Food and Agriculture Organization of the United Nations

World Food Programme

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

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

28 March 2018

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
WORLD FOOD PROGRAMME
Rome, 2018

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Acronyms and abbreviations

AFIS	Agriculture and Food Information System
BCS	Body Condition Score
BOSS	Bank of South Sudan
CARI	Consolidated Approach for Reporting of food security Indicators
BQ	Black Quarter
BRACE	Building Resilience through Asset Creation and Enhancement.
CBPP	Contagious Bovine Pleuropneumonia
CBT	Cash-Based Transfer
CCPP	Contagious Caprine Pleuropneumonia
CCMC	County Crop Monitoring Committee
CFSAM	Crop and Food Security Assessment Mission
DLCO	Desert Locust Control Organization
FAO	Food and Agriculture Organization of the United Nations
FAW	Fall Armyworm
FEWS NET	Famine Early Warning Systems Network
FFA	Food for Assets
FMD	Foot and Mouth Disease
FSNMS	Food Security and Nutrition Monitoring System
f.o.b.	Free On Board
GDP	Gross Domestic Product
GIEWS	Global Information and Early Warning System on Food and Agriculture
GRSS	Government of the Republic of South Sudan
ha	hectare (0.42 hectares = 1 feddan)
hh	household
IDPs	Internally Displaced Persons
IFDC	International Fertilizer Development Company
IPC	Integrated Food Security Phase Classification
kg	kilogramme
MAFS	Ministry of Agriculture and Food Security
mm	millimetres
MoA	Ministry of Agriculture
NARO	National Agricultural Research Organization
NBHS	National Baseline Household Survey
NBS	National Bureau of Statistics
NDVI	Normalized Difference Vegetation Index
NGO	Non-Governmental Organization
P4P	Purchase for Progress
PET	Pictorial Evaluation Tool (Crop yield and livestock condition photo indicators)
PoC	Protection of Civilians
PWG	Population Working Group
QQU	*Quelea quelea*
RFE	Rainfall Estimate
SDG	Sudanese Pound
SMoA	State Ministry of Agriculture
SS	South Sudan
SSP	South Sudanese Pound
t	tonne
UN	United Nations
UMMISS	United Nations Mission in South Sudan
UN/OCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNHCR	Office of the United Nations High Commissioner for Refugees
USD	United States Dollar
VAM	Vulnerability Assessment and Monitoring
WFP	World Food Programme

Mission Highlights

- The net cereal production in 2017 (after deduction of post-harvest losses and seed use) in the traditional sector, is estimated at 764 107 tonnes, 7.5 percent down from 2016, 14 percent below the average of the previous five years and the smallest recorded output since the start of the conflict.
- With a projected population of about 11.4 million in mid-2018, the overall cereal deficit in the January-December 2018 marketing year is estimated at about 482 000 tonnes, 26 percent above the deficit estimated for 2017.
- Despite overall adequate rainfall over most of the cropping areas, the 2017 agricultural season had a poor performance, mainly due to the combination of a reduced number of farming households and the lower-than-average area planted per household, following the increase in intensity and scale of the conflict that had disrupted farming activities. The largest reductions in the harvested area have occurred in Central Equatoria (-48 percent) and Western Bahr el Ghazal (-28 percent).
- In addition to the endemic presence of common pests, Fall Armyworm (FAW) outbreaks, detected in the country for the first time this year, caused mild to average damage on maize and sorghum crops in more than 20 counties.
- In January 2018, 48 percent of the population of South Sudan (just over 5.3 million) was classified in the Integrated Phase Classification (IPC) Phases 3 ("Crisis"), 4 ("Emergency") and 5 ("Catastrophe"). This represents an increase of about 40 percent relative to the same time last year. In July, at the peak of the 2018 lean period, this proportion is expected to rise to 63.4 percent (6.9 million people). The most serious situations are in Unity and Jonglei, where the population in some counties is facing famine or risk of famine, and Northern Bahr el Ghazal.
- Food insecurity has again reached new highs during the harvest period of 2017: 70 percent of the population were food insecure, with 14 percent severely food insecure, a slight increase from the values registered one year before. Only 20 percent of the households were found to have acceptable food consumption. The coming lean period of mid-2018 is likely to see food insecurity levels rise further.
- Livestock body conditions were generally good due to adequate pasture and water availability following favourable seasonal rains. As during the previous three years, widespread events of cattle raiding and altered marketing/migration routes occurred in most areas of major conflict/insecurity.
- Inflation significantly declined from the peak of over 500 percent year-on-year reached in September 2016, mainly due to the winding down of monetary expansion policies, but has remained very high, with the year-on-year inflation rate estimated in December 2017 at 188 percent.
- Cereal prices declined in the second semester of 2017 as newly harvested crops entered the markets, but in late 2017 they were still up to twice the levels of 12 months earlier and more than seven times higher than 24 months earlier, underpinned by tight supplies, insecurity-related market disruptions, high overall inflation and a weak local currency.
- The number of Internally Displaced Persons (IDPs) in the country stood at about 1.9 million in November 2017. The number of refugees in neighbouring countries was close to 2.1 million, of which over 1.6 million new arrivals were recorded since July 2017, when the conflict spread outside the Greater Upper Nile Region to most areas of the country.
- Under the 2018 Emergency Response, FAO plans to support 400 000 vulnerable households, out of which 350 000 will receive seeds of sorghum, maize and cowpeas through direct distribution, while the remaining 50 000 will receive crop seeds through seed fairs. In addition, half of the 400 000 households will receive vegetable seed kits while the rest (50 percent) will receive fishing kits. The livestock vaccination and treatment campaign is targeting approximately 8.7 million heads for 2018.
- In 2018, WFP plans to assist over 4.8 million people in South Sudan with nearly 310 000 tonnes of food assistance. This includes emergency food assistance for around 4 million people most affected by acute food insecurity and the support of almost 1.1 million people (refugees, Abyei displaced, other vulnerable South Sudanese) with recovery and development-oriented activities such as school meals, cash and food assistance for assets and Purchase for Progress (P4P).

1. OVERVIEW

An FAO/WFP Crop and Food Security Assessment Mission (CFSAM) visited South Sudan from 4 to 14 December 2017 to estimate the cereal production during 2017 and assess the overall food security situation in the country. The CFSAM reviewed the findings of several Crop Assessment Missions conducted at planting and harvest time in the different agro-ecological zones of the country from May to December 2017. As during 2014, 2015 and 2016, all the missions were carried out by a Task Force Team that comprised staff from the

Ministry of Agriculture and Food Security (MAFS), the National Bureau of Statistics (NBS) and FAO. Task Force Team members have been trained during the past years to conduct rapid assessments using established protocols and techniques, such as driving and walking transects, scoring standing crops according to yield, and livestock according to body condition, perform key informant interviews and farmer case studies. In addition, supported by the FAO/AFIS Project, 39 County Crop Monitoring Committees (CCMCs) have been formed in 2016 and 2017, with a view to extending the responsibility of collecting more objective data at local level. All assessment and training activities have been financially supported by the European Union through the FAO South Sudan office.

Building on the successful experience of the new assessment format introduced in since 2014, the 2017 annual crop assessment in South Sudan was also planned to follow a year-long roadmap, with a series of assessments at State level from planting to harvesting to be conducted by the Task Force teams. Unfortunately, severe insecurity conditions prevailing since July 2016 have precluded the full execution of the plan, with a reduction of field work activities to accessible areas. Overall, nine planting assessments and 14 harvest missions (23 in total) were conducted in Western, Central and Eastern Equatoria, Northern Bahr el Ghazal, Lakes, Warrap, Upper Nile, Jonglei and Western Bahr el Ghazal states. In the whole of Unity State, most of Central, Eastern and Western Equatoria, and parts of Jonglei states access has been precluded both at planting and harvesting times. In all visited areas, concerns over security precluded to conduct driving transects and the assessment was mainly done through walking transects to assess yields. In addition, 966 farmer case studies and 73 interviews with key informants (1 039 in total) were conducted between May and December 2017.

Using standard CFSAM procedures with regard to secondary sources of information, the Task Force Team reviewed and commented on factors affecting crop performance during the 2017 production year, estimated the national cereal production during the year and assessed the overall food security situation. Where risks to team safety through local breakdowns of law and order were considered to be too severe to allow any access at crucial times, “remote” assessments, based on telephone interviews with key informants, were used to derive the estimates. Information from CCMCs operating in insecure areas (not accessible for Task Force teams) were sent to the crop assessment team in Juba through various means, including hand delivery of reports.

Regarding the traditional farming sector, the aggregate cereal harvested area in 2017 is estimated at 863 000 hectares, about 8.1 percent below the previous year’s level, due to the combination of a reduced number of farming households and a smaller-than-average area planted per household, following the increase in intensity and scale of the conflict since July 2016, which had disrupted farming activities. The most severe contraction in the harvested area is reported in the key-producing areas of Central and Western Equatoria states (-47 percent and -11 percent, respectively) and in Western Bahr el Ghazal State (-28 percent). By contrast, the area harvested has slightly increased in Upper Nile (10 percent), Unity (9 percent) and Lakes (7 percent) states following the return of some previously displaced households. As rainfall in 2017 has been mostly favourable in terms of amounts and distribution (except in some areas of Eastern Equatoria and Jonglei states) and crop losses due to pests and diseases have been mild (except in areas affected by FAW), the widespread insecurity due to the conflict continued to be the most significant driver in reducing yields through the displacement of farmers and limiting farmers’ access to their farm lands.

Net cereal production in 2017 from the traditional sector, after deduction of post-harvest losses and seed use, is estimated at about 764 107 tonnes, 7.5 percent down from 2016, 14 percent below the average of the previous five years and the smallest output since the start of the conflict. The decrease in 2017 estimated national production is essentially due to the impact of the conflict on the area planted and yields, especially in Greater Equatoria and in Western Bahr el Ghazal states. In particular, a dramatic reduction in production is estimated in Central Equatoria State, where the output contracted by 48 percent from the levels of the previous year. By contrast, production is estimated to increase in Upper Nile and Unity states by 18 and 9 percent, respectively. Moderate increases of 6 percent are also estimated in Lakes and Jonglei states, although the output still remains well below the pre-conflict levels of production. With a mid-2018 projected population of about 11.4 million people, consuming on average about 110 kg of cereals/capita/year, the cereal requirement in 2018 is estimated at about 1.246 million tonnes. Accordingly, an overall rounded cereal deficit of 482 000 tonnes is estimated in the traditional sector for the January-December 2018 marketing year, 25.5 percent above the deficit estimated for 2017.

Net cereal production from the mechanized sector in Upper Nile State plus the Ton Chol sorghum scheme in Northern Bahr el Ghazal State is estimated at 87 127 tonnes. Although part of this production is expected to be traded across the border in the Sudan, some quantities are likely to be marketed internally, offering also options for local purchases by the GRSS and humanitarian agencies.

The country is facing a protracted macro-economic crisis, with contraction of domestic output, very high inflation rates and parallel exchange market premium spiralling. After two years of moderate growth in 2013 and 2014, the country's Gross Domestic Product (GDP) contracted by about 11 percent in 2015 and 2016 and by a further 6.6 percent in 2017, as a consequence of conflict on the overall economy, particularly on export revenues from the oil sector as well as Government-fixed investments. Inflation significantly declined from the peak reached in September 2016 (when the year-on-year inflation rate was estimated at 550 percent) mainly due to the winding down of monetary expansion policies, but remains very high, with the year-on-year inflation rate estimated in December 2017 at 188 percent.

Prices of cereals, which started to soar in late 2015 on account of the local currency devaluation, the general economic downturn and widespread insecurity, reached record levels in mid-2017. Subsequently, in the capital, Juba, prices of sorghum and maize declined by 12-13 percent between June and December, as 2017 harvests entered the markets. Similarly, prices of sorghum declined in Aweil, Wau, and Bentiu markets by 20-50 percent between August and October. Despite the recent declines, cereal prices in late 2017 were still up to twice the levels of 12 months earlier and more than seven times higher than 24 months earlier. Across the country, trade flows and market activities are at lower levels than before the conflict, as widespread insecurity is constraining trade flows and households' physical access to the markets.

In January 2018, 48 percent of the population of South Sudan (just over 5.3 million people) was classified in the IPC Phases 3 ("Crisis"), 4 ("Emergency") and 5 ("Catastrophe"). The projected status for the lean period of mid 2018 (May-July) estimates this proportion to rise to 63.4 percent (6.9 million people). These numbers translate into a striking increase of 40 percent when compared with the same situation one year ago. A number of states have seen the population in IPC Phases 3, 4 and 5 increase threefold.

These results arise from the emergence of conflict on previously peaceful areas and the continuing extreme staple food prices interacting with heavy market dependence by rural populations. Generalized insecurity and adverse economic circumstances lead to continuing disruption of commodity trade flows and the spread of critical humanitarian conditions into areas not directly affected by major hostilities.

Food insecurity has reached yet new records in 2017 (70 percent of the population at harvest time, with over just under 14 percent severely food insecure), twice the pre-conflict levels but only a small worsening relative to the same time last year when food insecurity stood at 67 percent (14 percent severely food insecure). Food consumption has worsened across most regions except Western Equatoria and Western Bahr-el-Ghazal. The coming lean period of mid-2018 is likely to see food insecurity levels rise further.

Households remain extremely dependent on markets during the lean period, particularly in Northern Bahr el Ghazal, Western Bahr el Ghazal, Lakes and Warrap where they are the main suppliers of staples for over 60 percent of the households during the lean period – this was an improvement compared to the previous year (70 percent in mid-2016). Therefore, the rural households in these regions are highly vulnerable to price shocks such as those occurring in mid-2017.

Market dependence and price shocks led to a rise in the proportion of households with very high and high food expenditure during the 2017 lean period (60 percent against 52 percent in mid-2016). The more extreme values of high food expenditure are in Northern Bahr el Ghazal and neighbouring regions, precisely those more affected by the disruption of trade networks by insecurity.

In 2018, WFP plans to assist over 4.8 million people in South Sudan with nearly 310 000 tonnes of food assistance. This includes emergency food assistance for around 4 million people most affected by acute food insecurity and the support of almost 1.1 million people (refugees, Abyei displaced, other vulnerable South Sudanese) with recovery and development oriented activities such as school meals, cash and food assistance for assets and P4P.

Under the 2018 Emergency Response, FAO plans to support 400 000 vulnerable households, out of which 350 000 will receive seeds of sorghum, maize and cowpea through direct distribution, while the remaining 50 000 will receive crop seeds through seed fairs. In addition, 50 percent of the 400 000 households will receive vegetable seed kits while the rest (50 percent) will receive fishing kits. The livestock vaccination and treatment campaign is targeting approximately 8.7 million heads for 2018.

2. SOCIO-ECONOMIC CONTEXT

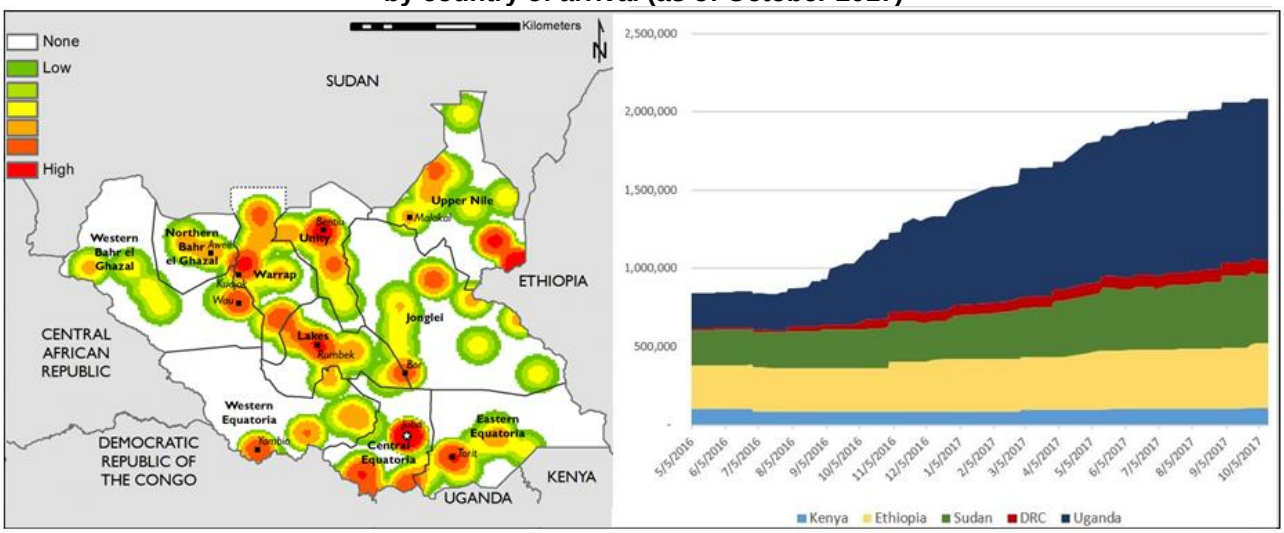
2.1 Population and population movements

Since the conflict started in mid-December 2013, population size and geographical distribution have significantly changed. According to UN/OCHA and UNHCR, by November 2017, over 4 million people were forced to flee their homes due to insecurity, including about 1.9 million IDPs (with about 210 000 people in UNMISS Protection of Civilians sites across the country) and 2.1 million people that fled into neighbouring countries (Uganda, the Sudan, the Democratic Republic of the Congo, Ethiopia and Kenya).

The highest concentration of IDPs is in conflict-affected areas of the Greater Upper Nile Region, with almost 60 percent of the total caseload (roughly 1.2 million). Displacements have increased significantly in 2016 and 2017 in the rest of the country following the spread of the conflict to most areas of the country. At the end of December 2016, there were over 400 000 IDPs in the Greater Equatoria Region, about 170 000 in the Lakes State and more than 100 000 in Western Bahr el Ghazal State. The country's largest PoC site is in Bentiu (Unity State), hosting about 112 000 people, followed by the PoC sites in Juba and Malakal with about 38 000 and 24 000 people, respectively.

About 2.1 million people are living in neighbouring countries as refugees and asylum seekers. The first significant part of the exodus took place during the first semester of 2014, with over 420 000 people leaving the country. Then, the flow slowed down between July 2014 and July 2016, with an average of about 12 000 people fleeing per month. After the expansion of the conflict outside the Greater Upper Nile Region in July 2016 until the end of 2017, about 1.6 million people left the country and moved mainly to Uganda, where 1 million refugees reside, Ethiopia and the Sudan, hosting each about 420 000[1] refugees. Notably, the traditionally cereal surplus producing areas of the former Central and Eastern Equatoria states have experienced an exodus of about 670 000 people in 2017, with an ensuing sharp reduction of the number of households actively engaged in farming activities. In 2014 and 2015, most South Sudanese refugees were from the Greater Upper Nile Region, while in 2016 and 2017 their origins included also the Greater Equatoria Region as well as Western and Northern Bahr el Ghazal states. At the same time, the country hosts about 284 000 refugees, mainly from South Kordofan and Blue Nile states of the Sudan.

Figure 1: South Sudan: Conflict density (July-October 2017) and external displacement by country of arrival (as of October 2017)



Source: FEWS NET.

According to NBS population projection data, revised by the South Sudan IPC Population Working Group (SS IPC PWG)[2] in close cooperation with UNHCR and IOM to take into consideration movements of people within the country and the flow of refugees outside the country, South Sudan's population for mid-2017 was estimated

[1] The figure for the Sudan refers to the individuals that sought refuge in the country after the conflict erupted in South Sudan in December 2013. The total number of South Sudanese refugees in the Sudan was estimated in December 2017 at about 770 000.

[2] The South Sudan IPC Population Working Group (SS IPC PWG) is a partnership between NBS, FAO, WFP, FEWS NET, and UN/OCHA.

at about 11 046 000. This represents a downward revision of about 1 million individuals from the figure used in the 2107 CFSAM report. The revised population figure, including the breakdown at county and state levels, has been used for the October 2017 IPC analysis. Given the implicit annual increment of 3 percent, the population for mid-2018 has been estimated by the Mission at 11 378 000.

2.2 Economy

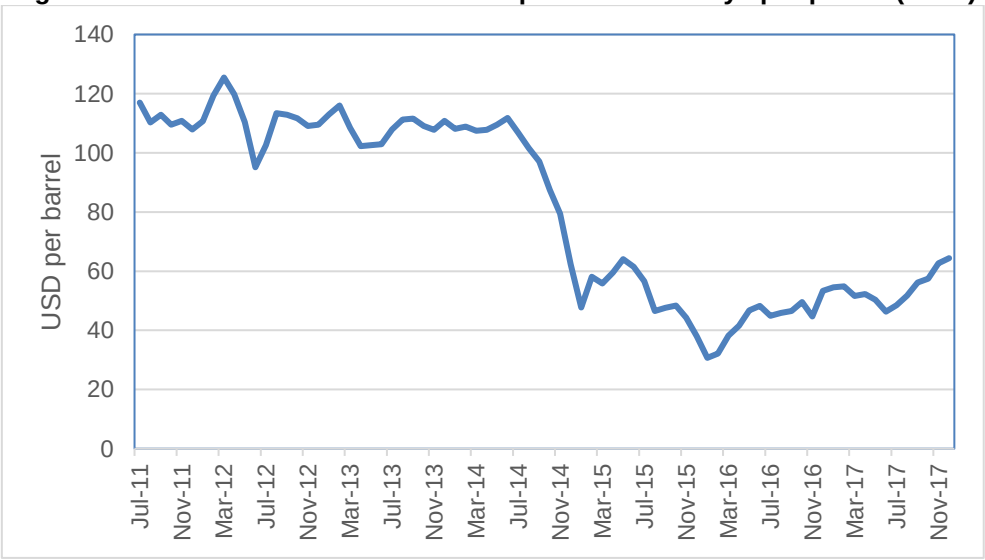
2.2.1 *Economic growth and national budget*

Since mid-2016, the country is displaying all the signs of macro-economic collapse, with output contracting, hyper-inflation and parallel exchange market premium spiralling. After two years of moderate growth in 2013 and 2014, the country's real GDP contracted by about 11 percent in 2015 and 2016 and by a further 6.6 percent in 2017[3], as a consequence of the severe impact of the protracted conflict on the overall economy, particularly on export revenues from the oil sector as well as on Government-fixed investments. The gap between Government expenditures and revenues has been mostly bridged by domestic borrowing from the Bank of South Sudan which depleted foreign exchange reserves and induced to print money with consequent increases in money supply and inflation. In addition, the lack of US dollars hampered the ability of the Bank of South Sudan to protect the local currency, leading to its accelerated devaluation in the parallel market.

Oil production plays an important role in the economy of South Sudan, contributing slightly more than half of the GDP, 95 percent of exports, 90 percent of Government revenues and a significant share of private sector employment. The domestic oil sector remains closely linked to the Sudan. Although most of the former Sudanese oil fields are now in South Sudan, the processing facilities, pipelines, export terminals and refineries are still in the Sudan. Since independence in 2011, oil production has steadily declined and has experienced frequent disruptions due to disputes with the Sudan and to internal conflicts. Estimated at 350 000 barrels/day before independence, oil extraction was interrupted in January 2012, due to a dispute with the Sudan over transit fees and transfers. Production resumed in April 2013, but it never fully recovered and decreased from 165 000 barrels/day in 2014 to about 120 000 barrels/day in 2016. In the 2017/18 budget, oil production is expected to average 110 000 barrels/day.

The impact of low oil production was compounded by the decline in international crude oil prices to historically low levels in early 2016. Prices have subsequently increased in 2016 and 2017 and, despite the price levels are still low, the recent trend had a favourable impact on oil revenues. As Figure 2 shows, crude oil prices dropped by more than 70 percent between mid-2014 and early 2016, from USD 112/barrel in June 2014 to a record low level of USD 31/barrel in January 2016, subsequently increasing to about USD 65/barrel at the end of 2017.

Figure 2: South Sudan - Crude oil - Europe Brent monthly spot prices (f.o.b.)



Source: United States of America Energy Information Administration.

[3] Estimates of GDP growth for 2015-2017 period sourced from World Bank, South Sudan Economic Update 201, available at https://openknowledge.worldbank.org/handle/10986/28560. Other sources might provide alternative absolute figures due to lack of reliable macroeconomic data and inherent difficulties in their estimation and forecast.

The decline in international crude oil prices has severely affected the economy of South Sudan by reducing the export revenues. In addition, transit and pipeline fees as well as direct financial transfers to be paid to the Sudan have been increasingly onerous as they are calculated on a volume basis, without considering the fluctuations of international prices. Under the agreement signed in September 2012 with the Sudan, oil transit fees for the use of the pipeline to Port Sudan were negotiated at about USD 24/barrel. Consequently, noting also that South Sudan's oil is sold at a discount of about USD 10/barrel given its low quality, profits due to oil extraction are very low. As a result, oil revenues had fallen from 23 percent of the GDP in fiscal year 2013/14 to 14.6 percent of the GDP in fiscal year 2014/15 and have further dropped to 11.4 percent in fiscal year 2015/16. Although South Sudanese authorities aim to boost oil output attracting new investments, insecurity and instability are likely to discourage investors. In addition, oil fields in South Sudan are mature and their output is likely to decline over time unless further investments in enhanced oil recovery techniques are made.

The 2017/18 budget, approved by the Transitional National Legislature in August 2017, forecast total revenues at about SSP 40 billion, compared to SSP 18.5 billion in 2015/16. However, in dollar terms, 2017/18 revenues are projected to remain similar to the previous year. Oil revenues in 2017/18 are projected to significantly increase from the previous year due to higher oil price forecasts[4], while non-oil revenues are projected to contract as conflict and macro-economic downturns are expected to continue to constrain economic activities.

The 2016/17 total spending from Government resources is estimated at SSP 43.7 billion. Although in nominal terms this value is about 30 percent higher than the 2016/17 budgeted levels of SSP 33.4 billion, the value of the expenditure in USD has contracted by 40 percent in an effort to balance the national budget. Recognizing the ongoing macro-economic crisis affecting the country, expenditure allocation by chapters allows the Government functioning and warrants the most essential services, including security and education. As a consequence, budget expenditure for salaries of Government employees is set at about 70 percent of the total domestically-financed budget, leaving limited amounts available for operating and capital spending. About SSP 3 billion have been allocated for the implementation and consolidation of peace, including reparation of damaged infrastructures and costs related to the return to their homes of the displaced population.

The budget allocations by sectors have not changed markedly from the budgets in previous years. Security, Rule of Law and Public Administration are the largest sectors of expenditure, together accounting for about 70 percent of Government expenditures. Funds for natural resources and rural development represent only about 2 percent of the total budget and are set at about SSP 809 million.

As 2017/18 estimated expenditures exceed the available resources[5] by about SSP 14 billion, new borrowings will be needed to cover the deficit and they will further increase the country's total indebtedness position that was provisionally estimated at SSP 54.8 billion as of 31 March 2017. Notably, in mid-2017, the Government ceased to monetize the fiscal deficit through borrowing from the Bank of South Sudan (BOSS), a practice that was one of the main drivers of the rampant inflation of recent years. No borrowings are foreseen in the 2017/18 budget.

2.2.2 *Exchange rate*

The South Sudanese Pound (SSP) was introduced following the independence in July 2011 and it was initially intended to have parity with the Sudanese Pound (SDG). Until mid-December 2015, the BOSS maintained an official fixed exchange rate of SSP 2.95/USD, providing limited amounts of dollars for sale by approved banks and exchange bureaus at SSP 3.16/USD. Rationing of foreign currencies since early 2012 (due to the oil production shut-down decided after the disagreement with the Sudan about transit fees), led to the development of a parallel market where the exchange rate was granted a premium. The parallel exchange rate has been quite stable moving within a band between SSP 3.9/USD and SSP 5.5/USD up to the end of 2014, when the shortage of foreign exchange (due to shrinking oil revenues caused by reduced domestic oil production in conflict-affected areas as well as record low international oil prices) started to severely limit the ability of the BOSS to defend the value of the local currency. This situation led to a steady and sharp devaluation of the SSP in the parallel market as reported in Figure 3, which shows mid-points between buying and selling parallel exchange rates in the capital, Juba, since the start of the conflict at the end of 2013. The exchange rate began to increase in late 2014, when it was SSP 5.5/USD, temporarily declining from SSP 37/USD to SSP 32/USD in April 2016 when the formation of the Government of National Unity was announced and subsequently resuming to increase, surging at faster rates since July 2016, when the conflict spread from the Greater Upper Nile Region to most of the country. Overall, the parallel market exchange rate

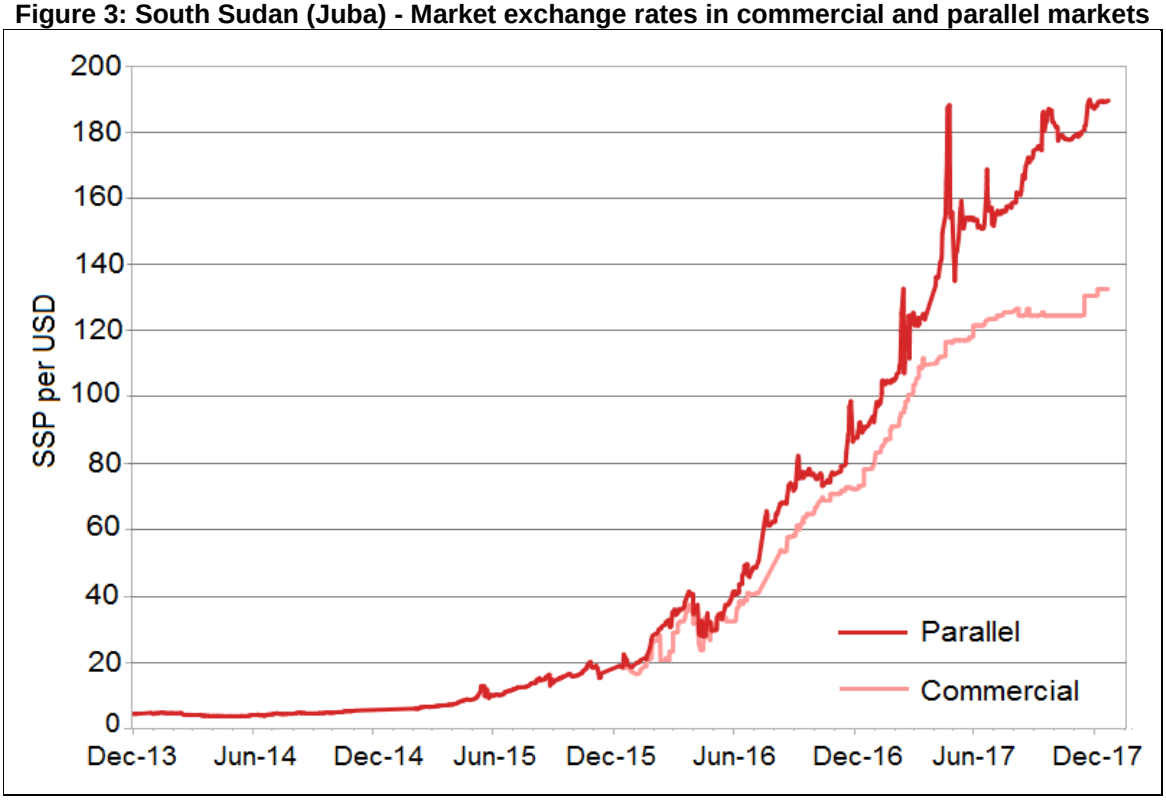
[4] Projected oil revenues in 2017/18 are USD 166 million, compared to USD 103 million projected in 2016/17.

[5] Available resources amount to about SSP 32 billion, about SSP 40 billion revenues minus SSP 8 billion net financing, as the Government plans to borrow about SSP 3 billion but to repay about SSP 11 billion loans.

of the SSP increased at an average annual growth rate of 225 percent between December 2014 and December 2017, when, at SSP 190/USD, it was more than 30 times higher than the exchange rate of three years earlier.

