any nationally generated, crop-yield forecasts and accurate data of cropped land disaggregated by crop, cereal production for the smallholder subsector is assessed using estimates of the following three variables: (1) estimates of the numbers of farm households in each county, based on total county population figures and the proportion of rural to urban dwellers; (2) standard estimates of the average area per farm household under cereals for each county, adjusted according to Mission observations made during field visits; and (3) estimates of average cereal yield for each county, based on Mission observations and calculations, interviews with farmers and rural communities, and information obtained from SMoA, NGOs and others involved in agriculture. The product of these three factors gives a cereal production figure for each county. The county figures are then summated 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. The Mission stresses the need for a rigorous agricultural survey in order to establish a more accurate baseline with regard to cropped areas.

[3] In this regard, the local 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.

3.1 Cereal harvested area estimates

The Mission's harvested cereal area estimates for the smallholder subsector in 2013 are calculated on the basis of the numbers of farming households in each county according to the 2008 census data, which includes numbers of households (both rural and urban) per county. Census figures have been 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 from 2008 based on the most recent information provided by the International Organization of Migration (IOM). In particular, given the most recent observations by the IOM, that suggests that returnees are less inclined to farm than was originally thought, the Mission have decided to reduce the numbers of returnees farming by 15 percent in each state.

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 considering the households displaced by floods and conflict during 2013. The numbers involved are summarised in the two figures produced by OCHA that have been included in Annex I.

Conservative upward adjustments to the area have been made as a step towards recognising, quantitatively, the important contribution made by second cropping in the bimodal rainfall areas. Such activities, particularly in Western Equatoria, still require a separate study to determine areas and accurate yields of the first, second and, sometime, third crops of maize.

The Mission estimates the total area of cereal harvested in the smallholder subsector in 2013 at about 1.1 million hectares, 2.84 percent above the figure estimated last year adjusted for the latest returnee figures. Table 2 presents the breakdown of area cultivated by state and county.

Table 2: Estimated settled population, farming households and harvested cereal area, 2013

State/County	Population mid-2013	Households mid-2013	Farming households (percent)	Farming households mid-2013	Average cereal area (ha/hh)	Total cereal area (ha)
Central Equatoria	**1 539 102**	**250 999**	**62**	**155 151**	**1.04**	**160 981**
Returnees (by IOM)	262 928	43 824	43	18 625	0.48	8 940
Juba	426 066	66 858	48	32 092	1.00	32 092
Kajo Keji	227 105	37 638	90	33 874	1.20	40 649
Lainya	103 285	16 171	60	9 703	1.20	11 643
Morobo	119 808	18 166	60	10 900	1.20	13 079
Terekeka	166 956	29 842	90	26 858	1.00	26 858
Yei	232 952	38 500	60	23 100	1.20	27 720
Eastern Equatoria	**1 127 674**	**191 219**	**73**	**140 204**	**0.99**	**138 732**
Returnees (by IOM)	79 774	13 296	65	8 702	0.50	4 351
Budi	114 756	19 403	90	17 463	0.85	14 843
Ikotos	97 890	19 106	90	17 195	1.10	18 915
Kapoeta East	189 649	34 046	50	17 023	1.00	17 023
Kapoeta North	119 208	18 472	50	9 236	1.00	9 236
Kapoeta South	91 901	13 702	50	6 851	1.00	6 851
Lafon	122 766	19 887	85	16 904	0.90	15 214
Magwi	196 390	30 383	90	27 345	1.20	32 814
Torit	115 341	22 923	85	19 484	1.00	19 484

State/County	Population mid-2013	Households mid-2013	Farming households (percent)	Farming households mid-2013	Average cereal area (ha/hh)	Total cereal area (ha)
Jonglei	**1 762 568**	**254 433**	**71**	**179 620**	**0.64**	**115 570**
Returnees (by IOM)	191 456	31 912	66	21 157	0.50	10 579
Akobo	157 516	20 483	78	15 977	0.50	7 988
Ayod	161 068	19 527	74	14 450	0.50	7 225
Bor South	255 691	36 259	87	31 545	0.80	25 236
Duk	75 847	11 844	84	9 949	0.70	6 964
Fangak	127 356	16 851	90	15 166	0.70	10 616
Khorflus/Pigi/Canal	114 564	13 834	88	12 174	0.70	8 522
Nyirol	125 673	17 658	85	15 010	0.50	7 505
Pibor	171 699	26 298	24	6 312	0.70	4 418
Pochalla	76 556	12 079	71	8 576	0.70	6 003
Twic East	98 699	16 625	38	6 317	0.70	4 422
Uror	206 443	31 063	74	22 987	0.70	16 091
Lakes	**1 013 143**	**141 525**	**78**	**110 784**	**0.97**	**107 415**
Returnees (by IOM)	208 172	34 696	70	24 183	0.45	10 882
Awerial	54 815	8 717	50	4 358	1.00	4 358
Cueibet	136 174	19 987	92	18 388	1.10	20 227
Rumbek Centre	177 568	19 447	75	14 586	1.00	14 586
Rumbek East	142 045	17 940	79	14 173	1.10	15 590
Rumbek North	50 200	5 727	60	3 436	1.10	3 780
Wulu	46 893	7 536	92	6 933	1.20	8 320
Yirol East	77 945	10 375	90	9 338	1.20	11 205
Yirol West	119 331	17 099	90	15 389	1.20	18 467
N Bahr el Ghazal	**1 281 991**	**229 175**	**73**	**166 303**	**0.69**	**115 309**
Returnees (by IOM)	448 332	74 721	49	36 837	0.40	14 735
Aweil Centre	48 369	10 502	30	3 150	0.60	1 890
Aweil East	358 398	65 773	91	59 853	0.80	47 883
Aweil North	149 325	28 786	90	25 907	0.75	19 430
Aweil South	85 351	16 250	66	10 725	0.70	7 507
Aweil West	192 216	33 144	90	29 830	0.80	23 864

State/County	Population mid-2013	Households mid-2013	Farming households (percent)	Farming households mid-2013	Average cereal area (ha/hh)	Total cereal area (ha)
Unity	**993 777**	**134 903**	**67**	**90 616**	**0.60**	**53 921**
Returnees (by IOM)	316 346	52 722	55	29 129	0.45	13 108
Abiemnhom	19 673	2 089	80	1 671	0.50	835
Guit	38 166	3 737	80	2 990	0.60	1 794
Koch	86 573	9 199	90	8 279	0.80	6 623
Leer	61 316	8 145	72	5 865	0.70	4 105
Mayendit	62 196	7 641	86	6 571	0.70	4 600
Mayom	139 597	17 597	80	14 077	0.63	8 869
Panyijar	58 657	10 033	90	9 029	0.50	4 515
Pariang	95 339	12 097	69	8 347	0.80	6 678
Rubkona	115 915	11 644	40	4 657	0.60	2 794
Upper Nile	**1 216 850**	**181 658**	**62**	**112 114**	**0.75**	**83 645**
Returnees (by IOM)	101 655	16 940	43	7 199	0.45	3 240
Baliet	55 520	8 393	80	6 714	0.60	4 029
Fashoda	42 230	6 820	90	6 138	0.80	4 910
Longochuk	73 046	9 573	78	7 467	0.50	3 733
Luakpiny/Nasir	242 850	33 571	70	23 500	0.60	14 100
Maban	52 314	11 366	80	9 093	0.50	4 546
Maiwut	91 891	12 116	78	9 450	0.50	4 725
Malakal	146 267	19 535	50	9 767	0.60	5 860
Manyo	43 955	7 388	90	6 649	0.70	4 654
Melut	56 944	8 219	38	3 123	1.70	5 310
Panyikang	52 533	8 405	50	4 203	0.60	2 522
Renk	159 298	26 009	38	9 884	2.00	19 767
Ulang	98 346	13 323	67	8 926	0.70	6 249
W Bahr el Ghazal	**511 979**	**88 932**	**78**	**69 174**	**0.90**	**62 026**
Returnees (by IOM)	126 394	21 062	58	12 174	0.50	6 087
Jur River	147 757	24 019	73	17 534	1.00	17 534
Raga	62 840	11 794	90	10 615	0.90	9 553
Wau	174 989	32 058	90	28 852	1.00	28 852

State/County	Population mid-2013	Households mid-2013	Farming households (percent)	Farming households mid-2013	Average cereal area (ha/hh)	Total cereal area (ha)
Warrap	**1 288 682**	**223 284**	**84**	**186 658**	**0.89**	**166 944**
Returnees (by IOM)	163 570	27 263	71	19 234	0.30	5 770
Abyei	61 155	9 132	65	5 936	1.00	5 936
Gogrial East	119 438	21 415	77	16 489	1.10	18 138
Gogrial West	282 075	52 024	76	39 539	1.00	39 539
Tonj East	134 286	22 841	95	21 699	1.00	21 699
Tonj North	191 066	34 332	93	31 929	0.80	25 543
Tonj South	100 137	16 815	90	15 133	0.90	13 620
Twic	236 956	39 462	93	36 699	1.00	36 699
Western Equatoria	**779 230**	**145 093**	**84**	**122 243**	**1.38**	**169 171**
Returnees (by IOM)	63 374	10 561	43	4 488	0.58	2 581
Ezo	93 509	21 048	90	18 943	1.38	26 142
Ibba	48 418	12 116	90	10 905	1.38	15 049
Maridi	95 359	15 170	90	13 653	1.50	20 480
Mundri East	55 876	7 888	73	5 758	1.38	7 946
Mundri West	39 289	4 656	80	3 725	1.50	5 588
Mvolo	55 663	7 585	70	5 309	1.38	7 327
Nagero	11 653	2 479	90	2 231	1.38	3 079
Nzara	75 991	18 872	90	16 985	1.40	23 778
Tambura	64 025	15 399	90	13 859	1.50	20 788
Yambio	176 073	29 319	90	26 387	1.38	36 414
SOUTH SUDAN	**11 514 995**	**1 841 221**	**72**	**1 332 867**	**0.88**	**1 173 714**

Cultivated area in 2013 increased in most states, with higher changes in state total cereal areas in Unity (+13.64 percent) and Lakes (+8.7 percent). Moderate declines in planted are estimated for Northern Bahr el Gazal (-3.4 percent, especially in Aweil South county) and Warrap (-0.9 percent, especially in Tonj North and South counties). These changes take into consideration also the reduction in area harvested as a consequence of floods and/or insecurity as well as the consideration, supported by IOM, that returnees' contribution to farming activities was overestimated during previous assessments, inducing the Mission to decide to reduce by 15 percent the number of returnees farming households in each state. By contrast, average harvested area under cereals per farming household in each county has been adjusted upwards this year on the basis of information gathered through field observations, measurements and interviews. This increase in area at household level is mainly due to:

- Opportunistic planting because of encouraging early rainfall patterns.
- Increased use of animal traction.
- Support to farming groups and general government promotion of domestic production and self-reliance in the face of diminished oil revenues.

In addition, conservative upward adjustments to the area have been made as a step towards recognising, quantitatively, the important contribution made by second cropping in the bimodal rainfall areas. Such activities, particularly in Western Equatoria, require a separate study to determine areas and yields of the second and, often, third crops of maize.

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 last year, using information from Mission teams. This year's data have been compiled

based on the proportions noted last year, and are presented by State in Table 3, along with estimates of groundnut and cassava areas.[4]

Table 3: Tentative estimates of cropped areas (ha) per household, 2013

States	Sorghum	Maize	Other cereals inter-crop[1/]	Total cereals	Ground-nuts	Cassava 2 years	Cultivated area
Central Equatoria	0.67	0.35	0.02	1.04	0.26	0.11	1.41
Eastern Equatoria	0.62	0.26	0.11	0.99	0.17	0.11	1.27
Western Equatoria	0.44	0.90	0.04	1.38	0.30	0.30	1.98
Jonglei	0.42	0.20	n/a	0.62	0.10	n/a	0.72
Upper Nile	0.50	0.25	n/a	0.75	n/a	n/a	0.75
Unity	0.36	0.24	n/a	0.60	0.05	n/a	0.65
Lakes	0.85	0.12	n/a	0.97	0.19	0.06	1.22
Warrap	0.80	0.04	0.05	0.89	0.19	n/a	1.08
Western Bahr el Ghazal	0.80	0.07	0.03	0.90	0.19	0.09	1.18
Northern Bahr el Ghazal	0.64	0.05	n/a	0.69	0.20	n/a	0.89
Country's average	**0.61**	**0.25**	**0.03**	**0.88**	**0.17**	**0.07**	**1.12**
SOUTH SUDAN	**815 000**	**322 000**	**36 000**	**1 173 000**	**226 000**	**82 000**	**1 481 000**

1/ Bulrush and finger millets, upland rice and paddy rice.
n/a: not enough or contradictory information collected.

3.2 Factors affecting yields

3.2.1 Rainfall

The remote sensing vegetation indices (NDVIs), rain gauge data and farmers' opinions provided a picture of a slow-starting main season in the north-east that improved in a south-westerly direction across the country. Consequently, the season developed into a better than average year in which both the quantity and the distribution of rain were adequate for crop and pasture growth in all but the north eastern zones of Upper Nile State. However, abundant rains in areas prone to flooding and water-logging caused some homes and fields to be abandoned in 43 locations in all states (see map in Annex II) but, particularly, according to OCHA, in Jonglei, Warrap, Unity, Northern Bahr el Ghazal, Lakes and Upper Nile States. A total of about 33 000 households are reported to have been affected out of the 1.3 million households estimated to be farming this year.

The series of Figures 1 to 3 below provide representations of vegetation development over the 2013 year and rainfall estimates by dekad in the arable areas of each state. Clustered into the three Regions of 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 which have continued to fall well into November.

More specifically, Figure 1 presenting dekadal rainfall data and NDVI patterns for the three states in Greater Equatoria shows a rainfall pattern with a timely start followed by heavy rainfall early in the season. In all three states, two-dekadal, drier-than-normal spells are noted in May and June, and again in August. However, figures also show that biomass development monitored through the NDVIs is normal or better than normal in all three states, suggesting that soil moisture content remained adequate throughout the season. As was the case in 2012, rain was continuing to fall in Greater Equatoria until the end of November, supporting the second and third plantings and rattoons.

[4]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.

Figure 1: Rainfall estimates and NDVI in Central, Eastern and Western Equatoria

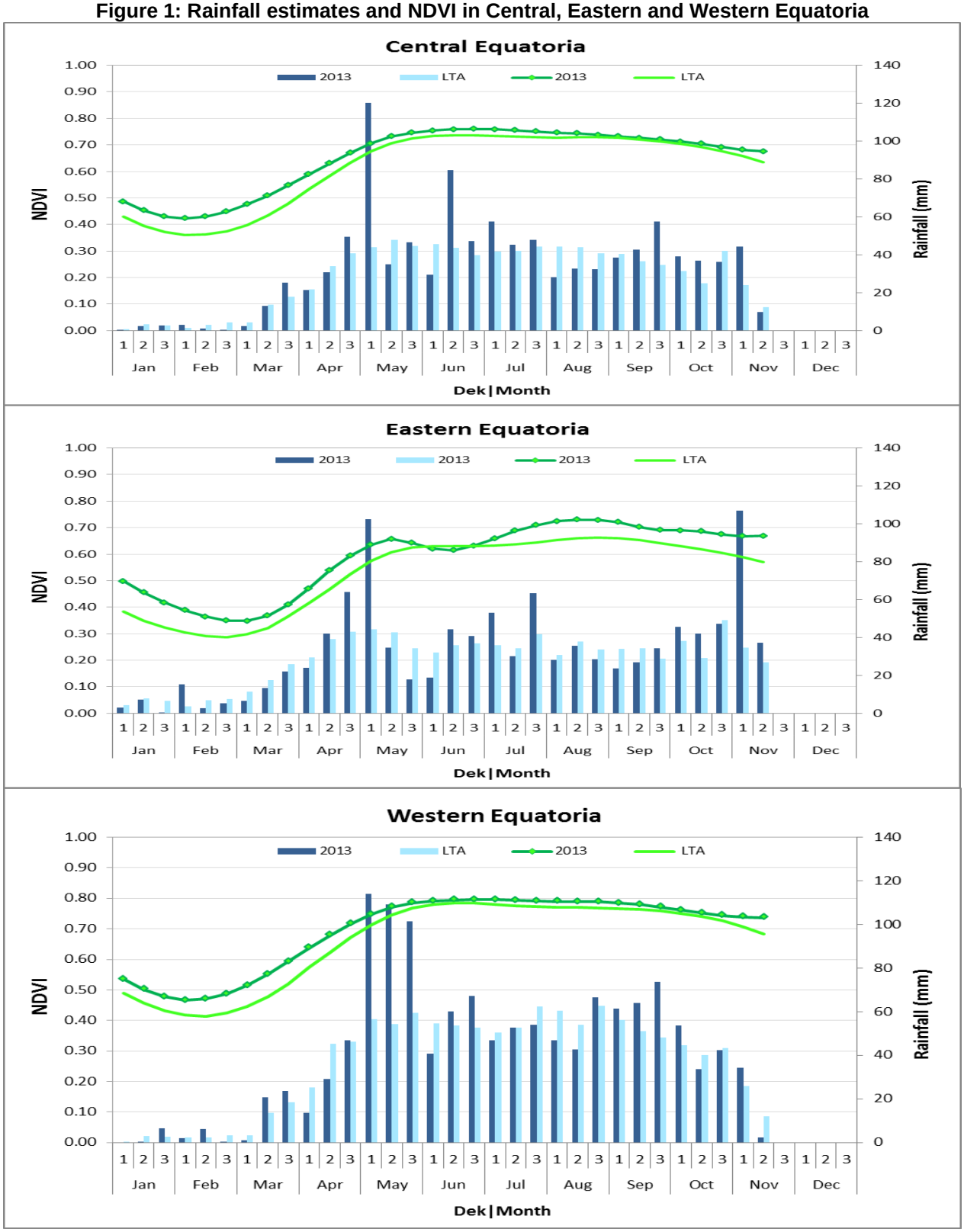


Figure 2 shows that, in each state of Greater Bahr el Ghazal, a later than normal start is followed by three dekads of heavier than normal rain, with concomitant water-logging in the lower areas noted by Mission teams. Short dry spells in June and August getting progressively later moving from north to south are also apparent and were reported by farmers during case-study interviews.

