

Poverty and Inequality in Sudan: 2009-2014

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This report was prepared by Simon Lange (Junior Professional Officer, GPV01) and Alvin Etang Ndip (Senior Economist, GPV01). Many thanks to Nobuo Yoshida (Lead Economist, GPV01) for invaluable inputs made at several stages of the writing of this report as well as Sergio Olivieri (Senior Economist, GPV04) and Carolina Mejia-Mantilla (Economist, GPV01) for useful peer reviewer comments. The report benefited greatly from discussions with Pierella Paci (Practice Manager, GPV01), Andrew Dabalen (Practice Manager, GPV07), Adama Coulibaly (Resident Representative, Sudan), Mohamed Osman (Operations Officer, AFMSD), Jeff Chelsky (Lead Economist, GMTDR), Jean-Pierre Chauffour (Lead Economist, GMTA4), Michael Geiger (Senior Economist, GMTA3), Mosllem Ahmed Alamir (Senior Economist, GMTA4), Tomomi Tanaka (Senior Economist, GPV07), Utz Johann Pape (Senior Economist, GPV01), Eiman Adil Mohamed Osman (Consultant, GPV01), Åsa Giertz (Senior Agricultural Economist, GFA13), Dmitry Chugunov (Consultant, GED01), Omer Nasir Elseed (Senior Education Specialist, GED01), Thanh Thi Mai (Senior Education Specialist, GED13), and Fareed M.A. Hassan (Consultant, GWA08).

Vice President	Hafez Ghanem
Country Director	Carolyn Turk
Senior Director	Carolina Sanchez-Paramo
Practice Manager	Pierella Paci
Task Team Leader	Alvin Etang Ndip

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List of Abbreviations

ACLED	Armed Conflict Location & Event Data Project
CBS	Central Bureau of Statistics
CPI	Consumer Price Index
DK/NA	Don't know/not applicable
EIU	Economist Intelligence Unit
FGT	Foster-Greer-Thorbecke
GoS	Government of Sudan
LPM	Linear Probability Model
NHBPS	National Household Budget and Poverty Survey
NHBS	National Household Baseline Survey
NISS	National Intelligence and Security Services
OLS	Ordinary Least Squares
PPP	Purchasing Power Parities
RSF	Rapid Support Forces
SDG	Sudanese Pound
USD	US Dollar
VA	Value Added

Executive summary

1. **A severe slow-down in economic growth and persistent macroeconomic imbalances characterizes the period between 2009 and 2014 in Sudan.** The loss of a large fraction of oil revenues the accompanied the secession of South Sudan in 2011 constituted a significant macroeconomic shock. Consequences included lower growth, a widening trade deficit, a shortage of foreign exchange, periodic bouts of inflation, and continued pressure on Sudan's currency, including the emergence of multiple exchange rates after 2011. The Government of Sudan (GoS) has responded by implementing a series of short-term adjustment measures, including devaluations of the Sudanese Pound (SDG) and the removal of some subsidies for fuel and, more recently, wheat. Deteriorating conditions have been made worse by inadequate policies, including deficit monetization. This has turned broad-based economic weaknesses into an economic crisis, as evidenced by recent shortages in staple foods and fuel.

2. **The present report serves three purposes:** (1) to establish a profile of poverty and shared prosperity for Sudan and thus establish a new baseline against which progress in poverty reduction can be measured, (2) to establish an understanding of the effects of recent macroeconomic shocks and sustained imbalances on poverty, inequality, and shared prosperity, and (3) to build the evidence base for the formulation of medium- and long-term strategies to foster inclusive growth and poverty reduction in Sudan. The analysis is based primarily on the two most recent household budget surveys, the 2009 National Household Baseline Survey (NHBS) and the 2014/15 National Household Budget and Poverty Survey (NHBPS). While there have been differences in methodology, survey design and implementation that need to be considered in interpreting estimates, comparisons of levels in poverty and other relevant indicators over time are still informative.

Between 2009 and 2014, extreme poverty fell by 1.4 percentage points while moderate poverty increased by 5.6 percentage points.

3. **The population share living on less than USD1.90 (in 2011 PPPs) per person and day decreased only modestly while the share living on less than USD3.20 increased.** Between 2009 and 2014, ten out of the 15 states saw a decrease in average real per capita consumption. By the end of 2014, poverty as measured by the World Bank's UDS1.90-poverty line (henceforth, *extreme poverty*), a standard typical of low-income countries, was 13.5 percent, down from 14.9 percent in mid-2009. On the other hand, poverty as measured by the World Bank's USD3.20-poverty line (henceforth, *moderate poverty*), a standard typical for lower-middle income countries, increased from 40.5 percent to 46.1 percent. These trends are broadly in line with low rates of real GDP per capita between 2009 and 2014.

4. **Driven by a bumper crop as well as differences in the timing of survey work between 2009 and 2014, poverty reduction in rural areas was likely a temporary phenomenon.** Between 2009 and 2014, extreme poverty among rural Sudanese decreased from 20.8 to 15.7 percent and moderate poverty decreased from 51.1 to 49.5 percent. However, one key challenge in establishing comparable poverty estimates that this analysis contends with is the timing of surveys, with the 2014/15-survey conducted during the harvesting season and during an above-average harvest and the 2009-survey conducted at the beginning of the lean season. There are several indications (including employment indicators, household incomes, and wage data) that elevated consumption levels in rural areas are linked primarily to agriculture and may therefore be temporary. On the other hand, rising real prices for agricultural outputs may further accelerate this trend.

5. **Poverty in urban areas, particularly in Khartoum, increased markedly.** Extreme poverty in urban areas increased from 4.2 to 9.5 percent while moderate poverty increased from 21.4 to 39.8 percent. While only one third of the population resides in urban areas, the increase in moderate poverty is entirely driven by the increase there. In Khartoum state, the most urbanized of Sudan's 18 states, extreme poverty climbed from 3.3 percent in 2009 to 9.4 percent in 2014. The state now accounts for twelve percent of the extreme poor, up from four percent in 2009. Khartoum also accounts for close to two thirds of the overall increase in moderate poverty. The end of the oil economy and subsequent changes in the macroeconomic environment hit urban areas through a decline in labor demand and an erosion of real wages.

Spatial inequities remain a main impediment to equitable growth and poverty reduction.

6. **While living standards are moderately high in Sudan's northern region and in Khartoum, a lack of investment and political instability have contributed to high levels of poverty in peripheral regions in the west, south, and east.** Poverty rates are above the national average in all of the five Darfuri states, all three states that make up Kordofan, as well as Blue Nile and Red Sea states. The lowest poverty rates by far are found in Northern state and River Nile state in Sudan's northern region. Any successful development strategy to bring about sustainable growth and poverty reduction should therefore build on policies and programs to address these spatial inequities.

Fluctuations in agricultural output between years and intra-seasonal variability in demand for agricultural labor affect poverty trends in rural areas.

7. **Lower levels of poverty in rural areas are driven by both inter- and intra-seasonal variation linked to the agricultural calendar; agricultural productivity continues to fall.** Between 2009 and 2014, agricultural yields stagnated and labor productivity in agriculture decreased, suggesting that the decrease in rural poverty is not structural. Instead, favorable weather conditions temporarily increased agricultural output in 2014 vis-à-vis 2009. Moreover, the 2009 survey was conducted in May, the peak of the lean season in which prices for staple crops tend to be close to their all-year high, while the 2014 survey was conducted in November, the month in which sorghum and millet is harvested and in which demand for agricultural labor peaks. The report therefore argues that the modest decrease in rural poverty will have been transitory.

While overall inequality remains moderately low, inequality in Khartoum increased sharply.

8. **Inequality remains moderately low.** At the national level inequality as measured by the Gini index¹ fell from 35.4 to 34.2 percent. However, inequality has increased by seven percentage points in Khartoum with declining inequality in states with a larger rural population share. It is conceivable that the latter result is also due to differences in the timing of survey work. Gains in rural areas and falling living standards in urban areas are the driving forces behind the modest decline in inequality at the national level. However, inequality in urban areas, particularly in Khartoum, has increased sharply, from 33.1 percent in 2009 to 40.6 in 2014.

9. **Real wages and salaries are the main drivers of changes in poverty and inequality.** Changes in household per capita income across the distribution of consumption closely track changes in per capita

¹ A Gini index of one would indicate maximum inequality, with all consumption accruing to one individual, while a Gini of zero would indicate complete equality of incomes.

consumption: while per capita household income increased among the bottom fifth, it decreased in all other quintiles. Wages and salaries account for more than two fifths, the largest share among different income sources. And while real wage and salary incomes have fallen for most households, they have increased among the poorest 20 percent. Real wages fell substantially, particularly in oil-related sectors and in sectors associated with public employment.

Unemployment in urban areas, especially among youth, increased sharply.

10. **Unemployment in urban areas increased sharply – particularly among the youth – and real wages decreased outside of agriculture.** Between 2009 and 2014, overall unemployment fell while labor force participation increased. However, labor force participation, particularly among women, continues to be very low. Unemployment in urban areas, where it is strongly associated with poverty, has increased sharply, to 16.8 percent among all working-age adults and to close to 40 percent among youth.

The nearing the first stage of the demographic transition provides an opportunity.

11. **Demographic trends point to the potential nearing of a turning point after which the share of working-age adults in the total population could increase substantially.** Sudan still has a very young population: every second Sudanese is below the age of 18 and only 4.2 percent are older than 64. However, total fertility is projected to fall as low as four children born per woman over her lifetime within the next 5-6 years. That number is usually associated with the transition of a country towards the first stage of the demographic transition during which the share of working-age adults in the population begins to increase. While this stage is typically associated with increasing opportunities for investment and growth, it also raises the stakes today and calls for rapid employment generation and human capital investment. To fully take advantage of the demographic transition, it will be paramount to tackle the challenge of youth unemployment.

Levels of educational attainment and literacy in the adult population are low; but school attendance and youth literacy are increasing

12. **Educational attainment among adults, a strong predictor of poverty, is low.** The adult population is roughly split in three with one third that has no qualifications or religious education only, one third with some education or complete primary, and a final third that has completed secondary education or a higher-level degree. Literacy rates are still lower than expected given Sudan's level of economic development and women are at a clear disadvantage in this regard. Educational attainment of the household head is a strong predictor of poverty and higher levels of education are associated with higher wages.

13. **Educational attainment and attendance have improved.** The share of children attending school and the share of youth that are literate has increased between 2009 and 2014: in 2014, two in ten children between the ages of six and 13 did not attend class, down from three in ten in 2009. School attendance has increased at the primary level while attendance rates have converged between the poor and the rich at the secondary level. Youth literacy, the proportion of youth between 15 to 24 that are able to read and write a simple sentence, has also increased, particularly among the bottom-40 percent. However, there are still more than 1.5 million Sudanese children or primary-school age that were not attending school in 2014, of which close to 60 percent came from the poorest 40 percent of the population. In addition,

gender gaps in attendance in rural areas are pronounced, with girls there six percentage points less likely to attend school than boys.

Social transfers in 2014 were poorly targeted.

14. **In 2014, existing government and parastatal transfers schemes covered only a small fraction of the poor.** Food aid recipients are heavily concentrated in North Darfur, suggesting that they benefit from transfers provided by humanitarian actors. They are fairly well targeted. Transfers extended by the Zakat Chamber, a parastatal religious organization, on the other hand, cover only a small fraction of the poor and targeting can be substantially improved. However, the receipt of transfers, especially the total amounts household received, is likely to be underestimated. In addition, the results have to be interpreted carefully as this has been an active policy area in recent years, with both efforts to improve targeted (with World Bank technical assistance) and an expansion of the number of beneficiary households.

15. **There is no indication of a decline in the volume of international remittances; however, international remittances benefit mostly the better-off.** Official data suggest a steep decline in the volume on international remittances sent to Sudan by its still sizable diaspora. Accurately measuring international remittances may improve the accuracy of debt sustainability analyses. Survey estimates in this report show no evidence of a decline (although the total amount seems severely underestimated). International remittances account for an increasing share of total expenditure over the consumption distribution, that is, they are regressive. Woman-headed households and households in specific states (especially Northern state) are more likely to be recipients while a large share of all remittances goes to recipient in Khartoum.

16. **A strategy for private-sector growth and job creation should focus on the economic opportunities of women and youth.** Youth unemployment in urban areas increased sharply between 2009 and 2014, from less than 20 percent to almost 40 percent. Female labor force participation is low and women face significant labor market discrimination. And although women are less likely to participate in the labor force, those that do are considerably more likely to be unemployed and those that work earn lower wages than men. Any poverty reduction strategy needs to address the constraints faced by these two groups in the labor market.

17. **Agriculture in Sudan holds great potential for significant poverty reduction; but to realize this potential, significant investment is needed.** The report only provides a very partial analysis of agricultural production and assets – it only considers the relationship between poverty and agriculture, recent trends in output and labor productivity, as well as access to agricultural assets. More data and more research will have a significant effect on the government's ability to formulate effective poverty reduction strategies directed at those engaged in agriculture. What is clear, however, is that agriculture holds great potential for poverty reduction in Sudan. A large share of the poor is engaged in agriculture in one way or another. Many farm and a significant share own livestock. At the same time, agricultural growth would translate into more poverty reduction than growth in other sectors. The potential for productivity gains is substantial given Sudan's low level of agricultural productivity today. The removal of wheat subsidies has the potential to eventually benefit both farmers and agricultural wage laborers through higher prices and wages (World Bank forthcoming). However, this will also require that farmers have access to crucial inputs, especially fuel and fertilizer, and an institutional framework that encourages investment.

18. **Different approaches to social protection in urban and rural areas should be considered.** In particular, a large fraction of poverty is likely transitory in rural areas while infrastructure is lacking. This suggests targeting schemes capable of responding to changes in the economy (e.g., falling labor demand or price shocks) such as public works schemes. In urban areas, on the other hand, poverty has a more prominent structural component that is better addressed with well-targeted schemes that are easier to administer and can feature productivity-enhancing measures.

19. **Any medium-term strategy should be premised on reforms that address macroeconomic imbalances.** The report as well as related work (World Bank forthcoming) demonstrate the cost associated with an inconsistent and ill-conceived response to Sudan's current macroeconomic crisis. These must be addressed comprehensively before embarking on any medium-term strategy to address slow growth, poverty, and inequity.

I. Introduction

20. Sudan is at a critical juncture regarding the direction of its economy and its development path.

The loss of a large share of oil revenues in the wake of the secession of South Sudan has given rise to a period of growing macroeconomic imbalances and moderately low rates of economic growth. Despite periodic adjustments measures, inadequate policies, including deficit monetization, have exacerbated macroeconomic imbalances. A resolution of these imbalances, through exchange rate unification and the removal of subsidies for food and fuel items, is a precondition for effective medium- and long-term policies to stimulate sustainable growth and poverty reduction.

21. This report on poverty and shared prosperity in Sudan, covering the period 2009 to 2014, serves three purposes: (1) to establish a profile of poverty and shared prosperity for Sudan and thus establish a new baseline against which progress in poverty reduction can be measured, (2) to establish an understanding of the effects of recent macroeconomic shocks and sustained imbalances on poverty, inequality, and shared prosperity, and (3) to build the evidence base for the formulation of medium- and long-term strategies to foster inclusive growth and poverty reduction in Sudan.

22. The report builds primarily on two multipurpose household sample surveys. The analysis is primarily based on the two most recent household budget surveys, the 2009 National Household Baseline Survey (NHBS) and the 2014/15 National Household Budget and Poverty Survey (NHBPS). While there have been differences in survey design and implementation that need to be considered in interpreting estimates, comparisons of levels in poverty and other relevant indicators over time are still informative (Box 1 and Appendix B). Both surveys are based on a sampling frame derived from the 2008 census. They are therefore representative of a large part of the population although by no means the entire population. Population groups that will be underrepresented include nomads (which were covered in the census but not in the surveys), illegal refugees (which are unlikely to participate in surveys), and Internally Displaced Persons (IDPs) (of which there is a large population in the western region of Darfur). It is important to keep in mind that there is a degree of uncertainty with regard to demographic levels and trends, including the regional distribution of the population, that are also transmitted to economic indicators.

Box 1: Household budget surveys in Sudan.

The report builds primarily on two multipurpose household sample surveys. The main data sources used in this report are the 2009 National Household Baseline Survey (NHBS) and the 2014/15 National Household and Poverty Survey (NHBPS). The data for the 2009 survey have been available to the World Bank for several years and have in the past formed the basis for a poverty assessment. While the survey was conducted in all of what was Sudan at the time, the subset used in this report chiefly applies to the geographic area that coincides with the Republic of Sudan after the secession of South Sudan in 2011. The 2014/15 survey became available only recently. Taken together, the two datasets provide an opportunity for more in-depth analysis not only of the levels of poverty and inequality but also trends.

The datasets provide comparable information subject to some qualifications. Both datasets were produced and analyzed by Sudan's Central Bureau of Statistics (CBS) with support from its international development partners. However, the surveys differ both in questionnaire design as well as in some aspects of survey implementation. A subset of the changes in the survey design have the potential to affect poverty trends, in particular a change in the recall period stipulated to elicit food expenditures from seven to ten days and changes in the list of consumption items included.

8. In 2009, data collection was conducted in May and households were visited only once. In 2014/15, however, households were initially interviewed in November 2014 with additional visits in March and August 2015 to re-administer the consumption module. This, in addition, to the changes discussed above, give rise to concerns about comparability of poverty estimates over time. These issues and the methodology used are discussed in more detail in

9.

Appendix B – Comparability of surveys and adjustments to sampling weights. In brief, it was decided to use only the first round of the 2014/15 data for this report in order to make estimates as comparable as possible.

23. **The report is structured as follows:** the next chapter provides background information on socio-demographic characteristics of Sudan's population, Sudan's political developments, as well as recent macroeconomic trends. Chapter III provides a profile of monetary poverty and inequality with a focus on trends and drives over the 2009-2014 period. Chapter IV provides a non-monetary poverty profile that covers demographics, education, access to productive assets and ownership of durable consumption goods, housing conditions and rent, and access to services. Finally, it provides a joint analysis of deprivations in multiple dimensions (material standard of living, education, and health). To rationalize observed trends in poverty and inequality, chapter V explores trends in labor markets, including labor productivity, labor market participation, employment, wages, and returns to education. It also explores the distributional consequences of the decline of the oil economy in Sudan in-between household surveys and the expansion of gold mining through the lens of jobs in mining and quarrying. Chapter VI provides an analysis of shocks, coping strategies, and transfers, including international remittances. The final chapter summarizes and provides policy implications.

24. **The scope of the report at this point is limited, omitting areas that should be explored in the near future.** By making the 2009 and 2014/15 datasets the basis of this report and because of time constraints, the range of topics relevant to poverty and inequality that are covered is limited. In particular, three priority areas that should be explored in detail for a full understanding of poverty and economic opportunities are not covered: first, agriculture is the mainstay of a large majority of the poor and its potential as an engine for poverty reduction has been identified elsewhere (World Bank 2015). The household surveys include an agricultural module (although not particularly detailed) that should be explored in the near future along with other data sources. Second, the more recent NHBPS lacks a health module. Other data sources, especially the 2010 and 2014 MICS, have been used to explore the relationship between material well-being and health (World Bank forthcoming). Third, job creation, especially stimulation of private-sector, non-agricultural growth, emerges as a key area for programs and policies. However, a more detailed analysis requires information on the demand side (i.e., firm-level surveys). The household surveys employed here can mostly illuminate the supply side of labor markets.

II. Background

The chapter provides background relevant to an understanding of economic and human development in Sudan over the past two decades. It also zooms in on developments between 2009 and 2014, the two years in which household budget surveys were conducted, that are relevant to distributional welfare analysis. Three aspects are highlighted: first, political developments of Sudan from its independent history. Second, the end of a period of oil-driven economic growth in Sudan, which ran from the late-1990s and ended in 2011 with the secession of South Sudan, is also likely a key driver of economic change, not least because of the effects this episode has had on other sector of the economy. Third, agriculture is the mainstay of a majority of Sudan's poor. The sector's performance is therefore key to understanding recent trends and prospects for poverty reduction in the future. However, growth in labor productivity in agriculture has fallen over time and yields have stagnated

Political developments

25. **Sudan has been beset by conflict for most of its independent history.** It has suffered from political instability and conflict for five of the six decades since independence in 1956. It has experienced two almost consecutive civil wars spanning over five decades with only a 10-year period of relative tranquility between 1972 and 1983.² The First Sudanese Civil War (1955–1972) was a conflict between the northern part of Sudan and the southern Sudan region that demanded representation and more regional autonomy. Half a million people died over the 17 years of war. The agreement that ended the First Sudanese Civil War's fighting failed to completely dispel the tensions that had originally caused it, leading to a reigniting of the north-south conflict between the central Sudanese Government and the Sudan People's Liberation Army. Although it originated in southern Sudan, the Second Sudanese Civil War (1983–2005) spread to the Nuba mountains and the Blue Nile. Around 2 million people were killed because of war, famine, and disease caused by the conflict.

26. **The Comprehensive Peace Agreement (CPA) between the Government of Sudan (GoS) and the Sudan People's Liberation Movement in 2005 established the framework for peace.** The terms of the peace agreement granted the south autonomy for six years, to be followed by a referendum on independence. Oil revenues were divided equally between the Government and Sudan People's Liberation Movement during the six-year autonomy period. The protocol on wealth sharing intended to address Sudan's needs for infrastructure, human resources, sustainable economic development, and the capacity to meet human needs within a framework of transparent and accountable government (ICG 2015).

27. **The six-year period after the signing of the CPA (2005–2011) was also punctuated by interstate conflict between the north and south of Sudan, as well as ongoing conflict in Darfur.** Following prolonged negotiations and significant international pressure, the GoS accepted a peacekeeping operation in Darfur. In 2009, the International Criminal Court issued an arrest warrant for President al-Bashir, accusing him of crimes against humanity and war crimes. In 2009 and 2010, a series of conflicts between rival nomadic

² The period between 1955 and 2005 is sometimes considered to be a single conflict with an 11-year ceasefire that separates two violent phases.

tribes in South Kordofan caused many casualties and displaced thousands. A ceasefire agreement ended the Darfur conflict in 2010. In January 2011, a referendum on independence for Southern Sudan was held, and the south voted overwhelmingly to secede. On July 9, 2011, the Republic of South Sudan became an independent state. Soon after, new violence between the north and south was reignited by a series of unresolved disputed areas—among them Abyei, South Kordofan, and the Blue Nile.

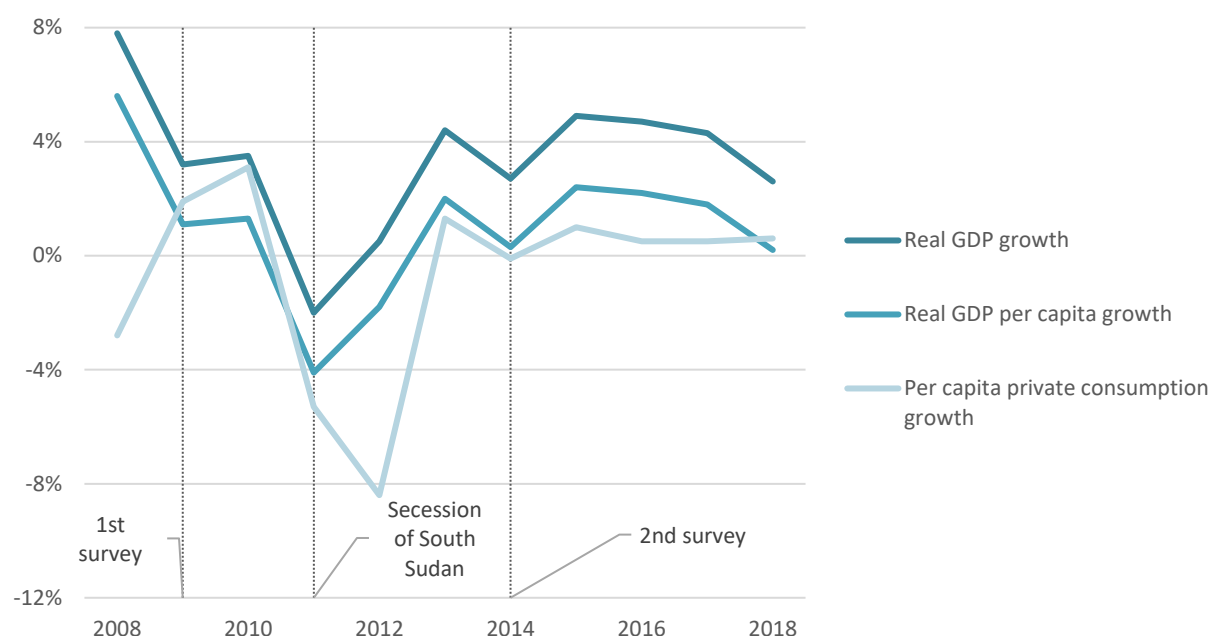
28. **A renewed wave of violence in Darfur erupted in mid-2012 and continued in subsequent years.** As a result of stalling of peace talks, the number of conflict events in Darfur and Kordofan recorded in the ACLED data as well as the number of fatalities increased sharply during the second half of 2012.³ In 2014 and 2015, two counterinsurgency campaigns were carried out by the Rapid Support Forces (RSF), a Sudanese government force under the command of the National Intelligence and Security Services (NISS), in South, Central, and North Darfur (HRW 2015). Overall, the political situation remains fragile, with reports of ongoing fighting and displacement, particularly in the country's southern and western states. The effect of changes in conflict intensity over time on levels and trends in economic welfare is further explored in chapter III.

Macroeconomic trends

29. **In Sudan, the period from 1999 to 2011 was characterized by high growth rates driven by oil exports and investment in industry-related infrastructure and utilities.** While exploration in Sudan began in the late 1950s, oil production at scale was only achieved by the late 1990s. From that point onward, the rise and fall of Sudan's oil industry was the key driver of economic development. Between 1999 and 2011, economic growth reached an average of 6.1 percent per year, exceeding Sudan's own historical average of 4.9 percent as well as average growth rates in lower and lower middle-income countries at the time. Oil revenues became increasingly important, accounting at its peak for around half of all government revenues.

³The Armed Conflict Location Event Dataset (ACLED) is part of a general trend in social science to use the current benefits of global online media and information to disaggregate and track social phenomena (Gleditsch, Metternic and Ruggeri 2013). However, the adoption of media monitoring is not without challenges. Datasets relying on external sources are subject to the biases of their sources. Sources can introduce bias through both selective reporting and omission. Previous studies of media monitoring have found that selectivity often results in a geographical bias, with publications focusing on events near their base of operations and editorial offices (Barranco and Wisler 1999). Similarly, reporting relies on infrastructure to send information effectively (Wooley 2000). Both these dynamics have the potential to introduce a strong urban bias into conflict reporting (Kalyvas 2004). If conflict itself results in population movements between rural and urban areas, which is often assumed to have been the case in Darfur, this type of bias can further result in misleading trends. See also <https://www.acleddata.com/2014/11/26/urban-bias-in-media-reporting/>.

Figure 1: Real growth of real GDP, real GDP per capita, and real private consumption (all in real terms), 2008-2018.



Source: World Bank staff calculations. Note: growth rates for 2017 and 2018 are estimates and forecasts, respectively.

30. **The secession of South Sudan in 2011 triggered a negative natural resource shock.** As a result of the secession of South Sudan in 2011, 70 percent of the commercial oil reserves and 80 percent of the pre-independence production was transferred to South Sudan. Oil rents, which accounted for more than 20 percent of GDP during the heyday of the oil economy, dropped sharply after 2011. Sudan's economy contracted by two percent in real terms in 2011. After that, growth resumed but averaged only 1.6 percent between 2012 and 2014.⁴ Growth per capita was negative in both 2011 and 2012, at -4.1 and -1.8 percent, and growth rates in 2012 and 2013 suggest that per capita GDP in 2014, at the time of the second survey, still fell 1.6 percent short of its levels in 2009. The drop in per capita private consumption was yet more pronounced and the recovery more sluggish, suggesting an overall decrease by close to eight percent between 2009 and 2014.

⁴ There are different assessments of the extent of the downturn following the secession of the South. After an adjustment made in early 2017 to recent real GDP growth rates, the official real GDP growth rate for 2009-2014 was reported at 4.9 percent. Economic activity in Sudan contracted by 2.3 percent in 2018, driven primarily by a decline in private consumption and investment.

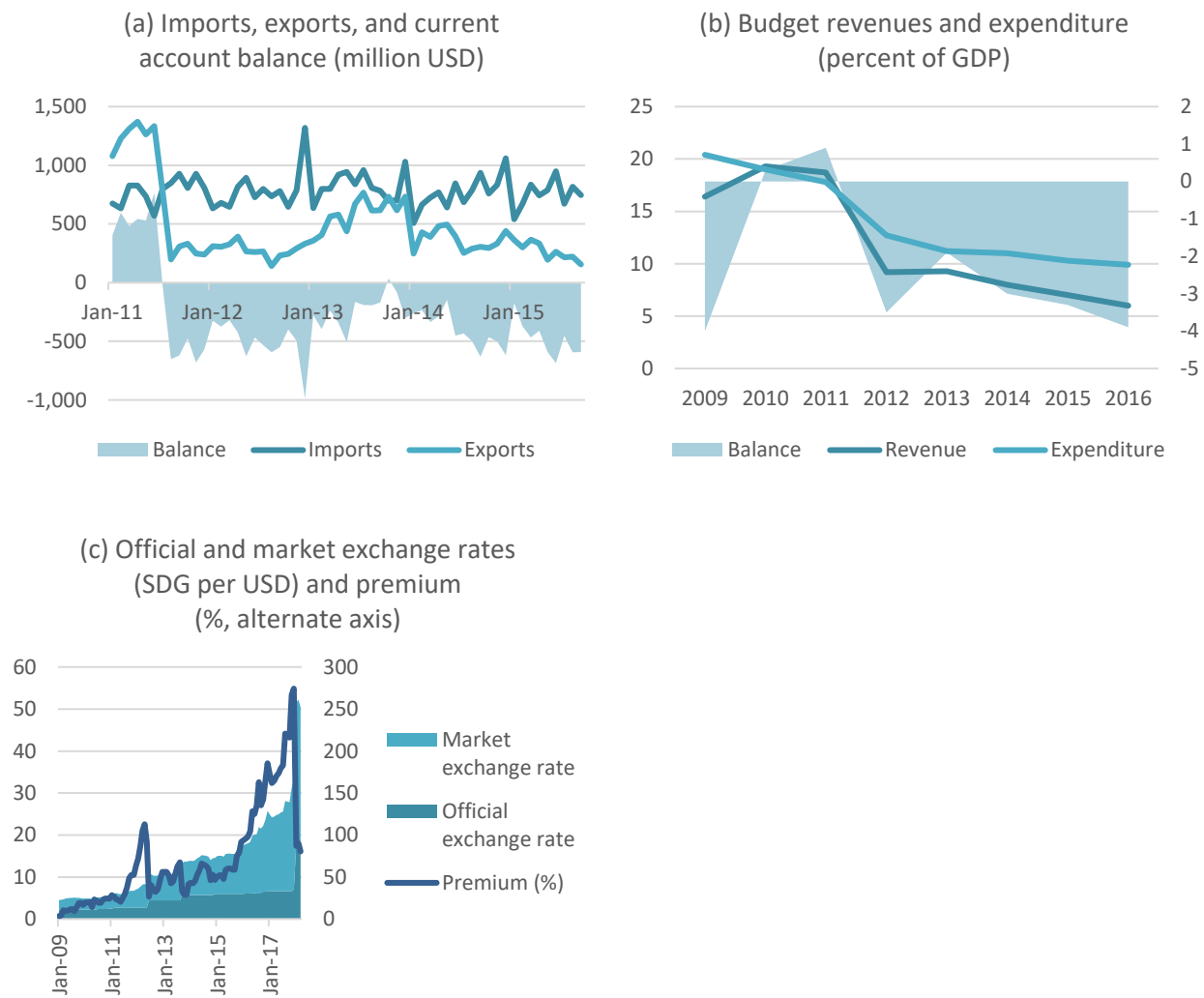
Table 1: Valued added (VA) by economic activity, 2009 and 2014, 2014 prices.

Economic activity	2009		2014		Real growth (percent, annualized)
	VA	Share	VA	Share	
(i) Agriculture, forests, animal resources and fisheries	139.6	30.7%	134.3	28.5%	-0.8%
(ii) Industrial sector	99.0	21.8%	109.0	23.1%	2.0%
Petroleum	37.3	8.2%	10.9	2.3%	-21.8%
Mining and quarrying	1.6	0.4%	3.8	0.8%	18.4%
Processing and handicraft	48.7	10.7%	81.8	17.4%	10.9%
Electricity and water	11.4	2.5%	12.5	2.7%	1.9%
(iii) Services	215.8	47.5%	228.0	48.4%	1.1%
Building and construction	14.6	3.2%	16.3	3.5%	2.2%
Trade, hotels, and restaurants	35.7	7.9%	41.8	8.9%	3.2%
Transport and communications	43.8	9.6%	50.3	10.7%	2.8%
Finance, Insurance, Real Estate, and other services	53.6	11.8%	57.5	12.2%	1.4%
Community and social services	4.9	1.1%	5.9	1.3%	3.9%
Financial intermediation services	6.5	1.4%	9.3	2.0%	7.5%
Government services	61.7	13.6%	54.2	11.5%	-2.6%
Non-profit private household services	3.2	0.7%	3.7	0.8%	2.6%
Import charges	6.5	1.4%	7.6	1.6%	3.2%
GDP at constant prices	454.4		471.3		0.7%

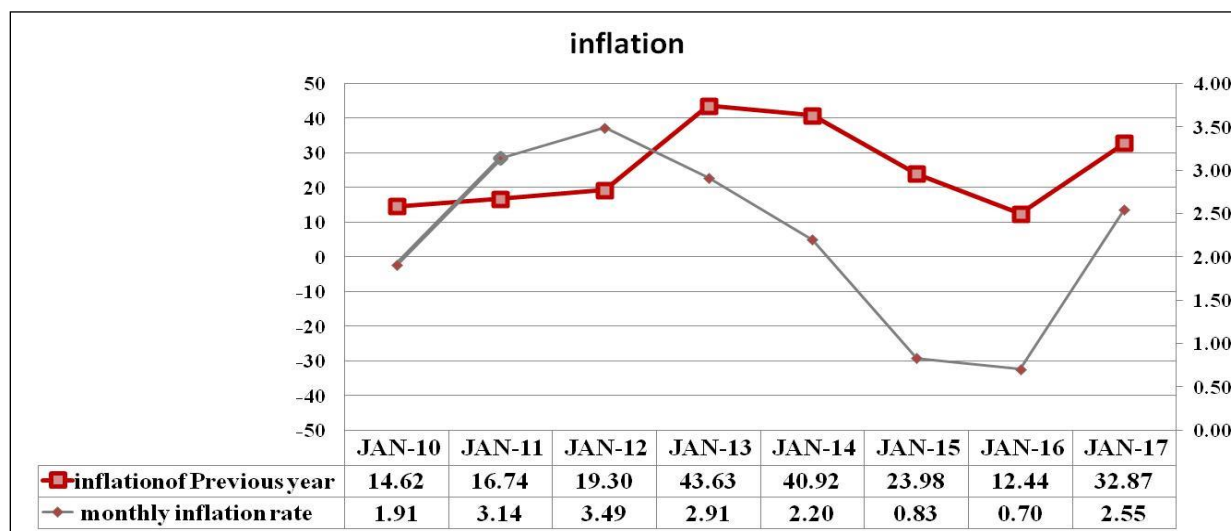
Source: Own calculations based on CBoS (2010, 2015).

31. **Structural changes played out mainly within the industrial sector.** At the lowest level of disaggregation, considering only the distinction between agriculture, industries, and services, there is almost no evidence for a major reconfiguration of economic activity between 2009 and 2014. The share of services in GDP was 48 percent in both years, while the share of industries, which includes the oil sector, at around 22 percent in 2009, may even have increased somewhat at the expense of agriculture. However, at the more disaggregated level, substantial changes in value added are evidenced *within* the industrial sector. Petroleum-sector output dropped by more than 70 percent (-21.8 percent on an annual basis) while the mining-and-quarrying sector doubled its share in total output, albeit from a very low level. The share of value added generated by the processing-and-handicraft sector increased from 10.7 percent to 17.4 percent for a healthy growth rate of 10.9 percent per year. Most other sectors experienced modest growth in output with the exceptions of agriculture and government services.

Figure 2: Select macroeconomic indicators.



(d) Inflation



Source: Own calculations based on data from the Central Bank of Sudan (panels (a) and (c)), Economist Intelligence Unit (panel (b)) and CBS (d).

32. **Structural imbalances emerged after 2011 that have worsened over time.** As exports declined, the current account deficit widened, from 3.9 percent of GDP in 2011 to more than nine percent in 2012 (Figure 2a). The budget balance also turned negative because of lower revenues (Figure 2b). While the GoS has responded by implementing a series of partial adjustment measures, including fuel subsidy reforms, fiscal policy was overall slow to adapt to the new economic environment. Because of its external debt overhang and the fact that Sudan remains on the US List of State Sponsors of Terrorism (U.S. Department of State n.d.), Sudan's access to external financing remains severely restricted. 2011 also marked the onset of a system of multiple exchange rates. The gap between market and official exchange rate increased substantially since 2011, with a market exchange rate that was estimated at more than 2.5 times the official rate by the end of 2017 (Figure 2c). However, the gap has since declined as the GoS allowed the Sudanese Pound to devalue substantially in early 2018 (see below).

33. **The inflation rate increased substantially between 2012 and 2015 and again over the course of 2017.** Driven by increasing prices for imports, which largely reflect changes in the market exchange rate, supply bottlenecks, and, most importantly, fiscal deficit monetization, the inflation rate after 2012 picked up in periodic bouts (Figure 2d). The cumulative rate of increase in the consumer price index between the two household surveys analyzed in this report, collected in May 2009 and November 2014, was more than 350 percent. Inflation is typically associated with lower rates of economic growth and lower investment ratios as economic agents perform worse under higher rates of price increases (Barro 1995, Briault 1995).

34. **The distributional consequences of general inflation in Sudan may be unlike those typically observed in developed economies.** In addition to negative aggregate effects on growth and investment, inflation is often associated with significant distributional effects. But while the burden of inflation in

developed countries has often been found to fall disproportionately on low-income households,^{5,6} the distributional consequences of inflation may be very different in rural, agricultural economies, in which the better-off are often formal-sector workers or even civil servants with salary incomes that are vulnerable to inflation while the poor are more likely to be producers of staple foods or agricultural laborers.⁷

35. While the end of US-imposed economic sanctions in October 2017 initially caused some optimism, the crisis worsened in recent months as food prices increased further and fuel shortages materialized. US-imposed economic sanctions had been in place for nearly 20 years when they were lifted in October 2017. While this step initially fostered optimism, Sudan remained on the US list of State Sponsors of Terrorism.

36. Wheat subsidies were removed at the beginning of 2018, resulting in sharply rising food prices. Next to subsidies for fuel energy, wheat subsidies, in the form of price subsidies to producers and preferential access to foreign exchange for importers, have long been a staple of economic policy in Sudan. As the gap between local consumption and production of wheat increased over time, the foreign exchange-channel for subsidies became increasingly important.³⁸⁰ An increasing shortage of foreign exchange and a more recent increase in international food prices prompted the government of Sudan to recant wheat importers' preferential rate at the beginning of 2018. Prices for wheat, other staple crops, and other food items subsequently increased sharply (Figure 6),⁸ resulting in street protests. Since March, Sudan has experienced fuel shortages that have further hiked food prices and negatively impacted transportation, particularly in the states.

Agriculture

37. Agriculture accounted for almost half of all employment in 2014, up ten percentage points from 2009. This report will show that, in terms of employment and livelihoods more generally, agriculture continues to be the mainstay of a large majority of Sudan's poor (chapter III). Survey estimates in May 2009 and November 2014 suggest that agriculture accounted for 48.8 percent of employment in 2014, up from 38.6 percent in 2009. The increase came mostly at the expense of the service sector, which accounted for 52.9 percent of employment in 2009 but only 43.4 percent in 2014, and may have been due to seasonal effects associated with the timing of the surveys. Employment in industries plays a modest role overall, with employment shares of 8.5 and 7.8 percent in 2009 and 2014, respectively.⁹

⁵ The poor in developed economies tend to be more likely to rely on incomes that are not fully indexed to inflation (e.g. transfers) and to be less likely to have access to inflation-proof financial instruments. They are also more likely to hold a greater portion of their portfolio in cash. These assertions are broadly backed by empirical evidence. See, for instance, Easterly & Fisher (2001). However, more recent evidence from the US indicates that contractionary monetary policy systematically increased inequality in labor earnings, total income, consumption, and total expenditures (Coibian, Gorodnichenko, Kueng, & Silvia, 2017).

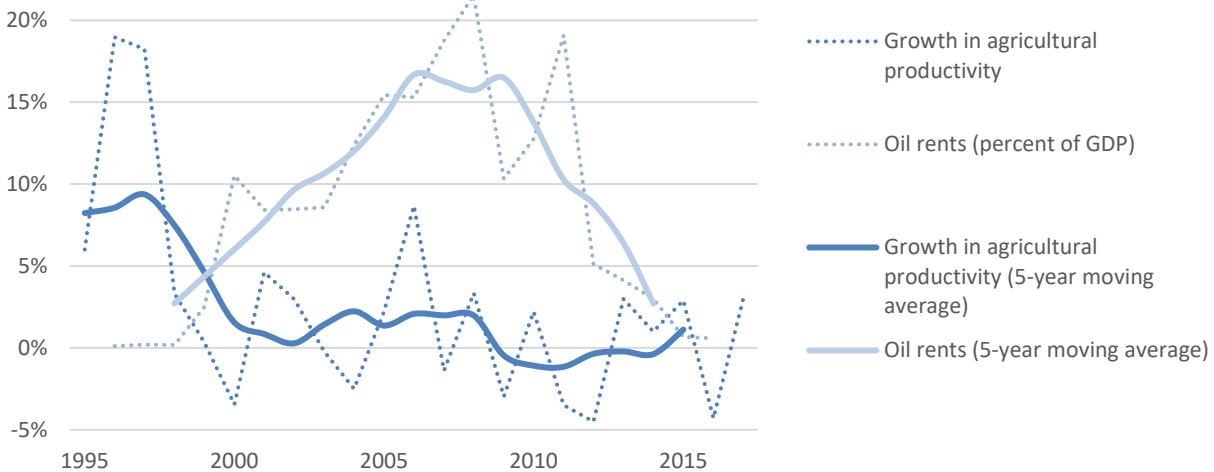
⁶ See Coibian, Gorodnichenko, Kueng, & Silvia (2017) for a recent discussion of the various transmission channels from monetary policy and inflation to inequality.

⁷ Evidence on the differential impacts of inflation in developed and developing countries is scarce. However, there is some evidence suggesting that the poor are more tolerant of inflation (Jayadev, 2006), particularly in developing countries (Hofstetter & Rosas, 2018).

⁸ See World Bank (forthcoming) for an analysis of the welfare effects of rising food prices.

⁹ An interesting aspect here is that despite the end of the oil economy and slow growth in construction, employment in mining and quarrying expanded rapidly. Chapter V argues that this is most likely due to an expansion in labor-intensive gold mining.

Figure 3: Growth in agricultural productivity and oil rents (percent of GDP), 1995-2016.



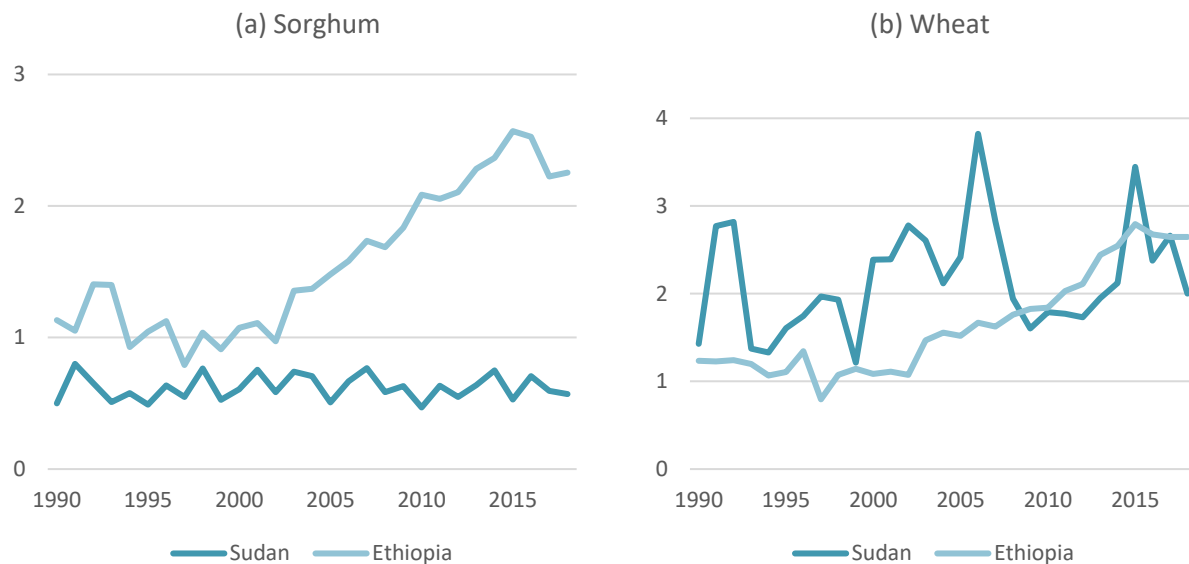
Source: Own calculations based on WDI and EIU data.

38. **Partly as a result of Dutch Disease and partly due to misguided policies, Sudan's agricultural sector has experienced a long stretch characterized by ever lower gains in labor productivity and falling yields.** At the time of the oil economy, the Sudanese economy exhibited symptoms of Dutch Disease, the phenomenon of changes in the structure of production in the wake of a favorable shock (such as a large natural resource discovery).¹⁰ In Sudan, the expansion of oil production was accompanied by a decrease in the importance of agriculture. While the sector accounted for 45.5 percent of total value added in 2001 while industries accounted only for 16.6 percent. By 2009, the peak of the oil economy, the share of agriculture in GDP had declined to 31 percent while industries accounted for more than one fifth of total output, with petroleum alone accounting for eight percent. Growth in labor productivity dropped from more than eight percent per year in the mid-1990s to only around two percent during the mid-2000s (Figure 3).¹¹

¹⁰ Where the natural resource discovered are hydrocarbons or minerals, a contraction or stagnation in other tradables sectors such as manufacturing and agriculture can accompany the positive effects of the shock (Brahmbhatt, Canuto and Vostroknutovva 2010). The main mechanisms are often thought to be an appreciation in the real exchange rate associated with a boom in one sector, which renders other tradables less competitive on international markets, and an increase in the price of inputs as a result of rising demand from the booming sector. However, the latter effect is typically less important in the case of booms in hydrocarbon and mineral sectors due to their low labor-intensity (Corden & Neary, 1982; Corden, 1984).

¹¹ See also World Bank (2015).

Figure 4: Sorghum and millet yields (metric tons/ha) in Sudan and Ethiopia, 1990-2018.

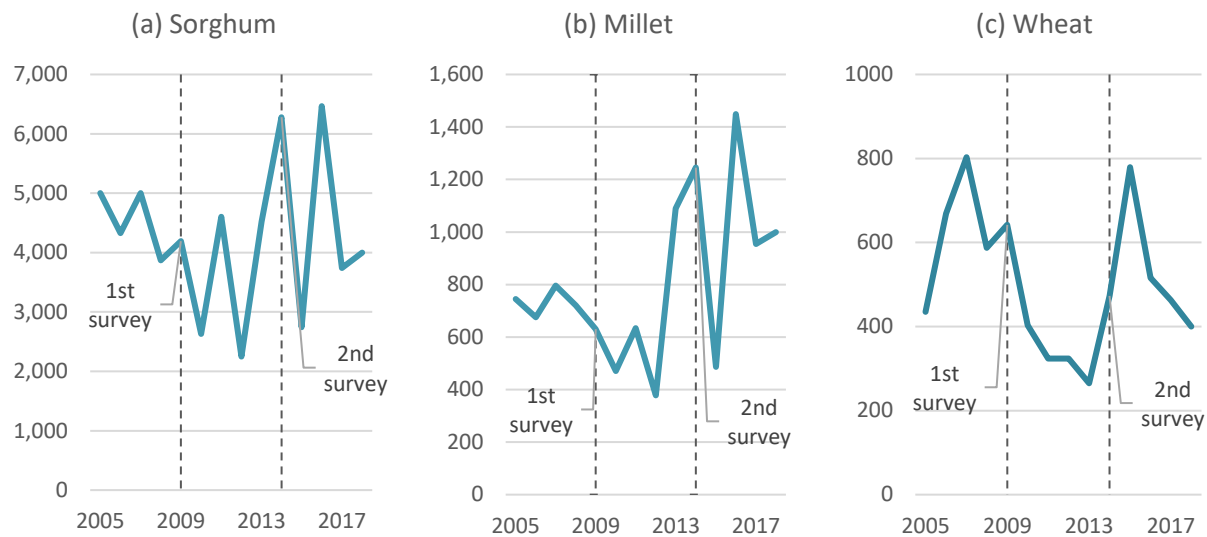


Source: <https://www.usda.gov/>.

39. **Between 1990 and 2018, yields of Sudan's key staple crops mostly stagnated.** Sorghum, millet, and wheat are three main staple crops produced, consumed, and traded in Sudan. Traditional rainfed, semi-mechanized and irrigated production systems each contribute around one third of overall cereal production. Wheat is almost exclusively produced in the irrigated sector (97 percent over 2008/09-2012/13), millet is produced mainly in the traditional sector (90 percent) and sorghum is produced in all three sectors (31 percent traditional, 43 percent semi-mechanized, and 26 percent irrigated). In contrast to neighboring countries and the Sub-Sahara Africa and Middle East & North Africa regions more generally, yields either stagnated or increased only very modestly since the early 1990s (Figure 4).¹² A decrease in yields is evident in the second half of the oil economy, between 2006 and 2011, and it is particularly pronounced for wheat (see also Figure 5).

¹² The evolution of yields for millet is not displayed. However, the picture here is qualitatively similar to that for sorghum.

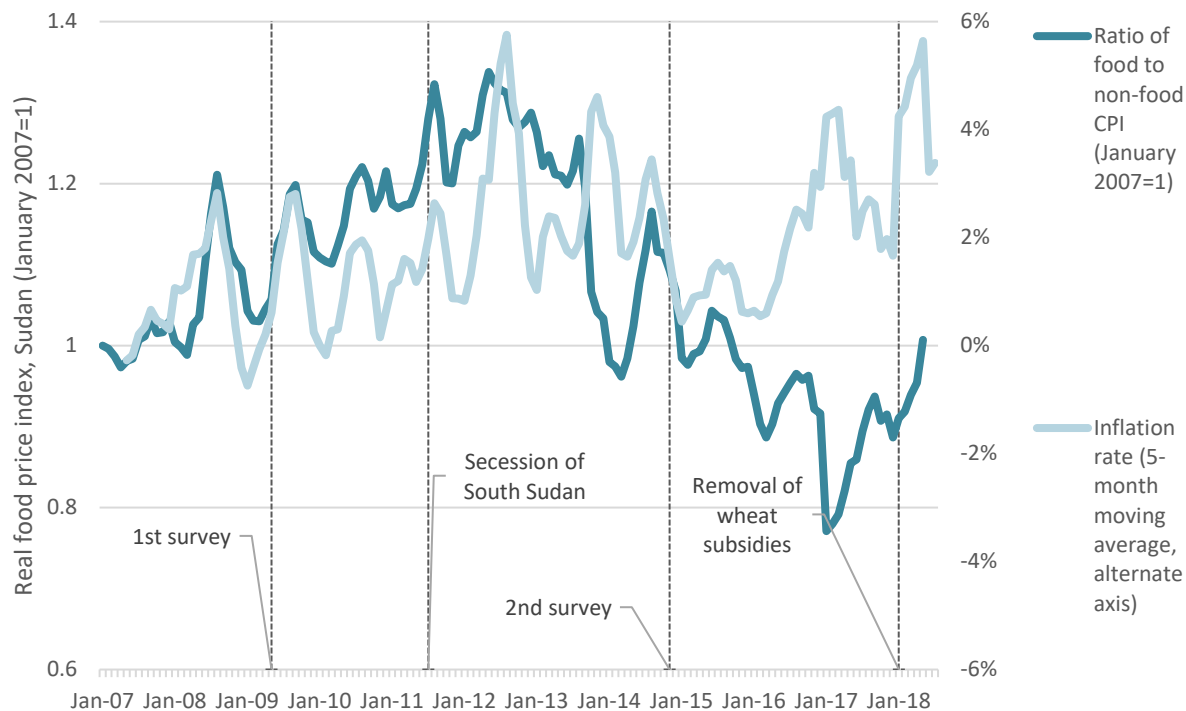
Figure 5: Agricultural output of sorghum, millet, and wheat (1,000 metric tons), 2005-2018.



Source: <https://www.usda.gov/>.

40. **Agricultural production of sorghum and millet, Sudan's main staples, has been volatile in recent years: output of sorghum and millet was around 50 and 100 percent higher in 2014 as in 2009.** Sorghum is the most important staple food produced and consumed in Sudan, followed by wheat and millet. In line with falling productivity, the output of sorghum, millet, and wheat, Sudan's main staples, mostly decreased between the mid-2000s and the early 2010s (Figure 5). Output has been increasingly volatile more recently, with bumper crops in 2014 and 2016 for sorghum and millet and in 2015 for wheat. Differences in harvests between years will be important in interpreting poverty trends across time (chapter III).

Figure 6: Ratio of food to non-food CPI and monthly inflation rate, January 2007 – May 2018.



Source: Own calculations based on CBS CPI data.

41. **After falling for much of the post-secession period, the ratio of food CPI to non-food CPI, a proxy for agriculture's terms of trade, have recently started to improve.** In economies in which the rural poor depend heavily on their earnings from supplying agricultural labor, the domestic terms of trade between agriculture and industry typically play an important role in policy debates.¹³ After 2011, high rates of inflation in Sudan were typically associated with lower terms of trade for agriculture, proxied here by the ratio of food to non-food CPI. This is evident for bouts of inflation observed in early-2014 and more recently at the beginning of 2017. The relationship changed only with the recent recanting of wheat importers' preferential access to foreign exchange has inflation been driven by rising food prices (Figure 6) (World Bank forthcoming).

42. **Of note for the analysis in this report, food and non-food prices increased at a similar cumulative rate between May 2009 and November 2014.** Relative increases in food prices will typically fall more heavily on the poor as they allocate larger fractions of their total expenditure to food expenditure. The price increases for food and non-food items between May 2009 and November 2014 differed only marginally.