On 14 December 2015, with the aim to narrow the difference between official and parallel exchange rates, the BOSS decided to abandon the fixed rate, letting the rate to freely float. Under the new system, the BOSS supplies foreign exchange through market-based auctions and commercial banks are free to determine their rates with customers. As a consequence of the new regime, the official exchange rate at the end of 2015 went up to SSP 19/USD. The reform was initially successful in reducing the spread between the official market rate and rates in the parallel cash market and the two rates converged to about SSP 30/USD in April 2016. Subsequently, as the parallel exchange rate started to soar in July 2016, the spread between the official and the parallel market rates began to widen with an increasing gap: the average monthly spread between the two rates was about 15 percent in December 2016, about 25 percent in June 2017, more than 40 percent in December 2017. The divergence between the two rates reflects that demand for hard currency continues to outweigh the limited supply of foreign exchange given unresolved fiscal and monetary issues, mainly excessive monetary expansion to finance Government spending.

Figure 3: South Sudan (Juba) - Market exchange rates in commercial and parallel markets



Source: High Frequency Survey in South Sudan by the National Bureau of Statistics and the World Bank.
http://dataviz.worldbank.org/views/MarketSurveys/Dashboard

2.2.3 *Inflation*

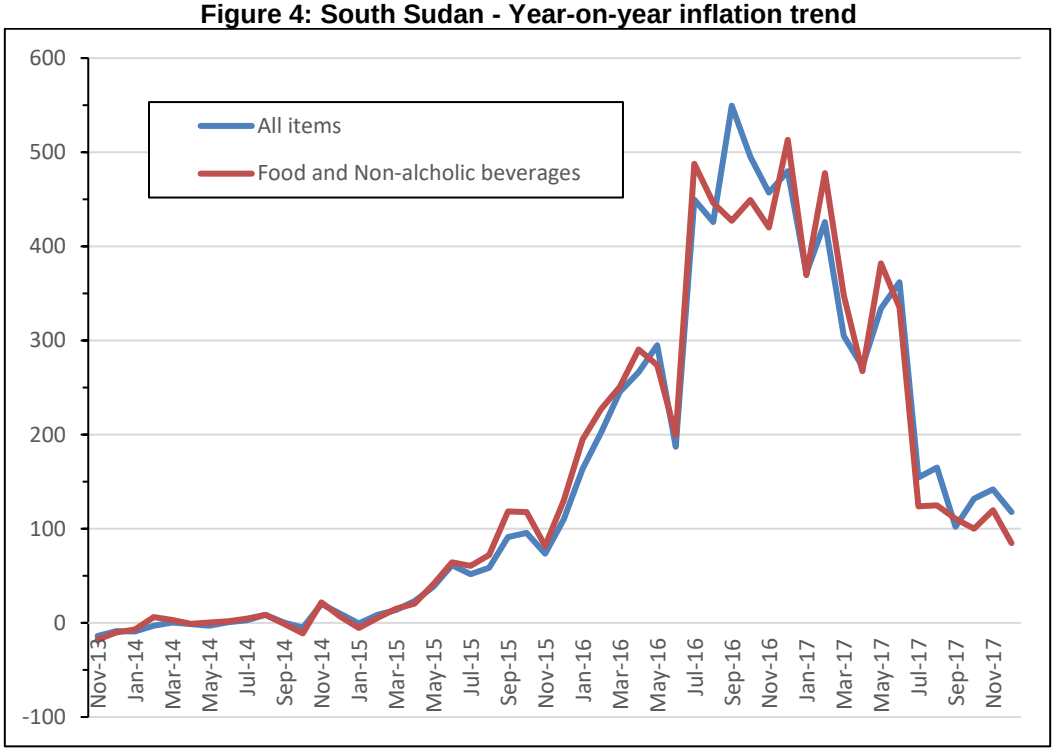
Inflation started a sustained upward trend in February 2015, with the year-on-year national inflation peaking at about 550 percent in September 2016 and leading to one of the worst ten episodes of hyper-inflation in the world during the last two centuries. The main drivers of inflation were:

- Insufficient foreign reserves of the BOSS compared to the local demand, leading to a substantial increase of the exchange rate in the parallel market.
- Expansion of the monetary base as the Government financed through borrowings from the BOSS a large portion of its increasing fiscal deficit[6].
- Increasing transaction costs due to supply-chain bottlenecks caused by the conflict, which drove up prices of imported commodities.

[6] The fiscal deficit more than tripled between fiscal years 2013/14 and 2014/15, increasing from 3.7 percent of the GDP to 12 percent, declined to 9 percent in 2015/16 and increased again to 11 percent in 2016/17. The overall increase since 2013 is mostly due to conflict-related security spending.

Subsequently, the general inflation declined markedly, albeit irregularly, and the year-on-year inflation rate decreased from the 550 percent peak in September 2016 to 118 percent in December 2017, mostly due to the winding down of the expansionary monetary policy in the second semester of 2016. The trend of general inflation closely follows the trend of food inflation, as the food component accounts for more than 70 percent of the total value of expenditures. Food inflation followed a sustained increasing trend between early 2015 and late 2106, peaking at 513 percent in December 2016[7], subsequently declining to 85 percent in December 2017.

Figure 4: South Sudan - Year-on-year inflation trend



Source: National Bureau of Statistics.

2.3 Agriculture

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

Agriculture is almost entirely dependent on rainfall and hence the variability of rainfall in terms of amount and distribution is usually the major factor in determining crop production. Historically, rainfall increases in a northeast to southwest direction culminating in the Greenbelt along the border with the Central African Republic, the Democratic Republic of the Congo and Uganda; but there are usually considerable variations in rainfall from year to year and from location to location within the same year. In low-lying areas, flooding/water-logging is a common occurrence, while many areas, especially those towards the northern border with the Sudan and in the southeast corner of the country, are susceptible to prolonged dry periods.

Crop production is mostly conducted by smallholder farmers on small plots of land cultivated by hand. The family size is five-seven persons that belong to larger family aggregations, reflecting the polygamous nature of most communities. Despite an abundant availability of land throughout the country, the area cultivated by households has, hitherto, been limited by a combination of (a) the size of the household labour force and/or the ability of households to provide in-kind payment (essentially food/beer) for the mobilization of traditional working groups (*nafeer);* (b) the lack of efficient tools and farm power for land clearing and ploughing; and (c) security of access.

[7] At these levels of hyper-inflation (equivalent to 6.2 percent daily), food prices doubled in only about 12 days.

In recent years, average farm sizes are noted to have increased with steadings-based, farm areas merging with far-fields as communities adopt animal traction (e.g. Lakes and parts of Warrap states) and, with the emergence of commercially-orientated farmers cultivating larger areas of cereals, groundnuts and cassava for sale using combinations of tractor services, labour gangs and pairs of oxen, depending on location. During the past 20 years, animal traction has been promoted by FAO and many NGOs in Central Equatoria, Eastern Equatoria, Lakes, Warrap and Bahr el Ghazal states in attempts to facilitate an increase in the area cultivated by each household. At last, previously-noted constraints to its adoption appear to be lifting, with requests for increased access to purchase units reported to visiting Mission teams in Lakes and Central Equatoria states. However, lack of spare parts, skills to maintain mould-board ploughs, raw materials for local blacksmiths and low levels of operator skill, still limit expansion; as does the lack of resources to capitalize on the increased area through more extensive and frequent weeding[8].

In 2017, the secure access to land throughout the year has been the defining characteristic of the areas farmed, not only in Greater Upper Nile Region and its bordering states as during the previous two years, but also in most areas of Greater Equatoria Region. Since July 2016, the situation in Central and Eastern Equatoria states has sharply deteriorated resulting in the displacement of local communities, who are mostly farming households, to neighbouring countries. In addition, farmers in the conflict-affected areas are not able to cultivate far-field and are limited to homestead areas.

Apart from the activities of the Aweil Rice Scheme in Northern Bahr el Ghazal State, mechanized cereal production is only noted to have been practised on a large scale in the Upper Nile counties of Renk, Manyo, Melut, Baliet, Fashoda and Malakal following the patterns of land occupancy established before the independence by traders/farmers from both South Sudan and the Sudan. Elsewhere, limited numbers of both private and GRSS tractors provide ploughing services to individuals and farmer groups. “Mechanization” as a term applies only to a one-pass preparation and a second sowing pass with a seed drill positioned over the ubiquitous disc harrows. Other operations are done manually. Major problems related to the supply of fuel and spare parts, operator skills and maintenance and repair capabilities persist, severely limiting the efficiency of the tractor service with, on average, three-four times more tractors, purchased in the last ten years lying idle rather than functioning.

In both the smallholder and mechanized sectors, sorghum is the main cereal crop cultivated by the traditional sector, comprising some 70 percent of the area sown to cereals. The preferred sorghum seeds are found among many local landraces with lengths to maturity fitting agro-ecological niches[9] ranging from short-season (<90 days) to very long-season (>220 days) types. There are also several improved, short-term varieties of sorghum from the Sudan that have become well-established in both large-scale mechanized farms and hand-cultivated farming areas, with cross-border access to the Sudan located from Renk via Abyei to Aweil[10].

Maize is estimated to be planted in about 27 percent of the cereal area. However, this percentage breakdown is not universally applicable to product availability due to regional differences. Maize is the most popular cereal in the Greenbelt, where Longi varieties (especially Longi-5) from Uganda are grown in series in two crops per year on the same land (200 percent occupancy). It is also the main cereal in southcentral parts of Unity State, along the Sobat River in Upper Nile State and in eastern counties of Jonglei State near the Ethiopian border, where mixed Longi varieties, local landraces and Ethiopian releases are noted. Elsewhere, maize is only cultivated in very limited areas close to homesteads, where it is consumed green with the first early sorghums in August-September.

Other cereals of minor significance, namely bulrush millet, finger millet and rice, are estimated to make up the remaining 3 percent of the cereal area. In Northern and Western Bahr el Ghazal, Warrap and Lakes states, sorghum is inter-cropped with bulrush millet; whereas finger millet and upland rice are mostly found in Greater Equatoria Region. Other crops of most importance to food security include cassava and groundnuts, sweet potatoes and yams. Cassava is estimated to make up 30 to 40 percent of the planted area in Western and Central Equatoria states and 27 percent of the cultivated area in Western Bahr el Ghazal State. Groundnut areas range from 5 to 15 percent according to location. Groundnut, usually *Red Beauty* and *Mr Lake* varieties, is usually cultivated on sandier soils and, after cereals, make the most important contribution to households’ diets throughout the northern states, where they are also the main cash crop[11].

[8] In this regard, the local transfer of donkey plough (scuffler) technology from Darfur Region in the Sudan to Western Bahr el Ghazal State offers an immediate solution for inter-row cultivation, including weeding and thinning of broadcast crops.
[9] Short-season landraces provide an early harvest in August/September, while long-season landraces, able to withstand both dry spells and water logging, are harvested in December/January.
[10] Afargadamek, Wad Ahmed, Gaddam el Hammam.
[11] Sesame, noted in traditional systems in all states inter-cropped with sorghum, is increasing in popularity in the north where it is sold to traders from the Sudan.

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 increasingly cultivated near the cities to supply the urban markets.

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

Chemical inputs such as commercial fertilizers[12], pesticides or herbicides are not used by small farmers on field crops, although some use of herbicides has been noted in previous CFSAM reports on large scale mechanized farms in Upper Nile with access to supplies from Kosti (the Sudan). Regarding pest control campaigns, before South Sudan independence, aerial spraying of nesting sites routinely controlled migratory *Quelea quelea* (*QQU)* bird populations near the mechanized areas. Although the practice was resumed in 2013, with some aerial spraying conducted by the Desert Locust Control Organization (DLCO) based in Nairobi, no widespread actions have been taken since then as the areas concerned are exclusively in conflict-affected states, which leaves the sorghum crops harvested in January in Upper Nile State increasingly vulnerable to attacks.

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

3. CEREAL PRODUCTION IN 2017

3.1 Cereal harvested area and yield estimates

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

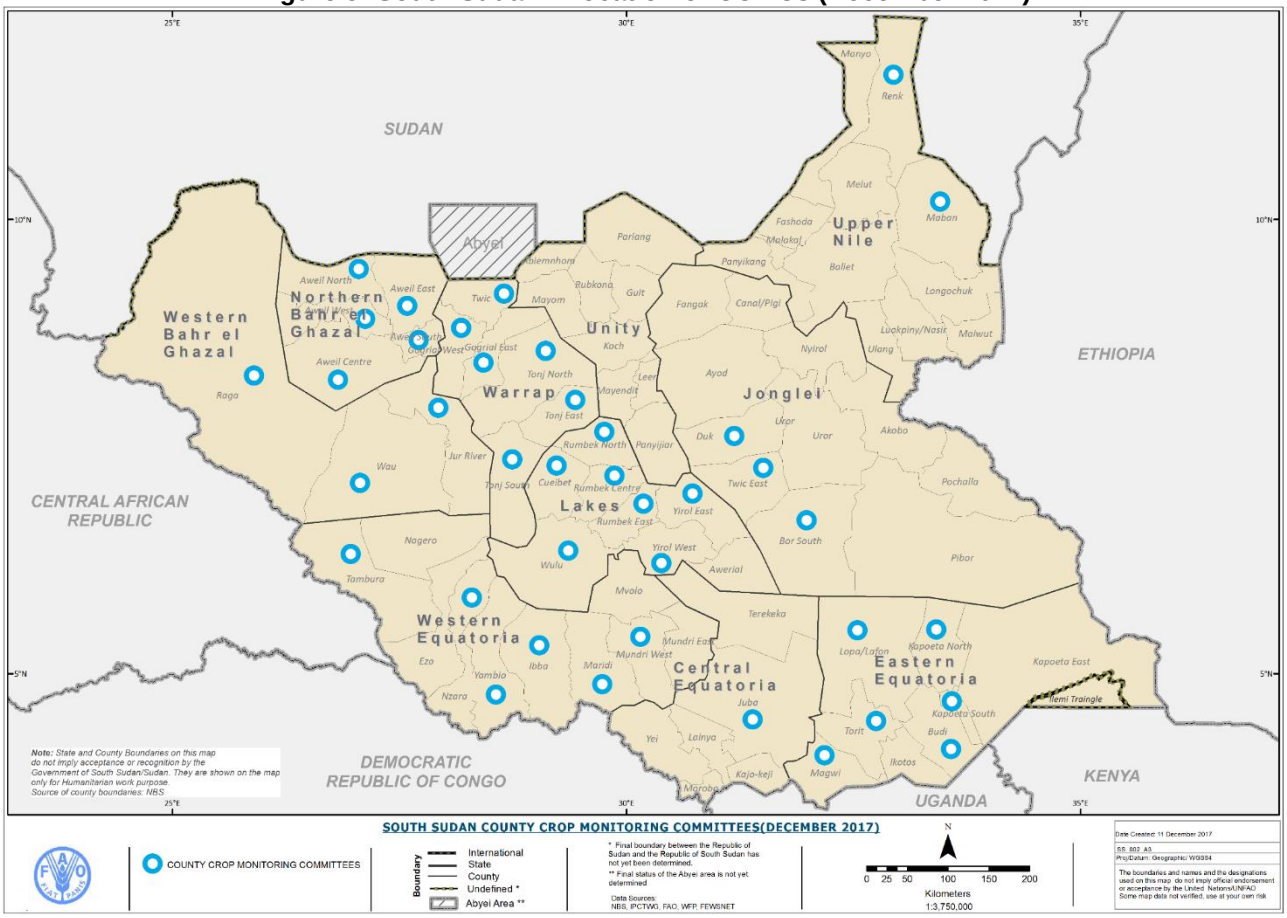
Combining the products of each of these four sources of information gives the cereal production estimates for each county. The county figures are then added to provide the cereal production figures for each of the ten states and for the country as a whole. The number of assumptions incorporated into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

In years up to 2013, the actions noted above have all been undertaken by a CFSAM Rome-based team of specialists during six-week missions to South Sudan in November-December, working with staff from MAFS, NBS and FAO national staff. Starting in 2014, in a departure from the usual one-off CFSAM exercise at harvest time, teams led by members of a Task Force of selected specialists from MAFS, NBS and FAO national staff conducted a series of intermediate missions at planting and harvest time. Since 2015, FAO South Sudan employed an international agronomist as Crop Assessment Supervisor/Trainer to support the capacity building efforts and year round assessment of crops from planting up to harvesting. As a result, all missions were timed to match the pertinent agricultural activities that occur at different times of the year in different agricultural zones. The effect of the change in approach was noticeable in the greater coverage obtained including a proper monitoring of the cropping season and assessment of production from both the first and second season harvests, including in the Greenbelt and being able to assess standing crops in Warrap State since last year.

[12] IFDC trials noted in Central Equatoria stopped three years ago and were considered as a failure, i.e. over-priced fertilizers gave no financial advantage over yields (previously underestimated) normally achieved by progressive farmers.

In 2016 and 2017, in an attempt to increase coverage and participation of local line agencies, FAO/AFIS in 2016 and 2017 set up 39 County Crop Monitoring Committees (CCMCs), whose members (extension workers and staff of NGOs) were trained[13] to monitor and report the progress of the season and performance of crops using a standard form designed to capture qualitative and quantitative information. The location of CCMCs is reported in Figure 5. Therefore, the crop assessment exercise in South Sudan is currently implemented in two pillars: the Task Force-led approach and the CCMCs established at county level.

Figure 5: South Sudan - Location of CCMCs (December 2017)



Source: FAO South Sudan.

During all the planting and harvesting assessment missions carried out in 2017, security and related access implications required that field work be conducted in pre-sited locations reachable only by air or separated by main roads where at least two UN vehicles were required to drive in-tandem. As in 2015 and 2016, "walking"[14] transects in specific locations were the major objective approach used rather than long-distance "driving" transects used in the past to estimate yields.

Between May and November 2017, the Task Force teams were able to conduct 23 missions to visit 23 counties, during planting and 30 counties at harvest time, with most of the counties visited twice in both assessments. The assessed areas are in Northern Bahr el Ghazal, Lakes, Warrap, Abyei Administrative Area, Central Equatoria, Eastern Equatoria, Upper Nile, Jonglei and Western Bahr el Ghazal states. The Task Force completed a total of 1 039 case studies during both planting and harvest assessments out of which 966 were farmers and 73 key informant interviews with senior staff in previously-designated State Ministries of Agriculture (SMoA), county officials and staff of NGOs and international agencies based in the field (Table 1). This represents a significant increase compared to last year, when only 12 missions (three planting and nine harvest assessments) were conducted. Therefore, in 2017 about twice as much crop assessment missions were conducted compared to the previous year.

[13] In 2017, a total of 222 extension workers and staff of NGO partners were trained by FAO/AFIS.

[14] Team members independently walk for about two hours along paths through fields, scoring yields in every plot/field passed by colour code according to "close-up level" of PET photo-indicators for each major crop. Scores made are then converted from colour codes into tonnes/hectares and weighted averages calculated for each "transect" walked.

Table 1: South Sudan - Planting and harvest assessments, visited counties and case studies in 2017

State	Type of assessment	Date of assessments (2017)	Counties visited	Number of case studies		
				Farmers	Key informants	Total
Western Equatoria	First season planting in Western Equatoria	27 May-2 June	Nzara, Tambura, Yambio	64	1	65
	First harvest assessment in Western Equatoria	18 -28 August	Tambura, Yambio, Nzara	41	1	42
	First harvest in Western Equatoria	15-22 August	Mundri West	16	4	20
	Second harvest Wester Equatoria	23 November -1 December	Tambura, Nzara, Yambio	38	2	40
Northern Bahr el Ghazal	Planting assessment in Northern Bahr el Ghazal	3-13 July	Aweil West, Aweil East, Aweil South, Aweil Centre	61	1	62
	Harvest assessment Northern Bahr el Ghazal	18-28 September	Aweil West, Aweil East, Aweil South, Aweil Centre	102	12	114
Warrap	Planting assessment in Warrap	3-13 July	Gogrial West, Twic, Abyei	41	5	46
	Harvest assessment in Warrap	20-29 September	Gogrial West, Twic	41	3	44
Lakes	Planting assessment in Lakes	4-14 July	Cuiebet, Wulu, Yirol West	47	2	49
	Harvest assessment in Lakes	13-22 September	Rumbek North, Cueibet, Wulu, Yirol West	50	6	56
Western Bahr el Ghazal	Planting assessment Western Bahr el Ghazal	3-13 July	Jur River, Wau	69	10	79
	Harvest assessment Western Bahr el Ghazal	16-27 October	Wau, Raja, Jur River	50	2	52
Jonglei	Planting assessment in Jonglei	14-19 August	Bor	28	2	30
	Harvest assessment in Bor	18-23 October	Bor	14	3	17
	Harvest assessment in Pochalla	17-24 October	Pochalla	24	1	25
Eastern Equatoria	Planting assessment in Kapoeta	9-13 August	Kapoeta South, Kapoeta North, Kapoeta East	29	3	32
	Harvest assessment in Kapoeta	17-24 October	Kapoeta East, Kapoeta West, Kapoeta South	48	3	51
	Harvest assessment in Torit	19-24 October	Torit	37	1	38
Upper Nile	Planting assessment in Renk and Melut	10-17 August	Renk, Melut	12	5	17
	Harvest assessment in Maban	15-22 November	Maban	56	2	58
	Harvest assessment in Renk and Melut	23-30 November	Renk	12	0	12
Central Equatoria	Planting assessment in Central Eqautoria	2-10 August	Juba, Tarekeka	51	3	54
	Harvest assessment in Juba	9-10 October	Juba	35	1	36
Total	**23 missions**			**966**	**73**	**1 039**

Source: FAO South Sudan.

Furthermore, reports from 39 functioning CCMCs offered qualitative and quantitative information on crop performance in their respective areas. Growing conditions reported in the case studies and interviews were then compared against 2017 Normalized Difference Vegetation Indices (NDVIs) data and remote sensed rainfall estimates provided by WFP/VAM for all areas, along with the long-term averages and rainfall data collected locally using manual rain-gauges.

For inaccessible areas, where the risks to the teams' safety were considered to be too severe, the crop assessment teams used "remote assessment" procedures, through e-mail and telephone conversations with key informants.

The Mission estimated the harvested cereal area in 2017 was at about 862 000 hectares, about 8.2 percent lower than the previous year's level. A significant reduction of harvested area has occurred in Central Equatoria (-47 percent), Western Bahr el Ghazal (-28 percent), Western Equatoria (-11 percent) states as a result of the combination of the reduced number of farming households and the smaller average area planted per household, due to the increase in intensity and scale of the conflict since July 2016, which caused large-scale displacements and disrupted farming activities. The highest reduction in harvested area is reported in some of the most productive zone of the Greenbelt, such as Kajo Keji, Lainya, Yei, Morobo and Juba counties in Central Equatoria State, followed by Lafon, Kapoeta South and Budi counties in Eastern Equatoria State. Sizeable reductions in area planted are also recorded in Iba, Nagero, Maridi and Nzara counties in Western Equatoria State and in Wau, Raja and Jur River counties in Western Bahr el Ghazal State. In these insecure areas, farmers are confined to cultivate around homesteads and are unable to cultivate far fields. By contrast, the area harvested has increased in Upper Nile (10 percent), Unity (9 percent) and Lakes (7 percent) states due to an increase of the number of farming households coupled with an expansion in the average area farmed by each household. The breakdown of harvested area by county and state as well as all variables used for its calculation are presented in Table 2.

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

State/County	Population mid-2017	Households mid-2017	Farming households (percent)	Farming households mid-2017	Average cereal area (ha/hh)	Total cereal area (ha)
Central Equatoria	**1 042 662**	**168 533**	**40**	**67 661**	**0.9**	**59 862**
Juba	381 092	59 801	**25**	14 950	1.00	14 950
Kajo Keji[1/]	110 083	18 244	**55**	10 034	1.00	10 034
Lainya[1/]	92 545	14 490	40	5 796	0.80	4 637
Morobo[1/]	144 620	21 928	30	6 578	0.90	5 921
Terekeka	157 562	28 163	80	22 531	0.70	15 771
Yei[1/]	156 760	25 908	30	7,772	1.10	8,550
Eastern Equatoria	**965 231**	**166 431**	**71**	**118 340**	**0.9**	**107 406**
Budi	90 800	15 353	85	13 050	1.20	15 660
Ikotos	119 949	23 411	80	18 729	1.10	20 602
Kapoeta East	158 627	28 477	54	15 378	0.70	10 764
Kapoeta North	100 493	15 572	56	8 720	0.75	6 540
Kapoeta South	65 734	9 801	56	5 489	0.70	3 842
Lafon	99 528	16 123	85	13 704	0.90	12 334
Magwi[1/]	179 638	27 792	75	20 844	1.00	20 844
Torit	150 462	29 902	75	22 427	0.75	16 820
Jonglei	**1 724 691**	**244 710**	**34**	**84 367**	**0.6**	**54 398**
Akobo	166 060	21 594	40	8 638	0.65	5 615
Ayod	166 334	20 165	10	2 017	0.50	1 008
Bor South	232 350	32 949	40	13 180	0.65	8 567
Duk	112 421	17 555	30	5 266	0.42	2 112
Fangak	210 183	27 811	20	5 562	0.42	2 336
Khorflus/Pigi/Canal	95763	11 564	15	1 735	0.70	1 214
Nyirol	169 493	23 816	35	8 335	0.50	4 168
Pibor	185 701	28 443	40	11 377	0.70	7 964
Pochalla	79 145	12 488	60	7 493	0.80	5 994
Twic East	116 641	19 647	40	7 859	0.80	6 287
Uror	190 600	28 680	45	12 906	0.70	9 034
Lakes	**1 189 156**	**159 043**	**74**	**117 218**	**1.1**	**124 531**
Awerial	121 487	19 319	60	11 591	1.20	13 910
Cueibet	181 891	26 697	88	23 493	1.10	25 843
Rumbek Centre	252 179	27 619	60	16 571	0.80	13 257
Rumbek East	205 394	25 941	80	20 753	0.90	18 678
Rumbek North	59 392	6 776	70	4 743	0.90	4 269
Wulu	68 164	10 955	80	8 764	1.20	10 516
Yirol East	131 970	17 567	75	13 175	1.10	14 493
Yirol West	168 679	24 170	75	18 128	1.30	23 566

State/County	Population mid-2017	Households mid-2017	Farming households (percent)	Farming households mid-2017	Average cereal area (ha/hh)	Total cereal area (ha)
Northern Bahr el Ghazal	**1 361 127**	**253 549**	**76**	**192 832**	**0.8**	**152 555**
Aweil Centre	106 751	23 177	60	13 906	0.84	11 681
Aweil East	534 909	98 166	80	78 533	0.72	56 544
Aweil North	272 120	52 457	80	41 966	0.84	35 251
Aweil South	145 484	27 698	70	19 389	0.84	16 287
Aweil West	301 863	52 051	75	39 038	0.84	32 792
Unity	**1 035 964**	**129 081**	**32**	**41 906**	**0.4**	**17 601**
Abiemnhom	22 970	2 439	60	1 463	0.42	615
Guit	47 303	4 632	25	1 158	0.42	486
Koch	134 590	14 301	40	5 721	0.42	2 403
Leer	134 714	17 896	10	1 790	0.42	752
Mayendit	104 105	12 790	25	3 198	0.42	1 343
Mayom	187 887	23 684	40	9 473	0.42	3 979
Panyijar	89 449	15 299	45	6 885	0.42	2 892
Pariang	242 266	30 740	35	10 759	0.42	4 519
Rubkona	72 680	7 301	20	1 460	0.42	613
Upper Nile	**1 025 188**	**160 943**	**47**	**74 854**	**0.7**	**53 312**
Baliet	**7 693**	1 163	15	174	0.60	105
Fashoda[1/]	13 572	2 192	10	219	0.50	110
Longochuk	72 304	9 475	70	6 633	0.50	3 316
Luakpiny/Nasir	288 704	39 910	50	19 955	0.50	9 977
Maban	197 867	42 990	50	21 495	0.70	15 047
Maiwut	40 292	5 312	70	3 719	0.50	1 859
Malakal	71 954	9 610	12	1 153	0.42	484
Manyo	16 689	2 805	50	1 403	0.50	701
Melut	73 105	10 552	40	4 221	1.20	5 065
Panyikang	23 760	3 802	35	1 331	0.50	665
Renk	123 368	20 143	40	8 057	1.50	12 086
Ulang	95 880	12 989	50	6 494	0.60	3 897
Western Bahr el Ghazal	**526 261**	**93 666**	**56**	**52 182**	**0.7**	**36 791**
Jur River	153 643	24 976	75	18 732	0.80	14 985
Raga	95 321	17 890	45	8 051	0.50	4 025
Wau	277 297	50 800	50	25 400	0.70	17 780
Warrap	**1 443 060**	**250 456**	**68**	**169 231**	**0.9**	**155 676**
Abyei	76 684	11 450	60	6 870	1.10	7 557
Gogrial East	117 079	20 992	65	13 645	0.80	10 916
Gogrial West	349 873	64 529	80	51 623	1.00	51 623
Tonj East	127 006	21 603	65	14 042	0.70	9 829
Tonj North	233 693	41 992	70	29 394	0.85	24 985
Tonj South	125 581	21 087	75	15 816	1.20	18 979
Twic	413 144	68 803	55	37 842	0.84	31 787
Western Equatoria	**733 340**	**133 636**	**62**	**83 193**	**1.2**	**101 077**
Ezo[1/]	102 351	23 038	40	9 215	1.00	9 215
Ibba[1/]	29 782	7 453	75	5 590	1.40	7 825
Maridi[1/]	74 338	11 826	75	8 869	1.30	11 530
Mundri East[1/]	65 704	9 275	45	4 174	0.80	3 339
Mundri West[1/]	52 739	6 250	60	3 750	0.80	3 000
Mvolo	82 867	11 292	50	5 646	0.80	4 517
Nagero	10 689	2 274	70	1 592	0.80	1 273
Nzara[1/]	54 467	13 526	85	11 498	1.40	16 097
Tambura[1/]	72 161	17 355	90	15 620	1.40	21 868
Yambio[1/]	188 242	31 346	55	17 240	1.30	22 412
Total	**11 046 680**	**1 760 048**	**57**	**1 001 785**	**0.9**	**863 208**

1/ First and second harvest areas combined.

Tentative estimates of areas of other crops grown in 2017 are shown in Table 3. The estimates are based on the proportions noted between 2013 and 2016 adjusted by information from the 2017 Task Force teams' case studies and information collected by the CCMCs. The estimates reflect the following issues: i) increased importance of groundnuts in Lakes, Warrap and Northern Bahr el Ghazal states; ii) the Mission assumed resilience of cassava as a safety net in times of temporary displacement of farming communities due to the transitory presence of armed groups. In addition, reports by the Task Force teams and the CCMCs show a reduction in area of new plantings of cassava since 2016 in insecure areas where farming households are displaced, especially in Central and Eastern Equatoria states.

Table 3: South Sudan - Tentative estimates of cultivated areas per household, 2017

State	Sorghum	Maize	Other cereals[1/]	Total cereals	Ground-nuts	Cassava 2 years	Cultivated area (ha)
Central Equatoria[2/]	0.36	0.50	0.02	0.88	0.13	0.5	1.51
Eastern Equatoria	0.69	0.13	0.09	0.91	0.04	0.2	1.23
Western Equatoria[2/]	0.61	0.55	0.05	1.21	0.28	1.16	2.65
Jonglei	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Upper Nile	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Unity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lakes	0.90	0.15	0.01	1.06	0.50	0.1	1.66
Warrap	0.81	0.06	0.05	0.92	0.42	0.02	1.36
Western Bahr el Ghazal	0.6	0.1	0.01	0.71	0.15	0.57	1.43
Northern Bahr el Ghazal	0.71	0.03	0.05	0.78	0.21	0.00	0.99

1/ Bulrush/finger millets and upland/paddy rice.
2/ Two seasons for cereals and mostly annual field crops.
n.a.: Not enough information collected.