Figure 2: Rainfall estimates and NDVI in North, and West Bahr el Ghazal, Warrap and Lakes

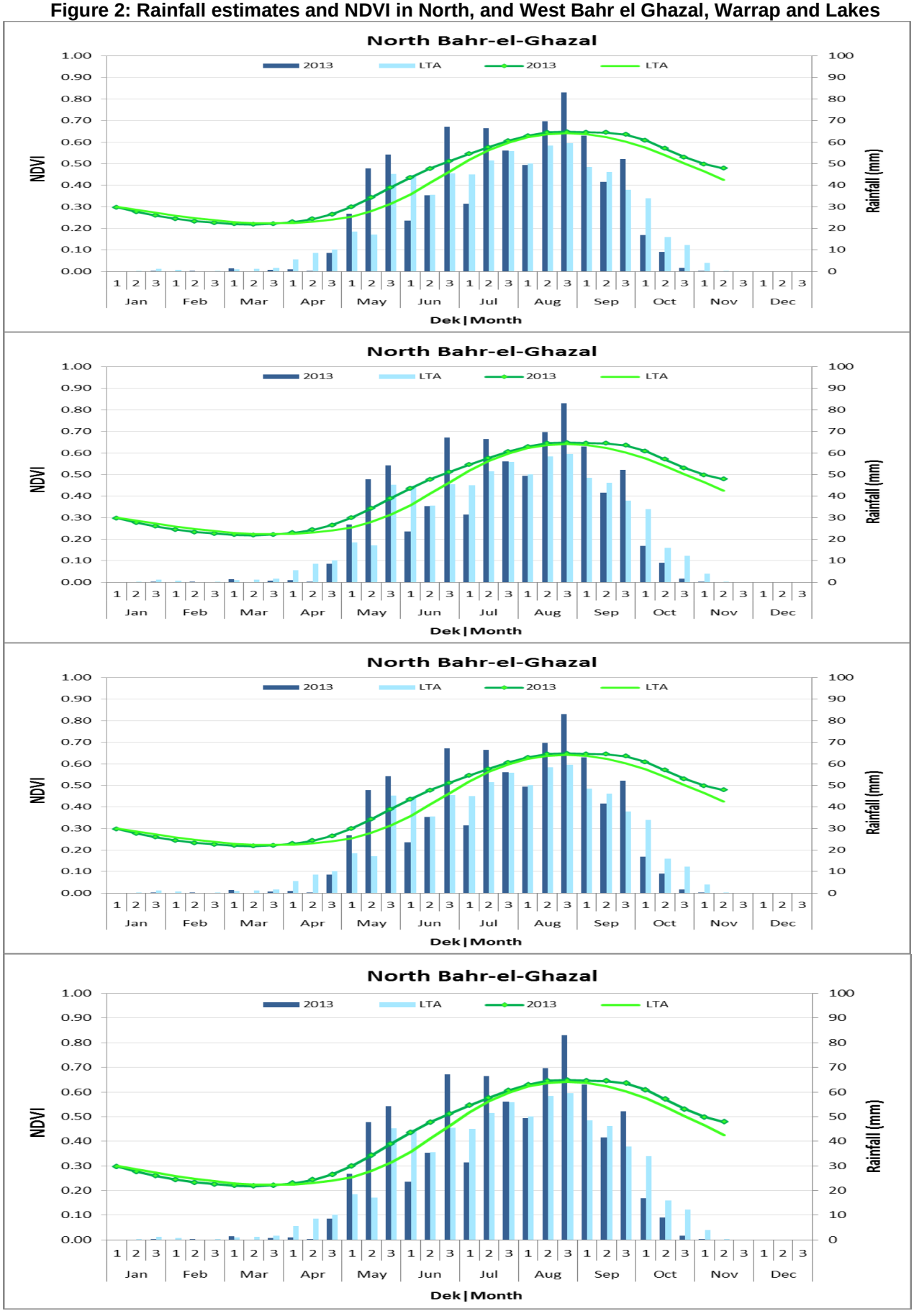
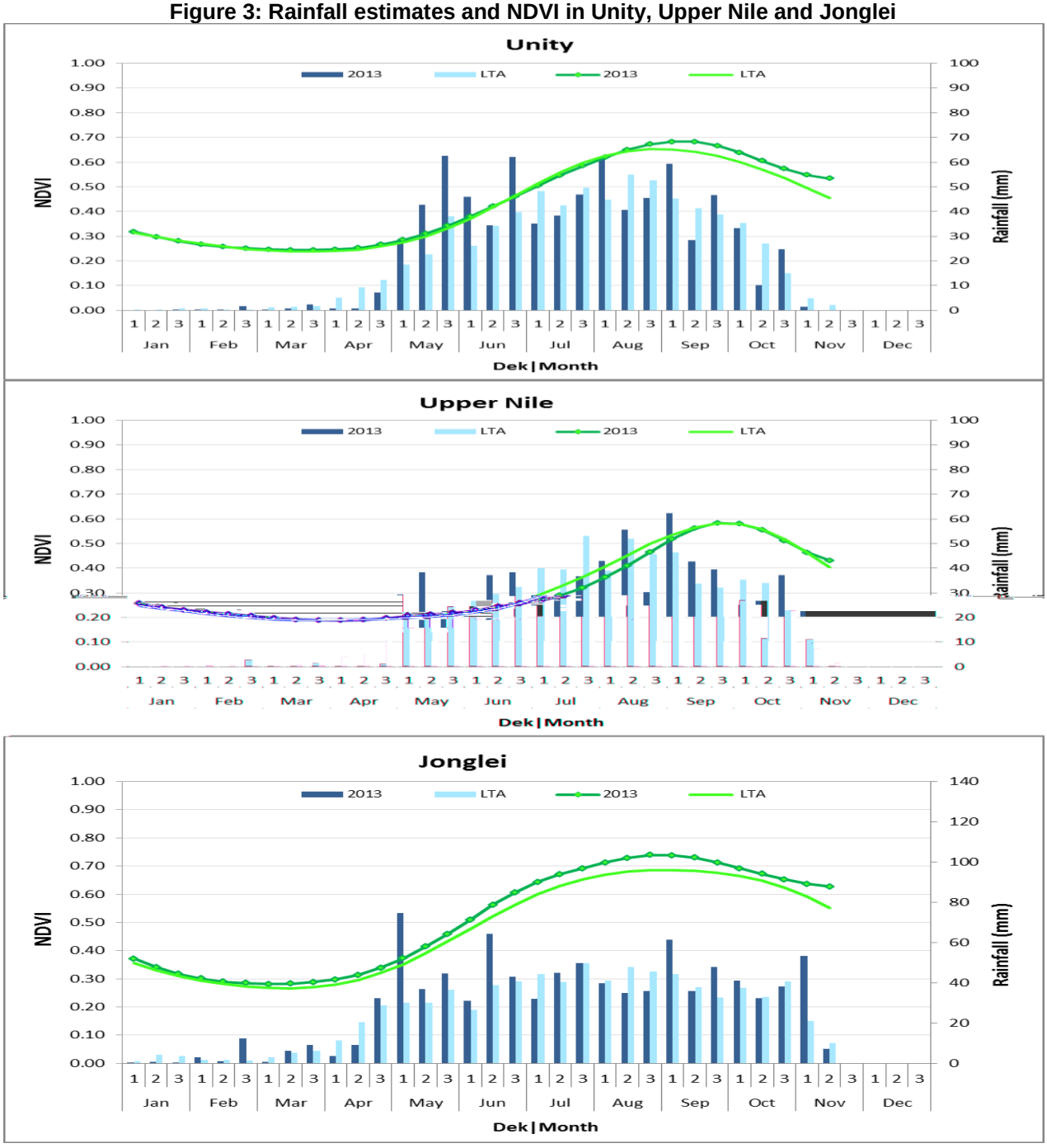


Figure 3 show biomass development curves in Greater Upper Nile states that match expectations despite a) late starts to the seasons, followed by b) heavier than usual rains in May and June, c) dry spells in July and August that are likely to have been most disruptive in Upper Nile State. Notwithstanding the foregoing, all three states of Greater Upper Nile exhibit normal or better than normal vegetative indices, with rainfall ongoing at the end of the Mission, supporting both late sown crops and extensive rattooning of sorghum.

Figure 3: Rainfall estimates and NDVI in Unity, Upper Nile and Jonglei



Overall, Figures 1, 2 and 3 match the information collected by the Mission from farmers and rain-gauges as well as transect observations made during Mission's field visits in November. At that time, the late-maturing and second-season crops were growing very well in almost all areas and the early maturing sorghum crops were noted to be "rattooning".

In all flooded and waterlogged areas encompassed in transects with the exception of Nasir county in Upper Nile State, Mission teams reported that first season crops of maize and early sorghum were harvested and the harvests of maize cobs and sorghum heads were evident in silos next to the homesteads. Such observations apply equally to most of the temporarily displaced households noted by the side of the roads, as well as to those households remaining *in situ* that were included in the Mission teams driven and walking transects.

The general effects of this year's rain may be summarised as follows:

- The later than normal start in the north-east is noted to have become increasingly more timely in a south-westerly direction across the country.
- Heavier than normal rain in May in all States, right across the country.
- Dry spells in late June and early July, caused some replanting and gap filling by sowing and by transplanting needed to overcome patchiness in germination of early/middle-cycle sorghums in June in all areas except West and Central Equatoria.
- Average or better growth and development from late June onwards and an improved crop performance to date over last year in all localities, except for the two noted above.
- Flood damage to some 33 000 households has been recorded by OCHA; and their estimated farm areas have been deducted from the county totals. Where the 2013 OCHA assessments were not yet unavailable yet areas are known locally (to have been affected, the 2012 season areas-lost were incorporated into the Mission's calculations.
- Extended planting of long-cycle sorghums and late planting of short–cycle sorghum and maize crops for December/January harvesting in all areas where such systems are traditionally practised is noted. The crops are expected to do well due to late rains. By the same token much more rattooning of early maturing sorghums that were harvested in September is noted this year; with more plants likely to yield an opportunistic grain bonus this year.

Regarding the mechanised farming sector in Unity State, the late start to the season in Upper Nile, along with insecurity last year, discouraged early planting in the demarcated (leased lands) in Renk. More timely beginnings further west (Manyo) and south (Melut) encouraged the South Sudan-based farmers to move away from the more northerly areas. The short breaks in August facilitated access to the vertisols for later planting, which supported by good rain for germination and early vegetative growth in September, resulted in the normal vegetative growth in Upper Nile noted in Figure 3, that is carried forward to the end of the year, despite a mid-October dry spell.

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 recognisable farm area, and, in some states, by the use of homestead animal dung and, across all the northern states, contracted-dunging by pastoralists' herds and flocks on private farmland. 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.

Traditional tools and equipment are the significant limiting factor 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 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.* Consequently, the average cereal area is still estimated at below one hectare per household at 0.88 ha. Greater areas are, however, cultivated under the following circumstances:

a) Through 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.
b) Through hiring labour gangs at rates according to workload – thus in West, East and Central Equatoria labour rates in 2013 ranged from SSP 215 to SSP 300/feddan for digging, compared to reports of SSP 300 for tractor ploughing and SSP 150/feddan for tractor-harrowing operations. Contracted bullock-ploughing services, in the same areas in Central Equatoria, are similarly priced. In Greater Bahr el Ghazal states, labour rates quoted at SSP 10-12/day would suggest a similar charge per feddan; however, bullock ploughing rates in Lakes, where the uptake of the technology is at its highest, are around SSP 150/ feddan.
c) Through hiring labour, whereby the wealthier farmers extend areas by using food and beer-funded labour groups (*nafeer).* Calculations provided by the Mission team which visited Warrap states suggest that the *nafeer* system may be two to three times more expensive than contracting labour gangs, tractors or pairs of bullocks.

Regarding common hand tool availability, there is no indication from Mission Team returns that a lack of hand-tools is affecting performance. Distributions of tools to returnees and returnee-affected and needy families and to adherents of particular programmes in some but not in all states have continued. More specifically, under five separately funded programmes for the 2013 agricultural season, FAO, through 28 NGO partners, has provided 51 360 households with 102 720 pieces of assorted hand tools (see Table

4). The items comprising *sickles, toriah* and *maloda* were distributed to returnees, IDPs and vulnerable host communities to arrive prior to the 2013 season.

Table 4: Hand tools and staple crop seeds distributed through FAO programmes

State	Target beneficiaries for tool distribution (number of hhs)		Assorted Hand Tools[1/] (pieces)		Assorted crop seeds[2/] (tonnes)	
	Plan	Actual	Plan	Actual	Plan	Actual
N Bahr el Ghazal	10 820	11 280	21 640	22 560	195	203
Upper Nile	7 000	1 500	14 000	3 000	126	27
Unity	6 000	3 500	12 000	7 000	108	63
Jonglei	16 500	15 500	33 000	31 000	297	279
Warrap	4 000	500	8 000	1 000	72	9
Lakes	7 720	6 860	15 440	13 720	139	123
Central Equatoria	2 620	2 620	5 240	5 240	47	47
Eastern Equatoria	10 210	10 210	20 420	20 420	184	184
W Bahr el Ghazal	890	890	1 780	1 780	16	16
SOUTH SUDAN	**58 760**	**51 360**	**117 520**	**102 720**	**1 058**	**924**

1/ Sickles, toriah & maloda.
2/ Varieties: Sorghum: local and Sekedo; Maize: Longo 5; Groundnuts: Serenut 4 (from Uganda); Cowpeas and sesame: local.

Regarding seed supply, Mission teams over the past fifteen 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. Again, this year is no exception. However, in addition to the general pattern of supply, the Mission notes other sources of supply of seeds. With FAO support, 28 NGOs have distributed a total of 924 tonnes of assorted staple crop seeds comprising both local and internationally sourced seeds (see Table 4).

Fertilisers remain at a limited level connecting to the emerging commercial units, pilot schemes and demonstration plots. A more detailed summary of uses noted this year includes:

a) Urea top dressing at 50 kg/feddan used on 2 000 feddan of rice in Aweil Rice Scheme.
b) Urea and diammonium phosphate (DAP) fertilisers used in IFDC (International Fertilizer Development Company) extension services and trials in Central and Eastern Equatoria.
c) Use of DAP on “FARM” demonstration plots in Eastern Equatoria and, possibly elsewhere.
d) Contract “on-the-hoof” dunging of farm fields in Northern Bahr el Ghazal, Warrap and Jonglei by pastoralist herds and flocks.
e) Own animal dung/household waste spreading on the valued crops/vegetables close to the homestead is practised in all states, with farmyard manure use well-regarded in farms in Northern Bahr el Ghazal, where goat-dung is noted to be differentially distributed to combat the effects of falling fertility and or *striga*.
f) The planting of valuable crops in cattle camps, a procedure noted from Jonglei to Kajo-Keji in Central Equatoria to Lakes.

Other chemical inputs are noted this year to be limited to:

a) The use of herbicides by a few mechanised farmers in Upper Nile State.
b) Insecticide use against stalk-borer in a few commercial maize growing farms in Central Equatoria.
c) Aerial spraying conducted by DLCO contractors in Melut in Unity State.

3.2.3 Pests, diseases and weeds

This year, neither in the traditional smallholder subsector nor in the large-scale, mechanized, subsector were any infestations of migratory pests noted or reported to the Mission. The main threat to late maturing sorghum, migratory Quelea birds, that does not usually materialise until January is also noted to be less likely to occur due to aerial spraying of nesting sites by DCLO contractors in Malakal, Melut, Fashoda, Baliet

and Pangikang in November, but not, however, in Manyo and Renk, where the initial surveys failed to detect nests to spray.[5]

Common non-migratory pests noted include in order of significance; local birds, grasshoppers, monkeys, rodents, termites, millipedes, stem-borer and dura-bugs (*um sharaba/manu*). Stem-borer (stalk-borer) is noted to be prevalent in the second season maize crops in Central Equatoria, probably exacerbated by continuous relay cropping of maize, up to three times per year, with no rotation, and has prompted the use of insecticides by commercial enterprises.

Regarding weeds, the main problems in a good rainfall year such as this one, as noted by the average or greater than average vegetation indices, are the local grasses that invade fields. The Mission noted that weeding once, twice and even three times was conducted throughout the traditional sector to get the best possible crops from the improved conditions and, perhaps, once in the mechanized schemes in Upper Nile State. Striga is noted to be less of a concern this year given the peace-induced, increased opportunity to shift areas of cultivation. Where farmers have continued to dig or plough exhausted plots, the plant parasite remains a problem that may be addressed by the use of fertiliser and manure. The negative effect of Striga may be partially by-passed by transplanting seedlings at 3-4 weeks old from nurseries or Striga free fields.

Regarding plant diseases, the major problems remain the same as in previous years comprising rosette virus and leaf spot of groundnuts, mosaic virus of cassava and sorghum smut.

3.3 Agricultural production in 2013

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 yield 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 491 detailed case studies with sample farmers and key informant interviews, 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. 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.

Where crops were already harvested at the time of the Mission but not threshed, which was the case for early maturing crops in Greater Bahr el Ghazal, and Greater Upper Nile Regions, observation of the farmstead granaries combined with measurements of the harvested area provided credible information on yields. In particular, the following approaches have been used:

- Yield spot-checks by weighing random samples of stored heads[6] to estimate production per plant and multiplying the average value of grain per head by the densities of harvested stems per square metre, as determined by the cut stalks in the stubble, from which data yields per hectare at each site were derived.
- Estimating the volume of sorghum heads in the household stores, determined the weight of grain per unit volume and cross-referenced the findings with the area harvested.

Cereal production is determined by multiplying yield per unit area by the disaggregated area estimates described in section 3.1 taking into account:

- Yields of cereal crops already harvested in August and September, including maize and the short-cycle sorghum landraces *Cham*, *Nanjung*, *Rapjung, Abele* (Bahr el Ghazal), *Leuwalding* (Upper Nile), *Ossingo* (East Equatoria) and *Kelle* (Central Equatoria).
- Yields of cereal crop from the ongoing harvests, which have been directly assessed by the Mission, comprising the medium-cycle sorghum landraces *Alep Cham*, *Nyethin*, *Nyandok, Rabdit, Aleul* (Bahr el Ghazal), *Atari* (East Equatoria) and *Ladoka* (Central Equatoria).

[5] State Director of Agriculture, Malakal. The action appears not to have reduced the vulnerability of the northern zones on both sides of the White Nile.

[6] Using techniques recommended for sampling heaps, the yields estimated.

- Yields of the long-cycle sorghum landraces to be harvested in December-January and short-cycle landraces planted in September and October, which are very conservatively predicted from the plant populations, maturity and overall quality of the standing crop in various vegetative stages. This third group includes the main local landraces of *Mabior* (West Bahr el Ghazal), A*iyella* (Warrap), *Kec* (Lakes), *Gude* (East Equatoria) *Agono* (Upper Nile), and *Serena*, *Bedele, Barre* and *Nyrangu* (West Equatoria).

Estimates of 2013 cereal production in the traditional sector, disaggregated by states and counties, are presented in Table 5. National gross cereal production in 2013 is estimated at about 1 115 000 tonnes. Post-harvest losses and retention of seed for sowing in 2013 are assumed to account for 20 percent of this total, leaving a net amount of about 892 000 tonnes available for local consumption. This result is 12.84 percent more than last year's adjusted net output of 790 000 tonnes and is some 22 percent above last five years' average.

As shown in Table 5, average cereal yield (gross) is estimated at 0.95 tonnes/ha, about 9.2 percent higher than last year's estimate of 0.87 tonnes/ha. However, the yield figures mask a range included in the calculations from 0.6 tonnes/ha in Unity and Upper Nile States to 1.20-1.30 tonnes/ha in Western and Central Equatoria States.

