Poverty, Livelihoods, and Perceptions in a High Inflation Environment

Findings from the 2015-2016 waves of the High Frequency South Sudan Survey

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South Sudan experienced a period of high inflation starting in 2015 and reaching hyper-inflation in summer 2016. Increases in prices without compensatory increases in income severely impacts livelihoods. This note compares changes in livelihoods in South Sudan between January, 2015, and May, 2016. During this period, inflation had not spiraled to the levels at which is currently stands, but remains nevertheless high with prices in June 2016 reaching five times their February 2015 value (Figure 1). The change in livelihoods is measured by the High Frequency Survey South Sudan (HFSSS) utilizing repeated interviews of 643 urban households across six of the ten former states of South Sudan. The household data is freely available in The World Bank's Microdata Library,[3] and the market price data is freely available from the South Sudan National Bureau of Statistics.[4]

Figure 1: Average weekly High Frequency Price Indices (HPIs) in selected locations (June 2011=1)
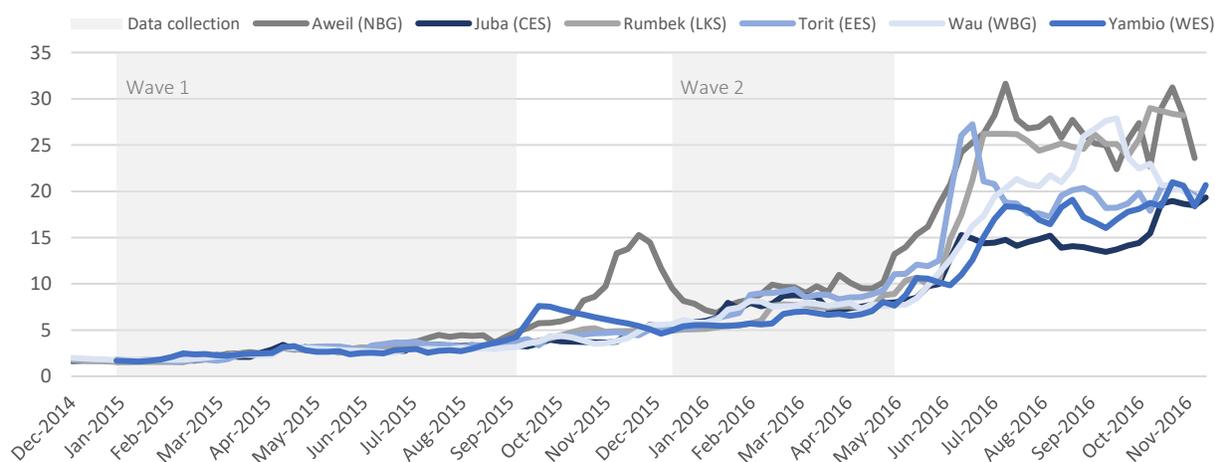
Source: Authors' own calculations based on HFS market prices data.

In 2015, 49 percent of the covered urban population in South Sudan was poor, by 2016 poverty increased to 70 percent, based on the international US$1.90 PPP (2011) poverty line. [5] This consists of a substantial increase in poverty, and is likely due to the particular vulnerability of urban households to inflation. Urban households rely more heavily on markets, and rising prices and food shortages combined with a general decline in economic activity will cause many of these households to experience a real loss in purchasing

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[1] The HFS is funded by DfID, designed by World Bank and implemented together with the South Sudan National Bureau of Statistics.
[2] Please direct your comments to Utz Johann Pape (upape@worldbank.org).
[3] http://microdata.worldbank.org/index.php/catalog/2778
[4] http://www.ssnbs.org
[5] Coverage excluded Jonglei, Unity, Upper Nile and Warrap due to security concerns.

power. Indeed, between waves 1 and 2, urban households depending on wages and salaries or on income from their own business experienced a large increase in poverty relative to other groups. Economic instability has led to many of the working age dropping out of the labor force, and for those who remain employed the share of workers practicing agricultural activities on their own account has grown. Rising food prices have also led to growing food insecurity for the poorest households, for whom the incidence of hunger has increased sharply.

Households' perceptions captured by the High Frequency South Sudan Survey reflect the dire state of economic conditions. *The south Sudanese express growing pessimism regarding their own personal living conditions and the economic conditions of their country. A large majority believe that they are not faring well and that conditions will only worsen in the future. Consequently, many express dissatisfaction with the government and local authorities' effectiveness with regards to achieving its policy objectives and raising the living standards of its citizens. A striking more than 9 in 10 of the South Sudanese believe the government has failed to achieve a range of economic objectives such as keeping prices down and ensuring that everyone has enough to eat. Similarly, more than 7 in 10 believe that the government has failed to provide adequate public infrastructure as well as most basic public goods.*

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Background

1.   South Sudan has been experiencing a macroeconomic crisis since 2015. A series of internal and external shocks have gravely destabilized the south Sudanese economy since a short-lived period of relative stability following the December 2013 conflict. The renewed call to arms from the Government and the steady escalation of the conflict, the drought, and the rapid depreciation of the South Sudanese Pound (SSP) have all contributed to throwing the country into a severe crisis. This crisis has manifested itself partly through high levels of inflation, driven primarily by increasing food and fuel prices. This note will related changes in the livelihoods of the South Sudanese to inflation using a panel dataset collected in 2015 and 2016 by the High Frequency Survey (HFS) in South Sudan.

2.   South Sudan has experienced a period of unprecedently high inflation. Based on the CPI calculated by the South Sudan National Bureau of Statistics (NBS), year-on-year inflation in South Sudan reached a high of 549 percent in September 2016 and was sitting at 480 percent in December 2016. During the period under study in this note market prices almost quintupled, with an inflation rate of 488 percent between the start and end dates of waves 1 and 2 respectively. The NBS CPI at the beginning of data collection for the HFS Wave 1 in February 2015 was equal to 171, and by the end of data collection for Wave 2 in May 2016 it stood at 824. Annual inflation continued to climb and reached even higher levels in the latter half of 2016, where it has since tethered just under the mark of hyperinflation at 500 percent.

3.   The rapid depreciation of the South Sudanese Pound has contributed to rising food prices. The South Sudanese Pound (SSP) stood at 6 SSP per US$ at the beginning of Wave 1 in early February 2015, and reached SSP 38 per US$ on the parallel market in Juba by the end of Wave 2 in May 2016. At the end of December 2016, the SSP had experienced further sharp devaluation down to SSP 92 per US$ in parallel markets in Juba. The South Sudanese economy is heavily reliant on imports, in particular with regards to meeting its food needs. Thus, the rapid depreciation of the SSP has exerted inflationary pressure through the large import-containing consumption basket of the South Sudanese. This has been a cause for concern given widespread food insecurity across large swathes of South Sudan. To aggravate the situation, a persistent gap between the official commercial and the parallel exchange rates signals the existence of distortions within internal markets for foreign currency (Figure 2).

Figure 2: Daily buying and selling prices for USD in SSP in Juba.
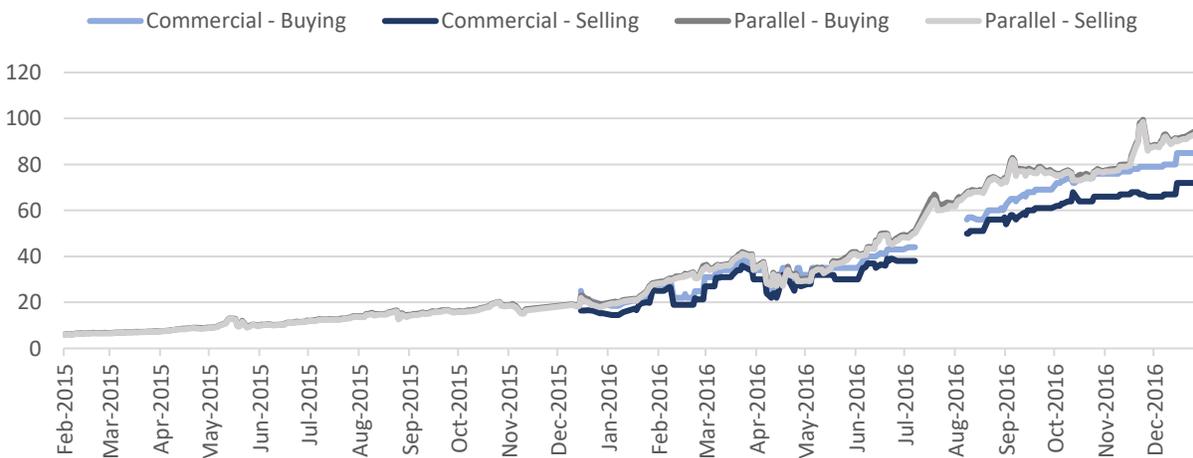
Source: Authors' own calculations based HFS market price data.

4.   A large Government deficit in 2016 is reviving fears over excessive use of monetary financing. Real revenues accrued by the South Sudanese Government have fallen significantly below budget and amounted to only 73 percent of expected levels, according to the Macro-Fiscal Report for the fiscal year 2015/16 ending in June 2016. Lower than expected oil revenues are the primary cause of this deficit, with gross and net oil revenues falling short of their budgeted figures by US$ 250 million and 100 million, respectively. Fears are growing regarding the possibility of greater reliance on central bank financing, given a lack of alternative methods of funding this deficit. This could lead to a hyperinflationary spiral and cause confidence in the South Sudanese economy to decline. Renewed fighting between rebel and government is likely to exacerbate this situation given the large share of expenditure of security in the GOSS's budget (World Bank, 2017a). Indeed, in the fiscal years from 2014/15 to 2016/17 the GOSS's expenditure on security amounted to more than one third of the total budget.[6]

5.   Drought and lower than average food production have exacerbated food insecurity. Large portions of the South Sudanese population were already food insecure and the situation has deteriorated to alarming levels. The FAO and WFP Crop and Food Security Assessment estimated substantive food production shortfalls in 2016 and 2017. In part, the conflict has led to a sharp reduction in the area under cultivation by causing large internal displacements, especially during the crucial planting season. Furthermore, the drought has intensified food insecurity not only by reducing domestic agricultural output but also by reducing production in nearby countries, particularly Uganda and Sudan from which South Sudan imported much of its food supply. Combined with the depreciation of the SSP, and difficulties surrounding obtained foreign exchange, this has made compensating local production shortfalls with imported food virtually impossible. Furthermore, poor internal market integration has meant that food from the few areas where production surpluses have been experienced could not easily reach the areas where the deficits were most severe (World Bank, 2017b).

6.   The High Frequency South Sudan Survey collected panel data for a representative sample of urban households to relate inflation to changes in livelihoods. The HFS conducted repeated interviews for a sample of 643 households in urban centers across 6 of the 10 former states of South Sudan. The households to be interviewed were drawn randomly based on a stratified two stage clustered design.[7] The data and code used to carry out this analysis are freely available on the World Bank's Microdata Library catalog.[8] The fieldwork for Wave 1 was undertaken between the months of February to November 2015 and Wave 2 from January to May 2016. Although inflation had not reached its current levels, price increases remain high over the sample period, with prices in May 2016 reaching almost five times their February 2015 values (Figure 1).[9]

7.   The HFS questionnaire covers a large range of topics and paints a well-rounded picture of the material and psychological well-being of people in South Sudan. The HFS questionnaire covers topics including demographics, employment, education, consumption, as well as perceptions of well-being and of the effectiveness of public institutions. Consumption is measured using the newly developed rapid consumption methodology.[10] In the rapid consumption methodology food and non-food consumption items are partitioned into core and non-core modules, and households are asked only about items in the

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[6] http://grss-mof.org/
[7] The surveys were conducted over two waves of data collection. Wave 1 was carried out from February to November 2015, and Wave 2 from January to May 2016. A more detailed breakdown of the interviews by month can be found in the technical appendix, in the discussion of the consumption deflator.
[8] http://microdata.worldbank.org
[9] Based on the High Frequency Price Index calculated using HFS market prices data.
[10] More details on the rapid consumption methodology can be found in the technical appendix.

core and in an assigned module. This reduces the number of items households are asked from 270 to about 120, household consumption is then estimated based on within survey multiple imputations.

Poverty

8.   **Poverty in urban areas of South Sudan increased from 49 percent in 2015 to 70 percent in 2016 using the international poverty line of US$ 2011 PPP 1.90.** Poverty is measured by the poverty headcount index, defined as the percentage of the population living below the poverty line. The analysis is based on the international US$1.90 PPP (2011) poverty line, which translates into 8.71 SSP in July 2015.[11] In 2016, almost 7 in 10 South Sudanese in urban areas were living below the international poverty line, with a point-estimate of 70 percent and a 95 percent confidence interval from 63 to 75 percent (Figure 3). Female headed households are poorer than male headed households, with more than 3 in 4 female headed households living in poverty (66 and 76 percent respectively, p<0.01).

Figure 3: Urban poverty Headcount.
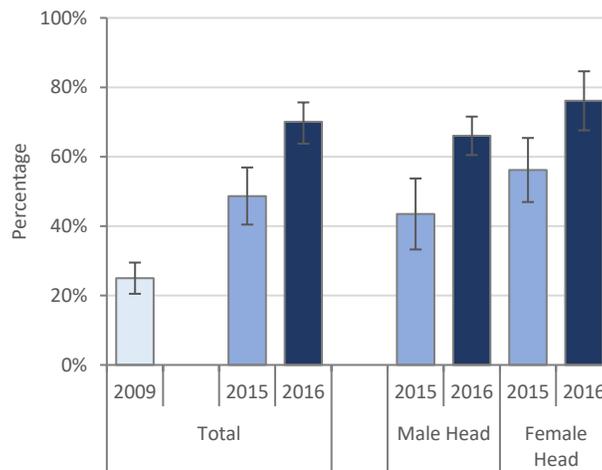
Source: Authors' own calculations based on NBHS 2009, and HFS 2015 and 2016 data.

9.   **High inflation is likely to have caused this large increase in poverty, because urban households are particularly vulnerable to price increases.** Urban households are more likely to earn their livelihood through wages and salaries or through their own business enterprise compared to rural households.[12] They are therefore more reliant on markets and will have less recourse to their own production of food when faced with shortages and rising prices. Stagnant wage levels and a general slowdown of economic activity is likely to have further affected these households, who will have experienced a real decline in purchasing power as food prices rose relative to their incomes. Indeed, households that rely on wages and salaries account for a large portion of the increase in poverty between 2015 and 2016 in urban areas of South Sudan.