3.2 Factors affecting yields

3.2.1 *Rainfall*

The CFSAM rainfall analysis is based on data provided by the WFP/VAM Unit on Remote Sensing Rainfall Estimates (RFEs) and NDVIs as well as rain gauge data and farmers' observations compiled by the Task Force teams and CCMCs' monthly reports.

The rainy season, which normally starts in April in southern bi-modal rainfall areas and in May in central and northern uni-modal rainfall areas, was delayed by about two weeks, especially in southeastern and eastern areas. Rainfall amounts in May and June were below average over most cropping areas, causing some dry spells in parts of Western Bahr el Ghazal, Jonglei, Warrap, Lakes and Eastern Equatoria states that forced farmers to re-plant. These dry spells, however, were localized and had a minor impact on the overall crop performance, unlike in 2016, when the large areas planted under sorghum needed replanting due to widespread early-season erratic precipitations. Subsequently, rainfall improved from July and further intensified in August and September, with a positive impact on vegetation conditions, lifting crop prospects in the areas previously affected by the dry spells. However, the above-average rains triggered floods and water-logging, causing crop damages in localized areas of Northern Bahr el Ghazal and Eastern Equatoria states. The season ended with below-average rains in October and November, which has slightly affected yields of some late-maturing sorghum varieties. On the other hand, this reduction in precipitation had minor effects on short season crops, including short maturing sorghum varieties, groundnuts and maize, which were already harvested. In general, despite some negative impacts on crops caused by localized erratic rains, the overall performance of the rainy season was favourable, supporting an increase or maintaining the same yield levels to that of 2016.

Regarding the mechanized farming sector in Upper Nile State, an early onset of seasonal rains in Renk County prompted a timely cultivation from the first week of June. In 2017, commercial farmers decided to expand their farmland, mostly to plant sesame to be exported to the Sudan. While other parts of the State experienced early season dry spells and mid-season floods (in August and September), growing conditions in the mechanized farms of Renk County were favourable and better than 2016, with average to above-average and well-distributed rainfall having a positive impact on vegetation conditions and yields.

Figure 6: South Sudan - Rainfall amounts RFE and NDVI, 2017

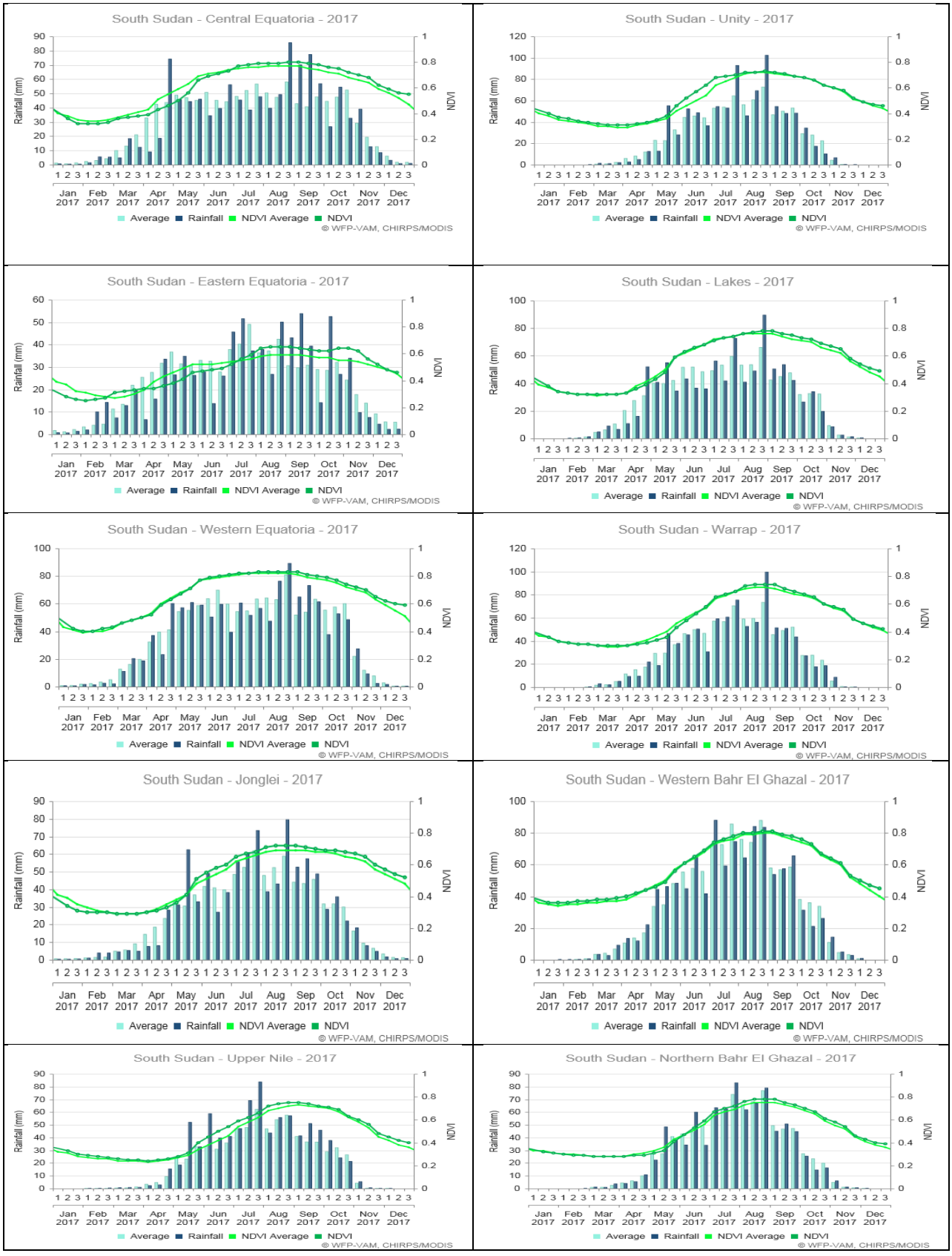


Figure 7: South Sudan - Rainfall anomalies, 2017

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) with farmers relying on shifting cultivation to sustain soil fertility in most areas except Northern Bahr el Ghazal State. Regarding hand cultivation, availability of hand tools and people to use them are the most significant limiting factors for agricultural activities. For the majority of the households, farm size is limited to the area of land that the farming families themselves can clear, cultivate and weed with the ubiquitous cutlass, the flat-bladed, long-handled hoe called the *maloda,* the local short-handled, bent hoe called the *toriah,* or the East African hoe or *jembe.*

Since 2016, prices of hand tools have increased dramatically mainly because of the economic crisis and the devaluation of the SSP. However, it should be noted that producer prices for livestock and crops have also increased and although that may be of scant value to vulnerable subsistence farmers, for those households with access to more land and labour such price rises affect livelihoods quite positively. The prices of hand tools varied across the states. For example in Yambio and Nzara counties (Western Equatoria State), at the beginning of the farming season a hoe costed SSP 500, a panga SSP 500, a *maloda* SSP 400-500, a rake SSP 250, a slasher SSP 400 and an axe SSP 1 500. In Western Bahr el Ghazal State, the cost of a hoe was SSP 350-500 and a *maloda* was bought at SSP 400. In general, the costs of these tools were three to five times higher than 2016 across all the states.

The acceptance of animal traction in all counties in Lakes State, where the up-take of the technology appears to be its highest, and in parts of Warrap and Central Equatoria states is also reflected in the high hiring rates for oxen cultivation. In Lakes State, despite the high cost of implements (a plough board costs about SSP 15 000-20 000), many households were buying their own or hiring bullocks for cultivation during the season. The area cultivated using ox-ploughs has increased noticeably due to the high crop prices and popularity of groundnuts as both a cash crop and a second staple. In addition, FAO and WFP have supported farmers in clearing and cultivation of land estimated at 52 600 feddans (22 000 hectares) land in BRACE[15] II Project and other Food for Asset (FFA) locations in Nothern Bhar el Ghazal, Warrap, Lakes, Western Equatoria states and Abyei Administrative Area.

Soil fertility maintenance practices are limited to shifting the farm lands and fallowing within a recognizable farm area or domain and the use of animal dung in Northern Bahr el Ghazal, Warrap, Western Bahr el Ghazal and Lakes states. Whereas in most locations the dung comes from the farmers' own livestock, in Northern Bahr el Ghazal State, where shifting opportunities are limited, contract dunging by pastoralists' herds and flocks on private farm lands is increasing from year to year. Such actions were practiced by better-off farmers, with contracted terms clearly depending on relationships between herders and farmers, with payment in cash, grain/sorghum, supplying all meals and drinks for the herders, including slaughtering goats, as needed. While most farmers are aware of the importance of animal dung to increase yield and control *Striga* weed, the practice of hiring herds of cattle to stay in their farms has been difficult for poor farmers.

Chemical fertilizers, pesticides or herbicides are not used by small farmers on field crops, although some use of herbicides has been noted in previous CFSAMs by some large-scale mechanized farms in Upper Nile State with access to supplies from Kosti (the Sudan). A few years ago, the trials made on maize by the International Fertilizer Development Company in Central and Western Equatoria states have been discontinued with no apparent gains recorded. The Aweil rice scheme, which used to apply Triple Super Phosphate, has ceased using fertilizers six years ago due to access constrains. Fertilizers are currently used only on vegetables in locations near the border with Uganda by better-off entrepreneurs. However, displacement and insecurity around Yei County and border areas of Central Equatoria State, suggest that such purchases became increasingly difficult since 2016.

Regarding seeds, farmers in all regions use either a) their own seeds of sorghum carried over from the previous harvest; b) market-purchased seeds for crops with high storage losses, including locally-multiplied, improved varieties of maize such as the ex-NARO[16] (Uganda) Longi-5 and improved groundnut varieties (Red Beauty); or c) they borrow seeds from extended family members and neighbours.

In 2017, through various emergency projects, FAO has provided seeds through direct distribution by NGOs and organizing seed fairs (Tables 4 and 5). In all states, a total of 958 tonnes of cereals (sorghum, maize and rice), 696 tonnes of pulse crops (cowpea, groundnuts, pigeon peas and beans) and 27 tonnes of sesame seeds were distributed to seed insecure farmers. The 639 tonnes of sorghum and 318 tonnes of maize seeds

[15] Building Resilience through Asset Creation and Enhancement.
[16] National Agricultural Research Organization.

are sufficient to plant approximately 42 000 and 12 700 hectares, respectively. With regard to pulse crops, 342 tonnes of cowpeas (sufficient to plant approximately 11 400 hectares) and 349 tonnes of groundnuts (sufficient to plant approximately 3 800 hectares). Overall, 1 680 tonnes of seeds were distributed in 2017, which is 83 percent more than 920 tonnes in 2016. The largest amount of seeds were distributed in Western Equatoria (17 percent), Jonglei (16 percent), Central Equatoria (16 percent), Upper Nile (12 percent) and Unity (11 percent) states. Furthermore, large quantities of different vegetable and watermelon seeds were distributed also by FAO.

Table 4: South Sudan – Crop seeds distributed by FAO and its partners, 2017 (tonnes)

State	Maize	Sorghum	Rice	Cowpea	Ground-nuts	Pigeon pea	Beans	Sesame	Total
Central Equatoria	79.5	85.7	0.0	51.0	43.1	0.3	1.1	6.7	267.5
Eastern Equatoria	0.0	81.0	0.0	54.0	0.4	0.0	0.0	0.0	135.4
Jonglei	61.7	118.0	0.0	78.7	10.0	0.0	0.0	6.0	274.3
Lakes	0.0	10.0	0.0	0.0	72.3	0.0	0.0	0.5	82.8
Northern Bahr el Ghazal	0.0	38.4	1.2	0.0	23.4	2.3	0.0	2.0	67.3
Unity	63.1	75.2	0.0	45.5	0.0	0.0	0.0	0.7	184.6
Upper Nile	45.2	91.1	0.0	58.1	1.0	0.0	0.0	2.3	197.6
Warrap	0.5	72.0	0.0	9.4	54.4	0.0	0.0	1.7	138.0
Western Bahr el Ghazal	0.0	23.1	0.0	12.3	16.8	0.0	0.0	0.7	52.9
Western Equatoria	67.7	44.1	0.0	33.5	128.0	0.0	0.0	6.5	279.8
Total	**317.7**	**638.7**	**1.2**	**342.4**	**349.5**	**2.6**	**1.1**	**27.1**	**1 680.2**

Table 5: South Sudan - Vegetable seeds distributed by FAO and its partners, 2017 (kg)

State	Amaranth	Cabbage	Carrot	Collard	Egg-plant	Okra	Onion	Tomato	Water-melon
Central Equatoria	1 206	151	308	1 206	1 126	3 015	1 206	1 206	1 806
Eastern Equatoria	646	39	1	630	646	1 611	646	646	822
Jonglei	1 713	594	712	1 652	1 568	4 028	1 704	1 602	1 535
Lakes	279	0	0	279	279	698	279	279	218
Northern Bahr el Ghazal	807	570	158	695	548	2 017	807	787	1 210
Unity	900	171	125	887	884	2 168	923	910	1 198
Upper Nile	905	378	283	914	914	2 285	914	914	1 071
Warrap	606	258	282	631	180	1 578	631	631	947
Western Bahr el Ghazal	679	224	80	679	599	1 697	679	679	1 018
Western Equatoria	427	100	35	426	427	1 067	427	427	595
Total	**8 166**	**2 485**	**1 984**	**7 999**	**7 171**	**20 164**	**8 216**	**8 081**	**10 420**

3.2.3 *Pests, diseases and weeds*

Several types of pests, diseases and weeds are infesting crops every year in South Sudan. Despite the damage caused by insect pests and diseases, they remain untreated with farmers accepting the losses as inevitable, while weeds and vertebrate pests are treated manually through hand weeding. Weeding of the majority of sorghum, for instance, is not carried out adequately by most smallholder farmers, usually done only once during the cropping season and groundnuts are weeded twice. On the other hand, bird scaring and protecting crop fields from wild animals and domestic livestock is usually practiced using family labour. No control measures have been carried out over migratory pests, especially migratory *QQU* birds since 2013. This year, *QQU* birds were not reported in Upper Nile State, despite the continued concern in 2016 from both traditional smallholder farmers and large-scale mechanized farmers as they consider them a major threat to the late sorghum harvest in January.

In 2017, FAW (*Spodoptera frugiperda*) made its first appearance in the country, quickly spreading to major cropping areas within a short period. In Africa, FAW was first detected in Central and West Africa in early 2016 and in Southern Africa in late 2016. In East Africa, the pest was reported in early 2017. The first FAW infestation was reported in May 2017 in Magwi County of Eastern Equatoria State attacking the late-planted maize crops. Since the pest was unknown, the agricultural extension staff in Magwi and other counties were unable to determine whether it was FAW. Access to Magwi County was not possible to FAO staff due to insecurity-related access constraints in the region. Subsequently, the pest was identified to be FAW and reported to have spread in Central and Western Equatoria, Northern Bahr El Ghazal, Jonglei, Western Bahr El Ghazal and Upper Nile states. The FAW was attacking maize crops in Eastern and Western Equatoria (Nzara and

Tambura) states and feeding on young sorghum plants in Northern Bahr El Ghazal State. It was also detected in the vicinity of Juba, with only mild effects on some farms. Field reports from the World Vision NGO indicated that the FAW was also spreading to Malakal, Balliet, Fashoda Manyo and Renk counties in Upper Nile State. So far, the pest was reported in all states, except Unity State and in over 20 counties in the country. The damage caused on the maize crops in Budi (Eastern Equatoria State) and Pochalla (Jonglei State) was reported as serious. According to Africa Life Aid, an NGO operating in Magwi County, the estimated damage to the maize crops in the severely affected fields was as high as 90 percent. In Magwi and Budi, the late-planted crops (in April) were more affected by FAW compared to the early-planted maize, which was not attacked.

In order to address the threat of FAW to crop production and food security, FAO, WFP and MAFS, together with various NGO partners, have introduced a series of measures through Food Security and Livelihoods Cluster and partnership forums. The FAW strategy is technically led by FAO and so far donors, including Japan, are supporting the programme for 2018. MAFS and FAO developed a one-year Project entitled "Technical assistance for management of Fall Armyworm", with financial support from FAO's internal funding mechanism. Additional support was provided by the Government of Japan to both FAO and WFP to control the spread and the impact of the pest in South Sudan.

In the 2017 cropping season, the most commonly-occurring non-migratory pests include green grasshoppers, caterpillars, millipedes, termites, aphids, sorghum midge, stalk (stem) borers, sorghum cinch bug, local birds, monkeys, rodents, wild pigs, porcupines and domestic livestock. All insect pest infestations were considered to be mild to average in most places. Weeds are noted to have been the main problem, due to the normal to above-normal rainfall and the average or above-average vegetation indices throughout the main growing season. Controlling grass and broadleaf weeds[17] by weeding once or twice was noted throughout the traditional sector. As observed by the Task Force teams, continued cultivation of land for several consecutive years, compounded with inadequate weeding has resulted in the build-up of weeds in most of the assessed areas. In this regard, *Striga* weed, remains a major problem for sorghum cultivation. Farmers who have no access to new plots and continued to dig or plough exhausted plots are highly affected by *Striga* weed. The impact of *Striga* weed on sorghum crops has been serious and increasing over time. According to the Crop Harvest Assessment Team, deployed to Northern Bahr el Ghazal State in September 2017, about 85-90 percent of the visited sorghum farms of smallholder farmers were infested by *Striga* weed. The extent of damage ranged from mild to severe. The problem may be addressed by using crop rotation (with leguminous crops like groundnuts) and through the use of manure or by transplanting seedlings at three-four weeks old from nurseries or from *Striga* weed-free fields. Other methods, including intercropping of Desmodium (leguminous fodder crop)[18] with cereals can also be used to effectively control *Striga* weed through the support of trained extension workers. The common plant diseases that occurred during the current cropping season include rosette virus and leaf spot of groundnuts, mosaic virus of cassava and head smut on sorghum.

3.3 Agricultural production in 2017

3.3.1 *Cereal production*

A. Traditional smallholder sector

Cereal production in the traditional sector is determined by multiplying yield per unit area by the disaggregated area estimates derived from secondary data, as described in Section 3.1.

In 2017, Task Force-led teams' estimates of production of cereals in each State were compiled from county-level disaggregated data. Such information was gained from historical time-series data adjusted by the findings from a series of missions conducted by the Task Force teams during the harvest assessments, which included a) 1 039 detailed, on-farm case studies with sample farmers and key informant interviews with staff from State ministries, NGOs and projects; b) empirical data obtained from a large number of localities using, where possible, the updated South Sudan's PET. In such transects, PET-based scores of crop yields are cross-checked by weighing crop-cut samples taken during the case studies. In addition, yield estimations made by the CCMCs through crop-cuts and PET manuals are used as supplementary information to further improve the quality of yield estimations.

[17] An unusual new broadleaf weed called *babashiro*, supposedly from the Democratic Republic of the Congo, is noted to be causing concern in Western Equatoria Greenbelt.

[18] Planting desmodium between rows of cereal crops can effectively reverse declining crop yields by controlling *Striga* and improving soil fertility, at the same time providing farmers with a year-round supply of fodder.

The empirical data obtained was finally reviewed using secondary data from reports provided by FAO, WFP, NBS and various NGOs plus the RFE and NDVI satellite data provided by WFP/VAM for the current season compared with the previous seasons and the long-term average as well as rainfall data collected at county level by AFIS-trained recorders. The planting/harvest time missions completed by the Task Force teams are listed below:

- In August, the missions to assess the yields of first season maize (*Longi-5* variety) and other cereal crops were conducted in Western Equatoria State covering Nzara, Yambio and Mundri West counties, followed by another Mission in November to assess the second season crops in Tambura, Nzara, and Yambio.
- In September, the missions to assess the yields of cereal crops, including rice, were conducted in Northern Bahr el Ghazal State (Aweil West, Aweil South, Aweil Centre, Aweil North and Aweil East counties), Warrap State (Twic and Gogrial West counties) and in Lakes State (Rumbek North, Cueibet, Wulu and Yirol West counties). Crops reported included short-cycle sorghum landraces *Cham*, *Nanjung*, *Rapjung, Abele* plus medium-cycle sorghum landraces *Alep Cham*, *Nyethin*, *Nyandok, Rabdit, Aleul, Aiyella* and improved *feterita*-type sorghums from the Sudan, such as *Afargadamek, Wad Ahmed, Gaddam el Hammam;* late sorghum landrace *kec* and groundnuts (*Red Beauty* and *Mr Lake*); plus very limited maize areas around the steadings.
- In October, the missions to assess the yields of cereal crops, including local landraces of sorghum (*Kabi*) and small areas of maize in Greater Kapoeta Region (North, East and South) in Eastern Equatoria State. The teams also conducted similar missions in Central Equatoria State, in Juba County to assess the yields of first season crops.
- In November, the missions to assess the yields of local landraces of sorghum (*Leuwarding* and *Agono*) and maize in the smallholder sector plus landraces *Afargadamek*, *Wad Ahmed*, *Gaddam el Hammam* in the mechanized sector were conducted in Maban and Renk counties in Upper Nile State; in Pochalla and Bor counties in Jonglei State and late-maturing sorghums in Jur River, Raja and Wau counties in Western Bahr el Ghazal State.
- Further information was provided by telephone interviews with the State directors of Agriculture and NGO agriculturalists in Unity State and by members of the CCMCs from inaccessible areas of Eastern Equatoria State.

Estimates of the 2017 cereal production in the traditional sector, disaggregated by state and county, are presented in Table 6. The national gross cereal production from the smallholder sector in 2017 is estimated to be below 1 million tonnes. As in previous assessments, post-harvest losses and seed use for sowing in 2018 are assumed to account for 20 percent of the total production, leaving a net amount of about 764 107 tonnes available for local consumption. This result is the smallest amount harvested since the start of the conflict, about 7.5 percent below the output obtained in 2016 and 14 percent below the last five-year average production estimates. The decline in 2017 is essentially due to the displacements of farmers and the disruption of farming activities following the increased insecurity and violence which continued from July 2016 onwards. The major reduction in production occurred in most key-cropping areas of Central Equatoria and Western Bahr el Ghazal states, by about 48 percent and 28 percent, respectively, compared to 2016. Declines of smaller magnitude are recorded in Western Equatoria (-6 percent) and Eastern Equatoria (-5 percent) states. By contrast, production was higher compared to 2016 in the Greater Upper Nile Region, increasing by 18 percent in Upper Nile State, by 9 percent in Unity State, by 5 percent in Jonglei State. Production levels in Lakes and Northern Bahr el Ghazal states have also showed slight improvements from 2016.

In 2017, the mean gross cereal yield from the smallholder sector is estimated at 1.11 tonnes/hectare, which is about the same level of 2016 estimate and 12.6 percent lower than estimated in 2014. The negligible increase of the average yield compared to 2016, despite more favourable precipitations, reflects the sharp decline in planted and harvested area in the most productive lands of the Greenbelt due to large-scale displacements and the increase in planted area in other less productive regions of the Greater Bahr el Ghazal Region. As has been done since 2014, conservative yield values have been used for the counties not visited by the Task Force teams at harvest time and where no independent assessments have been conducted[19] and where there are no CCMC reports.

[19] It applies especially to the whole Unity State and some locations in Jonglei State.

Table 6: South Sudan - Estimated cereal harvested area, yield, production, consumption and balance (traditional sector), 2017 and 2018

State/ County	2017				2018		
	Cereal area (hectares)	Gross yield (tonne/ hectare)	Gross cereal production (tonnes)	Net cereal production (tonnes)	Population (mid-2018)	Cereal require-ment (tonnes)	Surplus/ deficit (tonnes)
Central Equatoria	**59 862**	**1.3**	**77 942**	**62 354**	**1 073 942**	**137 532**	**-75 178**
Juba	14 950	1.20	17 940	14 352	392 525	54 954	-40 602
Kajo Keji[1/]	10 034	1.50	15 051	12 041	113 385	13 606	-1 566
Lainya[1/]	4 637	1.30	6 028	4 822	95 321	11 439	-6 616
Morobo[1/]	5 921	1.60	9 473	7 578	148 959	17 875	-10 297
Terekeka	15 771	1.00	15 771	12 617	162 289	19 475	-6 858
Yei[1/]	8 550	1.60	13 679	10 943	161 463	20 183	-9 240
Eastern Equatoria	**107 406**	**1.1**	**116 991**	**93 593**	**994 188**	**123 483**	**-29 889**
Budi	15 660	1.10	17 226	13 781	93 524	11 223	2 558
Ikotos	20 602	1.20	24 722	19 778	123 547	15 443	4 334
Kapoeta East	10 764	0.70	7 535	6 028	163 386	20 423	-14 395
Kapoeta North	6 540	0.80	5 232	4 186	103 508	12 939	-8 753
Kapoeta South	3 842	0.60	2 305	1 844	67 706	8 802	-6 958
Lafon	12 334	1.10	13 567	10 854	102 514	12 302	-1 448
Magwi	20 844	1.50	31 266	25 013	185 027	22 203	2 809
Torit	16 820	0.90	15 138	12 110	154 976	20 147	-8 037
Jonglei	**54 398**	**0.8**	**45 715**	**36 572**	**1 776 432**	**199 333**	**-162 761**
Akobo	5 615	1.00	5 615	4 492	171 042	18 815	-14 323
Ayod	1 008	0.70	706	565	171 324	18 846	-18 281
Bor South	8 567	0.85	7 282	5 825	239 321	27 522	-21 696
Duk	2 212	0.70	1 548	1 239	115 794	12 737	-11 499
Fangak	2 336	0.70	1 635	1 308	216 488	23 814	-22 506
Khorflus/ Pigi/Canal	1 214	0.63	765	612	98 636	10 850	-10 238
Nyirol	4 168	0.80	3 334	2 667	174 578	19 204	-16 537
Pibor	7 964	1.00	7 964	6 371	191 272	22 953	-16 582
Pochalla	5 994	1.10	6 593	5 275	81 519	9 782	-4 508
Twic East	6 287	0.70	4 401	3 521	120 140	13 216	-9 695
Uror	9 034	0.65	5 872	4 698	196 318	21 595	-16 897
Lakes	**124 531**	**1.1**	**140 472**	**112 377**	**1 224 831**	**134 733**	**-22 356**
Awerial	13 910	1.00	13 910	11 128	125 132	13 764	-2 637
Cueibet	25 843	1.20	31 011	24 809	187 348	20 608	4 201
Rumbek Centre	13 257	1.10	14 583	11 666	259 744	28 573	-16 906
Rumbek East	18 678	1.20	22 413	17 931	211 556	23 271	-5 341
Rumbek North	4 269	1.20	5 123	4 098	61 174	6 729	-2 631
Wulu	10 516	1.10	11 568	9 254	70 209	7 723	1 531
Yirol East	14 493	1.10	15 942	12 753	135 929	14 953	-2 199
Yirol West	23 566	1.10	25 922	20 738	173 739	19 112	1 626
Northern Bahr el Ghazal	**152 555**	**1.1**	**161 396**	**129 117**	**1 401 961**	**154 215**	**-25 098**
Aweil Centre	11 681	1.10	12 849	10 279	109 954	12 095	-1 816
Aweil East	56 544	0.90	50 889	40 711	550 956	60 605	-19 893
Aweil North	35 251	1.05	37 014	29 611	280 284	30 831	-1 220
Aweil South	16 287	1.24	20 244	16 195	149 849	16 483	-288
Aweil West	32 792	1.23	40 400	32 320	310 919	34 201	-1 881
Unity	**17 601**	**0.7**	**11 923**	**9 538**	**1 067 043**	**91 449**	**-81 910**
Abiemnhom	615	0.50	307	246	23 659	2 010	-1 765
Guit	486	0.60	292	233	48 722	4 141	-3 907
Koch	2 403	0.80	1 922	1 538	138 628	11 783	-10 246
Leer	752	0.70	526	421	138 755	11 795	-11 375
Mayendit	1 343	0.70	940	752	107 228	9 115	-8 363
Mayom	3 979	0.63	2 507	2 005	193 524	16 449	-14 444
Panyijar	2 892	0.50	1 446	1 157	92 132	7 831	-6 675
Pariang	4 519	0.80	3 615	2 892	249 534	21 211	-18 319
Rubkona	613	0.60	368	294	74 860	7 112	-6 817

State/ County	2017				2018		
	Cereal area (hectares)	Gross yield (tonne/ hectare)	Gross cereal production (tonnes)	Net cereal production (tonnes)	Population (mid-2018)	Cereal require-ment (tonnes)	Surplus/ deficit (tonnes)
Upper Nile	**53 312**	**0.8**	**43 593**	**34 874**	**1 055 944**	**91 132**	**-56 258**
Baliet	105	0.60	63	50	7 924	674	-623
Fashoda[1/]	110	0.60	66	53	13 979	1 188	-1 136
Longochuk	3 316	0.60	1 990	1 592	74 473	6 330	-4 738
Luakpiny/Nasir	9 977	0.85	8 481	6 785	297 365	25 276	-18 491
Maban	15 047	0.80	12 037	9 630	203 803	17 323	-7 693
Maiwut	1 859	0.65	1 209	967	41 501	3 528	-2 561
Malakal	484	0.70	339	271	74 113	7 040	-6 769
Manyo	701	0.85	596	477	17 190	1 461	-984
Melut	5 065	1.00	5 065	4 052	75 298	6 400	-2 348
Panyikang	665	0.80	532	426	24 473	2 080	-1 654
Renk	12 086	0.90	10 877	8 702	127 069	11 436	-2 735
Ulang	3 897	0.60	2 338	1 870	98 756	8 394	-6 524
Western Bahr el Ghazal	**36 791**	**1.1**	**40 872**	**32 698**	**542 049**	**61 499**	**-28 802**
Jur River	14 985	1.10	16 484	13 187	158 252	17 408	-4 221
Raga	4 025	1.20	4 830	3 864	98 181	9 818	-5 954
Wau	17 780	1.10	19 558	15 647	285 616	34 273	-18 627
Warrap	**155 676**	**1.1**	**178 331**	**142 665**	**1 486 351**	**143 495**	**-830**
Abyei	7 557	1.10	8 313	6 650	78 984	7 108	-458
Gogrial East	10 916	0.90	9 824	7 859	120 591	11 456	-3 597
Gogrial West	51 623	1.25	64 529	51 623	360 369	37 839	13 784
Tonj East	9 829	0.80	7 863	6 291	130 816	13 082	-6 791
Tonj North	24 985	1.00	24 985	19 988	240 704	24 070	-4 082
Tonj South	18 979	1.30	24 672	19 738	129 348	11 641	8 097
Twic	31 787	1.20	38 144	30 516	425 538	38 299	-7 783
Western Equatoria	**101 077**	**1.4**	**137 898**	**110 319**	**755 340**	**109 524**	**794**
Ezo[1/]	9 215	1.50	13 823	11 058	105 422	15 286	-4 228
Ibba[1/]	7 825	1.30	10 173	8 138	30 675	4 448	3 691
Maridi[1/]	11 530	1.30	14 989	11 991	76 568	11 102	889
Mundri East[1/]	3 339	1.10	3 673	2 938	67,675	9 813	-6 875
Mundri West[1/]	3 000	1.20	3 600	2 880	54 321	7 877	-4 996
Mvolo	4 517	0.80	3 613	2 891	85 353	12 376	-9 485
Nagero	1 273	1.10	1 401	1 121	11 010	1 596	-476
Nzara[1/]	16 097	1.60	25 754	20 604	56 101	8 135	12 469
Tambura[1/]	21 868	1.40	30 615	24 492	74 326	10 777	13 715
Yambio[1/]	22 412	1.35	30 256	24 205	193 889	28 114	-3 909
Total	**863 208**	**1.1**	**955 134**	**764 107**	**11 378 080**	**1 246 395**	**-482 287**

1/ first and second harvests combined.