Table 5: Estimated cereal harvested area, yield, production, consumption and balance (traditional sector), 2013

State/County	Cereal area 2013 (ha)	2013 gross yield (t/ha)	2013 gross cereal production (t)	2013 net cereal production (t)	Population mid-2014	2014 cereal req't (t)	2014 surplus/ deficit (t)
Central Equatoria	**160 981**	**1.17**	**188 109**	**150 487**	**1 591 043**	**205 062**	**-54 575**
Returnees to 2013	8 940	0.65	5 811	4 649	277 606	37 480	-32 831
Juba	32 092	1.10	35 301	28 241	438 507	61 391	-33 151
Kajo Keji	40 649	1.40	56 908	45 526	233 737	28 049	17 478
Lainya	11 643	1.10	12 808	10 246	106 301	12 756	-2 510
Morobo	13 079	1.10	14 387	11 510	123 307	14 797	-3 287
Terekeka	26 858	1.00	26 858	21 486	171 831	20 620	866
Yei	27 720	1.30	36 036	28 829	239 755	29 969	-1 141
Eastern Equatoria	**138 732**	**1.05**	**145 100**	**116 080**	**1 164 603**	**144 412**	**-28 332**
Returnees to 2013	4 351	0.75	3 263	2 611	86 103	10 765	-8 154
Budi	14 843	0.90	13 359	10 687	118 107	14 173	-3 486
Ikotos	18 915	1.10	20 806	16 645	100 748	12 594	4 051
Kapoeta East	17 023	1.20	20 428	16 342	195 187	24 399	-8 056
Kapoeta North	9 236	1.20	11 083	8 867	122 689	15 337	-6 470
Kapoeta South	6 851	1.20	8 221	6 577	94 584	12 296	-5 719
Lafon	15 214	0.90	13 692	10 954	126 351	15 163	-4 209
Magwi	32 814	1.00	32 814	26 251	202 124	24 255	1 997
Torit	19 484	1.10	21 433	17 146	118 709	15 432	1 714
Jonglei	**115 570**	**0.76**	**88 019**	**70 415**	**1 824 035**	**195 701**	**-125 286**
Returnees to 2013	10 579	0.45	4 760	3 808	207 047	22 775	-18 967
Akobo	7 988	0.90	7 190	5 752	162 115	17 833	-12 081
Ayod	7 225	1.00	7 225	5 780	165 771	17 406	-11 626
Bor South	25 236	0.90	22 712	18 170	263 157	30 263	-12 093
Duk	6 964	0.50	3 482	2 786	78 062	8 197	-5 411

State/County	Cereal area 2013 (ha)	2013 gross yield (t/ha)	2013 gross cereal production (t)	2013 net cereal production (t)	Population mid-2014	2014 cereal req't (t)	2014 surplus/ deficit (t)
Fangak	10 616	0.60	6 370	5 096	131 075	13 763	-8 667
Khorflus/Pigi/ Cnl	8 522	0.60	5 113	4 090	117 909	12 380	-8 290
Nyirol	7 505	1.20	9 006	7 205	129 342	14 228	-7 024
Pibor	4 418	1.00	4 418	3 534	176 713	18 555	-15 020
Pochalla	6 003	1.20	7 204	5 763	78 791	7 879	-2 116
Twic East	4 422	0.20	884	708	101 581	11 174	-10 467
Uror	16 091	0.60	9 655	7 724	212 471	21 247	-13 524
Lakes	**107 415**	**0.87**	**93 689**	**74 951**	**1 047 726**	**108 632**	**-33 681**
Returnees to 2013	10 882	0.50	5 441	4 353	219 250	21 926	-17 573
Awerial	4 358	1.00	4 358	3 487	56 416	5 642	-2 155
Cueibet	20 227	0.90	18 204	14 563	140 150	14 015	548
Rumbek Centre	14 586	0.80	11 668	9 335	182 753	20 103	-10 769
Rumbek East	15 590	1.04	16 214	12 971	146 193	14 620	-1 649
Rumbek North	3 780	0.80	3 024	2 419	51 666	5 166	-2 747
Wulu	8 320	0.95	7 904	6 323	48 262	4 826	1 497
Yirol East	11 205	1.08	12 102	9 681	80 221	8 825	857
Yirol West	18 467	0.80	14 773	11 819	122 815	13 510	-1 691
N Bahr el Ghazal	**115 309**	**0.92**	**106 361**	**85 089**	**1 326 425**	**145 909**	**-60 819**
Returnees to 2013	14 735	0.50	7 367	5 894	468 423	51 528	-45 634
Aweil Centre	1 890	1.20	2 268	1 815	49 782	5 476	-3 661
Aweil East	47 883	0.90	43 094	34 476	368 863	40 575	-6 099
Aweil North	19 430	0.90	17 487	13 990	153 685	16 905	-2 916
Aweil South	7 507	1.00	7 507	6 006	87 843	9 663	-3 657
Aweil West	23 864	1.20	28 637	22 909	197 829	21 761	1 148
Unity	**53 921**	**0.60**	**32 278**	**25 823**	**1 028 795**	**90 300**	**-64 478**
Returnees to 2013	13 108	0.40	5 243	4 195	331 583	29 844	-25 649
Abiemnhom	835	0.40	334	267	20 247	1 721	-1 453
Guit	1 794	0.70	1 256	1 005	39 281	3 338	-2 334
Koch	6 623	1.00	6 623	5 299	89 101	7 573	-2 275
Leer	4 105	0.60	2 463	1 971	63 106	5 365	-3 394
Mayendit	4 600	0.60	2 760	2 208	64 012	5 441	-3 233
Mayom	8 869	0.40	3 547	2 838	143 673	12 212	-9 374
Panyijar	4 515	0.40	1 806	1 445	60 370	5 132	-3 687
Pariang	6 678	0.90	6 010	4 808	98 122	8 341	-3 533
Rubkona	2 794	0.80	2 236	1 788	119 299	11 333	-9 545
Upper Nile	**83 645**	0.60	**49 937**	**39 949**	**1 256 382**	**104 958**	**-65 009**
Returnees to 2013	3 240	0.30	972	778	108 623	9 240	-8 462
Baliet	4 029	0.80	3 223	2 578	57 141	4 572	-1 993
Fashoda	4 910	1.00	4 910	3 928	43 463	3 477	451

State/County	Cereal area 2013 (ha)	2013 gross yield (t/ha)	2013 gross cereal production (t)	2013 net cereal production (t)	Population mid-2014	2014 cereal req't (t)	2014 surplus/ deficit (t)
Longochuk	3 733	0.60	2 240	1 792	75 179	6 015	-4 223
Luakpiny/Nasir	14 100	0.20	2 820	2 256	249 941	19 995	-17 739
Maban	4 546	0.60	2 728	2 182	53 842	4 307	-2 125
Maiwut	4 725	0.60	2 835	2 268	94 575	7 566	-5 298
Malakal	5 860	1.00	5 860	4 688	150 538	14 301	-9 612
Manyo	4 654	0.80	3 724	2 979	45 239	3 619	-641
Melut	5 310	0.80	4 248	3 398	58 607	4 689	-1 291
Panyikang	2 522	0.80	2 017	1 614	54 067	4 325	-2 711
Renk	19 767	0.60	11 860	9 488	163 949	14 756	-5 267
Ulang	6 249	0.40	2 499	2 000	101 218	8 098	-6 098
W Bahr el Ghazal	**62 026**	**1.01**	**62 549**	**50 039**	**527 929**	**59 227**	**-9 188**
Returnees to 2013	6 087	0.90	5 478	4 383	131 084	14 420	-10 037
Jur River	17 534	0.90	15 780	12 624	152 071	16 728	-4 104
Raga	9 553	1.00	9 553	7 643	64 675	6 467	1 175
Wau	28 852	1.10	31 737	25 390	180 099	21 611	3 778
Warrap	**166 944**	**0.75**	**125 430**	**100 344**	**1 330 311**	**129 773**	**-29 429**
Returnees to 2013	5 770	0.45	2 597	2 077	172 346	17 239	-15 162
Abyei	5 936	0.90	5 342	4 274	62 941	5 664	-1 391
Gogrial East	18 138	0.75	13 604	10 883	122 926	11 678	-795
Gogrial West	39 539	0.77	30 445	24 356	290 311	30 483	-6 127
Tonj East	21 699	0.45	9 765	7 812	138 207	13 821	-6 009
Tonj North	25 543	0.80	20 435	16 348	196 645	19 664	-3 316
Tonj South	13 620	0.75	10 215	8 172	103 061	9 275	-1 103
Twic	36 699	0.90	33 029	26 423	243 875	21 949	4 474
Western Equatoria	**169 171**	**1.32**	**223 532**	**178 826**	**803 983**	**116 578**	**62 248**
Returnees to 2013	2 581	1.15	2 968	2 374	67 224	9 747	-7 373
Ezo	26 142	1.30	33 984	27 187	96 240	13 955	13 233
Ibba	15 049	1.40	21 068	16 854	49 832	7 226	9 629
Maridi	20 480	1.40	28 671	22 937	98 144	14 231	8 706
Mundri East	7 946	1.10	8 741	6 993	57 507	8 339	-1 346
Mundri West	5 588	1.20	6 705	5 364	40 437	5 863	-499
Mvolo	7 327	1.20	8 792	7 034	57 288	8 307	-1 273
Nagero	3 079	1.10	3 387	2 709	11 993	1 739	970
Nzara	23 778	1.40	33 290	26 632	78 209	11 340	15 291
Tambura	20 788	1.20	24 946	19 957	65 895	9 555	10 402
Yambio	36 414	1.40	50 980	40 784	181 214	26 276	14 508
SOUTH SUDAN	**1 173 714**	**0.95**	**1 115 005**	**892 004**	**11 901 233**	**1 300 552**	**-408 548**

Table 6: Cereal harvested area and net production in the traditional sector, 2009-2013

Zones/States	2009			2010			2011			2012 (revised)			2013		
	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	**218**	**90**	**0.41**	**261**	**156**	**0.60**	**230**	**99**	**0.43**	**243**	**112**	**0.46**	**254**	**136**	**0.53**
Upper Nile	77	34	0.44	78	49	0.63	68	26	0.38	83	38	0.46	84	40	0.48
Unity	37	18	0.49	40	24	0.60	34	8	0.24	47	15	0.32	54	26	0.48
Jonglei	104	38	0.37	143	84	0.59	128	65	0.51	113	59	0.52	116	70	0.60
BAHR EL GHAZAL	**298**	**223**	**0.75**	**319**	**254**	**0.82**	**263**	**166**	**0.63**	**448**	**287**	**0.64**	**451**	**310**	**0.69**
N Bahr el Ghazal	71	49	0.69	79	60	0.76	68	40	0.59	119	78	0.66	115	85	0.74
W Bahr el Ghazal	39	30	0.77	37	34	0.92	41	35	0.86	61	48	0.79	62	50	0.81
Lakes	69	53	0.77	76	66	0.87	70	45	0.65	99	70	0.70	107	75	0.70
Warrap	119	90	0.76	126	94	0.75	84	46	0.55	169	91	0.54	167	100	0.60
GREATER EQUATORIA	**335**	**228**	**0.68**	**343**	**284**	**0.83**	**366**	**297**	**0.81**	**451**	**391**	**1.15**	**468**	**445**	**0.95**
Central Equatoria	121	72	0.60	127	93	0.73	123	78	0.63	155	114	0.92	160	150	0.94
Eastern Equatoria	98	53	0.54	103	79	0.77	115	99	0.87	135	116	1.07	139	116	0.83
Western Equatoria	116	102	0.88	112	112	1.00	129	120	0.93	161	161	1.25	169	179	1.06
SOUTH SUDAN	**852**	**541**	**0.63**	**921**	**695**	**0.75**	**860**	**563**	**0.65**	**1 141**	**790**	**0.69**	**1 173**	**892**	**0.76**

B. Mechanized sector

South Sudan's rain-fed mechanized sector includes the demarcated large-scale farmers in Upper Nile State; the un-demarcated *traditional* tractorized farmers of Renk and Malakal who hire tractors from the large-scale farmers; and recorded rice scheme in N. Bahr el Ghazal. There are also a) mechanized areas in other states, particularly in Greater Equatoria, but they are unaccounted for in the assessments, as are b) the emerging commercial farms of a smaller scale that are either expanding through the use of labour gangs, digging fields by hand or by using animal traction.

On the large scale farms, mechanization is limited to land preparation and drilling of seed using seed boxes placed over the 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, White Nile State, Sudan. In Renk and Malakal and in the leased land locations in-between these two sites, trader-farmers follow a low-cost, low-output farming system used extensively in Sudan since the 1970s, where the farms cover millions of hectares across the eastern and central clay plains, and may be best described as *mechanized shifting cultivation*. Mission visits note that this year in Renk and Manyo Counties, individual farms may cover several thousands of hectares cultivated under this simple system, which involves a single pass of disc harrows, followed by a second pass with the same disc harrows with a seed drill attached. All inputs for this subsector are sourced from Kosti this year 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 have received seasonal loans this year from the Khartoum-based banks that support activities this side of the border.

Mission transects and farm visits in Renk, Manyo and Malakal (Mohamed el Jack) and observations from the air over Fashoda and Melut, suggest that this year many of the South Sudan trader-farmers have moved southwards, away from Renk to Melut, in search of better rains and fewer security risks. The Sudan-based farmers noted by the Mission appear to be concentrated westwards across the river in Manyo County. The area and production estimates for sorghum in the mechanised subsector for the 2013 planting season are given in Table 7.

Table 7: Area and production estimates of the mechanized subsector

Location	Tractors-active (units)	Area cultivated (ha)	Area harvested (ha)	Yields (t/ha)	Expected production (t)
Renk	80	33 473	16 736	0.430	7 200
Melut	77	22 594	21 757	0.537	11 700
Manyo	100	66 946	52 301	0.346	18 125
Baliet	23	6 276	6 276	0.537	3 375
Akoka	4	1 674	1 673	0.537	900
Maban	2	837	837	0.537	450
Fashoda	7	3 222	3 222	0.537	1 733
Malakal	7	4 184	4 184	0.645	2 700
Panikang	3	1 046	1 046	0.645	675
Subtotal large scale	**303**	**140 251**	**108 033**	**0.434**	**46 858**
Subtotal small scale			**27 196**	**0.717**	**19 500**
Total Upper Nile State					**66 358**
Aweil rice			**874**	**2.5**	**2 185**
Grand Total					**71 543**

On all the large farms, harvesting is opportunistic. 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[7], the estimated yield and the prevailing market price.

The estimated overall yield of short and long maturing sorghum varieties in Renk is put at 0.43 tonnes/ha, similar to the low yield noted in 2011 (0.4 tonnes/ha). Migratory birds are expected to have *less* of a negative impact on the yield of sorghum in the large farms this year as, for the first time since independence, aerial spraying of the nesting sites of *Quelea quelea* birds has been carried out in November. At the same time, the

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

Mission Team visiting Renk reported sowing in June, July and August of the short-maturing, varieties of *Afergadamech and Wad Ahmed* that now cover most of the planted area. As a consequence, much of the harvest will probably be collected (if not threshed) before the bird threats materialise.

Cereal production from the rain-fed mechanized sector in Upper Nile State is put at a low level of about 46 800 tonnes. The mechanised small farmer, mostly undemarcated, subsector is likely to add a further 19 500 tonnes, and the Aweil Rice Scheme, with yields this year expected to be 2.5 tonnes/ha from 874 hectares adds a further 2 185 tonnes to the cereal balance. Summing all these amounts gives a total of approximately 71 000 tonnes, similar to the amount noted in 2011, which connects to an extra 57 000 tonnes net (considering 20 percent losses and seed use).

3.3.2 Other crops

Cassava provides a food safety net across the country south of Raga and Wau counties, while groundnuts (with their short growing season and nutritional flexibility) offer another form of safety-net on farms north of Raga and Wau, insomuch as they are often planted as an alternative to sorghum if the first planting of sorghum fails. Regarding cassava, the importance of which increases towards the south and west; in Rumbek (Lakes), the crop is planted around plots and household boundaries. In Wau and Raga, it is planted either as a sole crop or intercropped with sorghum and sesame. In Western and Central Equatoria, 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 and is noted regularly to be the last crop in a rotation that includes maize (two times per year), groundnuts and sorghum. Both sweet and bitter cassava varieties are grown as they have different maturation periods, ranging from 12 to 24 months. Most farms in the main growing areas follow the two-year cycle, harvesting tubers from 18 to 24 months, which is traded locally in the form of tubers, and farther afield from the farms as dried cassava chips, cassava flour or starch granules.

Yields vary significantly with the agro-ecology and plant densities and are noted by Mission teams this year to achieving 30 to 35 tonnes of fresh tubers per hectare in both Central and Western Equatoria.

In 2012, the Mission has attempted to quantify cassava production for the first time by calculating probable area to be harvested and assigning yields based on PET transect observations regarding (a) the prevailing cropping system, (b) plant density and (c) spot-checked yields per plant that have been conservatively extrapolated to give an indicative performance for the crop in each state.

Table 8 reproduces the estimates of area and production for both cassava and groundnuts used last year, as Mission teams, while confirming very high yields and the importance of the two crops, provided no improved data for either crop indicating that separate studies should be conducted during the coming year to determine the validity of the figures used.

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 4 000 tonnes that is likely to be purchased immediately from the field by Sudanese traders.

Table 8: Indicative performance estimates of cassava and groundnuts by state

States	Cassava (two years)			Groundnuts		
	Area (ha)	Yield (t/ha)	Production (fresh, t)	Area (ha)	Yield (t/ha)	Production (unshelled, t)
Central Equatoria	15 002	15	225 030	36 140	0.6	21 684
Eastern Equatoria	14 072	12	168 864	22 247	0.6	13 348
W. Equatoria	38 671	18	696 078	34 077	0.6	20 446
Jonglei	0	0	0	14 814	0.5	7 407
Upper Nile	0	0	0	0	0	0
Unity	0	0	0	3 360	0.4	1 344
Lakes	5 083	10	50 830	16 481	0.5	8 241
Warrap	0	0	0	32 692	0.5	16 346
W Bahr al Ghazal	5 158	12	61 896	10 605	0.6	6 363
N Bahr al Ghazal	0	0	0	20 514	0.5	10 257
SOUTH SUDAN	**77 986**	**15**	**1 202 698**	**190 930**	**0.55**	**105 436**

3.3.3 Livestock

As noted last year, the most recent documented estimate of cattle numbers, made by FAO in 2009, suggests a cattle population of 11.7 million head, similar to contemporary population estimates of sheep and goats at around 12 million head each. As was the case last year, the Mission's key informant from the Ministry had no further information on numbers or production. Mission observations suggest that, for cattle, 1) with the age at first calving being at least three 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 are unlikely to make up more than 30-35 percent of the estimated numbers noted above. Furthermore, with calving intervals of three years as noted by Mission teams, and a potentially high death-rate of young stock (15-20 percent), any unit of 100 head 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.

Estimates for agro-pastoralist flocks of sheep and goats at 0.1 to 0.4 percent per annum identified in Ethiopia (Negussie el al (2003) Analysis of 2002 Agricultural Census Survey, CSA, Addis Ababa) are also likely to apply to the agro-pastoralist herds and flocks in South Sudan. Therefore, corresponding calculations for sheep and goats have been made, that suggest that the current population (2013) of small ruminants may be in the order of 24.5 million head.

With regard to the applicability of these data, no progress has been made on identifying indicator units of breeding females within herds, recommended buy earlier CFSAMs. The reproductive performance of indicator units could be monitored throughout the year using simple farmer/herder run records in selected zones[8], thereby building on the data collected by livestock researchers in Sudan in the late 1970s and early 1980s[9]. Such records could then be analysed to produce regular sets of indicators such as birth rates (calving and lambing percentages), adult and postnatal death rates, weaning percentages, calving intervals and other performance related indicators that might provide an insight into livestock production for the year in question.

[8] Recommended previously in CFSAMs.
[9] WSARP (Western Sudan Agricultural Research Project).

Table 9: Revised cattle numbers ('000) by state, 2009-2013

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

Source: Mission's projections from FAO livestock population estimate (2009).