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[11] The South Sudanese PPP equivalent of the 2011 USD 1.90 international poverty line is USD 1.23 PPP. This is converted into South Sudanese Pound (SSP) at the USD-SSP exchange rate in 2011 of 2.95 and then adjusted for inflation using the CPI calculated by the NBS. All monetary values in this survey are converted into July 2015 SSP PPP.

[12] Based on the full HFS Wave 1 data, 39 percent of urban households earn their livelihood primarily through wages and salaries and 15 percent from their own non-farm businesses. In contrast, only 6 percent of rural households sustain themselves earning wages and salaries and 4 percent from non-farm businesses.

10.   Poor households are also worse off in 2016 than they were in 2015, as indicated by an increase in the poverty gap and poverty severity. The poverty gap is the average gap in consumption of poor households relative to the poverty line. The urban poverty gap has increased from 21 to 36 percent between 2015 to 2016, meaning that the average poor urban household has gone from consuming 21 percent less than the international poverty line of US$ 2011 PPP 1.90 in 2015 to 36 percent less in 2016 (Figure 4). Female headed households tend to be further away from the poverty line, with an average poverty gap of 42 percent compared to 33 percent for their male counterparts (Figure 4, $p < 0.05$). Inequality amongst the poor has also worsened, and the poverty severity index doubled from 0.10 in 2015 to 0.20 in 2016 (Figure 5, $p < 0.001$).[13]

Figure 4: Urban poverty gap.   **Figure 5: Urban poverty severity.**
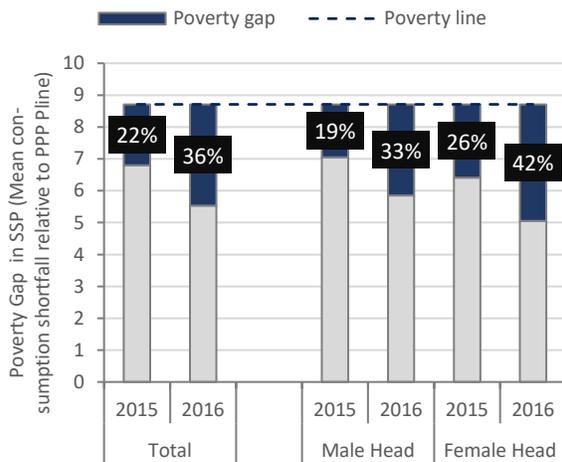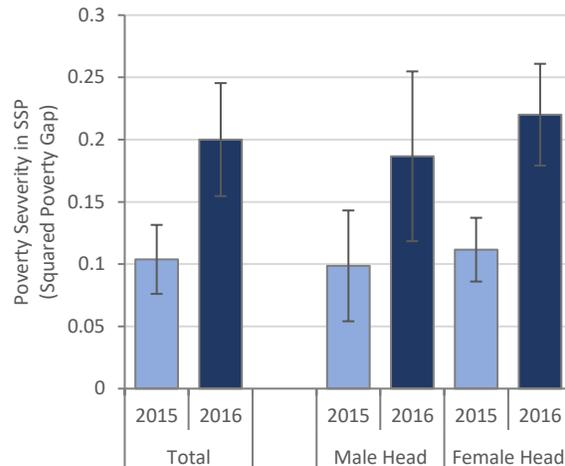
Source: Authors' own calculations based on HFS 2015 and 2016 data.

11.   Households with higher consumption levels in 2015 experienced a greater decline in consumption both in absolute and relative terms. Figure 6 and Figure 7 show the average change in households' consumption per consumption percentile in 2015 in percentage and in nominal terms, respectively. Figure 6 shows that the majority of households across the expenditure distribution in South Sudan experienced a decline in consumption between 2015 and 2016 (72 percent of all households, $p < 0.001$). Households in the top of the income distribution experienced a greater and more consistent decline in consumption between 2015 and 2016. More specifically, the households in the top quintile of consumption expenditure in 2015 are consuming on average 54 percent less in 2016 than they were consuming in 2015 ($p < 0.001$), representing an average decline of 12.5 SSP (2015) per capita per day. Figure 7 shows the change in consumption in nominal terms, and highlights the large nominal losses in consumption that the richer households have experienced.

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[13] Poverty severity is the average of the squared poverty gap, the poverty severity index therefore places more weight on poorer households and can capture inequality among the poor

Figure 6: Percentage change in consumption per percentile in 2015, urban.
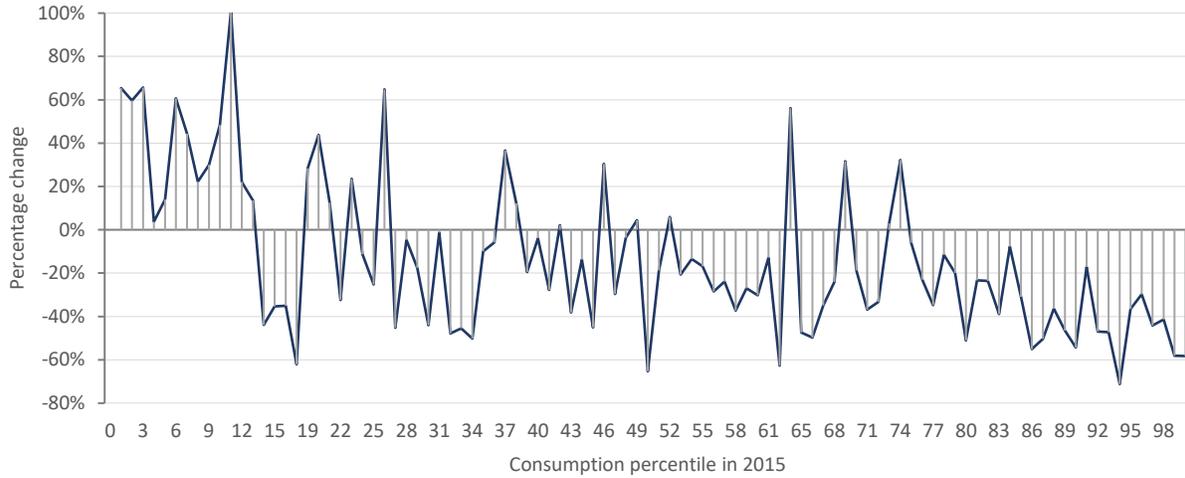
Source: Authors' own calculations based on HFS 2015 and 2016 data.

Figure 7: Change in consumption per consumption percentile in 2015, urban.
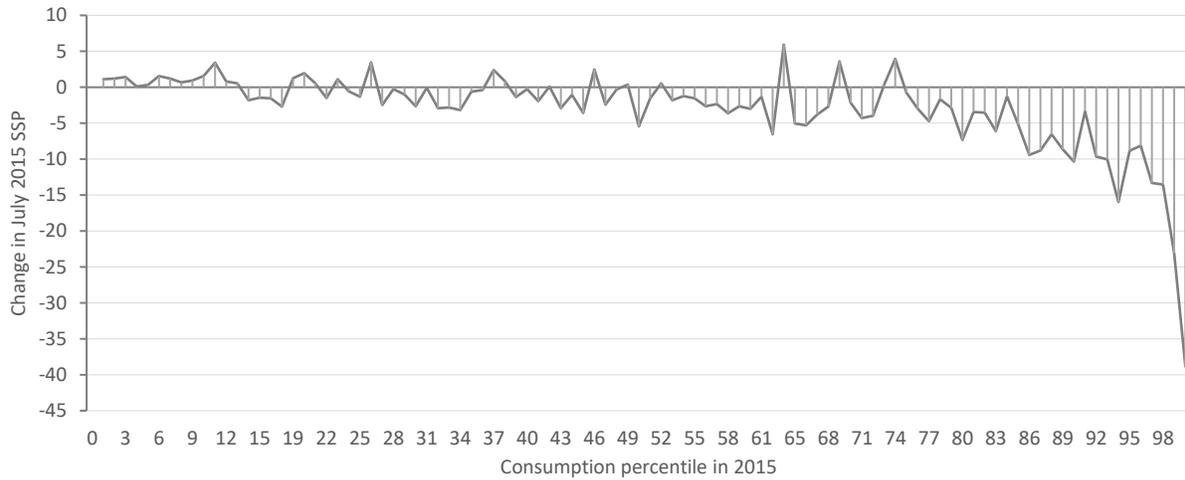
Source: Authors' own calculations based on HFS 2015 and 2016 data.

Livelihoods

12.   Households with higher levels of consumption in 2015 were significantly more likely to earn a living through salaried work relative to poorer households. Almost half of households in the top quintile of consumption expenditure cited wages and salaries as their main source of livelihood in 2015, compared to under a third for the bottom four quintiles (49 and 33 percent respectively, $p<0.001$). This provides some indication that the large decrease in consumption of richer households may be linked to a decline in the real value of wages due to inflation. Indeed, wage earners experienced the largest decline in consumption relative to other sources of livelihood, with consumption falling by more than a third from 2015 to 2016 ($p<0.001$). Similarly, but to a lesser extent, households that relied on income from their own business enterprise experienced a drop in consumption expenditure of about 21 percent ($p<0.05$). It is likely that the same factors that led to many wage earning households to experience a large decrease in consumption will have also been at play for this group of households. Households that relied on agricultural production did also experience a decline in consumption between the two years of about 24 percent (Figure 8, $p<0.001$).

Figure 8: Mean consumption by source of livelihood, urban.[14]
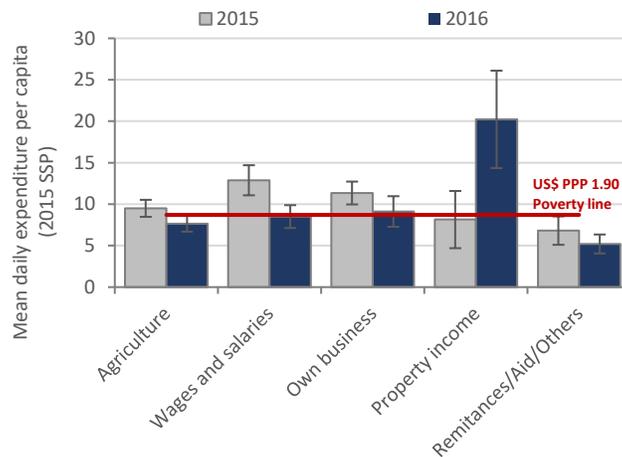
Source: Authors' own calculations based on HFS 2015 and 2016 data.

13.   The large loss of wages' purchasing power has driven many households relying on salaried work or on their own business enterprise into poverty. Although households supported primarily by wage earners remain amongst the richest groups in the population in South Sudan (Figure 9), the decline in purchasing power caused by rapid inflation has caused many of these households to fall into poverty. Poverty amongst wage earning households more than doubled from 28 percent in 2015 to 62 percent in 2016 (Figure 10, $p<0.001$), a stark increase relative to most other households. Indeed, households relying on wages and salaries in 2016 are disproportionately represented in the population that has fallen into poverty relative to those that have not (45 and 33 percent respectively, $p<0.05$). Similarly, poverty amongst households drawing on their own business enterprise for their livelihood increased from 43 to 61 percent between 2015 and 2016 (Figure 10, $p<0.05$).

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[14] Agriculture includes farming, hunting, and fishing. This category does not distinguish between own production or income earned through the sale of agricultural products.

Figure 9: Source of livelihood by poverty status, urban.
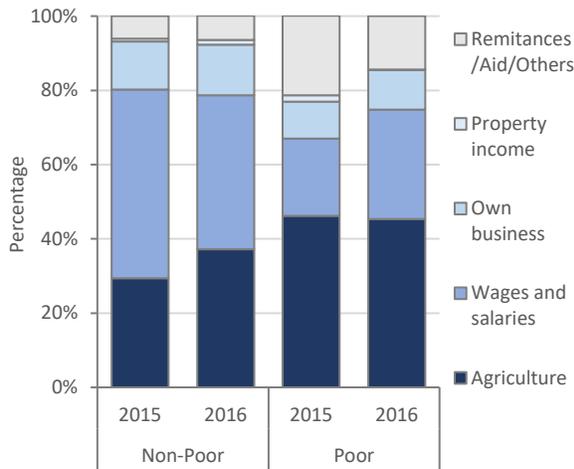
Figure 10: Poverty headcount by source of livelihood, urban.
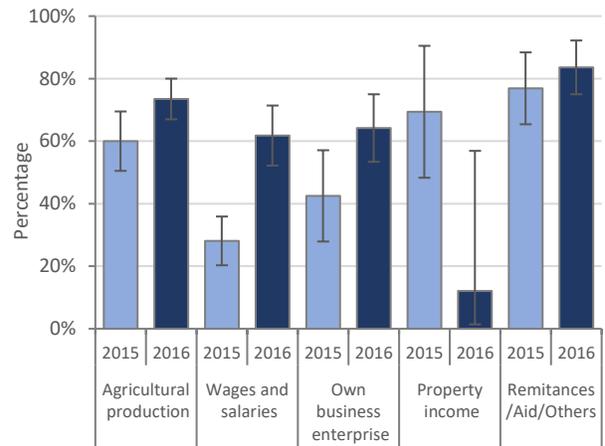
Source: Authors' own calculations based on HFS 2015 and 2016 data.

Labor

14.   Economic instability has led many of the working age to drop out of the labor force. The labor force participation rate in urban South Sudan has dropped from one half to one third between 2015 and 2016 (50 percent to 33 percent respectively, p<0.001).[15] The particularly volatile economic, political and security conditions may be responsible for this surprisingly low active labor force participation.[16][17] Poorer households experienced a larger decline in labor force participation. In 2015 the labor force participation rate remained relatively similar between poor and non-poor households and across expenditure quintiles. In 2016 the difference in labor force participation rate became more marked. In particular, amongst people in the poorest quintile, the labor force participation rate dropped from one half in 2015 to below one fifth in 2016 (51 and 17 percent respectively, Figure 11, p<0.001).

15.   The unemployment rate has remained stable between 2015 and 2016, and about one in ten South Sudanese are unemployed. The unemployment rate in South Sudan was 9 percent in 2015 and 11 percent in 2016. Relatively high levels of employment are common in developing countries, largely because the lack of a social safety net eventually forces the unemployed into subsistence farming and other such forms of basic self-sustenance. This is difficult to reconcile with the very low labor force participation rates reported in paragraph 14. However, one possibility is that many are losing their jobs because of economic instability, and instead of remaining in the workforce and actively looking for a job they are giving up looking for work entirely because the situation is so dire that they do not hope to find a job.