Table 7: South Sudan - Cereal harvested area and net production (rounded) in the traditional sector, 2013-2017

Region/State	2013			2014			2015			2016			2017		
	Area ('000 ha)	Net Prod. ('000 t)	Net Yields (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Net Yields (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Net Yields (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Net Yields (t/ha)	Area ('000 ha)	Net Prod. ('000 t)	Net Yields (t/ha)
Upper Nile	**254**	**136**	**0.53**	82	**50**	**0.61**	**108**	**68**	**0.63**	**118**	**73**	**0.62**	**124**	**82**	**0.65**
Upper Nile	84	40	0.48	36	19	0.53	45	27	0.53	48	30	0.63	53	35	0.65
Unity	54	26	0.48	15	8	0.53	16	9	0.55	16	9	0.56	18	10	0.54
Jonglei	116	70	0.60	31	23	0.74	47	32	0.76	54	34	0.63	54	37	0.68
Bahr el Ghazal	**451**	**310**	**0.69**	**415**	**403**	**0.97**	**440**	**379**	**0.86**	**480**	**416**	**0.87**	**470**	**417**	**0.89**
Northern Bahr el Ghazal	115	85	0.74	128	113	0.88	147	114	0.84	157	124	0.79	153	129	0.85
Western Bahr el Ghazal	62	50	0.81	69	75	1.06	65	58	0.89	51	45	0.88	37	33	0.89
Lakes	107	75	0.70	94	92	0.99	97	94	1.01	117	106	0.91	125	112	0.90
Warrap	167	100	0.60	124	123	0.99	131	113	0.9	155	141	0.91	156	143	0.92
Greater Equatoria	**468**	**445**	**0.95**	**517**	**562**	**1.09**	**467**	**465**	**1.00**	**346**	**336**	**0.97**	**268**	**266**	**0.99**
Central Equatoria	160	150	0.94	199	223	1.12	197	216	1.19	117	120	1.03	60	62	1.04
Eastern Equatoria	139	116	0.83	151	142	0.94	139	116	0.98	116	99	0.85	107	94	0.87
Western Equatoria	169	179	1.06	167	197	1.19	131	133	1.00	113	117	1.04	101	110	1.09
Total	**1 173**	**892**	**0.76**	**1 014**	**1 015**	**1.00**	**1 015**	**912**	**0.90**	**940**	**826**	**0.88**	**863**	**764**	**0.89**

B. Mechanized sector

South Sudan's rainfed mechanized sector includes demarcated, large-scale farmers in Upper Nile State with multiple aggregations of 500 feddans units (about 200 hectares) known as *mushroor,* in locations from Renk to Malakal; plus un-demarcated *traditional* farmers, who farm units up to 50 feddans (20 hectares) along-side the large scale farmers, hiring their tractors and equipment.

The sector also includes a rice scheme (Aweil Rice Scheme, Aweil Centre) and a mechanized sorghum area in Ton Chol, Aweil East, both located in Northern Bahr el Ghazal State. There are also mechanized farms in other states, particularly in the Greater Equatoria Region, which are normally unaccounted for in assessments, as are the emerging commercial farms in Greater Bahr el Ghazal State, expanding through the use of labour gangs, digging fields by hand or using animal traction.

The largest area of mechanized farms is in Upper Nile State and the degree of mechanization is limited to land preparation and sowing seed using seed boxes placed over ubiquitous disc harrows. All other operations up to harvesting are carried out by hand, with the exception, in previous years, of a few farmers using herbicides sourced from Kosti (the Sudan).

Sorghum and sesame are the dominant crops in the mechanized areas of Upper Nile State, grown by medium and large scale farmers who are cultivating big farms ranging from 800 to 1 500 feddans (from 336 to 630 hectares). Groundnuts are mostly grown by smallholder farmers, both for family consumption and selling.

In 2017, the Task Force-led missions visited the large scale farms in Renk, Melut, Maba and Aweil. According to the missions' findings, mechanized farming was undertaken intensively in 2017, with large areas cultivated by locally-based farmers in Upper Nile State. The favourable rainfall has also contributed to the large scale cultivation of land and better performance of crops (see Paragraph 3.2.1: Rainfall).

Based on the Task Force teams' estimations, a total of 150 000 hectares of sorghum and 14 300 hectares of sesame were sown in the mechanized sector in 2017.

In Renk, the Government has provided 50 new tractors to commercial farmers, in addition to the existing 250 private tractors, for a total of 300 tractors, all functional. This represents an increase by about 65 percent compared to 2016, when only 182 tractors were operating. The increase in the number of tractors has contributed to an expansion in cultivated area in 2017. The tractor-hire rate was SSP 50-60/feddan for ploughing or harrowing excluding the cost of fuel, which was SSP 1 920 for a 20-litre jerry can (SSP 95/litre), mostly smuggled from the Sudan. Combine harvesters are only used for sesame harvesting in commercial schemes.

Hand tools (hoes and sickles) are used in the commercial sector for weeding and harvesting of sorghum. Spare parts for tractors are very scarce and farmers have to smuggle them from the Sudan. Hand tools were obtained from the Sudan and were sold at a unit price of SSP 100 for hoe and SSP 50-80 for sickle. The Agricultural Bank of South Sudan provided loans to commercial farmers for the purchase of fuel, but the amount was not enough. In addition, the terms of the loans were not in favour of the farmers since the Bank purchases grains at the market price while demanding a high interest rate. The Government storage facility charges SSP 60/bag for a period not exceeding 12 months, while the price of an empty bag was as high as SSP 400.

In early August 2017, the Task Force teams observed that most of the tractors were working day and night to prepare as much land as possible in time for the planting season. Compared to 2016, larger areas were cultivated due to the increase in tractors, the attractive market (high cereal prices), the provision of loans, the improved security and the movement of labour force, also coming from the Sudan's Blue Nile, Gedarif and Darfur states. In addition, the new Belarus model tractors were performing better than the old Massy Ferguson tractors.

In 2017, rains were mostly conducive allowing access and supporting growth of both early and late-sown crops. Farmers' own seeds were available for sowing in July and August for the short-maturing improved sorghum varieties of *Wad Ahmed, Gaddam el Hammam* and *Afargadamek* that cover most of the planted area nowadays instead of the much long-maturing local landrace *Agono.* The main pest challenge was the appearance of FAW in many areas of Upper Nile State for the first time. However, since the pest is in its first year, the damage was not very serious in most places, partly due to the heavy rains that usually kill the pest. By end of December 2017, no migratory *QQU* birds were reported.

In 2017, the overall output of sorghum in the mechanized farms in all locations in Upper Nile State is estimated at 75 000 tonnes (Table 8) with a yield of 0.5 tonnes/hectare from 150 000 hectares, which is about 70 percent higher than 2016. Sesame production has also increased in Upper Nile State because of the high demand and good prices offered by traders from the Sudan. Due to the poor state of the road network to the capital, Juba, and to insecurity affecting trade routes, almost all sesame produced in this area is sold to the Sudan.

In the Aweil Rice National Project and mechanized farms located in the rice basins, about 900 tonnes of rice are expected to be harvested from the total 909 hectares planted. In Ton Chol mechanized farming areas in Aweil East, 37 650 tonnes of sorghum production is expected from 7 530 hectares. Finally, in the Aweil Udham and Ton Chol mechanized areas, an estimated 1 530 and 7 530 hectares of sorghum was cultivated, with an estimated 2 188 and 9 036 tonnes of production expected, respectively.

The area and production estimates for sorghum and rice in the mechanized sub-sector for the 2017 planting season are given in Table 8, showing a contribution of 87 127 tonnes of sorghum and 903 tonnes of paddy rice to the 2017 national harvest.

Table 8: South Sudan - Cereal area and production estimates of the mechanized sub-sector, 2017

Location	Tractor (units)	Estimated area harvested (ha)	Yields (t/ha)	Estimated production (t)
Upper Nile (sorghum)	300[1/]	150 000	0.5	75 000
Aweil Rice Scheme (paddy rice)	13 (only 5 active)	909	0.99	903
Aweil-Udham (sorghum)	11	1 530	1.43	2 188
Ton Chol (sorghum)	12 (9 private and 3 provided by the Government)	7 530	1.2	9 036
Total (mixed cereals)				**87 127**

1/ Two-hundred-fifty existing and 50 new tractors provided by the Government, which were all functional.

3.3.2 *Other crops*

Groundnuts, with a short growing season and the possibility to be used as both staple and cash crops, offer an important safety net for family farms in the northern states where cassava does not grow. Groundnuts also provide lucrative cash crops further south where the seasons are longer and a second planting is possible. However, cassava is the major safety net and the preferred staple crop in the Greenbelt and the southern areas of the Ironstone Plateau. Its importance increases towards the south and west in the three Rumbek counties in Lakes State where the crop is planted around plots and household boundaries. In Western Bahr el Ghazal, two-year cassava is planted either as a sole crop or inter-cropped with groundnuts, sorghum and sesame. Similarly, in the Greater Equatoria Region, two-year cassava is inter-cropped with a wide range of crops including cereals, sesame, groundnuts, pigeon peas and beans during the first year of its development. In the second year, it is left un-weeded until harvesting. As it is usually the last crop in a rotation, it may well be left for a third year depending on the need. Although one-year varieties of cassava are planted for home use and sale as fresh tubers, most farms in the main cassava-growing areas follow the two-year cycle, harvesting tubers from 18-24 months, which are traded locally in the form of tubers for processing, and farther afield from the farms as dried cassava chips or cassava flour. Yields vary significantly with the agro-ecology and, based on the PET photo-indicators (plant densities, crown sizes and canopies; and, occasional cross-check sample weights), are noted by the Task Force-led teams this year to fall between 12-13 tonnes of fresh tubers/hectare in Central and Eastern Equatoria states.

Table 9 shows the 2017 estimates of the area and production for both cassava and groundnuts that were calculated from field work and transects of previous years and current the estimates made by the Task Force teams. Reports of the Task Force missions in 2017 show that the overall output of groundnuts declined by about 7 percent from 2016 because of an overall decrease in planted area due to insecurity and flood damage in Northern Bahr El Ghazal State. Similarly, the aggregate output of cassava is about 6 percent lower than in 2016, mostly due to the negative impact of large-scale displacements in Central Equatoria State.

Regarding other field crops grown at the household level, information on oilseeds (sesame, safflower and sunflower) is too scanty to try deriving the production figures. However, in 2017, the mechanized sector in Upper Nile State is expected to produce some 8 600 tonnes of sesame from about 14 300 hectares that is

likely to be purchased immediately from the field by traders of the Sudan. The 2017 production of sesame is estimated to be 23 percent higher than 2016.

Table 9: South Sudan - Indicative performance estimates of cassava and groundnuts by State visited by the Task Force at planting time, 2017

State	Cassava (two years)			Groundnuts		
	Area (ha)	Yields (t/ha)	Production (t)	Area (ha)	Yields (t/ha)	Production (unshelled, t)
Central Equatoria	18 000	13	234 000	10 140	0.6	6 084
Eastern Equatoria	14 210	12	170 520	5 560	0.7	3 892
Western Equatoria	32 000	17	544 000	22 600	0.5	11 300
Jonglei	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Upper Nile	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Unity	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lakes	800	12	9 600	44 100	0.6	26 460
Warrap	0	0	0	14 600	0.5	7 300
Western Bahr el Ghazal	8 900	11	97 900	7 700	0.6	4 620
Northern Bahr el Ghazal[1/]	0	0	0	13 200	0.5	6 600
Total	**73 110**	**14.4**	**1 056 020**	**117 900**	**0.56**	**66 256**

1/ The harvested area and yield of groundnuts decreased compared to 2016 due to flood damage.
n.a.: Not enough information collected.

3.3.3 *Livestock*

The most recent documented estimate of cattle numbers made by FAO in 2009, suggests a cattle population of 11.7 million head, very similar to the contemporary population estimates of sheep and goats at around 12-13 million head for each species. The same Draft FAO Livestock Strategy Paper estimates the population of small ruminants at 13 974 135 head for goats and 12 611 522 head for sheep, providing a combined small ruminant population of about 26.6 million head, over 2 million head greater than the figures in the 2013 CFSAM report. The validity of these theoretical livestock data, particularly the distribution by State, is difficult to assess.

In this case, the conservative livestock population growth rates determined for use in Ethiopia for cattle at 0.06 percent may also be applied for South Sudan for the past years. Using this conservative figure, the cattle population estimated at 11 830 800 head in 2016 increased to 11 837 500 heads in 2017, disaggregated by state as shown in Table 10.

Table 10: South Sudan - Cattle estimates by State, 2014-2017 ('000)

State	2014	2015	2016	2017
Central Equatoria	885	885.5	886.0	886.5
Eastern Equatoria	895	895.5	896.0	896.5
Western Equatoria	679	679.4	679.8	680.2
Jonglei	1 475	1 475.8	1 476.7	1 477.5
Upper Nile	989	989.5	990.1	990.6
Unity	1 188	1 188.7	1 189.4	1 190.1
Lakes	1 320	1 320.7	1 321.5	1 322.2
Warrap	1 539	1 539.9	1 540.8	1 541.7
Western Bahr el Ghazal	1 257	1 257.7	1 258.5	1 259.2
Northern Bahr el Ghazal	1 590	1 590.9	1 591.9	1 592.8
Total	**11 817**	**11 823.7**	**11 830.8**	**11 837.5**

Source: CFSAM (2013) and Draft FAO Livestock Strategy Paper (2014).

In South Sudan, since the conflict started in 2014, enforced and voluntary livestock migration from the conflict-affected states into different states and across international borders and the redistribution through *systemic theft* within the states by the warring forces, has reportedly taken place on an enormous scale, affecting the location and even the very existence of thousands of head. This looting seems to have been particularly prominent in Unity and Jonglei states, but its effect on extant livestock population was hard to be assessed during the field interviews.

The normal to above-normal rainfall over most of the areas has created favourable condition for pasture growth and availability of water for livestock. Hence, the PET Body Condition Score (BCS) modes of all adult cattle

are noted to be at PET BCS 3-4, with few individual PET BCS of 2s and 1s. This suggests all classes of stock are in good body condition due to abundant forages and plenty of water throughout the season until December.

Livestock diseases have been normal this year, with incidents of endemic diseases reported by the Task Force teams gathered from the case studies and key-informant interviews. The most common diseases in 2017 include: Haemorrhagic Septicaemia, BQ, CBPP, Anthrax, East Coast Fever, *peste des petits ruminants*, Sheep Pox, Newcastle Disease, CCPP, Foot-and-Mouth Disease, Lumpy Skin Disease and the presence of internal and external parasites. However, none of these incidents were described as outbreaks, neither have any cases been confirmed by laboratory analyses. To counteract the threats of such disease outbreaks, exacerbated by the changes to the movements noted above, in 2017, FAO supported the supply of about 4.1 million vaccines for domestic livestock.

As shown in Table 11, more than 51 percent of the vaccinations were provided to Greater Upper Nile Region in 2017 and 41 percent to Greater Bahr el Ghazal State.

Table 11: South Sudan – Livestock vaccines provided by FAO through its partners, 2017

State	Households	Number of vaccines			
		Cattle	Shoat	Total	Percent
Central Equatoria	2 889	98 493	60 450	158 943	3.9
Western Equatoria	3 864	110 996	30 469	141 465	3.5
Jonglei	29 899	337 542	177 211	514 753	12.6
Unity	30 517	413 513	617 119	1 030 632	25.2
Upper Nile	8 880	313 603	245 875	559 478	13.7
Lakes	2 708	183 282	39 853	223 135	5.5
Northern Bahr el Ghazal	16 072	876 784	71 444	948 228	23.2
Warrap	7 620	318 709	175 871	494 580	12.1
Western Bahr el Ghazal	332	15 525	6 256	21 781	0.5
Total	**102 781**	**2 668 447**	**1 424 548**	**4 092 995**	**100**

4. CEREAL SUPPLY/DEMAND SITUATION

4.1 Cereal balance

Total cereal consumption in 2018 is estimated at slightly below 1.25 million tonnes, using a projected 2018 mid-year population of 11.4 million and an average per capita consumption of about 110 kg of cereals per year. The 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 the differences between the urban and rural areas and the relative importance in the local diets of other crops (notably cassava and groundnuts), livestock and wild foods. In particular, the estimated production of at least 1 million tonnes of fresh cassava and over 65 000 tonnes of unshelled groundnuts is expected to provide some 300 000 tonnes and 60 000 tonnes of grain equivalents, respectively, bringing the estimated average per capita consumption to about 130 kg of cereal equivalent per year, suggesting a level fairly close to the estimates for neighbouring countries.

With an estimated net cereal production from the traditional sector of about 764 000 tonnes, a cereal deficit of about 483 000 tonnes is forecast for the 2018 marketing year, 26 percent up from the 2017 (revised) deficit of about 380 000 tonnes. As the 2017 population figures have been revised downwards to take into account the refugee outflow (see section 2.1: Population and population movements), it induced a decline in food requirements leading to a downward revision of the 2017 estimated deficit at about 380 000 tonnes from previous estimate of 500 000 tonnes which was reported in the 2016 CFSAM report.

Table 12 summarizes the estimated cereal supply situation for each previously-designated State in 2018 and compares it with the Mission's estimates for the previous three years. The largest shortfall is forecast in the Greater Upper Nile Region. Here, the aggregate cereal deficit, after having increased by 40 percent between 2014 and 2015 due to the impact of the conflict, remained firm at around 300 000 tonnes in recent years. The situation is particularly worrisome in the Greater Equatoria Region (Western, Central and Eastern Equatoria states). The Region, which used to produce a moderate surplus in past years, moved to a deficit position of about 25 000 tonnes in 2017, as the area was affected by the expansion of the conflict. The aggregate cereal deficit is expected to quadruplicate to more than 100 000 tonnes in 2018 due to the deterioration of the security situation and to the massive refugee outflow (see section 2.1) Here, traditional food surplus-producing areas of Yei, Morobo, Lainya and Magwi counties, that combined accounted for a surplus of about 86 000 tonnes in

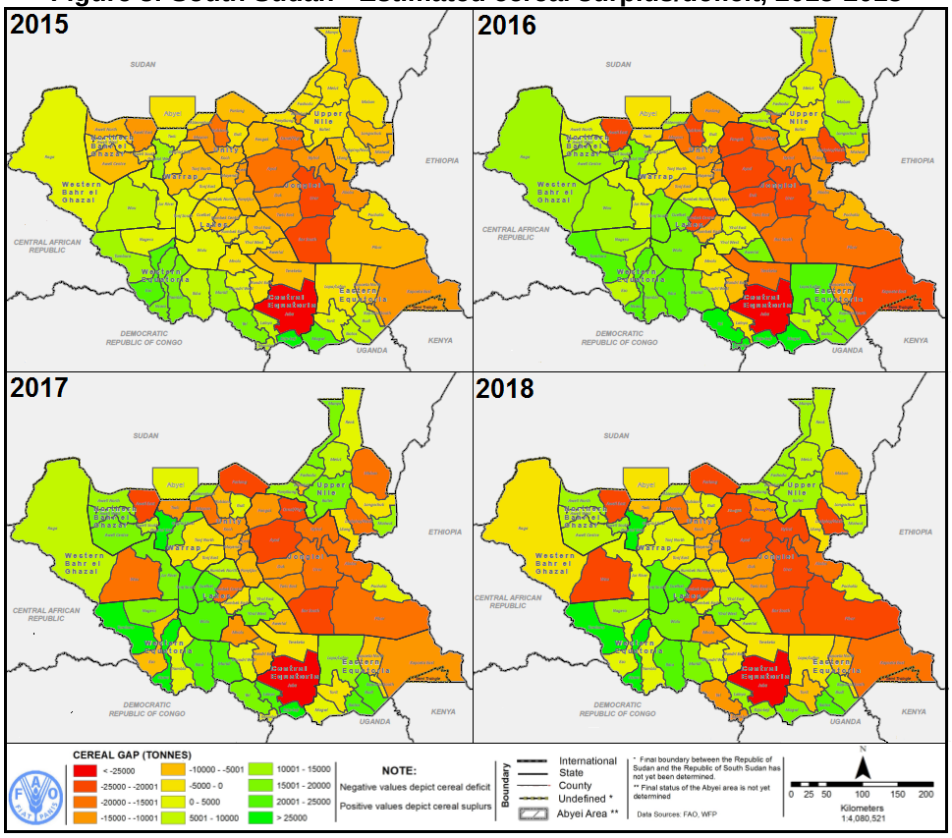
2016, moved to a deficit position of about 10 000 tonnes in 2017, which is expected to more than double to about 24 000 tonnes in 2018. Notably, Kajo Keji County, which on average in 2015-2017 produced a surplus of about 30 000 tonnes, will move in 2018 to a deficit position of about 1 500 tonnes. Similarly, Western Bahr el Ghazal State, that produced a surplus of about 16 000 tonnes in 2015, moved to a deficit position of about 4 000 tonnes in 2016, which more than tripled to about 14 000 tonnes in 2017 and doubled to 28 000 tonnes in 2018. The county with the largest food deficit is Juba County, where about 40 000 tonnes of cereals will be needed in 2018 to cover the food requirements of mostly urban households.

Table 12: South Sudan - Estimated cereal surplus/deficit, 2015-2018 (tonnes)

State	2015	2016	2017	2018
Central Equatoria	25 196	14 291	-13 294	-75 178
Eastern Equatoria	6 338	-16 750	-21 355	-29 889
Western Equatoria	86 767	18 542	10 601	794
Jonglei	-149 738	-148 937	-159 079	-162 761
Upper Nile	-78 942	-72 429	-58 864	-56 258
Unity	-80 298	-79 264	-80 041	-81 910
Lakes	-30 812	-28 889	-24 600	-22 356
Warrap	-4 907	-19 459	2 132	-830
Western Bahr el Ghazal	16 044	-4 350	-14 256	-28 802
Northern Bahr el Ghazal	-38 315	-28 006	-25 529	-25 098
Total	**-248 666**	**-365 248**	**-384 285**	**-482 287**

Cereal production from the rainfed large and small mechanized sector in Northern Bahr el Ghazal and Upper Nile states is expected to provide an additional 87 127 tonnes of cereals. Although some sorghum is expected to be traded across the border in the Sudan, some amounts are expected to be marketed internally, depending on security conditions, transportation costs compounded by local “taxes” imposed on traders moving grains to major markets and fluctuations of exchange rates between currencies in the Sudan and South Sudan. As in past years, this production may represent an option for the local purchases by the international institutions providing food assistance in the localities of production.

Figure 8: South Sudan - Estimated cereal surplus/deficit, 2015-2018

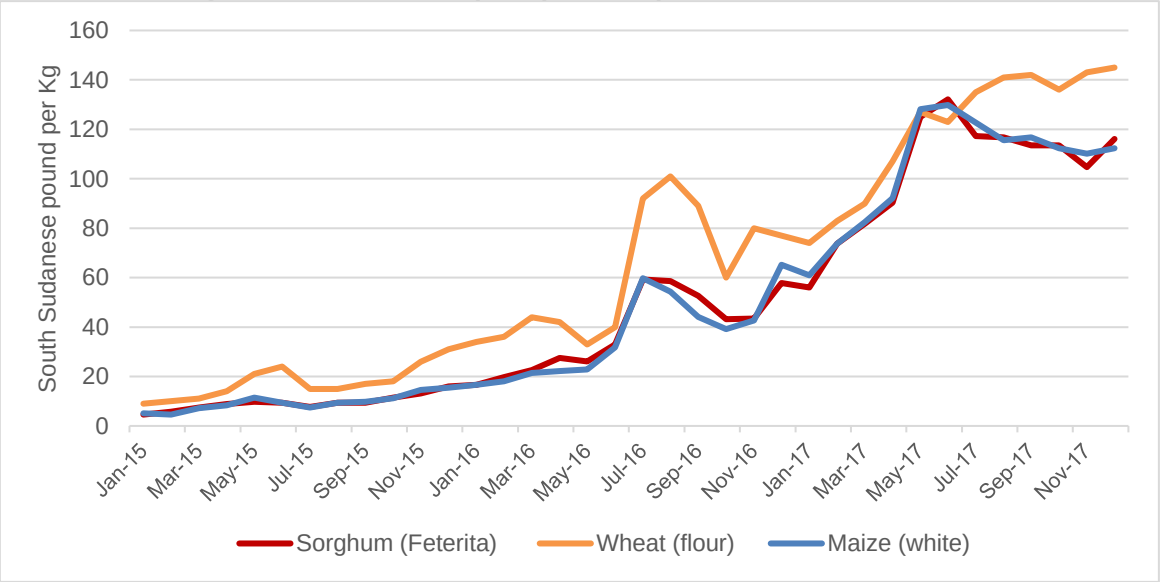


Source: FAO South Sudan.

4.2 Cereal and livestock markets

Prices of cereals started to soar in late 2015 on account of the devaluation of the local currency, the general economic downturn and widespread insecurity. In July 2016, the already sustained price increases further accelerated due to the intensification of the conflict, with cereal prices almost doubling in Juba's markets in only a few weeks and reaching new record highs. Subsequently, prices of sorghum, maize and wheat flour declined by 25-35 percent between August and October, as newly-harvested crops increased supplies. Cereal prices resumed their sustained upward trend at the end of 2016, with prices of maize and sorghum tripling between October 2016 and June 2017, and prices of wheat doubling over the same period. Subsequently, in Juba, prices of sorghum and maize declined by 12-13 percent between June (when they were at record highs) and December, as 2017 harvests entered the markets. Prices of wheat flour continued to increase until August, remaining mostly stable afterwards. Government subsidized sales of basic food commodities contributed to the downward pressure[20]. However, despite the recent declines, prices of cereals and most food items in Juba are still at exceptionally high levels. Sorghum and maize grains were traded in December 2017 at about SSP 116/kg and SSP112/kg, respectively, up to twice the high levels of 12 months earlier and more than seven times higher than 24 months earlier. Similarly, wheat flour, mainly imported from Uganda and the Sudan, was traded at SSP 145/kg in December 2017, about 90 percent up from 12 months earlier and almost four times its price 24 months earlier.

Figure 9: South Sudan (Juba) - Retail prices of selected cereals



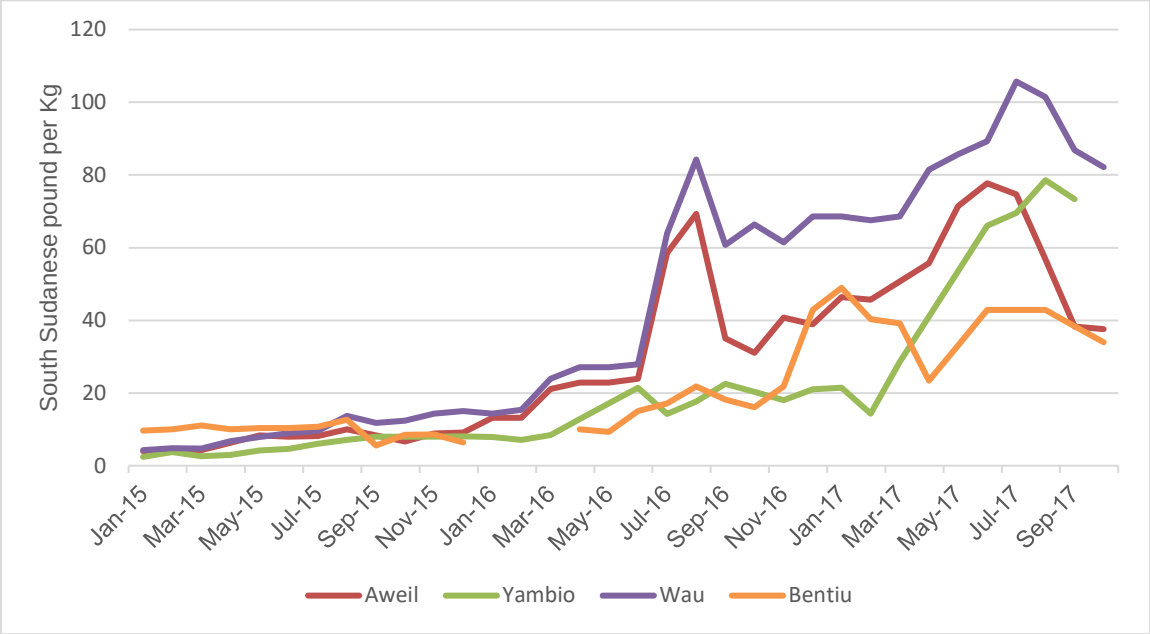
Source: South Sudan Crop and Livestock Market Information System.

Prices of other important food staples, including groundnuts and cassava, also recorded a sustained increasing trend over the last two years. In December 2017, groundnuts and cassava were traded in Juba at SSP 311/kg and SSP 127/kg, respectively, up to three times their one-year earlier levels and up to ten times their levels of 24 months earlier.

Prices of sorghum followed similar patterns in several markets across the country, starting to surge in late 2015, declining in August/September 2016 as the newly-harvested crops increased supplies, and subsequently resuming their sustained increasing trend, reaching near-record to record levels in June/July 2017. Prices of sorghum declined in Aweil, Wau, and Bentiu markets by 20-50 percent between August and October with the 2017 harvest. Despite the recent declines, sorghum prices in October were at exceptionally high levels in several markets, between 20 and more than 100 percent higher than 12 months earlier, and up to six times higher than 24 months earlier, severely constraining access to food for market-dependant households.

[20] In May 2017, the Government established a trading company to import and sell five basic food items (sugar, wheat flour, maize flour, beans and cooking oil) in 35 shops in Juba. The prices of these subsidized food items are 25-45 percent lower than the market prices.

Figure 10: South Sudan - Retail prices of white sorghum in selected markets

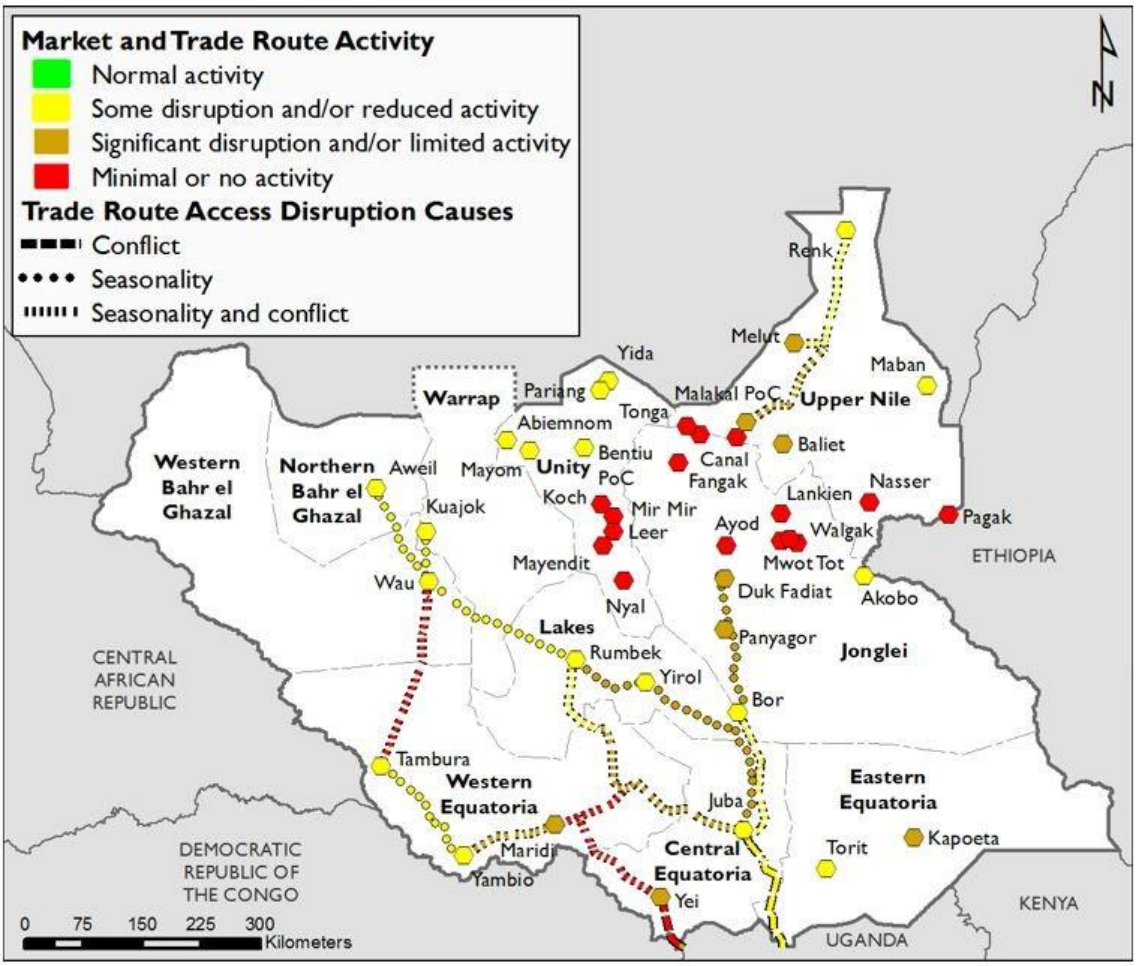


Source: WFP.