More information regarding health, pasture, water, animal body condition and sales is available from MoARD (FAO Liaison Officer) and from Vétérinaires Sans Frontières (VSF), Belgium, and collected by Mission teams and can be summarised as follows:

1) Nationally, the grazing systems are intact and the general transhumance pattern of movement is being accomplished without any significant changes noted.
2) Mission teams reporting from 43 counties confirm readily available water and abundant pasture in most locations. As against this, i) the Mission teams report water-logging restricting early access to pasture and aggravating foot problems. ii) Mission team in Upper Nile (Manyo County) report an early movement of livestock down the livestock corridors from White Nile State.
3) All Mission teams report that the body condition of non-milking livestock, assessed during transects travelled through the 43 counties, is noted to be good (PET Body Condition 3 to 4). NB-where a distinction was made between milking and of any of the species, the milkers were scored lower at PET Body Condition 1-2. In general, the returns confirm reasonable access to feed and water at this stage in the annual cycle.
4) Increased livestock prices are reported across the country, clearly indicating a firm market and sufficient available pasture and water resources to encourage herders to retain breeding stock and traders to retain store stock to fatten to utilise the pasture while it exists.
5) Incidents of endemic diseases noted include haemorrhagic septicaemia (HS), black-quarter (BQ), contagious bovine pleuropneumonia (CBPP), anthrax, East Coast Fever (ECF), peste des petits ruminants (PPR), sheep pox (SP), Newcastle disease (ND), contagious caprine pleuropneumonia (CCPP), foot and mouth disease (FMD), lumpy-skin disease, and the presence of internal and external parasites. However, no epidemics/outbreaks have been noted.
6) Vaccination programmes have yet to start.

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 visited by the Mission team is one example of an enterprise looking to diversify in such directions. In this regard, it is surprising that more attention is not given to the availability of cassava growing in quantity in the Greenbelt.

Fishing is considered to have a significant effect on diet throughout the riverine and swamp counties. Nationally, the annual catch is estimated to be between 40 000 and 45 000 tonnes as in previous years.

4. CEREAL SUPPLY/DEMAND SITUATION

4.1 Cereal balance

IMPORTANT: As large stocks in urban and peri-urban area as well as along rural corridors have been looted or destroyed, the estimated deficit would be upward revised, especially for the states that have been most affected by the conflict (Jonglei, Unity and Upper Nile).

As shown in Table 5, total cereal consumption in 2014 is estimated at about 1.30 million tonnes, using a projected 2014 mid-year population of about 11.9 million people (including about 2 million returnees) and an average per capita consumption of 109 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. In particular, the estimated production of 1.2 million tonnes of fresh cassava and 105 400 unshelled groundnuts is expected to provide some 463 000 tonnes of grain equivalent, boosting estimated average per capita consumption to 150 kg of cereal equivalent per year, suggesting a level fairly close to estimates for neighbouring countries.

With an estimated net cereal production from the traditional sector of approximately 892 000 tonnes, a cereal deficit of about 408 500 tonnes is forecast for the 2014 marketing year, about 13 percent less than last year's revised estimate. Table 10 summarizes the estimated cereal supply situation for each state in 2014 and compares it with the Mission's estimates for the previous two years. As in the past, the largest shortfall in 2014 is forecast in Jonlgei state, with about 125 000 tonnes. Only Western Equatoria state is expected to register a surplus, while Western Bah el Ghazal state shows a relatively small deficit. At county level, even, in states expected to be in deficit, some surpluses are expected in Kajo Keji (Central Equatoria); Ikotos, Magwi and Torit (Eastern Equatoria); Wulu, Yirol East and Cuibet (Lakes); Aweil West (Northern Bahr el Ghazal); Fashoda (Upper Nile); Raga and Wau (Western Bahr el Ghazal); and Twic (Warrap).

Table 10: Estimated cereal surplus/deficit, 2012-2014

States	2012	2013	2014
Central Equatoria	-86 861	-84 183	-54 575
Eastern Equatoria	-26 701	-23 846	-28 332
Western Equatoria	30 380	47 778	62 248
Jonglei	-98 487	-129 793	-125 286
Upper Nile	-67 172	-63 269	-65 009
Unity	-58 161	-72 030	-64 478
Lakes	-42 288	-35 167	-33 681
Warrap	-58 241	-34 885	-29 429
Western Bahr el Ghazal	-9 719	-9 387	-9 188
Northern Bahr el Ghazal	-56 404	-63 093	-60 819
SOUTH SUDAN	**-473 653**	**-467 875**	**-408 548**

About two million returnees have been registered by IOM since 2008. As they are considered to be less involved in farming activities than the resident population[10], while they fully count as consumers, some 190 000 tonnes of cereals, about 46 percent of country's deficit, are needed to cover returnees' food needs, mainly in Northern Bahr el Ghazal, Central Equatoria, Unity and Jonglei States.

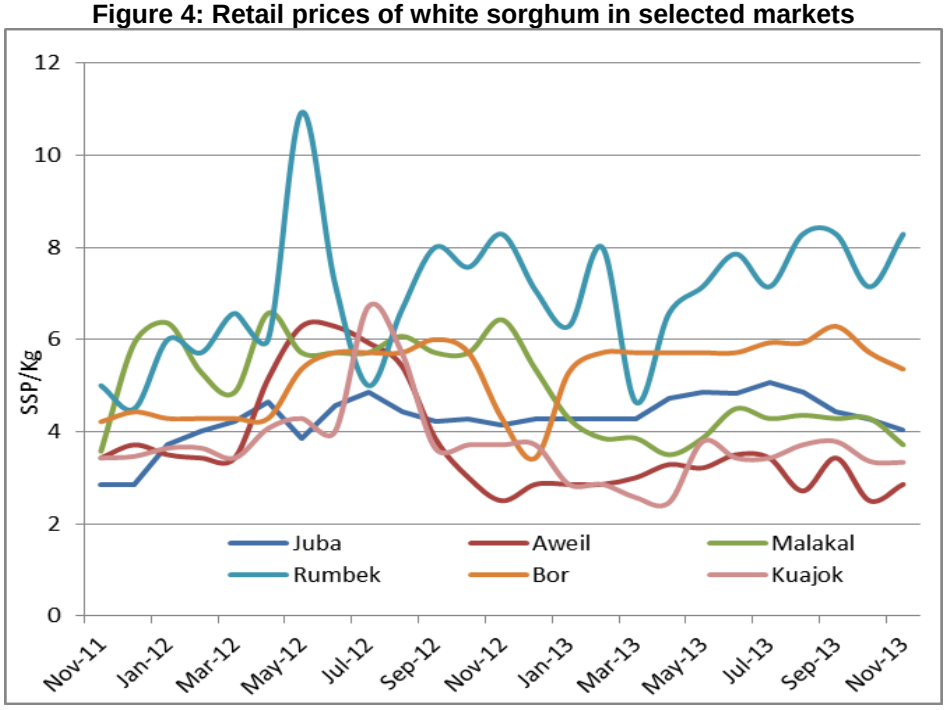
Cereal production from the rain-fed large and small mechanized sector in Upper Nile is expected to provide an additional 57 000 tonnes of cereals and they are in part expected to be commercialized in South Sudan, depending on transportation costs of shipping grains to main local markets, security conditions 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.

[10] After discussion with IOM, the Mission estimated that 60 percent of returnees' households are involved in farming activities, compared to the national average (excluding returnees) of about 75 percent.

4.2 Cereal and livestock markets

Prices of locally produced sorghum and maize normally decline in September/October following the start of the main harvest (which is usually completed in February) and remain generally stable through to March, before rising and peaking in August/September. As illustrated in Figure 4, nominal retail prices of white sorghum have risen sharply, above normal seasonal increases, since mid-2011, reaching record levels in June/July 2012. Subsequently, prices declined between August and November 2012 as the 2012 harvest increased supplies. During the first half of 2013, prices increased following seasonal patterns, but in most markets they remained well below the peaks reached in June/July 2012 due the adequate supplies from the satisfactory 2012 harvest. Then prices have started to decline in August 2013, a few weeks earlier than usual, as the good prospects for current crops became apparent and traders decided to gradually release their stocks. Price declines continued in following months, benefiting from increased supplies of newly harvested (green) crops and diminished demand by households due to increased consumption of own production. In particular, from August to November, retail prices of sorghum decreased by between 10 and 23 percent in Juba, Bor, Malakal, Bentiu, and Kuajok markets. By contrast, sorghum prices showed a marked volatility in Aweil in Northern Bahr el Ghazal State and Rumbek in Lakes State due to marketing disruptions caused by floods in September. Overall, sorghum prices in November were below or around their levels of 12 months earlier in most monitored markets.

Figure 4: Retail prices of white sorghum in selected markets



Prices of maize (Figure 5), mostly imported from neighbouring Uganda and consumed in southern areas, were stable in Juba since the beginning of 2013, but increased in August due to heavy rains which caused the flooding of Elego market in northern Uganda, a key trade centre near the border. Subsequently, they declined by 17 percent between August and November, due the normalization of trade flows compounded by the increased availability of locally produced sorghum, and November prices were at the same levels of 12 months earlier. Prices of wheat flour, mainly imported and consumed in urban areas, were stable in recent months in Juba, at about SSP 6 per kg, similar to the levels of 12 months earlier, but well below the peaks recorded in 2011 and 2012.

Figure 5: Retail prices of selected cereals in Juba

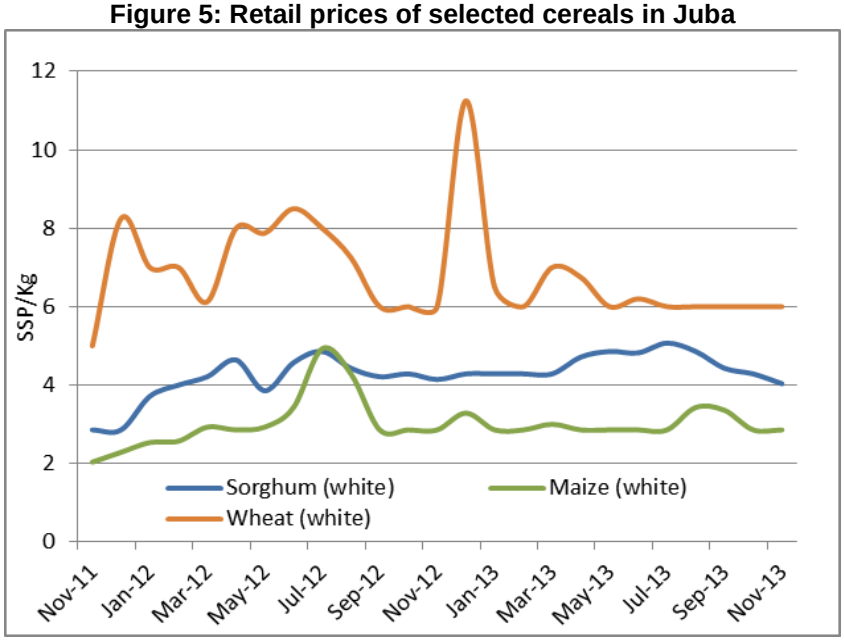
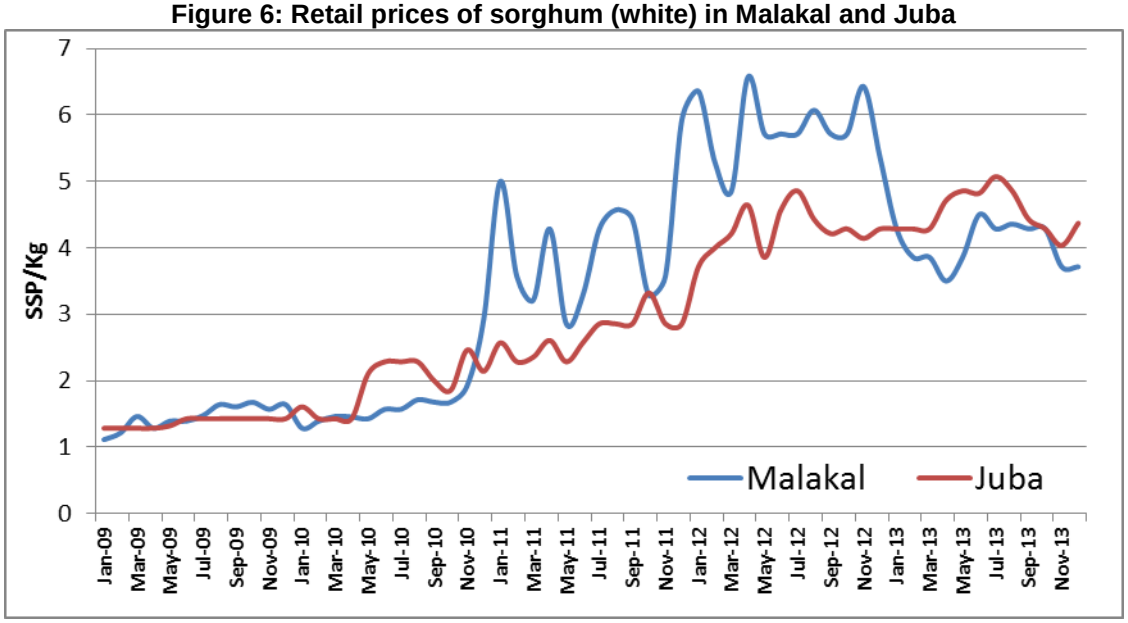


Figure 4 also shows the existence of significant price differentials between markets, illustrating limited spatial market integration. These differentials can be mainly attributed to three factors:

1) High freight tariffs due to the poor transport infrastructure: road density in South Sudan is among the lowest in Africa and road conditions are often patchy, especially during the rainy season (May-October), forcing trucks to carry small loads over long distances, thus increasing the average unit cost of transportation. Limited competition of transport services and high risk factor also contribute to the high unit cost of transport in South Sudan.
2) Asymmetry of trading patterns: trade between South Sudan and Sudan, Uganda and Kenya is highly asymmetric with the volume of exports from these countries being disproportionately larger than the volume of exports from Sudan. This implies that trucks transporting goods from Sudan, Uganda and Kenya to South Sudan usually return back empty, doubling transport costs faced by trucking companies.
3) Fuel shortages and fuel costs differentials: as a result of the low road density and the poor road conditions, distribution of fuel can be easily delayed and disrupted, causing shortages and high price differentials (as much as 100 percent) between different parts of the country. During the last 12 months, the average price of one litre of diesel fuel was SSP 6 in Juba, about SSP 8 in Bor and Rumbek, and almost SSP 12 in Malakal and Bentiu.

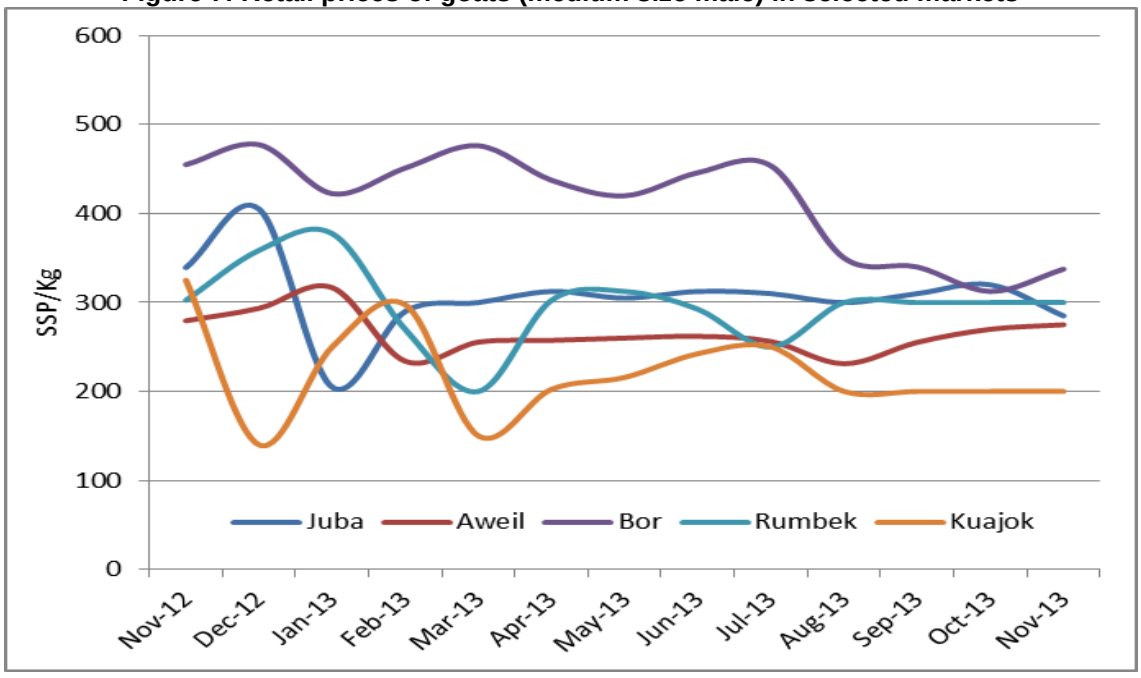
Given the high degree of market segmentation, the imposition of trade restrictions with Sudan since 2011 has severely constrained local supplies in northern markets. As shown in Figure 6, before the border closure, sorghum prices in Malakal were traditionally similar or lower than in Juba, while afterwards they became more expensive due to high transportation costs, multiple check points, roadblocks and the payments of several formal and informal taxes. Average price of sorghum in Malakal during 2009 and 2010 was 6 percent lower than in Juba; then, after the independence referendum held in January 2011, prices in Malakal surged and were extremely volatile, remaining much higher than in Juba in the following two years: average price of sorghum in Malakal during 2011 and 2012 was more than 40 percent higher than in Juba. Subsequently, in late 2012/early 2013, sorghum prices sharply decreased in Malakal (-40 percent between November 2012 and January 2013) and in 2013 the average price of sorghum in Malakal was about 10 percent lower than in Juba. The sharp drop in prices in late 2013/early 2012 can be partly attributed to increased availabilities following the 2012 harvest of crops in the large-scale mechanized sector in Upper Nile State. In the past, these crops traditionally flowed toward Sudan, but part of the 2012 harvest is likely to have been locally commercialized as export flows towards Sudan may have been discouraged by the significant devaluation of the Sudanese Pound in July 2012. The decrease in prices in Malakal (both in absolute terms and relative to Juba) may also be attributed to better relations with Sudan after the signing of the Cooperation Agreement in September 2012 and the adoption of the Implementation Matrix in March 2013, which improved security conditions along the border with positive effects on trade flows between cropping areas and main markets.

Figure 6: Retail prices of sorghum (white) in Malakal and Juba



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 7, goat prices (male medium size) were stable or slightly increased in most markets since August, due to a generally good pasture and water availability. By contrast, in Bor market in Jonglei State, civil insecurity and widespread displacement induced distress sales of livestock and depressed local demand leading to a decline of by more than 25 percent between July and November of goat prices. Across the country, the Mission expects that goat prices remain stable during first months of 2014 due to generally good conditions of pasture in most livestock areas.