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[15] The labor force participation rate is the ratio of the active in the labor force to the total working age population. A person is defined as active if of working age and currently in employment or unemployment. More details on the construction of these variables can be found in the technical appendix.
[16] The labor statistics of the HFS are drawn from an interview of a knowledgeable person (often the household head) in the household asked about the other members in the household. This often results in less accurate reporting than individual interviews with all household members.
[17] The labor force participation over a longer reference period, 12 months instead of 7 days, is considerably higher and more consistent with levels typical of a developing country higher (75 percent in 2015 and 54 percent in 2016, p<0.001).

Figure 11: Urban labor force participation rate.
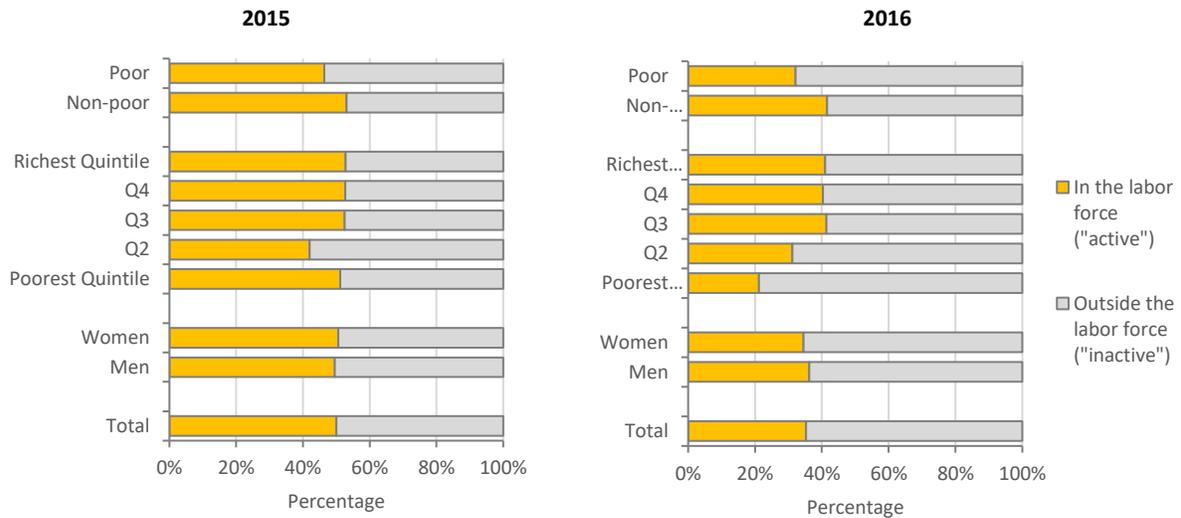
Source: Authors' own calculations based on HFS 2015 and 2016.

16. **Farming, hunting, and fishing at own account has become a more common type of employment, in particular amongst the richest households.** In 2015, the non-poor were much more likely to be employed as salaried workers (29 and 28 percent for the top and fourth quintile respectively), or to help in or run a non-farm business (46 and 52 percent for the top and fourth quintile respectively). Meanwhile, workers in the second and third quintiles of income were more likely to farm, hunt, or fish at their own account compared to workers in the top two quintiles and the bottom quintile (20 vs. 38 percent respectively, $p < 0.05$). The economic turmoil has changed this, and many households in those quintiles have turned to agricultural production. Only about 2 in 10 people in the top two quintiles were undertaking agricultural production in 2015. In 2016, this number doubled to about 4 in 10 (from 18 to 36 percent for the top quintile, $p < 0.01$, and from 19 to 42 percent for the fourth quintile, $p < 0.05$). This shift in employment patterns is consistent with business income or wages and salaries becoming less reliable sources of income, forcing people to enter agricultural production at their own account.

Figure 12: Urban employment by type.
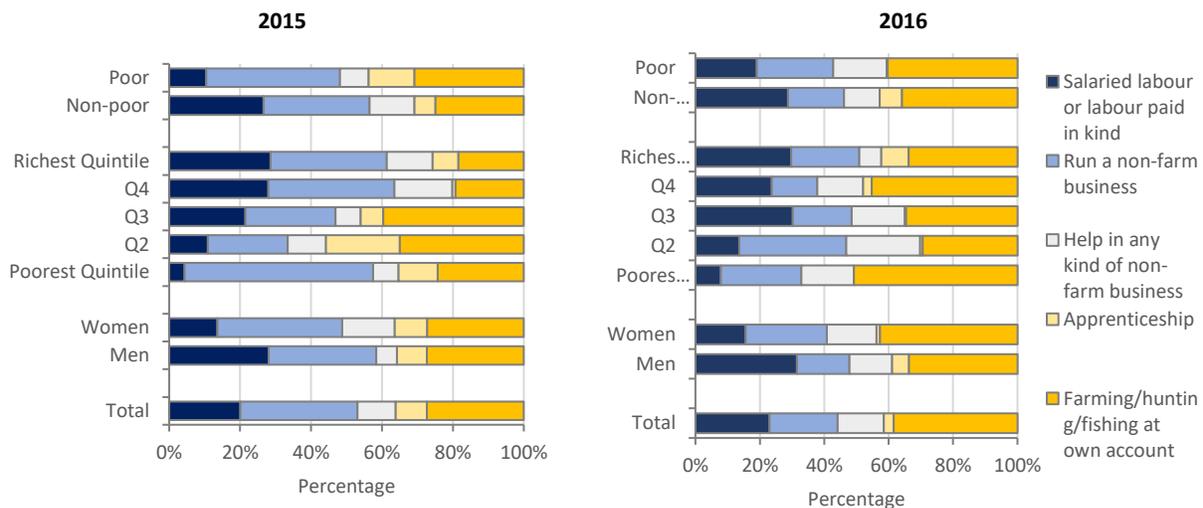
Source: Authors' own calculations based on HFS 2015 and 2016.

School attendance

17.   Despite lower economic outcomes school attendance has remained stable, about 3 in 4 of the South Sudanese children are currently attending school. The school attendance rate is 76 percent in both 2015 and 2016. This is a relatively high rate of attendance given the political turmoil and the violence. In addition, educational outcomes amongst the poor have slightly improved from 2015 to 2016. In particular, school attendance of children in the poorest quintile has increased from 61 percent in 2015 to 72 percent in 2016 (p<0.05).

Figure 13: Urban school attendance.
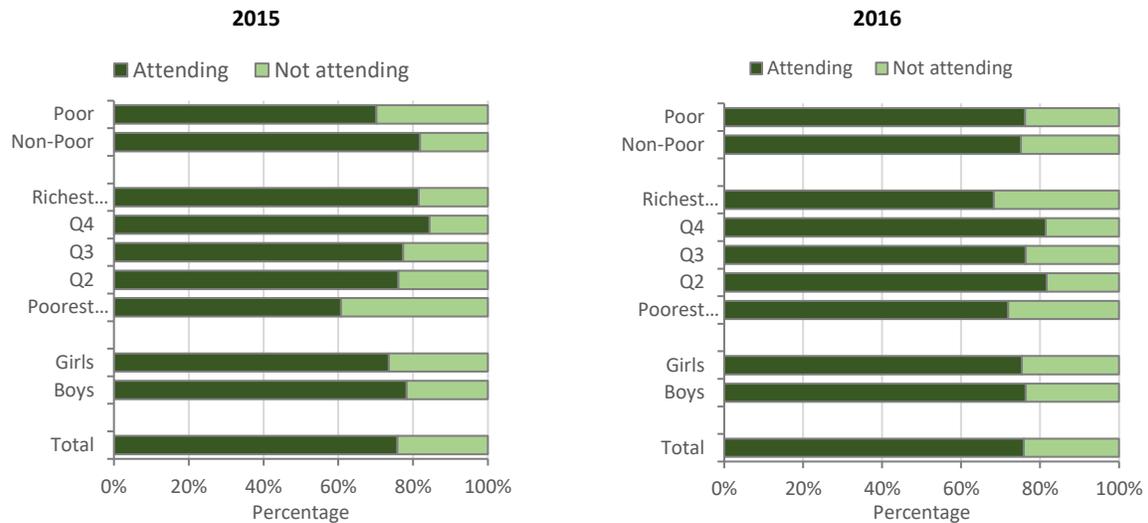
Source: Authors' own calculations based on HFS 2015 and 2016.

18.   There is no indication that older children are dropping out of school to join the labor force. It would be expected that during times of economic hardship children of working age would drop out of school and join the workforce to help the household sustain its livelihood. However, there is no indications that this is already happening at a large scale in South Sudan. The school attendance rate of boys aged 14 to 18 is slightly lower in 2016, having declined from 88 percent in 2015 down to 79 percent in 2016. However, this difference is not statistically significant.

Figure 14: Urban school attendance for children aged 6-13   **Figure 15: Urban school attendance for children aged 14-18**
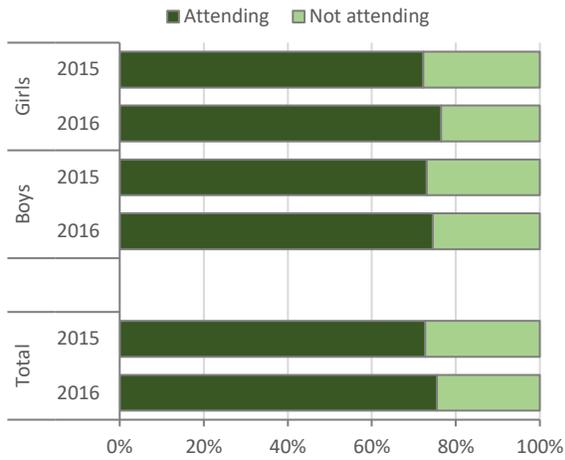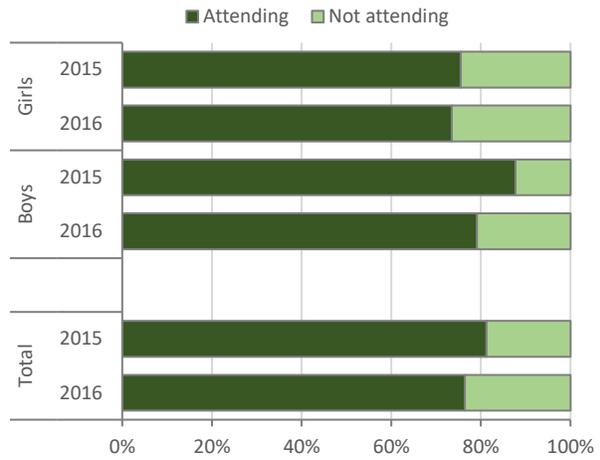
Source: Authors' own calculations based on HFS 2015 and 2016.

Hunger

19. **Food security in the top quintiles has remained relatively stable between 2015 and 2016, but hunger remains widespread even amongst richer households.** Food insecurity remains pervasive across South Sudan, with almost 3 in 4 households having experienced a lack of food or a lack of resources to buy food at least once in the past month. Almost a third of urban households reported having experienced hunger 'often' (more than 10 times) or 'sometimes' (3-10 times) in the past 4 weeks. Even for the top 20 percent richest households, more than half has experienced hunger at least once in the past month, and 1 in 8 experienced hunger between 3 and 10 times.

Figure 16: Hunger incidence over the past 4 weeks, urban.
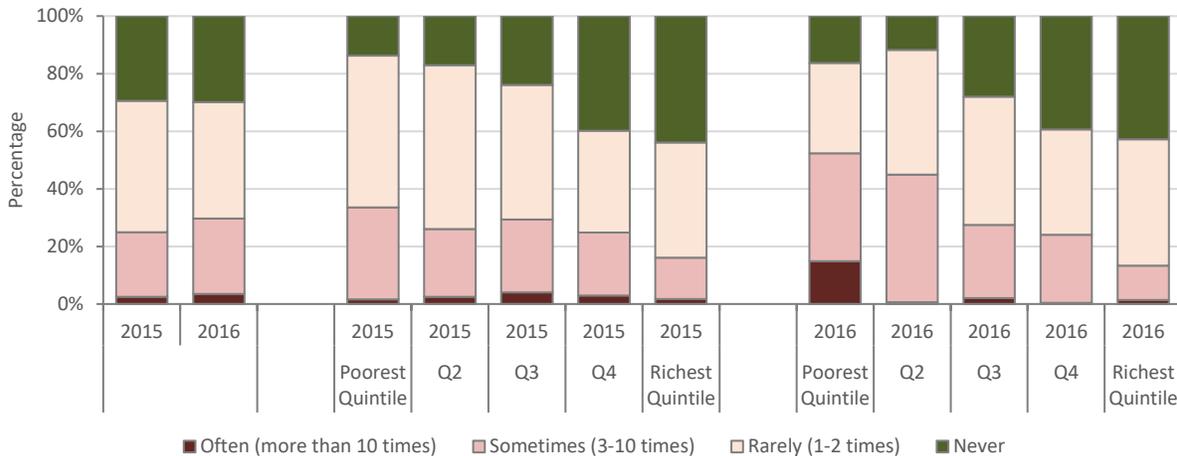
Source: Authors' own calculations based on HFS 2015 and 2016.

20. **Food security for the poorest households has deteriorated sharply between 2015 and 2016.** Food security for the poorest quintile of households fell from 2015 to 2016, with the likelihood of experiencing hunger 'often' (more than 10 times) increasing from 2 percent to 13 percent (p<0.05). The

same was experienced by households in the second poorest expenditure quintile, although to a lesser extent, and the incidence of experiencing hunger 'often' or 'sometimes' (3 to 10 times) in this quintile increased from 26 to 44 percent (p<0.05). Poorest households are more vulnerable to hunger in the face of rising food prices than richer households. This is because while richer households may be able to respond to a rise in food prices by adjusting their diets towards more staple and less expensive foods, the poorest households' diet may already be consisting primarily of such foods, and as their prices increase they are unable to afford even basic sustenance.[18] In 2016, households in the poorest quintile were more than ten times more likely than households in the top four quintiles to have experienced hunger 'often' in the past month (15 vs. about 1 percent respectively, Figure 16, p<0.05).

21.   **Richer households are much more likely to adjust their diets to cope with a lack of food, while the poorest households cope with a lack of food by going entire days without eating.** Households in the poorest quintile are more likely to be consuming largely basic foods and staple crops, and are therefore probably unable to afford even basic sustenance in the face of rising food prices. Indeed, households in the poorest quintile in 2016 are much more likely to report going entire days without food as their primary hunger-coping strategy than households in the remaining 4 quintiles (51 vs. 18 percent respectively, p<0.001). Furthermore, this figure has grown dramatically between 2015 and 2016, from about 15 to 51 percent (p<0.01). Meanwhile, other households are able to resort to less extreme strategies. Households in the top 4 quintiles of consumption are more likely to deal with a lack of food by reducing the number of meals or portion size, or consuming less preferred food than the poorest households (16 vs. 4 percent, p<0.05, and 40 vs. 23 percent respectively, p<0.01, respectively).