43. **To conclude, long-standing geospatial disparities in economic development, a poorly performing agricultural sector, and a sizable, adverse macroeconomic shock in 2011 are aspects of the recent history of Sudan that are of relevance for an interpretation of poverty trends between 2009 and 2014.** For the remainder of the report, three key aspects of Sudan's recent economic history are important in interpreting poverty trends over this period. First, a key feature of economic development in Sudan

¹³ Early theoretical work (Sah and Stiglitz 1987) and recent empirical evidence (Headey 2016) point to substantial benefits in terms of poverty reduction in the wake of improvements in agriculture's terms of trade.

were high levels of investment in the northern and central states (including in Khartoum) that predated some of the most intense episodes of conflict. Both investment patterns and conflict were key to an understanding of geospatial differences in economic welfare. Second are short- and long-run trends in agricultural output and productivity. In the long-run, yields of key staple crops were mostly stagnant while labor productivity growth decreased. These trends come as the result of both the adverse effects of the oil boom and misguided agricultural policy. But it is also clear that the 2014/15 harvest was exceptionally rich and this will be an important in interpreting poverty trends, especially in rural areas. Finally, a substantial macroeconomic shock, the sudden end of the oil economy in 2011, has led to macroeconomic imbalances that continue to this day. While some fiscal adjustment measures have been put in place, these imbalances worsened over time. The report will argue that direct and indirect effects of the end of the oil economy have mostly materialized in the form of fewer economic opportunities in urban areas, including higher unemployment, and increasing poverty.

III. Monetary Poverty and Inequality

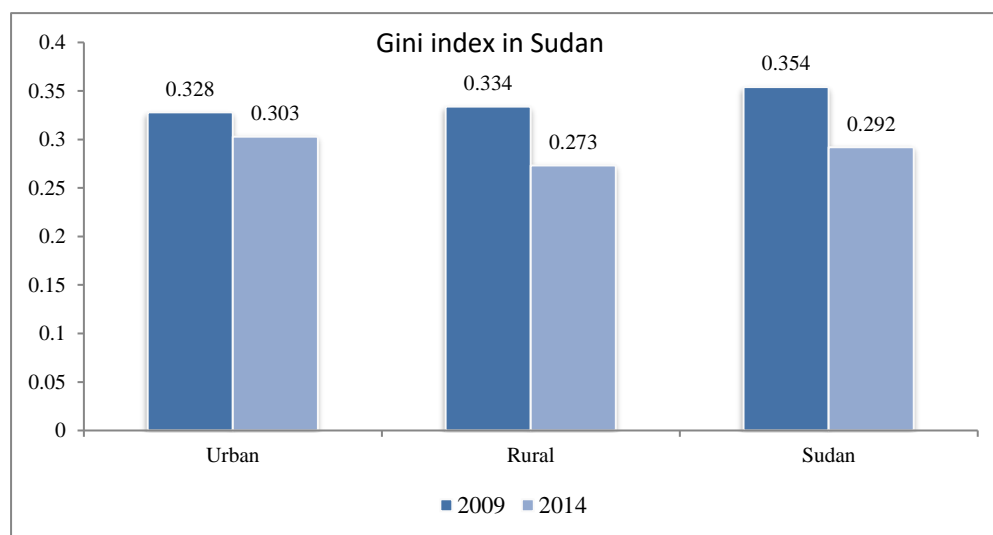
The chapter discusses levels and trends in monetary poverty and inequality in Sudan between May 2009 and November 2014. Before proceeding, show the official poverty and inequality numbers for 2009 and 2014/15 that were published by the Central Bureau of Statistics in November 2017 (Box 2), and highlight key differences between these results and the poverty and inequality results from the World Bank analysis in this report.

Box 2: Official poverty and inequality numbers (CBS 2017)

There were significant changes in the poverty methodology and survey design between 2009 and 2014/15.

Poverty incidence in 2014/15

	Population below the extreme poverty line	Population below the global poverty line
Urban	22.6%	37.3%
Rural	26.5%	35.5%
Sudan	25.2%	36.1%



The 2014/15 NHBPS had the consumptions module administered over three rounds, November 2014, March 2015, and August 2015, during which the same sample of households was visited. This was intended to capture seasonal effects. The March and August follow up rounds administered only the consumption module, but the March round did not administer module five which records non-food consumption with a twelve-month recall. On the other hand, the 2009 survey entailed only one round of data collection conducted in May 2009.

- 1. Consumption aggregate:** The official results are based on averaging of consumption aggregates from the three rounds. Note that there was substantial attrition in rounds 2 and 3. As shown in

Appendix 2, using an averaged aggregate for 2014/15 and a single-visit aggregate for 2009 would therefore result in misleading poverty and inequality trends. For this reason, the 2014 poverty and inequality results presented and discussed in the rest of this report are based on the first round only (November 2014). See Appendix 2 for technical details on the results for different methodologies.

2. **Comparing 2009 and 2014 surveys:** The official results are based on national poverty lines, which differed over time. The differences between the two surveys, noted above, makes comparison difficult, particularly using the national poverty lines, which also changed. At the same time, it is important to track changes in poverty over time to monitor progress towards the goals of the Government of Sudan, and international goals. For this reason, in this report, we use international poverty lines: USD1.90-poverty line (extreme poverty) and USD3.20-poverty line (moderate poverty). Consumption expenditure items used are those collected during both surveys. While efforts have been made to allow to compare the 2009 and 2014 numbers, potential seasonality effect may remain unresolved since the two surveys were conducted at different times of the year.

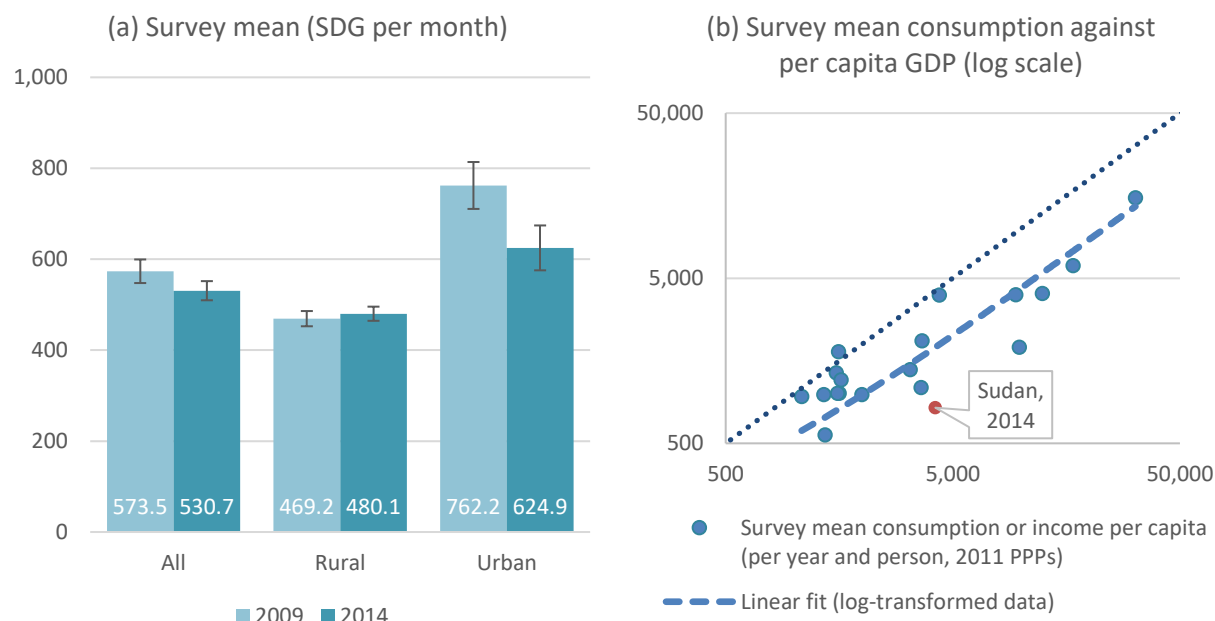
The remainder of this chapter and the whole report is based on the World Bank methodology discussed above. The chapter proceeds as follows. The first section considers levels and trends in per capita consumption and poverty measures at the national level and by rural-urban classification. It also provides some robustness checks with regard to trends. A divergence in poverty reduction between urban and rural areas turns out to be a crucial feature of poverty dynamics in Sudan over this period. The second section is concerned with variation across states. It shows that changes in economic welfare over the time period of interest were inversely related to initial levels. However, the historic divide between states with higher levels of economic welfare in the north and center and states with lower levels of economic welfare in the less developed areas is still a dominant feature in Sudan. The third section explores the interplay between inequality, growth, and poverty. Inequality remained moderately low in 2014, with some measures showing a decrease vis-à-vis 2009. However, inequality in urban areas increased sharply, driven by rising inequality in Khartoum. The fourth section explores socio-demographic correlates of poverty while the fifth section explores livelihoods and incomes. These sections show that wages and salaries are the main drivers of changes in per capita consumption, with positive wage growth among the rural poor and negative wage growth at the top of the rural consumption distribution and in urban areas. A more in-depth analysis of trends in wages and employment is relegated to chapter V. The final two sections explore two potential drivers of changes in economic welfare between May 2009 and November 2014, conflict and seasonality in agricultural production. While the former has some explanatory power for levels of economic welfare, conflict does not adequately explain poverty trends between the two surveys. Seasonality, on the other hand, is found to be an important factor in explaining trends.

Levels and trends in monetary poverty

44. **Given the macroeconomic outlook for Sudan, an understanding of recent trends in poverty can inform future policies and programming.** The GoS has implemented a series of adjustment measures between 2009 and 2014, including partial subsidy reforms, that resulted in rising prices for imports. However, similar – and more comprehensive reforms – particularly aimed at aligning the official and market exchange rates have been implemented since and the distributional consequences of these

reforms, if not mitigated, will have been broadly similar to those seen over this time period. It is therefore of utmost importance to understand the distributional consequences of past reform efforts.

Figure 7: Survey mean (SDG per month) by year and rural/urban and survey mean against GDP per capita (both international dollars per year).



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15 and WDI data (panel (b)). Note: 95-percent confidence intervals indicated in panel (a). Only developing countries in the MENA and SSA regions were considered as benchmark in panel (b).

45. **Between May 2009 and November 2014, average real per capita consumption decreased by 8.1 percent.** Average per capita consumption, the survey mean over the entire population, decreased from SDG573.5 in 2009 to SDG530.7 in 2014, a drop by 8.1 percent or 1.4 percent on an annual basis. The decrease is somewhat more pronounced than the decrease in real GDP per capita, which is estimated to have dropped by 2.7 percent over 2010-2014 or half a percent annually.

46. **The decrease in average per capita consumption is driven entirely by falling per capita consumption in urban areas.** Closer inspection shows that the drop in the survey mean is entirely explained by falling average consumption in urban areas (Figure 7a): while real per capita consumption increased by 2.3 percent in rural areas, it decreased by 22 percent in urban areas. As will be seen, this translates in to a sharp increase in poverty in urban areas and a more mixed picture in rural areas.

47. **The survey estimate of mean per capita consumption in 2014 is far below what one would expect based on Sudan's GDP per capita.** Given Sudan's level of economic development, proxied in Figure 7b by GDP per capita adjusted for differences in purchasing power, mean per capita consumption as measured from the 2014 survey appears low by regional standards.

Box 3: Poverty methodology and poverty measures.

The analysis in this report is based on the World Bank's USD1.90- and USD3.20-poverty lines. The measurement of poverty and economic welfare more generally in a consistent way across time and space is crucial for poverty reduction efforts to be successful. This report uses the World Bank's USD1.90- and USD3.20-poverty lines. The former was originally introduced in the World Bank's 1990 World Development Report with the aim of measuring poverty consistently across countries (Ravallion, Datt, & van de Walle, 1991) and has recently been updated (Jolliffe and Prydz 2016). It is based on a set of poverty lines found in some of the poorest countries. The latter poverty line was introduced more recently and captures poverty lines deemed relevant in lower-middle income countries (Jolliffe & Prydz, 2016). For simplicity, poverty measured using these two poverty lines will be referred to in this report as *extreme* and *moderate* poverty, respectively.

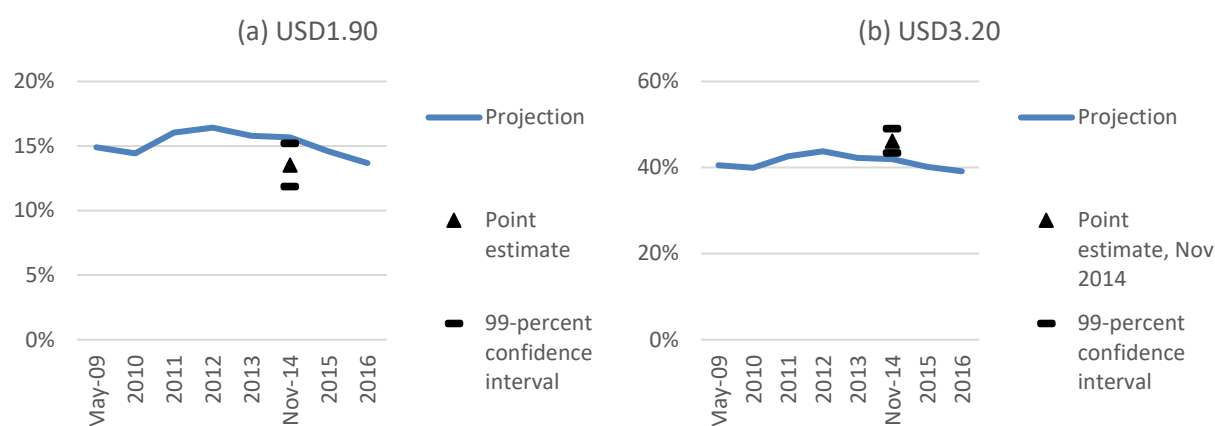
The analysis in this report is based on the international poverty measurement for two reasons: (i) While the analysis based on the national poverty methodology has recently been completed by Sudan's CBS, Sudan's international poverty measurement has not been updated since 2009; (ii) the national poverty methodology has been revised significantly since 2009, which makes interpretations of poverty trends challenging.

International poverty lines were calculated by updating the 2009 poverty lines using CBS' monthly CPI-series. The monetary values of the poverty lines in 2009 were SDG62.0 and SDG104.5 per month and person, respectively. The cumulative increase in consumer prices between May 2009 and November 2014 was 284.4 percent (and SDG358.8 according to CBS CPI report).

Poverty measurement in this report is based on the FGT-class of poverty measures, particularly the poverty headcount ratio and the poverty gap index. The poverty headcount ratio is the most common poverty measure. It is defined as the share of population whose total consumption level is lower than the poverty line. The poverty gap index is the average gap between current consumption and the poverty line (zero for the poor) expressed as a proportion of the poverty line. Multiplied by the total population and expressed in currency, it can be interpreted as the minimum amount of resources that would be required to eradicate poverty under a hypothetical, perfect targeting scheme. Both measures are members of the FGT-class of poverty measures (Foster, Greer, & Thorbecke, 1984). Importantly, they can be used to study the contribution to poverty of different subgroups.

48. Extreme poverty at the national level decreased marginally, but moderate poverty increased. The extreme poverty rate, the share of the population that had less than USD1.90 (in PPPs) in 2014 (Box 3), is estimated at 13.5 percent, down from 14.9 percent in 2009. Because of overall population growth, the total number of Sudanese that live below this threshold remained nearly constant at four million. Moderate poverty, however, increased from 40.5 percent in 2009 to 46.1 percent in 2014, suggesting that the number of Sudanese below this higher threshold increased by around three million (from 11.5 to 14.5 million).

Figure 8: Projections of the poverty rate against actual estimate, May 2009, November 2014, and August 2015.

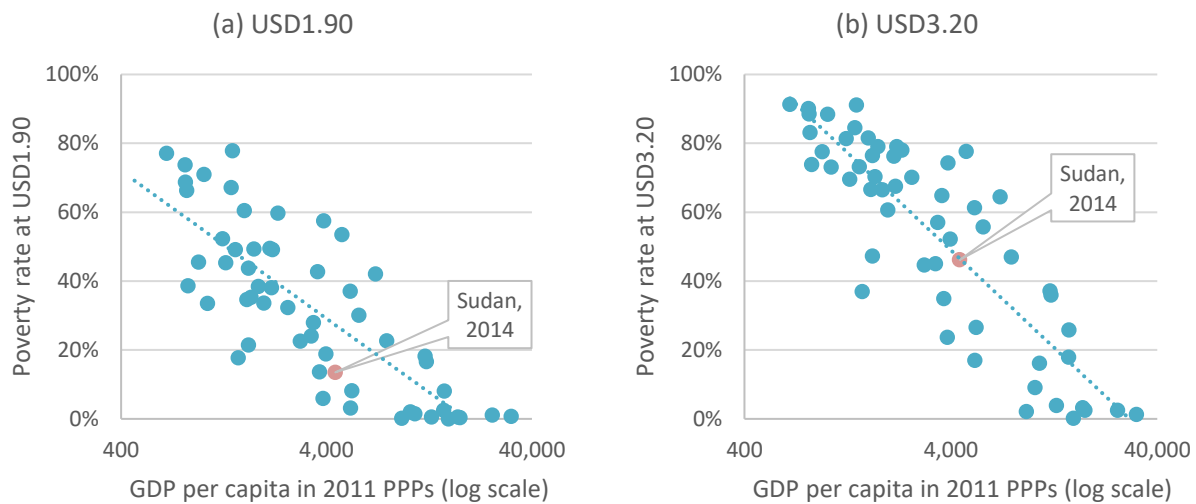


Source: Own calculations based on data from the World Bank's MMod, the NHBS 2009, and the NHBPS 2014/15. 99-percent confidence intervals are indicated or the estimate of poverty rates in 2014.

49. **Estimated poverty rates are broadly consistent with macroeconomic trends.** One way of verifying whether estimated changes in poverty are plausible is to compare poverty rates against projected poverty rates. Projections can be obtained by propagating forward the 2009 estimate of the poverty rate by applying growth rates of real GDP per capita.¹⁴ Doing so for the poverty rates at the USD1.90- and USD3.20-poverty lines suggests that poverty should have increased marginally, from 14.9 to 15.7 percent. In other words, between May 2009 and November 2014, the extreme poverty rate fell somewhat faster than would have been expected; the projected poverty rate for 2014 lies outside and below the 99-percent confidence interval of the point estimate. The incidence of moderate poverty – poverty measured against the World Bank's USD3.20-poverty line – at 43.3 percent is higher than the projected rate at 41.9 percent.

¹⁴ Note that this method is simplistic in that it assumes distribution-neutral growth and a one-to-one pass-through rate from growth in real GDP per capita to consumption.

Figure 9: Poverty headcount ratios (based on World Bank poverty lines) against GDP per capita (2011 PPPs, log scale).

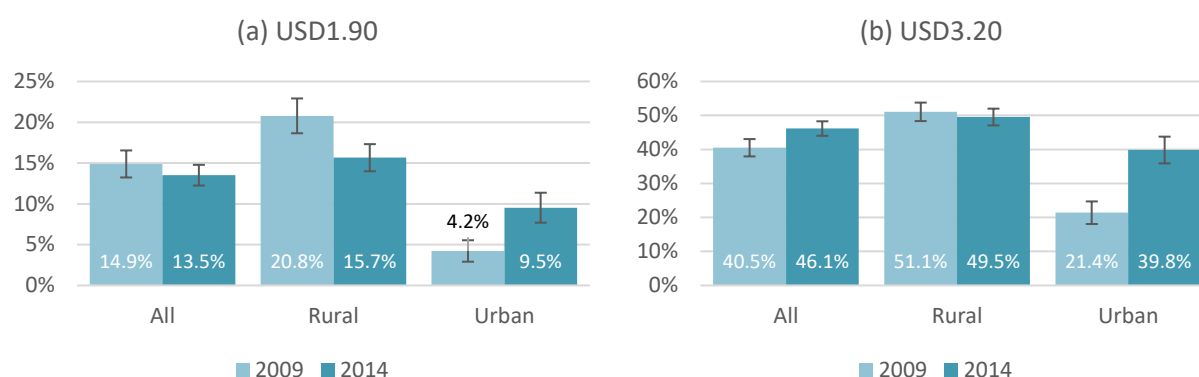


Source: Own calculations based on WDI and NHBPS 2014/15. Only developing countries in the MENA and SSA regions were considered as benchmark.

50. **Sudan's extreme poverty rate is low considering Sudan's level of GDP per capita while the moderate poverty rate is below expectation.** In countries with Sudan's level of economic development, captured here by GDP per capita (in PPPs), around 25-30 percent of the population are typically in extreme poverty. However, there is typically considerable variation around the average. Sudan's extreme poverty rate was in 2014 was considerably lower than what one would have expected given Sudan GDP per capita (Figure 9a) while the country's moderate poverty rate was almost exactly what would have been expected (Figure 9b). As will be further discussed below, the difference, low extreme poverty and about average moderate poverty, is a consequence of low levels of inequality in Sudan.

51. **The incidence of poverty remains higher in rural areas.** As noted above, about two thirds of the population of Sudan is rural while one third is urban. However, the rural population accounts for around 75 and 70 percent of extreme and moderate poverty, respectively. It is more than six percentage points (about 50 percent) more likely to be in extreme poverty and ten percentage points (25 percent) more likely to be moderately poor (Figure 10). Similarly, the poverty gap, the average shortfall from the poverty line expressed as a share of the poverty line, is also higher in rural areas (Figure 11).

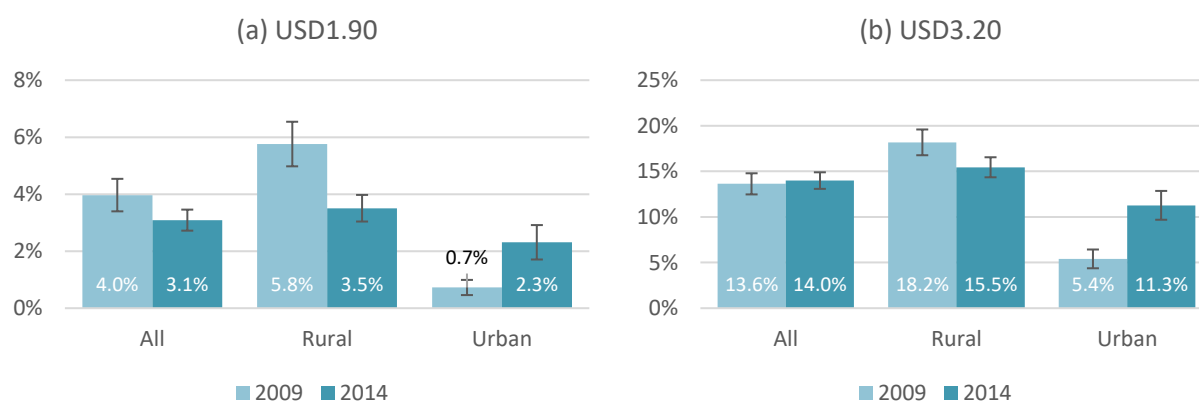
Figure 10: Poverty incidence (headcount ratio) by locality and year.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

52. **Poverty decreased in rural areas while extreme *and* moderate poverty increased significantly in urban areas.** Extreme poverty in rural areas fell from 20.8 percent in 2009 to 15.7 percent in 2014 (Figure 10a). In urban areas, in contrast, it increased from 4.2 to 9.5 percent. The pattern is qualitatively similar for moderate poverty although the decrease in rural areas is small and statistically insignificant ($p=0.42$) (Figure 10b). The increase in moderate poverty in urban areas – from 21.4 percent in 2009 to 39.8 percent in 2014 is, however, pronounced and statistically significant ($p<0.01$). Changes in the poverty gap index indicate a similar pattern of declining poverty in rural areas and increasing poverty in urban areas (Figure 11).

Figure 11: Poverty gap by locality and year.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

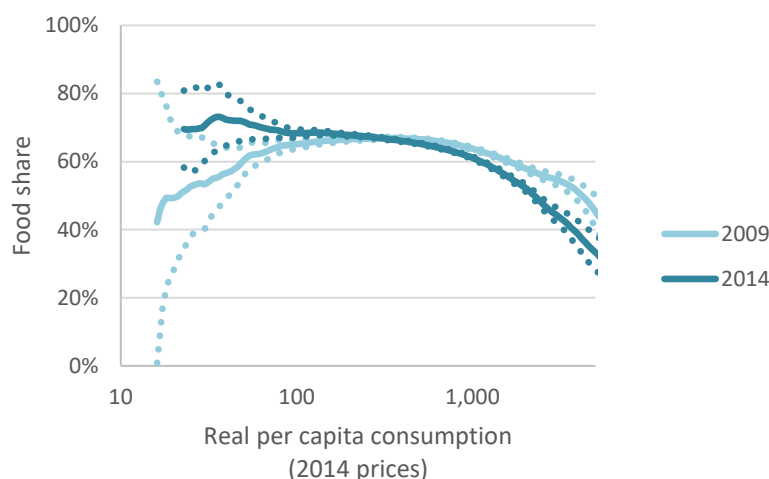
53. **While most of the poor still reside in rural areas, the share of the urban poor in the total has rapidly increased.** In the absence of any evidence for more rapid population growth in urban areas,¹⁵ the pattern observed here suggests an urbanization of poverty. The share of Sudanese in extreme poverty residing in urban areas increased from one in ten in 2009 to one in four by 2014. Among those moderately

¹⁵ As noted in chapter I, there is no evidence for urbanization between 2009 and 2014. The share of the population in urban areas is estimated at around 35 percent in both 2009 and 2014.

poor, the share increased from two in ten to three in ten. One caveat in this regard relates to the timing of survey work in 2009 and 2014 relative to the agricultural cycle. The issue will be explored in more detail below. This may affect share of the urban poor in total poverty through an effect on the denominator. However, changes in employment patterns and wage growth are better candidate explanation for the increase of poverty in urban areas (see chapter V).

54. Average food shares in consumption, at around 63 percent of the total value of consumption, did not change between 2009 and 2014. The average share of food in total consumption in households was 62.6 percent in 2014, down from 63.1 percent in 2009, a difference that is not statistically significant at conventional levels ($p=0.21$).

Figure 12: Food shares against real per capita consumption in 2014 prices (log scale) (Engel curves), 2009 and 2014, for a family with two adults and two children below 15 years.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: Graphs obtained from a local polynomial regression. The food share series is first corrected through regression-based prediction of food shares for a family of four with two children. Dotted lines indicate 95-percent confidence intervals. Positive extreme values are omitted but the graph shows estimates for up to the 99th percentile of per capita consumption in both years.

55. In both 2009 and 2014, rural households allocated a larger fraction of their total budgets to food. Rural households allocated on average 64.4 percent to food while urban households allocated 59.1 percent ($p<0.01$). The gap was very similar in 2009, with average food shares among rural and urban households of 64.6 and 60.3 percent, respectively ($p<0.01$). Only the decrease in the food share among urban households over time is significantly different from zero ($p=0.07$), but it is still negligible in economic terms.

56. Food shares declined monotonously with per capita consumption in 2014 but not in 2009. Engel's law predicts a negative relationship between the share of food in consumption and economic welfare, i.e., the income elasticity for food is between zero and one. Engel's law holds in Sudan in 2014, where the food share declined from 65.1 percent among the poorest 20 percent to 58.5 percent among the richest 20 percent. Interestingly, however, Engel's law is not borne out empirically in 2009: the food share in that year increases initially from 63.0 percent among the poorest 20 percent to 64.6 percent in the third quintile before it declines to 60.6 percent among the richest 20 percent, a pattern that holds

even after controlling for household size and the number of children below the age of 15 (Figure 12). Shifts in relative prices between food and non-food items across the consumption distribution may be one explanation for this curious pattern.¹⁶

Spatial variation in living standards

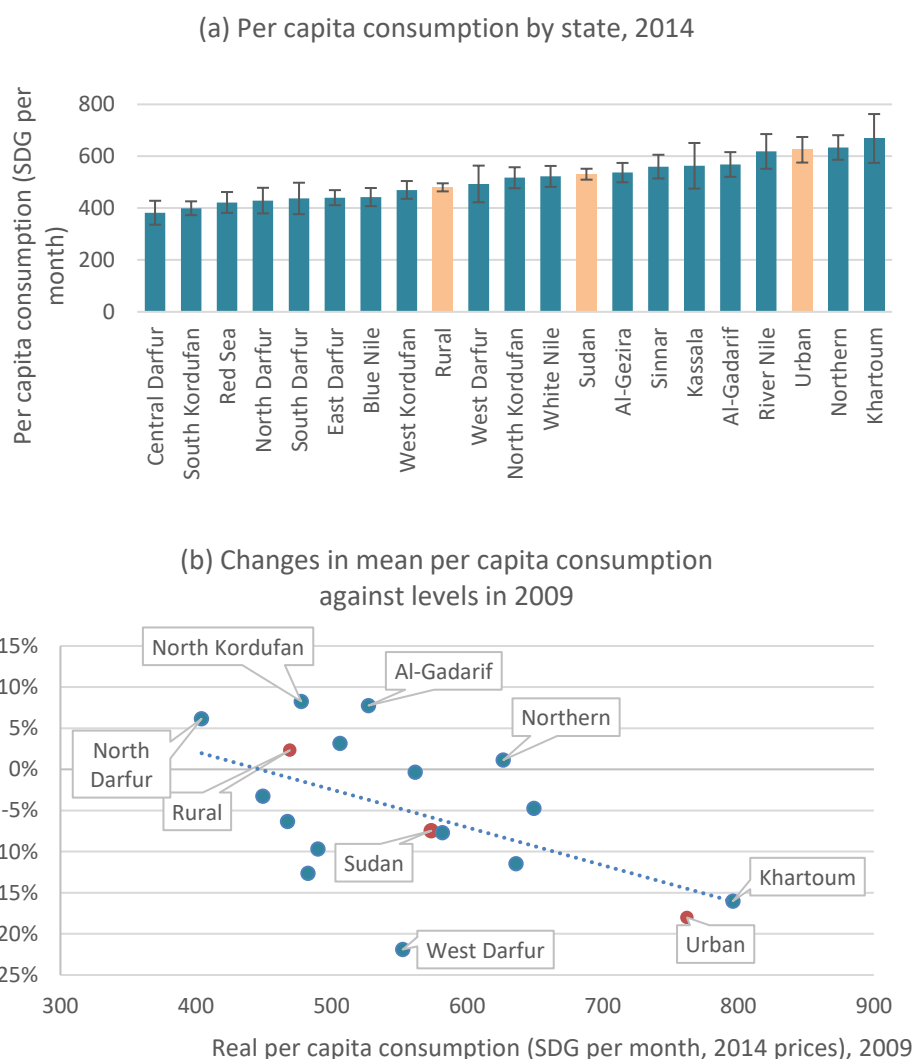
57. **Differences in per capita consumption and poverty across states were pronounced in 2009, a continuation of a long-standing pattern of uneven economic development.** Average per capita consumption in 2009 ranged from a little more than SDG400 per month in North Darfur to close to SDG800 in Khartoum. Differences in poverty rates were also pronounced, ranging from 3.3 percent in Khartoum to almost 30 percent in North Darfur. Reliable household data before 2009 is not available but there are several indications suggesting that this pattern predates the oil economy and the war in Darfur.¹⁷

58. **Development policies in Sudan have historically tended to concentrate investment in the northern and central states as well as in Khartoum.** While the war in Darfur and conflict in other peripheral areas has certainly aggravated differences in levels of economic and human development, the causes of conflicts and underdevelopment are often thought to be essentially the same. This is especially true of Darfur (Cobham 2005, Ahmed 2008). Cobham, for instance, shows that even after taking into account their greater capacity for own revenue generation, Sudan's northern and central states received disproportionately high per capita development expenditure.

¹⁶ Comparisons of Engel curves between years can also be informative about potential biases in the CPI series that is used to compare consumption over time (Dabalén, Gaddis and Nguyen 2016): under restrictive assumptions about preferences and relative prices, a left-shifting Engel curve may indicate an upward bias in the CPI series. Given that food shares are fairly similar across a wide range of the relevant parts of the consumption distribution, it seems unlikely that CPI bias has a large effect on poverty trends estimated in this report.

¹⁷ One World Bank report notes a strong consensus about considerable variations in poverty between states and within states, noting that "the incidence and depth of poverty are unquestionably well above average in southern [now South Sudan] and western Sudan, as well as in northwest and in parts of eastern Sudan. Rural poverty is said to remain high and concentrated in the west (Darfur and Kordofan), in eastern regions such as in Red Sea Hills, and in war-affected areas in the central and southern regions" (World Bank/Government of Sudan 2003).

Figure 13: Average real per capita consumption by state in 2014 and changes between 2009 and 2014.

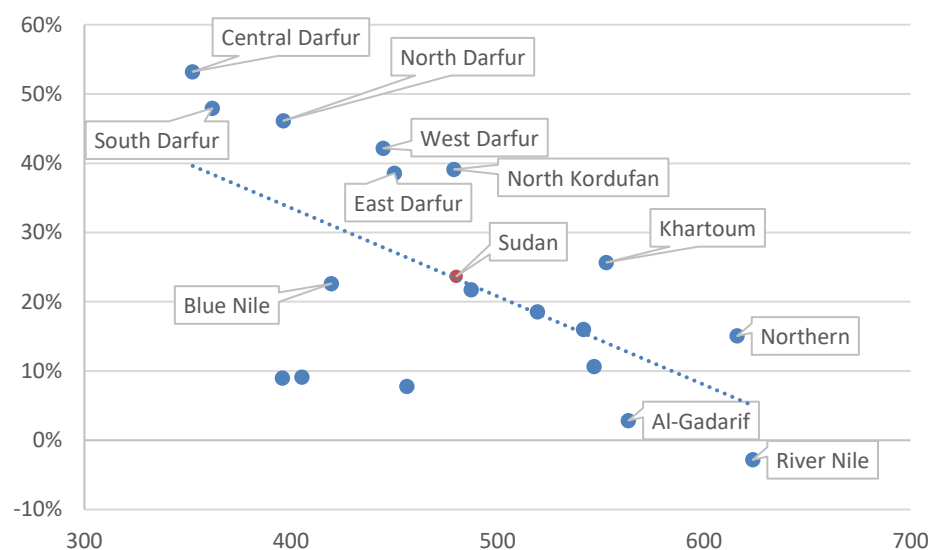


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated in panel (a). States reported as defined in 2009 in panel (b). The slope coefficient from the OLS-regression in panel (b) (excluding aggregates) is not significant at the five-percent level ($p=0.013$).

59. **The geo-spatial pattern observed in earlier years continued to be dominant in 2014.** Did the end of the oil economy affect historical patterns of inequality in economic development across Sudan's states? Average per capita consumption in Khartoum and in the northern region (Northern and River Nile states) in 2014 was about 26 and 18 percent higher than the national average, respectively. On the other hand, average per capita expenditure was eight and 18 percent lower than the national average in Kordofan and Darfur. However, the state with the lowest level of per capita consumption in 2014 – 20 percent below the national average – was Red Sea state in the East. Per capita consumption in urban areas was around 30 percent higher than in rural areas (Figure 13a). Overall, the pattern observed in previous years remains very much intact.

60. **Across states, Sudan experienced some in average levels of economic welfare between 2009 and 2014.** At the national level, real per capita consumption decreased by 7.5 percent on average. But there was considerable variation across states. North Kordofan (+8.3 percent), Al-Gedarif (+7.8), North Darfur (+6.1), White Nile state (+3.2), and Northern state (+1.1) all experienced positive growth in average per capita expenditure, while Kassala (-11.5), Red Sea state (-12.6), Khartoum (-16.0), and West Darfur (-21.9) experienced double-digit contractions in average per capita consumption.¹⁸ The decrease in per capita consumption was typically more pronounced in urban areas. Across the 15 Sudanese states in 2009, growth rates in per capita consumption were inversely related to initial levels, resulting in some convergence over the 2009-2014 period (Figure 13b).

Figure 14: Urban premia (percent) against average per capita consumption by state, 2014.

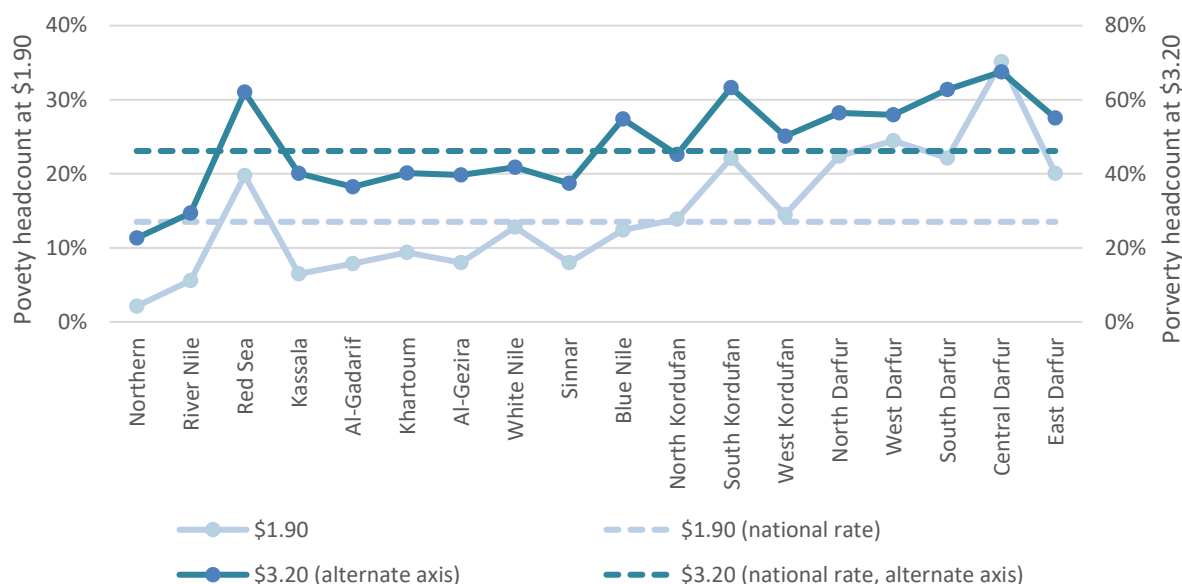


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: The slope coefficient from the OLS-regression is statistically significant at the one-percent level ($p=0.004$).

61. **Urban premia in per capita consumption, the positive difference between average per capita consumption in urban and rural areas, are pronounced in Darfur.** Urban residents in Darfur have levels of per capita consumption around 40-60 percent higher than those in rural areas. The urban premium at the national level, by contrast, is only around 25 percent while there in Al-Gadarif and River Nile state, differences are close to zero (Figure 14).

¹⁸ However, only differences in average per capita consumption observed in West Darfur and Khartoum are statistically different from zero at conventional levels (i.e., $p<0.05$).

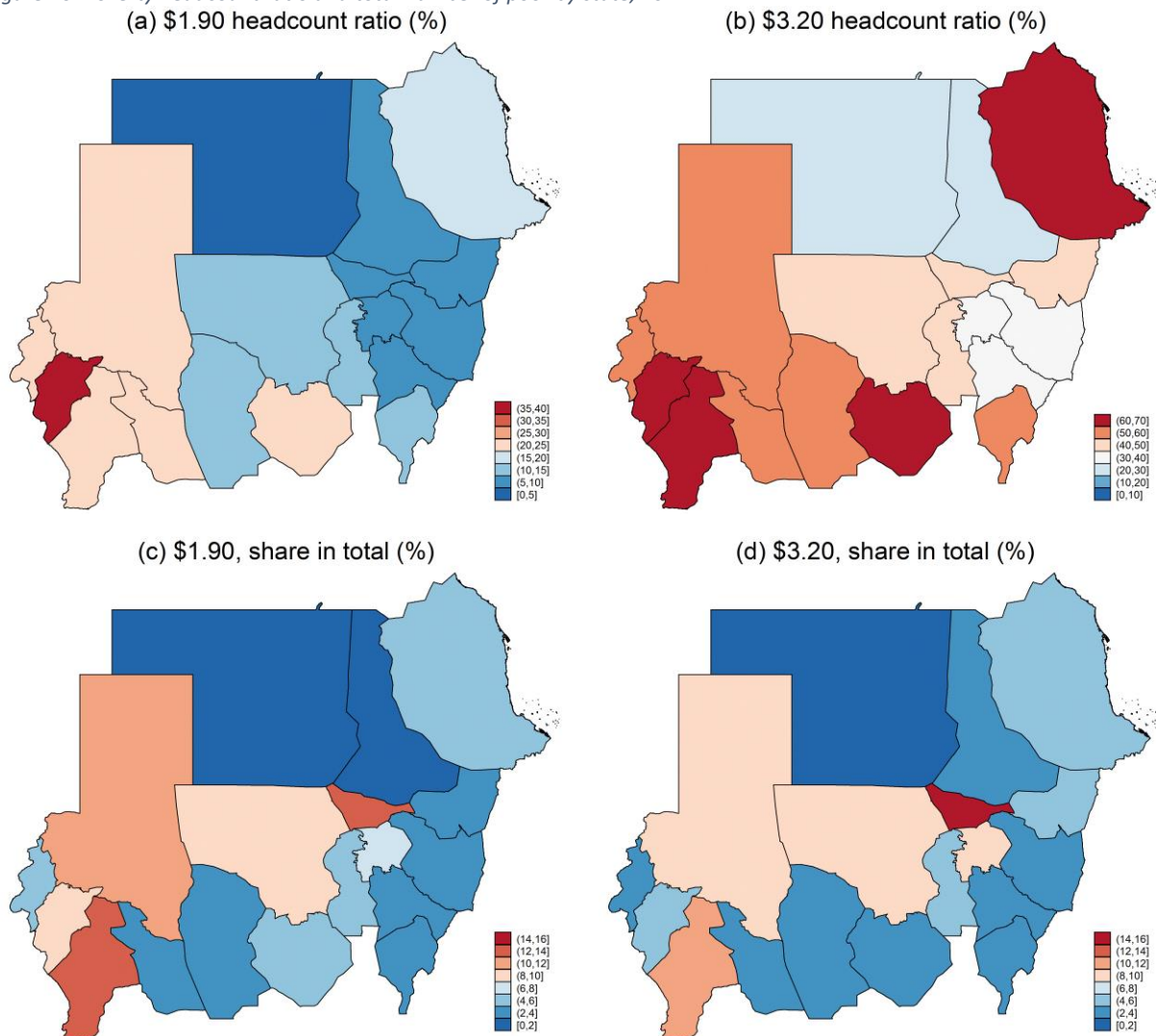
Figure 15: Poverty headcount ratio by state, 2014.



Source: Own calculations based on NHBPS 2014/15.

62. **Poverty rates vary significantly across states, with above-average poverty rates observed in Red Sea state as well as in Kordofan and Darfur.** One third and two thirds of the population in Central Darfur live in extreme and moderate poverty, respectively, compared to 22 and two percent in Northern state (Figure 15). Both Khartoum and Al-Gezira, which jointly account for close to one third of the population and are the only states with double-digit population shares, have below-average poverty rates.

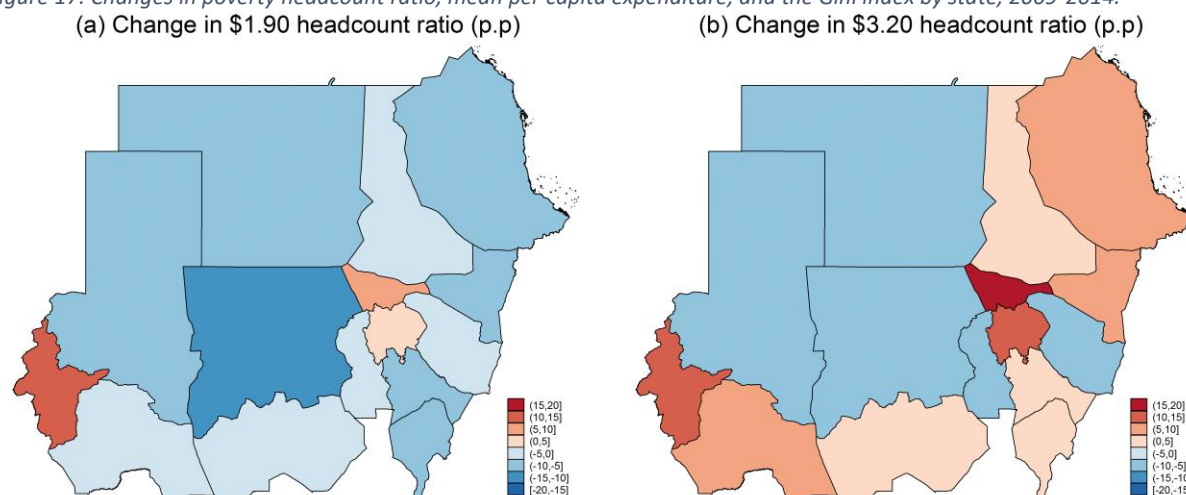
Figure 16: Poverty headcount ratio and total number of poor by state, 2014.



Source: Own calculations based on NHBPS 2014/15.

63. **Twelve to 15 percent of the poor reside in Khartoum.** Poverty rates are elevated in Darfur, in Southern Kordofan, and in Red Sea state (Figure 16a and Figure 16b). Darfur has not only high rates of poverty, it also accounts for around 40 and 30 percent of extreme and moderate poverty, respectively (Figure 16c and Figure 16d). Kordofan, by contrast, accounts for only 15-16 percent of poverty (regardless of the poverty line), with North Kordofan accounting for almost ten percent. A significant share of the extremely and moderately poor also reside in Khartoum (twelve and 15 percent, respectively) and Al-Gezira (seven and ten percent).

Figure 17: Changes in poverty headcount ratio, mean per capita expenditure, and the Gini index by state, 2009-2014.



Source: Own calculations based on NHBPS 2014/15 and NHBS 2009. Note: State borders are depicted as defined in 2009.

64. **While extreme poverty fell in all but three states, moderate poverty increased in most states among the eastern and southern borders as well as in Khartoum, Al-Gezira, and River Nile state.** The increase in extreme and moderate poverty is most pronounced in what was the state of West Darfur in 2009 (now West and Central Darfur) and Khartoum (Figure 17a and Figure 17b). Moderate poverty increased in most eastern and southern states with the exception of Al-Gadarif and Blue Nile state. Northern state, North Darfur, and North Kordofan saw reductions in both extreme and moderate poverty.

65. **Rural poverty is increasingly concentrated in Darfur while urban poverty is increasingly concentrated in Khartoum.** Darfur accounts for 45 (34) percent of extreme (moderate) poverty in rural areas, up from 35 (31) percent in 2009. Kordofan's share, on the other hand, has decreased somewhat, from 25 (21) percent to around 20 (19) percent (Table 29). Urban poverty is increasingly concentrated in Khartoum. In 2014, the capital accounted of 41 (41) percent of the urban population that lived on less than USD1.90 (USD 3.20) per day, up from 23 (35) percent in 2009. South Darfur, the state with the second-largest number of urban poor, accounted for only around ten to 14 percent of the urban poor in both 2009 and 2014.

Growth, poverty, and inequality

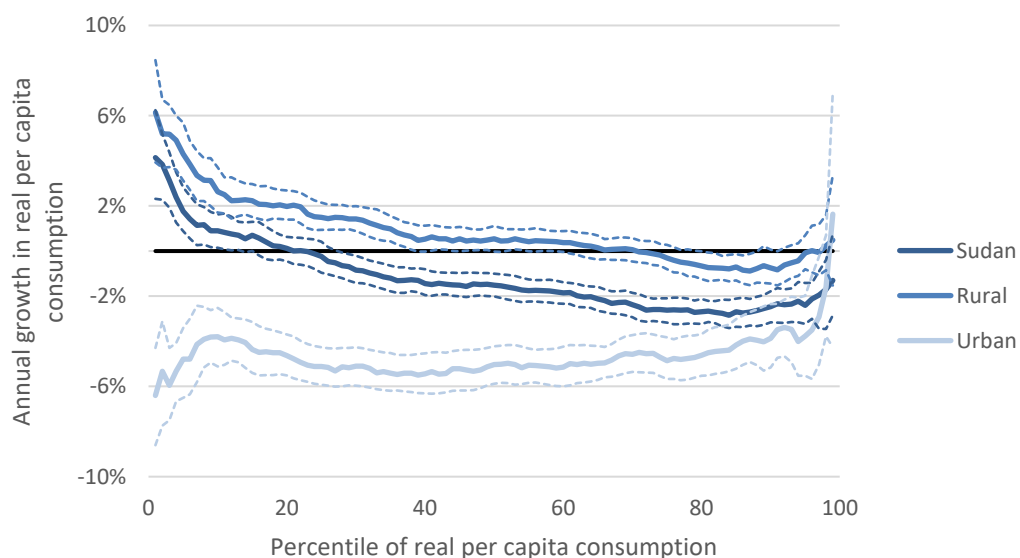
66. **The level of inequality can have significant consequences for economic growth, poverty reduction, political stability, and overall human well-being.** Inequality is a broader concept than poverty in that it is defined over the entire population, not just for the portion of the population below a certain poverty line. Inequality in standard of living is to some extent found in all market-based systems and is sometimes credited with generating beneficial incentives. However, beyond a certain point, income inequality can also undermine the foundations of market economies, resulting in lower growth and less poverty reduction (Deininger & Squire, 1998). For instance, inequality can lead to less demand by the general population and, in the presence of market failures, lower investment in education and health, impairing long-term growth (Galor & Zeira, 1993). Inequalities in outcomes (in incomes, expenditure, or wealth) are also often found to be closely linked to inequalities of opportunity and social and economic

mobility (Brunori, Ferreira, & Peragine, 2013), which are perceived as deeply unfair. Finally, inequality potentially threatens a country's political stability, lowering investment in the process (Alesina & Perotti, 1996).

67. **An understanding of changes in inequality shed light changes in poverty.** Inequality is a broader concept than poverty in that it is defined over the entire population and does not only focus on the poor. In addition, an analysis of changes in inequality in combination with growth also sheds light on poverty trends (Bourguignon, 2003). In the case of Sudan, changes in extreme poverty (poverty at the USD1.90-poverty line) and moderate poverty (poverty at the USD3.20-poverty line) have opposite signs with the former declining and the latter increasing. This finding cannot be explained by growth alone but is consistent with a contraction of the consumption distribution around a point in the lower part of the distribution. This section sheds light on how changes in averages consumption levels and changes in the distribution of consumption combined to bring about the observed changes in poverty in Sudan.

68. **Growth in real per capita consumption was positive only among the bottom-20 percent.** Average real per capita consumption fell by 1.6 percent per year. But there were differences across the distribution that inform our understanding of trends in poverty and inequality. For instance, per capita consumption fell by only 0.1 percent per year among the bottom-40 percent, but by 1.7 percent among the top-60 percent. Figure 18 depicts *growth incidence curves*, plots of annualized real growth rates against percentiles of the consumption distribution. It shows that growth was negative over much of the distribution of per capita consumption and 'pro-poor' only to the extent that the average growth rate by percentile was positive initially but decreasing with each percentile.

Figure 18: Growth incidence by percentile and locality, May 2009 to November 2014.

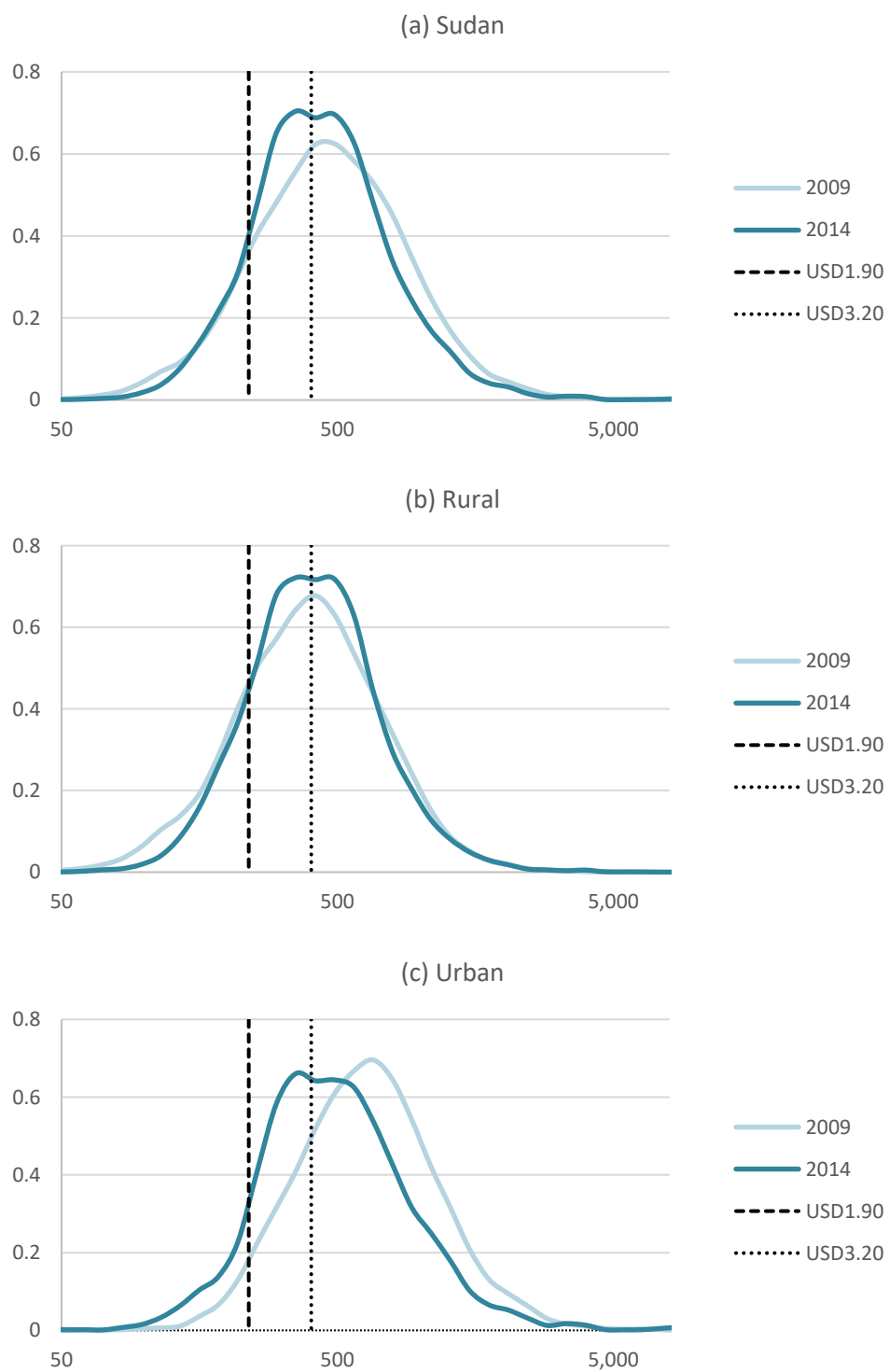


Source: Own calculations based on NBHS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated through dashed lines and based on 200 bootstrap replications.

69. **Rural households had higher levels of growth in per capita consumption over the entire distribution.** Because of a larger share of the rural population in the total population, the growth pattern at the national level mirrors the pattern of growth in rural areas. However, rural households had higher

levels of growth throughout. Only the richest 30 percent in rural areas experienced negative growth in per capita consumption. Growth in urban areas, on the other hand, was negative for nearly all percentiles.

Figure 19: Kernel density estimates of the distribution of (log) per capita consumption, 2009-2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

70. **Lower inequality in rural areas and falling per capita consumption in urban areas combine to produce a small reduction in extreme poverty and a more pronounced increase in moderate poverty.** Figure 19 provides (kernel) density estimates of the distribution of (log) per capita consumption for all of Sudan and rural and urban areas separately. From Figure 19b, it is apparent that the defining feature in rural Sudan is falling inequality. Per capita consumption at the bottom end of the distribution increased and per capita consumption at the top end decreased, although the former change may be more pronounced. The defining feature for urban Sudan, on the other hand, is a proportional left-shift in the distribution (Figure 19c), which is very much in line with the growth incidence analysis above. Taken together, the result is falling per capita consumption at the top end of the distribution and more moderate gains at the bottom (Figure 19a).