Food prices normally show a marked volatility and differ significantly among markets in the country as a consequence of the poorly-developed road network, the high level of fuel prices and transport costs which include the economic losses due to the high risk of looting along the main roads. Most roads, including those in the western corridor, connecting Juba with Rumbek to Wau up to Aweil, are subject to significant constraints during the rainy season (May-October) when they become often impassable compromising the stability of supply flows. Transportation costs are in general more than proportional to the distance from markets, due to multiple taxation (both official and unofficial), time spent at customs, check points and road blocks as well as increasing risks of looting. The intensification of the conflict during 2016 and its differential impact on various parts of the country further exacerbated price volatility and market fragmentation. For instance, as of September 2017, prices of 1 kg of sorghum varied from a low SSP 39 in Bentiu and Aweil, to about SSP 80 in Yambio and Wau, to SSP 107-137 in Juba and Rumbek. The difficult access to fuel and its high price also played an important role in determining food price differentials. Fuel availability has been often very limited in 2016 and 2017, and average prices per litre in the parallel market have been quite different across the country, varying (in the second week of October) from SSP 250 in Juba and Wau to SSP 300 in Aweil, up to SSP 400 in Torit and Rumbek. Compared to their levels of 12 months earlier, diesel prices in October were almost six times higher in Juba and up to eight times higher in Torit.

Across the country, trade flows and market activities are at lower levels than their pre-conflict levels, as widespread insecurity is limiting the trade flows and the households' physical access to the markets. Despite military escorts between Juba and Nimule, trade flows to Juba remain below pre-July 2016 levels, and, according to FEWS NET, maize flour imports in mid-2017 were roughly 75 percent below 2016, while sorghum imports in the fourth quarter of 2017 were 28 percent below the volumes imported during the 2016 fourth quarter and 15 percent below the average of the fourth-quarters of the previous four years. In Central Equatoria, the trade route connecting Yei and Kaya was re-opened in early October, but trade flows remain minimal. In Western Equatoria State, several trade routes remain closed due to insecurity and banditry. In Greater Upper Nile and Greater Bahr el Ghazal regions, limited activity has occurred on most trade routes in recent months, due to a combination of insecurity and seasonal constraints, as the rainy season limited road functioning.

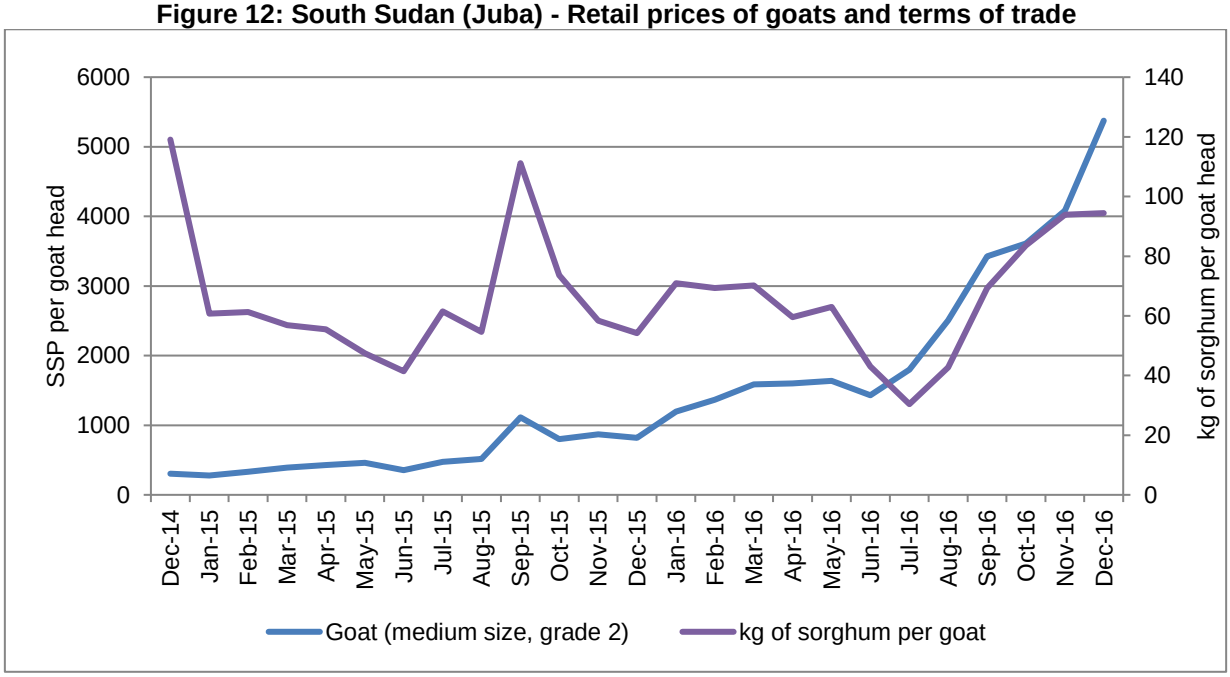
Figure 11: South Sudan - Market and trade functioning, October 2017



Source: FEWS NET.

Livestock is an integral part of the livelihood system of South Sudan and the sales of small ruminants represent an important source of income that largely determine pastoralists' capacity to purchase food items. As shown in Figure 12, prices of goats (medium size, grade 2) in Juba, following seasonal patterns, peaked in September 2015 at the end of the rainy season as body conditions improved due to a good pasture and water availability. Subsequently, prices declined in October and remained mostly stable in November and December 2015. Since early 2016, prices recorded an increasing trend, due to hyper-inflation and insecurity-related market disruptions. Price increases accelerated further since July 2016 due to the intensification of the conflict. In December 2017, prices of goats were at about SSP 10 000/head, almost twice their year earlier levels and 14 times higher than their 24 months earlier. Since early 2017, the increase of livestock prices was more pronounced than the increase of cereal prices, and terms of trade for pastoralists considerably improved – albeit irregularly - between March and December 2017, increasing by about 50 percent. In December 2017, in Juba, a goat was equivalent to about 86 kg of sorghum, about 8 percent more than 12 months earlier but almost twice the equivalent in sorghum 24 months earlier. However, considering the declines in household livestock assets due to the systematic looting by warrying factions, the recent increases in terms of trades are unlikely to translate into solid food security improvements for the pastoralist households.

Figure 12: South Sudan (Juba) - Retail prices of goats and terms of trade



Source: South Sudan Crop and Livestock Market Information System.

The Terms of Trade of the daily wage rate against white sorghum in Juba remained mostly stable between October 2016 and October 2017, with the equivalent in sorghum of one day of causal labour at around 1.1 kg of maize. However, in October 2017, the Terms of Trade were 37 percent lower than 24 months earlier, when one day of causal labour was equivalent to 1.8 kg of sorghum.

5. HOUSEHOLD FOOD SECURITY SITUATION

5.1 Methodology

This section looks at the food security trends in South Sudan, the evolution of its drivers and how they relate to the agricultural production data presented in the previous sections. The analysis is based on data from the Food Security and Nutrition Monitoring System (FSNMS) run by WFP and partners (FSTS, UNICEF, FAO, MOAF, NBS, RRC and NGOs). It opens with the overall food security diagnostics from the IPC analysis undertaken in January 2018.

The FSNMS was initiated in 2010 (then known as FSMS) and has established itself as the crucial source of information on the food security situation in South Sudan. The FSNMS used to be conducted three rounds per year, February, June and October/November. Since 2016, it is conducted twice per year, but its geographical scope has also been expanded and the rounds undertaken in 2017 are representative at the county level. The two rounds took place in June, at the peak of the lean season and in December, at the end of the harvest period.

Since June 2017 (Round 20), the FSNMS reaches all 78 counties of South Sudan. The survey is based on a sampling plan provided by the National Bureau of Statistics in order to obtain statistically representative results at the county level. The survey uses a two-stage cluster design with the first stage involving the selection of cluster/enumeration areas and the second stage involving the selection of households. During Round 21 (December 2017), 549 clusters were selected with 15 households from each cluster. Thus, the sample covered 8 190 households with an estimated 7 800 children under the age of five in those households.

By December 2017, 21 Rounds of data collection had taken place, providing a solid basis to distinguish the effects of seasonality from those of shocks.

5.2 Main drivers of food insecurity for 2018

Conflict in 2018 – The major factor influencing the general food security situation for South Sudan during 2018 remains the violent conflict that started in late December 2013. Its intensity and extent have increased since mid-2016 and is expected to continue through 2018. It is now more widespread across the country and may again affect the productive areas of the Greenbelt, leading to further decreases in national crop

production. The disruption of trade routes and commodity flows will contribute to keep food prices high, particularly in the more remote areas of the country.

Crop production in 2017 – In 2017, production was the lowest since the conflict began (see section 3.3.1), 7.5 percent below 2016 and 14 percent below the last five-year average. This was mostly due to the loss of cultivated area because of conflict and insecurity in productive areas of Central Equatoria and Western Bahr el Ghazal. Elsewhere, production increased especially in the Greater Upper Nile Region but not by enough to compensate for the losses in the high productive regions. This led to a cereal deficit of just under 500 000 tonnes, worse than the previous year's deficit of about 380 000 tonnes. The conflict-affected regions of Greater Upper Nile contributed the most to the deficit, while no region was able to post a significant surplus.

Market prices – Conflict has continued to affect the supply of commodities to households through large-scale disruption of trade flows into and within South Sudan. Prices underwent a sharp spike in mid-2016 and after a temporary respite, increased again from late 2016 towards record levels in mid-2017. Harvests brought prices down, but further increases were inevitable given the increasing national cereal deficit.

Population displacements: IDPs, refugees – A major outcome of the conflict was the displacement of over 4 million people, of which 1.9 million remained in the country and 2.1 million people fled into neighbouring countries (see section 2.1 for details). Most IDPs have remained within the conflict states, presenting an additional demand for food while largely not being able to farm and produce food. The remainder is in the Great Equatoria Region and in Western Bahr el Ghazal.

5.3 Current and projected IPC food security outcomes for 2018

In January 2018, 48 percent of the population of South Sudan (just over 5.3 million people) was classified in the IPC Phases 3 "Crisis", 4 "Emergency" and 5 "Catastrophe". The projected status for the lean period of mid-2018 (May-July) estimates this proportion to rise to 63.4 percent (6.9 million people), see Figure 13 and Table 13.

Figure 13: South Sudan - IPC situation maps, 2017 and 2018

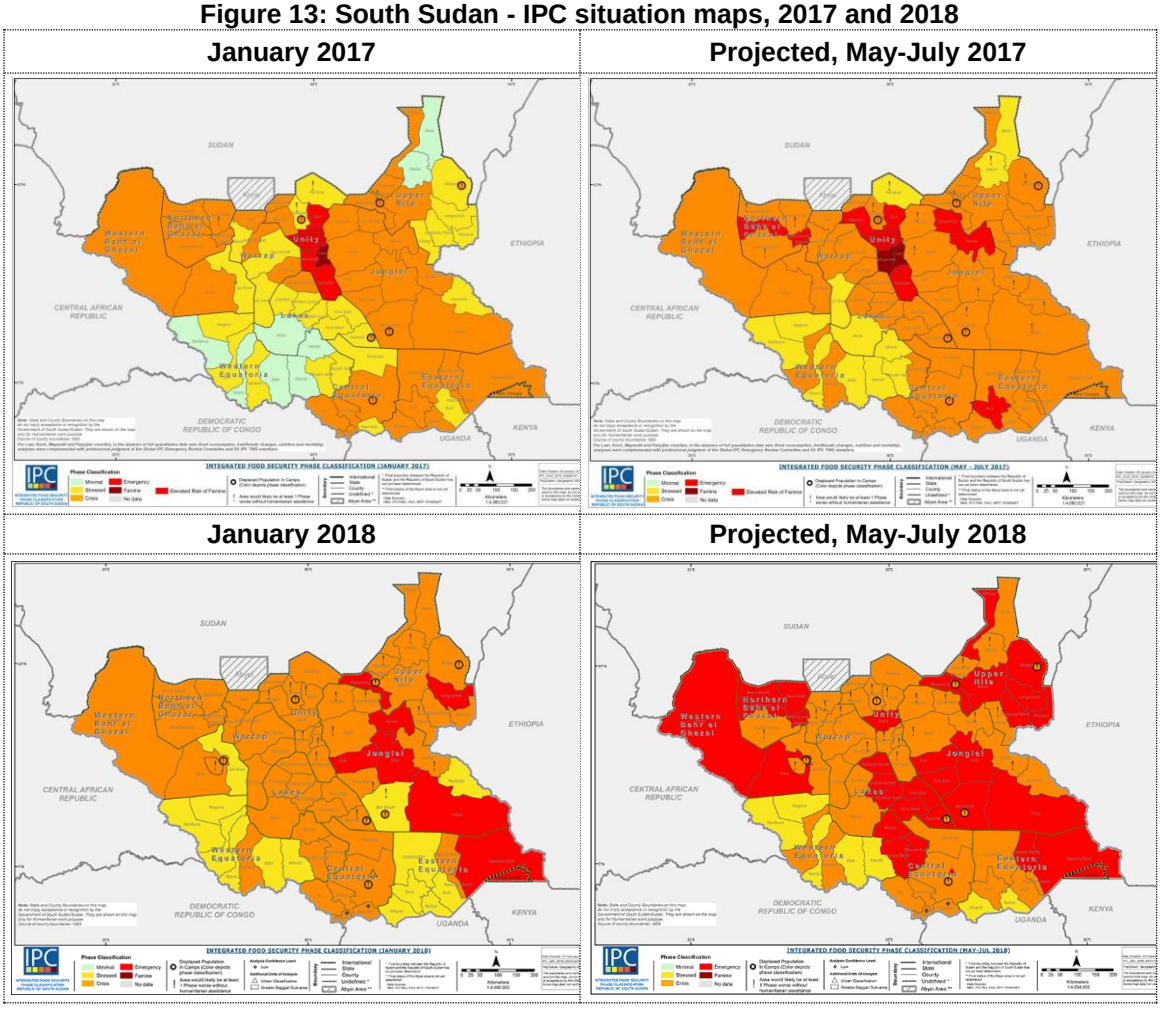


Table 13: South Sudan - Proportion of population in IPC Phases 3, 4 and 5, January 2017 and projected, May-July 2017 (percent)

State	Phases 3-5 January 2017	Phases 3-5 May-July 2017
Central Equatoria	52.1	64.2
Eastern Equatoria	31.8	43.7
Jonglei	54.7	75.9
Lakes	41.4	55.1
Northern Bahr el Ghazal	54.6	74.3
Unity	54.4	76.4
Upper Nile	61.8	68.9
Warrap	47.5	60.8
Western Bahr el Ghazal	45.0	60.6
Western Equatoria	21.7	35.5
South Sudan	**48.0**	**63.4**

Source: http://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/IPC_South_Sudan_Key%20Messages_Feb2017.pdf

Of particular relevance are the 50 000 people that may face famine or risk of famine in parts of Unity and Jonglei states during February to April 2018. The IPC Technical Working Group projects these numbers to rise to just over 150 000 in the lean period from May to July 2018. The worst affected populations are the IDPs and host communities in locations affected by the conflict.

In January 2018, the highest proportions of population in IPC Phases 3 to 5 are in Upper Nile (over 60 percent) as well as Jonglei, Northern Bahr el Ghazal, Unity states (over 50 percent). Later in May-July 2018, these three states may see these proportions rising to around 75 percent. Only in Eastern and Western Equatoria are these proportions projected to remain below 50 percent.

These numbers represent a striking increase of 40 percent in the number of people in the three worst IPC phases when compared with January 2017 (3.8 to 5.3 million). Upper Nile, Western Bahr el Ghazal and Western Equatoria, all saw numbers increase more than three-fold. Sharp rises were also registered in Warrap and Lakes.

These results arise from the emergence of conflict on previously peaceful areas and the continuing extreme staple food prices interacting with heavy market dependence by the rural populations. Generalized insecurity and adverse economic circumstances lead to continuing disruption of commodity trade flows and the spread of critical humanitarian conditions into the areas not directly involved in the major conflict.

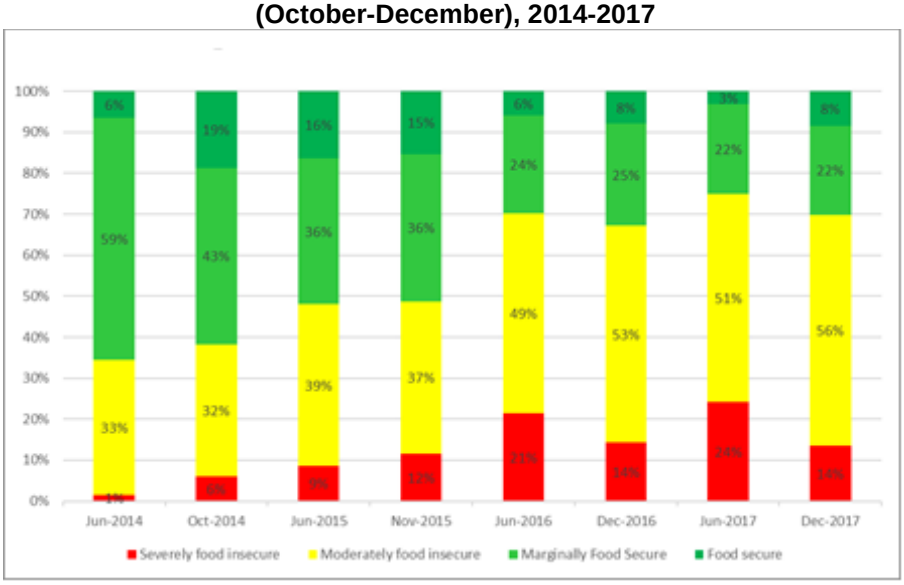
5.4 Evolution of the food security situation

The FSNMS surveys use the Consolidated Approach for Reporting of food security Indicators (CARI) approach to assess food security since Round 13 of June 2014. The CARI approach is based on the following components:

- Food consumption, measured by the Food Consumption Score, based on dietary diversity and food frequency.
- The share of households' expenditure on food.
- The type/degree of livelihood coping strategies employed by the households.

Based on these factors, the approach classifies the households into four categories: severely food insecure, moderately food insecure, marginally food secure and food secure.

Figure 14: South Sudan - – Food security status around harvest time (October-December), 2014-2017



Food insecurity in South Sudan has been increasing from the 30 or so percent typically verified before the generalized conflict took hold. In early 2016, as the conflict spilled into the more populated areas of the Equatoria and the Bahr el Ghazal states, against a backdrop of a severe macro-economic crisis and hyper-inflation, the proportion of food insecure population increased significantly from 49 percent in late 2015 to 70 percent in mid-2016.

These elevated levels of food insecurity seem to be the norm now, as they held throughout 2017 and actually broke new records: In December 2017, 70 percent of the population of South Sudan were food insecure with 14 percent severely food insecure (see Figure 15), a small increase of 3 percent relative to the same time last year. In the lean period of mid-2017 these proportions reached 75 percent with 24 percent severely food insecure, 5 percent higher than the same time a year before.

Figure 15: South Sudan - State level harvest time severe food insecurity, 2014-2017

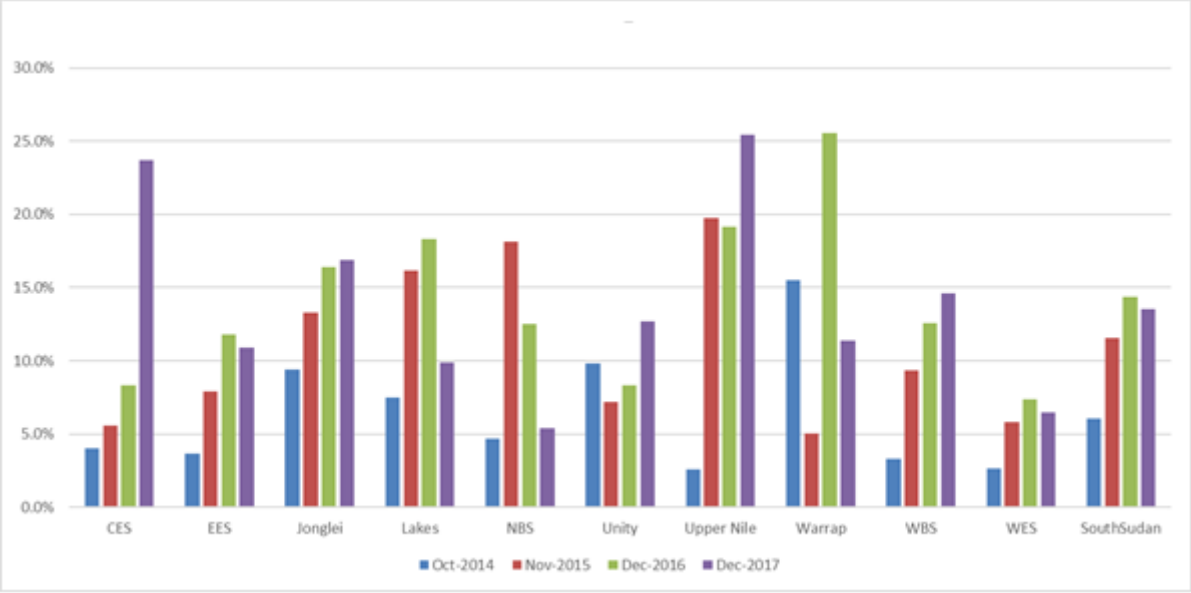
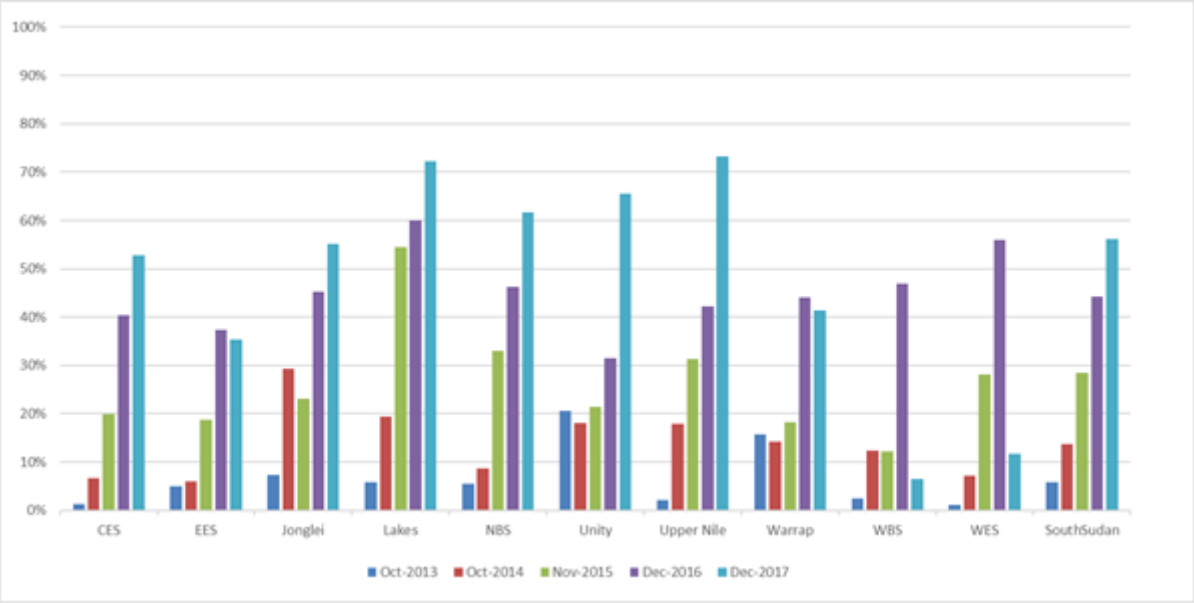


Figure 16: South Sudan - State level harvest time poor food consumption, 2013-2017



The regions affected by the conflict show the highest levels of severe food insecurity (Figure 15), particularly Upper Nile and Central Equatoria. The latter had a huge increase in severe food insecurity in 2017, due to conflict preventing access to harvests and food. In contrast, marked decreases in severe food insecurity in Lakes, Warrap and Northern Bahr el Ghazal may reflect the improvements in the supply of commodities to local markets, which had been severely affected in 2016.

The food consumption component of the food security indicator (Figure 16) displays a similar behaviour but does emphasise more the worsening situation developing from late 2013. The proportion of population with poor food consumption now stands at 56 percent nationally, worse than at the same time last year (44 percent). While Western Bahr el Ghazal and Western Equatoria have improved remarkably relative to late 2016, all other states have remained seriously affected or actually saw their food consumption significantly worsen, particularly in Unity and Upper Nile.

5.5 Household staple food supply: Markets vs household production

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

We focus on the sources of cereals and roots consumed by households as this covers the staple sources of food across the country. Other food items have fairly fixed supply sources, e.g. for vegetables, the major source is own production complemented by gathering, while fish, meat, oils and fats are overwhelmingly sourced from the markets. Dairy products arise from own production only in the states where livestock has a significant presence (Unity, Warrap, East Equatoria, Jonglei to a lesser degree).

Figure 17: South Sudan - Relative importance of different sources of cereals and roots consumed by households, June and December 2016

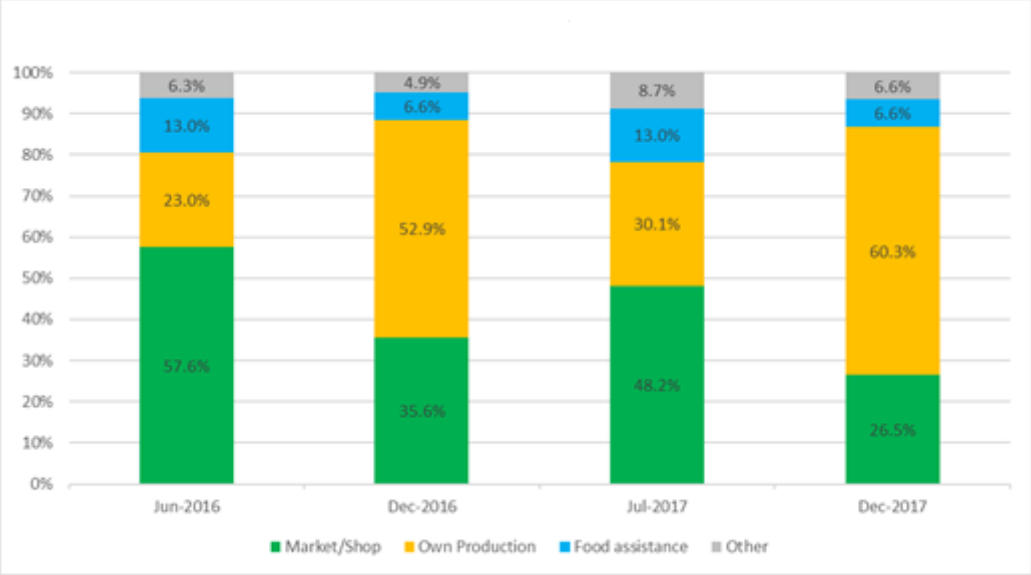


Figure 17 shows the contribution of different sources of cereals and roots to households in South Sudan since June 2016. As expected, the two dominant sources of cereals and roots for households are markets and the households' own crop production. While in June (lean period), the majority of the households depend on markets for their staple food supply, in December the households depend more on their own production as a result of the recent or ongoing harvest.

This pattern has not changed since data collection began – at the national level, households' crop production is the dominant supply of staples only in the period following the harvest and even then for no more than 60 percent of the households. Outside of this window, except for Western Equatoria, markets are always the dominant supplier (in some states up to 75 percent of the households during the lean period), as most households exhaust their stocks a few months after the harvest.

Food assistance became a noticeable contribution at the national aggregate level after the conflict started and agencies scaled up their assistance. It is now the main supplier of staples for about 13 percent of the households nationally during the lean period and 6 to 7 percent around harvest time.

Figure 18: South Sudan - Relative importance of different sources of cereals and roots consumed by households, State level, July 2017

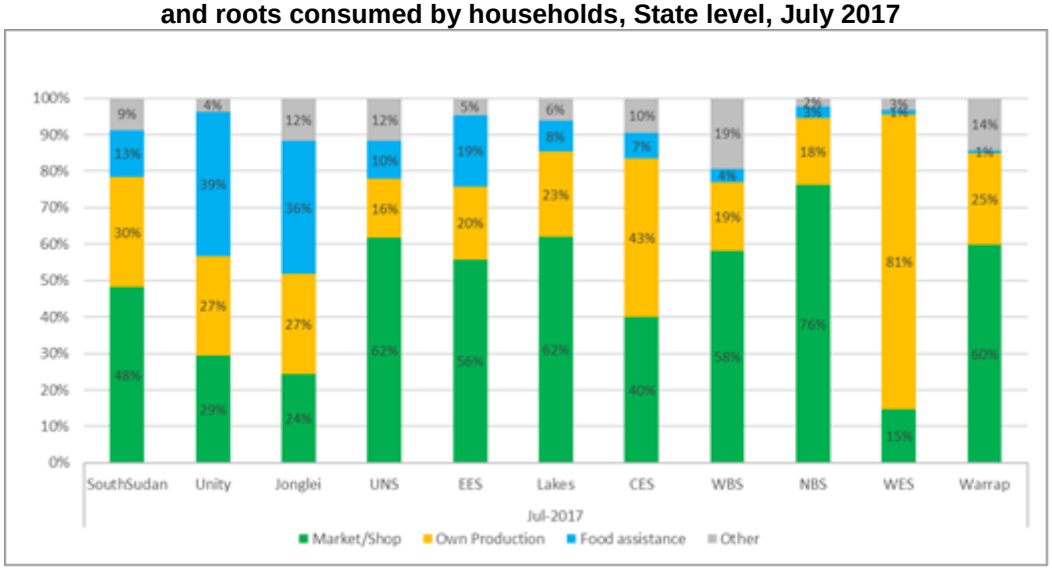
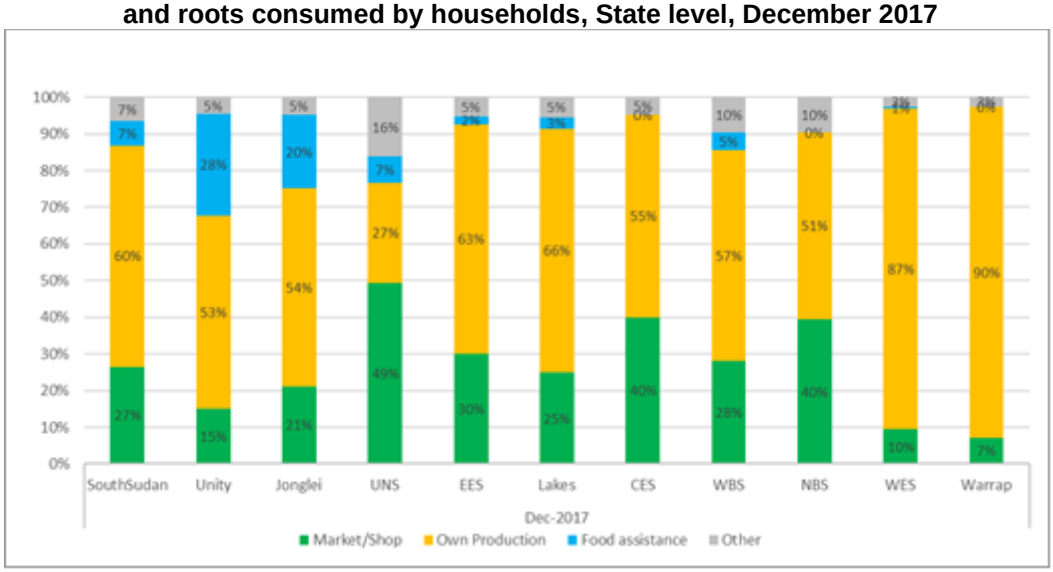


Figure 18a: South Sudan - Relative importance of different sources of cereals and roots consumed by households, State level, December 2017



This overall picture hides very considerable variation between states (Figure 18):

The food assistance contribution used to be significant only in the three original conflict states (Upper Nile, Jonglei and Unity) but has since become relevant in other states during the lean period (see values for East Equatoria, Lakes and Central Equatoria in Figure 18a).