Figure 17: Hunger coping mechanism by income quintiles, urban.
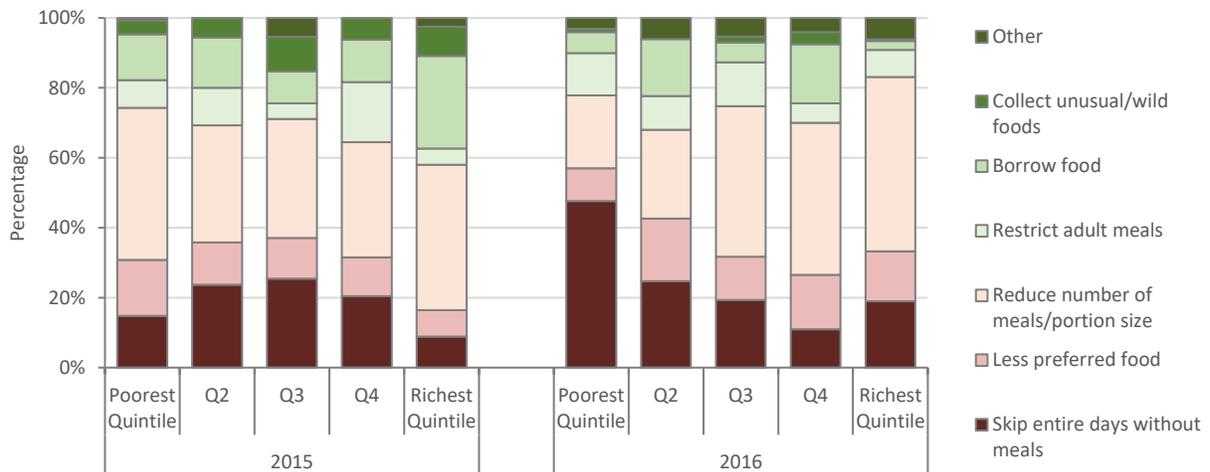
Source: Authors' own calculations based on HFS 2015 and 2016.

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[18] For example, poor households have a lower ratio of core consumption to total consumption than non-poor households (65 to 68 percent respectively, p<0.05). Please refer to the technical appendix section on consumption estimation for more details on the distribution of food items between core and non-core.

Perceptions of welfare

22.   **The deterioration of economic conditions is reflected in the large decline in respondents' perception of their own living conditions.** In 2015 about 1 in 2 urban households felt that their living conditions were fairly bad or very bad, this increased to more than 3 in 4 in 2016 (45 vs. 78 percent respectively, $p<0.001$). Similarly as in the case of economic conditions, a majority of respondents believe that their personal living conditions will deteriorate in the next 3 months. The share of households that believe living conditions will get worse or much worse has increased from about one quarter to one half (25 vs. 50 percent respectively, $p<0.001$), and the share of households who believe that conditions will improve has fallen from about half to less than a third (50 vs. 32 percent respectively, Figure 18, $p<0.001$).

Figure 18: Perception of living conditions, urban.
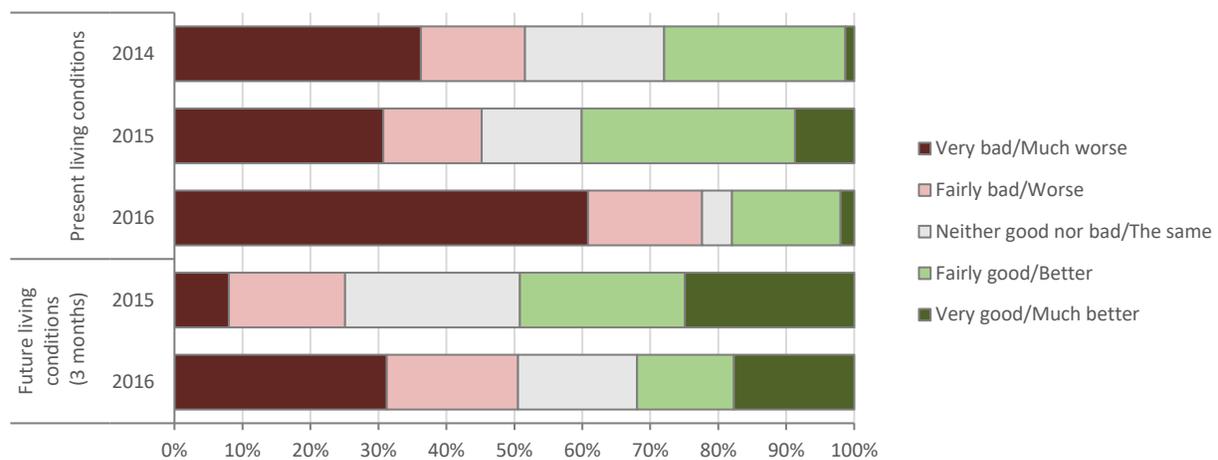
Source: Authors' own calculations based on HFS 2015 and 2016.

23.   **Respondents report lower life satisfaction and feel less in control of their daily lives.** Respondents were asked to score their life satisfaction from 0 to 10, where 10 was characterized as the best possible life and 0 as the worst possible life for them. The average life satisfaction score fell between 2015 and 2016, from about 3.5 to about 2.4 out of 10 ($p<0.001$). A similar decline is observed for households across expenditure quintiles, and for poor and non-poor households overall (Figure 20). This general decline in life satisfaction is mirrored by a growing feeling amongst the South Sudanese that they are powerless in the face of deteriorating economic and political conditions. The share of respondents who feel that they have no control over their daily lives has increased from about one quarter to more than one third between 2015 and 2016 (25 and 38 percent respectively, Figure 19, $p<0.01$).

Figure 19: Feeling in control over own life, urban.
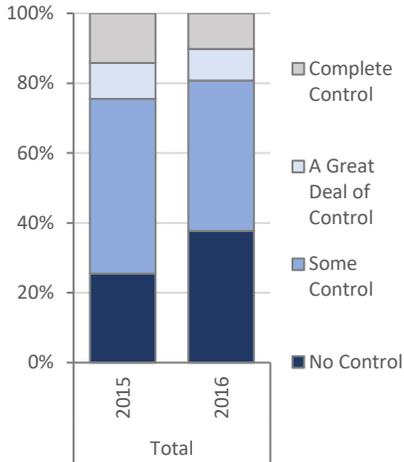
Figure 20: Life satisfaction score, urban.
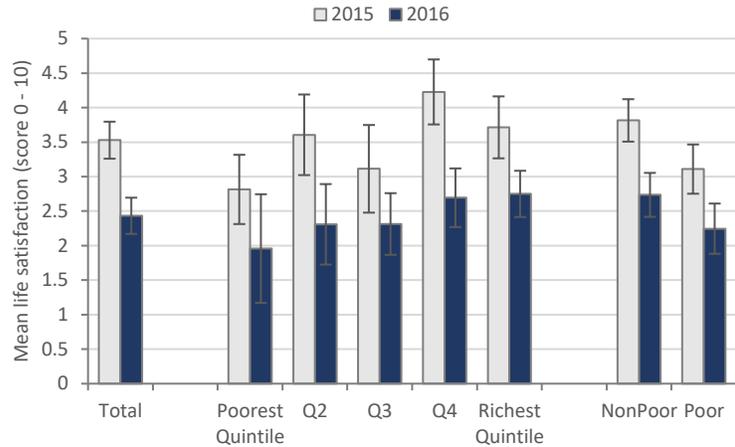
Source: Authors' own calculations based on HFS 2015 and 2016.

24.   The economic collapse is well echoed by household perceptions, and many households believe that economic conditions will continue to deteriorate. In 2015, at about two thirds of the South Sudanese residing in urban areas felt that economic conditions in their country were bad or very bad, in 2016 this figure increased to almost 9 in 10 (64 vs. 86 percent respectively, p<0.001). The people of South Sudan are not optimistic about the future either, and a majority believe that economic conditions will further deteriorate in 3 months' time. More than 3 in 4 stated that in 3 months' time the economic situation will be worse or much worse, with a notable 47 percent of households believing the latter. This pessimism with regards to the future of economic conditions in South Sudan has also become more prevalent between 2015 and 2016, and the share of households believing that conditions in three months will be worse increased from 38 to 65 percent (Figure 21, p<0.001).

Figure 21: Perception of economic conditions, urban.
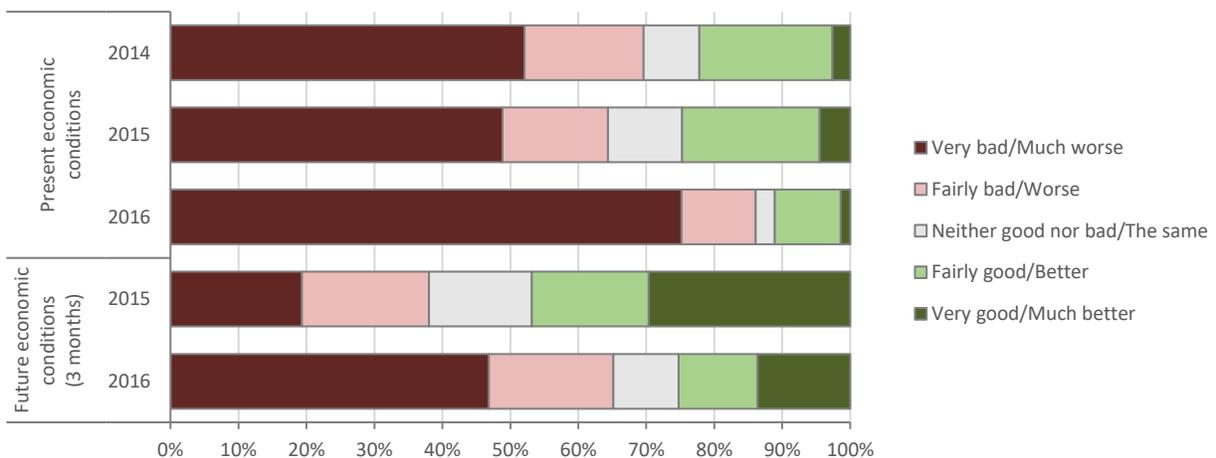
Source: Authors' own calculations based on HFS 2015 and 2016.

25. **The South Sudanese are increasingly worried about the future of their nation's economy.** The lack of economic opportunities and concerns about the economy of South Sudan have grown as fears for the future of their country. When probed about their greatest fear for the future of South Sudan, respondents in 2016 were much more likely to cite concerns such as the lack of opportunities for youth, a lack of jobs, poverty, and an overall bad economy than they were in previous years. About 3 in 10 respondents cited economic concerns as their main fear for the future in 2015, compared to one half in 2016 (29 and 50 percent respectively, p<0.001). Economic concerns gained ground relative to fears about insecurity, civil war, and political disintegration, which decreased from being the main concern of two thirds of the South Sudanese in 2015 to about one half in 2016 (66 and 47 percent respectively, p<0.001). These two concerns dominate the South Sudanese's fears for their country, and account for a combined 97 percent of responses in 2016 (Figure 22).

Figure 22: Fear for the future of South Sudan, urban.
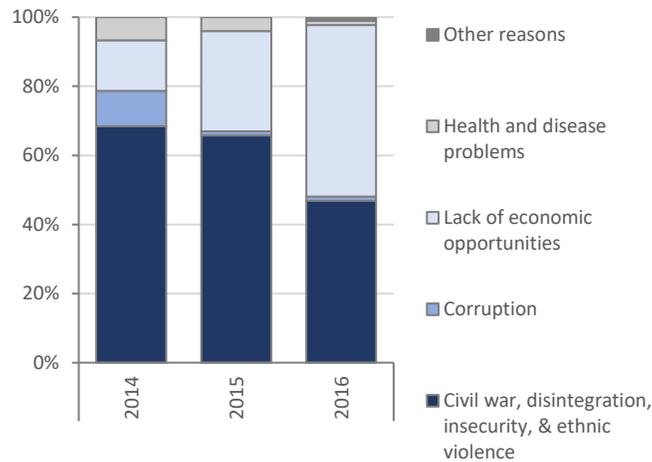
Source: Authors' own calculations based on HFS 2015 and 2016.

Perceptions of performance of public institutions

26. **Economic and political volatility have negatively affected households' perceptions of the Government's and other public institutions' performance.** Households in urban areas do not think that the Central Government and other domestic public institutions are very effective in improving the living conditions and life of the people of South Sudan. The Central Government of South Sudan in particular is consistently perceived amongst the least effective of these institutions. Households' perception were already in low in 2015, with half of all households believing that the Central Government is ineffective or very ineffective in improving the daily life of its constituency. These numbers increased by almost a third between 2015 and 2016, and in 2016 almost 3 in 4 households held a negative view of the Central Governments' effectiveness situation (50 and 72 percent respectively, Figure 23,p<0.001).