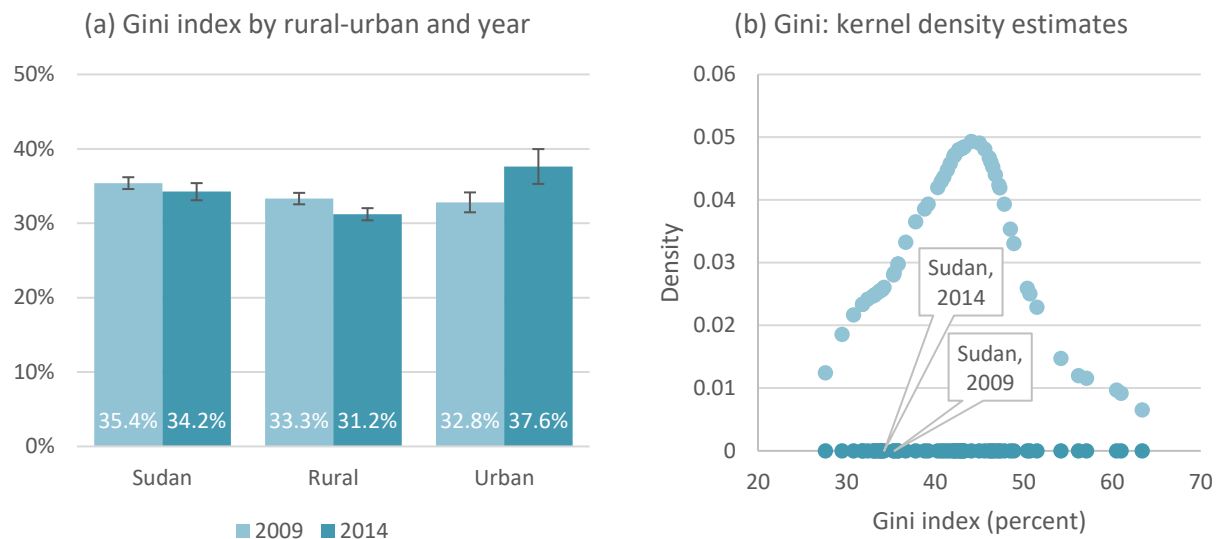
Box 4: Measures of inequality.

The Gini index is a popular measure of inequality. A popular measure of inequality is the Gini coefficient, which ranges from 0 (perfect equality) to 1 (perfect inequality). The Gini coefficient is derived from the Lorenz curve, which sorts the population from poorest to richest, and shows the cumulative proportion of the population on the horizontal axis and the cumulative proportion of consumption expenditure (or income) on the vertical axis. While the Gini coefficient has many desirable properties, it cannot easily be decomposed to show the sources of inequality.

Alternatives to the Gini include percentile ratios as well as more sophisticated measures. Percentile ratios simply present the ratio of certain percentiles of the distribution of interest, say the ratio of consumption at the 90th percentile to that of the consumption of the 50th percentile (the median). They are thus straightforward to interpret. However, they fail to satisfy criteria that are often seen as desirable. Generalized entropy (GE) measures (which include the mean log deviation, the Theil measure, and half the square of the coefficient of variation as special cases) and Atkinson measures satisfy all desirable criteria for inequality measures but have a less intuitive interpretation. Comparisons in trends between different GE and Atkinson-class measures are also informative about changes in inequality at different parts of the distribution: the larger the parameter in the GE-class, the more sensitive the measure to inequality in the top of the distribution, and the larger the parameter in the Atkinson-class measures (the *inequality aversion parameter*), the more sensitive the measure to income differences at the bottom of the distribution.

Source: Haughton & Khandker (2009).

Figure 20: Gini index by rural/urban and in comparison to other countries, 2009 and 2014.



Source: Own calculations based on NBHS 2009, NHBPS 2014/15, and WDI. Note: 95-percent confidence intervals indicated in panel (a). Only developing countries in the MENA and SSA regions were considered as benchmark countries in panel (b).

71. **From a moderately low level in 2009, inequality in Sudan as measured by the Gini index decreased further.** The Gini index in 2014 was 34.2 percent, down from 35.4 percent in 2009 (Figure 20a). Inequality declined by about two percentage points in rural areas but increased by about five percentage points. If the median individual is non-poor (i.e., the poverty rate is below 50 percent), declines in inequality will typically be associated with poverty reduction. Therefore, the changes observed here are in line with trends in poverty documented above, that is, falling or stagnating poverty in rural areas and an increase in urban poverty.

72. **In comparison with other countries, inequality in Sudan remains moderately low.** Gini indices measured in 2009 and 2014 imply that only around 25 percent of all countries in the Middle East/North Africa and Sub-Saharan Africa regions combined have lower levels of inequality (Figure 20b). Sudan's Gini index for 2014 suggests lower inequality than in neighboring Chad (with a Gini index of 43.3 percent in 2011) yet higher inequality than in Egypt (31.8 in 2015), and a similar level to that measured in Ethiopia (33.2 in 2010).

Table 2: Select measures of inequality, 2009-2014.

	Gini	Percentile ratios				Atkinson measures			General entropy measures			
		p90/p10	p90/p50	p75/p25	p75/p50	A(1/2)	A(1)	A(2)	GE(-1)	GE(0)	GE(1)	GE(2)
<i>Panel (a): Sudan</i>												
2009	0.35	5.07	2.24	2.36	1.54	0.10	0.19	0.35	0.27	0.21	0.22	0.29
2014	0.34	4.21	2.13	2.06	1.45	0.10	0.18	0.30	0.22	0.20	0.24	0.47
Difference	-0.01	-0.86	-0.12	-0.29	-0.09	0.00	-0.01	-0.04	-0.05	-0.02	0.02	0.19
<i>Panel (b): Rural</i>												
2009	0.33	4.70	2.14	2.22	1.48	0.09	0.17	0.32	0.24	0.19	0.19	0.24
2014	0.31	3.91	1.99	2.01	1.42	0.08	0.15	0.27	0.18	0.16	0.18	0.26
Difference	-0.02	-0.79	-0.15	-0.21	-0.07	-0.01	-0.02	-0.05	-0.05	-0.03	-0.01	0.02
<i>Panel (c): Urban</i>												
2009	0.33	4.49	2.13	2.17	1.47	0.09	0.16	0.29	0.21	0.18	0.19	0.24
2014	0.38	4.47	2.28	2.20	1.48	0.12	0.21	0.35	0.27	0.24	0.30	0.68
Difference	0.05	-0.02	0.15	0.03	0.01	0.04	0.05	0.06	0.06	0.06	0.12	0.43

Source: Own calculations based on NBHS 2009 and NHBPS 2014/15. Note: See Box4 for a brief discussion of alternative measures of inequality.

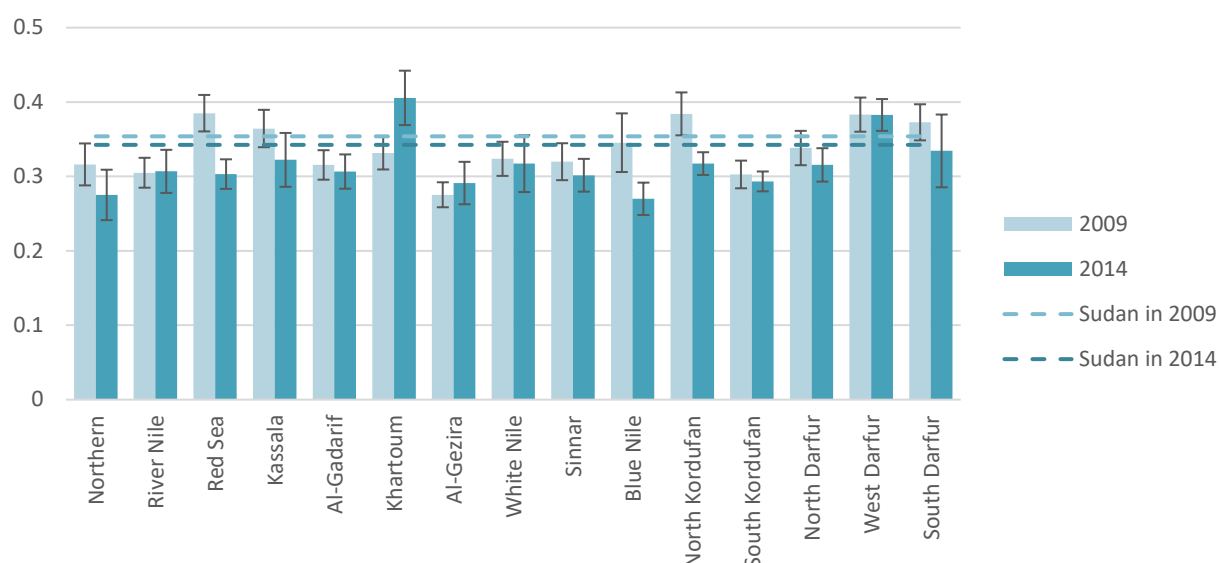
73. **Alternative inequality measures also suggest declining inequality, particularly in the bottom of the distribution.** The Gini index is but one measure of inequality (albeit a one that is widely used). Other indicators include various ad hoc measures such as percentile ratios (e.g. the ratio of per capita consumption at the 90th percentile to that at the 10th percentile) as well as measures of the Atkinson- and General Entropy-class of inequality measures (Box4). Most of these alternative measures suggest that inequality declined between 2009 and 2014. For instance, the per capita consumption of the individual at the 90th percentile in 2009 was five times that of the individual at the 10th percentile in 2009 but only 4.2-times as much in 2014. This is particularly true for inequality measures that are sensitive to inequality at the bottom of the distribution, such as the Atkinson-class measure with parameter two and the GE-measure with parameter negative one, which suggest falling inequality. However, measures that are more sensitive to inequality at the top of the distribution – GE(1), the Theil index, and GE(2), half the square of the coefficient of variation – indicate increasing inequality.

74. **Falling inequality was driven by falling inequality in rural areas.** Different measures of inequality all register fall inequality in rural areas. But inequality in urban areas is on the rise. This is due to increasing inequality at the top of the distribution. For instance, the GE(1) and GE(2) increased by 62 and 177 percent, respectively, while GE(-1) and GE(0) both increased more moderately, by 29 and 34 percent, respectively (Table 31).

75. **Inequality is particularly high in Khartoum and in some of the states in the Darfur region.** In 2014, only Khartoum (40.6), West Darfur (40.1), and Central Darfur (35.6) had levels of inequality higher than the national average and as measured by the Gini index (Table 31). The lowest levels of inequality by this measure are found in Blue Nile state (27.0), Northern state (27.5), South Kordofan (28.5), Al-Gezira (29.3), and West Kordofan (29.3) (Figure 21).¹⁹

¹⁹ Table 31 in the appendix reports alternative measures of inequality, including percentile ratios, Atkinson measures, and the Generalized Entropy (GE) class of inequality indices. All of these are highly correlated, with Pearson correlation coefficients greater than 0.75 and often significantly higher. The exception is GE(2), which is highly sensitive to income differences in the top of the distribution.

Figure 21: Gini indices by state, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated. State boundaries as in 2009.

76. **Khartoum is the only state in which inequality increased significantly.** An increase in the Gini index is apparent only for three states (as defined in 2009): River Nile, Al-Gezira, and Khartoum experienced increases by 0.2, 1.6, and 7.4 percentage points, respectively. However, only in the capital was the increase in this measure of inequality also statistically significant. Declines in inequality are pronounced in the states of Red Sea (-8.2 percentage points), Blue Nile (-7.5), and North Kordofan (-6.7) (Figure 21).

Table 3: Decomposition of inequality (Theil index) by regions and rural-urban classification, 2009 and 2014.

	By region				By rural-urban classification			
	2009		2014		2009		2014	
	Absolute	Share	Absolute	Share	Absolute	Share	Absolute	Share
Within	0.197	90.8%	0.226	95.4%	0.188	86.7%	0.228	96.5%
Between	0.020	9.2%	0.011	4.6%	0.029	13.3%	0.008	3.5%
Total	0.217	100.0%	0.237	100.0%	0.217	100.0%	0.237	100.0%

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

77. **Inequality within geographic entities constitutes the major share of overall inequality in Sudan.** Breakdowns of the Theil-index by regions and by rural-urban classification suggests that inequality within these geographic entities accounts for more than four fifths of the overall inequality between individuals. It also appears that the share of total inequality explained by inequality within entities has further increased between 2009 and 2014 (Table 3).

Table 4: Decomposition (Shapley values) of changes in poverty into growth and distribution components, 2009-2014.

	Growth in average per capita consumption		Change in the distribution		Total change	
	P.p.	Share	P.p.	Share	P.p.	Share
<i>(a) \$USD1.90 poverty line</i>						
Sudan	2.7	-200%	-4.1	300%	-1.4	100%
Rural	-1.1	22%	-4.0	78%	-5.1	100%
Urban	4.3	81%	1.0	19%	5.3	100%
<i>(b) USD3.20 poverty line</i>						
Sudan	5.3	94%	0.4	6%	5.6	100%
Rural	-1.3	83%	-0.3	17%	-1.5	100%
Urban	12.3	67%	6.1	33%	18.4	100%

Source: Own calculations based on NHBPS 2014/15 and using Stata module DRDECOMP (Azeveda, Castaneda, & Sanfelice, 2012).

78. **The decrease in extreme poverty at the national level is entirely attributable to falling inequality.** Average real per capita expenditure decreased between 2009 and 2014. Hence, the decline in extreme poverty is driven entirely by falling inequality (Table 4). The analysis for rural and urban areas separately turns out more informative. Close to 80 percent of the decrease in extreme poverty in rural areas (by 5.1 percentage points) resulted from a more equal distribution of per capita consumption, with only around 20 percent attributable to higher per capita consumption. The attribution of changes in extreme poverty is almost exactly the opposite, with more than 80 percent of the increase in extreme poverty in urban areas (5.3 percentage points) resulting from a drop in average per capita expenditure.

79. **Changes in moderate poverty result primarily from changes in average per capita consumption, with only a minor role for changes in inequality.** 94 percent of the increase by 5.6 percentage points at the national level in moderate poverty are attributable to lower average per capita consumption. And despite the significant increase in inequality in Khartoum, two thirds of the change in moderate poverty in urban areas are still attributable to lower per capita expenditure.

Table 5: Decomposition (Shapley values) of changes in poverty into growth and distribution components by region, 2009-2014.

	Growth	Redistribution	Total
<i>Panel (a) USD1.90-poverty line</i>			
Northern	0.7	-4.0	-3.2
Eastern	2.3	-8.5	-6.2
Khartoum	3.7	2.4	6.1
Central	1.2	-2.8	-1.5
Kordofan	-2.1	-7.4	-9.5
Darfur	3.7	-4.0	-0.3
<i>Panel (b) USD3.20-poverty line</i>			
Northern	2.3	-2.8	-0.4
Eastern	3.4	-1.1	2.4
Khartoum	10.6	9.1	19.7
Central	3.7	0.2	3.9
Kordofan	-3.2	-0.7	-4.0
Darfur	4.6	-1.4	3.3

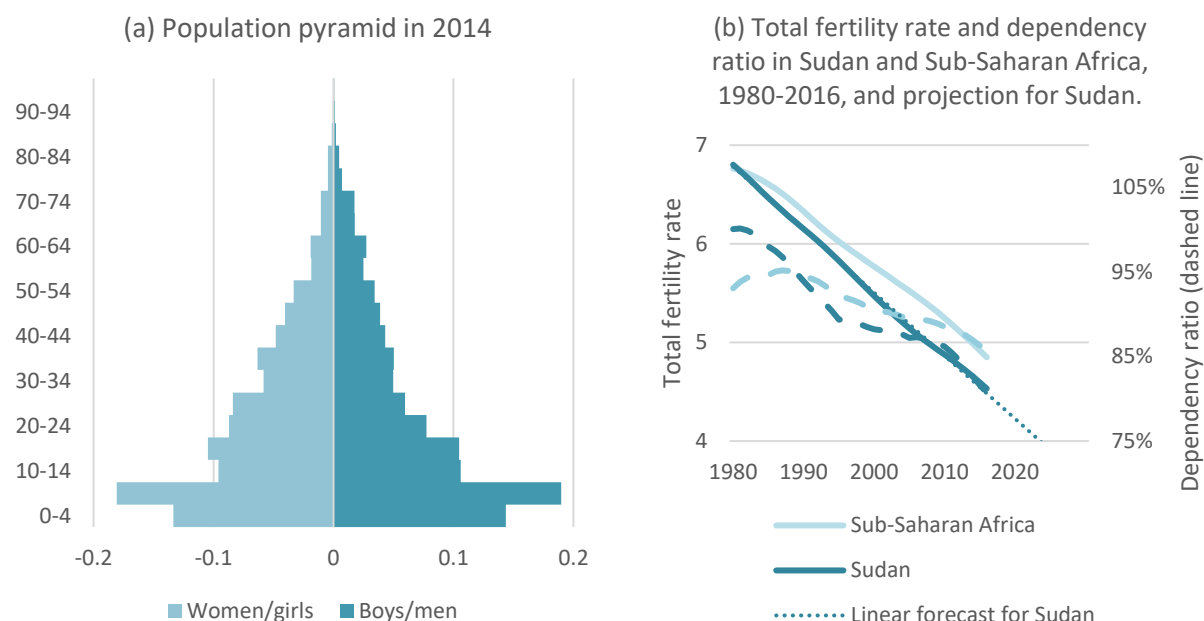
Source: Own calculations based on NHBPS 2014/15 and using Stata module DRDECOMP (Azeveda, Castaneda, & Sanfelice, 2012).

80. **While the effect of changes in inequality on poverty played an ambiguous role across regions, changes in average per capita consumption had a negative effect on poverty in all regions except Kordofan.** Growth contributed positively to poverty reduction only in Kordofan; in all other regions, average per capita consumption decreased. Inequality played an ambiguous role across almost all regions depending on the poverty line: In all regions save Khartoum, it has contributed towards lowering extreme poverty and in two out of the six regions this is also true for moderate poverty. The decomposition also shows that both increasing inequality and a decrease in average per capita consumption contributed to the sharp increase in poverty in Khartoum (Table 5).

Socio-demographic characteristics

81. **Sudan's population is young and expanding at a fast rate.** The Central Bureau of Statistics (CBS) population projection for Sudan for 2017 was 40.8 million. Sudan's population was estimated at 41.5 million in 2018 (WDI). Based on estimates from the 2014/15 National Household Budget and Poverty Survey (NHBPS), more than two in five (42.5 percent) Sudanese are below the age of 15 and only 4.2 percent are older than 64. According to CBS, the population grew at an estimated rate of 2.9 percent in 2017, slightly higher than the 2.7 percent estimated for the Sub-Saharan Africa region.

Figure 22: Key population trends in Sudan.



Source: Own calculations based on NHBPS 2014/15 (left panel) and WDI data (right panel).

82. **Sudan may be close to entering the ‘early-dividend’ stage of the demographic transition.** While Sudan’s population is young, total fertility is estimated to be 5.2 births per woman in 2014 and 4.7 births in 2016 (Figure 22b). Four children per woman, a rate Sudan would hit by about 2023 on current trends, is often seen as a critical threshold, at which countries enter the ‘early-dividend’-stage of the demographic transition, a situation that constitutes both major challenges and significant opportunities (Box 5).

Box 5: Entering the early stage of the demographic transition constitutes both major challenges and significant opportunities.

The demographic dividend describes the interplay between changes in a population’s age structure due to the demographic transition and rapid economic growth. Declines in child mortality, followed by declines in fertility, produce a “bulge” generation and a period when a country has a large number of working-age people and a smaller number of dependents. A higher ratio of working-age adults to dependents can give a boost to the economy provided there are labor opportunities for these workers. Smaller family sizes also imply that both families and governments have more resources to invest in health and education per child and that women are in a better position to enter the labor force. On the other hand, a failure to productively employ large cohorts of youth can be socially disruptive (Urdal 2006). With a total fertility rate of 4.7 births per woman, Sudan has yet to enter the early-dividend stage. But a simple linear forecast suggests that this could happen even within the next five years (Figure 22a).

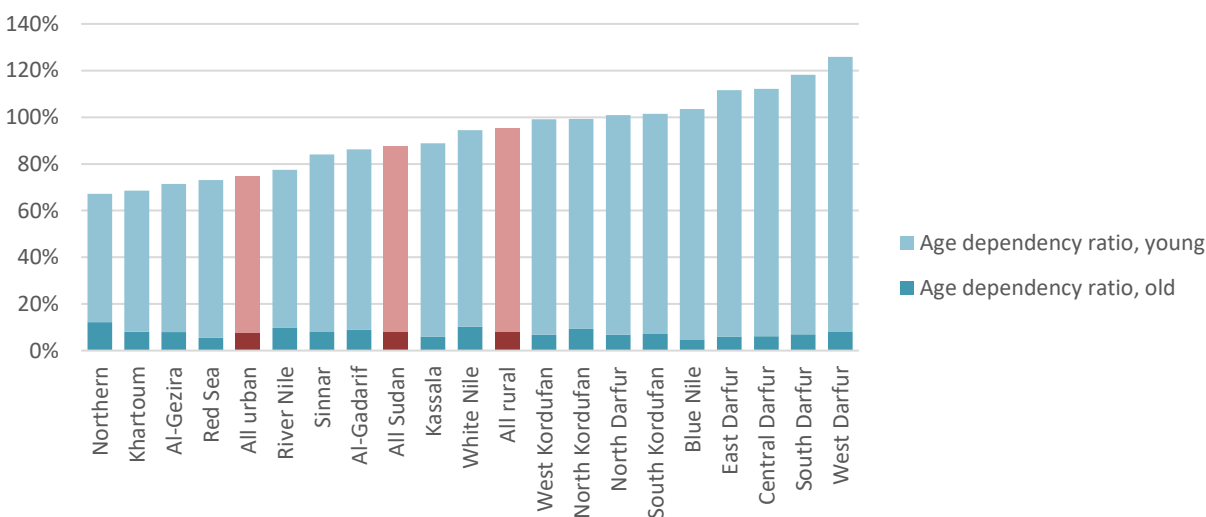
To realize the economic potential of the demographic transition, strategic planning and preparation are key. Having a large number of workers per capita gives a boost to the economy provided there are labor opportunities for these workers. More important for a sizable dividend, however, are changes in worker productivity. Smaller family sizes mean that both families and governments have more resources to invest in health and education per child. It also means that women are more able to enter the labor force. If the economic environment is conducive, and this large and well-educated cohort finds well-paying work, a first dividend comes as this productive labor boosts family and national income. Longer life spans mean that this large, better-earning cohort will also want to

save for retirement. And with the right policies and a well-developed financial sector, a second dividend can come from higher savings and investments, leading to further productivity gains.

Source: World Bank (2015).

83. Age-dependency ratios vary significantly across states: northern and central states have higher shares of working-age adults while the Kordofans, Darfur, and Blue Nile state have particularly young populations. Dependency ratios capture variations in the proportions of children, elderly people, and working-age people in the population that imply the dependency burden that the working-age population bears in relation to children and the elderly.²⁰ The overall survey estimate of the age-dependency ratio (dependents young and old as a share of working-age people) is 0.88 percent (Figure 23), only slightly higher than the projection reported in the World Development Indicators for 2014 (Figure 22b).²¹ Age dependency ratios vary from about 65-70 percent (two dependents out of five) in Northern state, Khartoum, Al-Gezira, and Red Sea state, to more than 100 percent (one in two) in Kordofan, Darfur, and Blue Nile state (Figure 23).

Figure 23: Age dependency ratios, 2014.



Source: Own calculations based on NHBPS 2014/15.

84. **There are differences in sex ratios in Sudan, with significant regional variation.** Differences in sex ratios, the ratio of boys/men to girls/women, can have many causes, including biological differences. In Sudan, sex ratios in childhood (ages zero to four) favor boys significantly in Eastern region (1.26; $p < 0.01$), Central region (1.11; $p = 0.07$), and Darfur (1.10; $p = 0.04$).²² Sex ratio fall in all regions between the ages of around ten and 25 before they increase again starting with the late-30s. The drop in the sex ratio

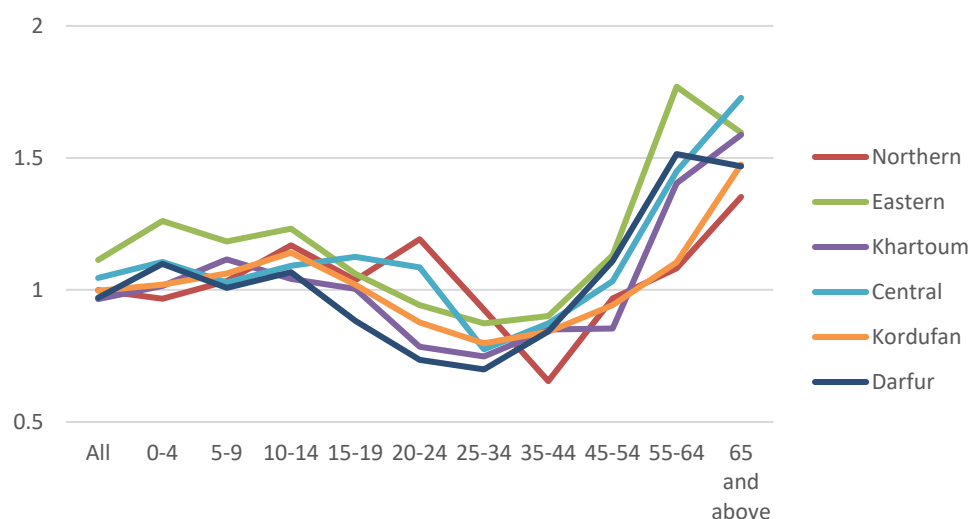
²⁰ Note that dependency ratios capture only the age composition of a population, not economic dependency. Some children and elderly people are part of the labor force and many working-age people are not.

²¹ Age structure in the World Bank's population estimates, which are made available through the World Development Indicators, is based on the age structure in United Nations Population Division's World Population Prospects.

²² Findings are qualitatively similar for 2009. In that year, it was 1.19 in Eastern region, 1.04 in Northern region, 1.14 in Khartoum and Darfur, 1.10 in Kordofan, and 1.09 in Central region. According to at least one study, domestic violence against women, which often correlates with poor maternal health outcomes, seems to be widespread in Eastern Sudan (AbdelAzim, Yassin and Omer 2014). On the other hand, women have a higher propensity to find domestic violence justified in Darfur and Kordofan (UNICEF, CBS, and others 2014).

between 20 and 44 is particularly pronounced in Sudan's Northern region, where, as will be discussed later in this report, labor migration is an important economic factor.

Figure 24: Sex ratios by age group and region, 2014.

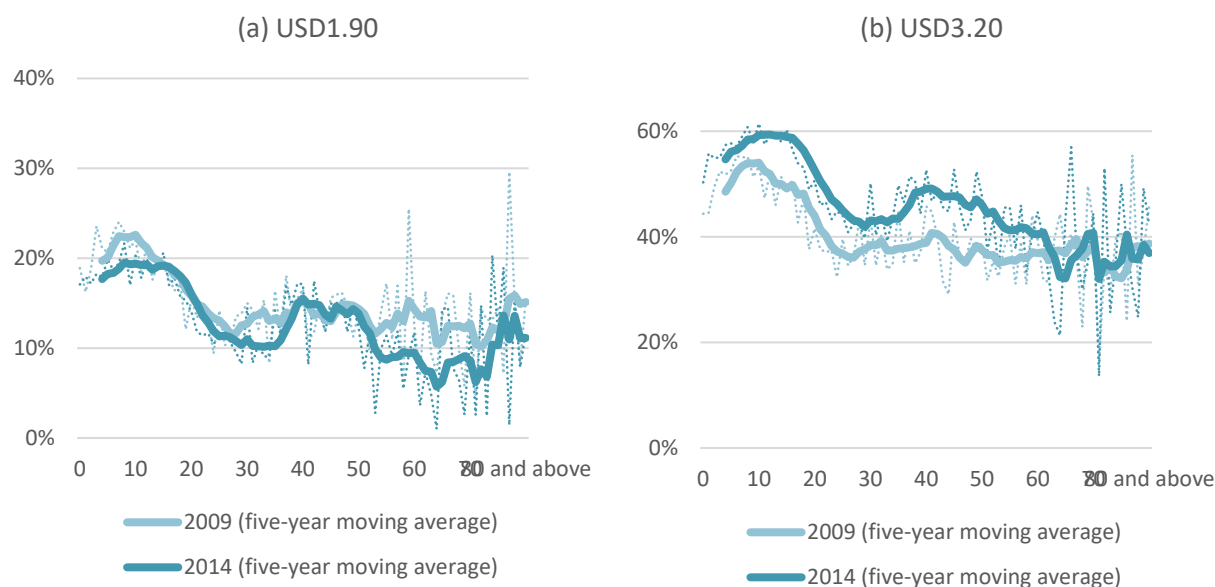


Source: Own calculations based on NHBPS 2014/15.

85. **The poverty risk in Sudan initially decreases with age,²³ but extreme poverty increases sharply among the oldest members of society.** The incidence of extreme and moderate poverty among those below the age of 15 was higher than the national averages of 13.5 and 46.1 percent, respectively. Poverty incidence broadly declines with age to lows of 6.8 and 29.4 percent among those between the ages of 80 and 84 before they increase again for the very old. There is evidence for an intermittent increase in poverty rates around the age of 45 that may be related to an increase in the share of children among household members.

²³ Note that monetary poverty cannot be measured at the level of the individual but only at the level of households.

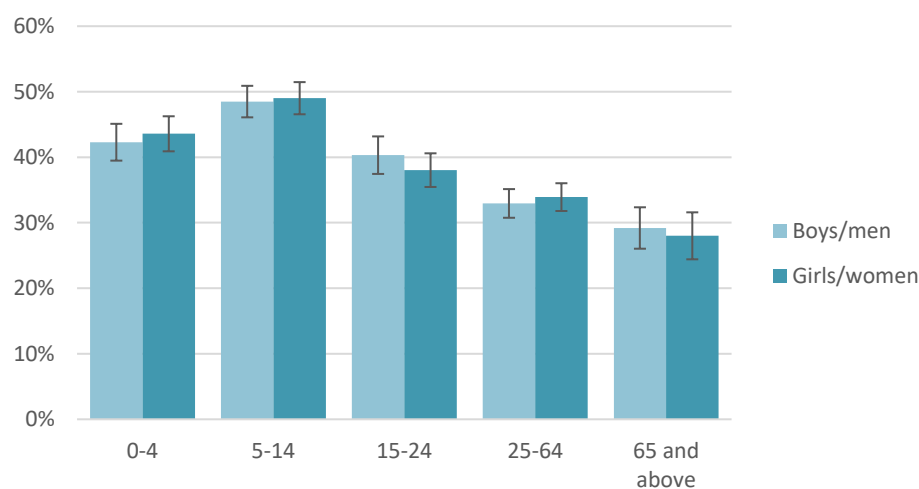
Figure 25: Poverty incidence by age, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Dotted series indicate actual data

86. **Compared to the incidence of poverty in 2009 and with the exception of those above the age of 60, moderate poverty increased across the entire age range while extreme poverty decreased mostly among the middle-aged and the elderly.** Changes in poverty in Sudan between 2009 and 2014 show a distinct demographic pattern. The decrease in extreme poverty is driven by a decrease among children below the age of ten, adults in their late 20s and early 30s, and adults above the age of 50. The increase in moderate poverty, on the other hand, is discernible for all age groups except those above the age of around 60. Elderly Sudanese were rather well-protected from recent economic shocks.

Figure 26: Share among the bottom-40 percent by age and gender, 2014.

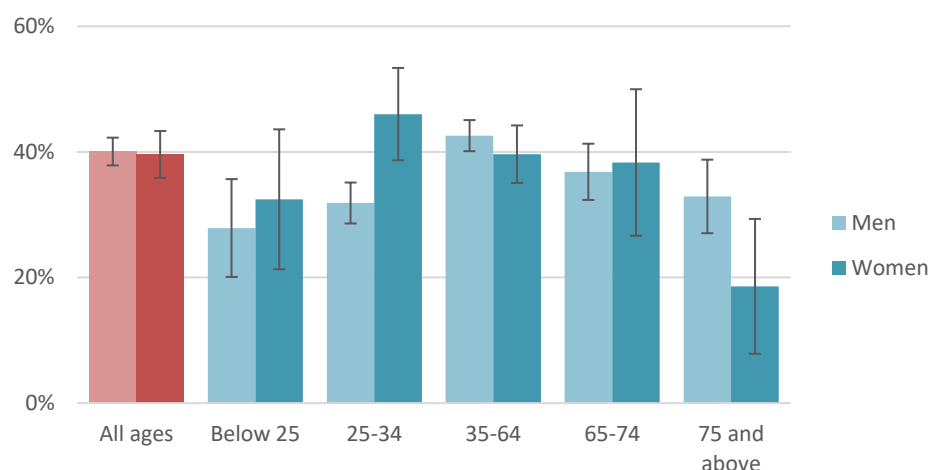


Source: Own calculations based on NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

87. **Children between the ages of five and 14 have the highest likelihood of being among the bottom-40 percent.** The probability of being among the bottom-40 percent initially increases with age, from only marginally more than 40 percent among those zero to four to close to 50 percent among those five to 14. At this age, Sudanese start to become more likely to be among the top-60 percent. Those 65 and above only have around a 30-percent chance of being among the bottom-40 percent (Figure 26).

88. **Household heads in Sudan are considerably older than the average Sudanese and few of them are women.** Households heads were on average 47.4 years old in 2014, up from 46.0 years in 2009. This compares to an average age in the population of 23.2 years in 2014 and 22.7 years in 2009. In other words, the average age gap between the Sudanese population and the subpopulation of household heads has increased by nearly one year. Few households are headed by women, but their share is increasing. In 2014, around eleven percent of the population lived in a household headed by a woman, up from eight percent in 2009. While more than three in five women-headed households are in rural areas, the probability of living in a women-headed household is around three percentage points higher in urban areas (13.4 vs. 10.3 percent).

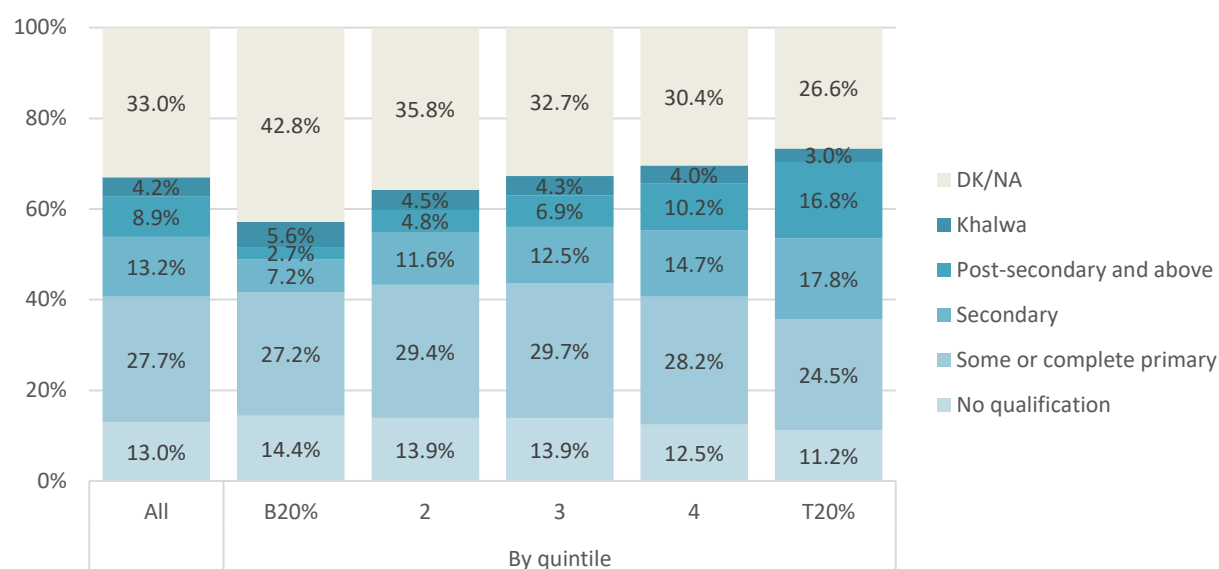
Figure 27: Share among the bottom-40 percent by age and gender of household head, 2014.



Source: Own calculations based on NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

89. **Women- and men-headed households are equally likely to be among the bottom-40 percent.** There is no statistically significant difference between woman- and man-headed households in the probability of being among the bottom-40 percent. Younger and older household heads, those below 25 and those above 74, are somewhat less likely to be among the two bottom quintiles while women-headed households with heads between 25-34 are more likely to be among the bottom-40 percent (Figure 27).

Figure 28: Educational attainment of population aged 15 and above by quintile, 2014.

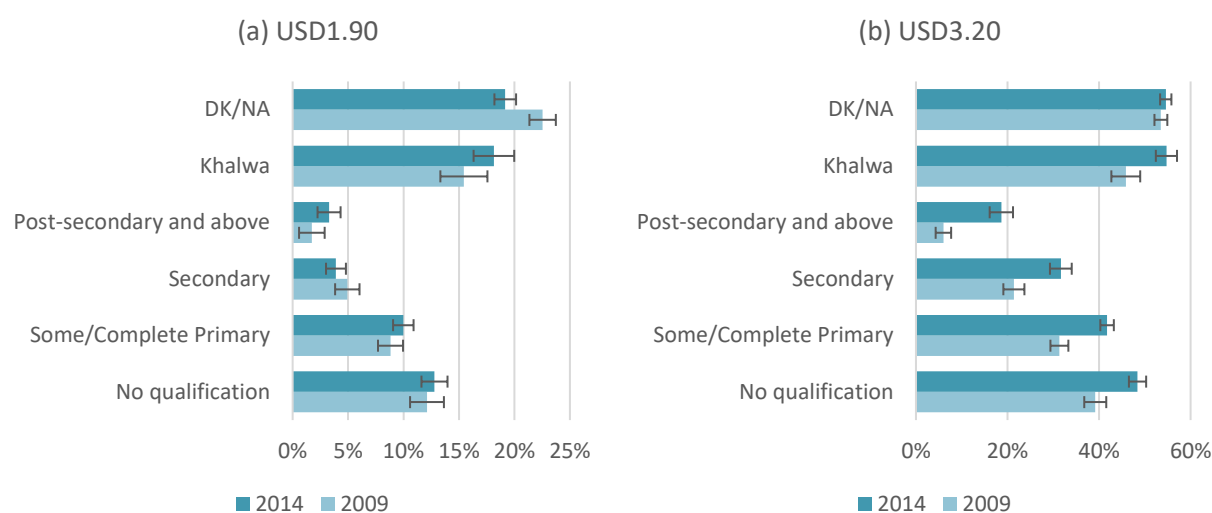


Source: Own calculations based on NHBPS 2014/15.

90. **Individuals in the bottom quintiles are more likely to have no qualifications and to fail to respond when asked about their educational attainment.** One third of all respondents above the age 15 failed to answer a question about their level of educational attainment (Figure 28) – an issue that will be taken up in more detail in chapter IV. The share was higher still in 2009, at 47.5 percent.²⁴ Yet the data still give some preliminary indications about the distribution of educational attainment by consumption levels: better-off Sudanese tend to be less likely to have no qualifications at all or to have attended *Khalwa*, a type of religious school. They are more likely, on the other hand, to have completed secondary and post-secondary.

²⁴ Further analysis indicates that non-response among those aged 15 and above in the 2014 survey is positively correlated with age and negatively with log per capita expenditure. Women are more likely to fail to respond.

Figure 29: Poverty by educational attainment of household head, 2009 and 2014.



Source: Own calculations based on NBHS 2009 and NHBPS 2014. 95-percent confidence intervals are indicated.

91. **Poverty is negatively associated with the educational attainment of the household head.** The incidence of extreme and moderate poverty among individuals who live with a household head who has a post-secondary degree is only 3.3 percent and 18.7 percent, respectively (Figure 29). In comparison, the incidence among those living with a household head that has no qualifications is 12.8 and 48.4 percent, respectively.

92. **At the same time, the odds of being moderately poor increased more for those with educated households.** Households with more educated heads were more likely to fall into poverty between 2009 and 2014. While the odds of being moderately poor increased by 45.7 percent for those living with a household head with no qualifications, they increased by 57.1, 70.2, and 259.7 percent for those living with a head with some primary or completed primary, secondary, and post-secondary education or more, respectively.

Table 6: Demographic attributes of households in the bottom-40 percent.

Characteristic	Bottom 40%	Top 60%	Difference	Significant?
Average household size	7.06	5.13	1.93	***
Share of households headed by men	0.87	0.86	0.01	
Age dependency ratio	1.49	0.95	0.54	***
Share of household members that are boys or men	0.50	0.49	0.01	*
Share of household members below 15	0.48	0.33	0.15	***
Share of household member 65 and above	0.04	0.07	-0.03	***
Average age of the household head	46.95	47.62	-0.67	*
Share of literate household members	0.52	0.61	-0.08	***
Share of literate household heads	0.57	0.69	-0.12	***
Share of household heads with some formal education	0.29	0.46	-0.17	***
Share of households that uses public electricity for lighting	0.31	0.53	-0.23	***
Share of households with improved source of drinking water	0.34	0.53	-0.19	***
Share of households with improved sanitation	0.53	0.65	-0.12	***
Share of households that depend on mainly on agriculture	0.39	0.27	0.12	***

Source: Own calculations based on NBHS 2009 and NHBPS 2014. Note: *, **, and *** denote significance at the one-, five-, and ten-percent level.

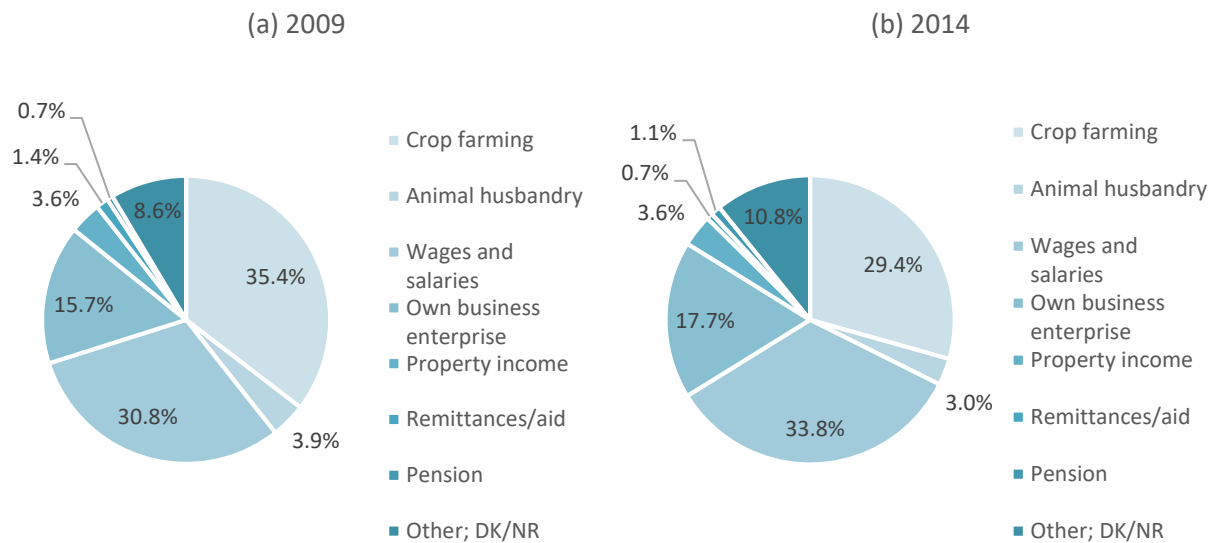
93. **Household in the bottom-40 percent tend to have more members and a larger share of children.** Households in the bottom-40 percent have no average around seven household members, compared to around five in households in the top-60 percent of the distribution. As almost half of all household members are below the age of 15, they also have significantly higher age dependency ratios. But households differ only marginally in terms of the average age of the household head, the average share of men or boys among household members, or the probability that the head is a man (Table 6).

94. **Households in the bottom-40 percent are also more likely to have illiterate and uneducated household heads, to lack access to basic services, and to depend on agriculture.** Household in the bottom-40 percent of the distribution exhibit lower levels of education and basic literacy. Bottom-40 percent households are also significantly less likely to use public electricity for lighting, improved sources of drinking water, or improved means of sanitation. Finally, they are more likely to depend primarily on crop farming or animal husbandry (as opposed to wages and salaries, business enterprises, transfers, etc.). These aspects will be explored more depth in the remainder of this report.

Livelihoods and incomes

95. **Agriculture remains the mainstay of a large fraction of the population.** The share of households with a mainstay in agriculture decreased from almost 40 percent in 2009 (Figure 30a). However, about one in three Sudanese reside in a household that considers agricultural production, crop farming and animal husbandry, its main source of livelihood (Figure 30b). Individuals in households that relied mainly on wages and salaries also accounted for a third of the population while individuals that mainly relied on proceeds from businesses owned by their household account for around 18 percent of the population. Both groups have increased their share in the total somewhat, by three and two percentage points, respectively.

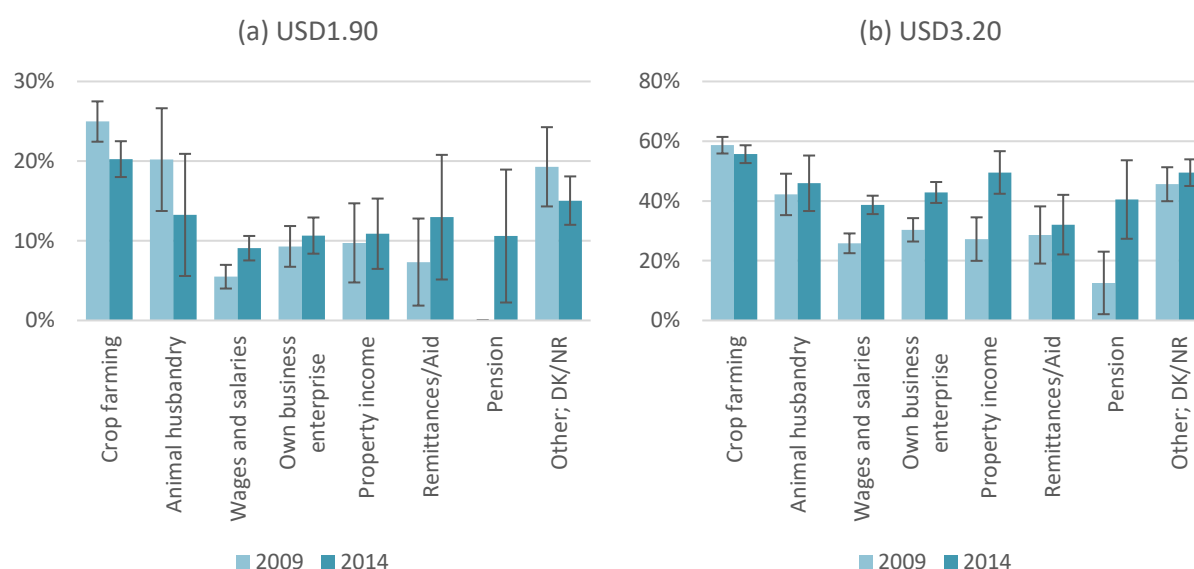
Figure 30: Population shares by self-reported main source of livelihood, 2009 and 2014.



Source: Own calculations based on NBHS 2009 and NHBPS 2014.

96. **In line with an urbanization of poverty, poverty decreased among crop farmers yet increased among business owners and recipients of incomes fixed in nominal terms.** Extreme poverty decreased among agricultural households while it increased among households that rely on wages and salaries, income from household-owned businesses, and pension recipients (Figure 31a). This pattern is consistent with an increase in poverty in urban areas and poverty reduction or stagnation in rural areas. More than 90 percent of the agricultural households are in rural areas, where crop farming accounts for more than 40 percent of all livelihoods. On the other hand, 70 percent of urban Sudanese live in a household that relies on either wages and salaries or business income.

Figure 31: Poverty headcount ratios by main source of livelihood and year.



Source: Own calculations based on NBHS 2009 and NHBPS 2014. 95-percent confidence intervals are indicated.

97. **The observed pattern is broadly consistent with differential effects of inflation on different types of households.** The increase in inflation between 2009 and 2014 is likely to have had more severe consequences for households that rely on wages, salaries, and transfers that are fixed in nominal terms. The observed pattern among business-owning household might suggest that those with larger businesses that source inputs from abroad but sell outputs locally have been more affected by macroeconomic adjustments, particularly rising prices for inputs in the wake of an exchange rate depreciation. Declining poverty rates among crop farmers are consistent with rising food prices.

Table 7: Growth elasticities and semi-elasticities by poverty line, rural/urban, and sector of economic activity of the household head, 2014.

	USD1.90-poverty line		USD3.20-poverty line	
	Elasticity (percent)	Semi-elasticity (percentage points)	Elasticity (percent)	Semi-elasticity (percentage points)
<i>Panel (a): All Sudan</i>				
Sudan	-2.69	-0.38	-1.56	-0.67
<i>Panel (b): By rural/urban</i>				
Rural	-2.75	-0.44	-1.50	-0.72
Urban	-2.68	-0.30	-1.67	-0.59
<i>Panel (c): By sector of employment of household head</i>				
Agriculture	-2.60	-0.49	-1.38	-0.72
Industry	-3.04	-0.34	-1.76	-0.69
Services	-2.92	-0.34	-1.72	-0.66

Source: Own calculations based on NBHS 2009 and NHBPS 2014. Note: Calculations are based on the assumption that per capita consumption is log-normally distributed. Formulae for elasticities and semi-elasticities are provided in Bourguignon (2003) and Klasen and Misselhorn (2008), respectively.

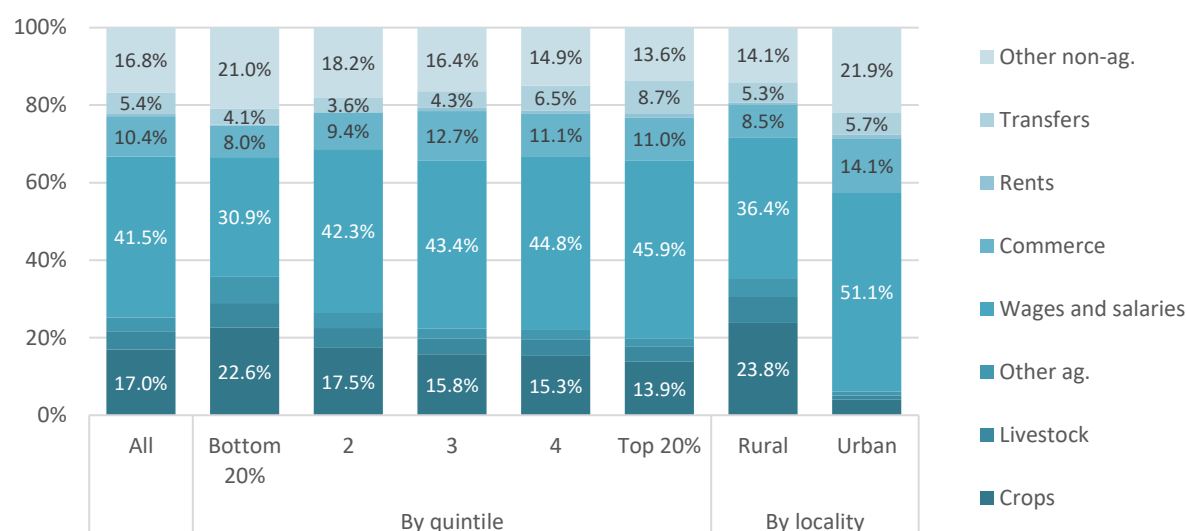
98. **The effect of growth on poverty headcounts is higher in rural areas and among households engaged in agriculture.** Elasticities and semi-elasticities of poverty with respect to growth, the change in

a poverty measure associated with a one-percent increase in per capita consumption, are informative about the stakes policy-making has in growth in two ways: first, they give a sense of priority with regard to policy interventions in different regions or sectors. The higher the elasticity (in absolute terms), the more poverty reduction can be expected from growth in per capita consumption. Second, they also give an indication of the extent to which population groups are vulnerable to shocks. Table 7 reports elasticities (relative changes, i.e. percent) and semi-elasticities (absolute changes, i.e. percentage points) of the poverty headcount ratio by rural/urban and by the sector of employment of the household head for 2014. The former are probably less relevant for policy makers and only reported here for completeness. Estimates of semi-elasticities suggest that they are higher in rural areas and in agriculture, where a one-percent increase in per capita consumption is associated with a reduction in the extreme poverty by close to half a percentage point (0.44 and 0.49 percentage points, respectively). Results are qualitatively similar for the incidence of moderate poverty. In urban areas and among households with a head working in industries or services, an increase in per capita consumption is only associated with a decline in about one third of a percentage point. This suggests a greater density just below the poverty line in the distribution of per capita consumption in agriculture in particular and, thus, both higher vulnerability and greater potential gains from growth.

99. **The analysis of the composition of total household income and changes in real incomes over time contribute to a better understanding of changes in consumption.** Growth in per capita expenditure between 2009 and 2014 was inversely related to households' position in the welfare distribution: while the bottom 20 percent appear better-off in 2014 compared to 2009, the upper quintiles have seen declining real per capita expenditures, with pronounced losses particularly among the top two quintiles. But how do these changes in consumption relate to change in incomes? The 2009 and the 2014/15 surveys collected ample information about household incomes in a consistent manner and reported both over one month and one year. Categories include agricultural income from crops, livestock, and other agricultural activities as well as non-agricultural income from wages and salaries, rental income, transfers, and business activities. In what follows, the relationship between per capita expenditure and income, the composition of total per capita household income, and changes in incomes will be analyzed.²⁵

²⁵ Income reported over one year are likely less affected by intra-annual seasonality in income receipts and are thus preferred to incomes reported over one month. On the other hand, inter-seasonal variation will still affect the comparisons and it should also be noted that recall bias may be more pronounced for longer recall periods, resulting in underestimates of total annual household income.

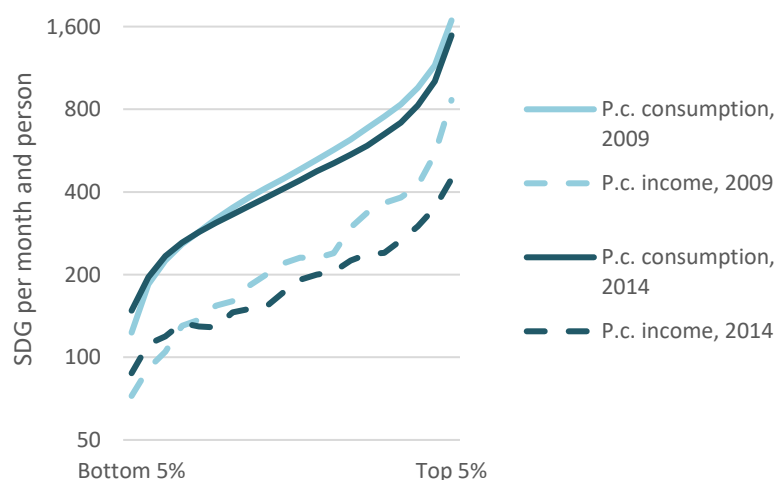
Figure 32: Income shares by quintile and locality, 2014.



Source: Own calculations based on NHBPS 2014/15.