In 2017, the dependency on markets was broadly lower than in 2016, including in the three conflict states. This may be a reflection of improved production levels in 2017.

Nevertheless, outside the harvest periods, markets remain the most important source of cereals and roots. Therefore, rural households in South Sudan are highly exposed to price shocks during the lean period. The current situation which was characterized by very high market prices and inflationary pressures provides pessimistic perspectives for the food security status of the population of South Sudan.

5.6 Food expenditure: Recent patterns and at-harvest situation

The households in South Sudan spend a large proportion of their incomes on food, given the high degree to which they depend on the markets for their staple food supply and the high food prices of the recent past. The 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 FSNMS data, the households are classified in terms of their expenditure on food:

- Very high food expenditure: Over 75 percent of expenditure allocated to food.
- High food expenditure: Between 65 percent and 75 percent of expenditure allocated to food.
- Medium food expenditure: Between 50 percent and 65 percent of expenditure allocated to food.
- Low food expenditure: Less than 50 percent of expenditure allocated to food.

Figure 19 shows the national level proportion of the households in each food expenditure class and its variation from June 2014 to December 2017.

Figure 19: South Sudan - Proportion of households in food expenditure class, June 2014-December 2017

As expected, the households' food expenditure presents a minimum around harvest time (October-December), which tends to be more pronounced when the harvest is good (e.g. 2014). As the households always rely on the markets to a significant degree and generally exhaust their stocks around the second quarter of the following year, usually the prevalence of high food expenditure is highest in February or June.

The impact of the conflict on the supply of food and other commodities to local markets led to a sharp increase in overall food expenditure levels in mid-2014 and early 2015. The countrywide proportion of households with high and very high food expenditure reached an all-time high of more than 70 percent (the previous record stood at 46 percent in June 2012 following the 2011 drought).

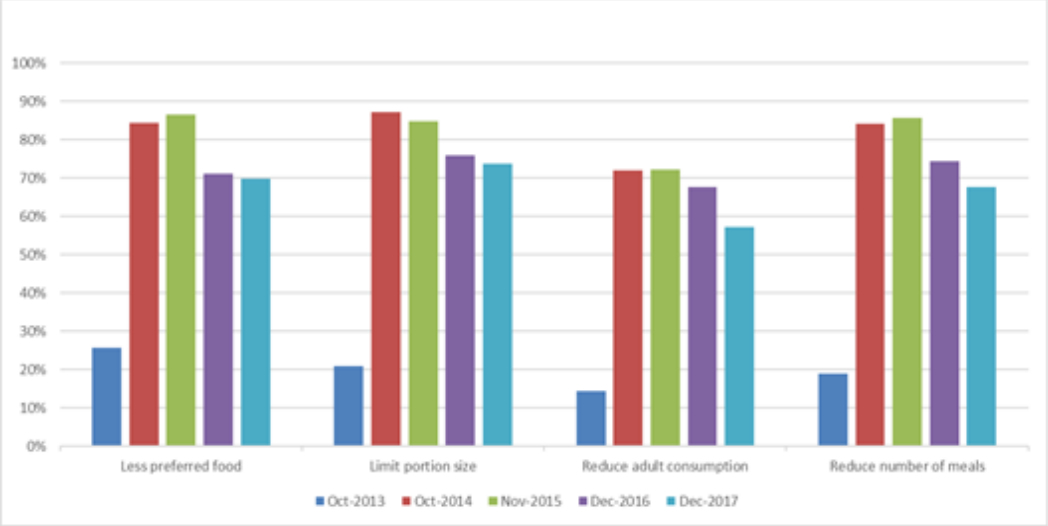
The situation has been more stable since, but very high food expenditure rates have been increasing year-on-year since mid-2015 (i.e. comparing the same periods every year). Very high food expenditure rates around the harvest period of 2017 are comparable to those of the lean period of 2015.

As far as the State-level picture is concerned, Northern Bahr el Ghazal stands out as the Region with the highest proportions of high and very high food expenditure – 77 percent in July 2017, an improvement compared with the same time last year (85 percent). Warrap, Upper Nile and Jonglei also show similar proportions of very high and high food expenditure, a worsening compared to the 2016 lean period. Because of conflict flare-ups, Central and West Equatoria saw much increased rates of high and very high food expenditure in mid-2017 compared to the same time last year.

5.7 Household coping strategies

In South Sudan, the prevalence of coping strategies involving changes in food intake (eating less preferred foods, limiting portion size, reducing adult consumption and eating fewer meals) around the harvest period has been decreasing from a peak of around 80 percent in late 2015 to the current values of around 70 percent (see Figure 20). This recent decrease is quite modest compared to the changes brought about by conflict.

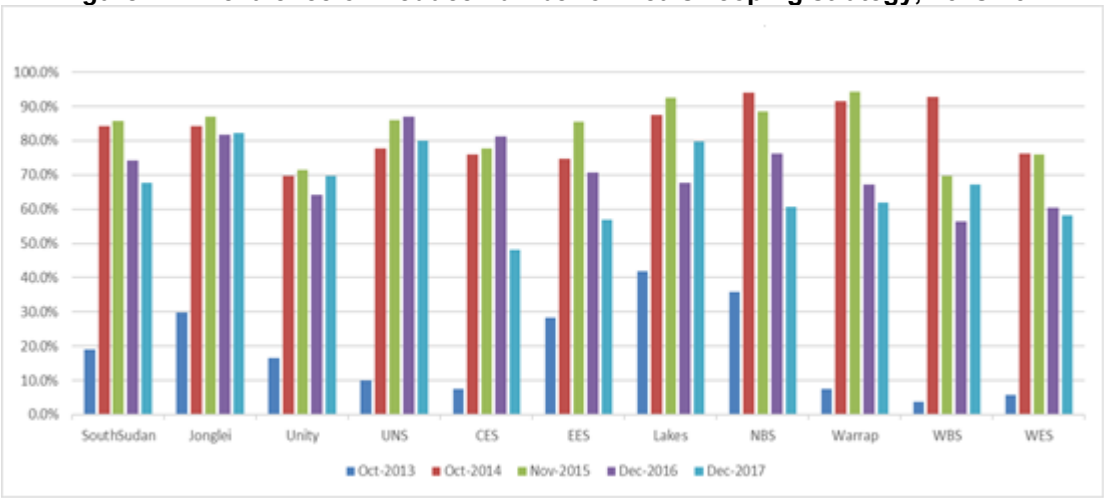
Figure 20: South Sudan - National prevalence of coping strategies involving decreases in food intake, 2013-2017



Conflict led to a very sharp increase in the adoption of most coping strategies from a minimum between 10 and 20 percent in late 2013 just before the start of the hostilities to values between 70 to 80 percent in late 2015.

Besides this sharp increase, conflict also strongly attenuated what was a pronounced seasonal variation in the degree of coping (increase from a harvest time minimum to a lean period peak, as households' food stocks decreased and market prices increased) – now coping takes place all year round at much higher levels.

Figure 21: Prevalence of "reduce number of meals" coping strategy, 2013-2017



Except for the conflict states, the improvement in the degree of coping was fairly general across the country in the past two years. In the Equatorias, Northern Bahr el Ghazal and Warrap the degree of coping is at a minimum of the post-conflict years.

5.8 Estimated food assistance requirements in 2018

WFP plans to assist over 4.8 million people in South Sudan in 2018 with nearly 310 000 tonnes of food assistance. Through its Emergency Operations (EMOPs), WFP aims to reach around 4 million people with the provision of general food distribution and nutrition support. This will include assisting people most in need of assistance due to acute food insecurity.

Table 14: South Sudan - Estimated food assistance requirements based on operational Plan, 2018

State	Unique Beneficiaries	Total (tonnes)
Central Equatoria	321 600	15 993
Eastern Equatoria	293 772	14 656
Jonglei	970 978	55 560
Lakes	379 743	23 427
Northern Bahr el Ghazal	713 766	28 003
Unity	800 791	81 762
Upper Nile State	595 323	47 217
Warrap	518 827	21 540
Western Bahr el Ghazal	192 831	16 836
Western Equatoria	102 004	3 921
Total	**4 889 636**	**308 914**

Furthermore, as part of its Emergency and Resilience/Development operations (previously under a Protracted Relief and Recovery Operation (PRRO), WFP also aims to support the needs of almost 1.1 million people. These include refugees, people displaced in the Abyei Region and other vulnerable South Sudanese with recovery and development-oriented activities such as school meals, cash and food assistance for assets and P4P with an aim at longer-term food security improvements.

6. RECOMMENDATIONS FOR 2018

The conflict has profoundly disrupted the functioning of all economic sectors in the country, including agriculture and livestock, with dramatic repercussions on households' food security. It has affected nearly all communities of South Sudan, either directly or indirectly, through loss of human lives and assets, impoverishment, restrictions of movements and loss of personal safety and security, including significant crop and livestock losses. Moreover, the macro-economic collapse has drastically curtailed trade and markets in 2016 and 2017. As a result, the aggregate food gap has increased compared to the previous year and the commercial and humanitarian mechanisms put in place to fill that gap are facing serious challenges. Expanding domestic food production is, therefore, essential to prevent the escalating food insecurity in 2018 and beyond.

Achieving a stable and lasting peace is the paramount recommendation in order to progress in terms of agricultural development and improving food security. While understanding the complexities of the prevailing situation during the process of reconciliation and peace-building, the following recommendations are made with the hopes that the national peace deal will progress successfully for a better future of the people of South Sudan.

Agriculture

In order to strengthen domestic food production and reduce the food gap in 2018:

- Provide support to the 2018 cereal production by the timely provision of agricultural inputs and seed fairs, together with the necessary technological packages and farmers' training/orientation.
- In addition to the provision of seeds and tools through emergency projects, also focus on supporting targeted farmers to use improved cultural practices like good land preparation, proper weeding, *Striga* weed control techniques, integrated pest management and soil fertility maintenance practices, among others.
- Address the main challenges of the FAW damage, the magnitude of which is expected to increase in 2018.
- Provide coordinated support to the people returning to some conflict-affected areas to reconstruct their livelihood systems by facilitating their access to land and agricultural inputs, while ensuring adequate food assistance to meet their short-term needs.
- Strengthen farmer and pastoral field schools to support the adoption and utilization of sustainable agro-pastoral production systems.
- Continue improving crop assessment tools and methodology, with particular emphasis on strengthening the assessment skills of agricultural officers at county level by broadening the involvement of local Government officers and NGOs in the annual crop assessment and seasonal monitoring exercise and by providing them with specific training.
- While strengthening the county-based CCMCs, there is a need for establishing strong linkages between the counties and State MoAs, and also the states with national Task Forces (MAFS and NBS).

Livestock

- Deepening and expanding animal health interventions. In particular: (1) to train animal health professionals and to allow them to move freely in order to discharge their duties in all states; (2) to review vaccination campaigns and procedures according to established vaccination calendars and (3) to expand the coverage of vaccination programmes, avoiding incorrect vaccine protocols and sub-optimal vaccination.
- Re-establish the access to seasonal grazing areas and routes that have been disrupted since the start of the conflict by supporting a process of negotiation amongst various herding groups.
- Establish a livestock information system to monitor key indicators, including animal production, marketing, movements and health.

Markets

- Closely monitor food stocks and trade behaviours in the main markets and facilitate the distribution of food from surplus to deficit areas, taking into consideration local market dynamics, as well as along the main corridors for both commercial and humanitarian commodities.
- Maintain and strengthen the market and price monitoring system in order to inform on the food availability and price situations in different markets across the country and allow timely intervention.
- Expand the use of Cash-Based Transfers (CBTs) in the areas where markets are functioning to encourage supply and greater market stability through demand side stimulation.

Food security

- Target food assistance to the most vulnerable households in the areas with the highest food deficits and with highest levels of food insecurity, especially in parts of Greater Upper Nile, Greater Bahr el Ghazal and Eastern Equatoria. Given the high cereal deficit, hyper-inflation and the prevailing insecurity in parts of the country, the level of households' food insecurity is likely to be higher than the previous year. Thus, scaled up efforts are required to support the populations most in need of assistance. Assistance, where appropriate, should be provided through Food For Assets interventions and agriculture-based livelihood support programmes. These activities should aim to provide the opportunities to rehabilitate the livelihoods and strengthen coping mechanisms. The design and implementation of food assistance activities should take into consideration an in-depth analysis of the local contexts: Cash-Based Transfers should be carried out in locations where the markets are functional with food availability assured, secondly in areas where there is on-farm surpluses thereby allowing targeted beneficiaries to purchase food from the households with surpluses. In the areas needing food assistance and where the above-mentioned conditions are not satisfied, in-kind assistance should be considered.
- Encourage the design and implementation of multi-sectorial interventions: both through conditional and unconditional modalities and explore market-based transfers in areas where the markets are properly functioning to address households' food insecurity as well as support the local economy.
- Provide context-appropriate emergency livelihood support for food insecure and displaced households in conflict-affected areas by delivering vegetable seeds and fishing kits.
- Improve access to micro-nutrient and protein-rich food through the use of nutrition vouchers to be traded against locally-sourced vegetables, fish and milk.
- Integrate a nutrition education component (infant and young child feeding) in the food security interventions (General Food Distribution, Framework for Assets, Cash-Based Transfers).
- Refine a prioritization matrix for the identification of locations for food security and nutrition response in the conflict-affected states to include, when feasible, available screening data on maternal nutrition.
- Continuously monitor food security and nutrition conditions, especially in conflict-affected areas, in order to periodically fine-tune the humanitarian emergency strategy and response.
- Strengthen early warning systems by improving the monitoring of rainfall and cropping conditions along the season. Promote the application of Sentinel-2 data to country scale crop type mapping.
- The latter should involve: i) monitoring the rainfall performance through remote sensing and GIS techniques in order to improve the quality of crop forecasting and thus the reliability of assessments; and ii) exploring the availability of high-resolution satellites imagery, which can be used to estimate the area planted, yield and production.

Annex 1

South Sudan - Indicative seasonal cropping calendar

<table>
<tr><th></th><th></th><th>March</th><th>April</th><th>May</th><th>June</th><th>July</th><th>August</th><th>September</th><th>October</th><th>November</th><th>December</th><th>January</th><th>February</th></tr>
<tr><td rowspan="3">Uni-modal rainfall zone found in Greater Bahr el Ghazal; Greater Upper Nile</td><td>Rainfall</td><td colspan="3">Dry season</td><td colspan="5">Wet season</td><td colspan="4">Dry season</td></tr>
<tr><td>Main crop</td><td></td><td rowspan="2">Land preparation and planting</td><td colspan="3">Growing season</td><td colspan="2">Harvest</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Long-cycle crops</td><td></td><td colspan="6">Growing season</td><td colspan="3">Harvest</td><td></td></tr>
<tr><td rowspan="3">Bi-modal rainfall zone found in Greater Equatoria</td><td>Rainfall</td><td>Dry season</td><td colspan="7">Wet season</td><td colspan="3">Dry season</td></tr>
<tr><td>First crop</td><td colspan="3">Land preparation and planting</td><td colspan="3">Growing season</td><td>Harvest</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Second and third crops</td><td></td><td></td><td></td><td></td><td></td><td colspan="2">Land preparation and planting</td><td colspan="3">Growing season</td><td colspan="2">Harvest</td></tr>
</table>

Note: Recent changes are blurring the divisions.

Recommendations for Roadmap, 2018:

- Maintain planting assessments to spot checks on *planted area* only in representative sample counties.
- As soon as security allows, conduct CFSAM-PET training for carefully-selected MoA and NGO staff in all new states.
- Provide CFSAM guides, PET tools and PET manuals to the new states.
- Introduce PET apps for use by the National Task Force and selected staff members of State ministries that have already demonstrated a willingness and a capacity to assess production properly using the PET manuals. The introduction should be planned during a short series of training courses early in the first season in Western/Central Equatoria states.
- Increase the range of timing of full harvest assessments to allow *each main crop, in each State* to be assessed.
- Continue to transfer the responsibility of conducting *all* the field work of *all* assessments in a staggered manner (to accommodate harvest dates) to State MoAs, *funded by FAO/AFIS*, **ONLY** where suitable levels of competence and integrity have been demonstrated. This means adjusting the role of the National Task Force to "remote" supervisory and analytical duties only in the states where the MoA teams have exhibited sufficient competence. In the states that continue to misrepresent performance presenting hearsay as evidence, the Task Force should conduct independent assessments.
- CCMC membership should be re-assessed with Committee members required to pass functional numeracy tests before recruitment. (Agricultural numeracy packages are available for training and testing assessors and the AgriTechTalk- International website).

Annex 2

South Sudan - Agricultural situation by area, 2017

GREATER EQUATORIA

Western Equatoria

A total of four short missions were conducted during the cropping season. The first one was conducted from the end of May to early June for first season planting assessment covering Nzara, Tambura and Yambio counties. This was followed by two missions during the first harvest to Tambura, Yambio, Nzara and Mundri West counties, from 15 to 28 August. The last mission to Tambura, Nzara and Yambio was carried out at the end of November to assess the yields of crops in the second harvest season. From all the four missions 167 case studies were made in the State (159 farmer interviews and eight key informants).

Reports of the Task Force Team show that rainfall started in March and April in Yambio, Nzara and Tambura, with a short dry spell in Tambura. The State generally experienced average rainfall in terms of amount and distribution compared to last year, resulting in a good performance of crops in both seasons. There is no problem of land access in the accessed counties except in some areas which are not safe in the far fields. Most respondents in the visited counties indicated a slight increase in cultivated area following a relative stability and motivation due to the incentives farmers get from selling their produce. Land preparation for the second season started in July, soon after harvesting of the first season crops. The main crops grown include, maize, cassava, groundnuts, rice, sorghum, finger millet, sesame and a variety of fruits. The area planted to rice is increasing and is almost competing with maize.

Hand tools were sourced mainly from the market with some distribution from the Star Trust Organization in Yambio County (hoes, axes and pangas). There are seven functional tractors in the State, including four in Yambio and three in Tambura counties. There is no use of ox-ploughs in the State and almost all of the required labour comes from families and communal labour. The unit cost of a hoe is about SSP 500, compared to SSP 200 in 2016.

The most prevalent pests during the season were FAW, wild pigs, monkeys, porcupines, rats, termites, green grasshoppers, local birds, midges and stem borer, where the damage levels were mild to average. FAW infestations were rampant during the first and second season in Yambio County, while more infestation was reported during the second season in Tambura and Nzara counties. However, infestation of a weed called *babashiro* is noted to be causing concern where weeding two or three times in the same location (grass and broadleaf weeds) is already a serious drain on households' resources.

Growing conditions

Figure A2-1 shows combined rainfall and vegetation cover and rainfall estimates and vegetation index graphs for six locations selected across Western Equatoria State (Tambura, Yambio, Ibba, Maridi, Mundri West and Ezo). The figures show normal to slightly below-normal rainfall and vegetation cover around March and April, which was immediately compensated by good rains starting from the end of April up to the end of the season creating favourable condition for crops. Thereafter, rainfall followed the expected pattern of sustaining crop and general vegetation growth until December; over most cropping areas of the State.

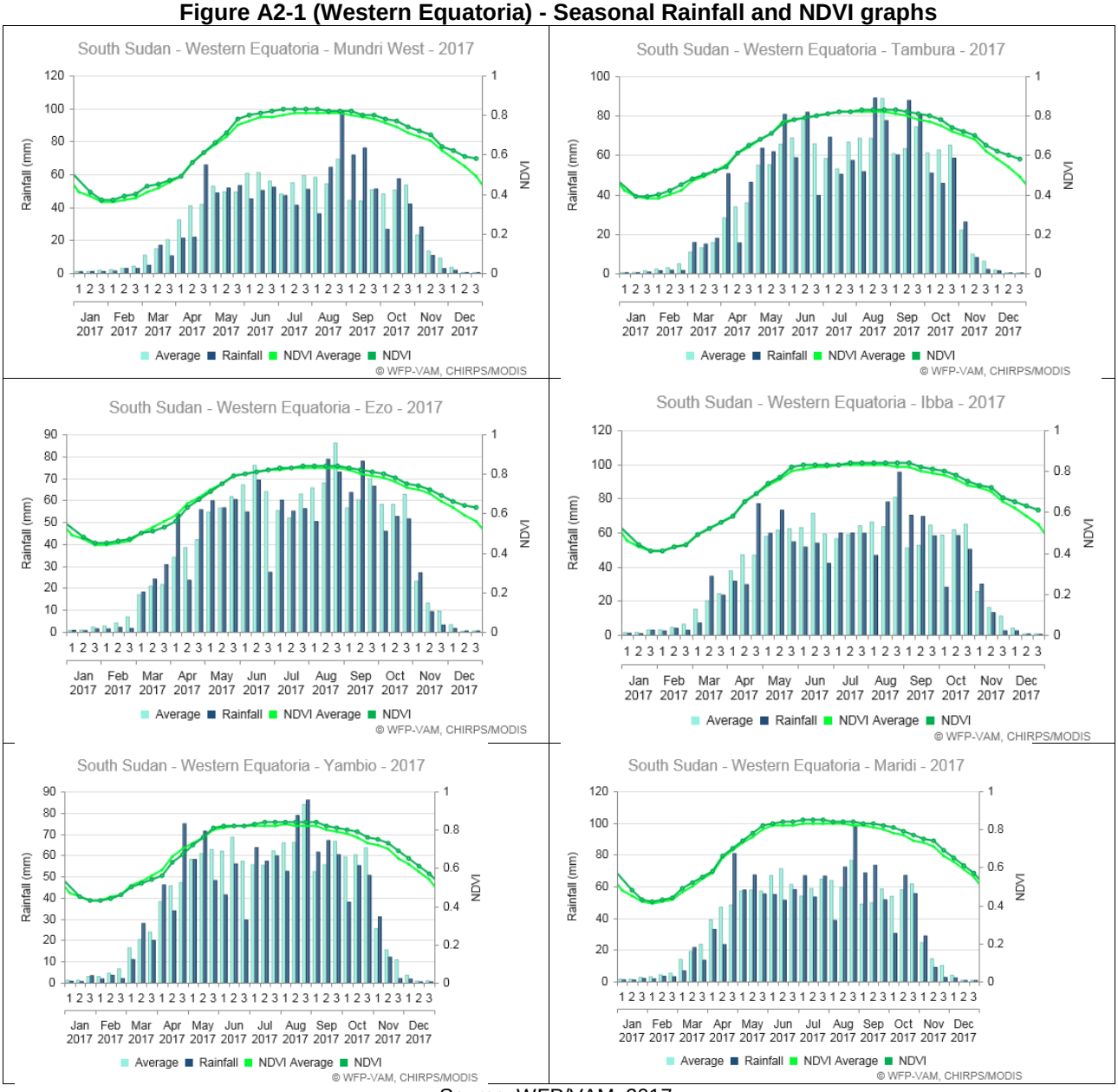
The seeds used are mostly own seeds carried over from the previous harvest or purchased in the local markets. Of the other crops, cassava is grown at levels similar to cereals through the Greenbelt and provides a security network that withstands displacement and disruption.

Production

Production estimates have been made on the basis of time-series information, adjusted downwards due to insecurity. Cereal yields are estimated at an average 1.36 tonnes/hectare for all cereals and both harvests, higher than the previous year's level of 1.29 tonnes/hectare. The increase in yield is due to favourable rainfall conditions and improved security situations in some places allowing farmers to do their cultural practices on time during both seasons. However, harvested area for the State has been reduced by about 11 percent because of the area reductions in Ibba, Maridi, Nagro and Nzara caused by the reduction in the number of farming households. Consequently, the gross cereal production from all the harvests is estimated at 137 898 tonnes exhibiting a further reduction on the low performance of the previous year, showing a small surplus of about 794 tonnes.

The contribution of cassava to households' food economy at State level is again assumed to be highly significant and harvesting is unlikely to have been affected by less than timely access. If all second year crops are harvested, around 158 000 tonnes of cereal equivalent, calculated using 42 percent dry matter and a gross processing efficiency of 70 percent, are likely to be available for use. Groundnuts may also add an estimated 22 000 tonnes of gross dry matter (unshelled).

Figure A2-1 (Western Equatoria) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

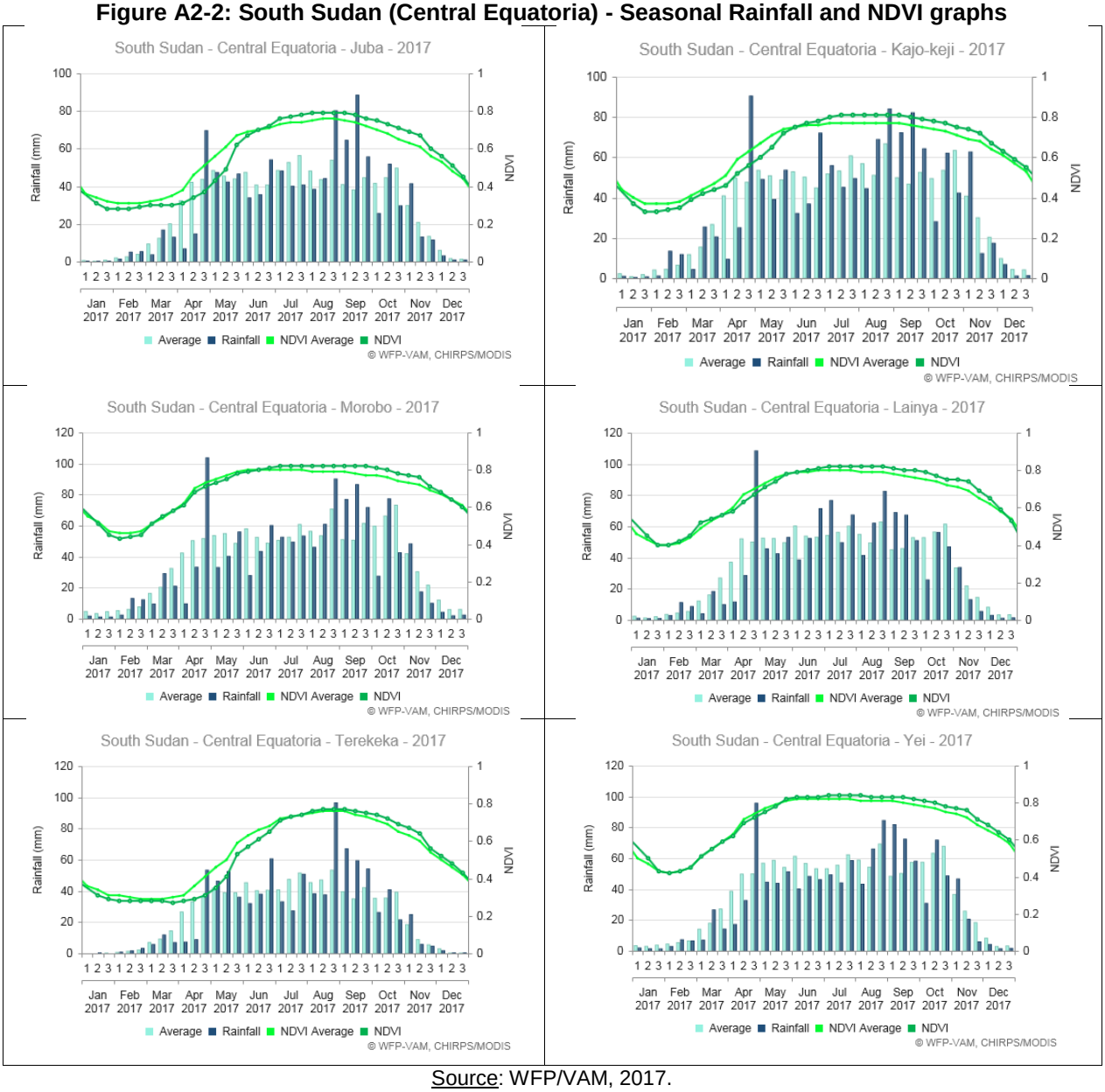
The livestock numbers in the State is very small (mostly small ruminants) compared to other states. Only counties in the northeast of the State may be considered as livestock areas due to *tse-tse* infestation in the forested zones that dominate the remaining counties. The PET BCS for shoats is 3-4 due to good pasture and water availability. The Task Force teams reported endemic diseases, including *peste des petits ruminants*, CCPP and Newcastle for poultry. About 3.5 percent of the vaccines distributed in the country were provided to Western Equatoria State in 2017.

Central Equatoria

In 2017, the Task Force teams undertook only two missions to Central Equatoria, the first Mission in August 2017 to assess the yields of the first season and the progress of second season planting. This Mission covered Juba and Terekeka counties and involved 54 interviews/case studies (51 farmers and three key informants). The second season harvest assessment was carried out from 9-10 October 2017 and covered

only Juba County, with 36 case studies (35 farmers and one key informant). No Mission was made to all the remaining counties of Morobo, Kajo Keji, Yei River and Lainya due to widespread insecurity. In addition, the previously established CCMCs, except Juba County, are not functional due to the displacement of all the members from these locations. As a result, information from such places was collected from NGOs operating in these areas and through personal/phone communications. The satellite based rainfall and NDVI graphs were used to analyse the production season.

Figure A2-2: South Sudan (Central Equatoria) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

Growing conditions

Combined rainfall estimates and vegetation index graphs are shown in Figure A2-2 for six locations selected across Central Equatoria State (Terekeka, Juba, Lainya, Kajo Keji, Yei and Morobo). There was a delay of rainfall at the beginning of the season in all counties, except the high rainfall recorded towards the end of April. The vegetation cover was also below normal up to June and then picked up immediately, with normal to above-normal rainfall and vegetation cover up to the end of 2017. However, there were dry spells in some pocket areas which resulted in replanting of seeds during the early season.