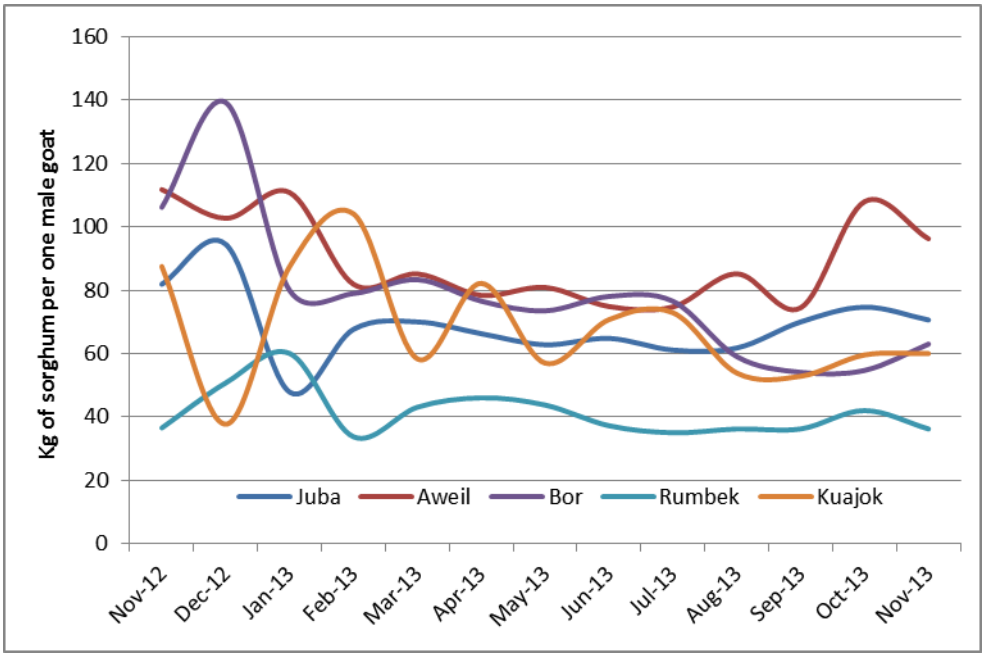
Figure 7: Retail prices of goats (medium size male) in selected markets



Since August 2013, the decline of grain prices, coupled with stable or slightly increasing goat prices in most markets, has generally improved pastoralists' purchasing power (see Figure 8). In Juba, terms of trade increased by about 14 percent between August and November 2013 as the exchange of one medium size male goat passed from 62 to 71 kg of sorghum. Similarly, in Aweil, increasing goat prices, coupled with a decreasing (albeit irregular) trend in sorghum prices from August onwards, strengthened terms of trade in favour of pastoralists and a goat was traded in November for almost 96 kg of sorghum, 13 percent more than in August. In Bor, by contrast, the steep decline in goat prices from June 2013 onwards was only partially offset by decreasing sorghum prices: as a result, terms of trade for pastoralists declined by about 18 percent

from June to November, when a goat was traded for 63 kg of sorghum, about 40 percent less than 12 months earlier, when it was traded for 106 kg of sorghum.

Figure 8: Terms of trade (sorghum per one medium size male goat) in selected markets



5. HOUSEHOLD FOOD SECURITY SITUATION

IMPORTANT: A major military confrontation erupted in mid-December 2013, soon after the end of the CFSAM field work and information gathering in the country. Food security prospects for 2014, usually provided by this section, have therefore changed considerably. To account for this, an additional section has been added to this report, detailing the likely impacts of the conflict and how it may affect the food security situation in South Sudan in 2014.

The present section, however, contains an overview of the food security situation **before the conflict erupted**. It provides a pre-conflict baseline analysis as well as important elements on factors affecting food availability and access that are relevant to evaluate the potential impacts of the conflict.

5.1 Methodology

In 2013, according to the CFSAM methodology, the Mission undertook extensive field visits throughout the 10 states of South Sudan to collect information on agricultural production and its determining factors. This section provides an analysis of how agricultural production relates to food security based on data from the Food Security Monitoring System (FSMS) run by WFP and partners (FSTS, UNICEF, FAO, MOAF).

The FSMS was initiated in 2010 and has established itself as the crucial source of information on the food security situation in South Sudan. The FSMS holds 3 rounds per year, February, June and October, thereby including the key food security stages during the season – most favourable period, October, right after or at harvest time, the least favourable in June, at the peak of the lean season and February, midway between these two stages.

Each FSMS round covers all 10 states. In each state, 10 sentinel sites have been purposively selected through a consultative process at the state-level, taking into account the representation of various livelihood zones and administrative areas 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 2500 households across the country.

By October 2013, eleven rounds of data collection had taken place with the latest round being conducted on 1-15 October 2013, just prior to the CFSAM field work (see Table 11). The analysis in this section is based on a consolidated dataset consisting of data from the Annual Needs and Livelihood Assessments (ANLA)

surveys of late 2008 and 2009 and ten rounds of FSMS conducted between October 2010 and October 2013 (the very first FSMS round of July 2010 covered only two states).

The next FSMS round was planned for February 2014, but at the time of finalising this report, conditions are not conducive to large scale field work and emergency assessments will likely be carried out as soon as feasible.

Table 11: List of datasets used for the food security analysis

Data	Date	States
ANLA 2008/2009	October 2008	
ANLA 2009/2010	October 2009	CESU[1/], EES, NBS, WBS, Lakes, Unity, Upper Nile, Jonglei, Warrap
FSMS 2	October 2010	EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 3	February 2011	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jongle
FSMS4	June 2011	CES, WES, EES, NBS, WBS, Upper Nile, Warrap, Jonglei, Lake
FSMS5	October 2011	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS6	February 2012	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS7	July 2012	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS8	October 2012	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS9	February 2013	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 10	July 2013	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei
FSMS 11	October 2013	CES, WES, EES, NBS, WBS, Upper Nile, Unity, Lakes, Warrap, Jonglei

1/ Taken March 2010.

5.2 Food security context for 2012-2013

5.2.1 Main drivers of food insecurity

Two major factors determined the general food security situation for South Sudan around the time of the Mission: the improved crop production resulting from a broadly favourable rainfall pattern in 2013 and the declining staple food prices relative to the peaks of 2012. Inter-communal and inter-ethnic conflicts during 2013 have caused important but localized impacts on the food security of households; the returnee influx from Sudan, while now much reduced compared to previous years, has a permanent effect on cereal requirements for the country.

Crop production in 2013: As a result of favourable rainfall, net cereal production in 2013 (see tables and full details in Section 3) for consumption in 2013-14 is expected to reach 892 000 tonnes, about 22 percent above the average of the previous 5 years and 13 percent above that of the last season. This leads to a cereal deficit of 408 000 tonnes. While this represents an improvement over the previous season (deficit of just under 468 000 tonnes), it still remains elevated and does not mark a significant departure from the significant deficits that have prevailed in the previous 4 years. Extensive flooding had reduced impact as it mostly occurred after the harvest of the first crops, while late maturing varieties are water logging resistant and benefited from the increased soil moisture.

Market prices: The border with Sudan remains closed and trade flows across it remain very restricted with the exception of unofficial flows through selected border areas, a feature which is of particular relevance to the northernmost states (Bahr el Ghazal, Warrap, Unity, and Upper Nile). The resulting trade gap has been filled by food commodities and other goods mostly imported from Uganda. The long distances involved and poor road network, the very expensive fuel, unfavourable exchange rates, taxes both official and unofficial, have contributed to high prices in the past couple of years. This year the impact of two good harvests, more favourable exchange rate and lower tax load, led to post-harvest prices lower than has been the case in the recent past (see Section 4.2 for details) particularly in northern states (North Bahr el Ghazal, Warrap, Unity and Upper Nile).

Refugees, returnees, inter-communal conflict and IDPs: Cross border conflict with Sudan (South Kordofan and Blue Nile), led thousands of residents to flee into exile in South Sudan in the first half of 2012. IOM estimates the refugee population at over 220 000, the vast majority in Upper Nile and Unity states (122 000 and 76 000 respectively) as of October 2013. This refugee population will present major food requirements for 2014 (see section on Estimated Food Assistance Requirements).

In 2013, the number of new returnees maintained the decreasing trend of the last few years – after halving from 329 000 in 2011 to 160 000 in 2012, the number reached about 86 000 in 2013 (IOM figures from November 2013). These numbers were reasonably well distributed across the country, with half of the returnees settling in Jonglei, North Bahr el Ghazal, Central Equatoria and Lakes. All together returnees have added close to 2 000 000 people to the country's population. Although the numbers are decreasing, newcomers will add to the cereal demand imposed by the returnee population, as many have settled in urban or peri-urban areas. Those who cultivate, farm very small plots of land which do not cover household requirements.

Incidence of internal conflict in 2013 (mostly inter-communal) has increased again after the relatively quieter conditions of 2012. Most conflict revolves around cattle raiding and peaks during the dry season. Jonglei was a hot spot of conflict, with major displacement of population in Pibor country.

Floods: in Jonglei (and Unity) led to the displacement of 315 000 people.

Major conflict from late 2013: Clearly the recent military conflict will become a key factor in the food security status of South Sudan households. **This is addressed in detail in the next section**.

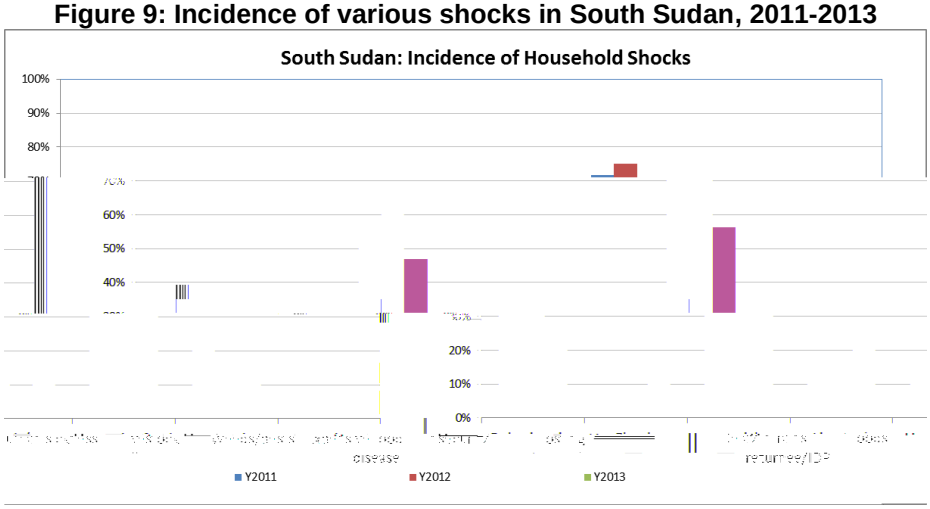
5.2.2 Main shocks affecting households in 2013

Figure 9 shows the proportion of households affected by different shocks in South Sudan between 2011 and 2013 (source: WFP FSMS). Overall, the chart reveals the importance of high food prices as a detrimental factor for the household food security. Illness is also much in evidence while drought and insecurity have been major factors in the past couple of years.

Of the socio-economic shocks, high food prices are the major issue for households, and are consistently ranked higher than all other shocks across all states throughout the four years of data – the peak food price impact occurred in June 2012 resulting from the poor production of 2011 and the disruption of trade flows with Sudan.

During 2013, high food prices are having less of an impact: frequency of "expensive food" shocks were systematically lower in 2013 and October 2013 shows a pronounced four-year minimum across all states with the exception of Unity where it still remains at record levels. This reflects directly the recent decrease in market prices.

Figure 9: Incidence of various shocks in South Sudan, 2011-2013



The 2013 rainfall season was characterized by early season dry spells (up to mid-July) followed by heavy rainfall and increased river flow (in August-September) – analysis of the data for each individual round shows features reflected in a spike in "delay of rains" shock in June this year and a spike in "floods" shock in the

October data. Delayed rains were more frequently reported in Lakes, East Equatoria, Warrap and the Bahr el Ghazals. Floods have been reported at record levels in Warrap and North Bahr el Ghazal.

Insecurity has an overall low incidence, but have localised importance, particularly in Jonglei, Lakes and East Equatoria. Together with hosting of returnees/IDPs will assume major importance under current developments.

5.3 Livelihood profile for South Sudan

Understanding livelihood patterns is essential to get a better grasp of food security dynamics. Livelihood information can be derived based on the main source of income for the household. Income sources are grouped into main livelihoods groups that reflect broad income substrata – agriculture, livestock, natural resources, paid employment. The livelihood categories used are as follows:

- Sale of cereal and other crops.
- Sale of livestock and livestock products.
- Casual labour: includes both agricultural and non-agricultural work (the former contributes about two-thirds).
- Salaried work and skilled labour.
- Sale of natural resources: this includes mostly charcoal making plus sale of fish, firewood and grass.
- Sale of alcohol (home brewed products).
- Others: includes aid external to the household (kinship, borrowing,...), petty trade and sale of food aid.

An overview of the main livelihood groups and how they are distributed across the country is presented below. Analysis of variations in food security indicators across these livelihood groups is included in the following sections.

5.3.1 Geographical distribution

Overall for South Sudan the two most important livelihoods are Sale of Natural Resources and Sale of Cereal and Other Crops – these occupy about 20 percent of the households overall, with other income sources varying from 9 to 14 percent (see Table 12 for overall predominance from 2010 to 2012).

Table 12: Proportion of households engaged in various livelihoods by state within the period October 2010 to October 2012 (percent)

State	Sales of cereals & other crops	Sale of livestock & other products	Casual labour	Salaried work	Sale of natural resources	Sale of alcohol	Others
CES	30	6	18	15	16	8	7
EES	10	19	6	11	35	15	3
Jonglei	13	16	6	18	29	7	11
Lakes	33	25	11	8	7	11	5
NBS	8	7	12	13	28	18	13
Unity	13	18	12	8	31	8	8
UNS	22	6	9	28	15	7	13
Warrap	23	25	6	11	10	17	8
WBS	27	2	11	11	33	9	7
WES	34	4	12	14	16	11	10
SOUTH SUDAN	**21**	**13**	**10**	**14**	**22**	**11**	**9**

There is geographic differentiation in the livelihood pattern: Sale of natural resources dominates in half of the states (East Equatoria, Jonglei, North and West Bahr el Ghazal, Unity) where it is the main income source for close to a third of the households. Livestock ownership dominates in Warrap, Lakes and to a lesser degree, East Equatoria, Unity and Jonglei. Crop sales dominate in Lakes and in the greenbelt states (Central and West Equatoria, West Bahr el Ghazal).

The table shows a clear inverse relationship between dependency on natural resources and dependency on agriculture plus livestock – this underlines the key feature of this livelihood as one in which households engage in when other more productive and reliable alternatives are not available or accessible.

Livelihoods reveal little seasonal variation apart from the expected higher predominance of crop sales around harvest time and increased reliance on natural resources in February when household stocks dwindle and other sources of income must be procured.

5.4 Recent food security situation and evolution

The household food security status is determined by three components:

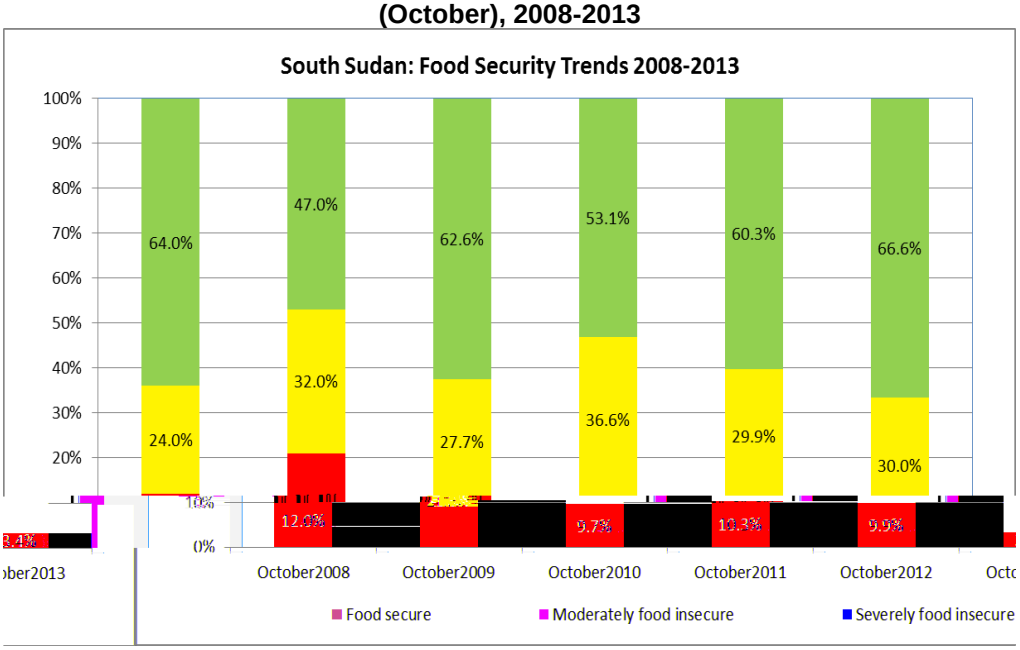
1. Food consumption, based on dietary diversity and food frequency.
2. Food access, based on the share of food expenditure and the reliability and sustainability of income activities pursued by the household.
3. Coping strategies derived from the frequency and severity of different coping strategies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

5.4.1 Overall food insecurity levels

In October 2013, just over 33 percent of the population of South Sudan was considered to be moderately to severely food insecure (see Figure 10). These are the lowest levels reached in the past four years. Severe food insecurity also decreased to 3.4 percent, the first time it has gone below 10 percent at the country level. This was attributed to a combination of factors such as two slightly above average crop production years in a row and overall lower market prices across the country.

Figure 10: Food security status in South Sudan around harvest time (October), 2008-2013



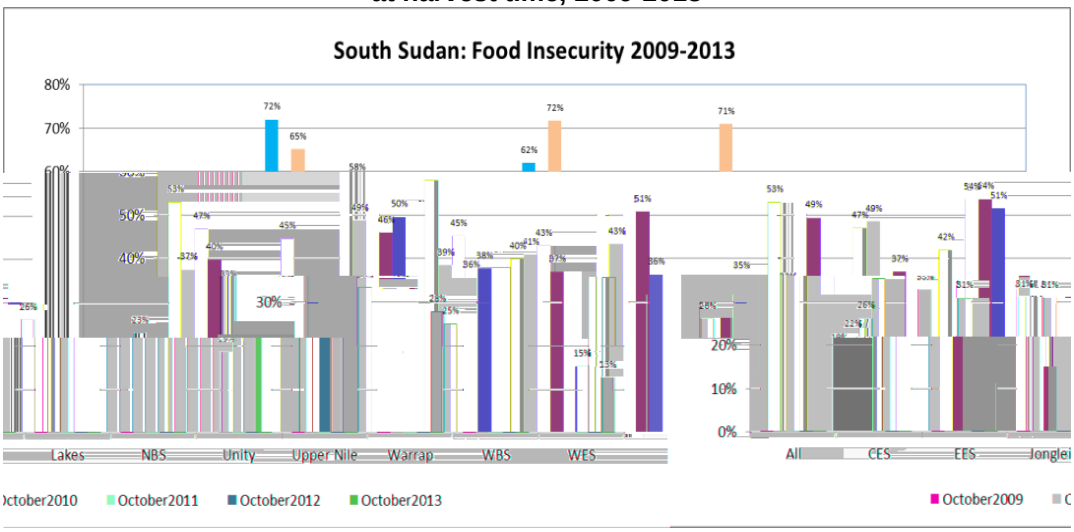
5.4.2 Seasonal and inter-annual patterns

As expected, food insecurity levels peak in June (during the hunger gap) from a minimum around the harvest period (October). Variations in overall crop production are reflected in the year on year variations in food insecurity levels in October (during harvest time) – years with poor crop production (2009 and 2011) result in increased October food insecurity at the national level and across a majority of states.