100. In 2014, an average of around two fifths of annual household income is earned in the form of wages and salaries, with limited variation across quintiles and by locality. The average Sudanese household derives two fifths of its total income from salaries and wages. Incomes derived from selling agricultural products account on average for about one fourth of total income and commerce and industrial activities for about one tenth. The share of the latter is increasing across the welfare distribution, from 7.2 percent among the bottom 20 percent to 12.5 percent among the top 20 percent. Transfers, a category that includes domestic and international remittances, account for five percent on average. Rental income plays a very small role with an average share of less than one percent. The share of the “other” category is 16.8 percent on average (Figure 32).

Figure 33: Per capita consumption and per capita income by year and ventile, 2009 and 2014.

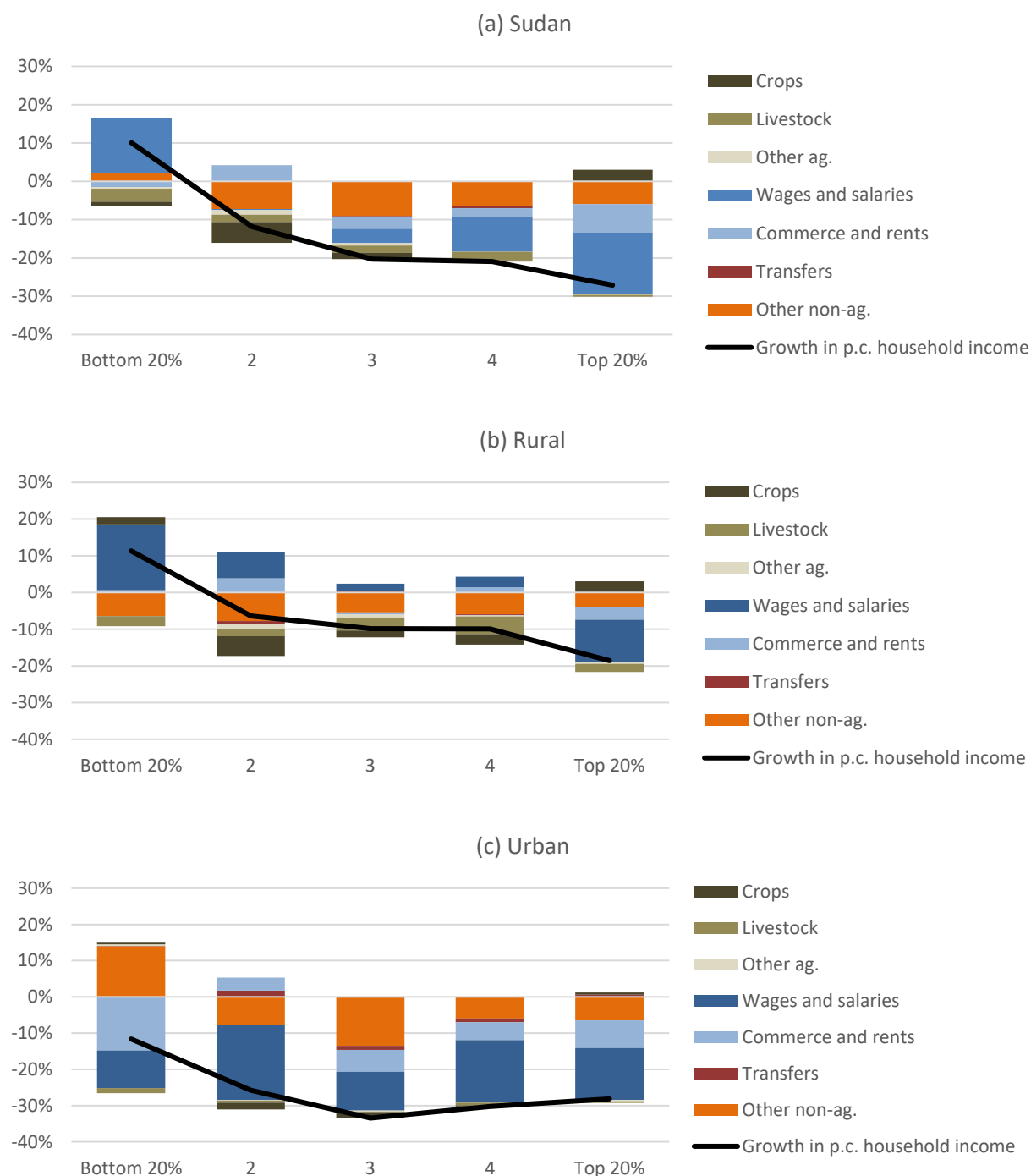


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: The series depict medians by ventiles of the distribution of per capita consumption.

101. **While survey estimates of per capita income are much lower than estimates of per capita expenditure, the gap increased significantly at the top end of the distribution.** Incomes estimated from surveys are often underestimated, even in developed countries (Deaton, 1997). This also seems to be the case for Sudan's household surveys, where the median per capita consumption is about twice as high as median per capita income. While this suggests that *levels* in per capita incomes should be interpreted only very carefully, *changes* in household incomes can still be informative with respect to trends in poverty and shared prosperity.

102. **Changes in the distribution of per capita income between 2009 and 2014 reflect changes observed in the distribution of per capita consumption.** Real per capita incomes increased in the bottom quintile of the distribution but decreased in the upper quintiles. This pattern mirrors changes in the distribution of per capita consumption, suggesting that these can largely be explained by changes in per capita income.

Figure 34: Decomposition of growth in per capita household income by quintile, 2009-2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

103. Changes in per capita household income reflect those in consumption, with gains among the poorest 20 percent and losses that are increasing in economic welfare. Average real per capita income decreased by almost 20 percent. However, the average hides considerable variation across the welfare distribution. Incomes among the bottom 20 percent increased by 11.6 percent but growth turns negative

among the second quintile to -13.1 percent. The richest 20 percent report incomes in 2014 that are 28.3 percent lower than in 2009. Reassuringly, this pattern of growth incidence is very similar to the pattern observed for real per capita consumption (see Figure 18).

104. **Across the entire distribution of per capita consumption, changes in wages and salaries are the key drivers of changes in overall household income.** Wages and salaries increased by 14.2 percent among the poorest 20 percent and decreased by 16 percent among the richest 20 percent. In conjunction with the importance of this type of income in overall household income, this implies that changes in wages and salaries are the key driver of changes in overall household income and, by extension, consumption expenditure. Chapter 172 sheds light on the evolution of wages and salaries between 2009 and 2014. Changes in incomes from other non-agricultural activities, which display a similar pattern as wages and salaries, have also played a significant role. They account for one fifth of the increase among the bottom 20 percent and between one fifth and half of the decrease in the top four quintiles. Incomes from commercial and industrial activities as well as rental income are a significant contributor the decline in total household income among the top 20 percent.

105. **While overall changes in household incomes in rural areas reflect those observed at the national level, wage growth is evident for a large portion of the rural population.** Total household income of households in rural areas declined for all but the poorest quintile with changes driven by changes in wages and salaries (Table 32). However, positive wage growth is evident for the first four quintiles, with a large decrease only for households that belong to the richest 20 percent of the population. This finding supports the notion that agricultural wages were higher in 2014 vis-à-vis 2009 in both relative and absolute terms. It is worth noting that in rural areas a decline in other non-agricultural incomes has had a negative effect on overall income growth among all rural households.

106. **In urban Sudan total income declined across all quintiles; yet the decline is also driven by falling incomes from wages and salaries.** Total per capita household income declined by more than eleven percent among the poorest 20 percent and by between 25 and 35 percent among the top four quintiles. Unsurprisingly, changes in incomes from agricultural activities play a minor role in urban areas. Changes in wages and salaries are once again key determinants of overall growth in household income with declines ranging from ten to 20 percent. Other non-agricultural activities have had a positive effect on total income among the poorest 20 percent but a negative impact among the upper four quintiles.

107. **Changes in wage and salary incomes are key to the understanding of changes in the incidence and geographical distribution of poverty.** The present section links changes in per capita consumption and, by extension, changes in poverty between May 2009 and November 2014 to changes in income. Changes in wages and salaries, which have been increasing for the poorest 20 percent yet decreasing for the richest 60 percent, are key to understanding change in per capita consumption and, by extension, poverty. The next section investigates jobs and their link to poverty in more detail.

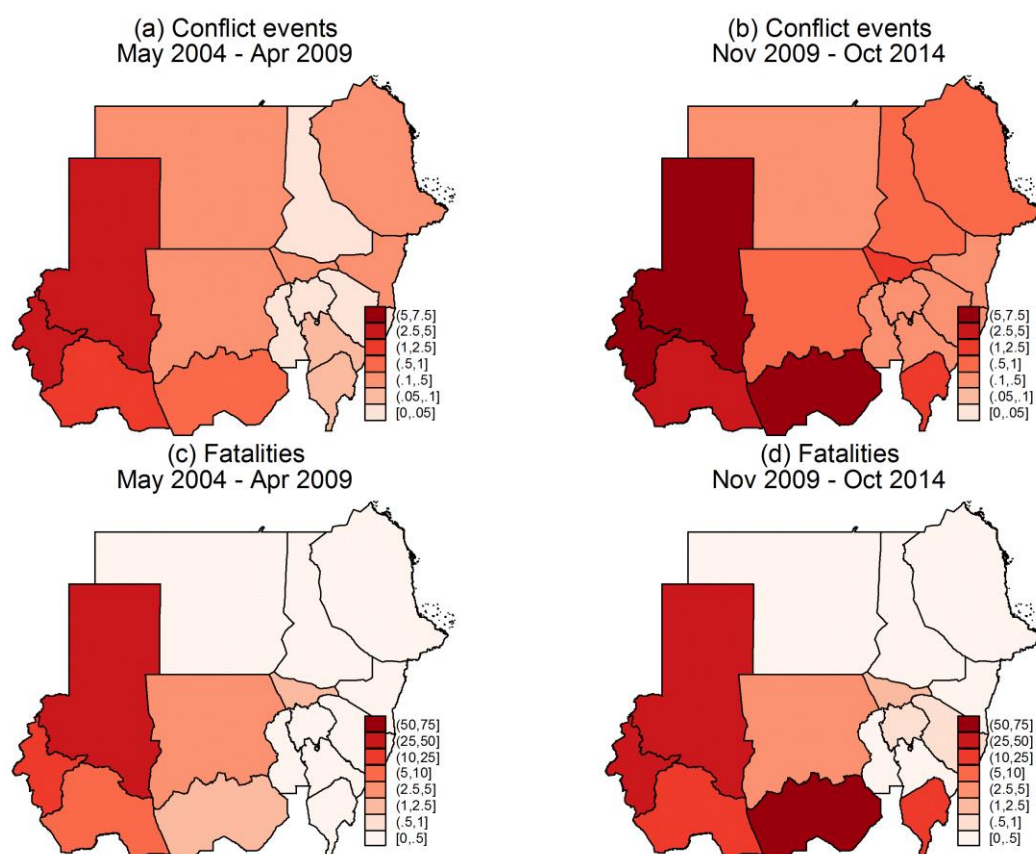
Conflict and economic welfare

108. **Civil conflict and civil wars can damage the economy in several ways.** First, armed conflict will typically take a toll in terms of resources that are destroyed, including both the loss of part of the labor force (either because of displacement or human fatalities) and of physical capital. Second, conflict will disrupt economic activities. For instance, trade may become prohibitively dangerous. Third, public

expenditure may be diverted from uses that would foster economic development (Knight et al). Fourth, investment will typically decline as households are forced to dissave outside investors price in increased risk to their assets. Finally, conflict has been shown to negatively affect social capital as measured by trust and associational membership (De Luca and Verpoorten 2015).²⁶

109. **Conflict intensity in Sudan increased after mid-2012 and continued in subsequent years.** As a result of stalling of peace talks, the number of conflict events in Darfur recorded in the Acled data as well as the number of fatalities increased sharply during the second half of 2012 (**Error! Reference source not found.**). In 2014 and 2015, two counterinsurgency campaigns were carried out by the Rapid Support Forces (RSF), a Sudanese government force under the command of the National Intelligence and Security Services (NISS), in South, Central, and North Darfur (HRW 2015). In-between surveys, the intensity of conflict also increased in South Darfur Overall, the political situation remains fragile, with reports of ongoing fighting and displacement, particularly in the country's southern and western states.

Figure 35: Average annual number of conflict events and conflict-related fatalities per 100,000 population and year by state.



Source: Own calculations based on NHBS 2009, NHBPS 2014/15, and Acled data. Note: The denominator, total population, is estimated from the surveys. Borders depict states as in 2009.

²⁶ See also Collier (1999).

110. **Conflict between May 2005 and October 2014 was concentrated in Darfur, in Kordofan and in Blue Nile state.** The analysis here is based on the Acled data, which records conflict events and the number of fatalities by type of event, locality, and time. As the difference between the two surveys is roughly five years, the average annual number of conflict events and conflict fatalities per 100,000 population was calculated from records spanning the five years prior to each survey, with the denominator calculated based on population estimates from the survey. The number of conflict events per 100,000 population ranged from zero in River Nile state, Al-Gadarif, and White Nile state prior to the 2009 survey to more than seven in South Kordofan and North Darfur prior to the 2014 survey. As no conflict events were recorded between May 2004 and April 2009 in the Acled data in River Nile state, Al-Gadarif, and White Nile state, the number of conflict-related fatalities per 100,000 population was also zero over this period. The maximum value in this series was a rate of 61.7 fatalities per year in South Kordofan in 2009-2014. Khartoum state, with a rate of 1.2 conflict events per year in 2009-2014, and Blue Nile state, with an average rate of two fatalities over the same time period, were the only states outside of Darfur and Kordofan with significant levels of conflict intensity in either period (Figure 35 and Table 8).

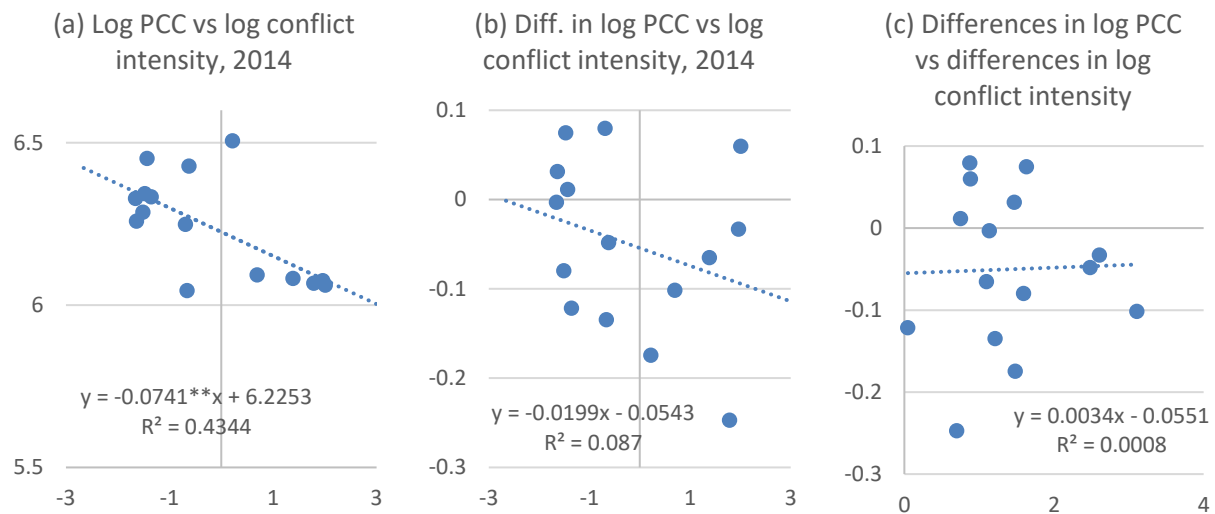
Table 8: Average annual number of conflict events and conflict-related events fatalities per 100,000 by state, May 2004 – April 2009 and November 2009 to October 2014.

State	Average annual number of conflict events per 100,000 population			Average annual number of conflict-related fatalities per 100,000 population		
	May 2004 - Apr 2009	Nov 2009 - Oct 2014	Change	May 2004 - Apr 2009	Nov 2009 - Oct 2014	Change
Sudan	0.68	2.45	207%	4.5	9.4	80%
Northern	0.11	0.24	112%	0.3	0.1	-69%
River Nile	0.00	0.54	NA	0.0	0.0	NA
Red Sea	0.15	0.52	236%	0.4	0.2	-53%
Kassala	0.25	0.26	5%	0.4	0.2	-43%
Al-Gadarif	0.00	0.23	NA	0.0	0.5	NA
Khartoum	0.28	1.24	339%	1.1	1.1	-5%
Al-Gezira	0.04	0.22	392%	0.2	0.7	215%
White Nile	0.00	0.19	NA	0.0	0.1	NA
Sinnar	0.06	0.19	211%	0.2	0.2	8%
Blue Nile	0.09	2.00	2137%	0.4	13.0	3318%
North Kordofan	0.21	0.50	140%	2.7	3.0	13%
South Kordofan	0.52	7.09	1255%	1.8	61.7	3337%
North Darfur	3.09	7.44	141%	26.9	25.2	-6%
West Darfur	2.97	5.96	101%	20.1	27.4	37%
South Darfur	1.33	3.99	200%	9.1	18.4	102%

Source: Own calculations based on NHBS 2009, NHBPS 2014/15, and Acled data.

111. **Blue Nile state and South Kordofan experienced the largest increase in conflict incidence and intensity.** Overall, the average annual number of conflict events and the average annual number of fatalities increased by 207 and 80 percent, respectively. But these averages hide substantial variation across states. Blue Nile state and south Kordofan stand out for large increases in conflict events and conflict-related fatalities. Northern state, Red Sea state, North Darfur, Khartoum, and Kassala, on the other hand, experienced an increase in incidents but a decrease in the fatality rate.

Figure 36: Relationship between levels and trends in per capita consumption and conflict intensity.



Source: Own calculations based on NHBS 2009, NHBS 2014/15, and Aclad data.

112. Conflict intensity predicts levels of per capita consumption. Across states, a one percent increase in conflict intensity, the average annual of conflict events per 100,000 population, is associated with a 0.07-percent decrease in log per capita consumption. Conflict intensity in the 60 months prior to the 2014 survey accounts for more than two fifths of the variation in levels in that year (Figure 36a). However, these results should not be taken to imply a causal relationship running from conflict to economic welfare. One concern is reverse causality (Starr 2010). For instance, lower levels of economic welfare might imply lower opportunity costs for engaging in conflict. Hence, low average levels of economic welfare may be causing conflict and not *vice versa*. There may also be omitted variables that are correlated with both higher conflict intensity and lower levels of economic welfare, for instance, a lack of social capital.

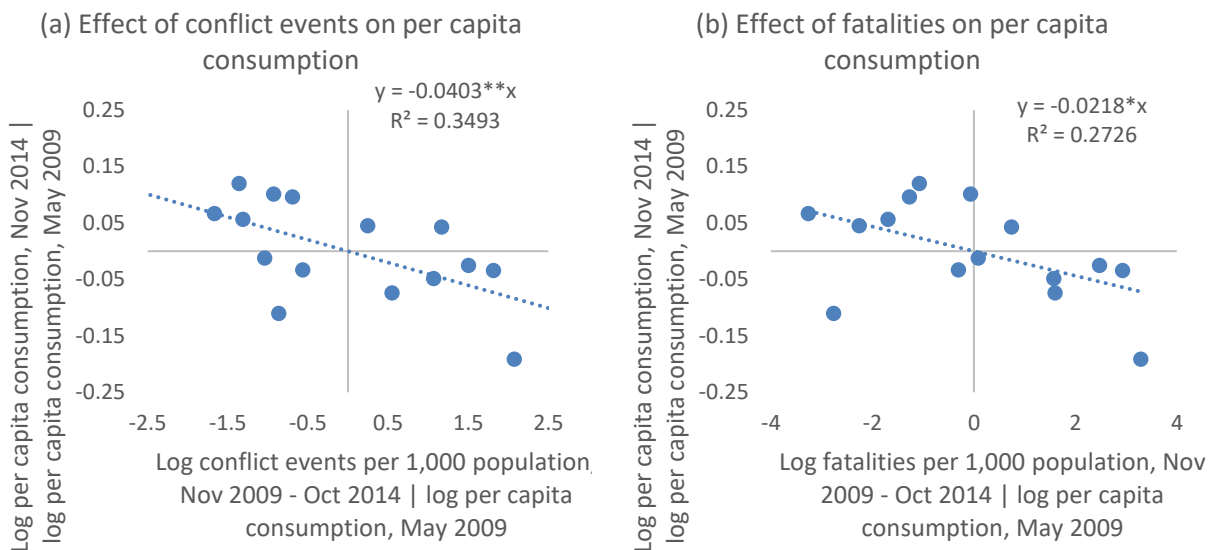
113. Neither levels nor changes in conflict intensity predict recent trends in per capita consumption. Neither the intensity of conflict in the 60 months preceding the survey nor the change in conflict intensity explain recent trends in per capita consumption. In the first case, the coefficient estimate has the expected sign and suggest that a one percent increase in conflict intensity was associated with a two-percent lower growth rate in per capita consumption. However, conflict intensity accounts only for 8.7 percent of the variation in trends and the correlation is not statistically significant. In the second case, there is no apparent relationship whatsoever (Figure 36b). The experience of some states is instructive here: West Darfur, for instance, experienced a moderate increase in conflict intensity but a decrease in per capita consumption by more than 20 percent. And Kassala experienced almost no increase in conflict intensity and a decrease in the fatality rate yet average per capita consumption dropped by 11.5 percent. Clearly, another

Table 9: State-level OLS regressions – the effect of conflict on average per capita consumption (N=15 states).

	(1)	(2)	(3)	(4)
Log per capita consumption, May 2009		0.623*** (0.122)		0.596*** (0.155)
Log conflict events per 100,000, November 2009 - October 2014	-0.074*** (0.011)	-0.040** (0.016)		
Log fatalities per 100,000 population, November 2005 - October 2014			-0.045*** (0.009)	-0.022* (0.012)
Constant	6.225*** (0.032)	2.314** (0.769)	6.249*** (0.032)	2.495** (0.984)
Long-run elasticity		-0.107		-0.054
R-squared	0.434	0.807	0.489	0.784
Partial regression R-squared		0.349		0.273

Source: Own calculations based on NHBS 2009, NHBPS 2014/15, and Aclcd data. Note: Robust standard errors reported in parentheses. *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Definitions of states as in 2009 (15 states). Partial regression R-squared is the R-squared of a regression of residuals from a regression of the dependent variable on log per capita consumption in 2009 against residuals from a regression of the (log) proxy for conflict on the lagged dependent variable.

Figure 37: Effect of conflict events and fatalities (per year and 1,000 population) over 60 months preceding the survey on average per capita consumption (partial regression plots, 15 states as defined in 2009).



Source: Own calculations based on NHBS 2009, NHBPS 2014/15, and Aclcd data. Note: **, and *** denote statistical significance at the ten-, five-, and one-percent level.

114. **The long-term relationship between per capita consumption and conflict intensity suggests a substantial peace dividend.** Table 9 provides additional estimates of the association between per capita consumption and the average annual number of conflict events and fatalities per 1,000 population that improve upon simple cross-sectional correlation. Following Wooldridge (2013), the lagged value of average per capita consumption, that is, the value observed in 2009, is included as an additional regressor. This variable proxies for unobserved factors that sets states apart other than the level of conflict in the five years preceding the survey. Alternatively, the coefficient estimate on the conflict variable can be

interpreted as the effect on the growth rate *conditional on initial levels*.²⁷ Results from these regressions suggest more moderate short-term effects of conflict (columns (2) and (4) of Table 9): in the short-run, a one-percent increase in the number of conflict events is now associated with a 0.04-percentage points lower growth rate of per capita consumption and a one-percent increase in the fatality rate is associated with a decrease by 0.02 percentage points. These estimates are statistically significant at the five and ten-percent level, respectively. In other words, the effect seems smaller if an estimator is used that has a somewhat greater claim to capturing a causal relationship.²⁸ Long-run elasticities can also be calculated.²⁹ In the long-run, a decrease in conflict intensity and fatality rate by one percent is associated with an increase in the growth rate of per capita consumption by 0.11 and 0.05 percentage points, respectively. These estimates imply a sizable effect of conflict on economic welfare.

Inter- and intra-seasonal variation in economic welfare

115. Inter- and intra-seasonal variation in per capita consumption and poverty can be substantial – it is often the case that a much larger fraction is poor at some time over the course of one year than is poor at any given time. Most studies examining the dynamics of welfare have found large fluctuations in incomes and consumption over relatively short periods of time, suggesting substantial short-run movements in and out of poverty (Dercon and Krishnan 2000). Vulnerability to poverty, in turn, can lead to poverty traps in which the poor and vulnerable forego lucrative investment opportunities in order to avoid (Fafchamps and Pender 1997, Zimmermann and Carter 2003). Identification of the vulnerable population and an understanding of seasonality is thus a prerequisite for effective policy-making, particularly in the area of social protection.

116. Household engaged in agriculture are typically more vulnerable and less resilient. All households can potentially be hit by shocks. However, it is commonly found that agricultural households, and particularly those that are involved in rain-fed subsistence agriculture, have a higher likelihood of experiencing shocks and may be less resilient due to high levels of structural poverty. In 2014, for instance, more than half of all shocks reported by Sudanese households were livestock- or harvest-related (chapter VI).

117. While the 2014 harvest was above-average, the 2009 harvest was about average only. Output of sorghum and millet in 2014 were 73 and 94 percent higher than average over the preceding five years while wheat output was still 21 percent higher (Figure 5). In contrast, the 2009 harvest resulted in total production that was only marginally higher than in the five previous years.³⁰

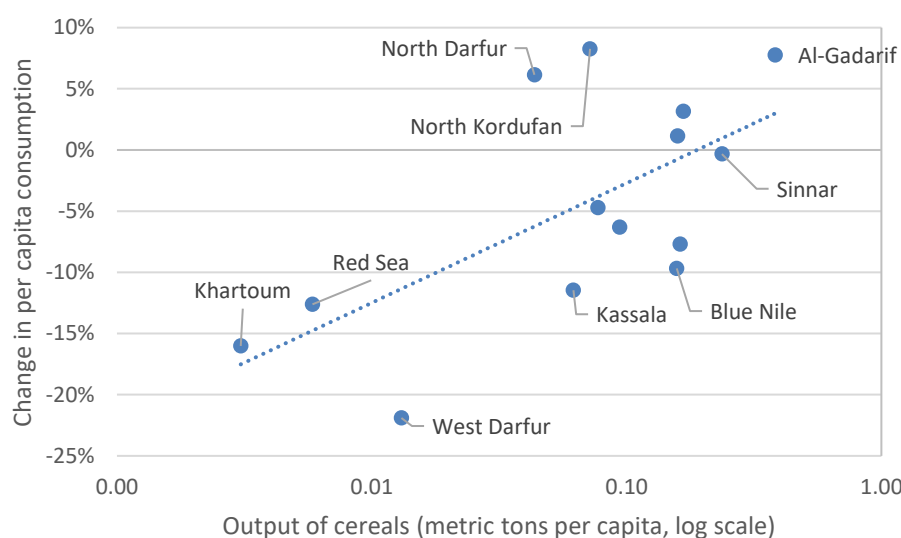
²⁷ Note that $y_t = \alpha + \gamma y_{t-1} + \beta x + \varepsilon$ can be written as $\Delta y_t = \alpha + (\gamma - 1)y_{t-1} + \beta x + \varepsilon$.

²⁸ These estimates should still be interpreted carefully. In particular, while reverse causality may be less of a concern, there may still be omitted variables that are correlated with both changes in average per capita consumption and the level of conflict.

²⁹ The long-run elasticity is calculated as $\beta / (1 - \gamma)$.

³⁰ See also FEWS NET (2014): "Harvests in October improved food availability and access as well as income and purchasing power of poor households. Increased supplies of cereals to markets have put downward pressure on prices, although sorghum and millet prices remain well-above average. Insecurity and displacement limited improvements in food security in Darfur and South Kordofan, where acute food insecurity persists."

Figure 38: Change in average per capita expenditure against per capita cereal production (five-year average).

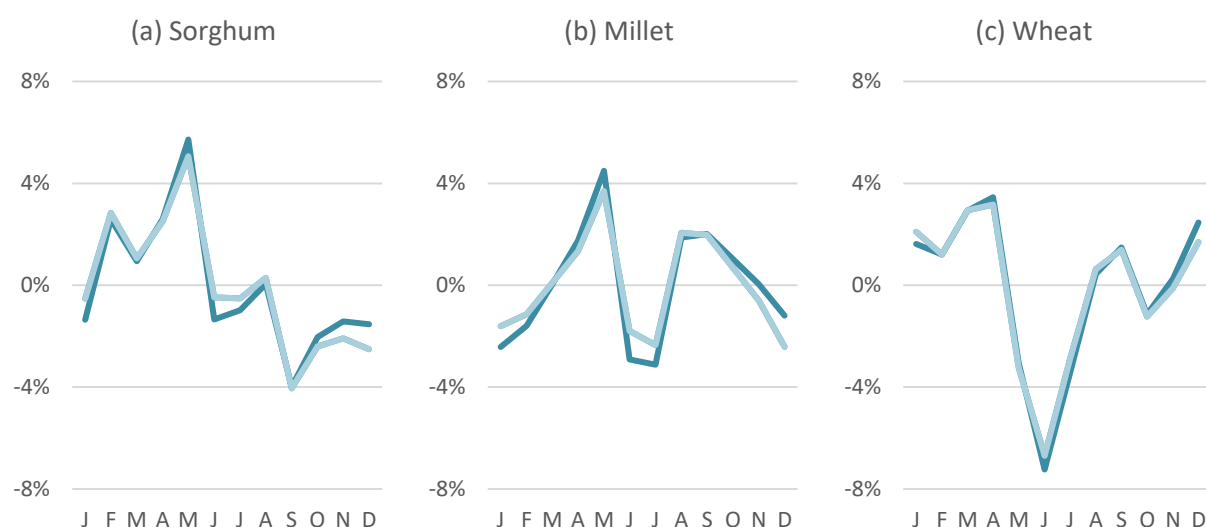


Source: Own calculations based NHBS 2009, NHBPS 2014/15, and FEWS NET (2015). Note: States as in 2009. As no data was available for West Kordofan, what is now West and South Kordofan was excluded. Output per cereals calculated as a five-year average while population figures refer to 2013. The fitted OLS-regression line has an R-squared of 0.42. The slope coefficient (N=15) is significant at the five-percent level.

118. **Intra-seasonal variation is also a key issue in comparing indicators of economic welfare between 2009 and 2014/15.** In Sudan, the main harvesting season for sorghum and millet, which is largely rain-fed, is between November and January. Wheat, on the other hand, is typically grown on irrigated plots and harvested around March and April. However, a large portion of wheat is imported. A caveat in comparing the two household surveys is thus the difference in timing of field work: while the 2009 survey was conducted in May, the first wave of the 2014/15 survey was conducted in November.

119. **Employment opportunities and wages are likely affected by the agricultural calendar, suggesting higher real per capita expenditure in any November-survey.** Depending on rainfall patterns, the main harvesting season for millet and sorghum in Sudan extends from roughly October to December. And at least in the past, even smallholders would often hire-in labor at this time of year (Fallon 1987). Hence, the demand for farm labor and, in response, wages would be expected to increase at that point of time. This is consistent with increasing employment and real wages in crop farming vis-à-vis other sectors of the economy (see chapter V). It is also suggestive that changes in average real per capita expenditure observed between the two surveys by state (as in 2009) are correlated with per capita agricultural output in these states (Figure 38).

Figure 39: Monthly deviations in staple crop prices from annual means, January 2005 to July 2018.



Source: Own calculations based on GIEWS data. Note: Estimates were obtained as follows: in a first step, monthly price data collected in six markets (four for wheat) was de-trended by regressing log prices on quadratic, cubic, and quartic time trends in addition to market-fixed effects. Different lines in the graph indicate different-order polynomials used in the estimation. In a second step, residuals were regressed on month-fixed effects.

120. **Prices for basic food staples, on the other hand, tend to be highest during the lean season, suggesting lower real per capita expenditure in surveys conducted in May-survey.** Wholesale prices for sorghum and millet, two of Sudan's main staple crops, tend to peak in May at the height of the lean season and shortly before sowing in producing areas commences. Prices for wheat, which is mainly imported and for which prices were controlled by authorities until the beginning of 2018, tend to peak April with a low in June. Intra-seasonal variation in prices in an average year is substantial: for instance, sorghum prices in an average year range from a high of five percent in May to a low of negative four percent in September (Figure 39). Sorghum and millet (including flour) accounted for 5.2 and 2.2 percent of total consumption expenditure on average in 2014. Yet among the bottom-40 percent, their consumption share was still higher – 6.8 and 3.1 percent. One would thus expect the welfare of the bottom-40 percent to vary by around ten percent in a typical year. Hence, a survey conducted in May are likely associated with lower real per capita consumption, particularly among the poor.

Table 10: OLS regression results with dependent variable $\log(\text{per capita income previous month}) - \log(\text{per capita monthly income previous year})$, pooled sample (household-level),

	(1)	(2)	(3)	(4)
Year: 2014	0.126*** (0.016)	0.126*** (0.016)	0.050*** (0.016)	0.064*** (0.016)
Household mainstay is crop farming			-0.165*** (0.027)	
HH crop farming X 2014			0.265*** (0.037)	
Head active in crop farming				-0.128*** (0.030)
Head crop farming X 2014				0.241*** (0.038)
Constant	-0.051*** (0.012)	-0.094 (0.060)	-0.045 (0.060)	-0.073 (0.060)
Additional controls?		Yes.	Yes.	Yes.
Observations	18,080	18,078	18,078	18,078
R-squared	0.008	0.008	0.015	0.013

Source: Own calculations based on NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses.

121. **In 2014, agricultural households reported significantly higher incomes in the previous month compared to average monthly incomes over the last year.** One final piece of evidence comes from incomes reported over different recall periods. Monthly incomes reported in November 2014 for the last month are substantially higher than those reported over the course of one year, in absolute terms and in comparison to 2009 (Table 10). This suggests that survey households in 2014 were temporarily in a better economic position in that month compared to the previous month and that they were in a better position than households in 2009.

122. **The difference in incomes is driven by households involved in crop farming.** Compared to other households, the gap between monthly income and annual income tends to be even higher for households who cite crop farming as their main source of livelihood and those whose head is engaged in crop farming tend to report seven to ten percent higher monthly income over the previous month compared to the previous year (Table 10). This suggests that their economic position during the survey month was better than during other months. The result would translate into seasonal poverty effects only if temporary changes in income (transitory income) translate into temporary changes in per capita consumption, i.e. imperfect consumption smoothing, which is often observed in developing countries.

123. **Intra- and inter-seasonal variability in staple prices and wages in rural areas linked to the agricultural calendar has implications for the design of safety nets.** Understanding intra- and inter-seasonal variation provides a perspective on changes in economic welfare between May 2009 and November 2014. However, it also has important implications for public policy, specifically the design of social safety nets. Some targeting mechanisms used to deliver social protection schemes are better able to deal with shocks and vulnerability than others. For instance, public works programs (sometimes called workfare programs) can temporarily provide income during the lean season (Imbert and Papp 2015) while cash transfers targeted based on household characteristics provide the same benefit across the year.

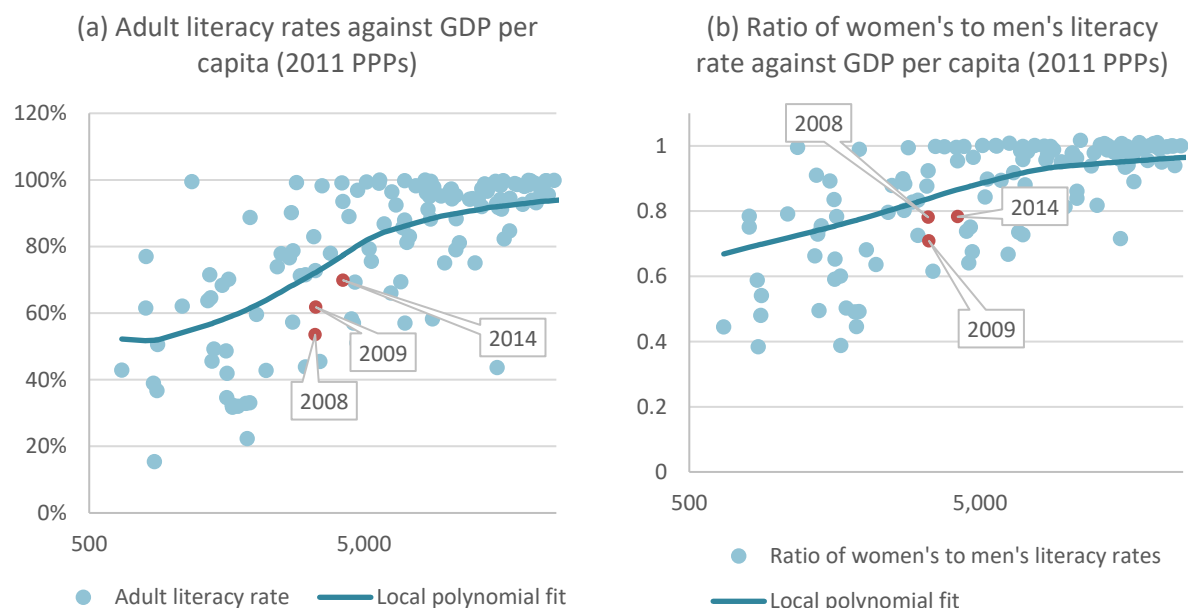
IV. Non-monetary Poverty

This chapter explores non-monetary dimensions of poverty with two general objectives of (i) understanding the structural determinants of poverty and (ii) complementing the monetary profile. The first two sections are concerned with the endowments of the poor. The first section explores access to education and educational outcomes. The analysis suggests that Sudan may be nearing the first stage of the demographic transition, which would raise the stakes for job creation. It also suggests that while educational attainment in the adult population is low, Sudan has made substantial progress in increasing access to education and in improving educational outcomes among youth. A large share of the Sudan's poor is engaged in agriculture and agricultural land and livestock are key endowments of this section of the population. They are the subject of the second section. The third, fourth, and fifth sections look at ownership of consumer durables, housing conditions, and access to services. The final section discusses correlations between deprivations in multiple dimensions.

Educational attainment and uptake

124. Education is central to achieving the goals of eliminating extreme poverty and boosting shared prosperity. High levels of education are often associated with improved economic opportunities, including better access to jobs and higher lifetime wages. Education is also correlated with healthier life choices and increased voice and agency, the ability to make decisions and to act on them. At the country-level, economic benefits of skills that are instilled through education include higher labor productivity and a greater capacity to adopt new technologies (Hanushek and Wößmann 2010). But education is not only instrumental in promoting development; it is also an end of development by itself.

Figure 40: Adult literacy and gender ratio in adult literacy across countries.



Source: Own calculations based on NHBS 2009, NHBPS 2014/15, and WDI. Note: For other countries, the last year with available data is plotted given that data is available after 2000.

125. Adult literacy rates are low given Sudan's level of economic development yet improving. Adult literacy rates in 2014 were lower than expected based on Sudan's level of economic development. For every five men that can read and write, there are only four women. However, trends are generally positive: overall literacy increased from 61.8 percent in 2009 to 69.9 percent in 2014. And while literacy among men increased by 6.1 percentage points, literacy among women increased by 10.2 percentage points.

Table 11: Changes in educational attainment of adults (15 and above) under alternative assumption about item non-response.

Method/assumption	Survey year	No qualification	Some primary or completed primary	Secondary	Post-secondary and above	<i>Khalwa</i>
Non-systematic non-response	2009	14.8%	37.9%	30.8%	11.1%	5.5%
	2014	19.4%	41.3%	19.7%	13.4%	6.2%
	Change	4.6%	3.4%	-11.0%	2.3%	0.7%
Imputation based on year of birth and gender	2009	21.3%	35.9%	19.1%	11.6%	12.0%
	2014	21.1%	36.9%	19.9%	11.4%	10.7%
	Change	-0.2%	1.0%	0.7%	-0.2%	-1.4%

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: Imputations are based on multinomial logit models that employ year of birth, gender, and their interaction as predictors.

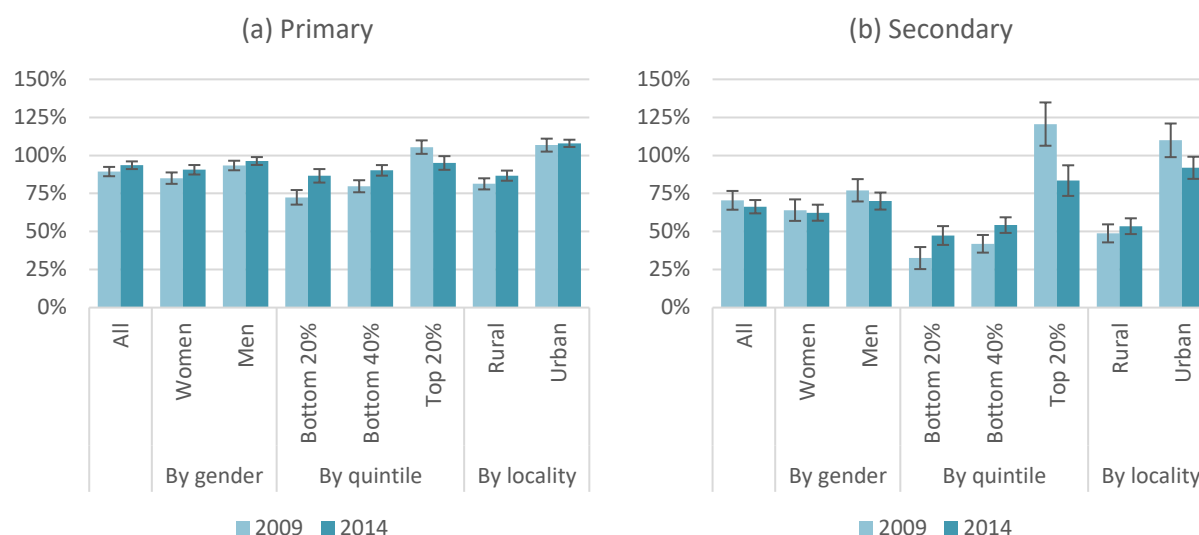
126. **Educational attainment in the adult population changed only slowly between 2009 and 2014.** High non-response rates of 41 and 33 percent in 2014 and 2009, respectively, make it challenging to pin down levels and changes in the skill composition of the adult population. One (naïve) way to approach this question is to assume that non-response is random (non-systematic). Under this assumption, the share of adults with no qualifications would appear to have increased by almost five percentage points, from 14.8 to 19.4 percent, while the share of those with secondary would have decreased by eleven percentage points, from 30.8 to 19.7. This seems highly unlikely given current trends in educational attendance (see below). Imputation of the probability of different levels of educational attainment based on gender and year of birth produces more plausible results: first, the share of those with no qualification and those that attended *Khalwa* appears higher, suggesting that non-response is positively correlated with these categories. Second, the share of those with primary and secondary increased moderately at the expense of those that attended a religious school. However, overall, changes between survey years appear modest.

127. **Overall, the pattern of changes in poverty rates by educational attainment is firmly linked to changes in employment and daily wages.** Between 2009 and 2014 and conditional on age and gender, employment rates among those with secondary and post-secondary education have declined by five and six percentage points, respectively. Employment rates have increased among those with no qualifications, those that attended *Khalwa*, and those with item non-response. Real daily wages, on the other hand, have decreased for individuals with some or completed primary education (-24.4 percent), secondary education (-28.8), and post-secondary education and higher degrees (39.3) (Table 34).

128. **Gross attendance in primary education in 2014 was around 94 percent.** Education in Sudan is nominally free and compulsory for children ages six to 13 years. It commences with eight years of primary education followed by three years of secondary. The teaching is in Arabic throughout. The primary gross attendance ratio, the ratio of children that report attending primary to those that would be age-eligible, increased from 89.4 to 93.5 percent between 2009 and 2014. The increase is driven by an increase in

attendance among the bottom-40 percent (Figure 41a). Gross attendance among the top-20 percent decreased slightly but is still about five percentage points higher than for the bottom-40 percent. While they may be overage, nearly all children attend primary in urban areas. But as of 2014, there was still a 20-percentage-point gap between rural and urban areas.

Figure 41: Gross attendance ratios in primary and secondary by gender, quintile, locality, and year.



Source: Own calculations based on NHBPS 2014/15 and NHBS 2009. Note: 95-percent confidence intervals indicated. Gross attendance rates are calculated as the ratio of children that report attending primary or secondary over the number of children that are age-eligible (6-13 for primary, and 14-16 for secondary.)

129. **Secondary gross attendance is much lower, but recent years have seen a convergence of attendance ratios between the poor and the rich.** The ratio of children attending³¹ secondary to those that are age-eligible for secondary is only around two thirds (Figure 41b). Between 2009 and 2014, secondary attendance increased among the bottom-40 percent and decreased significantly among the top-20 percent and in urban areas.

³¹ In contrast to the 2014/15 NHBPS, the 2009 NHBS also allowed for respondents to state attendance in grades four to six of secondary. It is not clear what these refer to and only 50 individuals in the sample stated attendance in these higher grades of secondary. For comparability, they were not considered in the calculation of gross attendance ratios in secondary.

Table 12: OLS results (linear probability model) for school attendance among children age six to 16 (N=23,770), 2014.

	(1)		(2)	
	Estimate	Standard error	Estimate	Standard error
Age	0.22***	(0.01)	0.22***	(0.01)
Age squared	-0.01***	(0.00)	-0.01***	(0.00)
Girl	-0.03***	(0.01)	0.00	(0.01)
Rural	-0.18***	(0.01)	-0.15***	(0.02)
Bottom 40%	-0.06***	(0.01)	-0.04***	(0.01)
Rural & girl			-0.06***	(0.01)
Bottom 40% & girl			-0.00	(0.01)
Rural & bottom 40%			-0.02	(0.02)
R-squared	0.13		0.13	

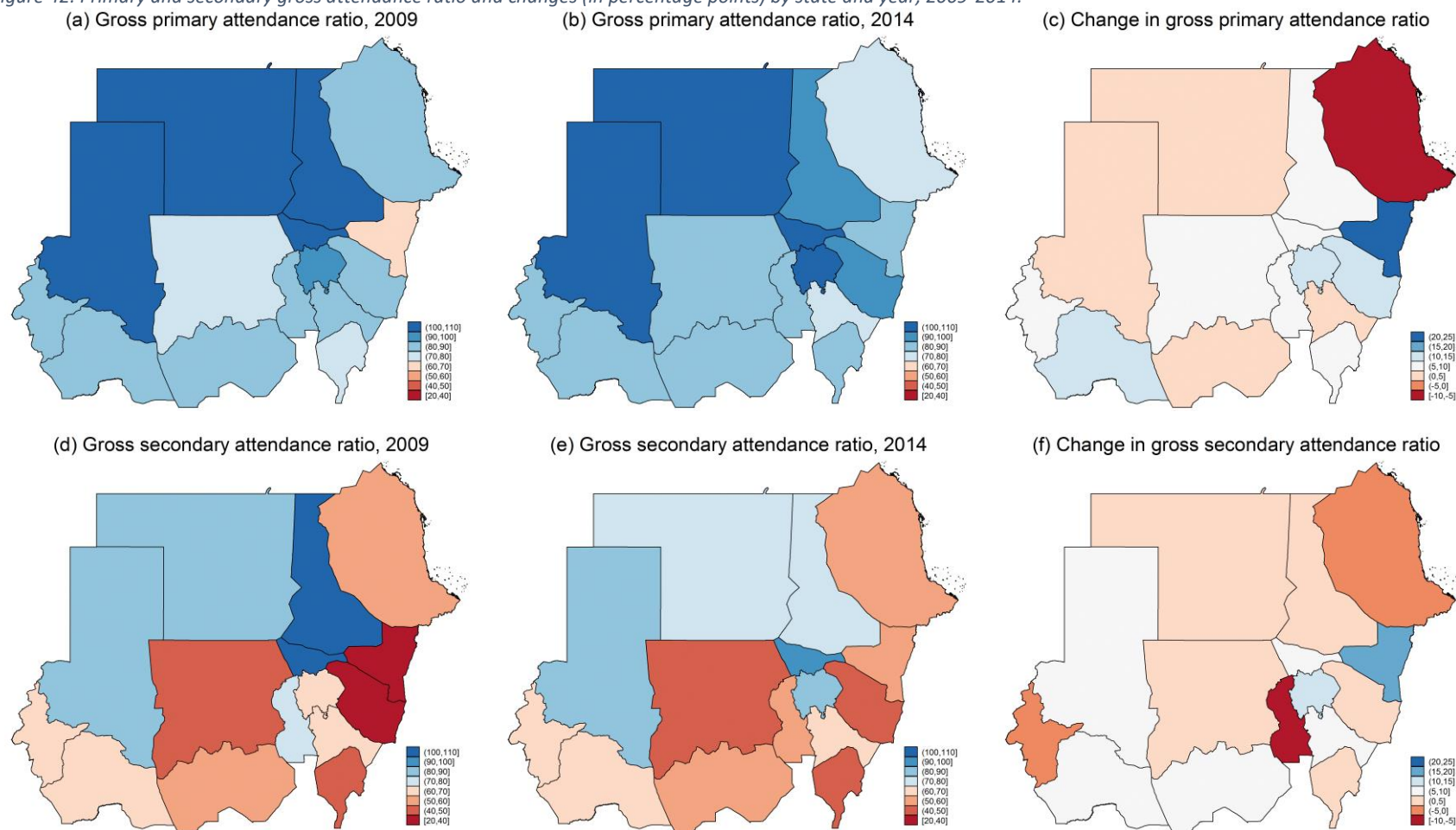
Source: Own calculations based on NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses.

130. **School attendance follows an ‘inverse-u,’ with attendance rates increasing between ages six and nine and decreasing after the age of 14.** Age is a major determinant of school attendance among children between six and 18 years of age (Table 12). Only around five in ten six year-olds are attending school, increasing to nine in ten at age nine. The probability of school attendance stays between 80 and 90 percent until about age 14, after which it starts to decline again. However, more than half (53 percent) of all 18 year-olds were still attending school in 2014.

131. **School attendance is lower among girls and among the bottom-40 percent, but rural location has the strongest effect.** The probability of attending school is about three percentage points lower among girls and about six percentage points lower among children from families in the bottom-40 percent of the income distribution. But it is 18 percentage points lower in rural areas (Table 12).

132. **The gender gap in school attendance is explained by lower attendance rates among girls in rural areas.** It is only in rural areas that girls experience a disadvantage when it comes to school attendance. Conditional on other variables, their attendance rates there are on average six percentage points lower than for boys. There is no statistically significant gender gap in school attendance in urban areas (Table 12). However, the gender gap in school attendance explains only around one sixth of the rural-urban gap in school attendance.

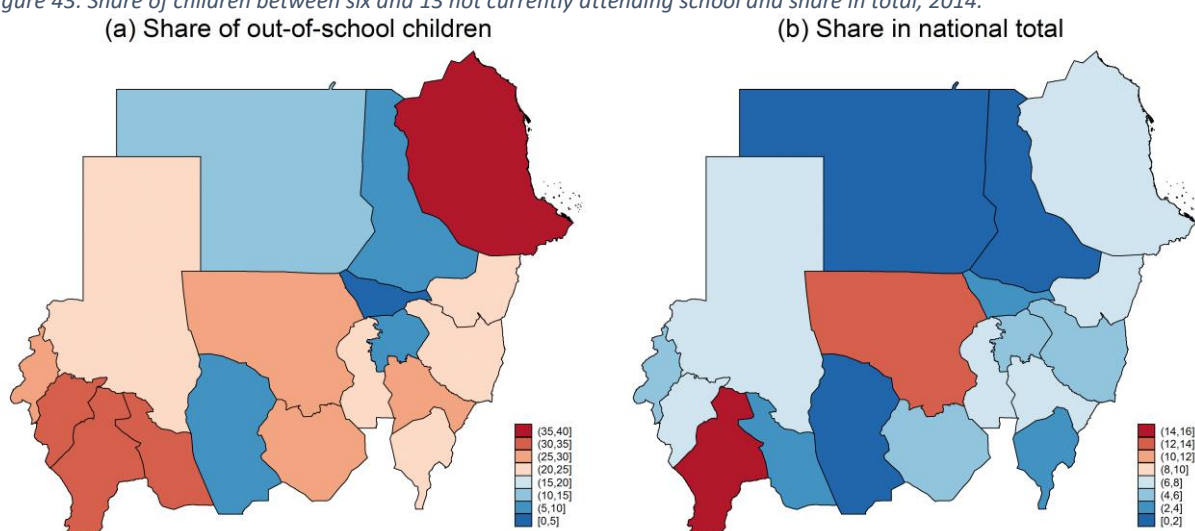
Figure 42: Primary and secondary gross attendance ratio and changes (in percentage points) by state and year, 2009-2014.



Source: Own calculations based on NHBPS 2014/15 and NHBS 2009. Note: State borders are depicted as they were defined in 2009.

133. **School attendance increased in most states.** Primary school attendance increased modestly in North Darfur (3.4 percentage points), Northern state (4.4), River Nile state (6.0), and Khartoum (8.6 percentage points), states with high levels of attendance already in 2009 (Figure 42). There was also progress in primary school attendance in many southern states, which often started from lower levels, including West Darfur (6.2; now West and Central Darfur, South Darfur (10.4; now South and East Darfur), and North Kordofan (7.3) and others. Changes in the eastern states were more mixed, with an increase in Kassala by 20.9 percentage points yet a decline in Red Sea state by 7.1 percentage points, the only state in which primary school attendance dropped. The pattern in secondary school attendance ratios is similar qualitatively, with improvements in many states. However, in this case, three states – White Nile, Red Sea, and West Darfur – experienced declining attendance ratios (by 5.0, 3.8 and 0.5 percentages points, respectively).

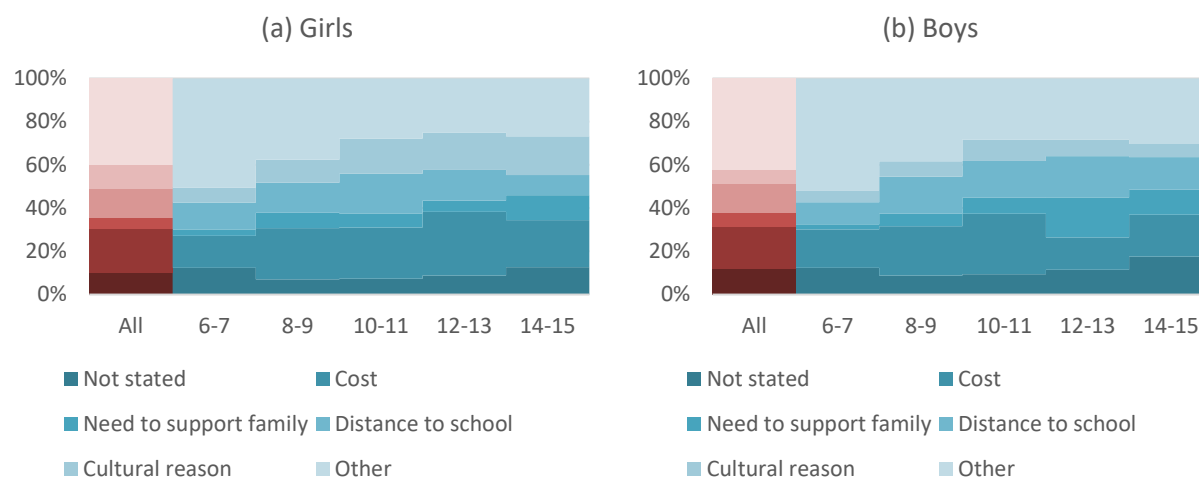
Figure 43: Share of children between six and 13 not currently attending school and share in total, 2014.