Figure 23: Perceptions of effectiveness of public institutions, urban.
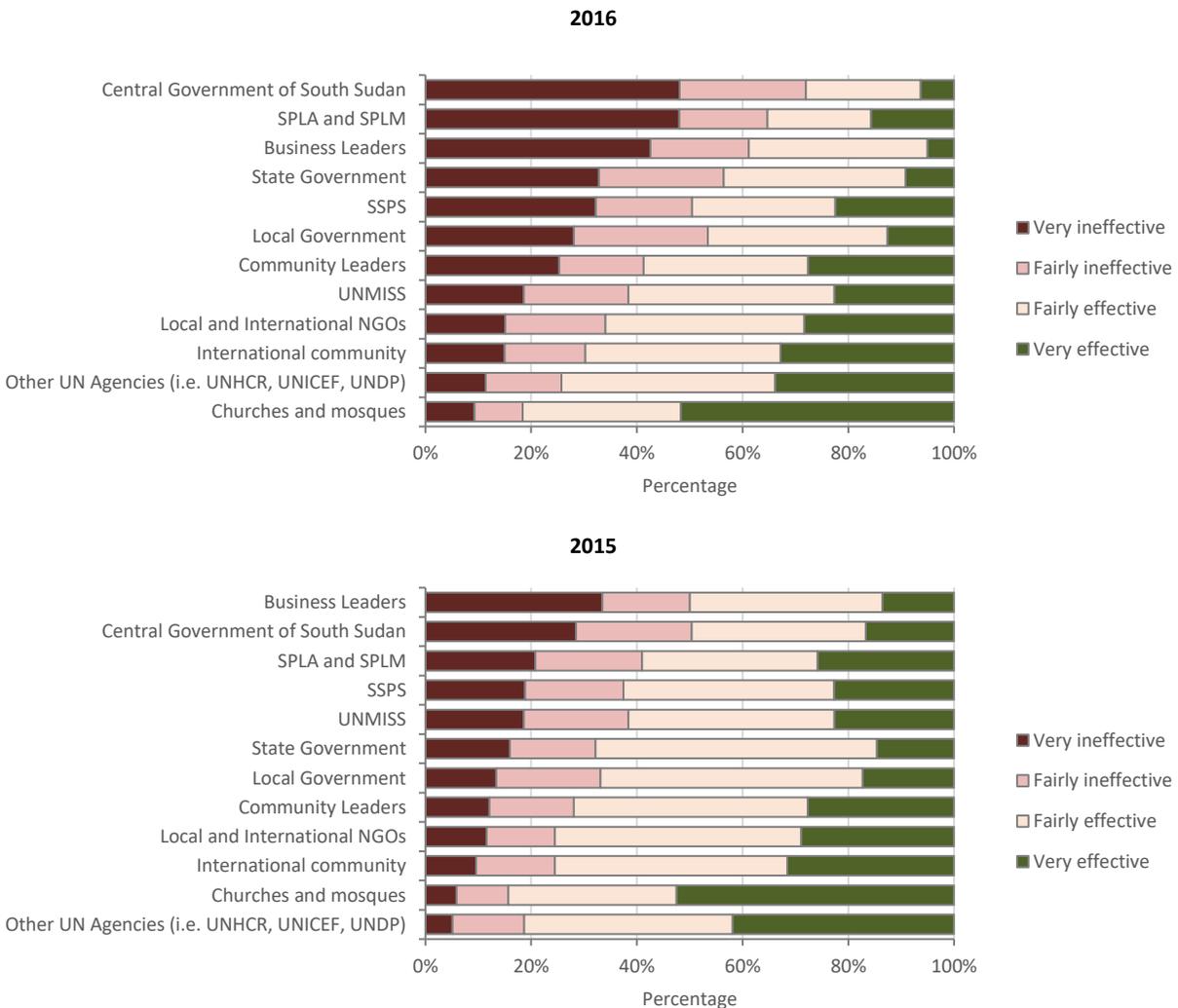
2016

2015

Source: Authors' own calculations based on HFS 2015 and 2016 data.

27.   **Household perceive most domestic public institutions as relatively ineffective compared to international institutions.** With the exception of religious institutions such as churches and mosques, which are consistently considered amongst the most effective institutions for improving living conditions, international institutions tend to be regarded as more effective than their domestic counterparts. In both years, UN agencies, local and international NGOs, and the broader international community, were considered amongst the most effective organizations (Figure 23).

28.   **Households' perception of the government's performance in meeting specific policy objectives is very low, in particular with regards to economic conditions.** Households are dissatisfied with the Government's performance in dealing with matters of economic policy, and in both years the levels of dissatisfaction are very high and remain high. About 9 out of 10 households rate the government's performance in keeping prices down badly in both years. Similar levels of dissatisfaction are felt with respect to the Government's performance in creating jobs and improving living standards, where about 8 out 10 and 9 out of 10 households respectively rate it as bad or very bad (Figure 24).

Figure 24: Government performance in meeting policy objectives, urban.
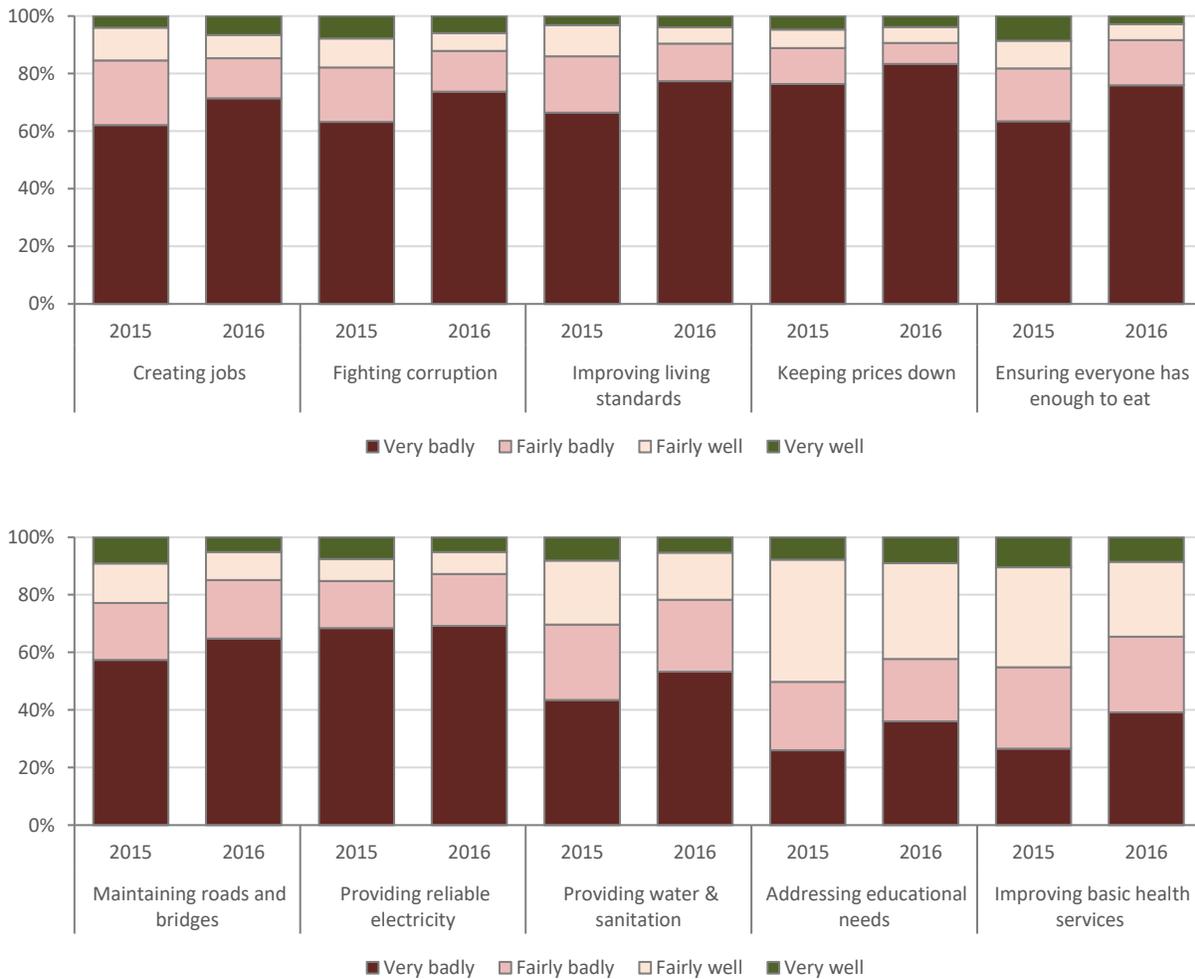
Source: Authors' own calculations based on HFS 2015 and 2016 data.

29.   Many households feel that the Government has also failed to provide most basic public goods. The majority of households in urban South Sudan believe that the Government's performance in providing many basic types of public goods was bad or very bad in both 2015 and 2016. This is particularly felt with respect to infrastructure, and about 8 out of 10 households believe that the Government fails to maintain roads and bridges. Households hold similar views with respect to the provision of a reliable electricity supply, adequate water, and sanitation. The Government's performance in addressing educational needs and basic health services is viewed slightly more positively, but it nevertheless remains at levels of approval that are lower than half of all households.

Outlook

30.   Between 2015 and 2016, inflation has had a powerful impact on the composition of urban poverty and is likely to affect the long-term prospects of South Sudan. Inflation changed the viability of the sources of livelihood urban households in South Sudan could rely on. In particular, the loss of purchasing power of wages and salaries has driven many of the South Sudanese residing in urban areas into poverty. This has instigated a shift in the South Sudanese economy towards greater self-reliance and own-production of food. Although these effects are small as observed in the present dataset, this is most likely because these are typically medium term effects and the sample period under study is relatively short. It is expected that these movements will continue to be accentuated in the following waves of the HFSSS in 2016 and 2017.

31.   The renewed threat of violence an instability following a call to arms by the former vice-president in September 2016 is likely to have aggravated the situation presented in this note. In a context of violence and widespread conflict, it is unlikely that the macroeconomic uncertainty facing South Sudan will be relieved anytime soon. Instability is contributing to the limited supply of foreign exchange, it is exacerbating food shortages, and will most likely be stretching the government's finances in the near future. The conflict has also impacted aid work, and this will reduce the livelihoods of the poorest and most vulnerable segment of the population. This will be particularly felt by those displaced by the ongoing conflict, who may need to rely on humanitarian relief. This will have drastic humanitarian consequences, given the predicted worsening food-security situation of some of the most vulnerable sections of the population.

32.   New waves of data collection in 2016 and 2017 will enable development actors to gain an accurate understanding of the impact of inflation. The HFS has collected a new wave of household data in late 2016, and will undertake another large-scale panel wave in early 2017 which will track the households from Waves 1 and 2. Repeated time varying data for a sample of households is invaluable in understanding the changes they undergo during such difficult periods as between 2015 and 2017. In addition, The World Bank will be undertaking a Crisis Recovery Survey, which consists of a household survey in refugee camps for internally displaced people across South Sudan. These data and subsequent analyses will be useful in guiding policy guidance and relief efforts that are badly needed in South Sudan.

33.   The data will be complemented by video testimonials providing a glimpse of the lives of the people of South Sudan. At the end of the interviews, respondents are offered to provide a short video testimonial where they can share their views and anything they would like to communicate. This allows the development community to gain a more rounded perception of the situation on the ground in South

Sudan. The translated testimonials as well as all of the data collected by the HFS in South Sudan are made available on the website http://www.thepulseofsouthsudan.com.

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Technical Appendix

This technical appendix describes sample design, definitions of education and labor statistics, as well as the cleaning and construction of consumption aggregates for the entirety of Wave 2 High Frequency Survey data in South Sudan.

Introduction

Estimating monetary poverty rates requires a sound, reproducible methodology. This methodology has several parts: it starts with the sample design, continues with questionnaire design, the construction of food and non-food consumption aggregates, the calculation of the consumption value derived from durable assets, the selection of price deflators, and requires decisions with regard to the construction of the poverty lines. This appendix describes the various parts of the methodology used to estimate poverty for the Wave 2 High Frequency Survey in South Sudan.

The chosen methodology balances a trade-off between feasibility and accuracy. South Sudan is a fragile country with severe security constraints for field work and wide spread displacement. The sampling methodology was adapted to the context by excluding several inaccessible areas. The questionnaire design utilized the Rapid Consumption methodology in order to reduce the interview time. Choices of deflators and the poverty line were influenced by data quality.

A household is defined as poor if the per-capita household consumption does not exceed a given threshold

$$(1) \qquad\qquad\qquad y_i \leq z$$

where y_i is the nominal per-capita household expenditure and z is the poverty line at the nominal level. The following section first presents the selection of a household i as part of the sample design, then outlines the construction of the consumption aggregate y_i before discussing the choice of the poverty line z and standard poverty measures.

Sample Design

The survey was designed to be representative at the state-level for urban areas of South Sudan. For security reasons, three states in South Sudan (Jonglei, Unity, Upper Nile) were excluded from the sample design. The sample design employs a stratified two-stage clustered design. Within each of the 6 strata (6 states), the primary sampling units are enumeration areas (EAs) that were drawn randomly proportional to size. Within EAs, 12 household were drawn randomly as unit of observation. The number of households per EA was determined to be 12 to allow an equal split into 4 groups per EA to facilitate the implementation of the Rapid Consumption Methodology (see below). Based on the sampling frame derived from the 5th Sudan Population and Housing Census from 2008, the number of EAs per stratum was determined under the condition to keep the number of EAs per state balanced.

Sampling weights are used to make survey observations representative for the sample. The sampling weight is the inverse probability of selection. The selection probability P for a household can be decomposed into the selection probability P_1 of the EA and the selection probability P_2 of the household within the EA:

$$(2) \qquad\qquad\qquad P = P_1 P_2$$

The selection probability P_1 of an EA k is calculated as the number of households within the EA divided by the number of households within the stratum multiplied by the number of selected EAs in the stratum

$$(3) \qquad P_1 = \frac{|K|\hat{n}_k}{\sum_{k' \in K} \hat{n}_{k'}}$$

where $\hat{n}_k$ denotes the number of households in EA k estimated using the Census 2008 data and K is the set of EAs selected in the corresponding stratum. The selection probability P_2 for a household within an EA k is constant across households and can be expressed as

$$(4) \qquad P_2 = \frac{|H|}{n_k}$$

where $|H|$ is the number of households selected in the EA and n_k denoting the number of listed households in EA k. Usually, the number of households per EA is 12 while a few exception exist due to invalid interviews.

Sampling weights were scaled to equal the number of households per strata using the Census 2008 data. Thus, the sampling weight W can be written as:

$$(5) \qquad W = \frac{c}{P} \text{ with } c = \frac{\sum_{k \in K} \hat{n}_k}{\sum_{k \in K} n_k}$$

Data Collection and Replacements

The survey was implemented using tablets as survey devices (CAPI). The data collection system consisted of Samsung Galaxy Tablet computers equipped with SIM cards, mobile data plans, microSD cards (16 GB capacity), and external battery packs. The tablets were secured with Android's native encryption and protected by a password. The Android application AirDroid was used to remotely manage devices, GPS tracker helped to track all devices using a web interface (www.gps-server.net), Barcode Scanner allowed to use barcodes for the identification of enumerators and a parental control application provided a safe working environment for enumerators. Interviews were conducted using SurveyCTO Collect on the tablet with data transmitted to a secure SurveyCTO server in a cloud computing environment. Teams of four enumerators and one supervisor were provided with a mobile generator using fuel to ensure that tablets can be charged overnight. Data collection was monitored daily taking advantage of near real-time availability of the data in the cloud.[19]

EAs were replaced if security rendered field work unfeasible (Table 1). Replacements were approved by the project manager. Replacement of households were approved by the supervisor after a total of three unsuccessful visits of the household.