Weeds, pests and diseases have remained at mild levels, with the exception of the FAW which has infested maize fields, with unknown magnitude of damage. The most troublesome common pests noted are grass weeds, stalk-borers in maize, local birds, termites, grasshoppers and rodents. *Striga* weed is noted to be of concern to farmers in the continually-farmed areas with no rotation in Terekeka.

Production

Production estimates have been made on the basis of the first season Task Force returns from two missions (case studies) and CCMC's reports of Juba County, compared and cross-checked with time series data.

Crop production was severely constrained by insecurity that has caused large-scale displacement of the farming population. The total area cultivated by farmers has decreased significantly due to a reduction in the number of farmers. With a 47 percent reduction in cereal area due to reduced planted/harvested area, gross production is estimated at 77 942 tonnes suggesting a 48 percent decrease, leaving Central Equatoria State with a cereal deficit of about 75 178 tonnes. If all second year crops (cassava) are harvested, around 70 000 tonnes of cereal equivalent, calculated using 42 percent dry matter and a gross processing efficiency of 70 percent, are likely to be available for use. Groundnuts may also add an estimated 11 300 tonnes of gross dry matter (unshelled). Groundnuts will add an estimated 12 000 tonnes (gross dry matter unshelled) of saleable product to the households' food economy of the State.

Livestock conditions, pasture/browse and water supplies are noted to be good, with no reported significant outbreaks of livestock diseases. Some 4 percent of the livestock vaccinations in 2017 are reported to have been conducted in Central Equatoria State.

Eastern Equatoria

The Task Force teams undertook two short missions to Greater Kapoeta for planting and harvest assessments in August and October, respectively, while a third Mission was carried out in Torit County in October. The missions conducted interviews/case studies of more than 114 farmers and seven key informants (121 in total).

Growing conditions

Combined rainfall estimates and vegetation index graphs for six locations selected across Eastern Equatoria State (Budi, Ikotos, Lafon, Torit, Kapoeta North and East) are shown in Figure A2-3.

All six locations reflect irregular rainfall and vegetation cover during the growing season. The pattern in Kapoeta area was unfavourable for crops, with early dry spells that required replanting, followed by excessive rainfall causing flooding and waterlogging. The fluctuating rains negatively affected full crop development up to the end of the season.

Sorghum is noted to be the main cereal, with *Lonyang* and *Lodoka* the preferred landraces. The seeds used are mostly local/own seeds carried over from the previous harvest or purchased in the market with dry planting again common especially in the areas where rains were starting late. Maize (Longi-5) growing is more prominent in Magwi and parts of Torit. Farmers in Magwi, reported that late planted maize crops were damaged by FAW. Based on information from Torit CCMC, about 40 percent of the fields were waterlogged affecting *Aderi*, long-term sorghum, which is the main cereal crop in the county, usually harvested in December 2017 and in early January 2018.

Of the other crops, cassava is grown in the higher rainfall zones to the south and west of the State and pearl millet is most significantly grown in Ikotos and drier areas to the east.

In the absence of a widespread adoption of oxen ploughing, hand-digging is the normal method of cultivation with labour provided by the family in most areas. No use of fertilizers, sprays and manure is reported this year.

FAW was the main pest that affected maize-growing areas this year, with reports of crop damage in Magwi, Torit, Budi and Kapoeta East. Other crop pests and disease levels were again mild this year with principal problems being local birds, termites and green grasshoppers. Weeding was undertaken, on average, two times per season for most crops.

Production

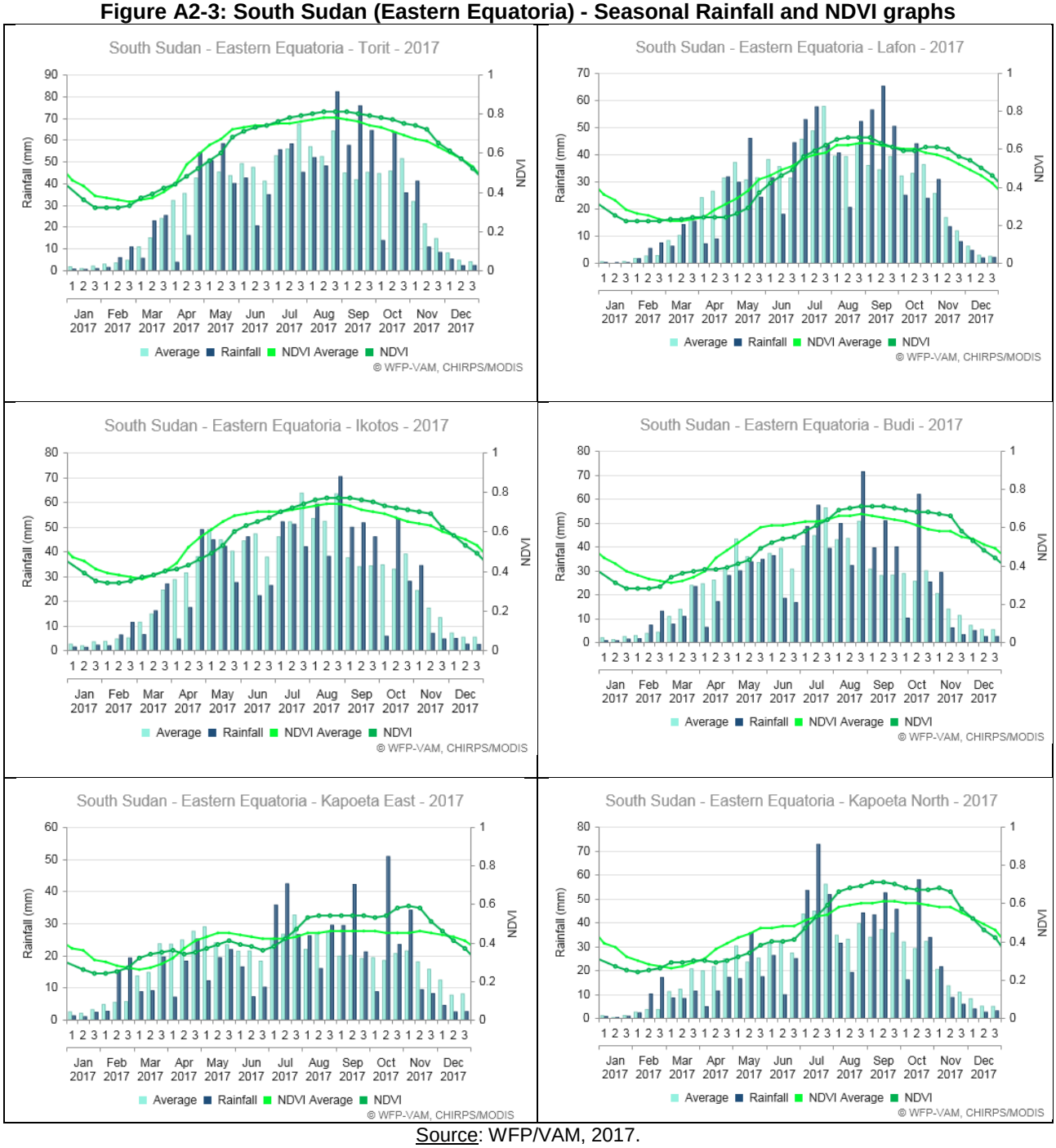
Production estimates have been made on the basis of the case studies and time series data. Dismal of crop performance in both seasons is reported. Consequently, gross cereal production is estimated at 116 991 tonnes from all cereal harvests, indicating a deficit of about 30 000 tonnes.

The contribution of cassava to households' food economy at State level is significant with an estimated 50 000 tonnes of cereal equivalent likely to be available if all second year crops are harvested. The estimate

is based on fresh tubers with 42 percent dry matter and a gross processing efficiency of conversion from tuber to chips/flour of 70 percent. Groundnuts may also add a further, conservatively-estimated 3 800 tonnes of gross dry matter (unshelled).

Livestock condition is good with a PET BCS of 3 most commonly noted for all species. Numbers are expected to have risen due to favourable conditions, with an ensuing increase in livestock prices.

Figure A2-3: South Sudan (Eastern Equatoria) - Seasonal Rainfall and NDVI graphs



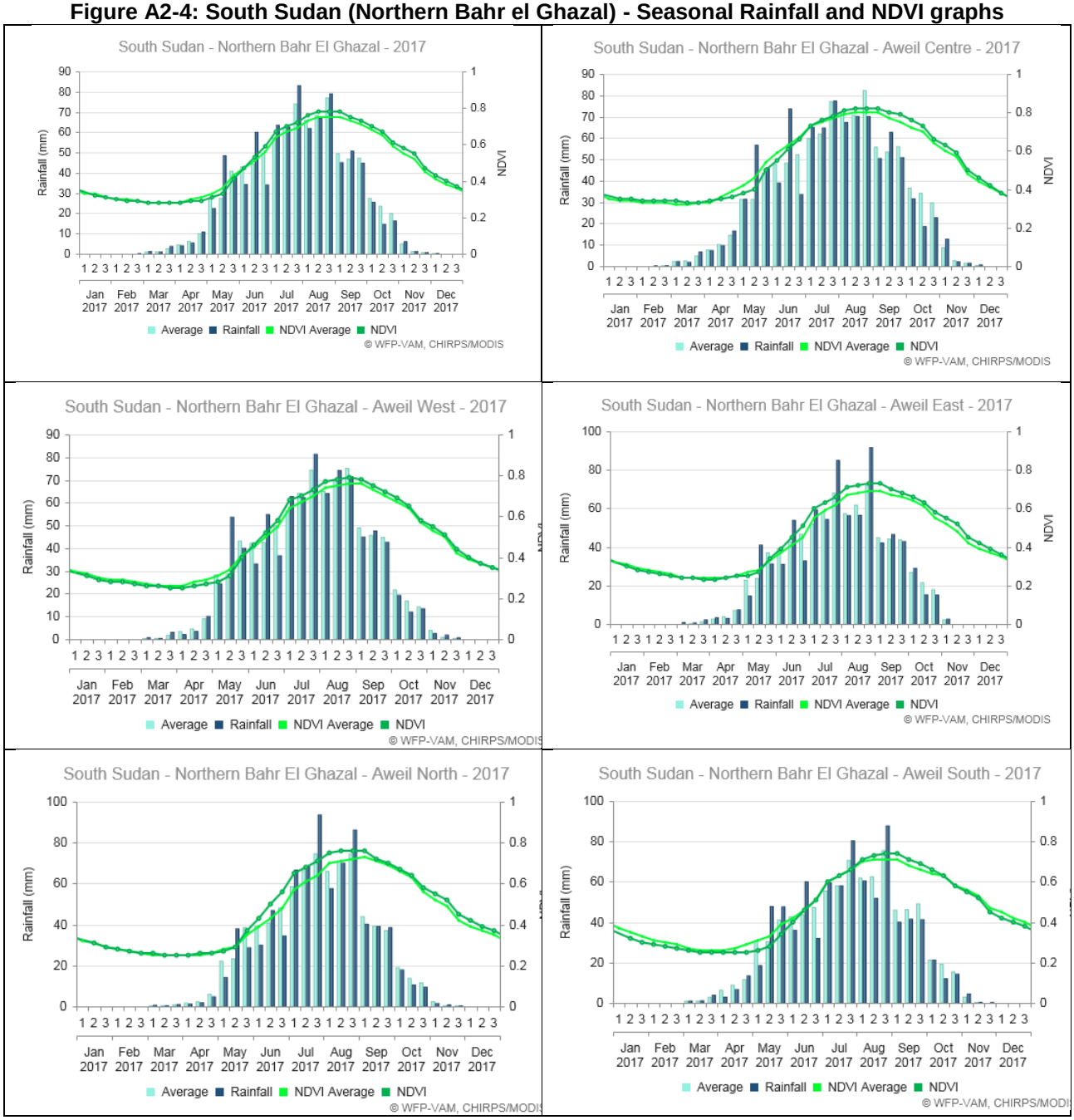
Source: WFP/VAM, 2017.

GREATER BAHR EL GHAZAL

Northern Bahr el Ghazal

The Task Force teams undertook a planting assessment in July and harvest assessment Mission in September with members of the State Ministry of Agriculture and the respective CCMC members. The joint activities comprised 176 case studies, five key informant interviews and some short walking transects in all the five counties.

Figure A2-4: South Sudan (Northern Bahr el Ghazal) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

Growing conditions

Combined rainfall estimates and vegetation index graphs for the State and five locations in Northern Bahr el Ghazal State (Aweil North, Aweil Centre, Aweil East, Aweil West and Aweil South) are shown in Figure A2-4. In all five of the spot locations, the Task Force Team reports reflect a late start of the rains with some dry spells up to June and heavy rainfall in August and September, showing above-normal vegetation cover. The flooding and inundation of crop fields and villages in some parts of Aweil North, Aweil West and Aweil East counties damaged crops and livelihoods. The situation in Aweil North and Aweil West was serious with most of the low-lying areas affected by flooding and waterlogging. In Aweil North, a high amount of rainfall was recorded in Gokmachar Station for August (407.6 mm) and September (484.8 mm). Contrary to the other three former counties, the rainfall amount in Aweil Centre was insufficient to create floods required for the growing rice crop in the Aweil Rice Scheme. Furthermore, the amount of rainfall in the smallholder farming areas of Aweil Centre was inadequate at the beginning of the season and planted crops were affected by prolonged dry spells.

Access to farm land is not a problem in the State in both near and far fields. Smallholders mostly use local tools and only a few farmers use ox-ploughs. The labour cost for digging is as high as SSP 4 200/feddan. The

Aweil Rice Scheme has 13 tractors, with only five of them functioning and eight tractors grounded due to the lack of spare parts. There are 20 tractors on the commercial farms. Access to tractor-hire by smallholders is minimal and costs SSP 4 500/feddan (SSP 1 500 for operator and SSP 3 000 for fuel). In Aweil East, out of the 20 tractors given by the Government, only 12 were functional due to the lack of spare parts. The cost of tractor-hire was SSP 3 600/feddan, which includes SSP 3 000 for fuel and SSP 600 for tractor operator, while in 2016 the cost was SSP 1 300-1 500/feddan.

Regarding inputs, sorghum is by far the preferred cereal throughout the State. Seed sources are noted to be mostly local/own seeds carried over from the previous harvest for early to main crop sorghum known collectively as *cham, alep cham* and *nyanchung* or *athel.* The preferred improved sorghum seeds in the mechanized and traditional sectors are of the Sudan provenance, i.e. *Wad Ahmed, Gaddam el Hammam* and *Afargadamek*. Local groundnuts and sesame seeds were planted at the same time as the early sorghum plus small areas of local maize.

Other than shifting location, which is easier in Aweil West and South than in Aweil East and North, the most common way of maintaining soil fertility is by local and transhumant herds grazing over farmland on contract.

Pests and diseases have remained at mild levels. The most troublesome pests noted are grass weeds with weeding undertaken only once, on average, per season for sorghum but two to three times by commercial groundnut farmers. CCMC's and Task Force teams' reports have also confirmed the presence of FAW in the State. Local birds, termites, grasshoppers, stalk-borer in sorghum and rodents were also reported with mild damage. *Striga* weed is noted to be of concern to small households' units in the over-used areas with no livestock and no means of shifting to improve fertility of the soil. In September 2017, the Task Force teams reported that *Striga* weed infestation was high in most of the sorghum-growing areas in the State, with 85-90 percent of the sorghum fields visited by the team infested.

Production

Production estimates have been made on the basis of the case studies, spot PET scores and time series data for the traditional smallholder sector. The estimates for the mechanized sector have been provided by the Aweil Rice State and mechanized farmers in Ton Chol. In 2017, the estimates of the cereal area harvested decreased by 2.7 percent. A gross cereal harvest of 161 396 tonnes is expected from the 152 555 hectares cultivated in the smallholder sector, resulting in a cereal deficit of about 25 000 tonnes.

Regarding mechanized farms, Aweil Rice is expected to produce 903 tonnes of rice from a total area of 909 hectares. In addition, a) mechanized farmers using the rice basins located between Udham and Aweil for growing sorghum are expected to produce 2 188 tonnes from 1 530 hectares, respectively; and b) mechanized farmers in Ton Chol in Aweil East are expected to produce 9 036 tonnes of sorghum from 7 530 hectares, including ratoon crops to be harvested in January 2018.

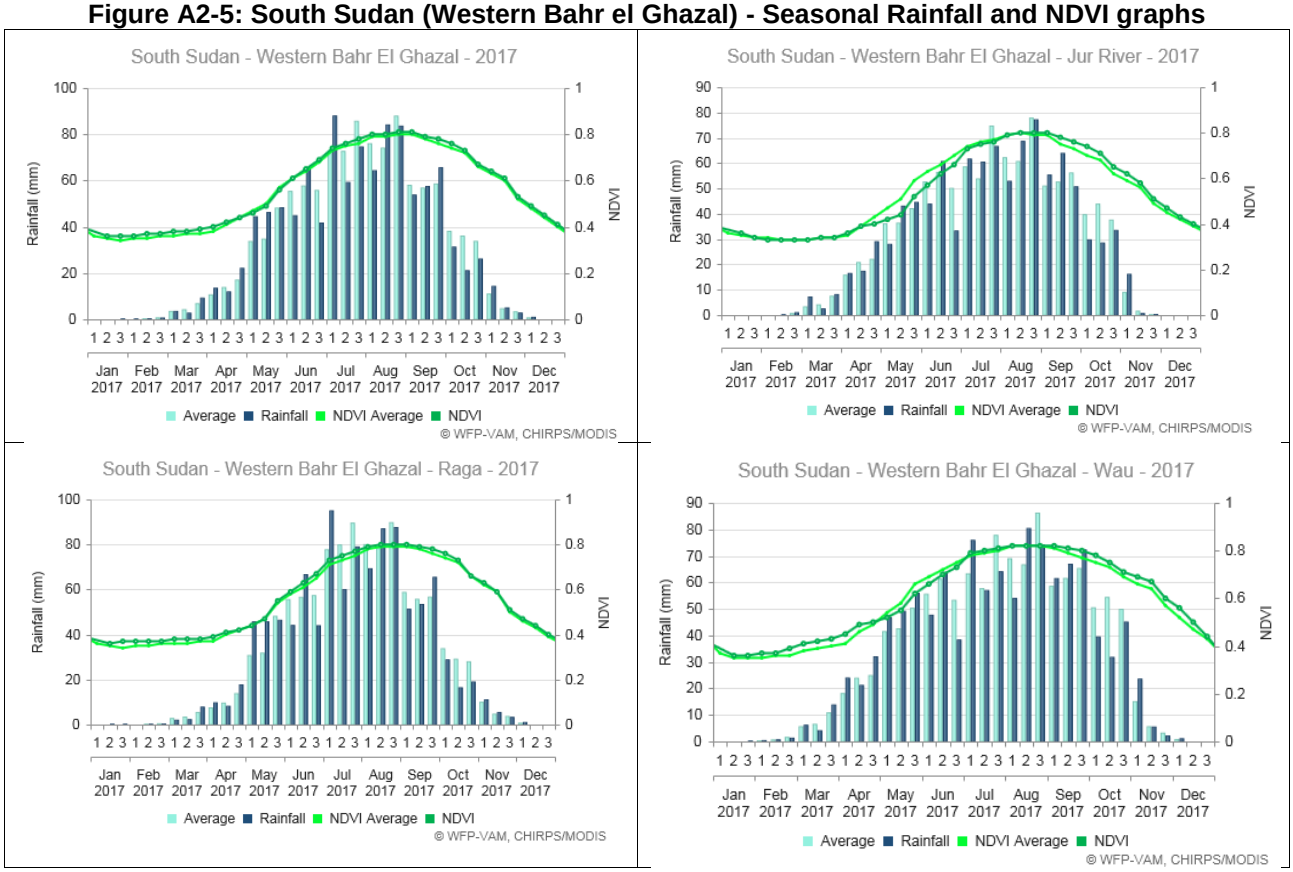
The ecology of Northern Bahr el Ghazal State does not support the widespread growth of cassava, which may be found in isolated pilot trials in Aweil West. Groundnuts, however, make a substantial contribution to the households' food economies and may augment the harvest by an estimated 6 600 tonnes of unshelled product. However, groundnut production has been affected by flooding and waterlogging. In addition, there are unknown numbers of commercial groundnut farms cultivated under *nafeer* and tractor-hire schemes that are not accounted for in this estimate, therefore, the contribution of groundnuts to State production is probably higher.

In 2017, due to adequate rainfall, pasture and water were abundant and accessible. Cattle condition is generally good with a PET BCS of 3-4 noted by the Task Force teams in all counties. Similar scores are noted for sheep and goats and no outbreaks of diseases are noted. According to FAO, 23 percent of all vaccinations in 2017 took place in Northern Bahr el Ghazal State.

Western Bahr el Ghazal

The Task Force teams undertook a planting assessment Mission in July (Jur River and Wau) and harvest assessment Mission in October (Wau, Raja and Jur River), with only parts of these counties visited due to insecurity. Raja County was visited for the first time since the past two years due to some improvement in security. Overall, 131 interviews were made, including 119 farmer case studies and 12 key informants.

Figure A2-5: South Sudan (Western Bahr el Ghazal) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

Growing conditions

Combined rainfall estimates and vegetation index graphs for four locations selected across Western Bahr el Ghazal State (all sites, Raja; Jur River and Wau) are shown in Figure A2-5. All three spot locations reflect a slow start of the rainfall up to April, followed by short dry spells and below-normal vegetation cover until the end of June, especially in Jur River and Wau. The rainfall situation has improved for all counties from June/July onwards with normal to above-normal rainfall and vegetation cover up to the end of the season. Both the farmers' case studies and the NDVI estimates support that growing conditions are favourable this year.

Only hand cultivation and oxen ploughing were the main means of cultivation. Family and communal labour *(nafeer*) are usually the means of weeding and harvesting. Sorghum is by far the preferred cereal and seed sources are noted to be only local/own seeds carried over from the previous harvest. Many farmers are also shying away from planting the traditional long-cycle landraces of *Mabior* or *Ulela* sorghum, since it is subject to destruction by livestock that are returning before the crop is harvested. Therefore, the production from these traditional long-cycle landraces of sorghum is expected to decrease. Progressive farmers and those living close to pastoralists have started to substitute the long-cycle sorghum with improved short-cycle varieties that include *Sesso 2*, *Gadam el Hamam* and *Luana* and *Bene*. These short season varieties are harvested together with groundnuts and, therefore, escape the destruction by early returning livestock. In addition, the continuous insecurity in these areas has also pushed farmers to plant short-cycle improved sorghum varieties.

The areas affected by FAW were able to harvest maize although with reduced amount, with affected farmers harvesting about 30 percent lower production compared to 2016. However, there is no information as to how much land was affected by the pest. There were cases of stock borers, monkeys and ants in Jur River County, while in Raja, the teams noted serious cases of premature harvesting of crops in the field by thieves, alleged to be organized forces. There were also cases of monkeys, squirrels, foxes and roaming shoats causing mild damage on crops.

Production

The gross production of cereals (mostly sorghum) is estimated at a very conservative 40 872 tonnes, recording a 28 percent reduction on 2016 estimates mainly due to a reduction in area. This leaves Western Bahr el Ghazal State with an estimated cereal deficit of about 28 800 tonnes for 2018.

Cassava grows in Kpale, Wau County and Raja. The two-year system of production is most common. Production is noted to be normal at 11 tonnes/hectare following the Task Force-led teams' returns. The contribution of cassava to food security in the State is estimated at 28 700 tonnes of cereal equivalent (gross dry matter). Groundnuts, at household level, will possibly add an estimated 4 600 tonnes of unshelled product.

The indigenous households of Western Bahr el Ghazal State are not large scale livestock owners and only 0.5 percent of all livestock vaccinations by FAO are noted to have been conducted in the State compared with 4 percent in 2016. The condition of cattle and goats was noted to be good due to the availability of adequate water and pasture in all locations, with the dominant PET BCS of 3-4 for both species and no significant pest and disease outbreaks recorded. Small ruminants, particularly shoats, owned by most farmers are kept to graze around homesteads, but prevented from intruding into crop fields by herders who always move along with them. Most farmers who own cattle in Jur River are in partnership with their neighbours in Tonj (Warrap State) who normally keep cattle for them. There were no outbreaks of livestock diseases reported, but endemic diseases, including diarrhoea and skin diseases continued to be a problem.

Warrap (including Abyei Administrative Area)

The Task Force teams undertook a planting assessment Mission in early July and a harvest assessment Mission in late September to cover the production of the main harvest in the State, with a total of 90 case studies. The harvest time actions comprised 44 case studies, with three key informant interviews. The visited counties include Gogrial West, Twic and Abyei for the planting assessment and Gogrial West and Twic for the harvest assessment. Abyei was not visited as the continuous heavy rains and muddy roads impaired the movement of vehicles during the harvest assessment.

Growing Conditions

Combined rainfall estimates and vegetation index graphs for six locations selected across Warrap State (Gogrial West, Gogrial East; Twic, Tonj North, Tonj East and Tonj South) are shown in Figure A2-6. All six spot locations reflect a delayed start and below normal rainfall up to May, followed by effective rains from June onwards. As confirmed by the Task Force Team and CCMC reports, the amount and distribution of rainfall in most cropping areas was generally favourable for growing crops. Waterlogging and flooding is usually experienced in the lower lying fields. This year, despite the appearance of early floods in the usual flood-prone areas, the impact on crop production was minimal. The NDVI charts also support the favourable growing conditions with vegetation cover closer to the long-term average.

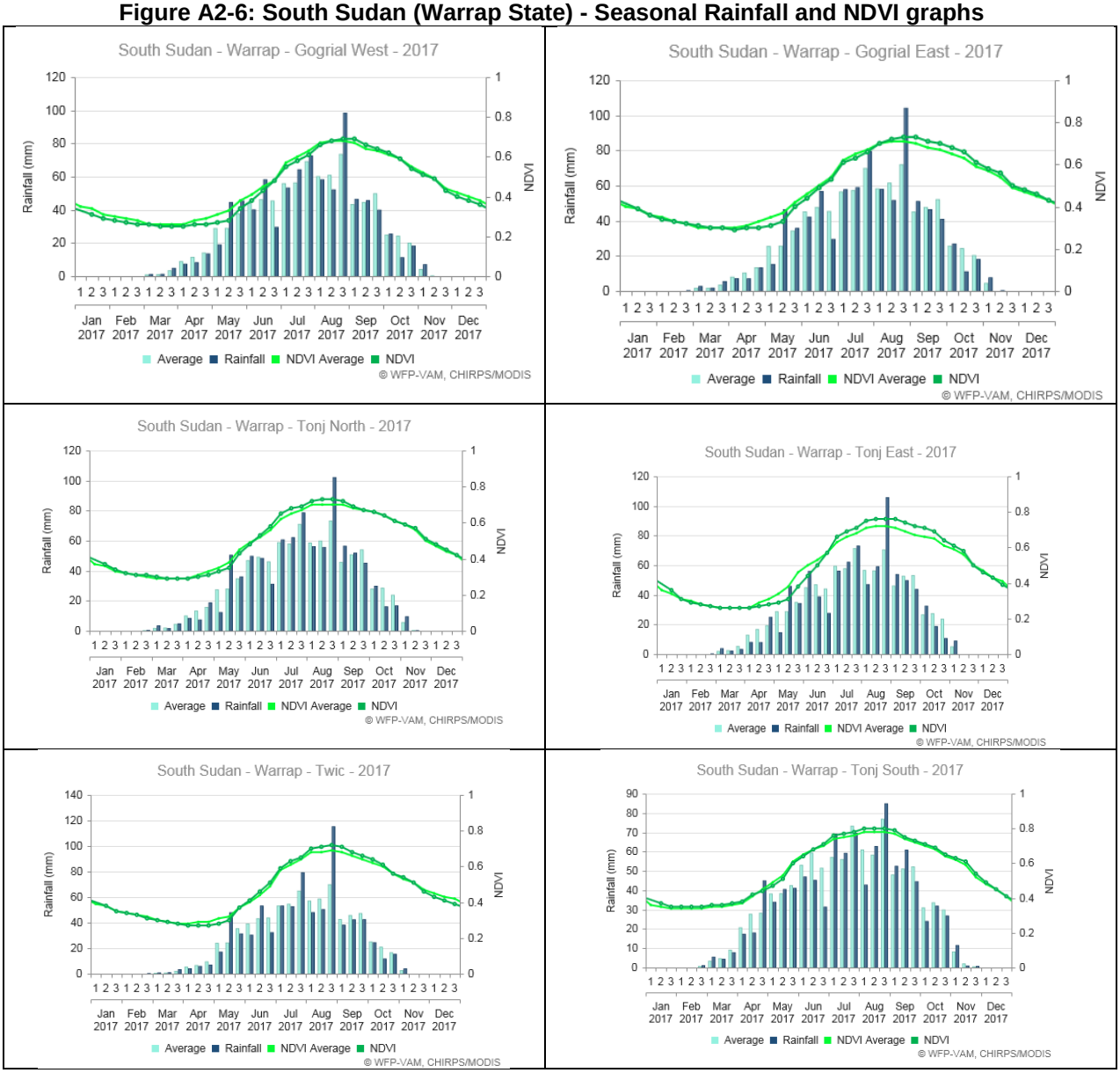
Generally, there was an increase in the use of tractors and ox-ploughs and support through Food For Assets (FFA) and Cash For Assets (CFA) by WFP. In Gogrial West, WFP supported the cultivation of 2 119 hectares, while in Gogrial East FFA supported the cultivation of 476 hectares. In Tonj East 485 hectares, Tonj North 656 hectares, Tonj South 863 hectares and Twic 3 039 hectares through FFA and CFA, respectively.

However, a decrease in cultivated area and a delayed planting was observed in areas bordering Apuk, Aguok and Kuac clans where there was conflict between these communities.

The main crops grown in the State, include sorghum, groundnuts, maize and sesame. Sorghum is by far the preferred cereal with seeds noted to be local/own seeds carried over from the previous harvest with a preference for the short landraces (*yaar, athel and nyanjung*) to be harvested in September. Late-maturing sorghum *(kec)* sown in Tonj South was too early to be effectively assessed during the Mission. Local groundnuts and sesame seeds were planted at the same time as sorghum plus small areas of local maize.

Regarding pests, there was a FAW infestation on most of the late-planted maize crops, ranging from mild to serious effects. However, maize is usually grown as a garden crop, for green consumption, but not a major crop in the State. Other usual pests were in the normal range, except the expansion of *Striga* weed and sorghum midge was observed in most sorghum fields causing average damage.

Figure A2-6: South Sudan (Warrap State) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

Production

Cereal production estimates have been made for sorghum only. The gross cereal production in Warrap State (including Abyei) is estimated at 178 331 tonnes, which is less than 1 percent increase from 2016. The cereal area has been estimated at 155 676 hectares with an increase of only less than 1 percent. In Abyei, the harvested area and gross production of cereals decreased by about 6 percent and 20 percent, respectively, mainly due to dry spells. The yield estimates for the State remained the same as in 2016, but decreased in Abyei by 15 percent.

The agro-ecology of Warrap State does not support the widespread growth of cassava, which is found only around the edges of the fields and pathways. Groundnuts, however, make a more contribution and may add an estimated 7 300 tonnes of unshelled product to the households' food economies. There are also unknown numbers of commercial groundnut farms that are not being captured by the system, therefore, their contribution to the State production is probably much higher. It behoves local staff of FAO, SMoA and CCMCs to try to assess the numbers and scope of such farms over the coming year.