5.4.3 Geographical – where are the food insecure

Within this broad picture, there is a fair amount of geographical variation (Figure 11). The October 2013 food insecurity minimum is more noticeable in Lakes, North Bahr el Ghazal, Upper Nile and Warrap, where it reached record low levels. This is a significant improvement compared to mid-2012, when food insecurity had reached record highs, due to moderate production, significant cereal deficits and high food prices.

Figure 11: State-level prevalence of moderately and severely food insecure at harvest time, 2009-2013



On the other hand, in East Equatoria, Jonglei and West Bahr el Ghazal no improvements are apparent as food insecurity remains at about the same levels as previous years. Here the improvements occur in the most extreme food insecurity (the severely food insecure): this has decreased across the board with very pronounced decreases for instance in West Bahr el Ghazal (2 percent now compared to 20 percent one year ago) and 5 states registering below 3 percent.

Unity state is the exception: food insecurity at harvest time has actually increased; severe food insecurity (at 8 percent in October 2013) is now the highest in the country for this time of the year. This is linked to higher cereal deficits, higher food prices and insecurity.

5.4.4 Livelihoods – who are the food insecure

The highest levels of food insecurity are consistently found among households engaging in Sale of natural resources – In October 2013, their severe food insecurity levels reached 7.6 percent with 48.8 percent moderately food insecure. They still represent a significant improvement compared to October 2012, when levels were 17.7 percent and 37.7 percent.

Sale of Alcohol is the other livelihood with relatively higher food insecurity levels – 6 percent severely and 30.5 percent moderately food insecure. This livelihood has seen little change in its food insecurity status, in contrast to all other livelihoods.

The remaining livelihoods have now fairly low severely food insecurity levels (all below 3 percent) and improved moderate food insecurity – the most food secure livelihood group are households involved in Sale of Cereals, Sale of Livestock and Skilled Work. For all livelihoods, levels for June and October 2013 are now at the lowest (year on year) since 2010.

5.5 Household staple food supply: markets vs household production

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

We focus on the sources of sorghum consumed by households as this is the staple cereal across most of the country. Data for maize and pulses was examined and shows similar patterns. Other food items have far more fixed supply sources – 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 arise from own production only in states where livestock has a significant presence (Unity, Warrap, East Equatoria, Jonglei to a lesser degree).

Figure 12: Relative importance of different sources of sorghum consumed by households, 2009-2013

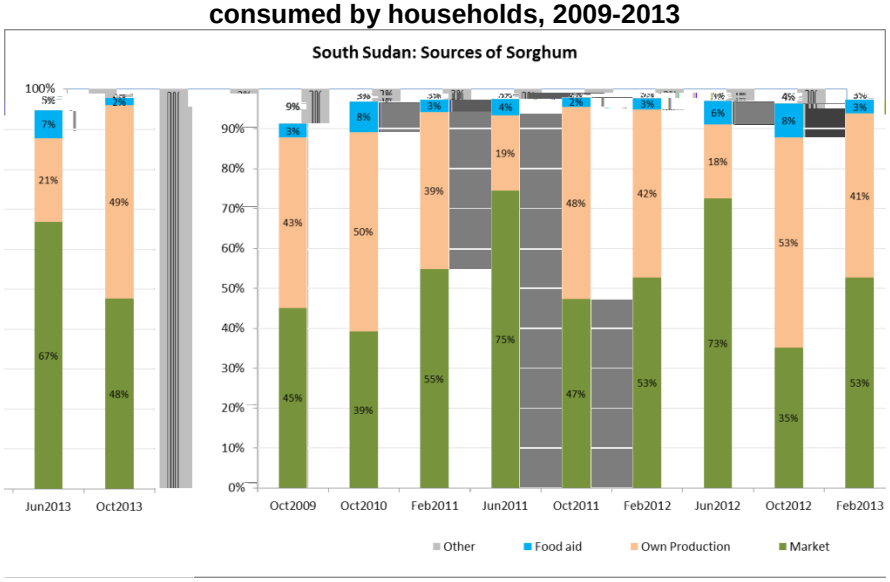


Figure 12 shows the households' main sources of sorghum and their seasonality within the 2009 to 2013 period (the indicator is the proportion of households that report each source as the main sorghum supply). As expected, the two dominant sources of sorghum for households are markets and the household's own crop production.

There is a clear overall pattern: household own production is a dominant source of sorghum only around harvest time (October); at all other times, markets are the dominant supplier (to around 70 percent of the households in June), as most households exhaust their stocks a few months after harvest.

Year on year patterns are largely dictated by the volumes of that year's harvest: the poor production of 2011 led to increased dependence on markets in the following lean period (June 2012) while the reverse happened from late 2012 to mid-2013; however these variations are not large enough to change the household's high dependence on markets.

Market dependence in October 2013 is higher than a year ago, which under a scenario of more moderate food prices and better economic conditions (see Sections 2 and 4) would be no case for major concern. However, the recent conflict will change this picture considerably.

The pattern of market versus household production has some noticeable geographical variations in both the levels of overall market dependence and its seasonality. States that deviate markedly from the national aggregate picture described above include Upper Nile, where households are almost exclusively dependent on market supplies throughout the year (market supply constantly above 80 percent since February 2011) and West Bahr el Ghazal, where it varies between 57 percent and 79 percent; North Bahr el Ghazal and to a lesser degree Warrap state show a marked seasonality in market supply with pronounced minima in October and very high levels in June; Jonglei and Unity show very high market dependence very soon after the harvest period.

These are the most vulnerable states to price shocks during the lean season. In West Equatoria and to a lesser degree in Central Equatoria own production is clearly more predominant as a sorghum supply throughout the year and from year to year.

Food aid shows up as a significant source of sorghum only in specific states and times of the season, e.g. in Jonglei Lakes, Warrap and West Bahr el Ghazal during the lean season (February and June FSMS rounds). Where and when food aid has a significant presence (e.g. Jonglei mid-2012, West Bahr el Ghazal, mid-2013) it acts to decrease the dependence on markets by households, providing relief from high food price impacts.

In terms of livelihoods, the same overall seasonal pattern as described above is seen across all groups, with variations in the levels of market dependency between the groups: lowest levels of market dependence can

be found as expected in households engaged in sale of cereal and crop products, although these still depend on the market for about 30 percent of sorghum needs around harvest time and about 50 percent during the lean period.

Highest market dependence is typical of households engaged in salaried work (50-60 percent at harvest time increasing to 80 percent in the lean season) and also households engaged in sale of natural resources (minimum of 40-50 percent at harvest time, peaking at above 80 percent during the lean season). For this particular livelihood group such susceptibility to market price rises is far more serious since they are the group with worst food security status. In October 2013 this livelihood group had higher market dependence (above 60 percent) than usual for the time of the year.

The above underlines the key role markets play in determining the food security of South Sudanese households. The evidence from the FSMS data shows that although good crop production levels are essential, markets are the main suppliers of staples (and other key food items such as meat, oils and fats) for a large part of the season and to a very high degree for specific states, livelihoods and times of the season.

5.6 Food expenditure: recent patterns and at-harvest situation

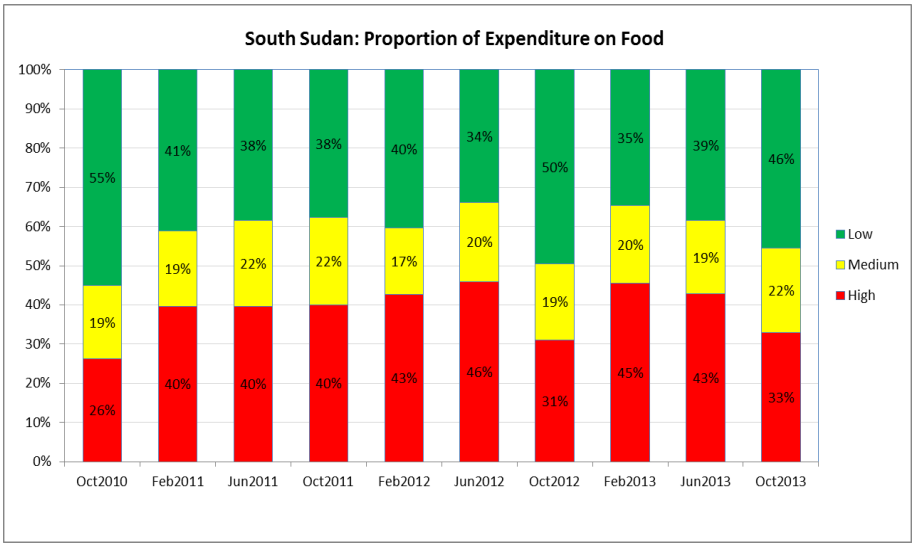
Households in South Sudan spend a large proportion of their incomes on food, given the high degree to which they depend on markets for their staple food supply and the high food prices reached in the recent past. Households with high expenditure on food are more vulnerable to market price rises as they have a narrower band of income to absorb expenditure increases and 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:

- High food expenditure: more than 65 percent of expenditure allocated to food.
- Medium food expenditure: between 50 and 65 percent of expenditure allocated to food.
- Low food expenditure: less than 50 percent of expenditure allocated to food.

The proportion of households in each class and its variation between late 2010 and late 2013 is shown in Figure 13. As expected, the seasonal patterns of food expenditure present a minimum around harvest time (October), which is more pronounced when the harvest is good (2010, 2012 and 2013). Mid-season levels vary little from year to year as households always rely on markets to a significant degree and generally exhaust their stocks around the second quarter of the following year.

Figure 13: Proportion of households in food expenditure class for South Sudan, October 2010 to October 2013



There has been little improvement in the food expenditure patterns as shown in Figure 13. Only in North and West Bahr el Ghazal has the food expenditure situation improved in 2013 relative to 2012, while in other states the situation remained unchanged and has worsened slightly in Unity, Upper Nile and Jonglei (the states with the most poorly integrated markets and more affected by insecurity). Hence the food expenditure has not yet reflected the lower market price pattern that has prevailed recently.

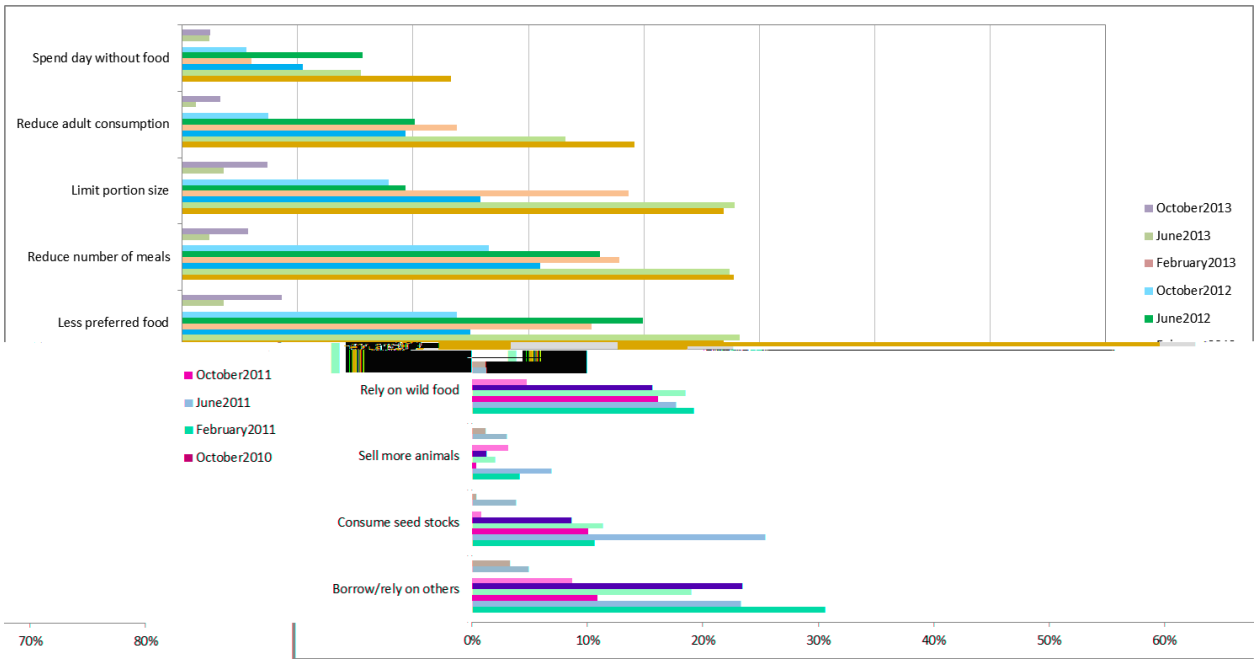
Across the country, food expenditure levels vary widely with clear minima in the surplus food producing states of West Equatoria and Central Equatoria (about 67 and 50 percent of households with low food expenditure) while Jonglei and East Equatoria register highest levels. Other states such as North Bahr el Ghazal and Warrap have marked seasonal variations in high food expenditure with pronounced minima at harvest time but country wide maxima later in the year.

In livelihood terms, high food expenditure currently (October 2013) predominates among households engaged in sale of natural resources (47 percent), followed by casual labour (36 percent) and sale of alcohol (28 percent); even households engaged in sale of cereal and crop products who are able to rely more on their own production, registered levels of high food expenditure of at least 24 percent, with a peak of 34 percent during the hunger gap.

5.7 Household coping strategies

In South Sudan the most widely/frequently adopted coping strategies involve changes in food intake (see Figure 14): 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.

Figure 14: Prevalence of different coping strategies in South Sudan, 2010-2013
(The four uppermost strategies imply decreases in food intake, while the bottom three imply reduction in household assets)



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 (Figure 14).

The improved harvest of late 2013 led to the frequency of (all) coping strategies decreasing relative to October 2012 – they were at record low levels within the past four years. This ties with improvements in the food security status of the population, though levels of expenditure on food still remain high.

The levels of coping during the lean season of 2013 have also decreased compared to the lean season of 2011 – both lean seasons followed a favourable cropping season. Given the good production levels of 2013, adoption of coping strategies during the lean season of 2014 are expected to be lower than at the same time last year, assuming market prices maintain their favourable tendency.

Previously, highest levels of coping have been observed in the states of North Bahr el Ghazal, Warrap, Unity, Upper Nile and Jonglei (the worst affected by the disruption of trade patterns). Livelihood groups most affected include households dependent on Sale of Livestock, and to a lesser degree, livelihoods tied to Sale of Alcohol and Sale of natural resources. Least affected tend to be Salaried Workers and households engaged in Sale of Cereal.

5.8 Estimated food assistance requirements in 2014

DISCLAIMER: Estimated food assistance levels planned by WFP for 2014 are provided here. However, as the conflict that developed at the end of 2013 is expected to change significantly these requirements, the revised figures are presented in following Section 6.

In October 2013, 3.4 percent of the population (391 500 people) is severely food insecure while 30 percent (3 454 500 people) are moderately food insecure (based on FSMS results). See the section "Recent Food Security Situation and Evolution" for a geographical and livelihood breakdown of the food insecure.

Prior to the eruption of the conflict, WFP planned to assist in 2014 an estimated 2 854 100 beneficiaries with 189 282 tonnes of assorted food commodities through various modalities (Table 13). The beneficiaries to be assisted include:

- 255 000 IDPs, 302 900 refugees, 60 000 returnees and 225 000 severely food insecure population supported with unconditional food assistance.
- 808 800 moderately food insecure population who were to be assisted through conditional food transfers including food and cash for assets interventions.
- 440 900 children of school going age to be provided with meals including incentives to support girl child education.
- 761 500 people to benefit from the nutrition component, including 59 600 sick under institutional feeding.

Table 13: Estimated food assistance requirements, 2014 (pre-conflict)

State	Beneficiaries	Tonnage (tonnes)
CES	133 946	9 085
EES	231 499	10 366
Jonglei	423 202	19 635
Lakes	248 356	11 589
NBS	256 475	10 361
Unity	384 565	37 681
Upper Nile	475 446	40 525
Warrap	404 211	32 685
WBS	192 800	9 245
WES	103 600	8 110
Total	**2 854 100**	**189 282**
Total without overlaps	**2 287 407**	

6. FOOD SECURITY SITUATION UPDATE

A major military confrontation between different SPLM factions erupted in mid-December 2013, about three weeks after the end of the work of the CFSAM team. It has mostly affected the states of Jonglei, Unity and Upper Nile as well as Central Equatoria and the capital Juba. The conflict is expected to have major impacts on the food security status of the South Sudanese households and it will introduce significant changes to the initial plans of volumes and modalities of WFP assistance. This update outlines likely impacts of the conflict on the various dimensions of food security and describes the mechanisms through which it will affect the food security of South Sudan's population. It provides:

- An overview of the pre-conflict food security situation.
- Likely impacts of the conflict on food availability and access.
- The degree of exposure and vulnerability of households to the impacts of conflict.

6.1 Conflict overview

6.1.1 Timing and extent

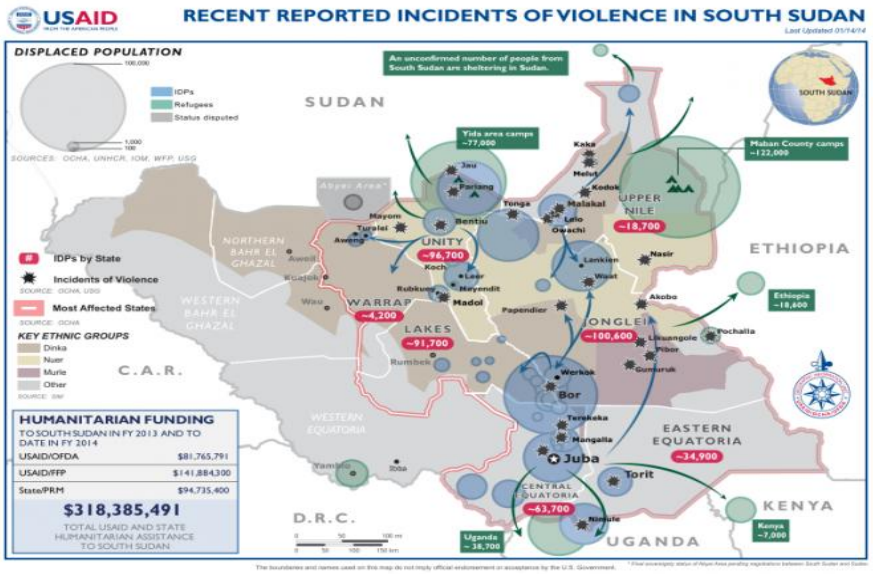
A major military confrontation between different SPLM factions erupted on 16 December 2013, three weeks after the end of the CFSA Mission. It spread quickly from Juba to Bor (Jonglei), Bentiu (Unity) and Malakal (Upper Nile) remained the major hotspots of conflict (see Figure 15 below).

A cease fire has been signed on 23rd January 2014; in the few days after the signing of the cease-fire, confrontations still took place in Jonglei, while tensions remained high elsewhere. Nevertheless, it is likely that the direct effects of conflict should be restricted to the states where it has taken place – Jonglei, Unity, Upper Nile and Central Equatoria.