Source: Own calculations based on NHBPS 2014/15

134. **Out of more than 1.5 million children between the ages of six and 13 out of school, 25 percent are concentrated in just two states:** South Darfur and North Kordofan. The total number of children age six to 13 that were not attending school fell from 1.9 million in 2009 to 1.5 million in 2014. Across states, the share in this age group ranges from less than five percent in Khartoum to more than 30 percent in South Darfur (30.8 percent), East Darfur (32.4), Central Darfur (34.0), and Red Sea state (35.0) (Figure 43a), all regions prone to conflict in recent years. In terms of the share of children nationally in this age bracket that are not in school, South Darfur (14.9 percent) and North Kordofan (12.2) jointly account for more than one fourth (Figure 43b).

Figure 44: Reasons stated for not attending school by gender, children ages six to 15, 2014.

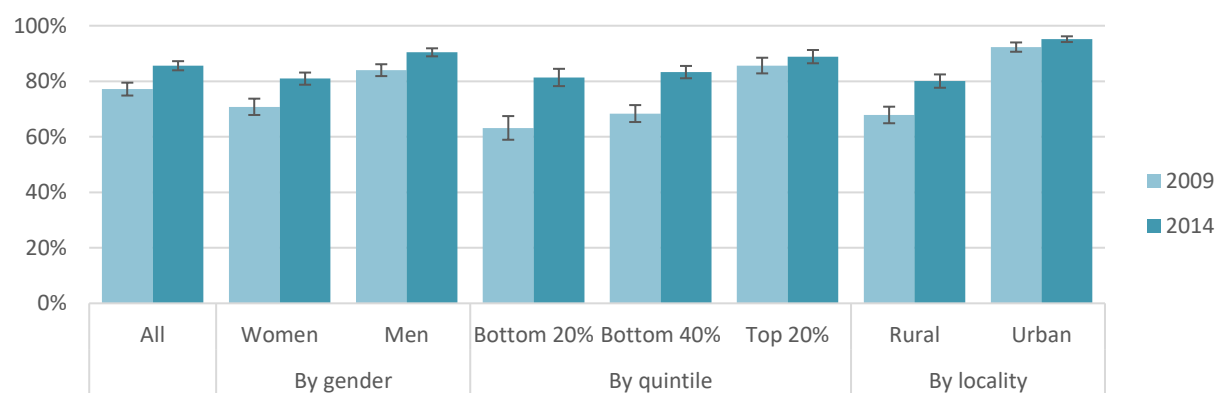


Source: Own calculations based on NHBPS 2014/15.

135. **Self-reported reasons for not attending school are often high costs and long distance to schools.** Respondents for almost 20 percent of children between the age of six and 15 that are not attending school cite high costs, 13.5 percent cite distance to school, and 5.7 percent cite the need for the child to support the family (Figure 44). Respondents for around 40 percent among both girls and boys cite other reasons (including disability and illness of the household head or the child itself) and around ten percent did not respond to the question at all.

136. **While stated reasons are mostly similar between boys and girls, cultural reasons play an important role among older girls.** The share of boys not attending school for cultural reasons varies between five and ten percent, depending on age (Figure 44b). Among girls age six to seven, only 6.9 percent are not attending for cultural reasons (Figure 44a). But this share increases to 16-18 percent among girls aged ten and above. This suggests that cultural reasons are important in explaining the gender gap in school attendance in secondary.

Figure 45: Literacy rates among 15-24 year-olds by gender, quintile, locality, and year.



Source: Own calculations based on NHBPS 2014/15 and NHBS 2009. Note: 95-percent confidence intervals indicated.

137. **Youth literacy has increased, particularly among the poor.** Overall, the youth literacy rate, defined as the proportion of youth between the age of 15 and 24 able to read and write a simple sentence in any language, increased from 77.2 to 85.6 percent between 2009 and 2014 (Figure 45). The increase is particularly pronounced among individuals in the bottom quintiles of the distribution and rural youth. However, there is still a considerable gap of around 15.2 percentage points between Sudanese youth in rural and urban areas.

138. **Two key findings emerge from the analysis in this section:** Educational attainment and outcomes among adults in Sudan reflects decades of conflict and limited investment in education. More recently, educational attainment and youth literacy increased and these gains have largely been equitable. However, much remains to be done to boost human capital, particularly for girls and children in rural areas.

Land and livestock

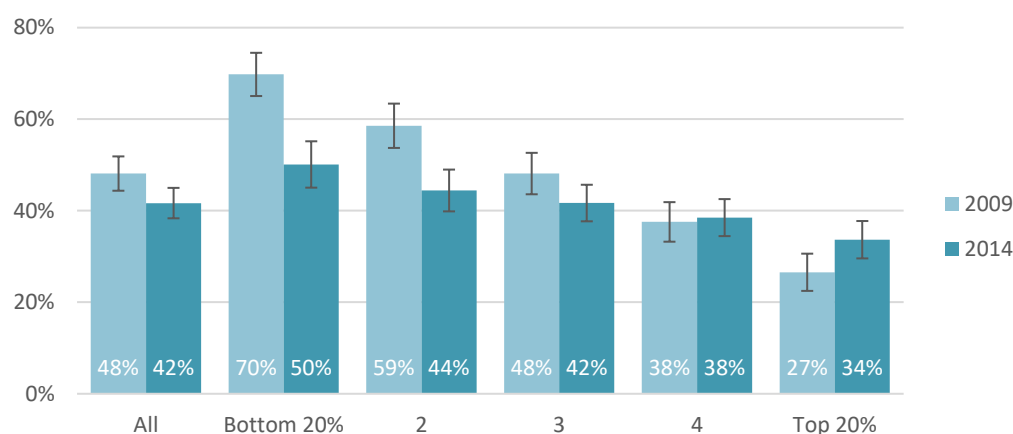
139. **The analysis of the incidence of asset ownership, housing conditions, and access to services shed light on the endowments of the poor and compliments the analysis of consumption.** Land and livestock are typically among the most important productive assets of the poor in developing countries and – as will be shown – Sudan is no exception. Understanding their characteristics, the incidence of ownership, and trends in access to these assets over time thus sheds light on the evolution of the poor’s economic opportunities. Ownership of durable assets, indices based on ownership patterns, access to services and housing conditions are also used widely as an alternative indicator of the material standard of living (Sahn and Stifel 2003, Sahn and Stifel 2000, Young 2012).³² The analysis of these indicators thus serves as a robustness check on the internal consistency of poverty trends and levels.³³

140. **The share of households that report owning or renting land has decreased; yet two in five Sudanese still lived in a household in which at least one member owns or uses agricultural land.** The share of individuals that live in a household in which at least one member owns or rents agricultural land dropped from 48.1 to 41.7 percent between 2009 and 2014. While one half of those in the bottom-20 percent were members of farming households, that share decreases to one third among the top-20 percent (Figure 46).

³² However, the use of asset indices is not without its critics. Importantly, unlike service flows from assets and consumption expenditure, indices based on asset ownership are stock measures. Hence, asset indices typically exhibit upward drift over time as old assets with low service flows are not always disposed of and new assets are accumulated (Harttgen, Klasen, & Vollmer, 2013).

³³ In addition, it might be noted that due to a lack of information about various variables usually employed to estimate service flows from durables (e.g. the real interest rate and the rate at which specific assets decay), they are not included in the consumption aggregates used in this analysis. The same is true for actual and hypothetical rents which were only recorded in the 2014 survey. Hence, the analysis of assets ownership and housing conditions/rents is complimentary to the analysis of consumption in this report.

Figure 46: Share of individuals with owning or using agricultural land, forest land, or pasture by quintile, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

141. **While most of the households that own or rent land are in rural areas, a significant portion also lives in urban areas.** More than half of the rural households (54.9 percent) own or rent land under crop while only around every tenth household in urban areas owns or rents land. The share of land-owning households in urban areas is therefore around nine percent. However, with an average area under crops of 11.6 hectares, land holdings of urban households tend to be almost twice as large as those of rural households (5.9 hectares). As a result, around 15 percent of all land holdings pertain to urban households. Urban households that own or rent land tend to be better-off: only around one fourth are among the bottom-40 percent – the same proportion as among all urban households – while the share in rural areas is almost exactly 40 percent.

Table 13: Land distribution among smallholder farms in selected African countries.

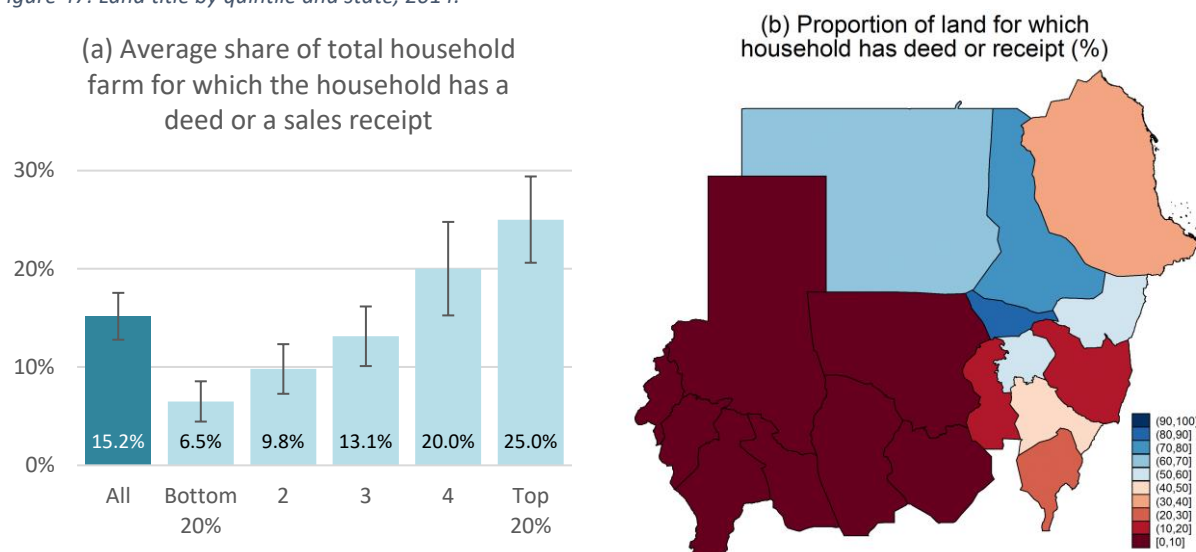
Country and year of survey	Mean farm size (ha)	Farm size (hectares per capita)						Gini coefficients		
		Median	Mean	Quartiles 1	2	3	4	Land per household	Land per capita	Land per adult
Kenya, 1997	2.28	---	0.41	0.08	0.17	0.31	1.10	0.55	0.56	0.54
Kenya, 2010	1.86	---	0.32	0.07	0.12	0.25	1.12	0.57	0.59	0.56
Rwanda, 1984	1.20	---	0.28	0.07	0.15	0.26	0.62	---	---	---
Rwanda, 1990	0.94	---	0.17	0.05	0.10	0.16	0.39	0.43	0.43	0.41
Rwanda, 2000	0.71	---	0.16	0.02	0.06	0.13	0.43	0.52	0.54	0.54
Sudan, 2009	6.76	0.53	1.18	0.15	0.38	0.76	3.69	0.65	0.65	0.67
Sudan, 2014	6.81	0.42	1.18	0.12	0.34	0.65	3.66	0.70	0.68	0.67

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15 and Masters, et al. (2013).

142. **While the average smallholder farm in Sudan is large by regional standards, mean farm size in the bottom of the farm size distribution decreased between 2009 and 2014.** Rural population growth determines average farm size changes and a decline in average farm sizes has been evident in much of Sub-Saharan Africa in recent years. In Sudan, the average smallholder farm is very large by regional standards, more than three times as large than the average farm in Kenya in 2010 (Table 13). An in

contrast to other countries in Sub-Saharan Africa, mean farm size per capita remained unchanged between 2009 to 4.55 hectares in 2014.³⁴ However, median farm size per capita decrease substantially and so did average farm sizes per capita in each quartile of the land distribution, suggesting an increase in inequality at the top of the distribution. As in other countries in the region, there is some evidence in Sudan for an increasing concentration of land between 2009 and 2014.

Figure 47: Land title by quintile and state, 2014.



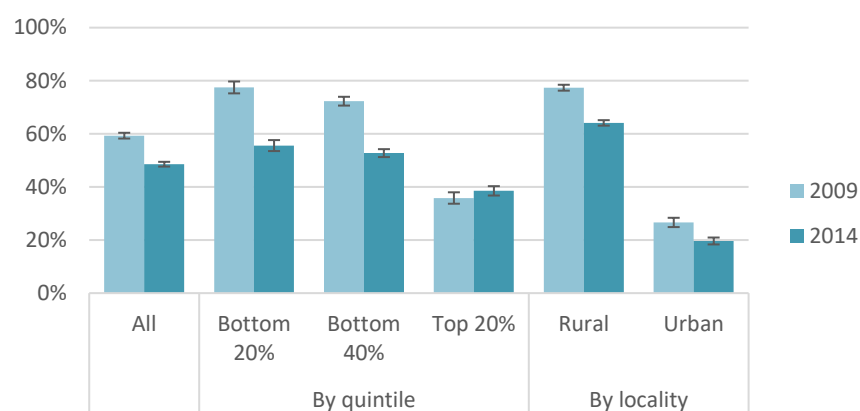
Source: Own calculations based on NHBPS 2014/15. Note: 95-percent confidence interval indicated in panel (a).

143. **Households from the bottom quintiles are less likely to have a deed or a sales receipts as prove of ownership of their land.** There has been an increasing interest among development practitioners in land registration and titling in recent years. Benefits associated with secure titles that can be enforced are thought to include higher investment, the easing of credit constraints, and improvements in allocative efficiency (Feder and Nishio 1999). In Sudan, the average share of land per farm for which the household in question could produce either a deed or a sales receipt is only 15.2 percent. This share varies from 6.5 percent among the poorest 20 percent to 25 percent among the richest 20 percent (Figure 47a).

144. **There is a significant variation in land title status by state.** The share of total smallholder land in any of the states in Darfur and Kordofan for which a deed or a receipt exists below ten percent yet significantly higher shares in eastern states and particularly in northern states (Figure 47b).

³⁴ Extreme outliers, defined as reported land areas that are larger than the mean plus 5.5 standard deviations in each year, are not considered in these calculations. Only two farms met this criterion in 2014 while no farm did in 2009.

Figure 48: Ownership of livestock (in the population) by quintile and urban/rural, 2009 and 2014.



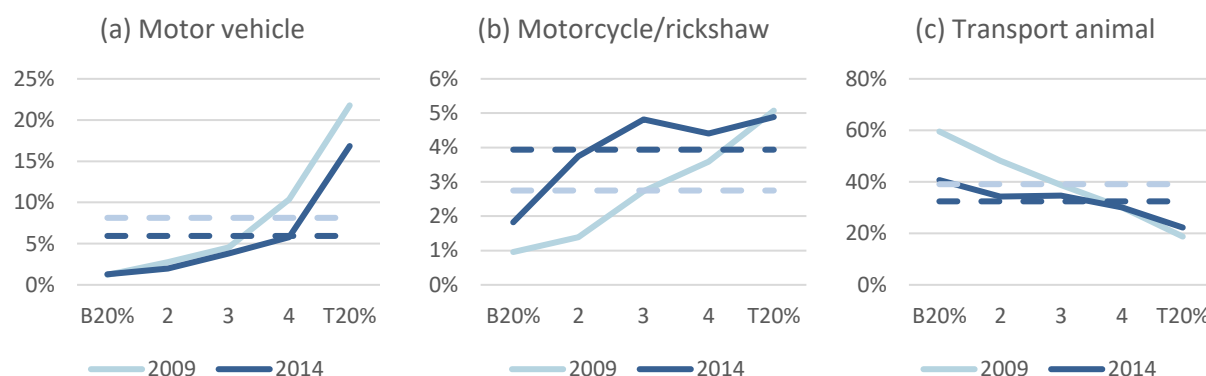
Source: Own calculations based on NBHS 2009 and NHBPS 2014. 95-percent confidence intervals are indicated.

145. **The poor are more likely to own livestock.** Almost half the population (48.6 percent) lives in a household that owns livestock (Figure 48). The share is somewhat higher among the poor – 52.7 percent in the among the bottom-40 percent. Livestock is, of course, more important in rural areas where three in five own at least one animal. But the share in urban areas, at almost 20 percent, is not negligible.

146. **The incidence of livestock ownership decreased markedly between 2009 and 2014, especially among the poor.** The incidence of livestock ownership dropped by almost eleven percentage points, suggesting that fewer households view holding livestock attractive.

Consumer durables

Figure 49: Incidence of ownership of transport-related assets, 2009 and 2014.

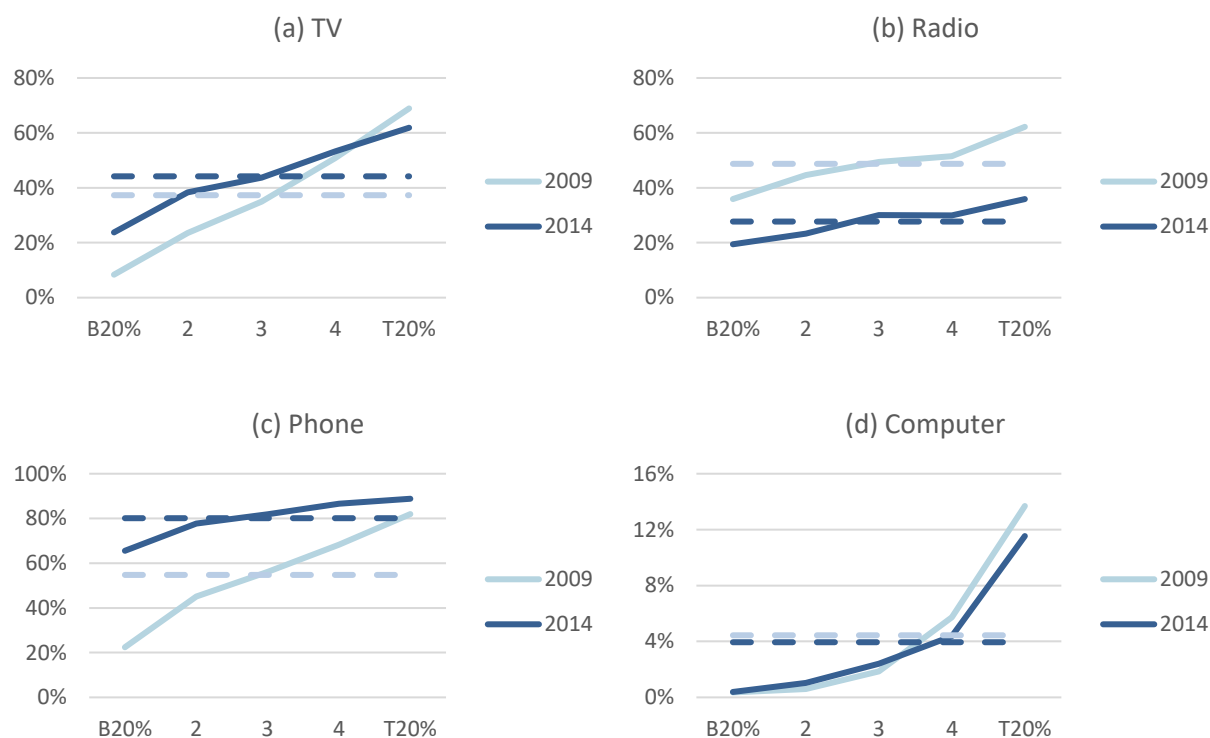


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

147. **Ownership of motor vehicles might has decreased while the ownership of motorcycles or motor rickshaws increased.** Ownership rates for cars are negligible among the bottom 40 percent but increase to more than 15 percent among the top 20 percent (Figure 49a). The data seem to indicate that the likelihood of car ownership decreased between 2009 and 2014. However, an alternative explanation that should be further explored is that the more recent survey, the 2014/15 NHBPS, suffers from higher unit

non-response rates at the top of the distribution. Around five percent of the population in the three upper quintiles live in a household that owns a motorcycle or a motor rickshaw. Among the bottom fifth, the rate is only around two percent (Figure 49b). Transport animals are more common among the poor, likely because they play a greater role in agriculture, which tends to be the mainstay of the poor more frequently than of the rich (Figure 49c).

Figure 50: Incidence of ownership of media- and communications-related assets, 2009 and 2014.

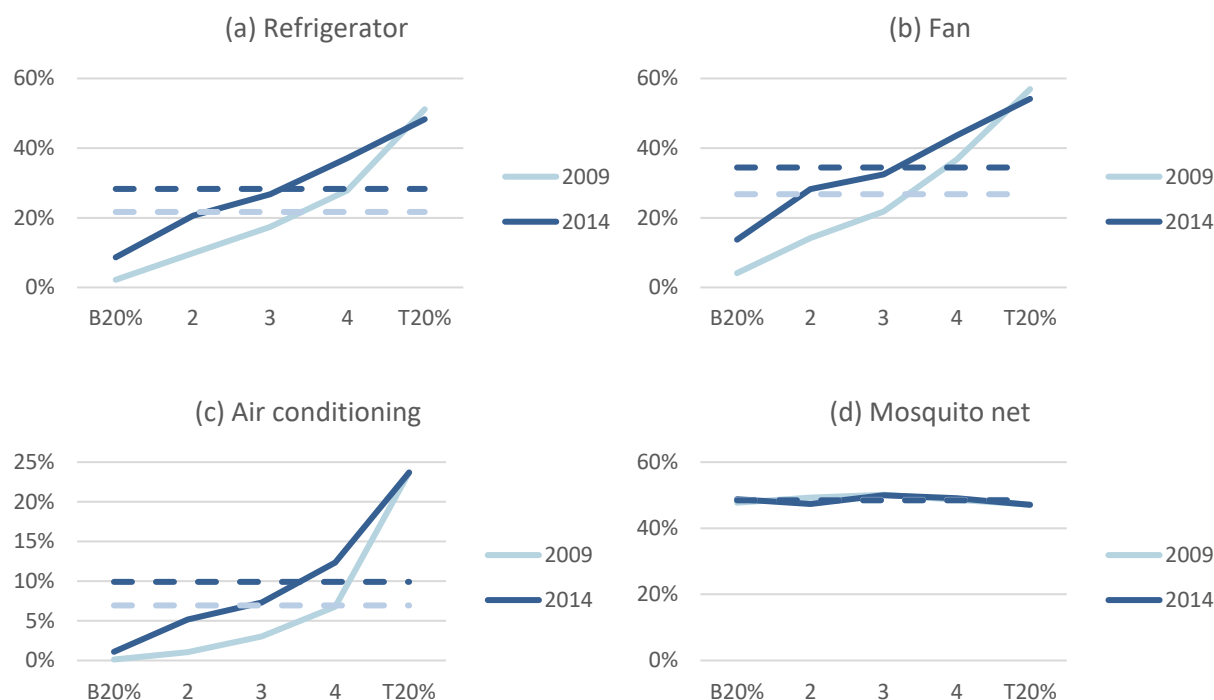


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

148. **While ownership of a TV set has become more common, ownership of radios has declined.** TV ownership increased from 37 to 43 percent (Figure 50a). This increase is driven by higher ownership rates among the bottom 40 percent of the population. Radios, on the other hand, have become less common (Figure 50b): while around half the population lived in a household with at least one radio in 2009, only 28 percent did so in 2014.

149. **Around 80 percent of the population resides in households that have access to a phone.** The strongest growth in the ownership rate among this class of assets is in phone ownership, from 55 percent penetration among the general population in 2009 to 80 percent in 2014 (Figure 50c). As will be demonstrated, this is largely due to strong uptake of mobile phones. Computers, on the other hand, remain rare, with less than five percent of Sudanese living in a household that owns at least one computer and less than one percent among the bottom 40 percent (Figure 50d).

Figure 51: Incidence of ownership of amenity assets, 2009 and 2014.

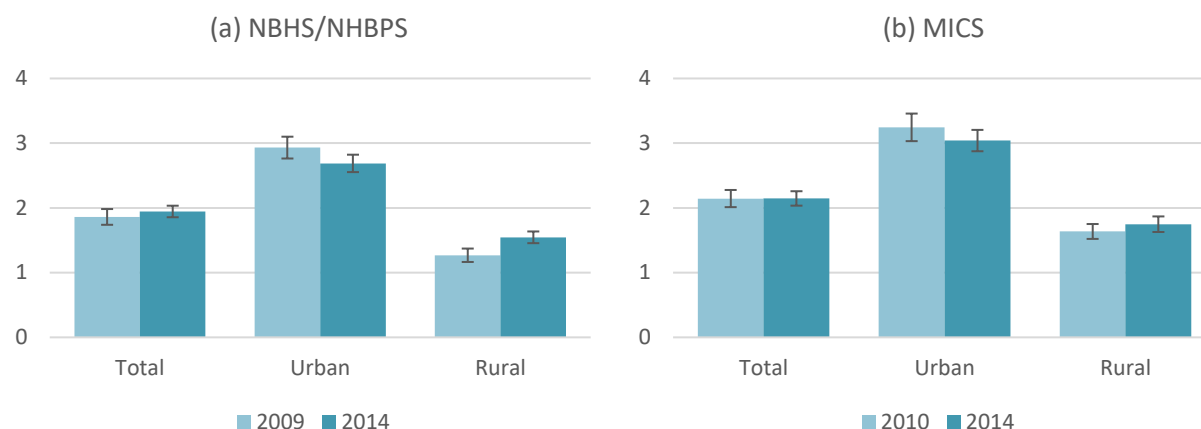


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

150. **Ownership of refrigerators, fans, and air conditioning has increased.** In line with greater access to public electricity, ownership of refrigerators, fans, and air conditioning increased by 6.6, 7.7, and 3.0 percentage points, respectively. These increases are driven by upticks in ownership rates among the bottom-40 percent as well as by the top 60 percent. However, large gaps between these groups remain. The top-60 percent are more than twice as likely to own refrigerators and fans and more than four times as likely to own air conditioners. Around half the population owns a mosquito net with no statistically significant differences across the welfare distribution and no changes between surveys.

151. **In line with the monetary profile of poverty, a simple asset index suggests marginal improvements in material living standards in rural areas yet a deterioration in urban areas.** It is useful to compare levels and trends in monetary poverty based on consumption expenditure against alternative indicators of the material standard of living. The present analysis stipulates an asset index that simply counts the assets owned at least by one member once across a list of seven assets: a motor vehicle, a bicycle, a TV set, a radio, any type of phone, any type of computer, and a refrigerator. On average, households in Sudan owned 1.86 assets out of a total of seven in 2009. That number increased to 1.94 by 2014. However, the difference is not statistically significant. No discernible change at the national level clouds trends similar to those for monetary poverty across localities: asset ownership decreased in urban areas, from 2.9 assets to 2.7 assets out of seven owned at least once on average, while it increased slightly in rural areas, from 1.3 to 1.5 assets owned (Figure 52a).

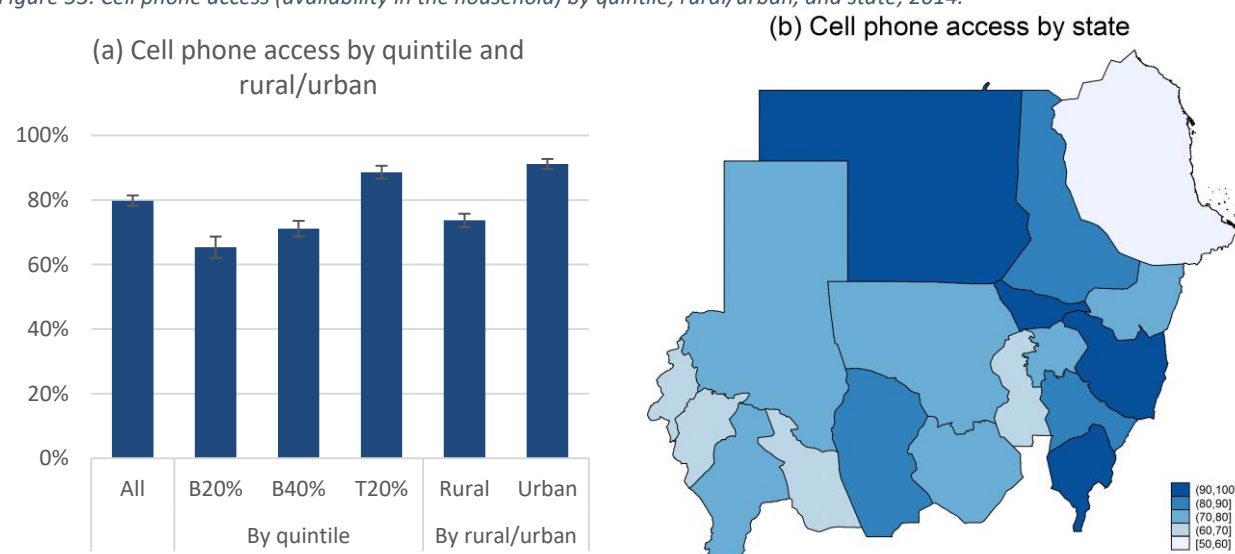
Figure 52: Index of ownership of seven assets with common support, NBHS/NHBPS and MICS, 2009-2014, by locality.



Source: Own calculations based on NBHS 2009, NHBPS 2014, MICS 2010, and MICS 2014. 95-percent confidence intervals are indicated.

152. **The same pattern of convergence in the material standard of living across localities emerges if the analysis is conducted based on an alternative data source.** Triangulation of results with respect to levels and trends in asset ownership with another set of household surveys, the 2010 and 2014 MICS, suggests that they hold outside the NBHS/NHBPS data. Levels of asset ownership are somewhat higher on average. However, the MICS data also indicate no change at the national level, a moderate decrease in asset ownership in urban areas, and a moderate increase in rural areas (Figure 52b).

Figure 53: Cell phone access (availability in the household) by quintile, rural/urban, and state, 2014.



Source: Own calculations based on NHBPS 2014/15.

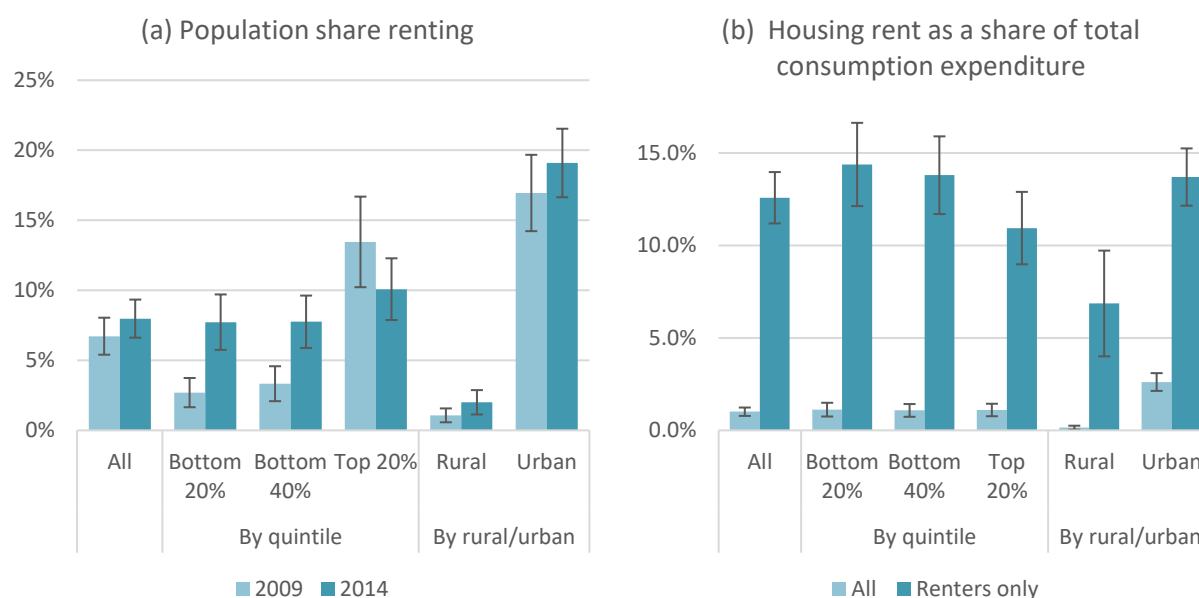
153. **Four in five Sudanese live in households in which at least one members has access to a cell phone.** Mobile telephony has brought a range of new possibilities to developing countries, connect individuals to individuals, information, markets, and services (Aker and Mbiti 2010). In Sudan, a question

about cell phone ownership was included in the household survey in 2014 but not in 2009. It suggests that a majority of the population, 80 percent, had access to a cell phone within the household. The population share with access was slightly less than two in three among the poorest 20 percent and close to nine in ten among the richest 20 percent (Figure 53a). Northern state and Khartoum have the highest access rate, 96 and 93 percent, respectively, while Red Sea state has the lowest (52 percent) (Figure 53b).

Housing conditions and rents

154. **Access to reliable sources of electricity, improved drinking water sources and improved sanitation, as well as sanitary housing conditions constitute key aspects of human wellbeing.** There is little doubt that access to key public infrastructure improves lives, although it is not only clear by how much. For instance, one study for South Africa finds that electrification significantly raises female employment over the course of five years (Dinkelman, 2011) while another for rural India finds only small effects of electrification on a range of outcomes (Burlig & Preonas, 2016). Inadequate sources of drinking water and open defecation are major determinants of communicable diseases, particularly in children. Poor housing conditions, particularly the crowding of too many household members on insufficient space and indoor air pollution due to the use of coal and biomass in the form of charcoal, wood, dung, or crop residues for domestic energy, have also been linked robustly to health problems, for instance chronic pulmonary disease and acute respiratory infections in childhood (Bruce, Perez-Padilla, & Albalak, 2000).

Figure 54: Population share renting by year and housing rents as a share of total consumption expenditure.



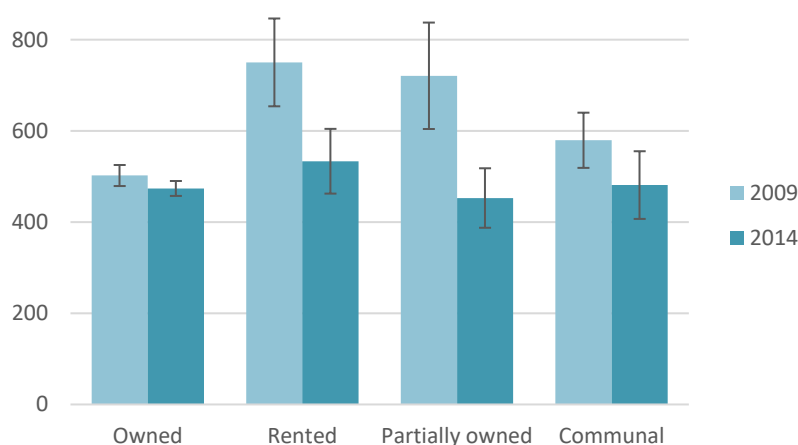
Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated. The denominator in panel (b) excludes actual rents.

155. **While most Sudanese own the homes they occupy, renting has become more important, particularly among the poor and in urban areas.** In 2014, 82 percent of the Sudanese remained the owners of the dwelling they occupy, down from 88 percent five years earlier. Eight percent lived in dwellings that are provided for free and another eight percent were renting. While renting was more

common among the better-off in 2014, in 2009, differences in the population share renting were far less pronounced (Figure 54a).

156. **Actual rents constitute a small but significant share only for urban households.** For comparability with the 2009 survey, which did not collect data on either actual or hypothetical rents, rent is not included in the consumption aggregate that forms the basis of the poverty analysis in this report. At the population level, this unlikely to have major effects on poverty estimates as rents are on average only about one percent of total household consumption expenditure. However, among urban households, the share is almost three times as high. And for the smaller group of renters in the population, the share of rent in total consumption expenditure is much higher, around 13 percent (Figure 54b).³⁵

Figure 55: Per capita consumption (2014 SDG per month) by year and tenure status, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

157. **Reports suggest that rents in urban Sudan, particularly in Sudan, have increased rapidly since 2009.** There have been several reports pointing to a sharp increase in housing rents in Khartoum, driven initially by a form of Dutch disease during the late years of the oil economy (Elzobier 2009) and more recently by a wave of in-migration (Ali 2015). Some reports even suggest a doubling of rents in USD between 2009 and 2014 (Ali 2015).

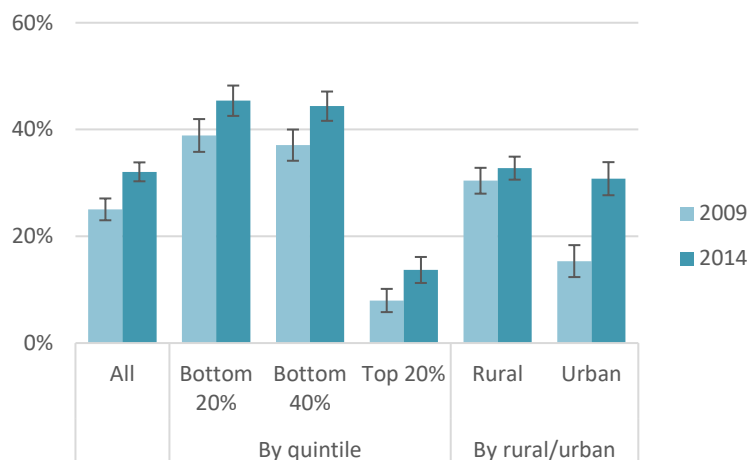
158. **Consistent with rising rents, owners have seen more moderate declines in per capita consumption and lower increases in poverty.** In 2009, renters' per capita consumption was around 50 percent higher than that of owners. But by 2014, the difference was no longer statistically significant (Figure 55). Moderate poverty among renters increased from 25 to 52 percent yet increased only moderately, from 47.8 to 51.8 percent among owners. Extreme poverty even declined among owners – from 18.8 to 15.5 percent – while it increased by a factor of nearly four among renters (from 3.8 to 14.5 percent).

159. **A more robust analysis of the issue of rents shows that the decline in per capita consumption among renters vis-à-vis owners are not driven by more pronounced declines in incomes in urban areas.**

³⁵ These calculations exclude actual and hypothetical rent in the denominator.

One possibility is that renting is more common in urban areas, which have been hit harder by recent macroeconomic shocks. In that case, allowing for diverging trends in per capita expenditure between rural and urban areas should account for the differences between renters and owners in changes in over time. However, the results of a more in-depth analysis of this finding show that the difference in the decline is significant even if different trends in urban vs. rural areas are accounted for. In addition, there is also some indirect evidence that rising rents have crowded out other expenditure to the tune of eight percent (Appendix C).

Figure 56: Share of population living in crowded housing conditions (i.e., more than three household members per room) by quintile and rural-urban, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

160. **The incidence of overcrowding has increased in urban areas.** Between 2009 and 2014, the median number of household members per room, an indicator of crowding, in Sudan has increased from 2.25 to around 2.5. However, changes in rural areas were only minor; in fact, the median number of household members per room remained at 2.5. Hence, this increase is almost entirely driven by an increase in crowding conditions in urban areas, where the median increased from two to 2.5. The population share living in crowded conditions, defined as housing conditions in which more than three household members share one room, doubled in urban areas (Figure 56).³⁶ This is consistent with upward pressure on rents and a response that in which families economize on the number of separate households they entertain (Box 6).

Box 6: Is Sudan urbanizing?

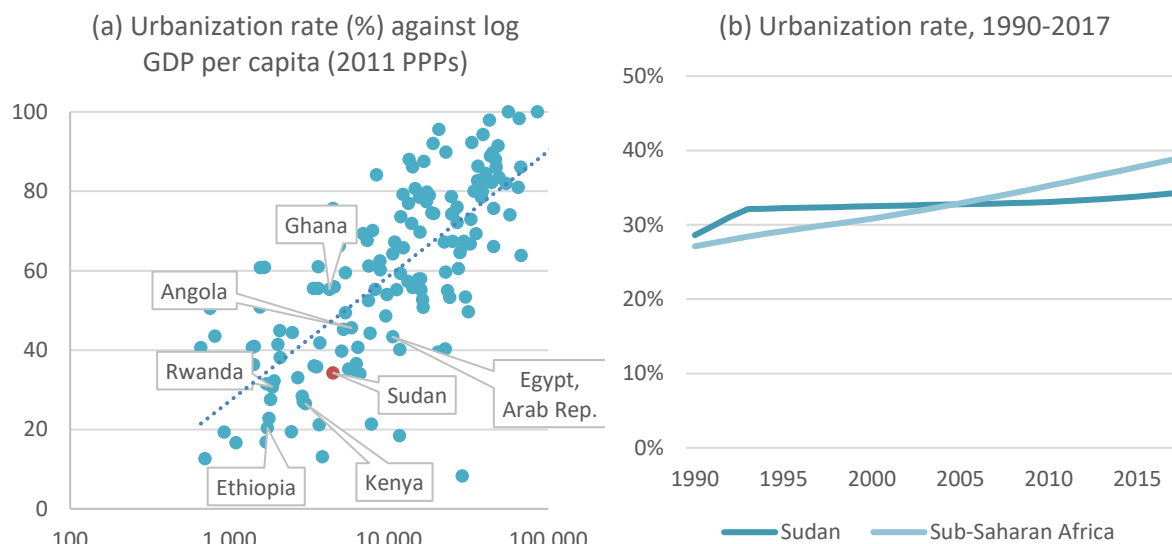
About two thirds of Sudan's population reside in rural areas and available data sources suggest only a modest pace of urbanization in recent years. Two thirds of Sudan's population are classified as rural by the UN and similar results are obtained from the household sample surveys. Sudan's urbanization rate would thus be low given the country's level of economic development (Official data sources suggest a modest pace of urbanization at best). Both data sources, the UN data and survey estimates, also indicate only a modest pace of urbanization between 2009 and 2014.

³⁶ The obvious drawback in this indicator is that it does not account for area, only for the number of rooms.

Figure 57a) and low in comparison to the regional average (Official data sources suggest a modest pace of urbanization at bets. Both data sources, the UN data and survey estimates, also indicate only a modest pace of urbanization between 2009 and 2014.

Figure 57b). Official data sources suggest a modest pace of urbanization at bets. Both data sources, the UN data and survey estimates, also indicate only a modest pace of urbanization between 2009 and 2014.

Figure 57: Levels and trends in urbanization.

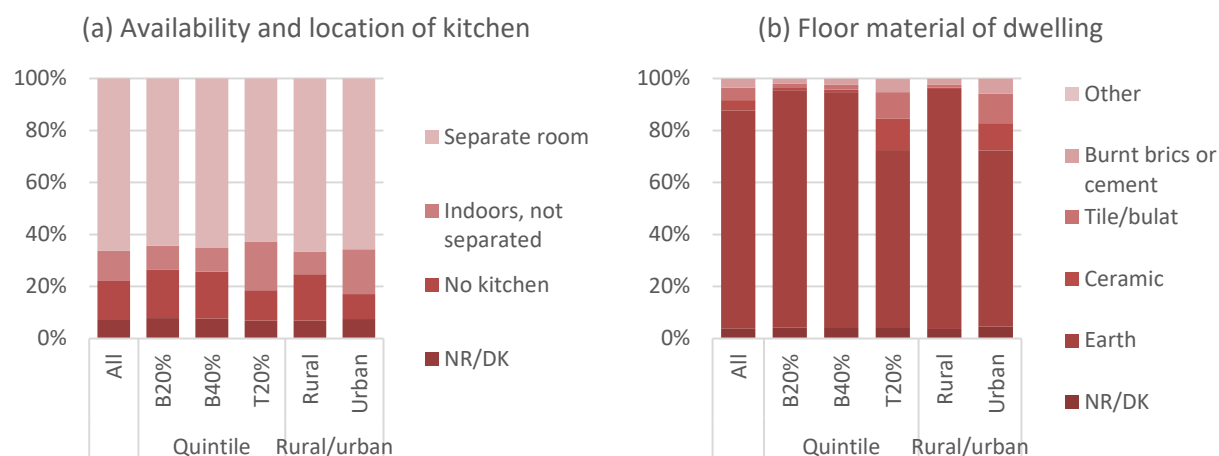


Source: Own calculations based on WDI data.

But Sudan's cities are often believed to have grown rapidly in recent years and there are some indications that this is indeed the case. While the pace of urbanization appears moderate based on available data, many observers do seem to think that Sudan's cities are experiencing rapid growth, citing an influx of cross-border migrants and IDPs. A report commissioned by ODI's Humanitarian Policy Group opens with the following: "Sudan is urbanising rapidly. Although the trend is not new [...] the pace in Sudan seems to be accelerating. For a country its size Sudan has relatively few cities, which means that the population drift from rural areas is focused on a small number of urban centres" (Pantuliano, et al. 2011). There are also other signs of rapid urbanization. For the city of Khartoum, for instance, multiple sources indicate a sharp increase in rents (Ali 2015) and the analysis in this report suggests that overcrowding in urban areas has become more common. Both observations seem inconsistent with only modest population growth.

There may be problems with the underlying data. For instance, estimates of the population of the capital of Red Sea State, Port Sudan, vary widely. According to the 2008 census, the population stands at 399,140, representing 28.6 percent of the population of Red Sea State, 29.5 percent of its households and 71.7 percent of its urban population. However, 2004 estimates of the state's population suggested that the city represented about 50 percent of its population and unofficial estimates in independent surveys and reports in the 1990s put the population at anywhere between 500,000 and 1.2 million (Pantuliano, et al. 2011). Surprisingly, survey estimates also indicate a large drop in the state's urbanization rate by more than ten percentage points between 2009 and 2014 (Table 28).

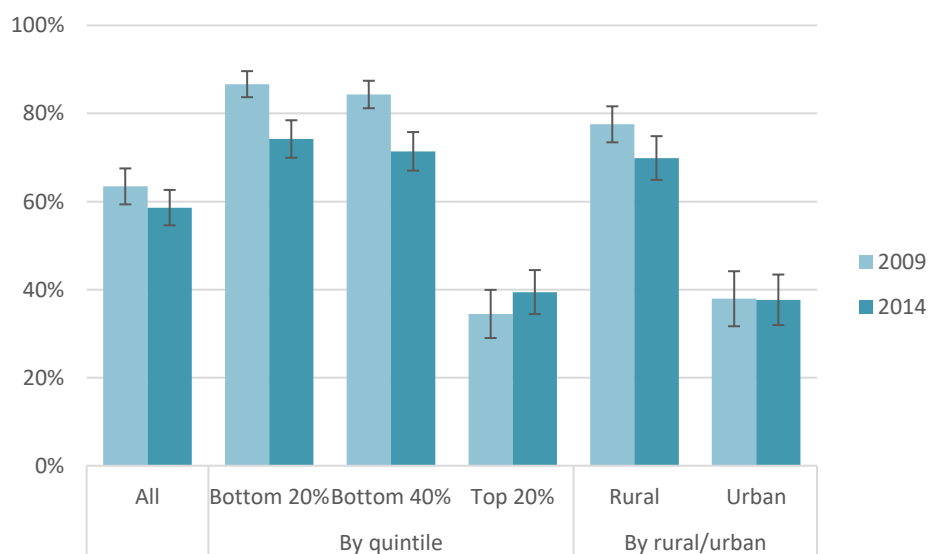
Figure 58: Floor material and availability of separate kitchen by quintile and rural-urban.



Source: Own calculations based on NHBPS 2014/45.

161. **The rich are more likely to have a kitchen as part of their dwelling and floors built out of lasting materials.** 14.9 percent of Sudanese live in a household with no kitchen, a share that decreases from 19.5 percent among the poorest 20 percent to 11.6 percent among the richest 20 percent. More than four out of five live in a dwelling with an earth floor, a percentage that declines from 92.4 percent among the poorest 20 percent to 68.5 percent among the richest 20 percent.

Figure 59: Use of biomass as the main energy source for cooking, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

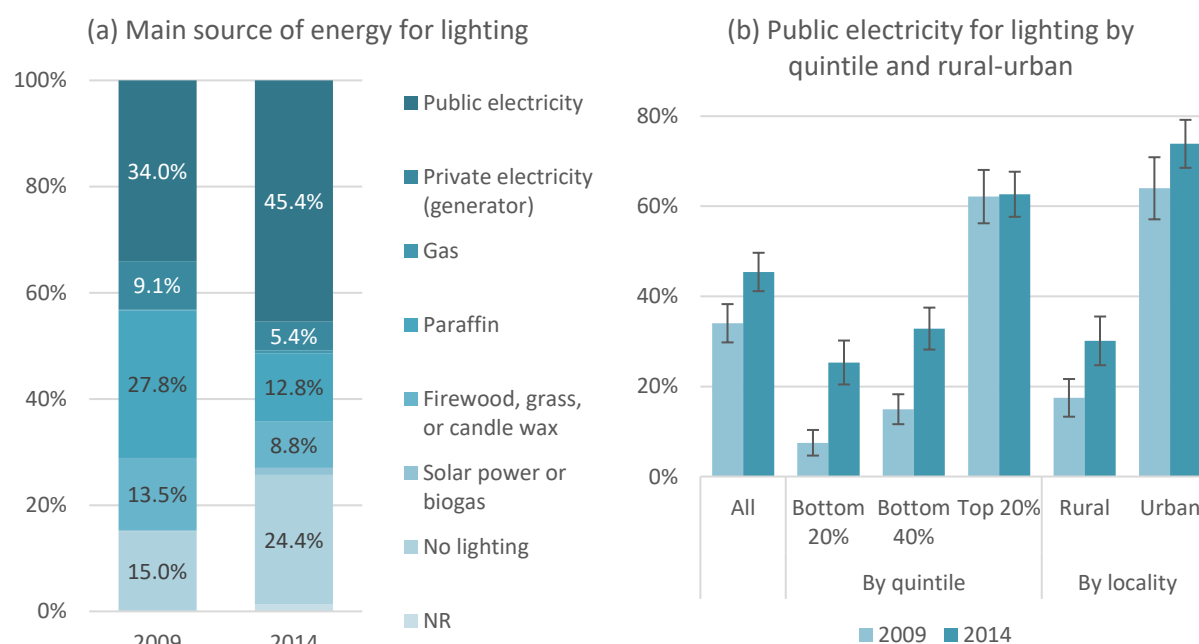
162. **Two in five Sudanese live in a household that depends on biomass – primarily firewood and charcoal – for cooking needs.** Cooking with energy sources that can cause indoor air pollution and, by extension, health problems is common in Sudan: 43 percent of the population live in a household that uses firewood, 15 percent in a household that uses charcoal, and another one percent using either cow

dung or grass. The main clean alternative to these is gas (LPG), used by households representing nearly 41 percent of the population.³⁷ While the use of potentially unsafe sources of energy for cooking has declined between 2009 and 2014 (by about 4.8 percentage points, $p < 0.10$), the poor and the rural population remain significantly more likely to be exposed.

Access to services

163. The population share using public electricity for lighting in their homes increased by more than ten percentage points between 2009 and 2014. Public electricity was the main energy source for lighting for around 45 percent of the population in 2014, up from 34 percent in 2009. The increase came at the expense of the use of paraffin lamps and lanterns, firewood, grass, and candles. Solar power or biogas played a negligible role in both years. Surprisingly, the share of those that report having no lighting at home increased by almost ten percentage points, from 15.0 to 24.4 percent (Figure 60a).

Figure 60: Source of lighting used in home by year, quintile, and rural-urban, 2009 and 2014.

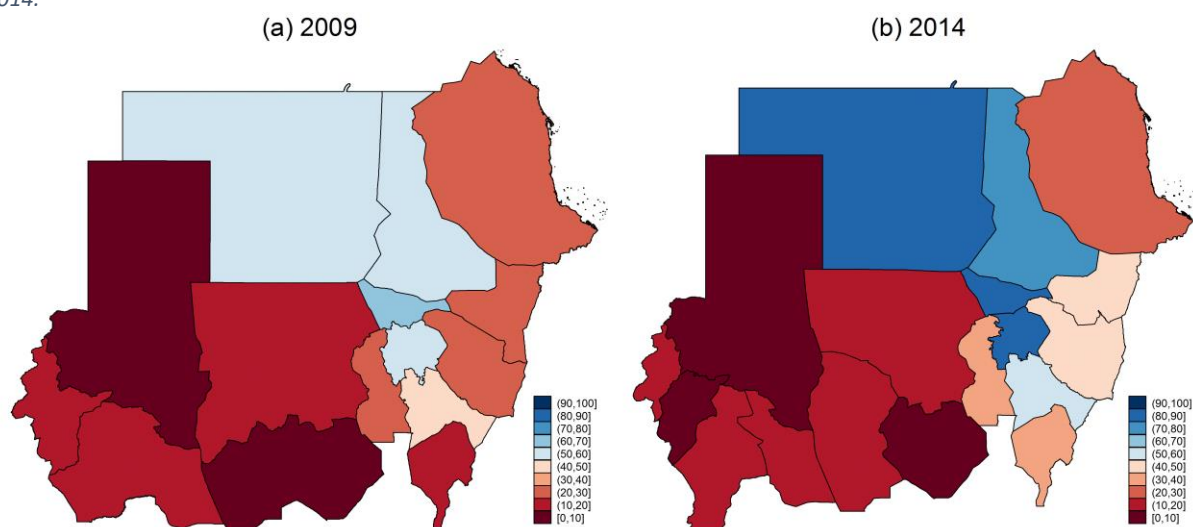


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated in panel (b).

164. The increase in access to electricity for lighting was particularly pronounced among the poor and is evident in both rural and urban areas. The share among those in the bottom-40 percent with access to public electricity more than doubled from 14.9 to 32.8 percent. There is no evidence for improvements among the top-60 percent, among which a little more than 60 percent enjoy access. Unsurprisingly, access is more common in urban areas. There, nearly three in four have access, compared to three in ten in rural areas. The increase in rural and urban areas was 12.6 and 9.9 percentage points, respectively, and statistically significant in both domains (Figure 60b).

³⁷ The share of household using electricity or biogas or that do not cook at all is all but negligible.

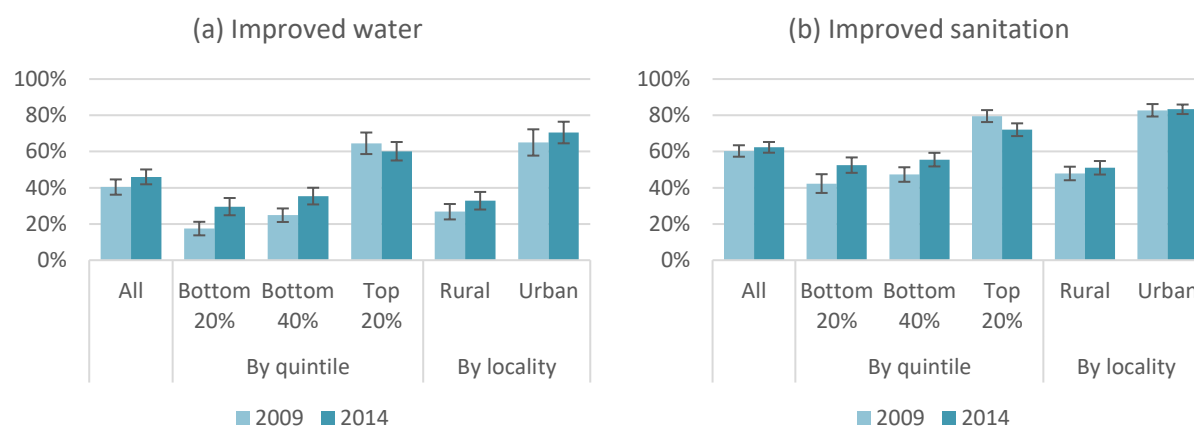
Figure 61: Access to public electricity (share of individuals that use public electricity for lighting in their home) by state, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: Map (a) depicts states in 2009 boundaries.