Table 1: Number of EAs and replacement EAs by stratum

Stratum	Total EAs completed	Replacement EAs
Warrap	15	1
Northern Bahr el Ghazal	15	0
Western Bahr el Ghazal	11	1
Lakes State	15	0
Western Equatoria	15	5

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[19] In areas without 3G activities, enumerators saved conducted interviews on the tablet and submitted data once they had 3G connectivity.

Central Equatoria	15	0
Eastern Equatoria	15	2

Incoming data is processed to create a raw consistent data set. Interviews with wrongly entered EAs were manually corrected. Interviews conducted outside sampled EAs were discarded. For duplicate submissions, only one record is kept.[20] Sampling weights are added to the final dataset and subsequently anonymized at the strata level. Missing values are recoded into four different types of missing values: (i) genuinely missing values coded as "."; (ii) respondent indicated "don't know" coded as ".a"; (iii) respondent refused to respond to the question coded as ".b"; and (iv) missing values due to the questionnaire skipping pattern because the question does not apply to the respondent coded as ".z".

Literacy and Educational Attainment

Literacy: literacy is the ability to read and write a simple sentence about every-day life. In the HFS South Sudan, the ability to read and the ability to write were self-reported in two separate questions (ILO, 2015).

Educational attainment: The five categories of educational attainment are: No education/Less than primary, primary and intermediate education, secondary, tertiary education, and other. This definition is in line with the International Standard Classification of Education (ISCED) of the UN. Note that 'primary' includes primary education as well as lower, incomplete secondary education; 'secondary' includes upper secondary and non-tertiary post-secondary education; and tertiary covers all levels of tertiary education (UNESCO, 2012). Educational attainment is determined by means of self-classification of respondents in levels of schooling in line with the education system. The 'other' category includes non-formal education as well as the option 'other' as chosen by respondents. The 'tertiary' category contains first university degree, master's degree, PhD, and post-secondary technical education.

Labor Statistics

The labor market statistics presented in this poverty profile follow closely the international standard set as per the International Labour Organisation's (ILO) Key Indicators of the Labour Market (KILM). There are two key reference periods: (a) the short observation period defined as 7 days, and (b) the long observation period defined as 12 months. Following ILO guidelines, statistics are reported for the short observation period unless explicitly stated. All persons aged 15-64 are defined as being of working age.

Labor force activity: Labor force status comprises three mutually exclusive and exhaustive categories. In the HFS data they are defined as follows:

1. Employment: A person is employed if he/she is of working age and has engaged in one of the following employment activities:
   - Working as an apprentice
   - Working on the household's farm, raising livestock, hunting or fishing
   - Conducting paid or commissioned work
   - Running a business of any size for oneself or for the household
   - Helping in a household business of any size

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[20] Two types of duplicate households are identified. Technical duplicates are defined as duplicate submission of the same interview. They are identified as households with identical GPS data (latitude, longitude and altitude coordinates). Manual duplicates are defined as two interviews conducted with the same household. They are identified by almost identical household rosters. The interview with more information is kept based on manual inspection.

The definition further includes persons who are temporarily absent from their work due to training or working time arrangements such as overtime leave, and paid interns. Note that the definition excludes household work.

2. <u>Unemployment</u>: A person is unemployed if he/she is of working age, is not in employment during the reference period, and has been seeking employment over the past 4 weeks.

3. <u>Outside the labor force or inactivity</u>: A person is outside the labor force (or "inactive") if he/she is of working-age and neither employed nor unemployed, according to the preceding definitions. An inactive person is not necessarily idle, especially in the context of a developing economy. The data breaks this group down into those who are inactive because they do household work, those who are enrolled in education, those who are discouraged, etc.

The labor force refers to the sum of persons in employment and in unemployment. It is the counterpart of the group of inactive persons, i.e. the labor force plus the inactive sum up to the entire working-age population (ILO, 2013).

Figure 41: Labor force, inactivity, and employment status.

Working-age Population (15 years and older)					
Labor Force		Outside of the labor force / Inactive			
In Employment	In Unemployment	Pursuing Education	Household Work	Discouraged	Other
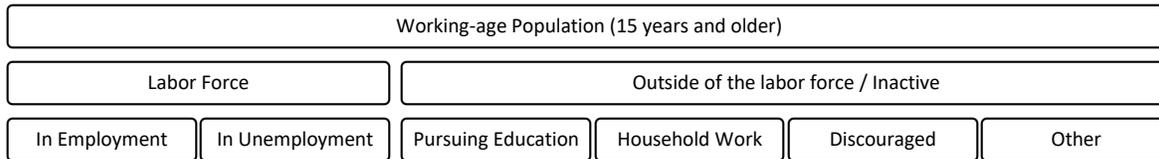
Source: Definitions based on ILO, 2013

<u>Labor Force Participation and Inactivity:</u> The labor force participation rate (LFPR) is the ratio of the labor force to the working age population, expressed as percentages. That is,

$$LFPR_{t,a,s} = \frac{LF_{t,a,s}}{POP_{t,a,s}},$$

where LF is labor force, POP is working age population, *t* is the reference period, *a* refers to age groups, and *s* to sex.

<u>Unemployment rate:</u> The unemployment rate (UR) is the number of persons in unemployment as a percentage of the total labor force. With unemployment defined as above and EMP being the number of persons in employment, the unemployment rate is given by:

$$UR_{t,a,s} = \frac{LF_{t,a,s} - EMP_{t,a,s}}{LF_{t,a,s}}.$$

<u>Employment by sector.</u> In line with the International Standard Industrial Classification of all Economic Activities (ISIC) Revision 4 of 2008, sectors are defined as:

- Agriculture (A)
- Industry / Manufacturing (M)
- Services (S)
- Education (E)
- Defense/Security (D)

In the HFS South Sudan, sectors are collapsed from a list of narrower categories according to which each respondent is classified to either Agriculture (A), Manufacturing (M), Services (S), Education (E) or Defense/Security (D):

- o Mainly crop production (A)
- o Mainly livestock production (A)
- o Mainly forestry (A)
- o Mainly fishing (A)
- o Mining and quarrying (A)
- o Manufacturing (M)
- o Electricity, gas, steam and air (M)
- o Water and waste (M)
- o Construction (M)
- o Whole sale, retail and repair of motor (S)
- o Transportation and storage (S)
- o Accommodation and food service (S)
- o Information and communication (S)
- o Financial and insurances (S)
- o Professional, scientific, technical (S)
- o Administrative and support (S)
- o Education (E)
- o Human health and social work (S)
- o Arts, entertainment and recreation (S)
- o Other service activities (S)
- o Household work as employers and for own (S)
- o Activities for extraterritorial organizing (S)
- o Defense / Security (D)

Employment by type: In the survey, status in employment is determined by respondents' direct self-classification of their main activity over the previous 7 days into one of the below 5 categories. While the first category describes employees, all others are self-employed workers:

- o Salaried labor or labor paid in kind
- o Run a non-farm business
- o Helping in any kind of non-farm business
- o Apprenticeship
- o Farming or hunting or fishing at own account

Employment by occupation: The International Standard Classifications of Occupations of 2008 (ISCO08) defines the major employment groups, along with suggested levels of skill, as follows:

Table 2: Employment by occupation classification

ISCO08 Major Groups	ISCO Skill Level
Managers	3 + 4
Professionals	4
Technicians and Associate Professionals	3
Clerical support workers	2

Service and sales workers	2
Skilled agricultural, forestry and fishery workers	2
Craft and related trade workers	2
Plant and machine operators and assemblers	2
Elementary occupations	1
Armed forces occupations	1+ 2 + 4
Non-classifiable workers.	-

Source: Occupation classification as set by ISCO08

ISCO skill levels are defined as: (1) primary education; (2) first stages of secondary education; (3) completed secondary education, and training not equivalent to a university degree; (4) university degree or equivalent. Employment by Occupation is informative of levels and composition of skills in the economy (ILO, 2008). In the survey, ISCO-08 occupations are determined via self-classification of respondents aged 15 and older.

Consumption Aggregate

The nominal household consumption aggregate is the sum of three components, namely 1) expenditures on food items, 2) expenditures on non-food items, and 3) the value of the consumption flow from durable goods:

(6)
$$y_i = y_i^f + y_i^n + y_i^d$$

Given the large variation in prices in the months of data collection, the consumption of the three components of the consumption aggregate are deflated by month, with the reference defined as February 2016. Values in terms of February 2016 prices are then deflated again using the CPI calculated by the NBS to July 2015 prices, so as to ensure comparability with Wave 1. This next section describes in detail the cleaning of the recorded data for each of three components. Subsequently, the construction of the consumption aggregate using the Rapid Consumption Methodology is explained as well as the estimation of the consumption flow for durables.

Cleaning

Food

Food expenditure data is cleaned in a three-step process. First, units for reported quantities of consumption and purchase are corrected. Second, quantities consumed and purchased converted into kilograms are cleaned, where potential data entry errors and outliers are detected and corrected. Third, prices per kilogram calculated using the cleaned quantities are corrected in a similar manner. Observations are tagged according to a set of cleaning rules which resemble closely to the rules applied in Wave 1, in order to maintain comparability. In total, the cleaning rules affect about a fifth of quantities and prices, this is primarily due to replacing missing values. Table 3 shows how many observations are tagged by at least one cleaning rule and are replaced by a median value.

Table 3: Overall impact of food cleaning rules

Consumption quantity in kg			Purchase quantity in kg			Price in SSP per kg		
	No.	%		No.	%		No.	%
Not-tagged	8,510.00	78.6	Not-tagged	8,515.00	78.6	Not-tagged	8,386.00	77.4
Tagged	2,322.00	21.4	Tagged	2,317.00	21.4	Tagged	2,446.00	22.6

Total	10,832.00	100	Total	10,832.00	100	Total	10,832.00	100

Source: Authors' own calculations based on HFS 2016

More details on the specific cleaning rules is provided below. It is important to note that for some observations a few cleaning rules may overlap:

- Rule 1 (data entry errors for units): For records that have the same figure in quantity purchased and consumed but have different units, it is assumed that the correct unit is the one that takes the quantity (consumed or purchased, converted into kilograms) closer to the weighted median value for the same item.

	No.	%
Not-tagged	10,789.00	99.6
Tagged	43	0.4
Total	10,832.00	100

- Rule 2 (mistakes in reported units): Items that are likely to be reported in the wrong unit are corrected following generic rules. An example of a typical mistake is to report consumption of 100 kilograms of a product (like salt) where the supposed correct unit is grams. In this case, all quantities given in kilograms that exceed 100 would be corrected so as to be given in grams instead. The specific rules can be found in Table 8.

Cons. Q.	No.	%	Purc. Q.	No.	%
Not-tagged	10,657.00	98.4	Not-tagged	10,591.00	97.8
Tagged	175	1.6	Tagged	241	2.2
Total	10,832.00	100	Total	10,832.00	100

- Rule 3 (missing quantities): Items that were consumed but have a missing quantity, consumed or purchased, are replaced with the item-specific median quantity. Note from the highlighted cells that this is where the bulk of corrections come from.

Cons. Q.	No.	%	Purc. Q.	No.	%
Not-tagged	8,558.00	79	Not-tagged	8,582.00	79.2
Tagged	2,274.00	21	Tagged	2,250.00	20.8
Total	10,832.00	100	Total	10,832.00	100

- Rule 4: (quantities beyond 'hard' constraints): Quantities consumed and purchased that are below or above the item-unit quantity constraints are replaced with the item-specific median.

	Cons. Q.			Purc. Q.	
	Below hard constraints				
	No.	%		No.	%
Not-tagged	10,819.00	99.9	Not-tagged	10,810.00	99.8
Tagged	13	0.1	Tagged	22	0.2
Total	10,832.00	100	Total	10,832.00	100

Above hard constraints

	No.	%		No.	%
Not-tagged	10,810.00	99.8	Not-tagged	10,827.00	100
Tagged	22	0.2	Tagged	5	0
Total	10,832.00	100	Total	10,832.00	100

- Rule 5 (data entry errors for quantities or prices): Records with the same value for quantity consumed or quantity purchased and price, or with the same value for all three, are assumed to have a data entry error in the price or quantity. They are replaced with the item-specific medians.

Same cons. q. and price			Same purc. q. and price			Same cons. q., purc. q., and price		
	No.	%		No.	%		No.	%
Not-tagged	10,819.00	99.9	Not-tagged	10,792.00	99.6	Not-tagged	10,678.00	98.6
Tagged	13	0.1	Tagged	40	0.4	Tagged	154	1.4
Total	10,832.00	100	Total	10,832.00	100	Total	10,832.00	100

- Rule 6 (missing prices): Items that were consumed but have zero or missing prices are replaced with the item-specific median price. This is another point where a bulk of the corrections are made

Missing price			Zero price		
	No.	%		No.	%
Not-tagged	9,478.00	87.5	Not-tagged	10,465.00	96.6
Tagged	1354	12.5	Tagged	367	3.4
Total	10,832.00	100	Total	10,832.00	100

- Rule 7 (price outliers): Prices in the item-specific price per kilogram distribution that lie above the 95th percentile are replaced with item-specific medians.

	No.	%
Not-tagged	8,943.00	94.4
Tagged	535	5.6
Total	9,478.00	100

All medians are estimated at the EA level if a minimum of 5 observations are available. If the minimum number of observations is not met, weighted medians are estimated at the strata-level requiring a minimum number of 10 observations before proceeding to the item level. Medians are estimated excluding zero values and tagged values so as not to replace reported values with zeroes or invalid values.

Non-Food
The non-food dataset only contains price values without quantities and units. Two cleaning rules are applied and tagged observations are replaced with item-specific medians at the EA, state, and survey level as is done for food consumption. In total, the cleaning rules affect about an eighth of prices, also primarily due to replacing missing values.

Table 4: Overall impact of non-food cleaning rules

	No.	%
Not-tagged	7,997.00	87.3
Tagged	1,161.00	12.7
Total	9,158.00	100

Source: Authors' own calculations based on HFS 2016

The cleaning rules are the following:

- Rule 1 (price outliers): Prices that are beyond the hard constraints, above or below, are replaced with item-specific medians.

Above hard constraints				Below hard constraints		
	No.	%			No.	%
Not-tagged	9,091.00	99.3		Not-tagged	9,005.00	98.3
Tagged	67	0.7		Tagged	153	1.7
Total	9,158.00	100		Total	9,158.00	100

- Rule 2 (zero or missing prices): Zero and missing prices for consumed items are replaced with item-specific medians.