Other neighbouring states such as Lakes and Warrap and parts of Eastern Equatoria are indirectly affected mostly by inflows of populations displaced by the fighting. In summary:

- States directly affected: Jonglei, Unity, Upper Nile and Central Equatoria.
- States indirectly affected: Lakes, Warrap and Eastern Equatoria.
- States not affected (so far): West Bahr el Ghazal, North Bahr el Ghazal and Western Equatoria.

Figure 15: Extent of conflict in South Sudan, January 2014



6.1.2 Immediate impact: population displacements

The conflict caused substantial population displacements into neighbouring states and across international borders into neighbouring countries. While the situation is fluid, current mid-January estimates are as follows:

Just under 863 000 persons (OCHA supplied figures) are estimated to have been displaced, including 123 000 into neighbouring countries (60 900 in Uganda, 28 100 in Ethiopia, 22 000 in the Sudan and 12 200 in Kenya). An approximate breakdown by state is as follows:

Central Equatoria:	93 600
Jonglei:	133 600
Unity:	188 100
Upper Nile:	157 300
Lakes:	92 000
Warrap/Abyei:	14 300
Eastern Equatoria:	59 000

The displaced populations will require substantial humanitarian support and will represent a major food requirement for South Sudan in 2014.

6.1.3 Possible developments and scenarios

Future developments depend crucially on how far and how quickly the signing of a cease fire translates into normality on the ground. Informal groups may scatter across the country, maintain low-level attrition or engage in banditry and cattle rustling. If insecurity remains significant, it may come to disrupt trade flows and the normal functioning of markets (beyond direct impacts on market infrastructure); this can have major impacts on the food security of populations extending through 2014 and beyond conflict areas. Insecurity may also prevent displaced people from returning to their places of origin, if it leads to populations not feeling safe enough to return home.

Three scenarios can be outlined as follows:

A. **No significant post cease-fire insecurity in most of the conflict affected areas** – this most favourable scenario implies little or no impacts on trade routes; recovery is limited only by the readiness of traders and transporters to resume activities and by the speed with which physical commercial infrastructures can be recovered.

B. **Insecurity remains, but confined to previous conflict areas** – here trade flows into Jonglei, Unity, Upper Nile and Central Equatoria are disrupted and markets may be disrupted to varying degrees.

C. **Insecurity remains and spills out into adjacent regions** – this scenario is least likely but has the potential to disrupt trade flows into a much wider area, in case insecurity affects the roads and trade flows that go into Lakes and the Greater Bahr el Ghazal regions.

The two major considerations to take into account are:

- The disruption of trade flows and markets and whether this will extend beyond the conflict-affected areas: given the extent households depend on markets; this can have severe impacts on their ability to access food. Major impacts on trade flows can lead to consequences well beyond conflict areas.

- The disruption of the coming agricultural season: planting activities are expected to start across the country from mid-March to mid-June; significant delays caused by conflict will have serious impacts on the ability of households to produce food for the next season.

These points are detailed in the next sections.

6.2 Conflict impacts on food security

6.2.1 Overall pre-conflict food security and humanitarian status

Conflict developed precisely at a time when food security conditions in South Sudan were showing a consistent improvement relative to the past few years (see Section 5). Food insecurity and in particular severe food insecurity was at the lowest levels since 2010 (30 percent and 3.4 percent respectively). Other indicators had shown progress as well – adoption of coping strategies involving reduction in caloric intake were also at record minima.

The recent pre-conflict IPC assessment classified about 4.4 million people (close to 40 percent of the population) in stressed (phase 2) and crisis (phase 3) IPC levels. Of this total, 990 000 were in phase 3. There were no populations classified under emergency before the conflict started.

However, there are geographical variations relevant to the evaluation of conflict impacts:

- In two of the most conflict affected states, Unity and Jonglei, pre-conflict food insecurity levels (severe and moderate) had actually increased compared to last year (see previous section), in contrast to all other states. In Unity, pre-conflict food insecurity was at the highest levels (year on year) since 2010; severe food insecurity rates were the highest in the country (currently 8.0 percent vs 3.4 percent nationally).
- In Jonglei and Upper Nile the situation was more favourable, but food insecurity levels still reached 38 and 31 percent respectively (vs 30 percent nationally); pre-conflict severe food insecurity was at minimum levels since records began (5.5 percent for Jonglei, 1.5 percent for Upper Nile).
- Of the population in Crisis IPC phase, 60 percent were contributed by Jonglei and Unity alone.

Hence the conflict and its aftermath affect some of the most problematic areas of South Sudan in terms of food security. These are also areas with the higher cereal production deficits in the country (see below).

Given large population displacements, uncertainty regarding the start of the next agricultural season and extensive disruption of markets and trade flows, the regions of Jonglei, Unity and Upper Nile will be facing elevated food insecurity levels throughout 2014. In Central Equatoria, the situation may not become so serious, given a more favourable starting point, the proximity to the capital and to Uganda, therefore likely to be less subject to widespread insecurity and with far better supply routes.

6.2.2 Preliminary assessment of conflict impacts

Preliminary post-conflict IPC analysis estimates that a total of about 6.4 million people are in phases 2, 3 and 4 (stress, crisis and emergency) an increase of 2 million people relative to pre-conflict levels. Of this total, 1.1 million are in emergency phase, 2.1 million in crisis phase and 3.2 million in stressed phase. A breakdown of the people in emergency phase is as follows:

Jonglei:	567 000
Unity:	273 000
Upper Nile:	172 000
Central Equatoria:	34 000
Eastern Equatoria:	31 000

The number of people in crisis or emergency phase increased more than 3 fold (just under 1 million to 3.2 million). Populations in emergency phase require immediate humanitarian assistance. These numbers are exclusive of the IDPs mentioned above.

6.3 Impact on cereal production/availability

6.3.1 Current crop production and stocks

The conflict started in mid-December 2013, at the end of the cropping season with only the late harvests remaining in the fields. These late harvests are predominant in Lakes (and parts of West Bahr el Ghazal) where long sorghum varieties (Kech) and bulrush millet are harvested during mid-December to mid-January and also in West and Central Equatoria. While in Lakes state this late harvest actually provides the bulk of the season's cereal, in the Equatorias its contribution is smaller as these areas have at least two cropping cycles and the late harvest is not the major supplier of grain. Conflict may have impacted harvests in the mechanized sector which typically happen fairly late (December-January). These remote areas require significant amounts of labour; conflict related restrictions on movement may have restricted the labour supply significantly and hence further reduce production levels in the mechanized sector in Upper Nile.

Direct impact on household's cereal stocks within the conflict areas is likely but hard to quantify without field assessments, though it is likely that displaced rural populations have lost their stocks. Larger stocks in urban or peri-urban areas are highly likely to have been looted or destroyed (as were WFP stocks up to 4300 tonnes). There are reports of large losses of household stocks along rural corridors used by combatant troops in Jonglei, Unity and Upper Nile.

There were large stocks of cereal (estimated at about 50 000 tonnes) in warehouses in Renk (northernmost Upper Nile) whose status will have to be ascertained. These can be mobilized to supply cereal to other regions of South Sudan, but their transport poses logistical difficulties and security along the Nile or along the road to Malakal needs to be ensured.

It should be noted that the three states most affected by conflict (Jonglei, Unity and Upper Nile) register for 2013/14 the highest cereal deficits in all of South Sudan. Jonglei alone accounts for more than 30 percent of the total national cereal deficit, with Unity and Upper Nile adding another 32 percent (see section 4.1 in this report).

The fall out of the conflict is likely to worsen this situation, with higher deficits most likely for 2014/15, depending on whether the next agricultural season can start timely and progress under reliable security conditions.

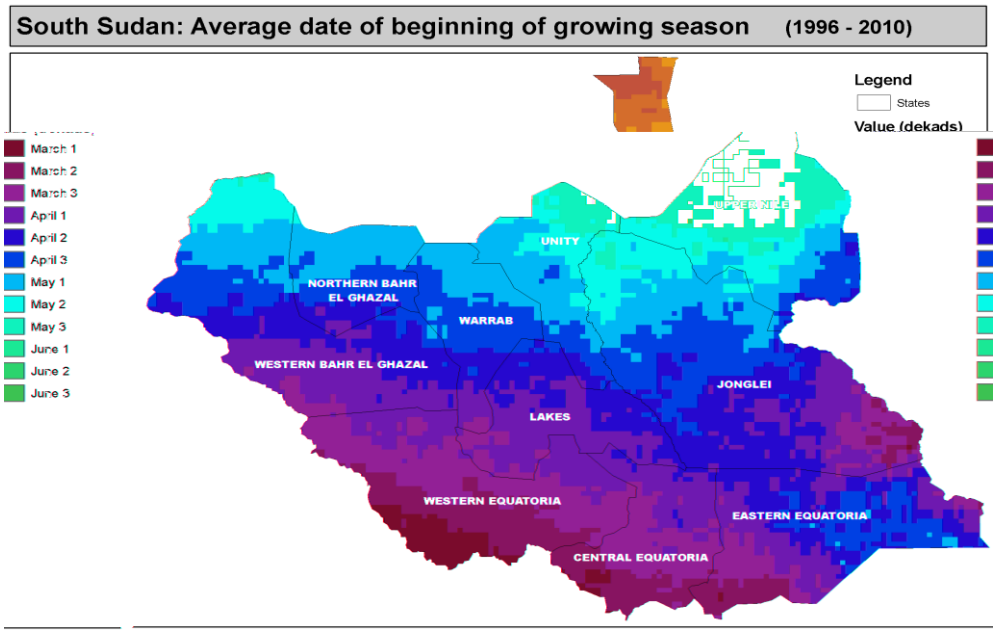
6.3.2 Next agricultural season

Both the return of displaced populations and a fair amount of security on the ground have to be accomplished before the start of the agricultural season. Figure 16 shows the average dates of onset of suitable conditions for land preparation and planting which may be interpreted as the dates by which populations need to be returned and appropriate security conditions ensured to avoid disruptions to the coming agricultural season. Within the affected states, this translates into:

Central Equatoria:	mid-March to early-April
Jonglei:	mid-April to mid-May
Unity:	late April to late May
Upper Nile:	mid-May to late June

Significant delays in the planting and/or decreases in area planted by households (e.g. abstaining from cultivating “far fields”, i.e. areas away from the homestead) will lead to reduced crop production in the conflict affected areas and result in cereal deficits for 2014/15 even larger than were registered last season.

Figure 16: Average date of onset of suitable conditions for planting



As military confrontation was more protracted and intense around main towns of Jonglei, Unity and Upper Nile, the latest date by which a return to normal needs to be achieved is early April for the more southern areas and early June at the latest in northern Upper Nile mechanized areas.

Some of the Upper Nile mechanized agriculture areas closer to the conflict (e.g. Mohammed el Jak) may have suffered loss of agricultural machinery – this will need to be confirmed, but if so, it may damage next season’s mechanized sector prospects.

6.4 Impact on markets and trade routes

This section outlines the range of possible impacts of conflict on markets and trade routes. The disruption of normal market functionality and trade flow patterns will affect household food security well beyond the duration of conflict; depending on developments, it may also affect households over a wider geographical area.

The nexus between conflict, markets and food insecurity arises from the way South Sudan households depend to a considerable degree on markets for their food supply (as described in the previous section) and how recent international and regional dynamics have re-shaped trade flows across the country.

Conflict impacts on the supply of commodities to households include:

- Direct impacts on market infrastructure – these impacts are confined to conflict locations and include destruction of physical infrastructure and the flight of (foreign) traders and other skilled players in the commercial and service sectors. This has happened to major markets in Malakal, Bor and Bentiu and surrounding areas.
- Disruption of trade flows within/into South Sudan – these impacts have also been confined to conflict regions, but may be felt elsewhere if insecurity spreads.

An overview of trade routes is provided next, to be followed by a more detailed analysis of the dependency of households on market supplies and its interaction with conflict timing and patterns.

6.4.1 Origins of major trade flows

Since the closure of the border with Sudan in 2011, following South Sudan's independence, the flow of commodities to the more northern regions of the country has dwindled to a virtual standstill, with only a few informal routes still open to cross border trade (e.g. near Aweil, for goods from Darfur and near Renk for inputs to mechanized farming).

As a result, markets in these regions of South Sudan became heavily dependent on food commodities and other goods from Uganda; in southern areas supplies from Uganda were always of importance and were further enhanced after the border closure. In eastern areas (Jonglei, Eastern Equatoria and Upper Nile) supplies from Ethiopia and Kenya may be relevant, but much less important than those from Uganda[11].

The long distances over a poor road network, very expensive fuel, unfavourable exchange rates, taxes both official and unofficial, have contributed to the poor integration of South Sudan's domestic markets, resulting in high prices, volatile price patterns and significant price differences between market prices in different states, in the past couple of years[12]. This has had far reaching consequences, with a severe decrease in availability of sorghum in local markets and its replacement by maize flour which has become an important new staple at least for urban and peri-urban populations in these regions.

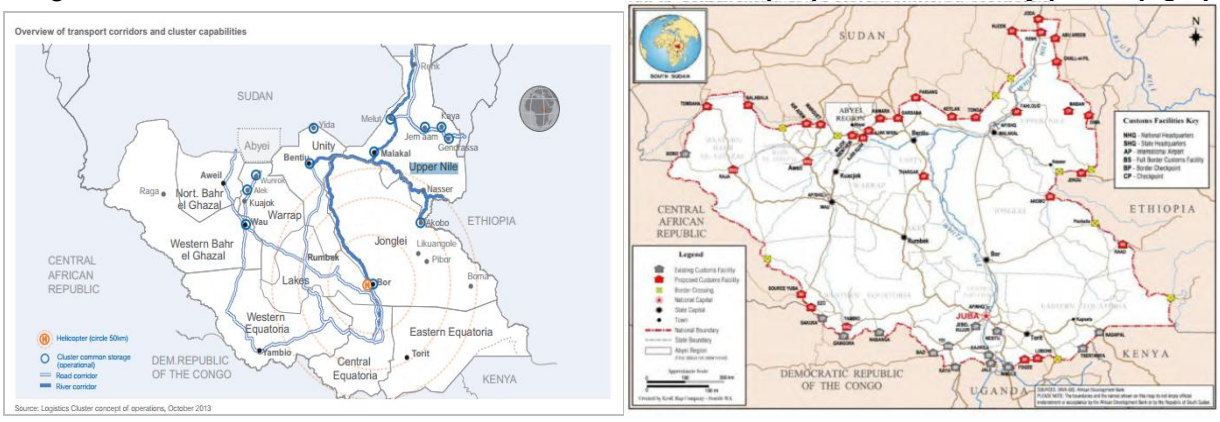
6.4.2 Main trade routes

Figure 17 shows how the main trade routes pass through major conflict hotspots: they enter South Sudan at Nimule or Kaya, going through Central Equatoria and following along the Jonglei-Lakes border. They go north to supply Unity state and Upper Nile, turn east to supply Jonglei or turn west into Lakes state (Awerial, Yirol, Rumbek) to supply the north-western regions of Greater Bahr el Ghazal. Alternative routes, e.g. Juba–Mvolo–Rumbek to bypass Bor and the areas bordering Jonglei, are less well developed and more prone to becoming impassable during the rainy season.

Most imported goods are carried by foreign lorries (Ugandese, Congolese and Ethiopian mainly) frequently free-lance operators who may be reluctant to risk a crucial asset if insecurity along the road network becomes a major threat.

Therefore road insecurity or conflict will undermine imported trade flows into Jonglei, Unity and Upper Nile and therefore impose constraints on household's market access in these regions. If more widespread insecurity becomes a reality, trade flows into the western and north-western regions of South Sudan may be disrupted; this can potentially affect very large numbers of people including the densely populated regions of North Bahr el Ghazal.

Figure 17: Road network and trade routes in South Sudan (left) and border entry points (right)



6.4.3 Impact on food price patterns

Retail prices have been trending dramatically upwards since independence in almost all markets in the country, shifting from a relatively stable level due to the border closure with Sudan and a continuous depreciation of unofficial exchange rates. In the past three years prices have been affected by increasing volatility way beyond their seasonal patterns (see Figure 18). Additionally, wide price differences between

[11] For details see AfDB (2013), A Study on Competitiveness and Cross Border Trade With Neighbouring Countries.
[12] For details see WFP (2012), Corporate Market Scoping Mission Report for the Republic of South Sudan.

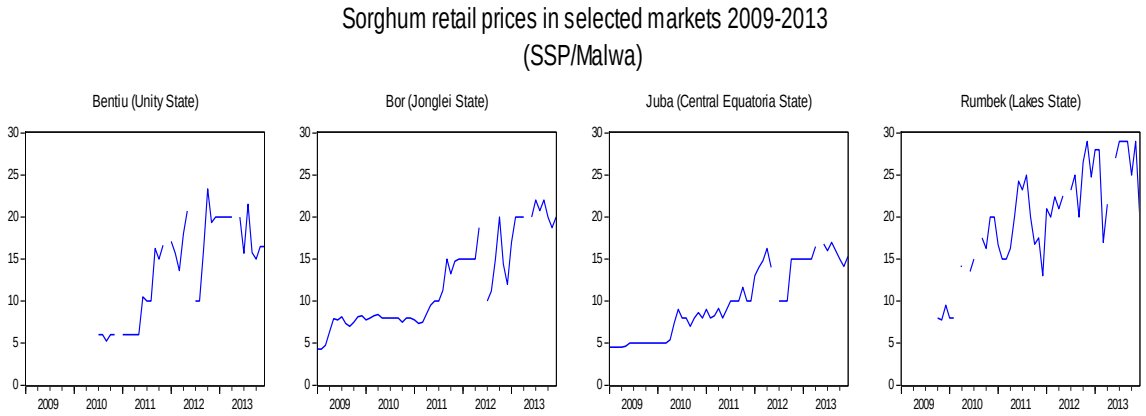
markets provide an insight of the weak integration of food markets, as insecurity and very poor infrastructures jeopardize their functioning.

At the onset of the conflict in December, prices of both sorghum and maize were the highest in Rumbek compared to the rest of the country. On the contrary, Aweil market was the less expensive, probably benefiting from informal cross-border trade from Sudan. Compared to Aweil, sorghum was twice as expensive in Bor and Rumbek.

It is likely that protracted insecurity and uncertainty will transmit further pressure on markets. In addition, cereal prices in markets located in the states mostly affected by the conflict in late 2013 (Bor, Jonglei State; Rumbek, Lakes State; Bentiu, Unity State) where already higher than in the rest of the country before the violence erupted (see Figure 4, paragraph 4.2 "Cereal and livestock markets").

In particular, high prices will deteriorate the purchasing power of households relying mostly on markets, especially in Unity state where 63 percent of households were reportedly buying sorghum from the markets prior to the conflict[13]. Households' stocks from own production may also be at risk in the coming months, as extended violence may accelerate stock depletion and trigger displacement, putting further demand pressure on markets for food.

Figure 18: Evolution of sorghum retail prices, 2009-2013



6.5 Markets in relation to household food security

6.5.1 High food prices as a household shock

The price patterns described above connect to the importance of high food prices for households in South Sudan: they are systematically ranked higher in importance than all other shocks (drought, flood, etc.) across all states since 2010, showing that even in normal times households are under considerable pressure from high food prices.

[13] According to FSMS data as of October 2013. For further details see next section.