165. **Access to public electricity increased primarily in states in the north, the center, and the southeast.** States west of Sennar, Al-Gezira, Khartoum and Northern state, saw increases in the share of population with access to public electricity of at most six percentage points (Figure 61). Changes in this indicator to the east of this line (including all five states in Darfur and Kordofan as they existed in 2009 and in White Nile) are all minor and statistically insignificant. On the other hand, states on the other side of this line, with the exception of Red Sea state, saw increases of at least 15 percent. The population share with access to electricity in Northern state, Al-Gezira, Al-Gadarif, and River Nile state all increased by more than 20 percentage points between 2009 and 2014. These were mostly states in which a significant portion of the population already enjoyed access to public electricity in 2009.

Figure 62: Access to improved source of drinking water and improved sanitation by year, quintile, and rural-urban, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

166. **Only 46 percent of the population have access to an improved source of drinking water³⁸ while 62 percent have access to improved sanitation.³⁹** Despite modest improvements since 2009, large parts of the population still lack access to improved sources of drinking water and improved sanitation. In 2014, 46 percent of the population had access to an improved source of drinking water while 62 percent had access to improved sanitation. Disparities by consumption quintile and between rural and urban areas are pronounced: for instance, households in the top quintile are about twice as likely to have access to an improved source of drinking water as household in the bottom quintile. However, the small improvements in access were realized mainly among the bottom-40 percent (Figure 62).

Multidimensional deprivations

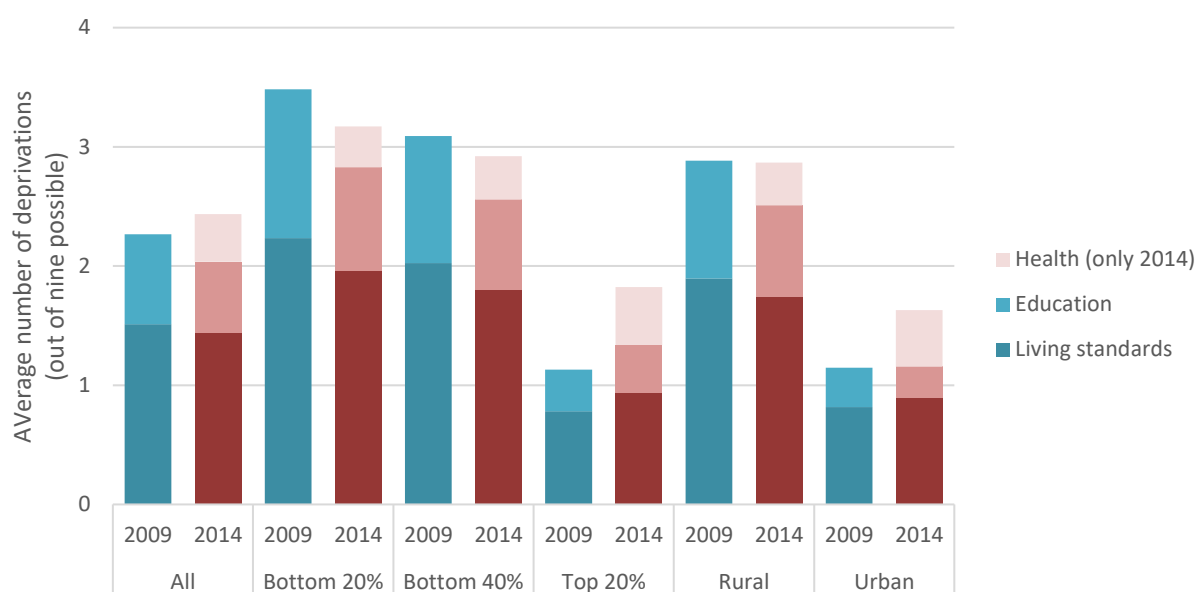
167. **Human wellbeing should be assessed along several dimensions, not only economic welfare.** Profiles of monetary poverty can play a key role in informing public policy. However, many dimensions in which people can potentially be deprived are not easily addressed through private, economic means. These include education, health, access to infrastructure and others for which prices are often ill-defined. In addition, broadening the scope of the analysis to include alternative dimensions of human wellbeing serves as a robustness check for the monetary poverty profile presented in chapter 0.

168. **The broad dimensions included here capture living standards, education, and health; each will comprise three sub-components, for a total of nine binary indicators.** A living-standards dimension considers access to public electricity, an improved source of drinking water, improved sanitation, and overcrowding. Households are considered deprived in each of these indicators of living-standards if they (1) lack access to public electricity, (2) if they have neither access to an improved source of drinking water nor improved sanitation, and (3) if rooms are shared among more than three household members. The education of children and adults constitutes the second dimension. Households will be considered deprived in this dimension if (1) at least one child between six and 16 is not attending school, if (2) there is nobody in the household able to read and write and simple sentence in any language, and if (3) all the adults in the household have not attended any formal education. The final dimension considers health. In this case, indicators are constructed only for 2014 because of comparability issues. Household will be considered deprived if (1) any household has a chronic disease, if (2) any household members has had an accident during the twelve months preceding the interview.

³⁸ It was not always clear whether a specific response option in the surveys should be classified as an improved source of drinking water. The World Health Organization/UNICEF Joint Monitoring Program for Water Supply and Sanitation defines “improved drinking water sources” as piped water into the dwelling or plot, public taps and standpipes, tube wells and boreholes, protected dug wells springs, rainwater collection and bottled water while sources not considered as improved include unprotected dug wells and springs, vendor provided water, water delivered by carts with small tanks or drums or tanker-trucks, and surface water. As the survey question does not distinguish between, for example, protected and unprotected dug wells, judgements had to be made. Sources of drinking water classified as “improved” water are filtering stations or mechanical boreholes with common network or standpipe, mechanical boreholes, deep boreholes with a network, and sand filters. Classified as unimproved water sources were deep boreholes without network, hand pumps, shallow wells, vendors, and all forms of open-water sources.

³⁹ As in the case of improved sources of drinking water, value judgments had to be made. The World Health Organization/UNICEF Joint Monitoring Program for Water Supply and Sanitation defines improved sanitation as having access to the piped sewer system, a septic system, a flush or pour-flush to a pit latrine, a pit latrines with slabs, ventilated improved pit latrines, and composting toilets while public or share latrines, flush/pour latrines that are not connected to a pit, a septic tank, or a sewer, pit latrines without a slab, bucket latrines, hanging toilets/latrines, and the absence of any facilities (open defecation) as unimproved sanitation. The response options, however, do not allow to distinguish between pit latrines with and without a slab. Only flush toilets, private pit latrines, and toilets connected to a sewage system were classified as improved sanitation.

Figure 63: Multiple deprivations by year, quintile, and rural-urban, 2009 and 2014.

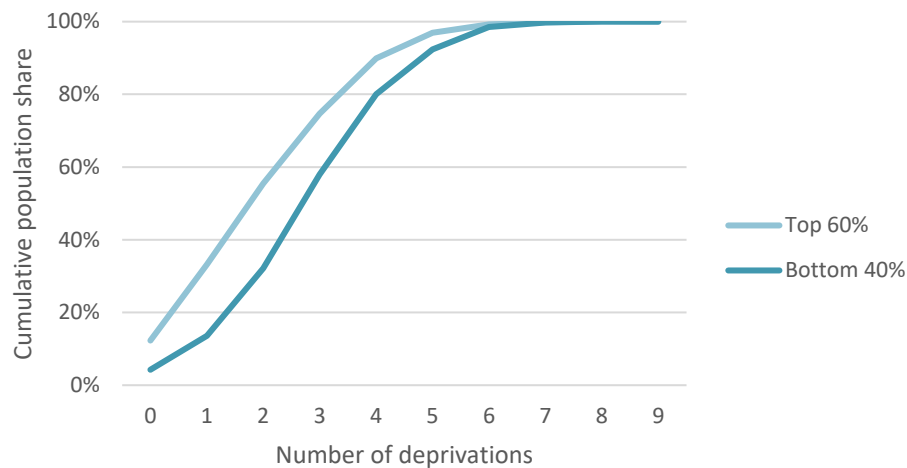


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

169. **Changes in the total number of deprivations in the dimensions of education and health reflect suggest modest improvements, particularly among the poor and in rural areas.** On average, Sudanese households in 2014 experienced 1.4 (out of three possible) deprivations in the dimension of living standards and 0.6 deprivations in the dimension of education, down from 1.5 and 0.8 in 2009 (Figure 63). Households on average experienced 0.4 deprivations in the health dimension, for which no comparison is available. Improvements in the first two dimensions are evident in rural areas, where the average number of deprivations in the living-standard and health dimensions dropped from 1.9 to 1.7 and from one to 0.8, respectively. Intriguingly, deprivations in the dimension of health seem to be more common in urban areas and among the better-off.⁴⁰

⁴⁰ Self-reported assessments of health status (which may include disabilities and chronic illnesses) should be interpreted only cautiously. A common concern is that socially disadvantaged individuals will often fail to perceive and report the presence of illness or health deficits because as their own assessment is directly contingent on their social experience (Sen, 2002).

Figure 64: Number of deprivations (out of nine) by quintile, 2014.



Source: Own calculations based on NHBPS 2014/15.

170. **The total number of deprivations in multiple dimensions is consistent with monetary poverty.** The average number of deprivations among the bottom-40 percent 2.9, compared to 2.1 for those in the top-60 percent ($p < 0.01$). Only 6.6 percent of the bottom-40 percent were experiencing no deprivation in 2014, compared to 15.5 percent of those among the top-60 percent. And almost 80 percent among the bottom-40 percent experienced multiple deprivations at the same time (i.e., more than two) compared to only 59 percent among the top-60 percent.

Table 14: Correlation between deprivations, 2014.

		Living standards			Education			Health		
		Electricity	Water and sanitation	Crowded living	Non-attending child	No literate member	No formal education	Chronic disease	Disability	Accident
Living standards	No electricity	1.00	0.61	0.07	0.31	0.22	0.37	0.04	-0.14	0.02
	Water and sanitation	0.61	1.00	0.07	0.25	0.18	0.31	0.03	-0.14	0.03
	Crowded living	0.07	0.07	1.00	0.15	0.04	0.09	0.01	-0.04	0.02
Education	Non-attending child	0.31	0.25	0.15	1.00	0.16	0.25	0.04	-0.06	0.05
	No literate member	0.22	0.18	0.04	0.16	1.00	0.43	0.00	-0.05	0.00
	No formal education	0.37	0.31	0.09	0.25	0.43	1.00	-0.01	-0.12	-0.01
Health	Chronic disease	0.04	0.03	0.01	0.04	0.00	-0.01	1.00	0.13	0.50
	Disability	-0.14	-0.14	-0.04	-0.06	-0.05	-0.12	0.13	1.00	0.14
	Accident	0.02	0.03	0.02	0.05	0.00	-0.01	0.50	0.14	1.00

Source: Own calculations based on NHBPS 2014/15. Note: The table reports Pearson correlation coefficients calculated at the household-level.

171. **Within dimensions, deprivations tend to be correlated.** Table 14 displays a matrix of correlation coefficients between different deprivations. Cells are color-coded with red indicating high positive correlations (higher overlap across households or a higher chance of experiencing both deprivations at the same time) and green indicating lower levels of correlation. One would expect deprivations within one dimension such as health or education to be highly correlated, in which case the matrix should exhibit block-diagonal form, i.e. blocks of nine cells along the main diagonal that exhibit higher correlations. This is indeed what is observed: households that lack access to electricity also have a higher likelihood of lacking access to an improved source of drinking water and improved sanitation, suggesting complementarities in public infrastructure. Even more obvious, households in which no member can read and write are also more likely to lack an adult with any formal education. And, finally and less clear, it is found that households in which at least one member has experienced an accident are also more likely to have a member that reports suffering from a chronic disease.

172. **High levels of correlation between dimensions are apparent for living standards and education but not between the former two and health deprivations.** Household that experience deprivations in the dimension of education tend to also experience deprivations in the dimension of living standards. (Of course, these correlations do not necessarily reflect causality.) Deprivations in the health dimension, on the other hand, tend to be uncorrelated with deprivations in other dimensions.

V. Structural Change, Labor Productivity, and Jobs

This chapter explores patterns of growth in labor productivity and the relationship between labor market outcomes and poverty. The first section investigates trends in labor productivity and their underlying drivers. The second section then turns to labor market participation, employment, and their respective links to poverty. The third and fourth section study the evolution of employment and wages by sector, respectively. The final section takes a closer look at trends within mining and quarrying, the subsector most closely associated with oil production and gold mining.

The section highlights a lack of structural change, falling labor productivity, and a low pace of job creation, especially outside of agriculture and in rural areas. While overall labor force participation and employment increased, unemployment in urban areas, especially among youth and among the better-educated, increased sharply. Female labor force participation

Labor productivity

173. **An economy's capacity to generate well-paying jobs for the population is key to sustainable economic growth with poverty reduction.** Sustained growth spurts have often been associated with the rapid generation of jobs in the secondary and tertiary sectors, that is, a shift of labor out of low-productivity activities – in particular, agriculture – and into highly productive jobs in the manufacturing and services sectors. As agriculture is typically associated with low levels of labor productivity, this type of structural change towards manufacturing and services is commonly associated with static gains in labor productivity. At the same time, manufacturing has often provided opportunities for dynamic gains in labor productivity through technological upgrading (Rodrik 2013). In the short-run, however, growth in agriculture typically have disproportionate effects on poverty reduction (Christiaensen, Demery and Kuhl 2011).

Table 15: Employment, labor productivity, and decomposition of change in labor productivity by sector, 2009-2014.

	Employment ⁴¹				Labor productivity						
	Total (million)		Shares (%)		Absolute (thousand SDG, 2009 prices)		Relative to average		Decomposition of annual growth rate in labor productivity		
									Within sector productivity growth	Structural change	Total
Year	2009	2014	2009	2014	2009	2014	2009	2014			
Agriculture	2.7	4.6	38.6	48.8	15	9	0.8	0.6	-2.9%	1.0%	-1.9%
Industries	0.6	0.7	8.5	7.8	56	44	2.9	3.0	-1.2%	-0.4%	-1.5%
Services	3.8	4.1	52.9	43.4	16	17	0.8	1.1	0.3%	-1.8%	-1.5%
Total	7.1	9.5	100.0	100.0	19	15	1.0	1.0	-3.8%	-1.2%	-4.9%

Source: Own calculations based on NHBS 2009, NHBPS 2014/15, and CBoS (2015, 2010). Note: Calculations based on the decomposition proposed by McMillan and Rodrik (2014).

⁴¹ The numbers reported here are a low estimate as employed workers that could not be assigned to a sector were discarded. This results in a upward bias in the estimate of labor productivity. The focus should be on trends, not levels.

174. **Between 2009 and 2014, real labor productivity in Sudan decreased at an average annual rate of 4.9 percent.** Average labor productivity, the ratio of real value added to employment, fell in Sudan between 2009 and 2014 at an annual average rate of 4.9 percent. Given moderate growth in real GDP, this suggests higher employment-to-population rates, an issue that is discussed in more depth in the next section.

175. **Falling labor productivity is attributable to declining labor productivity in agriculture and industries, as well as a drop in the share of workers employed in services.**⁴² To understand falling labor productivity, the total change was decomposed into its sectoral contributions as well as within sector productivity growth and movements of workers between sectors. The findings suggest that falling labor productivity in agriculture – by around ten percent per year – explains a large share of the drop in economywide labor productivity. Labor productivity also declined in industries, although less so than in the economy as a whole. Finally, the shift out of services, which had above-economywide labor productivity in 2014, and into agriculture, which is the least productive sector, played a significant role.

Labor force participation and employment

176. **Employment and labor force participation increased.** The economy added 2.5 million jobs between 2009 and 2014 while the working-age population increased by around 2.8 million and the active population by 2.6 million. As a result, labor force participation and employment as a share of the working-age population increased by more than five percentage points. The unemployment rate declined from 12.5 percent⁴³ in 2009 to 11.3 percent in 2014 (Table 16).⁴⁴ The broad unemployment rate, which includes working-age individuals that are not actively seeking work because of discouragement in both the numerator and the denominator, declined by 2.4 percentage points. The share of working-age individuals that have given up actively looking for employment has remained nearly unchanged at 5.6 percent.

Table 16: Basic labor market indicators, 2009 and 2014.

	2009	2014	Difference	p-value
Unemployment rate	12.5%	11.3%	-1.2%	0.141
Broad unemployment rate	19.3%	16.9%	-2.4%	0.008
Employment to working-age population	42.2%	47.4%	5.2%	0.000
Labor force participation	48.3%	53.5%	5.2%	0.000
Working-age population to total population	53.5%	53.3%	-0.2%	0.656

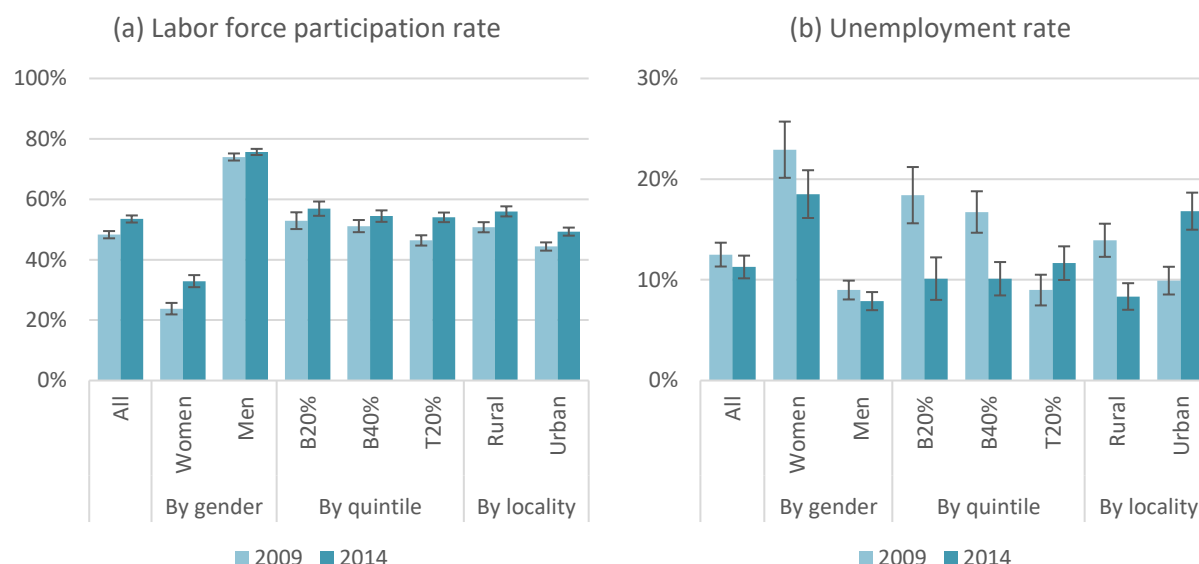
Source: Own calculations based on NBHS 2009 and NHBPS 2014. The working-age population is defined as all individuals between the ages of 15 and 64.

⁴² The first round of the 2014/15 survey was conducted at the end of 2014 during the height of the harvesting seasons of the 2014/15 agricultural season. Agricultural value added is higher in 2015 compared to 2014 (SDG9.9 million vs SDG8.3 million), which may partly reflect marketing of the 2014/15 harvest at the beginning of the year. Also, industrial value added is lower (6.6 vs 6.7) and service sector value added is higher (16.5 vs 14.0). Combining employment data from the 2014/15 survey with value added reported for 2015, labor productivity in agriculture is still found to have fallen by ten percent per year. But because of large employment shares of the primary and tertiary sectors, overall labor productivity increases to negative two percent, with two thirds explained by falling labor productivity in industries.

⁴³ There are minor discrepancies in these numbers with a previous report on poverty and employment in Sudan which reported an unemployment rate of 12.7 percent and a broad unemployment rate of 19.5 percent. There are no discrepancies in the other indicators.

⁴⁴ There are differences in the design of the labor modules between the two surveys: first, the recall period changed from seven days in 2009 to ten days in 2014. Second, the order in which questions were asked changed, with implications for skipping patterns.

Figure 65: Labor force participation rates and unemployment rate by gender, quintile, locality, and year.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

177. **Unemployment decreased among the bottom-40 and increased among the top-40 percent.** The overall decrease in unemployment hides large shifts across quintiles of the expenditure distribution and across localities (Figure 65b). Among the poorest 20 percent of the population, unemployment dropped by 45 percent, from 18.4 percent in 2009 to only 10.1 percent in 2014. On the other end of the distribution, among the top-20 percent, the unemployment rate increased by about 30 percent, from 9.0 to 11.7 percent. Unemployment is higher in urban areas than in rural areas, a reversal of the pattern observed in 2009. Trends are qualitatively similar when the broader definition of the unemployment rate is used.

178. **The increase in labor force participation mostly resulted from women entering the labor force.** More than half of the jobs added between 2009 and 2014 were filled by women. Labor force participation among women increased by close to ten percentage points yet only by a little less than two percentage points among men (Figure 65a), an increase that is evident for both rural and urban areas and in all regions (Table 17). Unemployment and broad unemployment decreased by four and seven percentage points for women but only by one and two percentage points among men.

179. **Nevertheless, gender gaps in labor market outcomes remain staggering.** There are many legal obstacles to women's economic activities in Sudan: women cannot in the same way as men work the same night hours, perform jobs deemed hazardous, arduous, or morally inappropriate, perform the same tasks or work in the same industries (World Bank, 2018). Only one in every three working-age women are either employed or actively seeking employment, compared to three in four men. While rural areas tend to have higher rates of female labor force participation, low rates of participation are found especially in more rural states in the vicinity of Khartoum: Northern, Eastern, and Central region all had female labor force participation rates below 20 percent. In contrast, more than half of all working-age women in Darfur and Kordofan were economically active in 2014 (Table 17). Yet despite much lower participation rates, working-age women were about as likely as men to be unemployed.

Table 17: Select labor market indicators by rural/urban and region, 2009 and 2014.

	Unemployment rate		Youth unemployment rate		Labor force participation		Female labor force participation	
	2009	2014	2009	2014	2009	2014	2009	2014
<i>(a) All Sudan</i>								
Sudan	12.5%	11.3%	20.2%	22.3%	48.3%	53.5%	23.8%	32.9%
<i>(b) By rural/urban</i>								
Rural	13.9%	8.3%	20.4%	15.6%	50.7%	56.0%	26.8%	35.4%
Urban	9.9%	16.8%	19.7%	39.3%	44.4%	49.3%	18.9%	28.8%
<i>(c) By region</i>								
Northern	10.1%	16.6%	22.4%	38.5%	41.3%	46.7%	9.7%	16.7%
Eastern	9.0%	7.1%	17.5%	14.8%	43.2%	47.0%	8.3%	16.3%
Khartoum	8.8%	16.6%	18.0%	41.7%	41.8%	46.2%	15.4%	25.1%
Central	7.8%	15.1%	14.3%	30.6%	45.1%	47.5%	16.6%	18.8%
Kordofan	21.1%	7.2%	26.4%	14.0%	62.7%	64.3%	47.1%	51.0%
Darfur	16.9%	7.8%	22.9%	13.0%	56.4%	67.9%	42.2%	61.9%

Source: Own calculations based on NBHS 2009 and NHBPS 2014/15.

180. **The geographic distribution of unemployment reversed itself between 2009 and 2014:** unemployment rates appear to be very low in 2014 in Darfur and Kordofan and high in Khartoum, Northern, and Central region. There is considerable regional variation in labor market trends. Unemployment increased chiefly in Sudan's Northern region, in Khartoum, and in its Central region and decreased markedly in Kordofan and Darfur (and to a lesser extent in Eastern Sudan). A similar region pattern is evident only for youth unemployment. While the former regions had far lower unemployment rates than Kordofan and Darfur in 2009, by 2014, they had the highest unemployment rates in the country (Table 17). Labor force participation rates, on the other hand, increased in all regions. But while the labor force participation rate increased by 11.5 percentage points in Darfur, the indicator increased only by 1.6 percentage points in Kordofan. One interpretation is that increasing supply was matched by increasing demand particularly in Kordofan and Darfur (with Eastern Sudan an intermediate case).

Table 18: Determinants of labor market participation and employment among working-age adults, 2009-2014 (results from linear probability models).

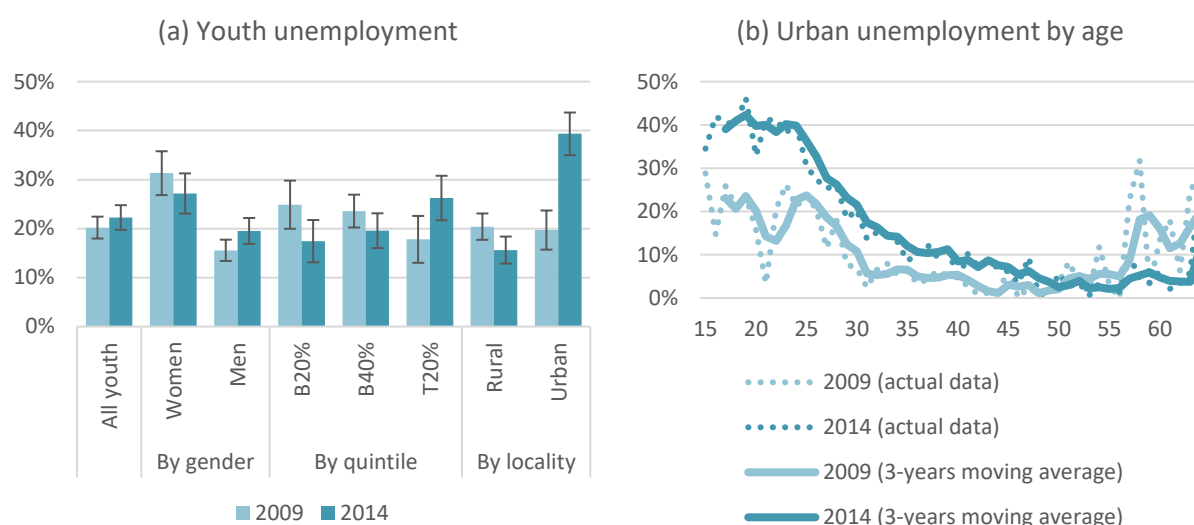
	(1) Economically active		(2)		(3) Employed		(4)	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Age	0.05***	(0.00)	0.05***	(0.00)	0.02***	(0.00)	0.02***	(0.00)
Age squared	-0.00***	(0.00)	-0.00***	(0.00)	-0.00***	(0.00)	-0.00***	(0.00)
Female	-0.46***	(0.01)	-0.49***	(0.01)	-0.11***	(0.01)	-0.13***	(0.01)
Rural	0.07***	(0.01)	0.08***	(0.01)	0.05***	(0.01)	-0.02**	(0.01)
Year: 2014	0.05***	(0.01)	0.02*	(0.01)	0.02**	(0.01)	-0.04***	(0.01)
Female & 2014			0.07***	(0.02)			-0.06***	(0.02)
Rural & 2014			-0.01	(0.02)			0.07***	(0.01)
Rural & female & 2014			0.01	(0.02)			0.14***	(0.02)
Constant	-0.29***	(0.02)	-0.29***	(0.02)	0.51***	(0.03)	0.55***	(0.03)
N	62,009		62,009		32,705		32,705	
R-squared	0.31		0.31		0.06		0.08	

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses.

181. **There is suggestive evidence that increases in employment are seasonal rather than structural.** As discussed previously, the 2009 data were collected in May at the beginning of the lean season while

the first round of the 2014/15 data were collected in November during the main harvest season. This suggests that some features of the observed changes in employment patterns, a reduction in unemployment among women, the poor, and in rural areas, is seasonal rather than structural. While the increase in labor force participation between 2009 and 2014 does not vary significantly by locality, the increase in employment is driven by women in rural areas. Active working-age women in urban areas, by contrast, became almost ten percentage points less likely to be in employment (Table 18).

Figure 66: Youth unemployment rate by gender, quintile, locality, and year, and unemployment rate by age in urban areas.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated in panel (a).

182. **Youth unemployment increased sharply in urban areas.** Youth unemployment increased by about two percentage points between 2009 and 2014, from 20.2 to 22.2 percent, and patterns of changes across the consumption distribution appear similar to those for unemployment rates among all working-age adults (Figure 66a). But the increase among urban youth is more pronounced than among urban Sudanese in general. Urban youth unemployment almost reached 40 percent in 2014, up from only around 20 percent in 2009. While unemployment rates increased for almost all urban workers below the age of 50, they increased more moderately for those between 25 and 50 (Figure 66b).

Table 19: Relationship between moderate poverty (measured using the \$3.20-line) and head's employment status, 2014 (linear probability estimates).

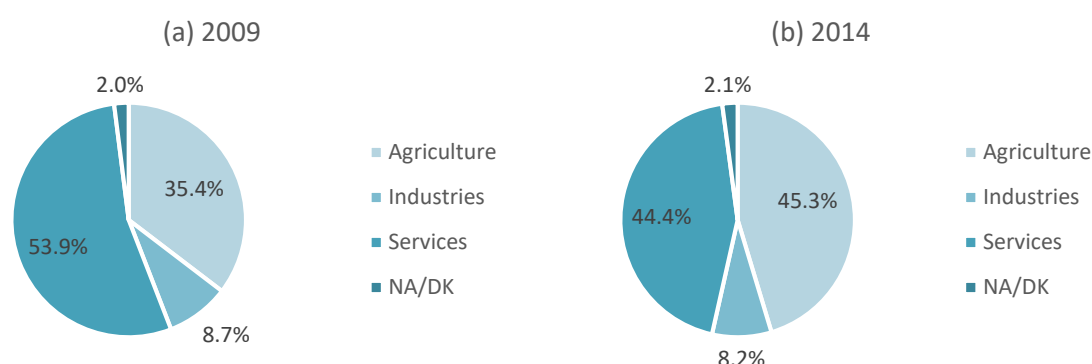
	(1) All	(2) Rural	(3) Urban
Age	-0.01*** (0.00)	-0.00 (0.00)	-0.01** (0.00)
Age squared	0.00** (0.00)	0.00 (0.00)	0.00 (0.00)
Female	0.07*** (0.02)	0.10*** (0.02)	0.05 (0.03)
Log household size	0.44*** (0.01)	0.41*** (0.02)	0.49*** (0.02)
Employer	-0.07*** (0.02)	-0.09*** (0.03)	-0.05* (0.03)
Own-account worker	0.02 (0.02)	-0.00 (0.02)	0.02 (0.03)
Unemployed	0.09** (0.04)	0.05 (0.05)	0.15*** (0.06)
Economically inactive	-0.07*** (0.02)	-0.07** (0.03)	-0.05 (0.03)
Other	0.01 (0.05)	0.01 (0.05)	-0.05 (0.07)
Constant	-0.15** (0.06)	-0.15** (0.07)	-0.24** (0.11)
N	11,953	8,361	3,592
R-squared	0.13	0.12	0.16

Source: Own calculations based on NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses. The excluded type-of-worker category is paid employee.

183. **Unemployment of the household head is associated with higher poverty rates in urban areas.** Across the population and conditional on household characteristics, unemployment of the household head⁴⁵ is associated with nine-percentage point higher incidence of moderate poverty and a seven-percentage point higher incidence of extreme poverty (Table 19). These effects are more pronounced in urban areas, where unemployment of the household head is associated with a 15-percentage point higher likelihood of being moderately poor.

Employment trends by sector

Figure 67: Share of working-age employed by main economic activity, 2009 and 2014.



Source: Own calculations based on NBHS 2009 and NHBPS 2014/15.

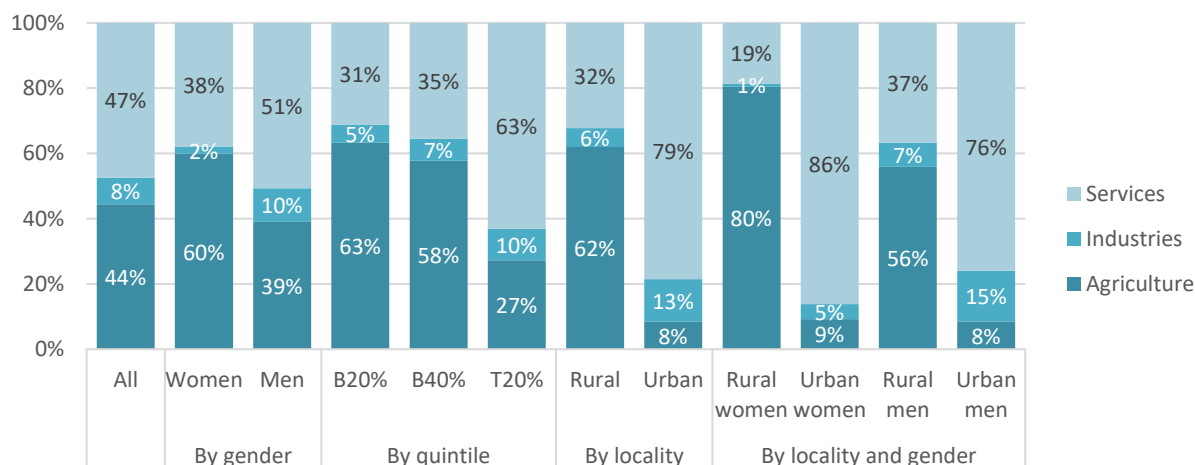
184. **The total number and the share of working-age individuals employed in agriculture was higher in 2014.**⁴⁶ Out of the 2.5 million additional jobs created between 2009 and 2014, 1.9 million, more than

⁴⁵ However, unemployment among household heads in urban areas was at very low levels in 2014 (around three percent) and did not increase between 2009 and 2014. This is in line with the notion that rising unemployment is primarily a problem among youth.

⁴⁶ Shares differ from those reported Table 15; estimates are restricted to working-age employees and include a non-response category.

three fourths, were added in agriculture. Services and industries added only about 356,000 and 135,830 with the remainder unclassified. As a result, the share of agricultural workers has increased by more than ten percentage points between 2009 and 2014, largely at the expense of the services sector (Figure 67).

Figure 68: Employment shares by sector, gender, quintile, and locality, 2014.

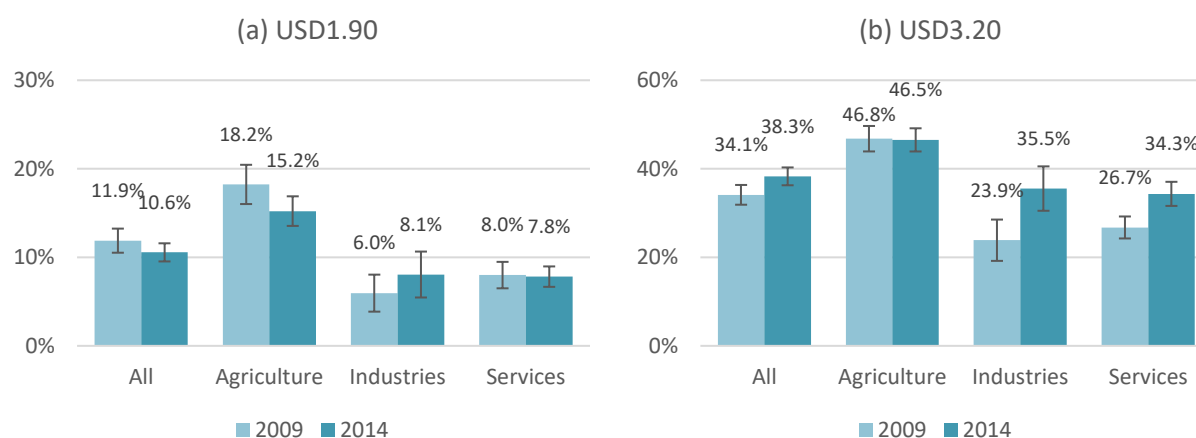


Source: Own calculations based on NHBPS 2014/15.

185. Employment in agriculture is more common among women, among the poor, and in rural areas.

Only eight percent of all employment in Sudan is in industries while 47 and 44 percent of employment is in agriculture and services, respectively (Figure 68). Agriculture accounts for 60 percent of employment among women but only 39 percent among men. It is also more common among the poor, with a share of 58 percent among the bottom-40 percent yet a share of 27 percent among the top-20 percent. Jobs in industries are heavily male-dominated while employment among women is largely restricted to the agricultural sector in rural areas and to services in urban areas.

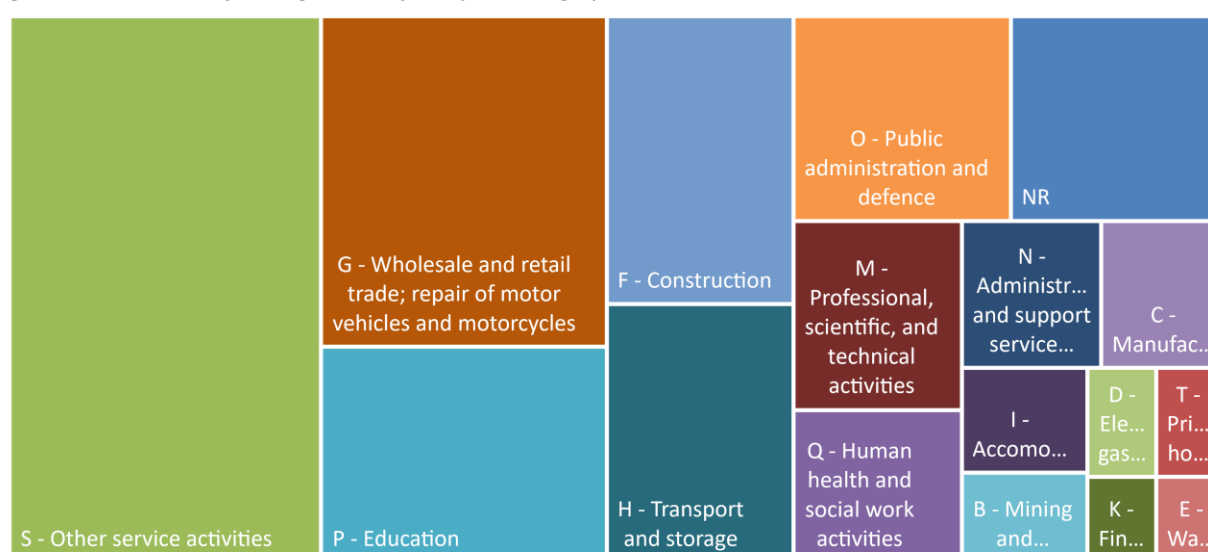
Figure 69: Poverty incidence by sector of employment, working-age population, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

186. **Employment in agriculture is associated with a higher likelihood of being poor, but the difference in poverty in agriculture vis-à-vis industries and services of the economy has declined.** The incidence of extreme poverty among Sudanese employed in agriculture in 2014 was 18.9 percent, compared to 10.4 and 10.0 percent in industries and services, respectively (Figure 69a). The incidence of moderate poverty among Sudanese employed in agriculture was 54.3 percent in 2014 – also much higher than in industries (44.1 percent) and services (41.7) (Figure 69b). But extreme poverty declined among households with heads employed in agriculture while it increased among households whose heads were employed in industries. Moderate poverty remained almost unchanged among agricultural workers but increased in both industries and services. Unsurprisingly, given the importance of agriculture and services for employment in rural and urban Sudan, respectively, changes reflect those documented for poverty by locality.

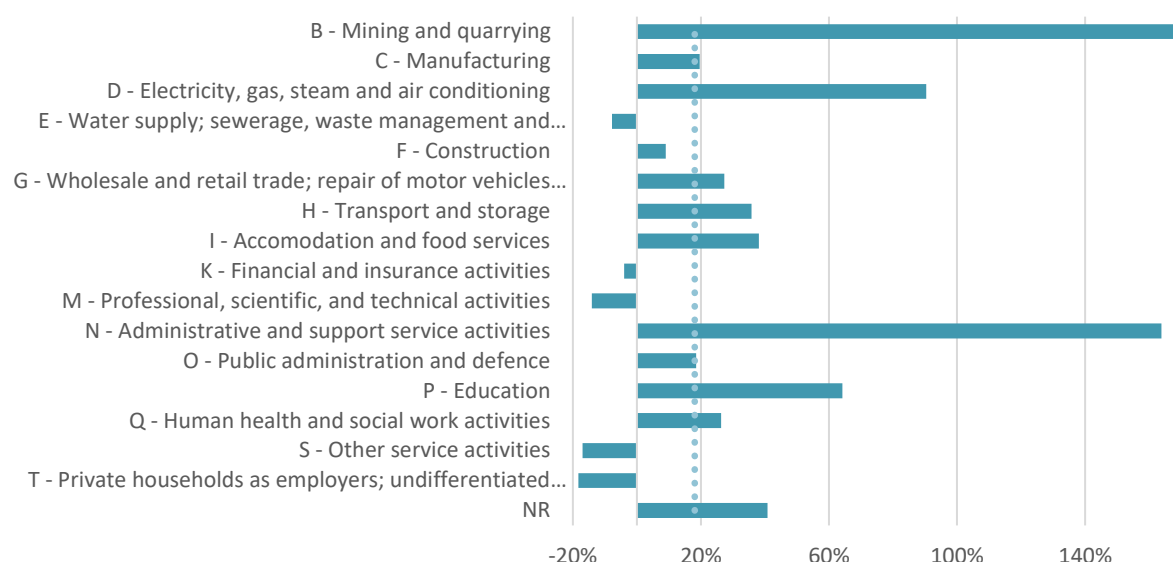
Figure 70: Distribution of non-agricultural jobs by ISIC category, 2014.



Source: Own calculations based on NHBPS 2014. Note: Jobs that accounted for fewer than one percent of non-agricultural employment in 2014 are subsumed in the "Other/NR" category.

187. **Non-agricultural jobs are often in services, particularly 'other service activities,' a residual category; the share of manufacturing in total employment in 2014 was negligible.** Jobs in the residual services sector accounted for one fourth of all employment outside of agriculture – 1.3 million jobs. Wholesale and retail trade and education account for significant shares – 14.2 and 9.3 percent or about 730,000 and 475,000 jobs, respectively. All other categories account for fewer than 500,000 jobs each, with construction (425,000), transport and storage (372,000), and public administration and defence (344,000) the most important. Only around 140,000 Sudanese are employed in manufacturing, a sector that is often seen as having ample potential for growth in labor productivity (Figure 70).

Figure 71: Changes in number of non-agricultural jobs by sector, 2009-2014.



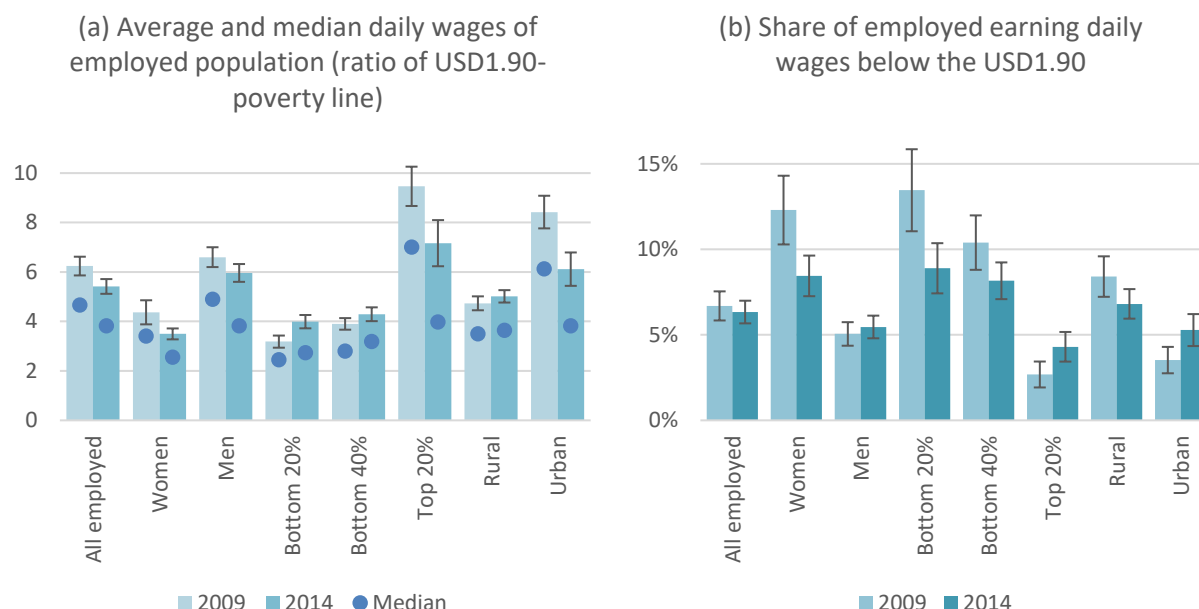
Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: The dotted line indicates growth in the working-age population. Jobs that accounted for fewer than one percent of non-agricultural employment in 2014 are subsumed in the "Other/NR" category.

188. Job growth outside of agriculture was pronounced in mining and quarrying and in administrative and support service activities. Between 2009 and 2014, job growth in mining and quarrying, the sector that would typically both encompass oil and gold production (see below), and administrative and support services was more than 160 percent, compared to an increase in the working-age population by around 18 percent. But real wages in both these sectors have declined significantly over time (see below). Electricity, gas, steam, and air conditioning and the education sector have also expanded their employment share relative to the working-age population and so have the wholesale and retail sectors, transportation, hospitality services, human health and social work activities, as well as the residual category. Growth in construction jobs has not kept up with growth in the working age population. Worryingly, the total number of individuals employed in professional, scientific, and technical activities has declined. This is also true for water supply, sewerage, waste management, and remediation activities, financial and insurance activities, other service activities, and private households as employers.

Wages

189. Wages are a key determinant of poverty. Next to the availability of regular employment, the level and distribution of wages among the employed will be a key determinant of poverty and inequality. In addition, trends in wages by economic sector sheds light on the economic consequences of the end of Sudan's oil economy and recent adjustment measures.

Figure 72: Daily average and median wages among the employed and share of employed earning wages below the \$1.90-poverty line by gender, quintile, locality, and year.

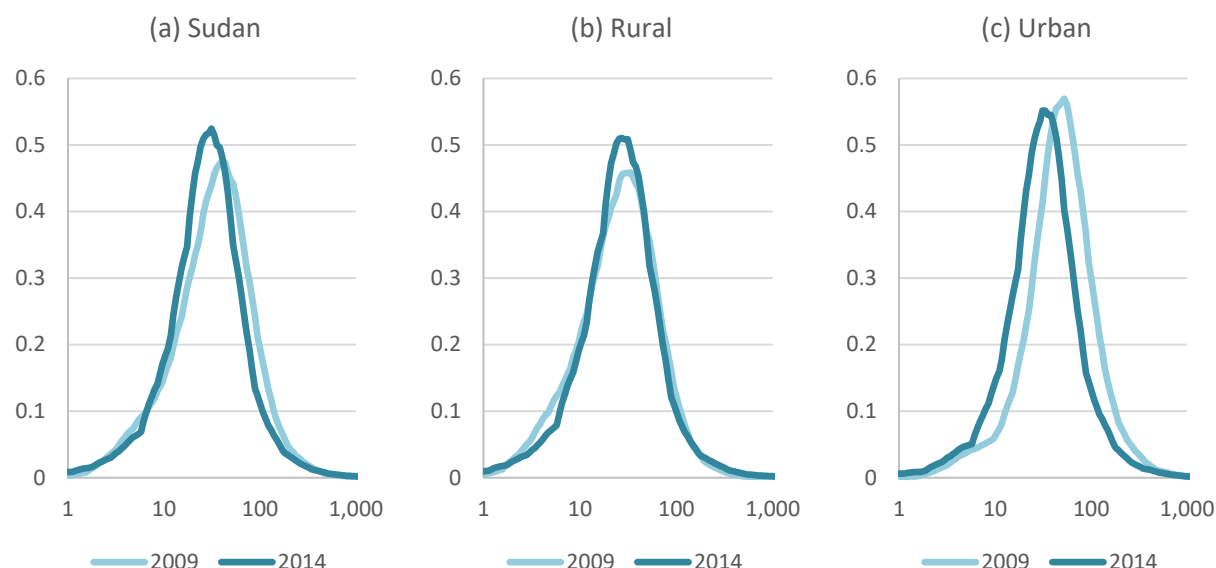


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

190. While real wages declined markedly in-between surveys, a relatively small fraction of wage recipients receive wages below the poverty line. Between May 2009 and November 2014, average and median real daily wages declined by about 15 and 22 percent, respectively (Figure 72a). However, the median daily wage in 2014 was still around 3.8 times what would be required to be non-poor by the USD1.90-standard. Even among the poorest quintile in 2014, only 8.9 percent earned below-poverty line wages (Figure 72b).

191. The decrease in real wages was more pronounced among women and the better-off. While men's average wages declined by 10.7 percent, women's declined by more than one third. It is important to interpret these changes in conjunction with increasing labor force participation and employment among women: an increase in the labor supply among women, particularly through greater participation in low-productivity activities such as agriculture, would be expected to result in a decrease in wages. Wages decreased more drastically at the top end of the welfare distribution. In fact, they increased among the bottom-40 percent.

Figure 73: Kernel density estimates of the distribution of daily real wages by rural/urban, 2009 and 2014.

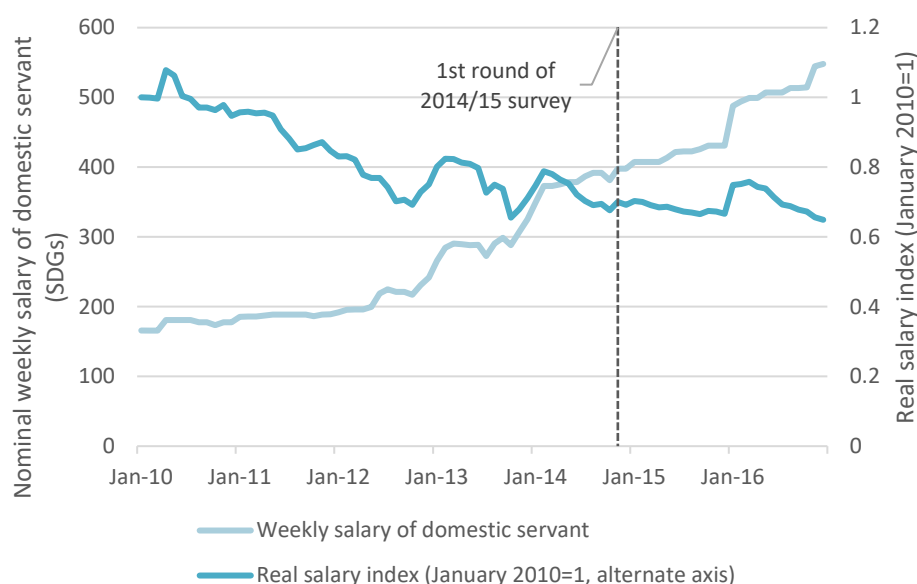


Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

192. **Wage inequality declined by most measures.** Visual inspection of the distribution of real wages in 2009 and 2014 (Figure 73a) suggest that the lower quintiles held up well while upper quintiles saw falling real wages. This suggests that wage inequality should have been falling, an interpretation that is also borne out by most measures of inequality: for instance, while daily wages at the 90th percentile in 2009 were 11.4 times higher than at the 10th percentile, they were only 7.1 times higher in 2014. The Gini index, on the other hand, indicates an increase in wage inequality from 0.466 to 0.483.

193. **The decline in wages was more pronounced in urban areas, in line with changes in the geographic distribution of poverty.** The analysis of the distribution of wages in rural and urban areas separately provides additional insights. Average real wages in rural areas increased, albeit only by a modest 6.6 percent (Figure 72a and Figure 73b), while those in urban areas decline by 24 percent. In other words, the decline in the real wage is driven entirely by falling wages in urban areas. In addition, real wages declined across the entire distribution in urban areas (Figure 73c). Both findings confirm those reported earlier regarding trends in household incomes, in which wages and salaries have the largest share (chapter III).

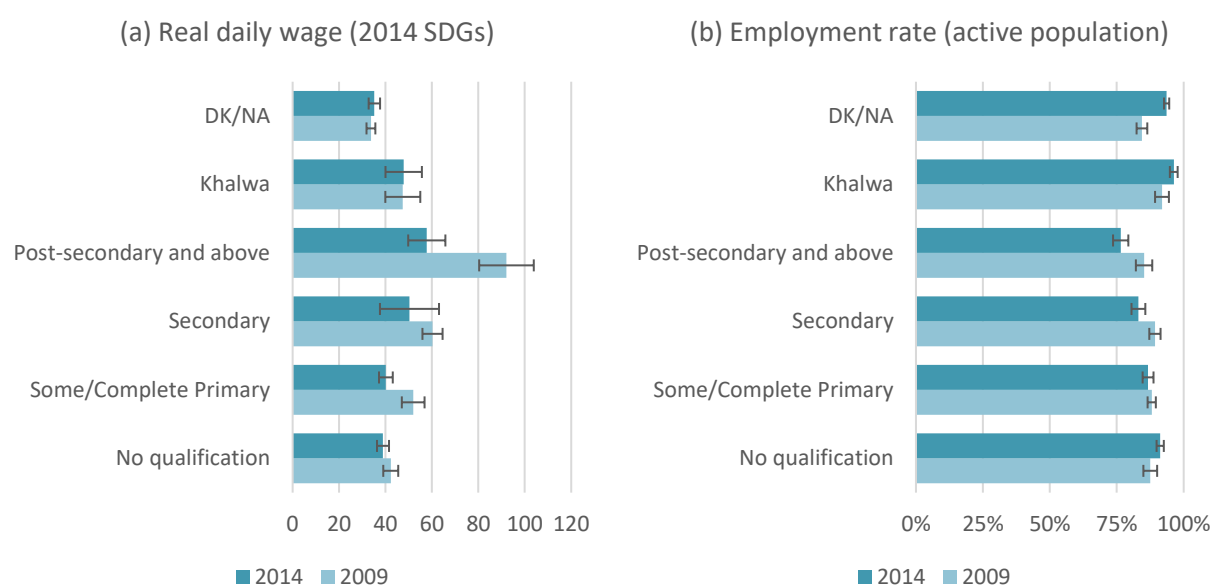
Figure 74: Nominal weekly salary and real salary of a domestic servant, January 2010 to December 2016.



Source: Own calculations based on CBS data.

194. **CPI data provide additional evidence for a decrease in real wages.** One item included in the monthly data collection effort for the construction of CBS' CPI series are weekly wages of domestic servants. The series shows that while nominal wages of this type of worker increased by a factor of about 2.4, average real wages declined by around 30 percent between January 2010 and November 2014 or 8.7 percent annually (Figure 74).

Figure 75: Real daily wage and employment rate and educational attainment, 2009 and 2014.