Zero price				Missing price		
	No.	%			No.	%
Not-tagged	9,106.00	99.4		Not-tagged	8,217.00	89.7
Tagged	52	0.6		Tagged	941	10.3
Total	9,158.00	100		Total	9,158.00	100

The medians are calculated following exactly the same process as in food cleaning. All medians are estimated at the EA level if a minimum of 5 observations are available. If the minimum number of observations is not met, weighted medians are estimated at the strata-level requiring a minimum number of 10 observations before proceeding to the item level. Medians are calculated excluding zero values and tagged values so as not to replace reported values with zeroes or invalid values.

Durables

For durables, the quantity of an item is replaced by the item-specific survey median (due to paucity of data) if the reported quantity is unrealistically high assessed by manual inspection. The purchase value of durables is recorded in the year and currency of purchase. Outliers of purchase values in the reported currency are identified by hard constraints and replaced by the item-specific survey median. Items with at least 3 observations purchased in the same year are replaced by the respective item-year specific median. Alternatively, the item-state-level median prices are used if at least 5 observations are given. Hypothetical selling prices are replaced by the item-state level median if at least 5 observations are available. Without the minimum number of observations available, the item-specific median is used. All prices reported in foreign currencies are converted into SSP through conversion to USD.

This next section tabulates the number of values that are tagged by each cleaning rule.

- Rule 1 (quantity outliers): Quantities above 100 units of an asset are replaced with the item-specific median.

	No.	%
Not-tagged	3,868.00	99.6
Tagged	14	0.4
Total	3,882.00	100

- Rule 2 (price outliers): (i) Prices above hard constraints are replaced with the item-specific median. (ii) For specific assets where outliers are identified that fall below the hard constraints and for which we have enough observations to estimate a distribution, the top 5 percent of observations are replaced with item-specific medians.

Purchase price above hard constraints			Selling price above hard constraints		
	No.	%		No.	%
Not-tagged	3,639.00	93.7	Not-tagged	3,652.00	94.1
Tagged	243	6.3	Tagged	230	5.9
Total	3,882.00	100	Total	3,882.00	100

Purchase price outliers			Selling price outliers		
	No.	%		No.	%
Not-tagged	3,752.00	96.7	Not-tagged	3,805.00	98
Tagged	130	3.3	Tagged	77	2
Total	3,882.00	100	Total	3,882.00	100

- Rule 3 (missing prices and quantities): Missing quantities and prices are replaced with the item-specific median. Similarly to food and nonfood, this is where the bulk of replacements come from.

Missing Quantity		
	No.	%
Not-tagged	3,789.00	97.6
Tagged	93	2.4
Total	3,882.00	100

Missing purchase price			Missing selling price		
	No.	%		No.	%
Not-tagged	2,459.00	63.3	Not-tagged	1,309.00	33.7
Tagged	1423	36.7	Tagged	2573	66.3
Total	3,882.00	100	Total	3,882.00	100

- Rule 4 (missing vintages): Items with missing vintages are replaced with the item-specific median.

	No.	%
Not-tagged	3,056.00	78.7
Tagged	826	21.3
Total	3,882.00	100

Rapid Consumption Methodology: Food and Non-Food Aggregates

The survey used the new Rapid Consumption methodology to estimate consumption. A detailed description including an ex post assessment of the methodology is available in a separate document.[21] The rapid survey consumption methodology consists of five main steps. First, core items are selected based on their importance for consumption. Second, the remaining items are partitioned into optional modules. Third, optional modules are assigned to groups of households. Fourth, after data collection consumption of optional modules is imputed for all households. Fifth, the resulting consumption aggregate is used to estimate poverty indicators.

First, core consumption items are selected. Consumption in a country bears some variability but usually a small number of a few dozen items captures the majority of consumption. These items are assigned to the core module, which will be administered to all households. Important items can be identified by its average food share per household or across households. Previous consumption surveys in the same country or consumption shares of neighboring / similar countries can be used to estimate food shares.[22] In the worst case, a random assignment results in a larger standard error but does not introduce a bias.

Table 5: Core vs. module shares

	Food Consumption				Non-Food Consumption			
	Number of items	Share of NBHS 2009	Share of HFS 2016	Share HFS 2016 (imputed)	Number of items	Share NBHS 2009	Share HFS 2016	Share HFS 2016 (imputed)
Core	33	80%	93.2%	92.9%	26	65%	91.9%	91.6%
Module 1	27	5%	2.1%	2.2%	21	8%	1.8%	1.8%
Module 2	26	5%	1.4%	1.4%	20	9%	1.7%	1.7%
Module 3	26	5%	2.3%	2.4%	18	7%	3.3%	3.4%
Module 4	28	5%	1.0%	1.1%	25	11%	1.3%	1.4%

Source: Authors' own calculations based on NBHS 2009 and HFS 2015 data

Second, non-core items are partitioned into optional modules (four modules in the case of the South Sudan HFS; Table 5). Different methods can be used for the partitioning into optional modules. In the simplest case, the remaining items are ordered according to their food share and assigned one-by-one while iterating over the optional module in each step. A more sophisticated method takes into account correlation between items and partitions them into orthogonal sets per module. This leads to high

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[21] Pape & Mistiaen (2015), "Measuring Household Consumption and Poverty in 60 Minutes: The Mogadishu High Frequency Survey", World Bank (2015).

[22] As shown later, the assignment of items to modules is very robust and, thus, even rough estimates of consumption shares are sufficient to inform the assignment without requiring a baseline survey.

correlation between modules supporting the total consumption estimation. Conceptual division into core and optional items is not reflected in the layout of the questionnaire. Rather, all items per household will be grouped into categories of consumption items (like cereals) and different recall periods. Using CAPI, it is straight-forward to hide the modular structure from the enumerator.

Third, optional modules will be assigned to groups of households. Assignment of optional modules will be performed randomly stratified by enumeration areas to ensure appropriate representation of optional modules in each enumeration area. This step is followed by the actual data collection.

Fourth, household consumption will be estimated by imputation. The average consumption of each optional module can be estimated based on the sub-sample of households assigned to the optional module. In the simplest case, a simple average can be estimated. More sophisticated techniques can employ a welfare model based on household characteristics and consumption of the core items. The results presented in this note uses a multiple imputation technique based on a multi-variate normal approximation.

Next, the methodology is formalized and assessed using an *ex post* simulation based on the NBHS 2009 data. Food and non-food consumption for household *i* are estimated by the sum of expenditures for a set of items

$$y_i^f = \sum_{j=1}^{m} y_{ij}^f \text{ and } y_i^n = \sum_{j=1}^{m} y_{ij}^n$$

where y_i^f and y_i^f denote the food and non-food consumption of item *j* in household *i*. As the estimation for food and non-food consumption follows the same principles, we neglect the upper index *f* and *n* in the remainder of this section. The list of items can be partitioned into M+1 modules each with m_k items:

$$y_i = \sum_{k=0}^{M} y_i^{(k)} \text{ with } y_i^{(k)} = \sum_{j=1}^{m_k} y_{ikj}$$

For each household, only the core module $y_i^{(0)}$ and one additional optional module $y_i^{(k^*)}$ are collected.

The item assignment to the modules are based on the NBHS 2009 survey with manual modifications especially to treat 'other' items correctly.[23] The core module was designed to maximize its consumption share resulting in 85 percent and 65 of food and non-food consumption respectively, based on NBHS 2009 consumption. Optional modules are constructed using an algorithm to assign items iteratively to optional modules so that items are orthogonal within modules and correlated between modules. In each step, an unassigned item with highest consumption share is selected. For each module, total per capita consumption is regressed on household size, the consumption of all assigned items to this module as well as the new unassigned item. The item will be assigned to the module with the highest increase in the R2 relative to the regression excluding the new unassigned item. The sequenced assignment of items based on their consumption share can lead to considerable differences in the captured consumption share across optional modules. Therefore, a parameter is introduced ensuring that in each step of the assignment procedure the difference in the number of assigned items per module does not exceed *d*.

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[23] Items 'other' are often found to capture remaining items for a food category. Using the Rapid Consumption Methodology, this creates problems as 'other' will include different items depending on which optional module is administered. This can lead to double-counting after the imputation. Therefore, 'other' items are re-formulated and carefully assigned so that double counting cannot occur.

Using *d=1* assigns items to modules (almost) maximizing equal consumption share across modules.[24] Increasing *d* puts increasing weight on orthogonality within and correlation between modules. The parameter was set to *d=3* balancing the two objectives.

In each enumeration area, 12 households were interviewed with an ideal partition of three items per optional module. The assignment of optional modules must ensure that a sufficient number of households are assigned to each optional module. Household consumption was then estimated using the core module, the assigned module and estimates for the remaining optional modules

$$\hat{y}_i = y_i^{(0)} + y_i^{(k^*)} + \sum_{k \in K^*} \hat{y}_i^{(k)}$$

where $K^* := \{1, \dots, k^* - 1, k^* + 1, \dots, M\}$ denotes the set of non-assigned optional modules. Consumption of non-assigned optional modules is estimated using multiple imputation techniques taking into account the variation absorbed in the residual term.

Multiple imputation was implemented using multi-variate normal regression based on an EM-like algorithm to iteratively estimate model parameters and missing data. This technique is guaranteed to converge in distribution to the optimal values. An EM algorithm draws missing data from a prior (often non-informative) distribution and runs an OLS to estimate the coefficients. Iteratively, the coefficients are updated based on re-estimation using imputed values for missing data drawn from the posterior distribution of the model. The implemented technique employs a Data-Augmentation (DA) algorithm, which is similar to an EM algorithm but updates parameters in a non-deterministic fashion unlike the EM algorithm. Thus, coefficients are drawn from the parameter posterior distribution rather than chosen by likelihood maximization. Hence, the iterative process is a Monte-Carlo Markov –Chain (MCMC) in the parameter space with convergence to the stationary distribution that averages over the missing data. The distribution for the missing data stabilizes at the exact distribution to be drawn from to retrieve model estimates averaging over the missing value distribution. The DA algorithm usually converges considerably faster than using standard EM algorithms:

$$\hat{y}_i^{(k)} = \beta_0^{(k)} y_i^{(0)} + x_i^T \beta^{(k)} + u_i^{(k)}$$

The performance of the estimation technique was assessed based on an *ex post* simulation using the NBHS 2009 data and mimicking the Rapid Consumption methodology by masking consumption of items that were not administered to households. The results of the simulation were compared with the estimates using the full consumption from NBHS 2009 as reference. The simulation results distinguish between different levels of aggregation to estimate consumption.[25] The methodology generally does not perform well at the household level (HH) but improves considerably already at the enumeration area level (EA) where the average of 12 households is estimated. At the national aggregation level, the Rapid Consumption methodology slightly over-estimates poverty by 1.6 percent Assessing the standard poverty measures including poverty headcount (FGT0), poverty depth (FGT1) and poverty severity (FGT2), the

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[24] Even with *d=1*, equal consumption share across modules is not maximized because among the modules with the same number of assigned items, the new item will be assigned to the module it's most orthogonal to; rather than to the module with lowest consumption share.

[25] The performance of the estimation techniques is presented using the relative bias (mean of the error distribution) and the relative standard error. The relative error is defined as the percentage difference of the estimated consumption and the reference consumption (based on the full consumption module, averaged over all imputations). The relative bias is the average of the relative error. The relative standard error is the standard deviation of the relative error. The simulation is run over different household-module assignments while ensuring that each optional module is assigned equally often to a household per enumeration. The relative bias and the relative standard error are reported across all simulations.

simulation results show that the Rapid Consumption methodology retrieves almost unbiased estimates (Figure 42). Generally, the estimates are robust as suggested by the low standard errors (Figure 43).

Figure 42: Relative bias of simulation results using Rapid Consumption estimation
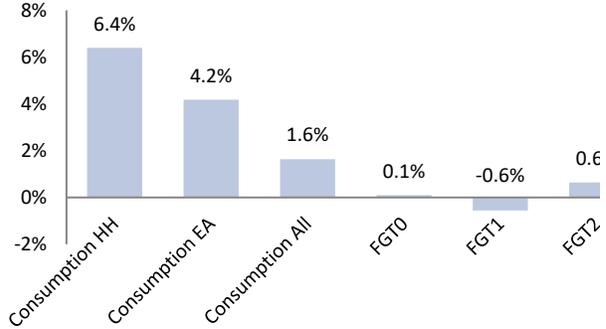
Figure 43: Relative standard error of simulation results using Rapid Consumption estimation

Source: Authors' own calculations based on NBHS 2009 data
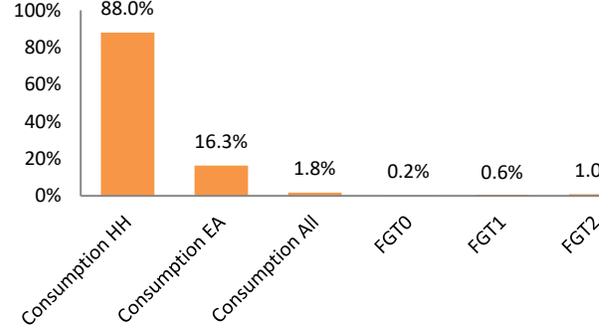
Source: Authors' own calculations based on NBHS 2009 data

Durable consumption flow

The consumption aggregate includes the consumption flow of durables calculated based on the user-cost approach. The consumption flow distributes the consumption value of the durable over multiple years. The user-cost principle defines the consumption flow of an item as the difference of selling the asset at the beginning and the end of the year as this is the opportunity cost of the household for keeping the item. The opportunity cost is composed of the difference in the sales price and the forgone earnings on interest if the asset is sold at the beginning of the year.