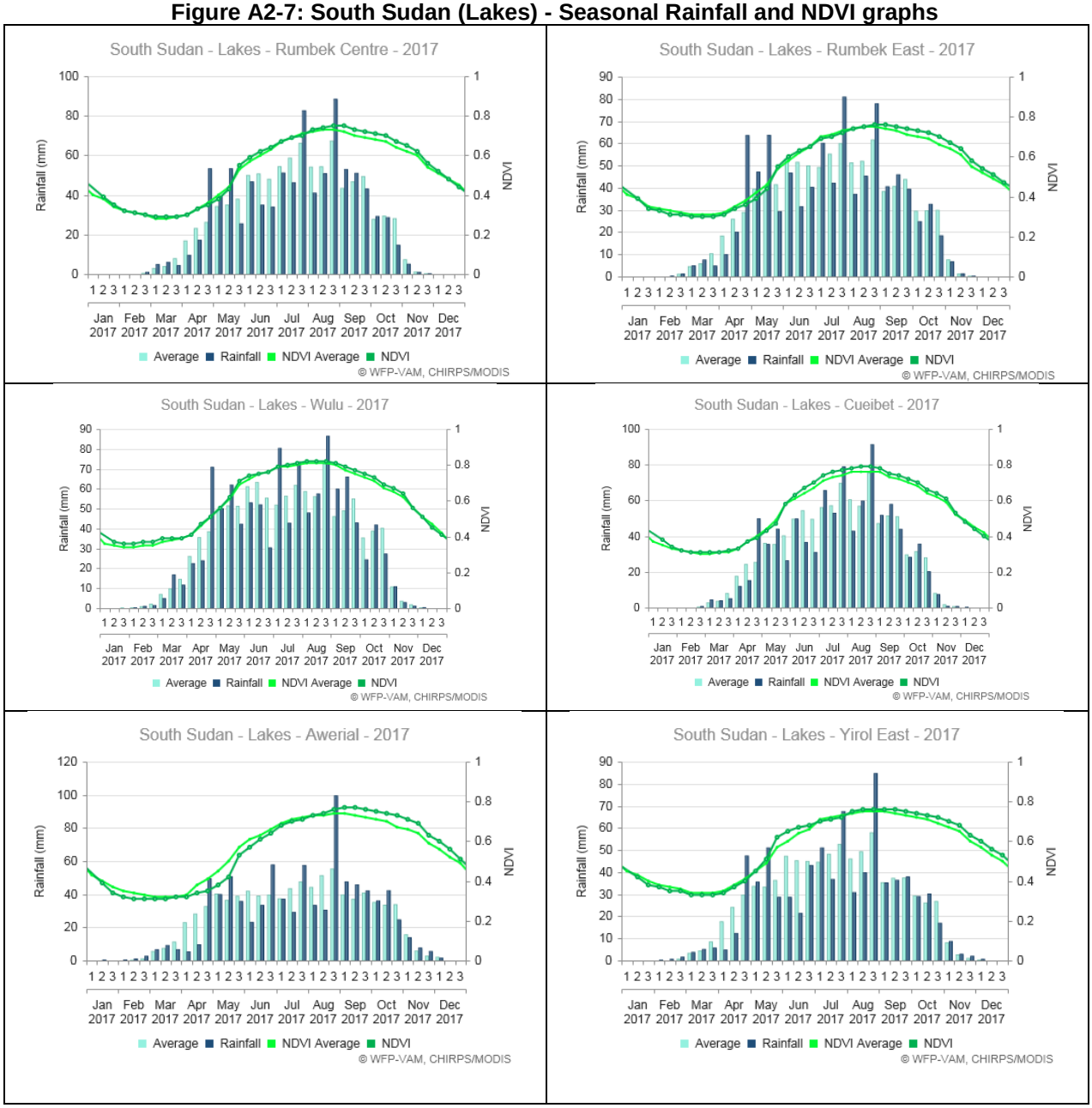
Due to favourable rains, the water and pasture conditions were reported to be good, although there was shortage water and pasture at the beginning of the season that led to fighting between communities, which has also affected livestock vaccinations. There were outbreaks of livestock diseases, more than the previous year, including Anthrax, FMD and BQ. Higher mortality rate and increased theft was reported by Task Force

teams and CCMCs. Shortage of vaccines and difficulty in reaching conflict areas has affected livestock performance, despite the availability of water and pasture. The State received about 12 percent of the total amount of vaccines distributed in the country by FAO in 2017.

Lakes

The Task Force teams undertook planting and harvest assessment missions in Lakes in July and September, covering 105 case studies. The harvest-time action comprised 56 case studies, with six key informant and 50 farmer interviews, including walking transects allowing yields to be predicted objectively in spot locations. In most areas visited, access to land was unimpeded, except in few insecure areas of the State.

Figure A2-7: South Sudan (Lakes) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

Growing conditions

Combined rainfall estimates and vegetation index graphs for six locations selected across Lakes State (Rumbek Centre, Rumbek East, Cuibet, Wulu, Awerial and Yirol East) are shown in Figure A2-7. All six spot locations show a slight delay in the start of the rains in May, rather than the normal time (April) in most places, showing a decreased vegetation cover in Awerial County. The Task Force teams reported, a dry spell of three-four weeks in most areas of the State in June that affected the growth of maize in Rumbek North and early

sorghum in Yirol West, Cueibet and Wulu counties. The level of damage was reported to be average for maize and mild for sorghum and groundnuts. Despite the short dry spells in June in some places, the rainfall significantly improved throughout the growing season, with normal vegetation cover, closer to the long-term NDVI averages (Figure A2-7).

Use of ox-ploughs across the State has increased with many households adopting its utilization. The hire rate of ox-ploughs was lower (SSP 2 500/feddan) than the cost of manual labour (SSP 4 000/feddan) due to shortage of labour. The hire rate for tractor service was SSP 1 000 plus 20 litre diesel/feddan (20 litre diesel costs SSP 5 000) making it SSP 6 000/feddan in total compared to SSP 1 600/feddan in 2016. Out of the 26 Government tractors available in the four assessed counties (Rumbek North, Cueibet, Yirol West and Wulu) only nine tractors were functional, mainly due to the shortage of spare parts and very high cost of fuel.

FAW has been reported in Rumbek North County, which caused average damage on maize. No control measures were taken due to the limited knowledge in the country about the pest and its management practices. Other mild pests include stem borers, sorghum cinch bug, monkeys, local birds, grasshoppers and roaming livestock. Millipedes, bush rats, weeds and beetles have also affected groundnuts mildly. *Striga* weed and head smut (fungal disease) have always been the main problem for sorghum growers in the State.

Production

Production estimates for 2017 have been made for sorghum on the basis of time series data adjusted by PET scores and case studies. The gross cereal production is estimated at 140 472 tonnes reflecting a 6 percent increase from that of 2016, due to a 7 percent increase in area. Groundnut yields are estimated at 26 460 tonnes of unshelled product, about 5 percent increase compared to last year.

Expansion of cassava in Lakes State is limited by the uncontrolled cattle-keeping practices, with animals causing damage to growing crops during herd movement. Cassava production is estimated at 9 600 tonnes of fresh tubers or 2 822 tonnes of cereal equivalent.

The system of rearing livestock in Lakes is transhumant, with animals migrating in search of water and pasture. As a result of such movement, the pastoralists in most cases encounter the serious problem of cattle raiding, fighting over pasture and water, especially in Rumbek North. In general, livestock condition was good and the number is reported to be increasing. The Task Force teams reported that livestock body condition was good due to the availability of water and pasture. A PET BCS of 3 for cattle and 3-4 for shoats was reported for Rumbek North and Yirol West. In Cueibet, the PET BCS was at 2-3 for cattle and 3 for shoats, because of the confinement of animals around homesteads, caused by the insecurity in the County. Wulu County has very small number of livestock, mostly small ruminants.

There are no reported cases of disease outbreaks, except the normal presence of the following endemic diseases: Foot and Mouth Disease (FMD), Black Quarter (BQ), Haemorrhagic septicaemia, Lumpy Skin Disease, Contagious Bovine Pleuropneumonia (CBPP), *pest de petit ruminant*, Newcastle Disease and internal and external parasites. Vaccines provided to the State in 2017 account to only 5.5 percent of the national total.

GREATER UPPER NILE

Upper Nile

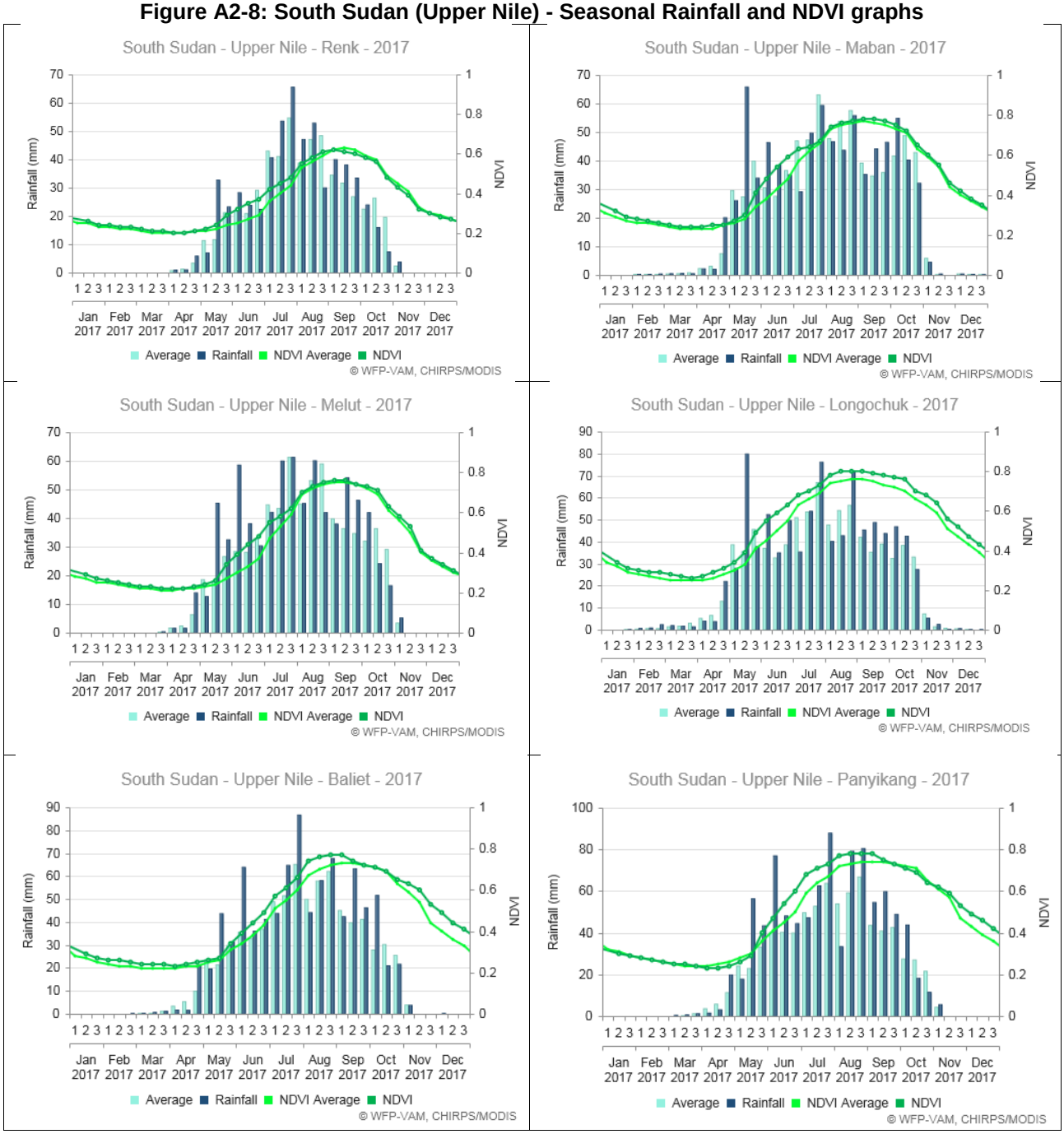
The Task Force teams undertook a planting assessment Mission in August and a harvest assessment Mission in November visiting Renk, Melut and Maban. The total number of case studies from all missions was 87, out of which the harvest time action comprised 70 case studies, with two key informant interviews. Upper Nile State is the State with the largest semi-mechanized schemes in the Country. In all areas visited by the Task Force teams, access to land was unimpeded and an expansion of commercial farming is noted, increasing the areas under cultivation in the mechanized and traditional (small holder and emerging farmer) sectors. Based on Task Force teams' report, large-scale farmers cultivate 320 hectares, on average, while small-scale farmers cultivate about 5.67 hectares.

Growing conditions

Combined rainfall estimates and vegetation index graphs for six locations selected across Upper Nile State (Renk, Maban, Melut, Longochuk, Baliet and Panyikang) are shown in Figure A2-8. The six spot locations all

show a favourable season with rainfall that started well, followed by good amount and distribution during the season.

Figure A2-8: South Sudan (Upper Nile) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

A normal onset of rainfall occurred in Maban (in May) and Renk (in July) counties. With the exception of short dry spells of two-three weeks in Maban County, and floods in August and September (due to water coming from the near-by Ethiopian highlands) that damaged maize and vegetables, the overall rainfall situation in most locations of the State was favourable for crops. Generally, as confirmed by the Task Force teams, the amount of rainfall was normal to above normal and better than in 2016. The NDVIs in Figure A2-8 also confirm above-normal vegetation cover over most of the growing season.

The Task Force-led missions visited farmers in major farming centres of Renk, Melut, and Maban. The State Director of Agriculture reported significant increases in the planting of sorghum and sesame in the mechanized sector. Over the past two-three years, the area under cultivation has been reduced because of insecurity, lack of credit services, high fuel prices and shortages of spare parts.

Since 2016, small changes have been made in terms of supporting commercial farmers through the provision of new tractors and fuel which has contributed to the cultivation of more land in 2016 and 2017. In particular, a large area of land was cultivated by commercial farmers due to: availability of 300 tractors, all reported to be functional; high price incentives to crops, especially for sesame which can be easily sold to the Sudan with good price; relative stability of the area and availability of loans from the Agricultural Bank of the Sudan. In addition, the rains were very conducive allowing access and supporting growth of both early and late-sown crops. Out of the 300 functional tractors, 50 tractors were donated by the Government and 250 were private tractors, all with implements including disk ploughs, harrowers and planters. There are also some combine harvesters (unknown number) in the schemes, used for sesame harvesting only. Hand tools (hoes and sickles) are used in the commercial sector for the weeding and harvesting of sorghum. The spare parts for tractors are very scarce and have to be smuggled from the Sudan together with fuel and lubricants. No use of fertilizers or manures is noted, while hand weeding is noted to have been undertaken two to three times for all crops in all case studies.

Farmer-saved seeds were available for sowing in July and August for the short-maturing improved sorghum varieties of *Wad Ahmed, Gaddam el Hammam* and *Afargadamek* that cover most of the planted area nowadays instead of the much long-maturing, local landrace *Agono* that dominated planting ten years ago.

Outbreak of FAW was reported in Maban County on maize crop, while other common pests, including local birds, rats, stem borer, grasshopper, aphids and *Striga* weed were in an acceptable level. In the semi-mechanized farming areas, there were no reports of major outbreaks of pests and diseases, except a mild infestation of sorghum by *Striga* weed. *QQU* bird outbreaks were reported in the Sudan during October 2017, where aerial control operations were launched with assistance from DLCO-East Africa. Although there were no reports *of QQU* threats in Upper Nile State, much of the harvest will have been collected before the migratory *QQU* bird threats in January 2018.

Access to land in Maban has been constrained by the presence of huge numbers of IDPs and refugees especially near fields due to the insecurity caused by refugees on the host communities, while commercial farmers in Renk have normal access to land.

The use of chemical fertilizers is not practiced in both traditional and semi-mechanized systems. Farmers practice the shifting of cultivation and crop rotation for improving soil fertility. In the traditional farming area, almost all fields were cultivated by hand using family labour. It was reported that there was only one tractor in Maban, which is not functional due to the lack of spare parts and fuel.

The main crops grown are noted to be late-maturing sorghum *(agono)* and early-maturing maize with seeds coming mostly from households' stocks, markets or family members. The CCMC in Maban reported that both maize and sorghum performed well and harvesting was done on time, while the late sorghum varieties are expected to be harvested in January and early February 2018. The newly-planted groundnuts were reported to performing well due to the favourable growing conditions in the area. Upper Nile State is a comparatively minor livestock-producing area. In Maban County, the system is predominantly sedentary agro-pastoralism. A typical farmer has at least 2-5 cattle, 3-15 shoats and 10-20 piglets. Livestock numbers are reported to be decreasing due to excess sales combined with the high mortality rate caused by prevalence of diseases induced by floods such as FMD, CBPP, CCPP, Lumpy Skin Disease and *pest de petit ruminant*. Pasture and water are available and the PET BCS of cattle is 3 and goats at 4.

The Task Force teams reported that commercial farmers in the semi-mechanized schemes are introducing livestock in their farms, where animals are fed on crop residues during the harvest season. A farmer may hold 35–60 heads of cattle and 500-1 200 heads of shoat, on average. The PET BCS for animals kept in semi-mechanized schemes is very good, with a PET BSC 3-4 for cattle and 4 for shoats.

Production

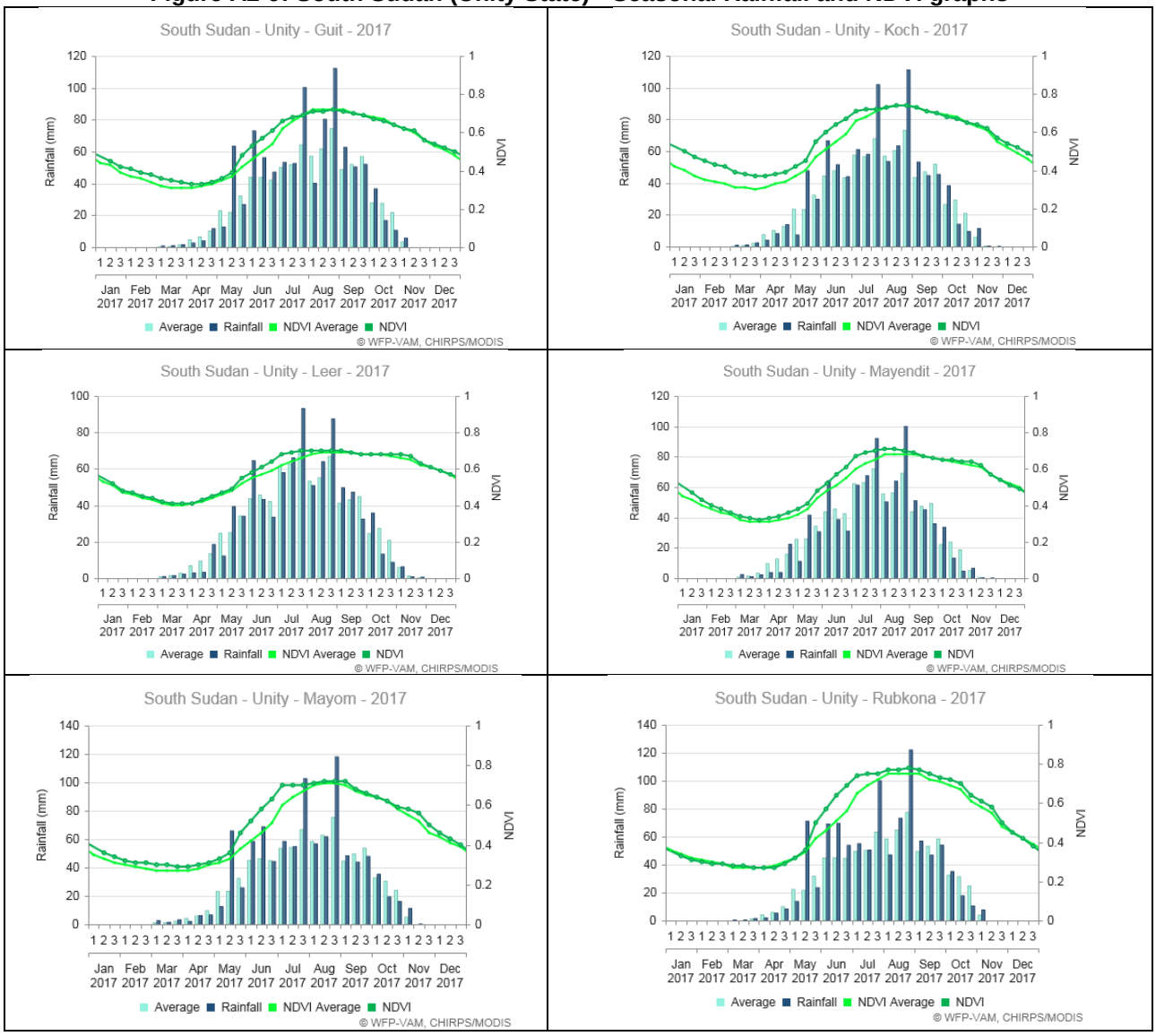
Gross production in Upper Nile State is estimated at 43 593 tonnes of mixed cereals from 53 312 hectares, 18 percent and 11 percent up from 2016, respectively.

The Task Force teams and the Director of Agriculture for the mechanized sector provided an estimate for a gross production of 75 000 tonnes of sorghum in the mechanized farms in all locations, at 0.5 tonnes/hectare from 150 000 hectares, which is 70 percent more than the 2016 estimate.

Unity

The Task Force Team Mission was not carried out to the State mainly due to insecurity, which severely constrained/limited movement of field workers to cropping areas. The FAO/AFIS Team conducted a training on crop monitoring to 20 county agriculture staff in Bentiu/Rubkona at the beginning of August, with the aim of establishing a CCMC. Although the training was successful, it was not possible to establish CCMCs and travel to farming areas out of the centre (Rubkona). However, phone communication was used to obtain some yield information, which was used in the CFSAM analysis. In addition, the NDVI graphs in Figure A2-9 are used to understand the growing conditions and estimate crop production.

Figure A2-9: South Sudan (Unity State) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

Growing conditions

Combined rainfall estimates and vegetation graphs for six locations selected across Unity State (Guit, Koch, Leer, Mayendit, Mayom and Rubkona) are shown in Figure A2-9. The six spot locations all show a slow beginning of the season with rainfall that started late, around May. Given that most soils in Unity State are heavy clays, the NDVIs follow a pattern that shows vegetation growth that is better than normal for most of 2017 in all locations.

Despite the late start, the rainfall has shown improvement with a normal distribution across the State allowing farmers to start planting. However, some pocket areas of northern and eastern parts of Mayom County, Koch, Guit, and Rubkona have experienced dry spells in June resulting in replanting of some of the damaged fields.

Crops have then recovered when the rains resumed in July, with good amount and distribution in the remaining months of the season.

Regarding pests, although the presence of FAW and stalk borer was reported, the damage caused by these pests was reportedly mild. Field reports from World Vision confirmed FAW infestations in Malakal, Balliet, Fashoda, Manyo and Renk, with mild to average damage on crops.

CFSAM production estimates are, therefore, conservatively put at 11 923 tonnes of mixed cereals comprising early maize and sorghum harvests from 17 601 hectares, with both area and output having increased by 9 percent from the previous year.

Jonglei

Access to information from Jonglei State has again been limited by the conflict. Three short assessment missions, one planting and two harvest missions were completed in August and September to Bor and Pochalla. The Task Force-led teams carried out short walking transects where the 38 farmer interviews and four key informant interviews took place. Access to the areas close to the villages meant that more families were noted to be farming, however, farm sizes are noted to be smaller as far fields are not being cultivated due to insecurity.

Growing conditions

Combined rainfall estimates and vegetation index graphs for six locations selected across Jonglei State (Akobo, Fangak, Nyirol, Pibor, Twic East and Bor South) are shown in Figure A2-10. The six spot locations show a slight delay of the season due to a late onset of seasonal rains in the State. This is also confirmed by the Task Force Team, CCMCs and phone communications from inaccessible areas.

The rainfall in May and June was below-normal in some areas, with dry spells which caused mild to average damage on growing crops. The performance of the crops was mixed, as eastern and southern parts of Jonglei State, including Twic East, Bor South, Duk and the central parts of the State were affected by dry spells, resulting in wilting and drying which required replanting. Replanting in Bor South was constrained by a combination of climatic extremes, including dry spells in June and July followed by heavy rainfall and flooding in August and September. The area planted by individual farmers was small since they cultivated the plots only around their homesteads, because of the insecurity that prevented them from cultivating far fields. Flooding also occurred in the lowland areas of Pibor, Gumruk and Pochalla in August and September, after most of the crops matured.

In areas where there are two seasons, such as Pochalla, seasonal rains started in April and fully established in May. The Task Force Team reported that the first season rain was below average, while the second season rain was average. In Pochalla, the yield of the first season maize was reduced due to a four-week dry spell in June, while the second season maize in the Northern Payams of the County was affected by flooding (river floods) in October, caused by heavy rains in the Highlands of Ethiopia.

Agricultural activities were reported to have increased from 2016 as many people were engaged in farming; however, the average cultivated area per household is 0.6 hectares and cropped twice in the season. The yields of the first season maize have decreased due to a prolonged dry spell in June and the second season maize was affected by river floods in northern Payams due to heavy rains from the Highlands of Ethiopia. The southern Payams were also affected by FAW infestation.

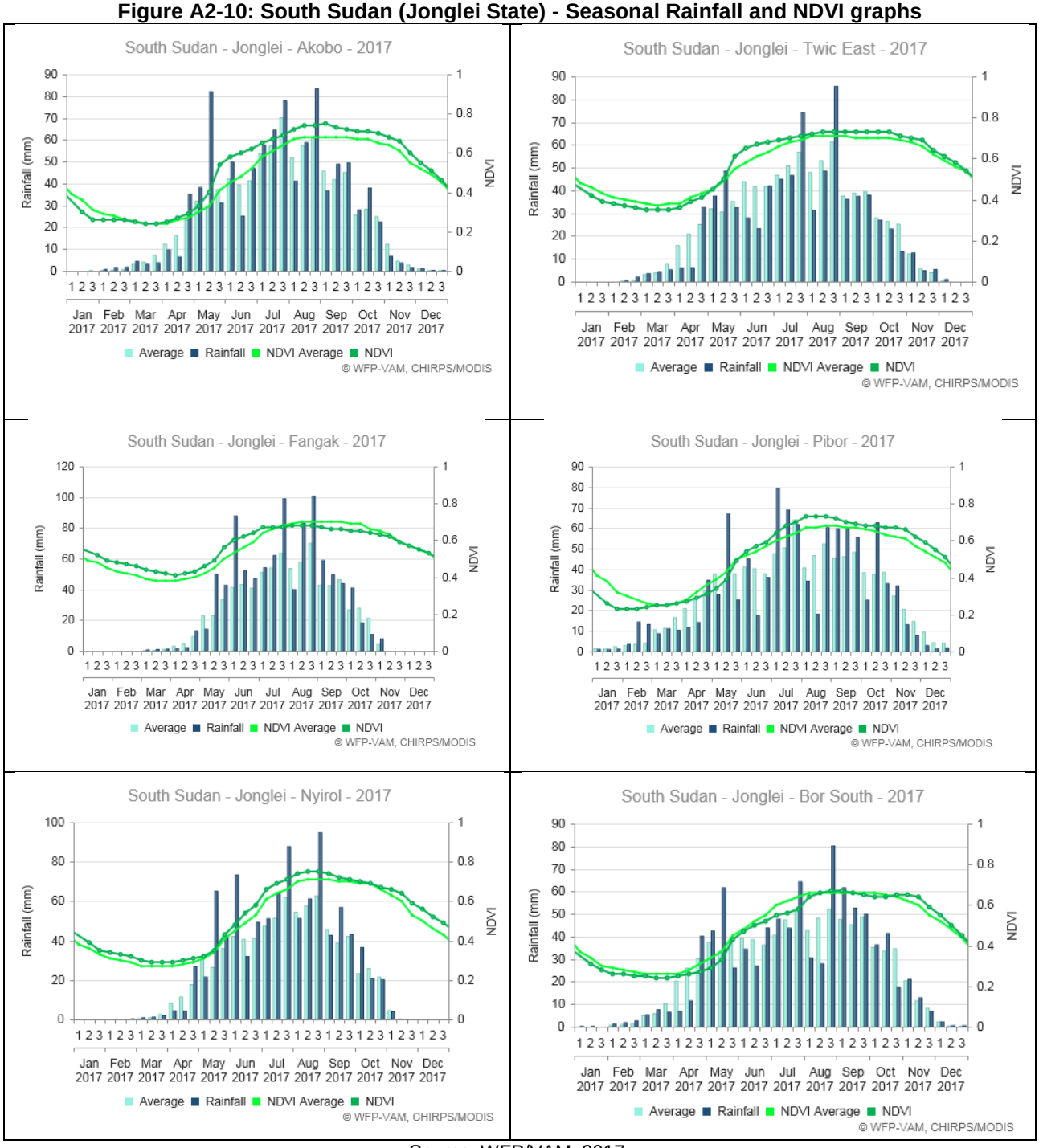
No tractors and very little animal traction are noted in the assessment returns. Hand-digging is the normal method of cultivation accomplished by family or labour-sharing groups. Ratooning of sorghum is prevalent but generally is not accounted for. The Task Force Team reported that crop pest and disease levels were mild with principal problems being local birds, ants, stem borers, wild animals, squirrels, millipedes and guinea fouls. In addition, FAW has caused mild to serious damage to the maize crops in Bor South, Pibor, Ayod and Pochalla (second season maize).

Production

Cereal production in Jonglei State is estimated at 45 715 tonnes, 6 percent higher than 2016, but from an equivalent area harvested. The production reflects the conservative estimates of the areas per household that actually farmed with yield reflecting more than one harvest and ratooning. Cassava production is observed in Pochalla only, and none of the CCMCs (Bor South, Duk and Twic East) reported cassava

production. Due to this, only 500-600 tonnes of cassava, which is similar to 2016 is considered to add to the households' food economy at State level.

Figure A2-10: South Sudan (Jonglei State) - Seasonal Rainfall and NDVI graphs



Source: WFP/VAM, 2017.

Livestock production systems in Jonglei State are based on transhumance and the herds/flocks are exceptionally mobile and well-used to conflict. As most of Jonglei State's wide grazing areas are in opposition-held territory, some transhumance is likely to have been accomplished, albeit with caution. In the secure counties visited by the Mission teams, PET BCS for cattle were noted to be 3 for most areas, while for Pochalla it was 2-3 for cattle and 3-4 for goats. There were no disease outbreaks and the endemic diseases including BQ, CBPP, PPR and CCPP were reported to be within the normal range. FAO vaccination returns indicate that 12.6 percent of all vaccinations were conducted in Jonglei State, which is similar to the 2016 level of 12 percent.

Annex 3

South Sudan - CCMC - Training provided by FAO, February-August 2017

Place of training	Number of trainees			NGOs/UN Agencies	Dates of training (2017)
	Male	Female	Total		
Aweil/Northern Bahr el Ghazal	28	-	28	4	21-24 February
Rumbek/Lakes	13	3	16	1	02-07 March
Wau/Western Bahr el Ghazal	22	5	27	7	14-17 March
Kuajok/Warrap	37	2	39	7	04-07 April
Torit/Eastern Equatoria	19	1	20	1	19-22 April
Bor/Jonglei	19	1	20	1	04-08 May
Yambio/Western Equatoria	28	3	31	1	23-26 May
Maban/Upper Nile	16	1	17	-	15-19 June
Bentiu/Robcona Unity	21	3	24	1	05-08 August
Total	**203**	**19**	**222**	**23**	

Source: FAO South Sudan.

Annex 4

South Sudan - CCMCs - Established and made operational, 2016-2017

Name of former State	CCMCs established	CCMCs reporting
Northern Bahr el Ghazal	5	5
Lakes	8	7
Western Bahr el Ghazal	3	3
Warrap	6	6
Eastern Equatoria	6	6
Central Equatoria	1	1
Jonglei	3	3
Western Equatoria	6	6
Upper Nile	3	2
Total	**41**	**39**

Source: FAO South Sudan.

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