Figure 19: Proportion of households reporting high food prices as a concern/shock
(Note the extreme value for Warrap and the high values for Unity and Upper Nile)

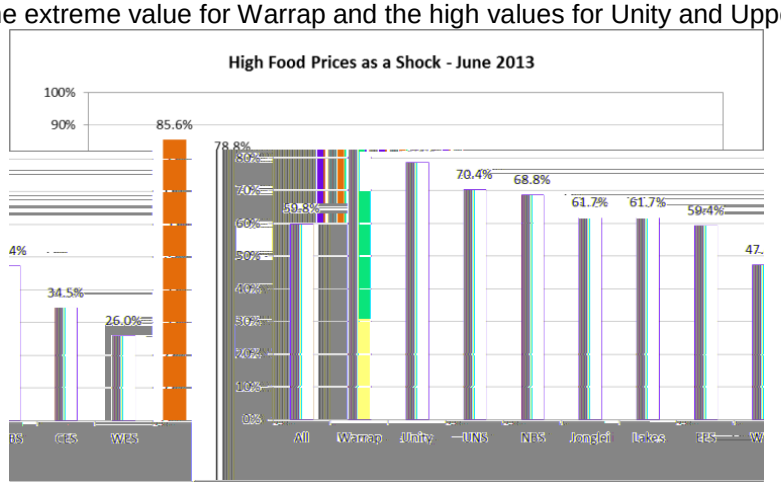


Figure 19 shows that market price pressure on households is heavier in states with high food production deficits and dependence on long range commodity transport. Note that while in 2013 high food prices were having less of an impact in general (see previous section), households in the conflict affected states of Unity and Upper Nile state reported high food prices as a concern in record numbers.

6.5.2 Timing and magnitude of household reliance on markets

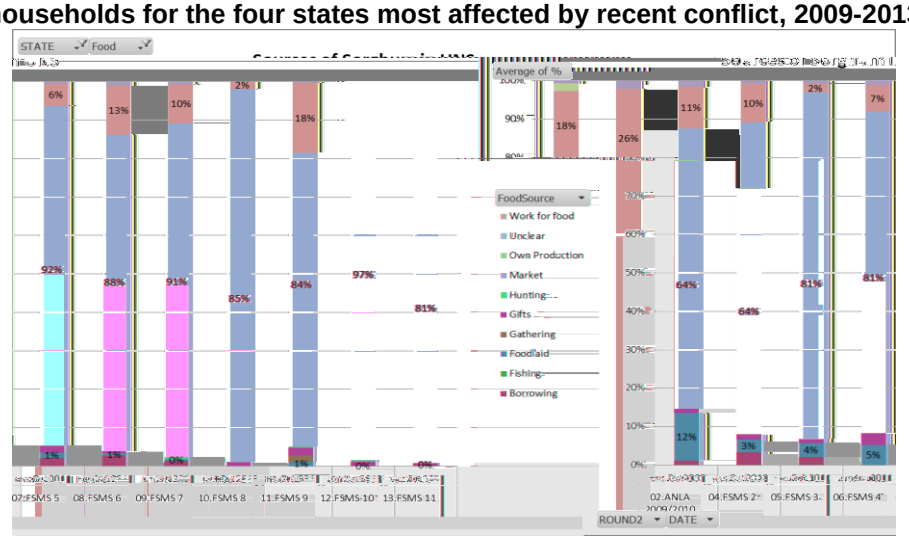
Reliance on markets for staple food supply (sorghum, maize, pulses) by South Sudan rural households is very high (see previous section) – as a source of staple food, markets predominate over household own production at all times (except just around harvest time) and nearly everywhere in the country (based on FSMS data 2010-2013[14]). During the hunger gap (May-August) markets are the main source of sorghum for at least two-thirds of the households at the national level (see Figure 12 in section 5.5).

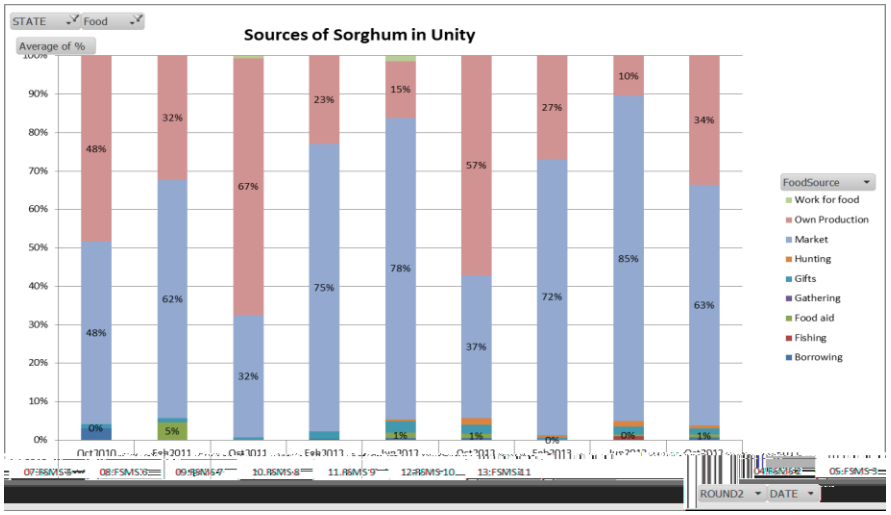
Within this general picture there are important variations from state to state (see Figure 20):

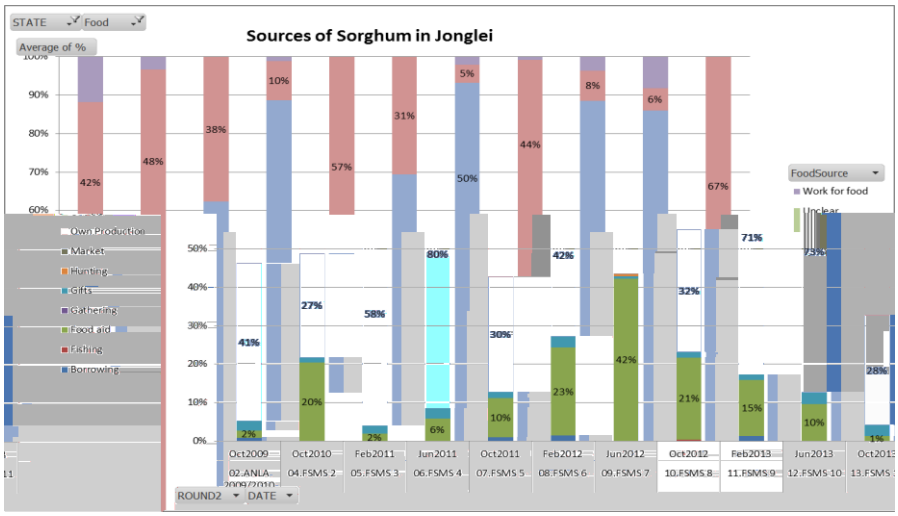
- Unity and Jonglei: households show very high dependence particularly from February onwards (over 70 percent and as high as 82 percent in June 2013 in Unity)
- Upper Nile: households are nearly exclusively dependent on market supplies throughout the year (the proportion of households reporting markets as the main source of sorghum has been permanently above 80 percent since February 2011).
- Central and West Equatoria: market dominance is lowest here, given the high levels of crop production in these states (WEQ being the only self-sufficient state in South Sudan), but still can reach 50 percent of the households during the hunger gap after a poor harvest.
- West Bahr el Ghazal: households also exhibit high market dependency through the season - between 57 percent and 79 percent.
- North Bahr el Ghazal (and Warrap to a lesser degree): market dependency is pronouncedly seasonal, varying from minima of 10-30 percent around harvest time to peaks of 70-95 percent during the hunger gap.

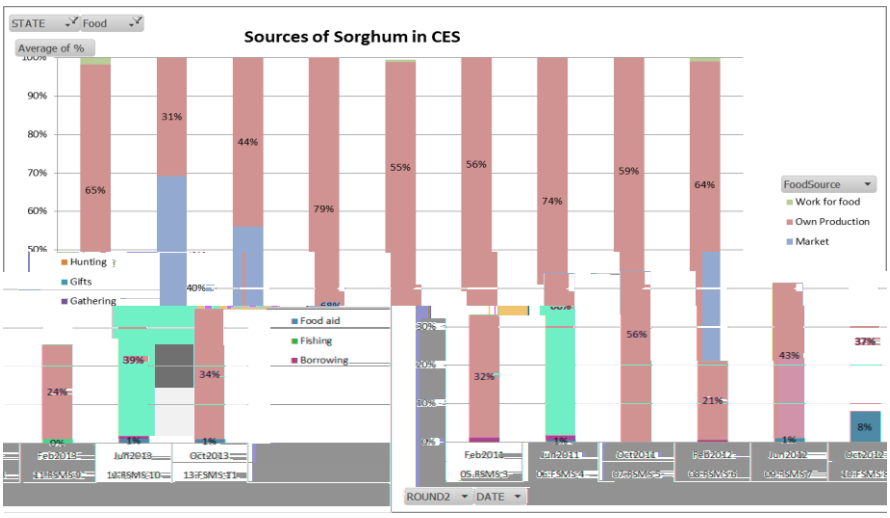
[14] Based on proportion of households reporting markets as the main source of sorghum (and other commodities).

Figure 20: Relative importance of different sources of sorghum consumed by households for the four states most affected by recent conflict, 2009-2013









The most affected states by conflict (Jonglei, Upper Nile and Unity) are those where households show the highest dependence on markets for staple food supply, in particular once household stocks decrease after harvest. Other states which display high market dependence are Warrap and the Bahr el Ghazals which could be affected by wider trade flow disruptions.

In terms of timing, households start relying on markets for staple food supply from February, (depending on the quality of the previous harvest), intensifying from March onwards, and this extends until the first main crops are harvested (broadly around early to mid-September across the country).

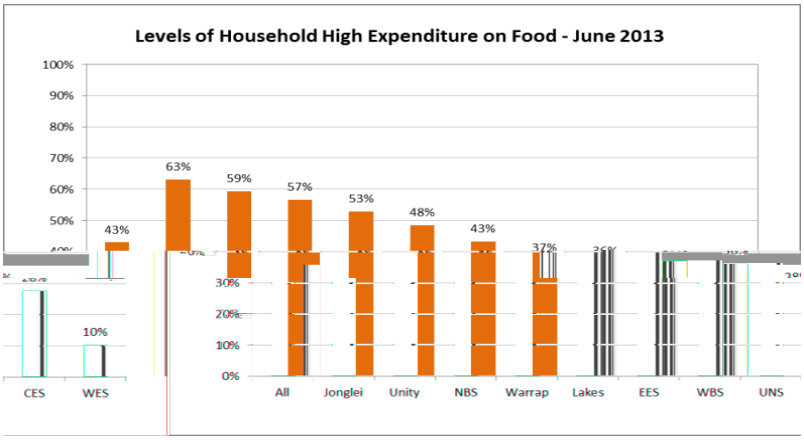
If protracted insecurity results in severe restrictions to trade and market disruptions, the ability of households to access food and their food security status will be seriously compromised.

6.5.3 Vulnerability to price increases

Given the household's dependence on markets, price increases can have a major impact on the ability of the population to access food. Households with high expenditure on food (as a proportion of household income) are more vulnerable to market price rises as they are less able to absorb price rises.

- Jonglei has the highest pre-conflict levels of high expenditure on food of all states (peaking at 63 percent in June 2013 – see Figure 21), making it the most vulnerable to food price rise.
- Other states directly affected by conflict, Unity and Upper Nile, had more moderate food expenditure levels, though Unity reached very high values in mid-2013 (59 percent second only to Jonglei) which were later attenuated by a better than usual harvest; Upper Nile has recently been in line or below the nationally aggregated figure.

Figure 21: Proportion of households with high expenditure on food for all South Sudanese states (in decreasing order) and overall country at the peak of the hunger gap, July 2013
(Note high levels in Jonglei and Unity and neighbouring states of Lakes and Warrap as well as North Bahr el Ghazal)



Should insecurity affect more widely the trade flows in South Sudan, market prices in other regions may also be affected. Households in North Bahr el Ghazal, Warrap and Lakes have very high levels of food expenditure in the run up and during the hunger gap and may come to be affected by the conflict through possible price increases. Further pressure on markets in Lakes and Warrap may arise from the influx of significant numbers of displaced people adding to local food requirements.

6.6 Revised food requirements for 2014

At the time of writing (end-January 2014) the situation remains fluid. While in mid-January OCHA estimated a total of 409 000 people displaced, by end of January this figure had been revised to 862 000, of which 123 000 in neighbouring countries. WFP has provided assistance to more than 190 000 people so far. Other operations are on course in neighbouring countries to assist South Sudanese who moved across the border into Uganda and Ethiopia.

In early January 2014, WFP planned to provide food assistance to 419 000 IDPs in locations of displacement and other conflict-affected people, as appropriate. Given more recent figures for displaced populations, levels of assistance will be scaled up. At this stage, the volatility of the situation makes any figures that might be quoted at this stage fairly unreliable.

Target beneficiaries of ongoing assistance are currently located in Juba, Bor, other areas in Jonglei, Bentiu, Pariang, other areas in Unity state and Malakal. WFP will also consider providing support to additional people who are both vulnerable and indirectly affected by the conflict, due to their role as host families for the displaced, the destruction of their livelihoods or the disruption of food availability or accessibility.

Over the course of this emergency operation, it is expected that a wide-range of assistance modalities will be implemented. They may include wet feeding for some of the people living in displacement sites, general food distributions for these sites as well as for other affected populations who have taken shelter in more rural areas and nutritional support for children under five and pregnant and lactating women. Pending emergency market assessments, cash or voucher interventions will also be considered in areas where markets are functioning.

Given the volatility of the current situation, WFP will delay the implementation of some assistance objectives that had been planned pre-conflict, while others will go ahead as planned (e.g. food and nutrition support to the refugee population from the Republic of the Sudan and the Abyei displaced residents). Recovery activities (e.g. food for assets and school feeding) may be implemented according to opportunities in areas not immediately affected by the conflict.

Annex I

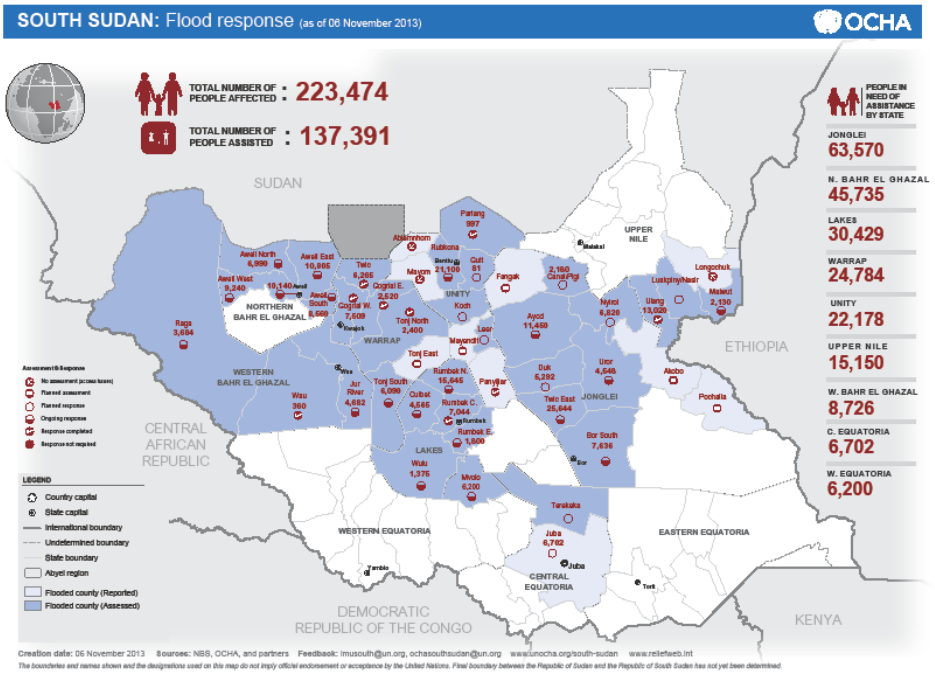
States and counties visited by CFSAM teams

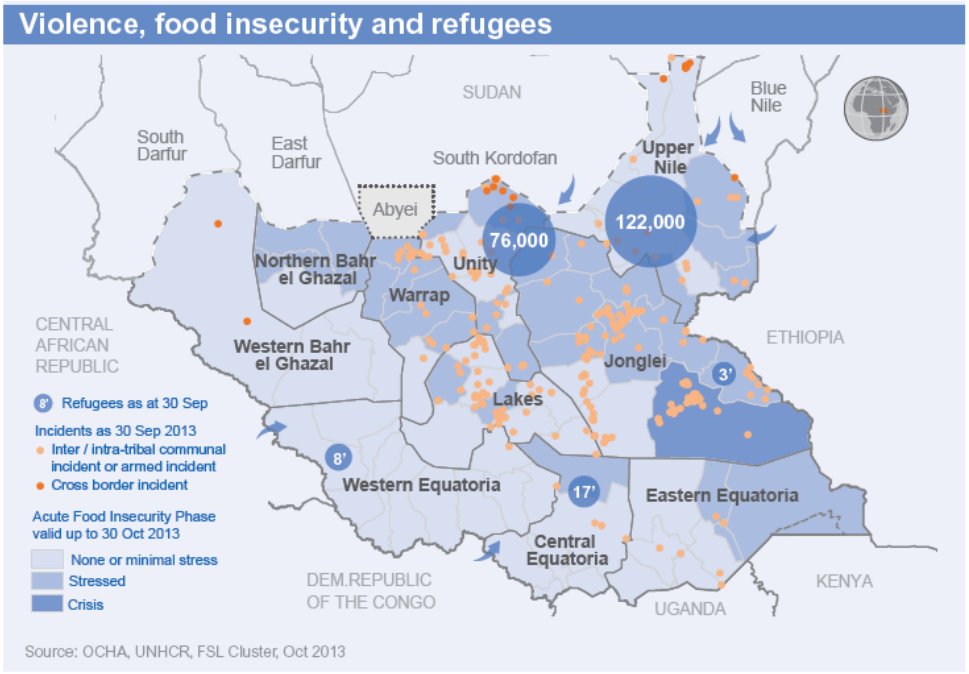
Divided into five teams, the Mission visited the 55 counties during the fieldwork conducted between 19 October and 22 November 2013, with 491 case studies and interviews to key informants.

Team	States	Counties visited		Number of case studies & interviews
1	Northern Bahr el Ghazal	5/5	Aweil Centre, Aweil East, Aweil North, Aweil South, Aweil West	98
	Western Bahr el Ghazal	3/3	Raja, Wau, Jur River	
2	Warrap	5/6	Gogrial West and East, Twic, Tonj North and South and Abyei (accessible parts)	77
	Lakes	7/8	Cuibet, Rumbek-Centre, East, Wulu, Yirol West, Yirol East	
3	Eastern Equatoria	4/8	Torit, Kapoeta North and South, Ikotos, Magwi	142
	Western Equatoria	6/10	Yambio, Maridi, Tambura, Mundri West, Mundri East, Mvolo	
	Central Equatoria	6/6	Kajo Keji, Terekeka, Juba, Lainya, Yei, Morobo	
4	Jonglei	6/11	Akobo, Ayod, Bor South, Nyirol, Twic East	53
5	Unity	6/9	Leer, Mayendit, Koch, Guit, Pariang Rubkona	121
	Upper Nile	7/12	Malakal, Panyikang, Renk, Manyo, Mhd el Jack, Nasir, Ulang	

Annex II

Summaries of flood and conflict incident affected families (by OCHA)





Annex III

Seasonal calendar

South Sudan - Indicative 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		