The current price of the durable is p_t. If the durable item would have been sold one year ago, the household would have received the market price for the item twelve months ago plus the interest on the revenue for one year. The market price from twelve months ago is calculated by adjusting for inflation π_t and annual physical or technological depreciation rate δ arriving at[26]

$$(7) \qquad \frac{p_t(1 + i_t)}{(1 + \pi_t)(1 - \delta)}$$

with the nominal interest rate denoted as i_t. Alternatively, the household can use the durable and sell it after one year of usage for the current market price p_t. The difference between these two values is the cost that the household is willing to pay for using the durable good for one year. Hence, the consumption flow is:

$$(8) \qquad y^d = \frac{p_t(1 + i_t)}{(1 + \pi_t)(1 - \delta)} - p_t$$

By assuming that $\delta \times \pi_t \cong 0$, the equation simplifies to

$$(9) \qquad y^d = \frac{p_t(r_t + \delta)}{(1 + \pi_t - \delta)}$$

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[26] Assuming a constant depreciation rate is equivalent to assuming a "radioactive decay" of durable goods (see Deaton and Zaidi, 2002).

where r_t is the real market interest rate $i_t - \pi_t$ in period t. Therefore, the consumption flow of an item can be estimated by the current market value p_t, the current real interest rate r_t, the inflation rate π_t and the depreciation rate δ. Assuming an average annual inflation rate π, the depreciation rates δ can be estimated utilizing its relationship to the market price[27]:

(10)
$$p_t = p_{t-k}(1 + \pi)^k (1 - \delta)^k$$

The equation can be solved for δ obtaining:

(11)
$$\delta = 1 - \left(\frac{p_t}{p_{t-k}}\right)^{\frac{1}{k}} \frac{1}{(1 + \pi)}$$

Based on this equation, item-specific median depreciation rates are estimated assuming an inflation rate of 0.5 percent, a nominal interest rate of 5.5 percent and, thus, a real interest rate of 5 percent (Table 6). Due to the paucity of data in Wave 2, the depreciation rates calculated with Wave 1 data are used to estimate durables consumption flow.

Table 6: Estimated median depreciation rates based on Wave 1 data

Assets	Depreciation rate[28]
Cars	0.05
Trucks	0.02
Motorcycle/motor	0.12
Rickshaw	0.12
Bicycle	0.04
Canoe or boat	0.04
Plough	0.21
Television	0.04
Satellite dish	0.12
DVD or CD player	0.16
Radio or transistor	0.17
Mobile phone	0.21
Computer or laptop	0.03
Refrigerator	0.05
Fan	0.16
Mattress or bed	0.10
Mosquito net	0.11
Electric ironer	0.07
Hoe, spade or axe	0.12

Source: Authors' own calculations based on HFS 2015

For all households owning a durable but that did not report the current value of the durable, the item-specific median consumption flow is used. For households that own more than one of the durable, the

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[27] In particular π solves the equation $\prod_{i=t-k}^{t}(1 + \pi_i) = (1 + \pi)^k$

[28] Washing machines and Air conditioners were not bought

consumption flow of the newest item is added to the item-specific median of the consumption flow times the number of those items without counting the newest item.[29]

Deflator

Prices fluctuated considerably in South Sudan while the survey was conducted. The HPI price index based on the HFS market price survey increased from 5.3 in mid-January to 7.8 by the end of May 2016, indicating a price increase of 47 percent. Thus, prices need to be adjusted to make consumption comparable across duration of fieldwork. The Laspeyres index is chosen as a deflator due to its moderate data requirements. The deflator is calculated by month of data collection based on the price data collected within the HFS household survey.

The Laspeyres index reflects the item-weighted relative price differences across products. Item weights are estimated as household-weighted average consumption share across all households before imputation. Based on the democratic approach, consumption shares are calculated at the household level. Core items use total household core consumption as reference while items from optional modules use the total assigned optional module household consumption as reference. The shares are aggregated at the national level (using household weights) and then calibrated by average consumption per module to arrive at item-weights summing to 1. The item-weights are applied to the relative differences of median item prices for each month. Missing prices are replaced by the item-specific median over all households. A large Laspeyres indicates a high price level, requiring consumption to be deflated more strongly, than with a lower Laspeyres index. The resulting indices show the large fluctuation of prices in South Sudan over the period of the survey implementation as observed by the HFS market price surveys. One deflator is calculated for food consumption and another for non-food consumption. Durables are deflated using the non-food consumption deflator.

Table 7: Laspeyres Deflators[30]

Month	Food	Non-Food
January	0.76	1.15
February	1.00	1.00
March	1.05	1.11
April	1.14	1.44
May*	1.14	1.44

Source: Authors' own calculations based on HFS 2015

The overall consumption aggregate is then deflated again using the CPI calculated by the NBS for comparison with Wave 1, with the reference month defined as July 2015. The latter reference month is used to update the international PPP poverty line from 2011 to 2015. The NBS CPI was equal to 239.906 in July 2015 and 517.190 in February 2016. The deflator used to deflate consumption between the two waves is the ratio of these two variables and is therefore equal to 2.156.

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[29] The 2015 HFSSS questionnaire provides information on a) the year of purchase and b) the purchasing price only for the most recent durable owned by the household.

[30] Some months had very low number of interviews (61 in April and 23 in May); those months marked with * are therefore estimated relative to the prior month that included data.

Tables for Cleaning Rules

Table 8: Summary of outlier cleaning rules for food items

Unit	Condition	Correction	Affected Records[31]
Basin (10 liter)	>=10	divide by 10 to obtain liters	6,7
Bundle (100g)	>=100	divide by 100 to obtain grams	6, 7
Cup (200g)	>=100	divide by 200 to obtain grams	3, 8
Grams	<=5	multiply by 1000 to obtain kilograms	117,111
Grams	>=10000	divide by 10 to obtain hundred grams	10,10
Heap (100g)	>=100	divide by 100 to obtain grams	5,5
Kilogram	>=100	divide by 1000 to obtain grams	6,22
Liter	>=100	divide by 1000 to obtain milliliters	3,3
Milliliters	<=5	Multiply by 1000 to obtain liters	27,23
Sack (50kg)	>=10	divide by 50 to obtain kilograms	2,2

Source: Authors' own calculations based on HFS 2015

Table 9: Hard constraints for standard units of food items[32]

Unit	Minimum	Maximum
basin (10 liter)	0.1	20
cup	0.2	200
cup (200g)	0.2	100
gram	10	10,000
heap (100g)	0.1	200
heap (150g)	0.02	1,000
heap (200g)	0.1	100
heap (300g)	0.2	40
heap (700g)	0.2	40
kilogram	0.02	50
liter	0.02	50
piece	0.2	200
plate	0.2	70
sack (50kg)	0.02	5

Source: Authors' own calculations based on HFS 2015 and 2016 data

Table 10: Non-standard hard constraints for other food items

Items	Unit	Minimum	Maximum
Milokhia (green leaf)	bundle (100g)	0.1	70
Green spicy (pungent)	bundle (100g)	0.1	200
Dates; Insects	cup (200g)	0.02	50
Natural groundnut (Roasted); Okra dry powder (waika)	cup (200g)	0.02	100
Dry Egyptian beans (local); Ghee (samin)	cup (200g)	0.02	500

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[31] The first number indicates the number of affected records reported for consumption while the second number states the number of affected records for purchases.

[32] These minimum and maximum values were used for outlier detection based on reported consumption. For outlier detection based on reported purchasing, the same minimum thresholds were used and the maximum thresholds were four times higher than those used for consumption. This same method was applied to both the standard and nonstandard constraints.

Fresh milk	cup (200g)	0.02	1,000
Food salt	cup (200g)	0.1	50
Natural honey	cup (200g)	0.1	100
Sugar	cup (200g)	0.2	500
Tomato sauce (small pack of 70 grams)	gram	0.2	10,000
Green okra	gram	2	3,000
Nescafe (coffee instant); Tobacco; Honeyed tobacco	gram	10	5,000
Dried fish (local); Tinned fish, sardine 125 grams, tuna, etc	gram	10	20,000
Dry okra (dry Alweka)	heap (100g)	0.02	200
Cinnamon powder	heap (100g)	0.1	100
Green okra	heap (100g)	0.2	30
Groundnut flour; Lentils;	heap (700g)	0.02	150
Fresh meat: beef, goat, sheep, pork, other	heap (700g)	0.02	150
Feet from sheep/goat; beef/cow/veal/mutton intestines	heap (700g)	0.02	150
Food salt	kilogram	0.02	5
Maize (in the cob); Wheat	kilogram	0.02	75
Liquor	milliliter	40	5,000
Cigarettes	packet	0.1	100
Yeast	packet (20g)	0.2	100
Chocolate	packet (30g)	0.2	500
Tea bags	packet (50g)	0.2	30
Local biscuit	packet (70g)	0.2	200
Jelly	packet (200g)	0.2	50
Candy	packet (200g)	0.2	100
Reels of pasta	packet (400g)	0.02	400
Head from cow/veal (fresh and clean without skin)	piece	0.002	25
Chicken and poultry	piece	0.02	25
Small animals (rabbits, mice, etc...); Feet from cow/veal	piece	0.02	50
Head from sheep/goat (fresh and clean without skin)	piece	0.02	75
Cucumber; Fissekh, salted fish (local); Fresh fish	piece	0.02	200
Maize (on the cob)	piece	0.02	600
Sweet potato; Other roots, tubers, vegetables	piece	0.02	1,000
Local mineral water 1.5 liters	piece	0.2	50
Pineapple	piece	0.2	70
Cooking banana; Cassava tubers	piece	0.2	100
Local mineral water 0.5 liters; Papaya	piece	0.2	150
Carrots; Tea bags; Fresh tomatoes	piece	0.2	1,000
Jam (the malty) & jelly	tin (300g)	0.04	50

Source: Authors' own calculations based on HFS 2015 and 2016 data

Table 11: Hard constraints for non-food item expenditure (in currency)

Item or Service	Minimum	Maximum
Accommodation services, hotel rent etc…	3	1,500

Antibiotics	0.1	850
Bathing soap	0.1	100
Birth certificate fees	3	650
Birth in general hospital	5	1,400
Boda-boda, taxi and bus fares	0.5	600
Bulb charger (imported)	4	800
Carpet, imported	1.7	25,000
Charges for official documents, including ID card	5	1,000
Clothing materials, tissue etc…	5	1,100
Compulsory car insurance	5	7,500
Cooking set (pots)	2.5	900
Cost of sending mail, parcels	1	500
Cough Syrup medicine (cold)	0.1	600
Decoration for women	1	1,500
Driving license fees	22.5	2,500
Drug tabs and roots for reducing fever and malaria	0.1	500
Dry-cell battery (Haggar battery, large size)	0.5	200
Electrical link	4	750
Faucet (tap)	2.5	750
Filling and treatment of teeth	1	750
Filling of refrigerator gas	14	2,000
Football and other sports equipment	3	1,125
Fuel, oils and lubricants for personal transport	0.6	750
Furniture except bed/mattress	5	17,500
Girl's clothing	3	1,500
Girl's shoes, imitation leather	2	700
Glass bowl (imported)	2	700
Glass for building	5	2,000
Glass plate	0.3	300
Government hospital	8	1,500
Hair cut for men, hair dressing for women	0.5	1,000
Hand operated screwdriver	1	300
Hand saw	2	800
Hats and ties	1	600
Hearing aid	10	1,500
Infant and boys clothing	2	1,000
Lady's clothing	5	2,000
Laundry soap (local)	0.2	440
Laundry, repair and rental	1	500
Linoleum / plastic flooring	5	1,250
Maintenance and repair of personal transport	2.5	3,000
Malaria blood testing	0.2	400

Marriage document fees	2.5	500
Match boxes	0	20
Medical consultation at hospital	1	500
Medical eye glasses	20	1,750
Men's Slippers	0.5	400
Men's clothing	5	2,000
Men's shoes (normal skin)	5	1,250
Mixer repair	1.5	600
Mobile airtime and internet and fax fees	0.5	750
Mobile and fixed phone costs and their repair	2	2,500
Monthly water fees	5	1,500
Movement and freight using train or road transport	10	3,000
Neon bulb	0.5	250
Newspapers and periodicals	0.2	60
Occupied family housing maintenance cost	10	10,000
Operations in hospital	8	3,500
Ordinary razor	0.1	50
Organized travels incl. Hajj and Umrah	30	74,000
Other	0.1	70
Other electrical household appliances repair	1.5	600
Other kind of domestic services	4	3,500
Other materials for housing maintenance (no cement or bulbs)	5	2,250
Other personal care services	2	750
Other pharmaceutical products except antibiotics	0.1	500
Other related fees and services	0.5	1,750
Other tests (blood, urine, feces)	0.5	500
Ownership document for real estate	50	5,000
Paraffin lamp	0	750
Participation and fees in sports clubs and tickets	0.2	100
Passport fees	30	1,750
Photographic and computers tapes/CD	0.5	200
Physiotherapy	5	750
Pillows and blankets	5	1,500
Planning blood vessels	0.2	750
Portland cement	5	3,000
Post-secondary education / Higher education	150	12,500
Preprimary and primary education	5	15,000
Private hospital	17	12,500
Relating insurance transport	5	2,500
Sauna bath	0.5	400
Secondary education	40	10,000
Service cost weekly salary at family house	4	10,000

Shampoo, creams and perfumes	2	1,000
Small electric hairdryer, etc…	5	750
Soap (powder)	0.8	700
Spare parts and accessories for personal transport	0.5	1,000
Specialist and general doctors	10	2,500
Spending on books including textbooks	2	750
Spending on pets and related products	1.5	400
Spoons, knives, forks	0.3	500
Stationary and painting	0.5	750
Suitcase, schoolbags, etc…	1.3	1,250
Switch (electric)	0.5	300
Tailoring fees	1	750
Talh wood and shaf	1	500
Tea cups, glasses, etc…	2.5	700
Telephone subscription fees (no airtime)	2	700
Tickets for air travel	50	4,000
Tickets for travel by sea or river	8	2,500
Tools and hand equipment	6	1,250
Toothpaste and toothbrush	0.5	300
Torch/Flash light	0.5	250
Traditional healers fee/medicine	1	2,500
Tree branch shears	4	750
Unspecified educational level	10	7,500
Waste fees	1	700
Women's leather slippers	3	600
Women's shoes (normal skin)	1.5	1,000
Wristwatch and wall clock	5	1,500
X-ray test	5	750

Source: Authors' own calculations based on HFS 2015 and 2016 data

Table 12: Hard constraints for assets (in currency)

Item	Minimum	Maximum
Air cooler or air conditioner	0.01	1,000
Bicycle	0.01	2,000
Canoe or boat	0.01	5,000
Cars	0.01	90,000
Computer or laptop	0.01	5,000
DVD or CD player	0.01	1,500
Electric ironer	0.01	250
Fan	0.01	500
Hoe, spade or axe	0.01	1,000
Mattress or bed	0.01	2,000
Mobile phone	0.01	2,000
Mosquito net	0.01	500
Motorcycle/motor	0.01	15,000
Plough	0.01	6,000
Radio or transistor	0.01	500
Refrigerator	0.01	4,000
Rickshaw	0.01	9,000
Satellite dish	0.01	2,500
Television	0.01	7,000
Trucks	0.01	150,000
Washing machine	0.01	4,000

Source: Authors' own calculations based on HFS 2015 and 2016 data