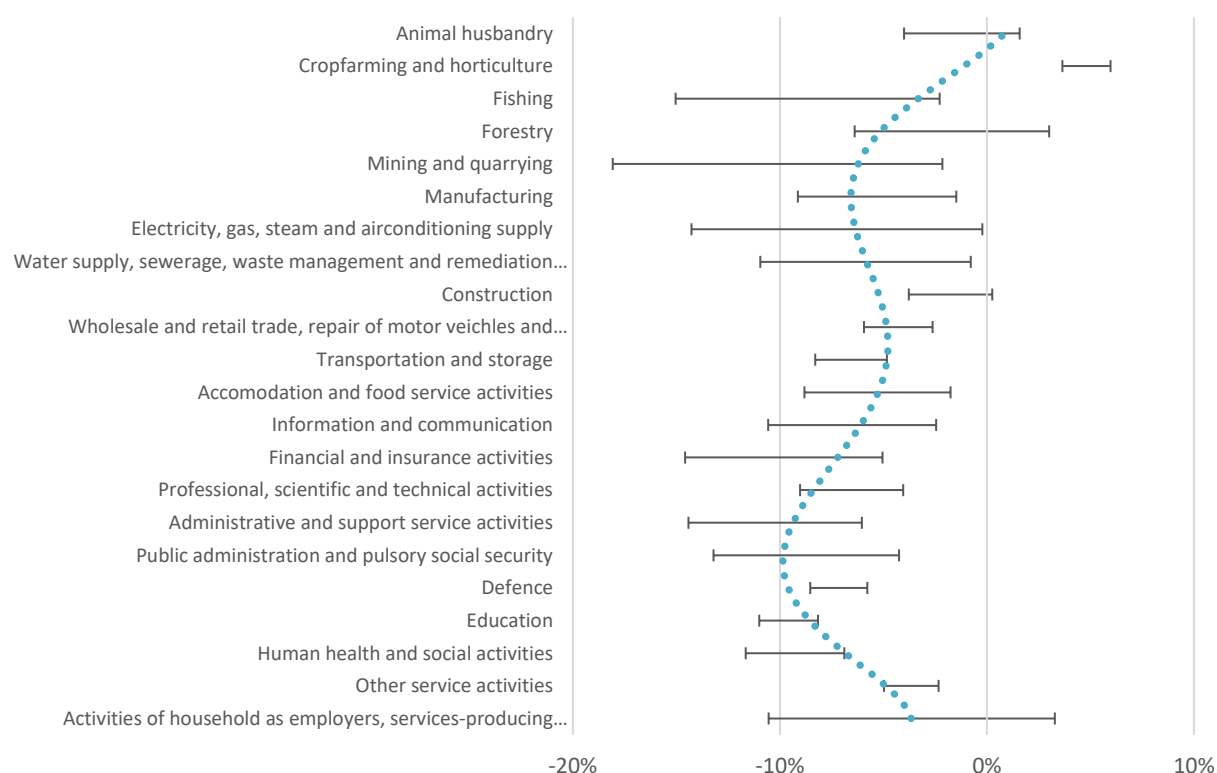


Source: Own calculations based on NBHS 2009 and NHBPS 2014. 95-percent confidence intervals are indicated.

195. **Returns to secondary education and higher levels of educational attainment are substantial; however, they have fallen between 2009 and 2014.** Conditional on age and gender, daily wages in 2014 were 10.5 percent higher for those with secondary education and more than 40 percent higher for those with post-secondary education vis-à-vis Sudanese with no qualifications. Interestingly, they were around six percent *lower* for individuals with some primary or completed primary. Those who attended only *Khalwa* and those who did not respond to the question earned lower daily wages than those who reported having no qualifications at all, by ten and 17 percent, respectively. This pattern constitutes a departure from returns to education in 2009 when workers with post-secondary earned daily wages more than twice as high as those with no qualifications and those with at least some primary still earned 16 percent more (Table 33).

196. **Educated Sudanese became less likely to be employed.** While there were no discernable differences in the probability of being employed in 2009 between workers with different levels of educational attainment, educated Sudanese were less likely to be employed in 2014. Changes in the probability of being employed reflect changes in labor market conditions, with fewer employment opportunities for those with higher educational attainment. For instance, the probability of being employed dropped by five, ten, and 16 percentage points for those with at least some primary, those with secondary, and those with post-secondary education, respectively (Table 33).

Figure 76: Annualized change in average real daily wages by sector, May 2009 to November 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 90-percent confidence intervals indicated. See text for more details.

197. **Real wages⁴⁷ declined in most sectors, particularly in those linked to oil production and sectors in which the share of civil-servants is presumably high.⁴⁸** Only crop-farming households have seen a significant increase in their daily wages (by about 4.8 percent on an annual basis) between May 2009 and November 2014 (Figure 76).⁴⁹ In most other sector, wages have declined, often significantly. Among the ten sectors which saw the largest annual declines are five that are likely to be associated with public: administrative and support service activities (-10.2 percent per year), education (-9.6), human health and social activities (-9.3) public administration and pulsory social services, and defense (-7.2). Other sectors with large wage declines include mining and quarrying (-10.1 percent) and transportation and storage (-6.6), both sectors that are likely to have seen falling productivity after the end of the oil economy.

Mining and quarrying: the decline oil and the rise of gold mining

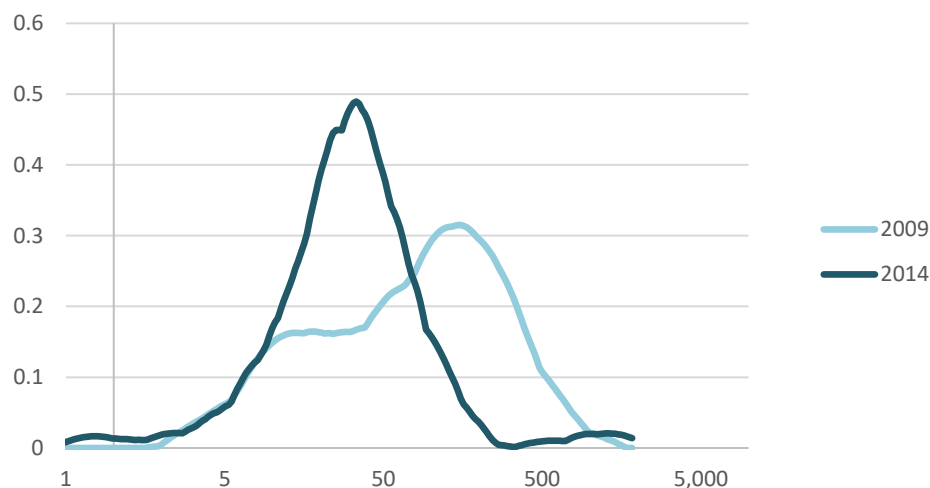
198. **While oil production declined with the secession of South Sudan, gold mining has become an important economic activity.** The decline in oil production and related activities after the secession of the South Sudan was pointed out in chapter II. At the same time, however, gold output increased more than six-fold between 2009 and 2016, from 14.9 to 93.4 tons, rendering Sudan one of the third-largest gold producer on the continent after South Africa and Ghana. Gold exports, which accounted for one third of Sudan's total exports in 2015, have also become an important source of foreign currency. What were the distributional consequences of the end of the oil economy and the rise of gold mining? Workers in the survey cannot be directly linked to either of these activities as they both fall under mining and quarrying. Instead, this section studies changes in the characteristics of workers in mining and quarrying.

Figure 77: Kernel density estimates of daily wages (2014 SDGs) in mining and quarrying, 2009 and 2014

⁴⁷ The way in which pay was measured changed between surveys: in the 2009 survey, respondents were asked about payments received over the last month and the number of weeks they worked for these payments. In the 2014/15 survey, on the other hand, respondents were first asked whether they received payment, before they were asked about the value of the last payment in cash or kind and the number of days they worked (or expect to work) for this payment. A small number of respondents in 2009 reported working more than four weeks in a month, in which case it was assumed that they worked exactly four weeks.

⁴⁸ Estimates are obtained from Mincer-type OLS regressions with the log daily wage as the dependent variable and controlling for age, age squared, gender, locality, and education level of the respondent. Standard errors used to construct confidence intervals are clustered around the PSU-identifier. Only sectors in which in any given year more than 30 respondents reported wage income were considered. Outliers in terms of the log daily wage, defined as individuals that report a daily wage 3.5 times larger or smaller than the mean across both years, were not used in the estimation.

⁴⁹ This finding is at odds with falling labor productivity in agriculture. A seasonal upswing in demand for farm labor during the harvest season seems to be a plausible explanation for this discrepancy.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

199. **Despite the end of the oil economy in-between surveys, the mining sector has added jobs while real daily wages declined sharply.** As already noted above, employment in mining and quarrying increased while daily wages declined (although the point estimate is estimated with little precision). However, wages in mining were still about 50 percent above the average non-agricultural wage, their decline in the mining sector since 2009 was dramatic (Figure 76). Closer inspection of the distribution of real wages in the sector reveals two modes in 2009, with a larger cluster around a wage of SDG150 and a smaller cluster with a wage around SDG15. It seems plausible that the larger cluster on the right represents mostly well-paying jobs in the oil industry while the smaller cluster may already contain some workers involved in gold mining. By 2014, however, there were far fewer better-paying jobs in the sector, in line with a shift from jobs in the oil industry to jobs in gold mining and other more low-skilled jobs.

Table 20: Characteristics of workers in mining and quarrying, 2009 and 2014.

	2009	2014	Change (p.p.)	Significant?
Share in bottom 40%	8.5%	30.5%	22.0%	***
Per capita consumption	937.3	692.9	-244.4	*
Daily wage	125.4	63.7	-61.7	*
Share women	18.1%	5.8%	-12.2%	
Share with any formal education	78.2%	44.5%	-33.8%	***
Share of paid employees?	87.1%	66.1%	-20.9%	***
Share of own-account workers	10.9%	27.8%	17.0%	**
Share urban	61.9%	29.6%	-32.2%	**
Share in Khartoum	76.3%	15.6%	-60.7%	***
Share in Northern region	3.4%	29.9%	26.5%	***
Share in Kordofan region	9.9%	19.1%	9.2%	

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: *, **, and *** denote significance at the one-, five-, and ten-percent level.

200. **A large fraction of employment in gold mining is likely to have been in artisanal and small-scale gold mining.** Artisanal and small-scale gold mining has comparatively low entry costs, making it an attractive source of employment for the poor. Workers in the sector were more likely to be poor, male, and uneducated in 2014 compared to 2009. They were also more likely to be own-account workers and,

in 2014, to be in elementary occupations. Finally, jobs in mining shifted from urban areas, especially Khartoum, to the Northern region and, to a lesser extent, to Kordofan, regions that have known gold extraction sites. The finding sheds light on the drivers behind a sharp increase in poverty in Khartoum, where more than three fourths of the jobs in mining and quarrying were prior to the secession of the South.

201. **The rise of gold mining also brings with it economic and governance challenges, including questions about the sustainability of artisanal or traditional gold mining.** The recent expansion of gold production and exports constitutes a challenge to the recovery of the economy by raising the prospect of a renewed Dutch Disease, a drawing away of labor and capital from the production of goods that were significant in the 1990s. However, the scale of the sector is unlikely to rival that of the oil sector in its heyday and its fiscal impact may be substantially lower (World Bank, 2015). More worryingly, artisanal gold mining is not technically sustainable in the long term as operations quickly run out of exploitable gold.⁵⁰ The pace at which gold mining grew after 2011 and the largely unmanaged proliferation of traditional mining operations is bound to have generated multiple environmental and social challenges and some observers have voiced concerns over a lack of regulations and oversight (Schwartzstein & Cecco, 2015).⁵¹

202. **To conclude, falling demand for better-paid workers in Sudan in the wake of the secession of South Sudan has resulted in falling wages at the top-end of the distribution.** While employment has increased, particularly among women and in agriculture, most of the jobs generated were in agriculture and may result from an increase in seasonal demand. Declines in wages are particularly pronounced in sectors that tend to have a higher share of formal employment relationships and a higher share of public employment, pointing to lags in the adjustment of wages to rising price levels. Unemployment rates increased sharply in urban areas and among youth.

⁵⁰ In mid-2014, there was already evidence that output from artisanal mining had been falling. Such evidence includes abandoned mine sites, the presence of scavenging where more methodical mining had taken place previously, abandoned or under-used facilities at gold processing centers, and accounts by traders of falling activity, all of which were observed during a field visit in May 2014 and have been corroborated by others familiar with the sector (World Bank, 2015).

⁵¹ For instance, mercury is reportedly used in significant amounts in traditional gold mining, which has been identified as a serious health hazard, particularly for children (Bose-O'Reilly, et al., 2008).

VI. Shocks and Transfers

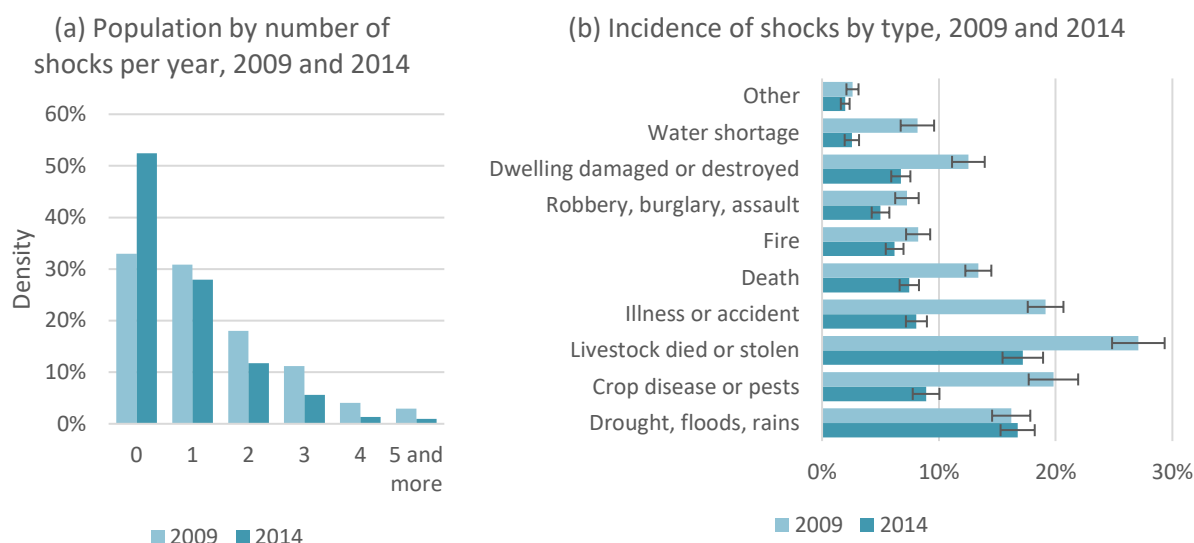
The chapter investigates the incidence of shocks and transfers over space and time at the time of the two latest surveys, May 2009 and November 2014. Self-reported shocks as recorded in the surveys may indicate protection needs. An understanding of the incidence of government and non-government transfers, on the other hand, may indicate the adequacy of households' ability to deal with shocks and, in the case of formal transfers programs, the efficacy of existing targeting mechanisms. There are several reservations when it comes to analysis based on self-reported shocks. For instance, the recall period of five years is rather long. This section highlights problems in the reported data on transfer receipts and urges to address these in future survey work in Sudan. Finally, it is noted that the nature of shocks households experienced and the availability and efficacy of formal transfers may have changed significantly since the end of 2014.

Shocks and coping strategies

203. **The most common shocks reported by households at the end of 2014 were livestock theft and extreme weather events.** Livestock theft and extreme weather events (such as droughts, flooding, or heavy rain) both account for around 20 percent of all shocks reported in 2014. Crop diseases or pests, illness, and the death of a household member all accounted for around ten percent of all shocks in 2014 while damaged or destroyed dwellings (8.3 percent); fires (7.4 percent); and robberies, theft, and burglaries (6.1 percent) accounted for smaller yet still significant shares of the total. Water shortages (other than droughts, presumably) rare in the years leading up to the 2014 survey, with only 3.5 percent of households stating that they have experienced a lack of access to water.

204. **The incidence of self-reported shocks decreased between 2009 and 2014.** In 2014, respondents on average reported 0.8 shocks over of the previous five years, down from 1.3 in 2009 (Figure 78a). Around one in three report no shock whatsoever, down from more than 50 percent in 2009. However, it is important to consider the shocks households are asked about in the survey in this case. For instance, the survey questionnaire captures several shocks related to agriculture and health, including occurrences of droughts, floods, and crop disease as well as illness, injury, and the death of household members. Yet shocks such as the loss of employment are not captured in either the 2009 or 2014 questionnaires. It is also worth pointing out that the recall period – at five years prior to the survey – is quite long and that this may interact with the difference in timing of the survey throughout the calendar year.

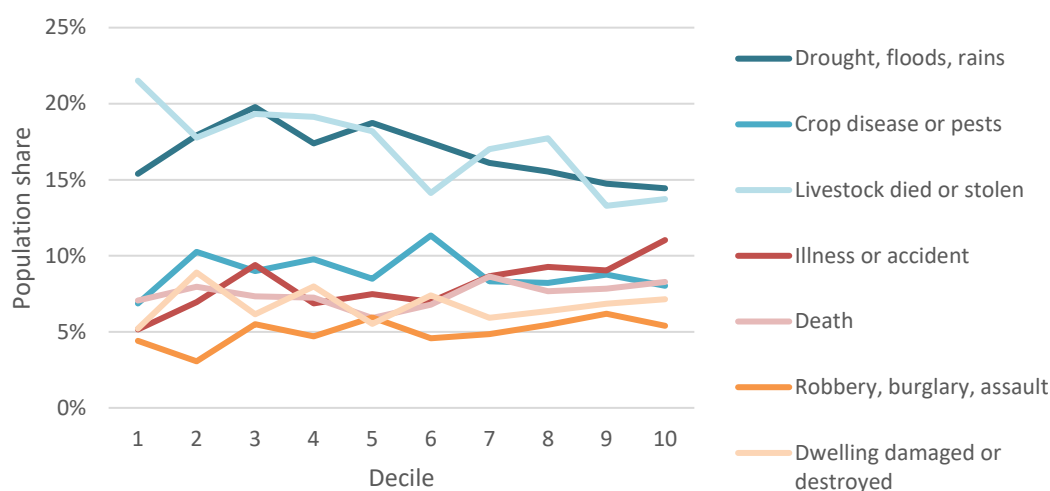
Figure 78: Number of shocks and incidence over the last five years by type of shock and year.



Source: Own calculations based on NBHS 2009 and NHBPS 2014. Note: 95-percent confidence intervals indicated in panel (b).

205. **Compared to 2009, respondents in 2014 report fewer health-related shocks, a lower incidence of water shortages, a decline in crop diseases, and fewer incidence of livestock loss.** The share of individuals that experienced illnesses or accidents in the household or the loss of a household member declined by 11.1 and 5.9 percentage points, respectively (Figure 78b). Only 2.6 percent of the population were affected by water shortages, down from 8.2 percent in 2009. Significant declines are also evident for livestock loss and crop diseases: while the former continues to be the most common shock reported – more than one in six Sudanese were affected in 2014 – the incidence of this type of shock declined by almost ten percentage points. Fewer than ten percent of the population were affected by crop diseases, down from close to 20 percent in 2009. On the other hand, one in six were affected by drought, floods, or rains, with no change compared to 2009.

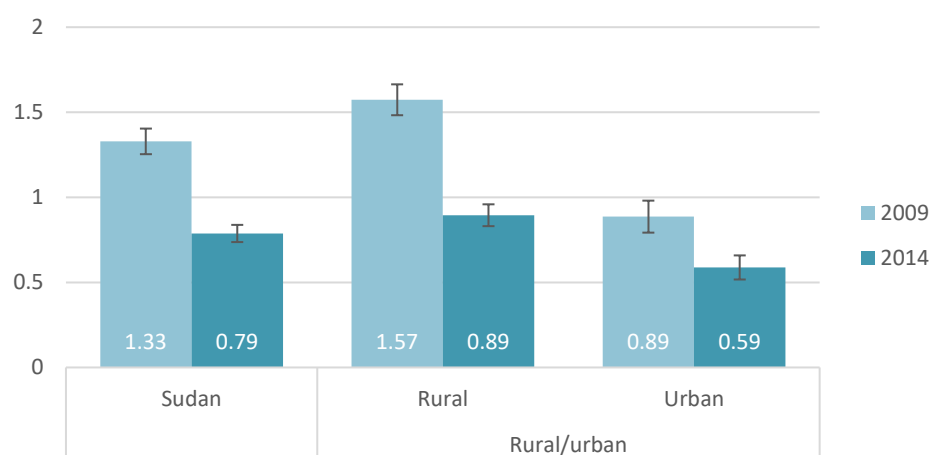
Figure 79: Incidence of self-reported shocks over the previous five years by decile, 2014.



Source: Own calculations based on NHBPS 2014/15.

206. **Overall, the number of shocks exhibits only limited variation across the consumption distribution.** The average number of shocks experienced by someone in the bottom decile of the distribution is almost the same as the average number by someone in the top decile: around 0.75 (Figure 79). Shocks are somewhat more common in the second, third, and fourth decile. But overall, there is only minor variation. This suggests that self-reported shocks may be rather subjectively assessed, which would indicate that the informative content of levels may be limited. However, it is still informative to compare trends over time.

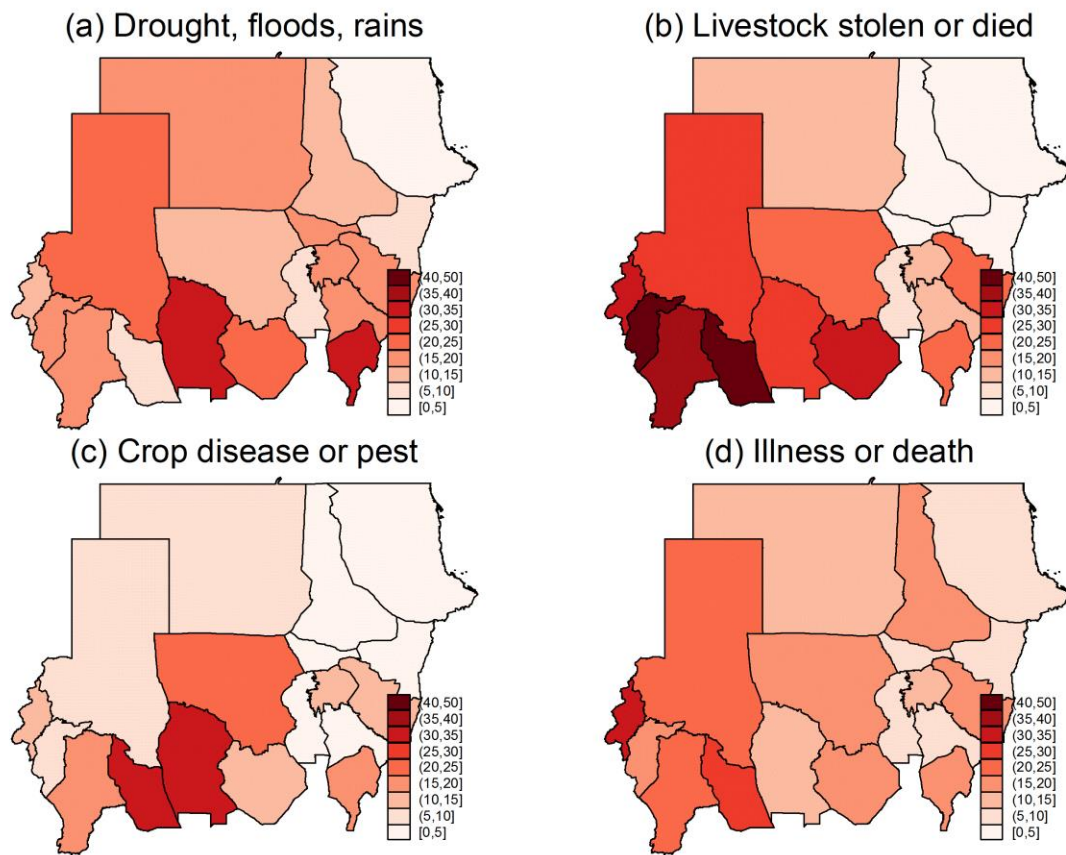
Figure 80: Average number of shocks by rural/urban and year.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

207. **Individuals in rural Sudan report more shocks than those in urban areas.** The average number of shocks household report dropped from 1.3 in 2009 to about 0.8 in 2014 (). Individuals in rural areas report a higher number of shocks in 2014 – 0.9 compared to 0.6 in urban areas. The drop in the average number shocks reported is evident in both rural and urban areas yet more pronounced in rural areas.

Figure 81: Share of individuals affected by shocks by state, 2014.



Source: Own calculations based on NHBPS 2014/15. Note: Illness and death are combined in this analysis.

208. **Shocks, especially shocks related to livestock loss, are more commonly reported by households in Kordofan and Darfur.** Almost half of all Sudanese (47.7 percent) have experienced some type of shock over the five-year period preceding the 2014 survey. Variation across states is pronounced, ranging from one in six in Red Sea state in the east to close to four out of five in South Kordofan. The incidence of shocks is generally elevated in Kordofan (ranging from 55 percent in North Kordofan to 80 percent in South Kordofan), in Darfur (ranging from 62 percent in North Darfur to 72 percent in East Darfur), in Blue Nile state (72 percent) and in Al-Gadarif (62 percent). A more disaggregated analysis suggests that the Kordofani and Darfuri states were more susceptible to livestock loss (Figure 81). The three states with the highest incidence of deaths or illness of family members are all in Darfur (West Darfur: 30.7 percent; East Darfur: 28.5 percent; and South Darfur: 24.5 percent). Blue Nile state and West Kordofan were heavily affected by extreme weather events while individuals in East Darfur and, again, West Kordofan were the most likely to be affected by crop disease or pests.

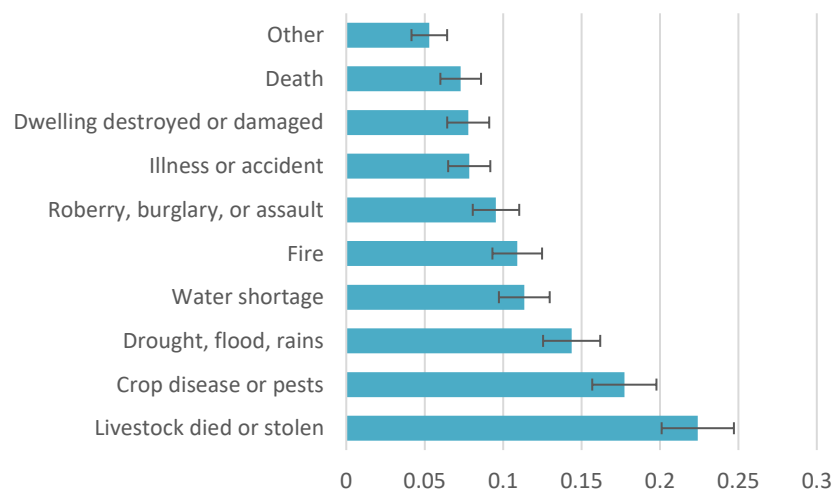
Table 21: Correlation matrix for the incidence of shocks, 2014.

	Drought, flood, rains	Crop disease or pest	Livestock died or stolen	Illness or accident	Death	Fire	Robbery, burglary, or assault	Dwelling destroyed or damaged	Water shortage	Other
Drought, flood, rains		0.14	0.15	0.08	0.06	0.05	0.05	0.10	0.13	0.03
Crop disease or pest	0.14		0.27	0.09	0.05	0.09	0.02	0.10	0.15	0.02
Livestock died or stolen	0.15	0.27		0.08	0.07	0.14	0.08	0.08	0.10	0.02
Illness or accident	0.08	0.09	0.08		0.07	0.07	0.06	0.06	0.09	0.02
Death	0.06	0.05	0.07	0.07		0.06	0.04	0.08	0.06	0.04
Fire	0.05	0.09	0.14	0.07	0.06		0.06	0.01	0.02	0.03
Robbery, burglary, or assault	0.05	0.02	0.08	0.06	0.04	0.06		0.04	0.04	0.02
Dwelling destroyed or damaged	0.10	0.10	0.08	0.06	0.08	0.01	0.04		0.10	0.02
Water shortage	0.13	0.15	0.10	0.09	0.06	0.02	0.04	0.10		0.08
Other	0.03	0.02	0.02	0.02	0.04	0.03	0.02	0.02	0.08	

Source: Own calculations based on NHBPS 2014/15. Note: The table reports Pearson correlation coefficients calculated at the household-level. The color code, from green to yellow to red, indicates increasing positive correlation between shocks.

209. **Agricultural shocks are correlated across types of shocks.** Households hit by one type of agricultural shock are more likely to also experience other shocks. This is particularly true for agricultural shocks, such as livestock loss and crop disease or pests (Table 21).

Figure 82: Intra-cluster correlation of shocks, 2014



Source: Own calculations based on NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

210. **Agricultural shocks also tend to be covariate shocks, i.e. correlated spatially.** An important consideration in the analysis of shocks is whether they are idiosyncratic, i.e. likely to be affecting only one household in a community at a time, or covariate, i.e. commonly experienced by several households in the same village or neighborhood. Households tend to be better able to self-insure against idiosyncratic shocks or to maintain informal insurance mechanisms at the village-level. Covariate shocks, however, restrict the number of coping mechanisms or informal insurance arrangement. Conditional on the intensity of the initial shock, households therefore often find it difficult to recover from covariate shocks. In Sudan (as in many other rural developing context), agricultural shocks tend to be covariate shocks, i.e., own shocks are positively correlated with shocks experienced by neighbors. This is particularly true for livestock loss but also for crop disease and pests and droughts, floods, and rains (Figure 82).

211. **The items recorded in the 2014/15 NHBPS focus on shocks in the domains of agriculture, natural disasters, conflict, and health; previous sections suggest that it may well be worth to include employment-related categories in future surveys.** The decline in the incidence of reported shocks, while positive, seems at odds with some findings in previous sections, particularly rising inflation and increasing poverty and unemployment rates in urban areas. An obvious reason for this is that the shock module of the 2014/15 survey is geared towards agricultural shocks (e.g., livestock and crop loss), natural disasters (drought and floods), health shocks (death, illness, and accidents), and conflict and crime (e.g., robberies, burglaries, and assaults). It does not cover non-agricultural economic shocks such as job loss, business failures, and large, unexpected price increases. It may be worth including items in this domain in future surveys (in addition to the domains included in 2014).

212. **To better understand welfare effects of shocks, it is paramount to understand households' strategies to cope with shocks once they materialize.** Coping strategies are strategies designed to relieve the impact of an adverse shock once it has occurred (Holzmann, Sherburne-Benz, & Tesliuc, 2003). The main forms of coping consist of individual dissaving, borrowing, or relying on public or private transfers. The government has an important role to play in helping people to cope (for example, when individuals or households have not been able to accumulate enough assets to handle repeated or catastrophic risks). The smallest income loss would make these people destitute and virtually unable to recover. The next subsection will investigate the adequacy of social assistance in Sudan in more detail.

Table 22: Incidence of coping strategies by wealth quintile, 2014.

Coping strategy	Bottom 40%	Top 60%	Difference	Significant?
Spent saving	17.9%	17.0%	0.9%	
Sent children to live with relatives	1.5%	1.3%	0.2%	
Sold assets	12.3%	12.4%	-0.2%	
Rent-out farm	0.7%	0.7%	0.0%	
Removed children from school	5.2%	4.2%	1.0%	
Increased labor supply	11.7%	9.7%	2.1%	*
Borrowed	11.8%	13.4%	-1.7%	
Received assistance from government, NGO, religious organization	1.4%	1.4%	0.1%	
Received help from family or friends	5.8%	6.1%	-0.4%	
Reduced consumption	12.3%	11.1%	1.2%	
Sought spiritual help	23.6%	21.2%	2.4%	

Other	18.5%	21.7%	-3.2%	**
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*Source: Own calculations based on NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Tests based on standard errors clustered at the PSU-level.*

213. **Sudanese households hit by shocks use a wide range of coping strategies.** The most common coping strategies among those hit by shocks are seeking of spiritual help (20.4 percent), dissaving (17.4), borrowing (12.8), asset sales (12.4), reduction of consumption (11.6), and increases in the labor supply (10.5). Among these, asset sales and reductions of consumption are strategies that are most likely to be associated with lower economic welfare in the future. The removal of children from schools, another in this category, is less common although not negligible (4.6 percent). The receipt of assistance from family and friends upon the realization of a shock (6.0 percent) is more than four times more common than the receipt of assistance from government agencies, NGOs, or religious organizations (1.4 percent).

214. **For most strategies, differences in the incidence between the bottom-40 percent and the top-60 percent are small and insignificant.** The bottom-40 percent (among those affected by shocks) are 2.1 percentage points more likely to increase their labor supply and 3.2 percent less likely to seek spiritual help than the top-60 percent. For all other categories, differences between these two groups are small and statistically insignificant (Table 22).

Social assistance and other transfers

215. **Social protection systems can help individuals and households cope with shocks, find jobs, improve productivity, invest in the health and education of their children, and protect vulnerable population groups.** Social protection systems include a wide range of policy instruments, including social assistance through cash and in-kind transfers, benefits and support for people of working age in case of maternity, disability, work injury, or job loss, and pensions for the elderly. Assistance may be provided through contributory social insurance, tax-funded social benefits, social assistance services, public works programs, and other schemes. Social protection systems have the potential to both alleviate poverty directly (e.g., through transfers targeted to the poor) (Fiszbein & Schady, 2009) and to trigger higher growth among the poor (e.g., by addressing market failures and encouraging asset accumulation) (Alderman & Yemtsov, 2013). Importantly, social protection measures can be a valuable tool in overcoming political constraints, for instance, by building public support for fuel subsidy reforms (Atansah, Khandan, Moss, Mukherjee, & Richmond, 2017).

216. **To mitigate the potentially negative effects of fiscal and subsidy reforms, the Social Initiatives Program (SIP) was created in 2011.** In its Interim Poverty Reduction Strategy Paper (2012), the GoS clearly recognizes that social safety nets are an important instrument for reducing poverty by including them as a strategic area. Created by presidential decree, the SIP is envisioned as a comprehensive set of social protection measures that aims to establish the foundation of a modern social protection system to help stabilize the country's response to shocks and alleviate poverty. The SIP targets poor households in all states and is managed by the Ministry of Welfare and Social Security (MoWSS) and financed through the Ministry of Finance and Economic Planning (MoFEP). The Poverty Reduction Coordination Center (PRCC) of the MoWSS manages the day-to-day operations of the program in collaboration with implementing agencies like the Zakat Chamber (for targeting, outreach, and some of the cash payments), the Savings and Social Development Bank (SSDB), SudaPost (for payments), and the National Health Insurance Fund

(NHIF) for provision of health insurance services. It has several components, including a cash transfer (CT) program that aims to provide financial support to poor households, free coverage of CT recipients under the National Health Insurance Fund (NHIF), and a range of smaller components aimed at pastoralists, women, and students in low-income households.

217. Coverage and transfer size of Sudan’s cash transfer (CT) program has increased significantly in recent years. In the period from 2011 to 2016, beneficiary coverage has expanded six-fold and cash payments have increased, in local currency, by 100 percent. In 2011, the CT component provided SDG 100 (US\$38.4) each month to 100,000 households; in 2016, the CT component provided SDG 150 (US\$25) each month to 600,000 households. A further monthly benefit increase of SDG 50 per household was introduced in May 2017, bringing the total monthly household benefit to SDG 200.

218. A 2014 World Bank report found that Sudan’s existing safety net programs at the time were limited in coverage and lacked proper coordination, monitoring, and evaluation. Notwithstanding efforts to expand and strengthen safety nets since 2011, a 2014 report found that the coverage of existing programs at the time was limited and that there were many evident overlaps between them due to a lack of coordination between government, semi-autonomous agencies (e.g. Zakat), and non-government actors (Kjellgren, Jones-Pauly, El-Tayeb Alyn, Tadesse, & Vermehren, 2014). It urged moving towards improved targeting, a unified beneficiary registry, efficient payment systems, and more transparent governance mechanisms.

219. Since 2016, the World Bank supports the MoWSS with technical assistance to strengthen the targeting and implementation of Sudan’s CT program. Since 2016, the World Bank supports reforms to improve the targeting and management of Sudan’s existing social protection and cash transfer schemes, with the aim to help cushion the negative effects of fiscal reforms on poor and vulnerable households.⁵² Starting from 2016, the Social Safety Net Project piloted a ‘Productive Safety Net’ approach in North Kordofan, providing access to livelihood opportunities for poor households.

Table 23: Transfer receipts (cash and in-kind combined) recorded in the NHBPS 2014/15.

Transfer type	Beneficiaries (share of population)	Share of GDP	Share of total household expenditure
Food aid	4.98%	0.02%	0.85%
Other government programs	2.40%	0.02%	0.52%
NGOs/charity	2.36%	0.01%	0.35%
Zakat chamber	4.49%	0.04%	1.47%
Other individuals outside the household	7.12%	0.54%	13.43%
Other groups	1.41%	0.03%	0.73%

Source: Own calculations based on NHBPS 2014/15 and WDI.

220. Receipts from transfer programs appear small and are very likely underreported in the survey. Survey estimates suggest that only 5.0, 2.4, 2.4, and 4.5 percent of the population received food aid, government programs, transfers from NGOs and charities, and from the Zakat chamber in either cash or in-kind, respectively (Table 23). These estimates are roughly in line with administrative data. For instance, the SIP reportedly covered 5.3 and 7.1 percent of the population in 2014 and 2015, respectively, similar

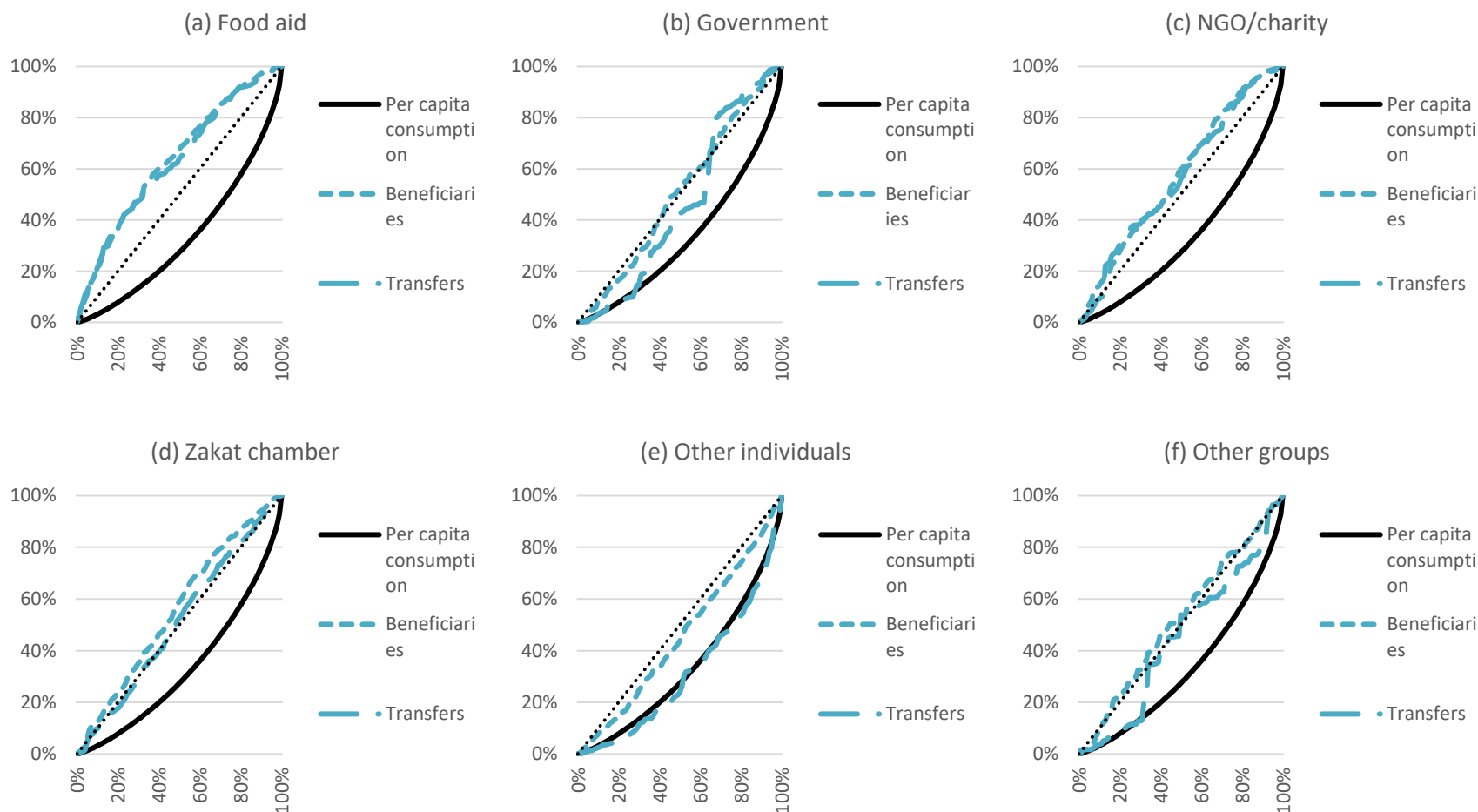
⁵² See <http://www.worldbank.org/en/news/press-release/2016/02/11/world-bank-launches-new-project-to-strengthen-sudans-social-protection-systems>.

to the combined coverage of government and Zakat transfers. But the size of these programs relative to GDP and as a share of household expenditure in 2014 appears very small. With a recall period of twelve months, one reason may be recall decay, the tendency of respondents to report smaller quantities with increasing time period over which quantities are recorded (Sudman & Bradburn, 1974). It may also be that respondents receive transfers frequently but that they are unable to calculate and report the sum of transfers over the course of a year. However, while the transfer amounts may be underreported, it may still be informative to compare characteristics of beneficiaries and non-beneficiaries to shed light on the adequacy of targeting of transfers at the end of 2014.

221. While food aid programs were reasonably targeted to the poor; government transfers, NGO/charity transfers, and Zakat transfers had comparatively low targeting accuracy. The bottom-40 percent accounted for around 60 percent of the recipients of food aid (Figure 83a). This compares to a share in consumption expenditure among this group of around 20 percent. Hence, food aid in Sudan is progressive and pro-poor. While pro-poor, other types of transfers lack targeting accuracy: the bottom-40 account only for 39.4, 45.5, and 46.5 percent of the beneficiaries of government programs, NGOs/charity transfers, and Zakat transfers, respectively (Figure 83b-e). To put this into perspective, it is useful to compare these results to those reported in a meta-study of 122 targeted anti-poverty interventions (Coady, Grosh, & Hoddinott, 2004). The study stipulates a standardized measure of targeting performance, the ratio of receipts accruing to the poorest x percent of the population (typically the poorest 20 or 40 percent) to what would have been expected under random targeting. Assuming that all beneficiaries of food aid, government, and Zakat transfers receive the same transfer amount, a conservative assumption given the estimated distribution of transfer amounts, the targeting performance would thus be calculated as 1.50, 0.99, and 1.16, respectively. This compares to a median targeting performance of 1.25 across 85 programs for which the measure can be calculated. The median program that relies on some form of individual assessment, 37 programs that rely on either means testing, proxy-means testing, or community assessments, is comparable to the targeting performance of food aid in Sudan, at 1.50.

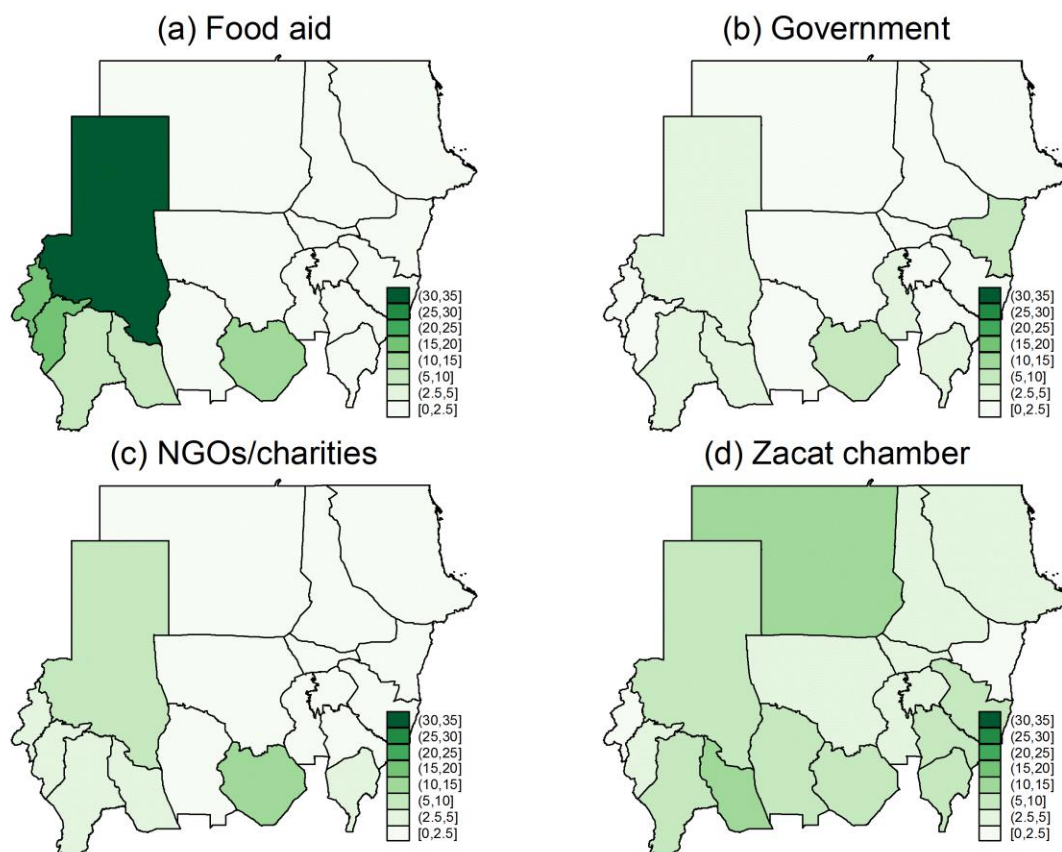
222. In 2014, transfers from other individuals were much more important than all other categories combined. On average, transfers from other individuals accounted for a share of 13.4 percent of total household expenditure and 0.54 percent of GDP (Table 23). More than seven percent of the population reported transfers from other individuals. However, receipt of transfers in this category is nearly proportional to the level of economic welfare, with the poorest 40 percent of the population accounting for 34.1 percent of all beneficiaries and only 17.5 percent of the total transfer amount, a share that is slightly smaller than their share in total consumption expenditure (19.9 percent).

Figure 83: Lorenz-curve for per capita consumption and concentration curves for beneficiaries and transfer amounts by program, 2014.



Source: Own calculations based on NHBPS 2014/15. Note: Outliers in transfer receipts were identified as log receipts greater or smaller than 1.96 standard deviations above or below the mean of log transfers. Transfers amounts are the sum of receipts in cash and kind.

Figure 84: Share of beneficiaries in total population by transfer and state, 2014.



Source: Own calculations based on NHBPS 2014/15.

223. **Food aid was heavily concentrated in Darfur.** More than 80 percent of food aid recipients were residing in one of the five states of the Darfur region. Almost 70 percent were in North, Central, and West Darfur alone. The density of food aid recipients was particularly high in North Darfur where more than one in three was a food aid recipient (Figure 84a). NGOs and charities beneficiaries were similarly distributed across states. But they were far fewer. Only in South Kordofan (13.4 percent) and North Darfur (7.1 percent) was their share greater than five percent. The density of government transfer recipients was high in South Kordofan and Kassala, where, 7.9 and 7.4 percent of the population received transfers. Between three and five percent of the population of Blue Nile, White Nile, East Darfur, North Darfur, and South Darfur identified as recipients of some form of government transfers. The largest share of Zakat beneficiaries was in Northern state (12.4 percent), followed by East Darfur (10.1) and Blue Nile (9.9).

Table 24: OLS regressions of transfer receipt on log per capita expenditure by type of transfer (N = 11,953).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Food aid		Government		NGOs/charities		Zakat chamber	
Log per capita expenditure	-0.04*** (0.01)	-0.01* (0.00)	-0.00 (0.00)	0.00 (0.00)	-0.01*** (0.00)	-0.00 (0.00)	-0.01*** (0.00)	-0.02*** (0.00)
R-squared	0.01	0.41	0.00	0.14	0.00	0.17	0.00	0.13
Cluster-fixed effects?		Yes.		Yes.		Yes.		Yes.

Source: Own calculations based on NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses.

224. **Food aid was well-targeted to the poor and transfers from NGOS, charities, and the Zakat chamber were somewhat targeted to the poor; there is no correlation between per capita consumption and receipt of government transfers.** A ten-percent increase in per capita expenditure was associated with an increase in the probability of receiving food aid by four tenths of a percentage point (Table 24, columns (1) and (2)). The association between transfer receipts from NGOs and charities or the Zakat chamber is weaker: a ten-percent increase in per capita expenditure was associated with an increase in the probability of being a beneficiary by only one tenth of a percentage point. The targeting performance of food aid and that of NGOs/charities was achieved mainly through geographic prioritization: within villages, there was no association between economic welfare and the probability of receiving transfers. Interestingly, this was not the case for transfers from the Zakat chamber. Here, the association *conditional on geographic location* (i.e., conditional on cluster-fixed effects) was somewhat stronger.⁵³ In the case of government transfers, beneficiary status was not correlated with economic welfare. Government transfers are not correlated with log per capita expenditure, neither across the entire population nor

⁵³ This would be consistent with an equal allocation of resources between geographic regions and targeting at the village- or neighborhood-level that relies on local knowledge.

Table 25: OLS regressions of transfer receipt on other indicators of need (N=11,046).

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Food aid		Government		NGOs/charities		Zakat chamber	
<i>Household characteristics</i>								
Woman head	4.3*** (1.5)	0.4 (0.9)	1.2 (0.7)	1.2* (0.7)	0.7 (0.7)	-0.3 (0.8)	3.1*** (1.1)	3.5*** (1.2)
Head is 65 or older	1.0 (0.9)	0.7 (0.8)	1.0 (0.7)	1.1 (0.8)	-0.1 (0.5)	-0.3 (0.5)	1.5 (1.1)	1.3 (1.1)
Woman head X head is 65 or older	-2.4 (2.2)	-1.8 (1.7)	-3.2*** (1.2)	-2.5** (1.2)	1.7 (2.3)	2.4 (2.5)	3.7 (3.7)	3.7 (3.8)
Log HH size	1.1 (0.9)	0.5 (0.6)	0.2 (0.5)	0.5 (0.5)	0.3 (0.7)	0.4 (0.7)	1.5* (0.9)	1.3 (0.9)
No. of children 15 and under	0.6** (0.2)	0.3* (0.2)	-0.0 (0.1)	-0.2 (0.2)	0.2 (0.1)	-0.0 (0.1)	-0.0 (0.2)	0.0 (0.2)
Head is unemployed	0.9 (2.4)	0.7 (1.5)	-0.6 (1.2)	-0.1 (1.4)	2.2 (1.7)	2.2 (1.7)	-0.1 (1.8)	0.6 (1.9)
HH member with chronic disease	5.5 (4.7)	1.8 (2.5)	-2.6*** (0.5)	-5.4*** (1.7)	-2.0*** (0.6)	-2.7*** (0.9)	3.2 (5.7)	3.1 (5.6)
HH member with disability	-1.5** (0.7)	0.0 (0.6)	-0.3 (0.6)	0.3 (0.6)	-0.2 (0.6)	0.3 (0.6)	2.6*** (0.9)	2.5*** (1.0)
<i>Shocks experienced over the previous 60 months</i>								
Drought or flood	0.2 (1.0)	-0.5 (0.9)	-0.2 (0.5)	-1.0 (0.6)	1.2 (0.9)	1.0 (1.0)	0.5 (0.8)	0.3 (0.9)
Crop disease or pests	-0.6 (1.5)	-0.5 (1.3)	1.3 (1.1)	1.7 (1.1)	0.6 (0.9)	1.1 (0.8)	1.4 (1.0)	-0.3 (1.1)
Livestock died or stolen	5.3*** (1.4)	1.1 (1.0)	1.0 (0.7)	0.8 (0.7)	0.7 (0.6)	-0.5 (0.7)	1.3 (0.8)	0.0 (0.9)
Illness or accident	2.8* (1.6)	2.6** (1.2)	0.7 (0.9)	0.2 (1.1)	0.4 (0.8)	0.3 (0.8)	2.2* (1.1)	1.7 (1.1)
Death of household member	1.8* (1.1)	0.2 (1.2)	2.1* (1.1)	1.9* (1.1)	0.4 (0.8)	-0.1 (0.7)	2.2* (1.2)	1.5 (1.3)
Fire	2.1 (1.7)	-0.6 (1.3)	0.6 (1.0)	0.2 (1.2)	2.2* (1.1)	1.4 (1.2)	0.5 (1.0)	-0.8 (1.0)
Robbery, burglary, or assault	1.0 (1.7)	-2.7 (2.0)	-1.0* (0.6)	-1.2 (0.7)	2.4 (1.9)	1.8 (1.8)	-0.6 (1.5)	0.4 (1.6)
Dwelling damaged or destroyed	-3.8*** (1.0)	-2.1** (0.9)	1.1 (0.9)	1.0 (0.9)	0.4 (0.8)	0.2 (0.8)	-0.5 (1.0)	-0.9 (1.0)
Severe water shortage	-1.4 (3.1)	0.5 (2.3)	0.2 (2.2)	0.7 (2.1)	0.0 (1.7)	1.4 (1.9)	0.4 (2.5)	1.1 (2.7)
Other shock	2.6 (2.8)	-1.2 (1.7)	-2.0*** (0.6)	-2.1** (0.8)	0.1 (1.4)	-0.3 (1.6)	1.4 (1.8)	1.0 (1.5)
R-squared	0.02	0.43	0.01	0.15	0.01	0.18	0.01	0.13
Cluster-fixed effects?		Yes.		Yes.		Yes.		Yes.

Source: Own calculations based on NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses. Coefficient estimates can be interpreted as the change in the outcome variable, a binary indicator of transfer receipt, in percentage points.

225. **Zakat transfers are better targeted to households headed by women and those that experienced illness, accidents, or the death of household members.** Transfer schemes do not and should not always only target the poor. For instance, they may be directed to households with non-monetary needs or those that have experienced hardship. Further analysis shows that households headed by women and households that have at least one member with a disability are 3.0-3.5 and 2.5 percentage

points more likely to receive Zakat transfers, respectively (Table 25). One additional child below the age of 15 increases the probability of receiving food aid by 0.3-0.6 percentage points. The death of a household member in the last five years increases the probability of receipts of transfers from the government by around two percentage points. Surprisingly, households headed by elderly women, households that have experienced shocks not otherwise classified, and households with members with chronic diseases less likely to receive government transfers. The presence of a member with chronic diseases also reduces the chances of receiving transfers from NGOs or charities. And experiencing the destruction or damaging of one's dwelling is associated with a lower probability of being a food-aid recipient.

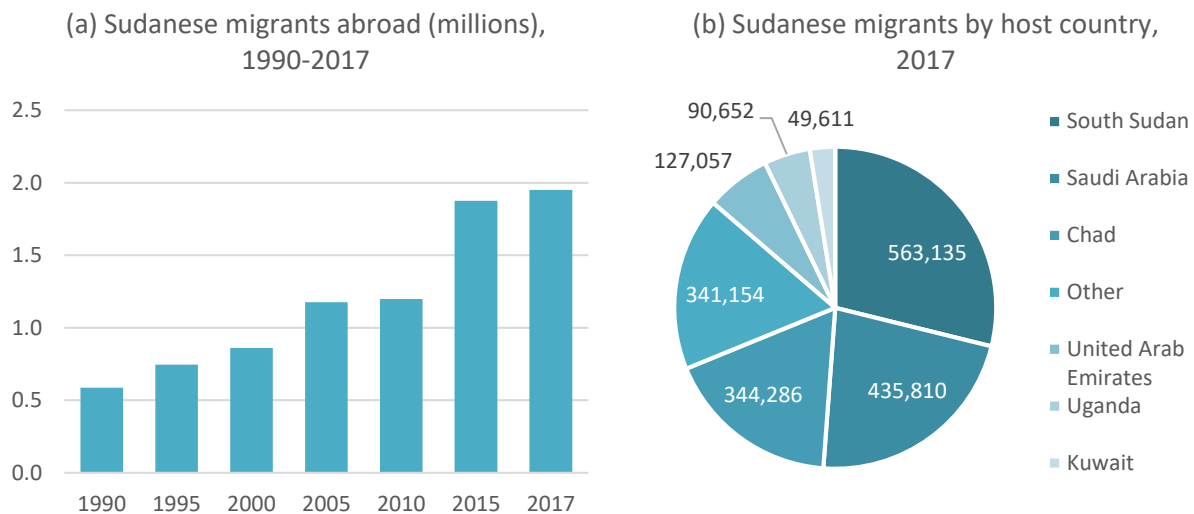
226. **Overall, survey estimates of the incidence of transfers at the end of 2014 suggest that the poverty-reducing effect of transfers could be improved substantially through better targeting.** Food aid was well-targeted to the poor, a result mostly of geographic prioritization. But there was almost no correlation between beneficiary status and consumption per capita for government and Zakat transfers. However, Zakat transfers in particular seem better-targeted to the households with members that have disabilities and those with woman heads. It should also be noted again that dedicated projects have been aimed at improving the targeting accuracy of government transfer programs only after 2014. The discrepancy between administrative data and survey estimates is large with regard to transfer amounts. Future surveys should aim to record transfer receipt using shorter recall periods that are aligned with the frequency of cash disbursements under these programs.

International migration and remittances

227. **The Sudanese diaspora has the potential to contribute to economic development at home.** As a result of extended periods of conflict and a lack of economic opportunities in the past, Sudan has a substantial diaspora. International remittances, which have the potential to benefit economic development and to support poverty reduction, have played an important role in past years. However, with the emergence of multiple exchange rates in the wake of the secession of the South, official data on international remittances are believed to have become unreliable. After a brief review of Sudan's current levels and trends in migration populations inside and outside Sudan, this section investigates the link between poverty and international remittances and points to important data gaps.

228. **Close to two million Sudanese living abroad, including as migrant workers in the Gulf, constitute a significant potential for international remittances.** More than two million Sudanese, around five percent of the population, are currently estimated to live abroad, up from around 1.4 million in 1990. After a decline in Sudan's migrant population until about the mid-2000s, the total number of migrants has increased again since. More than half a million Sudanese nationals, 29 percent of the total migrant stock abroad, are estimated to live in South Sudan. As these only became migrants with the secession of the South, they clearly account for most of the increase in the Sudan's migrant stock abroad after 2010 (Figure 85a). More than 600,000 live in the Gulf states, mostly in Saudi Arabia but also in the United Arab Emirates, and Kuwait (Figure 85b).

Figure 85: Sudanese migrants abroad.



Source: Own calculations based on UN Department of Economic and Social Affairs (2017).

229. **International remittances can make a significant contribution to poverty reduction.** International remittances directly benefit recipient households by raising their incomes. They are therefore arguably more efficient in meeting the needs of recipients than official aid, which has to go through official channels. By raising aggregate demand, they may further increase employment and wages. One study finds that across 71 developing countries, a ten-percent increase in per capita international remittances procured a 3.5-percent decline in the poverty rate (Adams & Page, 2005). This finding is broadly supported by a wide range of country- and regional case studies (World Bank, 2016). And while remittances are spent primarily on consumption, especially in the case of poorer households, they also provide funds for education, health, and business investments (ibid.).

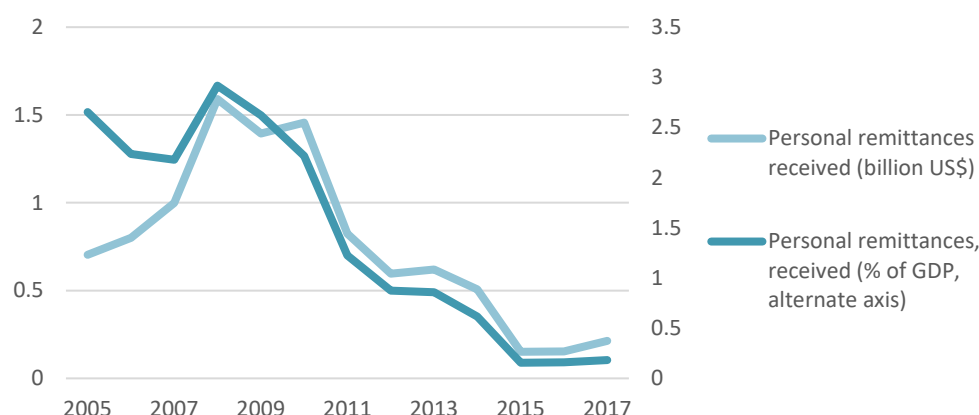
230. **International remittances can also contribute to reducing macroeconomic volatility and imbalances.** Remittances tend to be relatively stable and often consumption-smoothing – that is, they act as insurance for families during economic crises and after natural disasters. In particular, international remittances have been found to be less volatile than other foreign currency flows and often do not co-move with business cycle fluctuations (De, Isamaj, Kose, & Yousefi, 2016).

231. **International remittances could be included in the preparation of the debt sustainability analysis as per the latest guidance on debt sustainability analysis; however, this will require and overhaul of the data sources and methodologies currently used to estimate international remittance flows in Sudan.** A better understanding of the levels of international remittances entering and leaving Sudan is potentially also for debt sustainability analysis. In particular, the ratio of external debt to exports would be significantly lower if incoming international remittances were included in the denominator. To the extent that current methods and procedures to estimate international remittance flows underestimate their level, the analysis presented here can be used to inform future data collection efforts, i.e., by pointing to sections of the population that are likely to be recipients of international remittances.

232. **Given the potential development gains through migration and remittances, the United Nations have recently adopted targets and indicators for migration as part of the Sustainable Development**

Goals. The SDGs include explicit targets to ensure safe, orderly, and regular migration, including through well-managed migration policies and reductions in the costs of sending remittances to no more than three percent. However, according to the 2017 progress report, post offices and money transfer operators still charge over six percent of the amount remitted while commercial banks charge eleven percent (United Nations Economic and Social Council, 2017).

Figure 86: Personal remittances, 2005-2017.



Source: Own calculations based on WDI data.

233. **While international remittances have clearly been important in the past; however recent events have likely rendered official data on remittance flows unreliable.** International remittances sent through official channels increased in importance over the course of the 1990s and 2000s and on average accounted for USD1.25 billion, around 2-3 percent of GDP, between 2006 and 2010. However, the official data displayed above, which is based on data provided by the Central Bank of Sudan, suggest two steep declines in remittances payments – from 2010 to 2011 and from 2014 to 2015. While the former drop may to some extent be attributable to remittances sent to households in South Sudan, the latter drop in would be difficult to explain through changes in the demand or supply of remittance transfers such as changes to the stock of international migrants or relatively lower rates of economic growth in migrants’ host countries. Rather, the emergence of multiple exchange rates in 2011 and the breakdown of correspondent bank relations in 2014⁵⁴ may have led Sudanese migrants to have opted to transfer their earnings through informal channels, particularly the *halwal* system, which priced foreign exchange at a premium (IMF, 2014; Ebaidalla, 2015).

Table 26: Survey estimates of total annual remittances, 2009 and 2014.

Reporting period:	SDG, billions (in 2014 prices)		Current USD, millions (at official exchange rate)	
	Monthly	Annual	Monthly	Annual
2009	2.82	2.76	128.4	125.8
2014	3.04	3.06	347.7	351.1
Change (percent)	7.7%	10.9%	170.8%	179.1%

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: The official exchange rate used in the calculation was 5.71 SDG per USD in 2009 and 8.73 SDG per USD in 2014.

⁵⁴ Reports at the time indicated that Saudi and international banks banned transactions including remittances to Sudanese banks. See, for instance, Naffee (2014).

234. **While survey estimates are much lower than administrative data, they indicate no decline in total remittances received between 2009 and 2014.** The survey data suggest that households' receipt of international remittances was only around USD125.8 million in 2009, less than a tenth of the official estimate for that year. It can therefore be assumed that international remittances are severely underreported in the household budget surveys. Trends, however, may be more indicative. These estimates suggest that remittances increased by around ten percent in real terms, from SDG2.8 billion in 2009 (in 2014 prices) to SDG3.1 billion in 2014. At official exchanges rates and in current USD, this translates to around USD125.8 million and USD351.1 million, respectively.

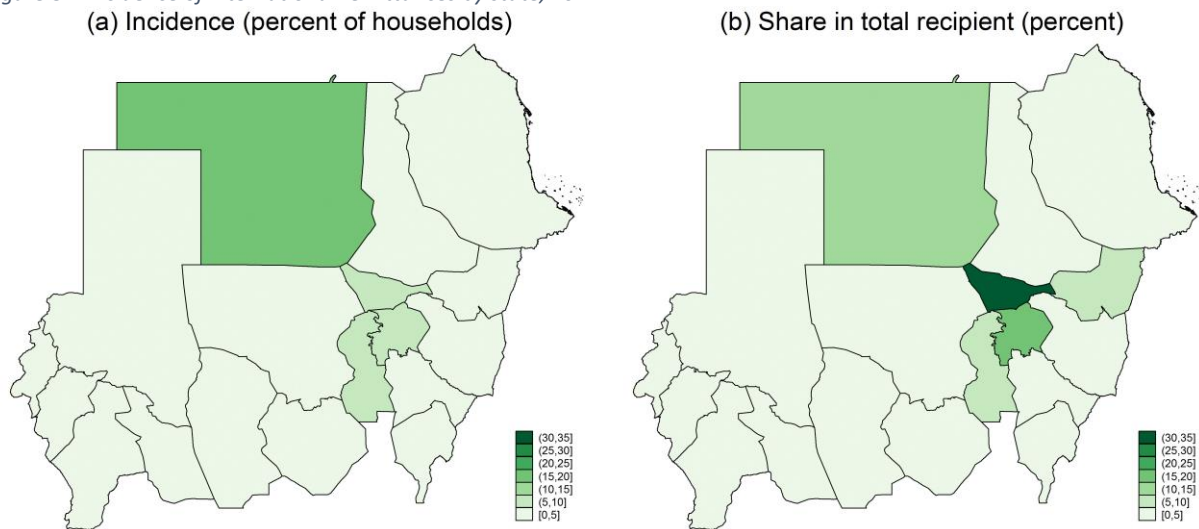
Table 27: Incidence of international remittances, 2009 and 2014.

	Individuals			Households		
	2009	2014	Change (percentage points)	2009	2014	Change (percentage points)
Total						
Sudan	3.0%	3.1%	0.1%	3.0%	3.4%	0.4%
By gender of household head						
Woman head	6.6%	11.4%	4.8%	6.9%	11.4%	4.5%
Man head	2.7%	2.0%	-0.7%	2.6%	2.1%	-0.5%
By locality						
Rural	2.6%	2.7%	0.1%	2.6%	2.9%	0.3%
Urban	3.8%	3.9%	0.1%	3.9%	4.4%	0.5%
By state (2009 boundaries)						
Northern	10.7%	15.0%	4.3%	11.1%	16.0%	4.9%
River Nile	3.0%	3.5%	0.6%	3.2%	3.7%	0.5%
Red Sea	0.2%	0.4%	0.2%	0.3%	0.3%	0.0%
Kassala	1.6%	3.5%	1.9%	2.3%	3.4%	1.1%
Al-Gadarif	0.9%	0.7%	-0.2%	1.0%	1.2%	0.3%
Khartoum	6.9%	5.5%	-1.4%	6.6%	6.1%	-0.5%
Al-Gezira	3.5%	4.7%	1.2%	3.4%	5.0%	1.6%
White Nile	2.0%	4.6%	2.6%	1.7%	5.4%	3.7%
Sinnar	0.3%	3.1%	2.8%	0.4%	2.5%	2.2%
Blue Nile	0.4%	0.3%	-0.1%	0.6%	0.5%	-0.1%
North Kordofan	5.1%	1.2%	-3.9%	5.3%	1.3%	-4.0%
South Kordofan	0.7%	0.8%	0.1%	0.9%	0.8%	-0.2%
North Darfur	1.5%	2.4%	1.0%	1.6%	2.6%	1.1%
West Darfur	0.0%	0.9%	0.9%	0.0%	1.1%	1.1%
South Darfur	0.3%	0.8%	0.5%	0.2%	0.8%	0.6%

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

235. **Woman-headed households and urban household are more likely to be recipients of international remittances.** Overall, only 3.4 percent of Sudanese households, 3.1 percent of the population, reported any positive amount of international remittances over the twelve months prior to the survey, up from three percent in 2009. However, there are large differences by the gender of household head and by geographic location: woman-headed households are more than five times as likely to receive international remittances (11.4 vs. 2.1 percent), suggesting a higher propensity of men to seek work abroad. Households in urban areas have a 50-percent higher likelihood of receiving remittances (4.4 vs. 2.9 percent).

Figure 87: Incidence of international remittances by state, 2014.

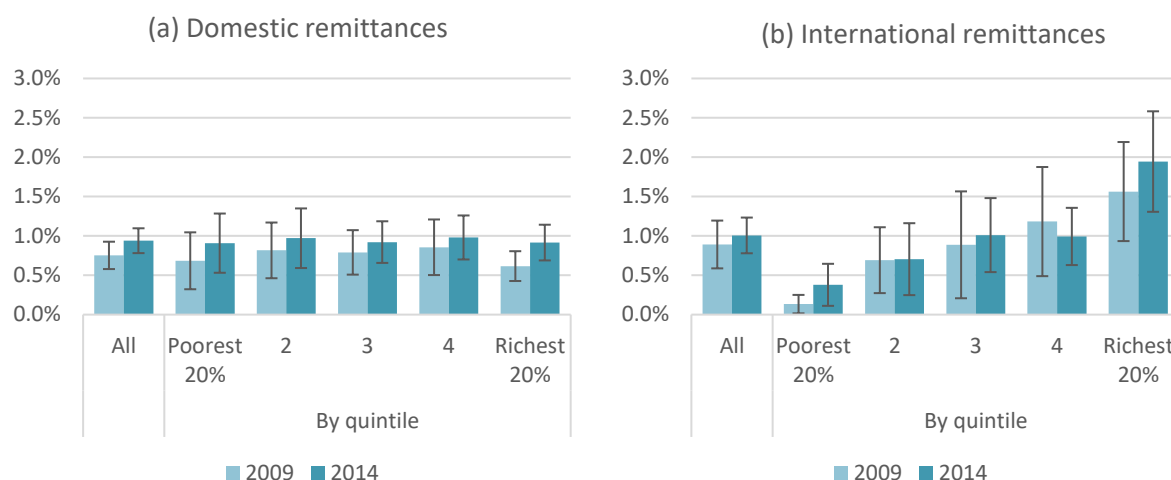


Source: Own calculations based on NHBPS 2014/15.

236. **While most households that report receipt of remittances are found in Khartoum, Northern state has the highest incidence of remittance-receiving households.** Only four states, Khartoum (32.1), Al-Gezira (17.9), Northern state (11.0), and White Nile state (9.6) account for more than 70 percent of all remittance-receiving households in Sudan. The incidence is particularly high in Northern state, where one in every six households received international remittances over the course of the twelve months prior to the survey. By contrast, the incidence of remittances in Darfur and Kordofan is low, ranging from zero in East Darfur to 2.6 percent in North Darfur. However, the latter still accounts for around 4.7 percent of all remittance-receiving households.

237. **Individuals residing in households that receive international remittances are significantly less likely to be poor.** On average, per capita consumption of individuals in households that receive international remittances is roughly 50 percent higher than among those in non-remittance-receiving households. As a result, they are 7.3 percentage points less likely to be extremely poor and 20.8 percentage points less likely to be moderately poor.

Figure 88: Domestic and international remittances as share of household expenditure, 2009 and 2014.



Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: 95-percent confidence intervals indicated.

238. **However, international remittances seem moderately important only for richer Sudanese.** In 2014, domestic remittances accounted for close to one percent of total household expenditure, up from around three fourths of a percent in 2009 (Figure 88b). There is hardly any variation across quintiles, that is, domestic transfers are as important for the poor as they are for the rich. International remittances also account for about one percent of household expenditure in 2014, a similar fraction as in 2009 (panel (b)). But they tend to be much less important for the poorest 20 percent, for which they account for less than two fifths of a percent of household expenditure, and much more important for the top 20 percent, for which they account for close to two percent of expenditure on average. Again, incomes are likely underestimated in the survey. As this may be true for transfers as well, the share of remittances in total expenditure may be higher.

239. **While receipt of international remittances is likely underestimated from the 2014/15 NHBPS, an analysis of their incidence suggests that they likely benefit primarily the better-off.** However, given the potential relevance of remittances for the macroeconomy and debt sustainability analysis, more work should follow. This could usefully be based on subsidiary findings reported here, especially the profile of remittance recipients.

VII. Summary and Policy Implications

240. **The present report documents levels and trends in poverty and inequality in Sudan between May 2009 and November 2014.** Over the time period under consideration, Sudan experienced intertwined economic and political changes, chiefly the secession of South Sudan by referendum in 2011 and the associated loss in oil revenue. The distributional effects of these changes can be inferred by comparison of poverty and inequality profiles based on the two most recent household budget surveys, the 2009 National Household Baseline Survey (NHBS) and the 2014/15 National Household Budget and Poverty Survey (NHBPS). While there have been differences in survey design and implementation that need to be considered in interpreting estimates, the report argues that poverty and inequality comparisons are still informative if supplemented with additional information about household economic activities.

241. **Urban areas have been hit hardest by recent macroeconomic shocks.** Overall poverty either fell or increased moderately, depending on whether the USD1.90- or the USD3.20-poverty line) is used. A clearer picture emerges once poverty trends in urban and rural areas are considered separately. Poverty in urban areas increased markedly and unambiguously and this is also true for inequality. The increase is driven by the loss of jobs related to oil production, low rates of job creation in other sectors, and, thus, increasing unemployment and falling real wages. The increase in joblessness is particularly pronounced among youth. In line with journalistic reports, there is also some indirect evidence that rising rents may have displaced other consumption expenditure in Sudan's capital Khartoum.

242. **Rural areas have seen some gains, but they may have been transitory.** The 2014/15 harvest was a bumper crop and November, the month in which the first round of the survey was conducted, is typically the peak of the harvesting season. In line with these observations, poverty fell moderately in rural areas, driven to a large extent by increased employment in agriculture and an increase in real wages for agricultural labor. On the other hand, there is little to suggest that these gains were based on more than a temporary boost to agricultural production and employment opportunities. Labor productivity in agriculture is very low and has been falling for years, including between 2009 and 2014.

243. **While recent trends worked in opposition to historically uneven patterns of economic and social development in Sudan, these patterns are still dominant.** Growth in average per capita consumption and poverty reduction between 2009 and 2014 were inversely related to initial levels. But gradients in living standards between Khartoum and Sudan's Northern region and the rest of the country remain pronounced: while the former three states represent close to one fourth of the population (23.5 percent), they are home to only one in seven among the extreme poor. Even more pronounced are differences in access to key services: fewer than six percent of all children between six and 13 that are not currently attending school live in these three states and fewer than eight percent of the population without access to public electricity are found here.

244. **Sudan may well be nearing the first stage of the demographic transition, raising the stakes for private-sector growth and job creation.** Total fertility rates in Sudan have been falling and are getting closer to four children per woman, a threshold often interpreted as the beginning of the demographic transition. If fertility rates continue to fall at current rates, Sudan will soon be confronted with a youth bulge, an increasing number of working-age adults per dependent. This would both present significant opportunities and increased downside risks, depending on whether the economy will be in a position to

generate sufficient jobs for a large influx of youth into the labor market and on whether these cohorts are sufficiently equipped to fill these jobs. Sudan has been making some progress on the latter front, expanding access to education and improving educational outcomes. But rising youth unemployment and falling returns to education suggest that job creation remains a key challenge and that economic opportunities for youth are severely lacking.

245. **Transfers were poorly targeted in 2014.** The analysis in this report of transfers is subject to the caveat that transfer amounts are likely to be underreported and that much has happened between the second survey used here and today. What can be inferred is that the receipt of government and Zakat transfers was at most weakly correlated with poverty. But more analytical work is required to understand recent trends in the performance of transfer schemes.

246. **Effective policy-making will require a stronger evidence base, including up-to-date poverty data.** Updates of Sudan's poverty profile based on the most recent data available are an important step forward. But a four-year time lag and a rapidly changing macroeconomy suggest that insights that can be gained are quickly becoming outdated. Given that a new households survey takes considerable time to prepare, field, and analyze, this process should be started as soon as possible. A future survey would also present an opportunity to cover a greater share of the population, including, for instance, internally displaced persons and other population groups that have been beyond the reach of existing surveys.

247. **There are several lessons learned from the present analysis and best-practice examples for the design of a future survey.** For instance, the issue of seasonality can be addressed through data collection that spans an entire agricultural cycle (as in, for instance, Kenya). Information gathered about the uptake of health and education services by type of provider has the potential to throw light on the incidence of government spending. But the 2014/15 survey did not collect this information and, in fact, lacks a comprehensive health module altogether. There is also some evidence that incomes and transfers recorded through the most recent survey significantly underestimate population totals.

248. **Findings in this report suggest that a strategy for private-sector growth and job creation should focus on the economic opportunities of women and youth.** Women in Sudan face significant discrimination in the labor market. And although they are less likely to participate in the labor force, those that are economically active are considerably more likely to be unemployed. Despite a moderate narrowing of gender gaps in educational attendance and outcomes, very few women are employed outside of agriculture. And those that are working earn significantly lower wages than men. At the same time, youth unemployment, especially in urban areas has increased sharply. Any poverty reduction strategy needs to address the constraints faced by these two groups.

249. **Agriculture in Sudan holds great potential for significant poverty reduction; but to realize this potential, significant investment is needed.** The report only provides a very partial analysis of agricultural production and assets – it only considers the relationship between poverty and agriculture, recent trends in output and labor productivity, as well as access to agricultural assets. Without doubt, more research can have a significant effect on the government's ability to formulate effective poverty reduction strategies directed at those engaged in agriculture. What is clear, however, is that agriculture holds great potential for poverty reduction in Sudan. A large share of the poor is engaged in agriculture in one way or another. Many farm and a significant share own livestock. At the same time, agricultural growth would translate into more poverty reduction than growth in other sectors. The potential for productivity gains seems substantial given Sudan's low level of agricultural productivity today. The removal of wheat

subsidies has the potential to eventually benefit both farmers and agricultural wage laborers through higher prices and wages (World Bank forthcoming). However, this will also require that farmers have access to crucial inputs, especially fuel and fertilizer, and an institutional framework that encourages investment.

250. **Different approaches to social protection in urban and rural areas should be considered.** In particular, a large fraction of poverty is likely transitory in rural areas while infrastructure is lacking. This suggests targeting schemes capable of responding to changes in the economy (e.g., falling labor demand or price shocks) such as public works schemes. In urban areas, on the other hand, poverty has a more prominent structural component that is better addressed with well-targeted schemes that are easier to administer and can feature productivity-enhancing measures.

251. **Any medium-term strategy should be premised on reforms that address macroeconomic imbalances.** The report as well as related work (World Bank forthcoming) demonstrate the cost associated with an inadequate response to Sudan's current macroeconomic crisis. These must be addressed comprehensively before embarking on any medium-term strategy to address slow growth, poverty, and inequity.

VIII. References

- AbdelAzim, A. Ali, Khalid Yassin, and Rawia Omer. 2014. "Domestic Violence Against Women in Eastern Sudan." *BMC Public Health* 14 (1136).
- Adams, Richard H., and John Page. 2005. "Do International Migration and Remittances Reduce Poverty in Developing Countries." *World Development* 33 (10): 1645-1669. doi:10.1016/j.worlddev.2005.05.004.
- Ahmed, Abdel Ghaffar M. 2008. "Multiple Complexities and Prospects for Reconciliation and Unity: Sudan Conundrum." In *The Roots of African Conflicts: The Causes and Costs*, by Alfred, Zeleza, Paul Tiyanbe Nhema, 71-87. Ohio University Press.
- Aker, Jenny C., and Isaac M. Mbiti. 2010. "Mobile Phones and Economic Development in Africa." *Journal of Economic Perspectives* 24 (3): 207-232.
- Alderman, Harold, and Ruslan Yemtsov. 2013. "How Can Safety Nets Contribute to Economic Growth?" *World Bank Policy Research Working Paper No. 6437*.
- Alesina, Alberto, and Roberto Perotti. 1996. "Income Distribution, Political Stability, and Investment." *European Economic Review* 40 (6): 1203-1228.
- Ali, May. 2015. "Khartoum's Real Estate Prices are Becoming Unaffordable." *The New Arab*, April 6. Accessed May 19, 2018. <https://www.alaraby.co.uk/english/features/2015/4/6/khartoums-real-estate-prices-are-becoming-unaffordable>.
- Atansah, Priscilla, Masoomah Khandan, Todd Moss, Anit Mukherjee, and Jennifer Richmond. 2017. "When Do Subsidy Reforms Stick? Lessons from Iran, Nigeria, and India." *Center for Global Development Policy Paper* 111 .
- Azeveda, Joao Pedro, Andres Castaneda, and Viviane Sanfelice. 2012. "DRDECOMP: Stata Module to Estimate Shapley Value of Growth and Distribution Components of Changes in Poverty." *Statistical Software Components S457563* (Boston College Department of Economics).
- Barranco, José, and Dominique Wisler. 1999. "Validity and Systematicity of Newspaper Data in Event Analysis." *European Sociological Review* 15 (3): 301-322.
- Barro, Robert J. 1995. "Inflation and Economic Growth." *Quarterly Bulletin of the Bank of England* 14 (1): 166-176.
- Bourguignon, Francois. 2003. "The Growth Elasticity of Poverty Reduction: Explaining Heterogeneity Across Countries and Time Periods." (The World Bank).
- Brahmbhatt, Milan, Otaviano Canuto, and Ekaterina Vostroknutowva. 2010. "Dealing with Dutch Disease." *Economic Premise*, June. <http://documents.worldbank.org/curated/en/794871468161957086/pdf/548670BRI0EP160Box349431B01PUBLIC1.pdf>.
- Briault, Clive. 1995. "The Costs of Inflation." *Bank of England Quarterly Bulletin* 33-45.

- Bruce, Nigel, Perez-Padilla, and Rachel Albalak. 2000. "Indoor Air Pollution in Developing Countries: A Major Environmental and Public Health Challenge." *Bulletin of the World Health Organization* 78 (9): 1078-1092.
- Brunori, Paolo, Francisco H. G. Ferreira, and Vito Peragine. 2013. "Inequality of Opportunity, Income Inequality and Economic Mobility." *World Bank Policy Research Paper No. 6304*.
- Burlig, Fiona, and Louis Preonas. 2016. "Out of the Darkness and Into the Light? Development Effects of Rural Electrification." *EI @ Haas WP 268*. <http://ei.haas.berkeley.edu/research/papers/WP268.pdf>.
- CBoS. 2015. *Annual Report*. Khartoum: Central Bank of Sudan.
- CBoS. 2010. *Annual Report 2010*. Khartoum: Central Bank of Sudan.
- CBS. 2009. *Statistical Year Book for the Year 2009*. Khartoum: Central Bureau of Statistics.
- CBS. 2017. Sudan: Poverty profile in 2014 - Main findings. Khartoum: Central Bureau of Statistics.
- Christiaensen, Luc, Lionel Demery, and Jasper Kuhl. 2011. "The (Evolving) Role of Agriculture in Poverty Reduction - An Empirical Perspective." *Journal of Development Economics* 96 (2): 239-254.
- Coady, David, Margaret Grosh, and John Hoddinott. 2004. "Targeting Outcomes Redux." *World Bank Research Observer* 19 (1): 61-85.
- Cobham, Alex. 2005. "Causes of Conflict in Sudan: Testing the Black Book." *European Journal of Development Research* 17 (3): 462-480.
- Collier, Paul. 1999. "On the Economic Consequences of Civil War." *Oxford Economic Papers* 51: 168-183.
- Dabalén, Andrew, Isis Gaddis, and Nga Thi Viet Nguyen. 2016. "CPI Bias and Its Implications for Poverty Reduction in Africa." *World Bank Policy Research Working Paper No 7907*.
- De Luca, Giacomo, and Marijke Verpoorten. 2015. "Civil War, Social Capital and Resilience in Uganda." *Oxford Economic Papers* 3 (1): 661-686.
- De, Supriyo, Ergys Ismaj, M. Ayhan Kose, and S. Reza Yousefi. 2016. "Remittances Over the Business Cycle: Theory and Evidence." *KNOMAD Working Paper No. 11*.
- Deaton, Angus. 1997. *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*. Washington DC: The World Bank.
<http://documents.worldbank.org/curated/en/593871468777303124/pdf/multi-page.pdf>.
- Deininger, Klaus, and Lyn Squire. 1998. "New Ways of Looking at Old Issues: Inequality and Growth." *Journal of Development Economics* 57: 259-287.
- Dercon, Stefan, and Pramila Krishnan. 2000. "Vulnerability, Seasonality and Poverty in Ethiopia." *Journal of Development Studies* 36 (6): 25-53.
- Dinkelman, Taryn. 2011. "The Effects of Rural Electrification on Employment: New Evidence from South Africa." *American Economic Review* 101 (7): 3078-3108.
<https://www.aeaweb.org/articles?id=10.1257/aer.101.7.3078>.

- Ebaidalla, Ebaidalla Mahjoub. 2015. "Flow of Migrants' Remittances into Sudan: The Role of Macroeconomic Environment." *Middle East Development Journal* 7 (1).
<https://www.tandfonline.com/doi/abs/10.1080/17938120.2015.1019292>.
- Elzobier, Ahmed. 2009. "The Madness of Land Property Values in Khartoum." *Sudan Tribune*, September 10. Accessed May 19, 2018. The madness of land and property values in Khartoum (2-2).
- Fafchamps, Marcel, and John Pender. 1997. "Precautionary Saving, Credit Constraints, and Irreversible Investment: Theory and Evidence from Semiarid India." *Journal of Business & Economic Statistics* 15 (2): 180-194.
- Fallon, Peter R. 1987. "Labor Markets in Sudan : Their Structure and Implications for Macroeconomic Adjustment." *World Bank Departmental Working Paper*.
- Feder, Gershon, and Akihiko Nishio. 1999. "The Benefits of Land Registration and Titling: Economic and Social Perspectives." *Land Use Policy* 15 (1): 25-43.
- FEWS NET. 2015. "Sudan Staple Food Market Fundamentals."
- Fiszbein, Ariel, and Norbert Schady. 2009. *Conditional Cash Transfers - Reducing Present and Future Poverty*. Washington DC: The World Bank.
- Foster, James, Joel Greer, and Erik Thorbecke. 1984. "A Class of Decomposable Poverty Measures." *Econometrica* 52 (3): 761-766.
- Galor, Oded, and Joseph Zeira. 1993. "Income Distribution and Macroeconomics." *Review of Economic Studies* 60: 35-52.
- Gleditsch, Kristian Skrede, Nils W. Metternic, and Andrea Ruggeri. 2013. "Data and Progress in Peace and Conflict Research." *Journal of Peace Research* 51 (3): 301-314.
- Government of Sudan. 2012. "Sudan: Interim Poverty Reduction Strategy Paper." Khartoum. Accessed September 18, 2018. <https://www.imf.org/external/pubs/ft/scr/2013/cr13318.pdf>.
- Hanushek, E.A., and L. Wößmann. 2010. *Education and Economic Growth*. Vol. 2, in *International Encyclopedia of Education*, by Penelope Peterson, Eva Baker and Barry McGaw, 245-252. Oxford: Elsevier.
- Haughton, Jonathan, and Shahidur Khandker. 2009. "Handbook on Poverty and Inequality." In *Handbook on Poverty and Inequality*. The World Bank.
- Headey, Derek D. 2016. "Food Prices and Poverty." *World Bank Policy Research Working Paper No 7898*.
- Holzmann, Robert, Lynne Sherburne-Benz, and Emil Tesliuc. 2003. *Social Risk Management: The World Bank's Approach to Social Protection in a Globalizing World*. Washington DC: The World Bank.
- HRW. 2015. "Men With No Mercy" - Rapid Support Forces Attacks against Civilians in Darfur, Sudan. Human Rights Watch.
https://www.hrw.org/sites/default/files/report_pdf/sudan0915_insert_lowres_with_cover.pdf.
- Imbert, Clement, and John Papp. 2015. "Labor Market Effects of Social Programs: Evidence from India's Employment Guarantee." *American Economic Journal: Applied Economics* 7 (2): 233-263.

- IMF. 2014. *IMF Country Report No. 14/203*. Washington DC: International Monetary Fund.
<https://www.imf.org/external/pubs/ft/scr/2014/cr14203.pdf>.
- Jolliffe, Dean, and Espen Beer Prydz. 2016. "Estimation International Poverty Lines from Comparable National Thresholds." *Journal of Economic Inequality* 14: 185-198.
- Kalyvas, Stathis N. 2004. "The Urban Bias in Research on Civil Wars." *Security Studies* 13 (3): 160-190.
- Kjellgren, Annika, Christina Jones-Pauly, Hadyat El-Tayeb Alyn, Endashaw Tadesse, and Andrea Vermehren. 2014. "Sudan - Social Safety Net Assessment." *World Bank Social Protection and Labor Discussion Paper No. 1415* (World Bank).
<https://hubs.worldbank.org/docs/ImageBank/Pages/DocProfile.aspx?nodeid=19769271>.
- Klasen, Stephan, and Mark Misselhorn. 2008. "Determinants of the Growth Semi-Elasticity of Poverty Reduction." *University of Göttingen: Ibero-America Institute for Economic Research Working Paper No 176*.
- Masters, William A., Agnes Andersson Djurfeldt, Cornelis De Haan, Peter Hazell, Thomas Jayne, Magnus Jirstrom, and Thomas Reardon. 2013. "Urbanization and Farm Size in Asia and Africa: Implications for Food Security and Agricultural Research." *Global Food Security* 2 (3): 156-165.
doi:<https://doi.org/10.1016/j.gfs.2013.07.002>.
- McMillan, Margaret, and Dani Rodrik. 2014. "Globalization, Structural Change, and Productivity Growth." *World Development* 63: 11-32.
- Miguel, Edward, Shanker Satyanath, and Ernest Sergenti. 2004. "Economic Shocks and Civil Conflict: An Instrumental Variables Approach." *Journal of Political Economy* 112 (4): 725-753.
- Murdoch, James C., and Todd Sandler. 2002. "Economic Growth, Civil Wars, and Spatial Spillovers." *Journal of Conflict Resolution* 46 (1): 91-110.
- OCHA. 2016. "Humanitarian Bulletin Sudan - 26 September - 2 October 2016."
[https://www.unocha.org/sites/dms/Sudan/Reports/OCHA_Sudan_Weekly_Humanitarian_Bulletin_2016/OCHA_Sudan_Weekly_Humanitarian_Bulletin_Issue_40_\(26_September_-2_October_2016\).pdf](https://www.unocha.org/sites/dms/Sudan/Reports/OCHA_Sudan_Weekly_Humanitarian_Bulletin_2016/OCHA_Sudan_Weekly_Humanitarian_Bulletin_Issue_40_(26_September_-2_October_2016).pdf).
- Pantuliano, Sara, Margie Buchanan-Smith, Victoria Metcalfe, Sara Pavanello, and Ellen Martin. 2011. *City Limits: Urbanisation and Vulnerability in Sudan - Synthesis Report*. London: Humanitarian Policy Group, Overseas Development Institute.
- Raphael, Steven, and Rudolf Winter-Ebmer. 2001. "Identifying the Effect of Unemployment on Crime." *Journal of Law & Economics* 44 (1): 259-283.
- Ravallion, Martin, Gaurav Datt, and Dominique van de Walle. 1991. "Quantifying Absolute Poverty in the
- Rodrik, Dani. 2013. "Uncoditional Convergence in Manufacturing." *Quarterly Journal of Economics* 128 (1): 165-204.
- Sah, Raaj Kumar, and Joseph E. Stiglitz. 1987. "Price Scissors and the Strcuture of the Economy." *Quarterly Journal of Economics* 102 (1): 109-134.

Sahn, David .E., and David C. Stifel. 2003. "Exploring Alternative Measures of Welafre in the Absence of Expenditure Data." *Review of Income and Wealth* 49 (4): 463-489.

doi:<https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.0034-6586.2003.00100.x>.

Sahn, David E., and David C. Stifel. 2000. "Poverty Comparisons Over Tiome and Across Countries in Africa." *World Development* 28 (1): 2123-2155.

Schwartzstein, Peter, and Lelyland Cecco. 2015. "Sudan's Stakes: The 21st-century Gold Rush Where People Work in 19th-Century Conditions." *Quartz*, December 11. <https://qz.com/568773/the-21st-century-gold-rush-where-people-work-in-19th-century-conditions/>.

Starr, Martha A. 2010. "Violent Conflict and Economic Growth: Some Time-series Evidence." *Economics Letters* 106 (3): 200-204.

Sudman, Seymour, and Norman M. Bradburn. 1974. *Response Effects in Surveys: A Review and Synthesis*. Chicago, Illinois: National Opinion Research Center/Aldine Publishing Company.

U.S. Department of State. n.d. Accessed September 17, 2018.

<https://www.state.gov/j/ct/list/c14151.htm>.

UN Department of Economic and Social Affairs. 2017. *Trends in International Migrant Stock: The 2017 Revision*. United Nations database, New York: United Nations Department of Economic and Social Affairs, Population Division.

UNHCR. 2017. *Sudan: 2017 Year-end report*. United Nations High Commissioner for Refugees.

<http://reporting.unhcr.org/node/2535>.

UNICEF, CBS, and others. 2014. "Sudan: Multiple Indicator Cluster Survey Final Report."

United Nations Economic and Social Council. 2017. *Progress Towards the Sustainable Development Goals: Report of the Secretary-General*. New York: United Nations.

Urdal, Henrik. 2006. "A Clas of Generations? Youth Bulges and Political Violence." *International Studies Quarterly* 50 (3): 607-629.

Wooldridge, Jeffrey M. 2013. *Introductory Econometrics. A Modern Approach*. 5. South-Western, Cengage Learning.

Wooley, John T. 2000. "Using Media-Based Data in Studies of Politics." *American Economic Journal of Political Science* 44 (1): 156-173.

World Bank. 2015. *Africa's Demographic Transition: Dividend or Disaster?* Washington, DC: The World Bank Group. doi:10.1596/978-1-4648-0489-2.

World Bank. forthcoming. *Education, Health and Poverty in Sudan*. Washington DC: International Bank for Reconstruction and Development/The World Bank.

World Bank. 2016. *Migration and Development: A Role for the World Bank Group*. Washignton, DC: World Bank Group.

World Bank. 2015. *Sudan: Realizing the Potential for Diversified Development*. Country Economic Memorandum, Washington, DC: The World Bank Group.

World Bank. forthcoming. *Sudan: Welfare Impacts of Recent Food Price Hikes, November 2017 - July 2018*. Washington, DC: International Bank of Reconstruction and Development/The World Bank.

World Bank. 2018. *Women, Business and the Law 2018*. Washington, DC: World Bank Group.
file:///C:/Users/WB495217/Downloads/Women,%20Business%20and%20the%20Law%202018_0.pdf.

World Bank/Government of Sudan. 2003. "Sudan: Stabilization and Reconstruction." Country Economic Memorandum, Washington DC.
<http://documents.worldbank.org/curated/en/440091468777571140/pdf/multi0page.pdf>.

Young, Alwyn. 2012. "The African Growth Miracle." *Journal of Political Economy* 120 (4): 696-739.

Zimmermann, Frederick J., and Michael R. Carter. 2003. "Asset Smoothing, Consumption Smoothing and the Reproduction of Inequality Under Risk and Subsistence Constraints." *Journal of Development Economics* 71 (2): 233-260.

IX. Appendices

Appendix A – Additional tables

Table 28: Population estimates and urbanization rates, 2008-2014.

State	Population (thousands)			Growth (annualized, percent)	Urbanization rate, 2009		
	2008 Census	2009	2014		2009	2014	Change (percentage points)
Sudan	30,894	29,199	34,575	3.1%	35.6%	35.0%	-0.6%
Northern	699	711	755	1.1%	17.3%	19.2%	1.9%
River Nile	1,120	1,165	1,343	2.6%	27.8%	28.8%	1.0%
Red Sea	1,396	1,043	1,282	3.8%	55.0%	44.4%	-10.6%
Kassala	1,789	1,708	1,942	2.4%	28.4%	28.2%	-0.2%
Al-Gadarif	1,348	1,409	1,749	4.0%	27.9%	29.7%	1.7%
Khartoum	5,274	5,455	6,017	1.8%	80.9%	81.6%	0.6%
Al-Gezira	3,575	3,571	3,992	2.0%	19.1%	18.2%	-0.9%
White Nile	1,285	1,866	2,057	1.8%	32.2%	33.1%	0.8%
Sinnar	1,730	1,308	1,576	3.4%	20.5%	21.0%	0.5%
Blue Nile	832	893	1,088	3.7%	25.9%	24.3%	-1.6%
North Kordofan	2,920	2,584	3,233	4.2%	20.0%	20.3%	0.4%
South Kordofan	1,406	1,605	1,717	1.2%	23.5%	21.2%	-2.2%
North Darfur	2,113	1,711	2,389	6.2%	21.8%	17.9%	-4.0%
West Darfur	1,308	936	2,050	15.3%	18.3%	21.1%	2.8%
South Darfur	4,093	3,232	3,386	0.8%	26.5%	33.4%	6.9%

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15 and CBS (2009).

Table 29: State-shares in the number of poor by rural-urban and year.

	Rural poverty				Urban poverty			
	\$1.90-poverty line		\$3.20-poverty line		\$1.90-poverty line		\$3.20-poverty line	
	2009	2014	2009	2014	2009	2014	2009	2014
Northern	1.4%	0.3%	2.1%	1.2%	0.9%	0.4%	0.9%	0.8%
River Nile	1.6%	1.8%	2.4%	2.4%	5.5%	0.9%	2.7%	2.7%
Red Sea	5.9%	5.0%	3.8%	4.3%	9.3%	6.8%	8.6%	6.7%
Kassala	6.3%	2.8%	5.6%	5.2%	3.8%	2.5%	1.2%	4.1%
Al-Gadarif	3.6%	3.2%	5.7%	4.1%	3.0%	2.1%	3.5%	3.7%
Khartoum	2.0%	2.6%	3.5%	4.1%	23.1%	41.1%	35.2%	40.6%
Al-Gezira	5.7%	7.6%	9.4%	12.2%	6.2%	4.6%	6.7%	4.7%
White Nile	5.1%	5.8%	7.0%	5.7%	12.9%	5.1%	10.1%	4.6%
Sinnar	4.3%	3.0%	4.5%	4.3%	2.1%	1.9%	2.6%	2.3%
Blue Nile	4.2%	3.0%	4.1%	4.1%	2.3%	2.6%	2.4%	2.9%
North Kordofan	18.3%	12.2%	13.4%	11.7%	2.2%	1.6%	3.4%	3.2%
South Kordofan	7.1%	7.5%	7.7%	6.8%	9.9%	4.4%	5.4%	4.4%
North Darfur	12.0%	13.5%	9.6%	10.7%	6.1%	5.0%	6.9%	3.2%
West Darfur	4.0%	15.4%	5.0%	9.7%	0.0%	7.0%	0.1%	4.0%
South Darfur	18.6%	16.3%	16.2%	13.4%	12.7%	13.8%	10.4%	12.0%

Source: Own calculations based on NBHS 2009 and NHBPS 2014/15. Note: state boundaries defined as in 2009.

Table 30: Poverty headcount ratios by locality and state, 2014.

State	\$1.90						\$3.20					
	All		Rural		Urban		All		Rural		Urban	
	Pov. rate	St. error	Pov. rate	St. error	Pov. rate	St. error	Pov. rate	St. error	Pov. rate	St. error	Pov. rate	St. error
Sudan	13.5%	1.3%	15.7%	1.7%	9.5%	1.8%	46.1%	2.1%	49.5%	2.5%	39.8%	3.9%
Northern	2.1%	1.7%	1.9%	1.6%	3.3%	6.3%	22.6%	5.3%	22.0%	5.8%	25.3%	14.0%
River Nile	5.6%	3.0%	6.8%	4.0%	2.6%	3.4%	29.4%	7.9%	27.6%	9.7%	33.8%	13.5%
Red Sea	19.8%	5.6%	24.5%	8.6%	13.8%	5.6%	62.1%	7.2%	66.5%	10.7%	56.5%	8.9%
Kassala	6.5%	4.0%	6.9%	5.3%	5.4%	4.5%	40.1%	8.0%	41.6%	10.4%	36.2%	10.9%
Al-Gadarif	7.9%	4.2%	9.2%	5.6%	4.7%	4.1%	36.4%	8.1%	37.1%	10.4%	34.8%	12.5%
Khartoum	9.4%	3.1%	8.2%	5.6%	9.7%	3.6%	40.2%	7.0%	41.5%	11.0%	39.9%	8.3%
Al-Gezira	8.0%	3.5%	8.1%	4.0%	7.4%	6.7%	39.7%	6.1%	41.6%	6.9%	31.1%	13.3%
White Nile	12.8%	3.7%	14.8%	4.6%	8.6%	5.5%	41.8%	5.6%	46.3%	6.7%	32.6%	8.5%
Sinnar	8.0%	3.4%	8.4%	3.9%	6.7%	7.1%	37.4%	6.5%	38.5%	7.6%	33.4%	12.2%
Blue Nile	12.4%	3.3%	12.7%	3.7%	11.4%	7.0%	54.7%	5.1%	55.4%	5.7%	52.8%	11.3%
North Kordofan	13.9%	3.5%	16.7%	3.8%	2.7%	4.1%	45.2%	6.3%	50.7%	6.8%	23.5%	5.5%
South Kordofan	22.1%	5.2%	23.5%	6.0%	17.8%	10.8%	63.2%	4.5%	61.6%	5.3%	68.1%	7.6%
West Kordofan	14.5%	5.2%	15.8%	6.1%	8.3%	5.3%	50.1%	6.4%	51.3%	7.5%	44.9%	9.5%
North Darfur	22.4%	6.6%	24.3%	7.6%	13.6%	9.0%	56.5%	9.3%	60.9%	10.2%	36.0%	15.6%
West Darfur	24.4%	5.3%	28.3%	6.0%	12.2%	5.8%	55.9%	6.6%	61.4%	6.4%	38.5%	12.4%
South Darfur	22.1%	6.2%	27.1%	7.6%	12.1%	9.1%	62.8%	7.4%	69.4%	7.9%	49.3%	13.8%
Central Darfur	35.1%	6.6%	37.4%	7.7%	25.0%	9.5%	67.5%	7.3%	71.4%	7.8%	50.7%	16.4%
East Darfur	20.0%	4.3%	19.3%	5.6%	21.4%	6.5%	55.1%	5.3%	53.5%	7.1%	58.1%	7.5%

Source: Own calculations based on NHBPS 2014/15.

Table 31: Inequality measures by locality and state, 2014.

	Percentile ratios				Atkinson measures			Generalized Entropy (GE) measures			
	Gini	p(90)/p(10)	p(90)/p(50)	p(75)/p(25)	A(0.5)	A(1)	A(2)	GE(-1)	GE(0)	GE(1)	GE(2)
All Sudan	0.342	4.212	2.127	2.065	0.101	0.179	0.305	0.219	0.197	0.237	0.473
All rural	0.312	3.910	1.994	2.013	0.081	0.150	0.269	0.184	0.162	0.177	0.256
All urban	0.376	4.466	2.278	2.198	0.124	0.213	0.347	0.266	0.239	0.302	0.678
Northern	0.275	2.929	1.695	1.758	0.068	0.121	0.205	0.129	0.129	0.161	0.297
River Nile	0.307	3.702	1.941	1.845	0.081	0.145	0.247	0.164	0.157	0.186	0.318
Red Sea	0.303	3.806	2.132	1.922	0.074	0.139	0.245	0.162	0.149	0.161	0.207
Kassala	0.322	3.593	2.098	1.970	0.089	0.158	0.260	0.176	0.172	0.207	0.337
Al-Gadarif	0.307	3.819	1.972	2.014	0.078	0.144	0.255	0.171	0.155	0.170	0.251
Khartoum	0.406	4.875	2.477	2.291	0.141	0.241	0.384	0.312	0.276	0.344	0.692
Al-Gezira	0.291	3.470	1.830	1.921	0.071	0.131	0.229	0.149	0.140	0.157	0.222
White Nile	0.317	3.880	1.945	1.975	0.090	0.160	0.284	0.199	0.175	0.214	0.513
Sinnar	0.302	3.615	2.029	1.997	0.074	0.140	0.256	0.172	0.151	0.160	0.209
Blue Nile	0.270	3.068	1.870	1.746	0.063	0.114	0.198	0.124	0.121	0.143	0.250
North Kordofan	0.317	4.369	2.184	2.032	0.081	0.154	0.299	0.213	0.167	0.172	0.213
South Kordofan	0.285	3.249	1.865	1.825	0.067	0.124	0.221	0.142	0.133	0.144	0.184
West Kordofan	0.293	3.878	2.065	2.007	0.068	0.131	0.241	0.159	0.140	0.143	0.169
North Darfur	0.316	4.173	2.072	2.076	0.080	0.151	0.271	0.186	0.164	0.171	0.218
West Darfur	0.401	5.187	2.387	2.318	0.137	0.236	0.379	0.305	0.269	0.333	0.742
South Darfur	0.341	3.939	2.138	1.964	0.108	0.180	0.289	0.204	0.199	0.294	1.276
Central Darfur	0.356	4.735	2.331	2.217	0.107	0.190	0.321	0.237	0.211	0.248	0.510
East Darfur	0.307	4.020	2.041	2.133	0.075	0.144	0.265	0.181	0.156	0.157	0.186

Source: Own calculations based on NHBPS 2014/15.

Table 32: Changes in real per capita household income and contributions by income source by quintile and locality, 2009-2014.

Contribution by source								
	Growth in real per capita household income	Crops	Livestock	Other ag. incomes	Wages and salaries	Commerc e and rents	Transfers	Other non-ag.
(a) Sudan								
All	-19.4%	0.0%	-1.6%	-0.4%	-7.8%	-3.5%	-0.2%	-6.1%
Bottom 20%	10.1%	-1.1%	-3.3%	-0.4%	14.2%	-1.5%	0.0%	2.2%
2nd quintile	-11.8%	-5.4%	-1.9%	-1.2%	-0.3%	4.1%	0.1%	-7.2%
3rd quintile	-20.3%	-1.6%	-1.9%	-0.6%	-3.8%	-3.1%	-0.3%	-9.1%
4th quintile	-20.9%	-0.3%	-2.3%	0.0%	-9.2%	-2.1%	-0.7%	-6.4%
Top 20%	-27.1%	3.0%	-0.5%	-0.2%	-16.0%	-7.5%	0.0%	-5.9%
(b) Rural								
All	-2.4%	0.3%	-2.6%	-0.6%	4.1%	1.0%	0.4%	-5.1%
Bottom 20%	11.3%	2.0%	-2.7%	0.0%	18.0%	0.6%	-0.1%	-6.4%
2nd quintile	-6.4%	-5.4%	-2.0%	-1.4%	7.1%	3.8%	-0.8%	-7.8%
3rd quintile	-9.8%	-1.8%	-3.4%	-0.9%	2.0%	-0.6%	0.4%	-5.5%
4th quintile	-9.9%	-2.9%	-4.8%	-0.3%	2.9%	1.4%	-0.3%	-5.9%
Top 20%	-18.6%	2.9%	-2.2%	-0.6%	-11.4%	-3.6%	0.1%	-3.8%
(c) Urban								
All	-35.1%	-0.4%	-0.6%	-0.2%	-18.6%	-7.5%	-0.7%	-7.0%
Bottom 20%	-11.6%	0.4%	-1.4%	0.5%	-10.4%	-14.8%	0.1%	14.0%
2nd quintile	-25.8%	-1.9%	-0.6%	-0.1%	-20.7%	3.6%	1.7%	-7.8%
3rd quintile	-33.5%	-1.6%	-0.1%	-0.3%	-10.7%	-6.1%	-1.1%	-13.5%
4th quintile	-30.2%	-0.3%	-0.7%	0.0%	-17.3%	-5.0%	-1.0%	-6.0%
Top 20%	-28.1%	0.6%	-0.5%	-0.4%	-14.4%	-7.6%	0.6%	-6.5%

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15.

Table 33: Educational attainment and labor market outcomes, 2009 and 2014.

	Employed (LPM)		Log daily wage	
	(1) 2009	(2) 2014	(3) 2009	(4) 2014
Some or completed primary	0.00 (0.01)	-0.05*** (0.01)	0.15*** (0.04)	-0.06* (0.03)
Secondary	0.00 (0.02)	-0.10*** (0.01)	0.42*** (0.05)	0.12*** (0.04)
Post-secondary and above	-0.03 (0.02)	-0.16*** (0.01)	0.77*** (0.07)	0.34*** (0.06)
Khalwa	0.01 (0.02)	0.00 (0.01)	-0.07 (0.06)	-0.10* (0.05)
DK/NA	-0.01 (0.01)	0.02** (0.01)	-0.27*** (0.04)	-0.19*** (0.03)
Observations	14,059	22,783	9,813	14,905
R-squared	0.06	0.09	0.20	0.10

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses. The excluded category are individuals with no qualifications. All regressions include age, age squared, and a binary indicator for respondent's gender as controls.

Table 34: Changes in employment and daily wage between years, 2009-2014.

	(1) No qualification	(2) Some/comple te primary	(3) Secondary	(4) Post- secondary and above	(5) Khalwa	(6) DK/NA
<i>Panel (a): Employed (linear probability model)</i>						
Year: 2014	0.05*** (0.01)	-0.00 (0.01)	-0.04*** (0.02)	-0.05*** (0.02)	0.04*** (0.02)	0.09*** (0.01)
Observations	5295	8117	3767	2782	2119	14762
R-squared	0.06	0.06	0.12	0.19	0.02	0.06
<i>Panel (b): Real daily wage</i>						
Year: 2014	-0.05 (0.05)	-0.28*** (0.04)	-0.37*** (0.04)	-0.50*** (0.08)	-0.08 (0.08)	0.02 (0.04)
Observations	3,575	5,369	2,802	1,987	1,670	9,315
R-squared	0.07	0.11	0.11	0.13	0.07	0.09

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. Standard errors clustered at the PSU-level are reported in parentheses. The excluded category are individuals with no qualifications. All regressions include age, age squared, and a binary indicator for respondent's gender as controls.

Appendix B – Comparability of surveys and adjustments to sampling weights

253. Sudan's 2014/15 National Household Budget and Poverty Survey (NHBPS) saw the consumptions module administered over three rounds, November-December 2014, March 2015, and August 2015, during which the same sample of households was visited. Sudan's Central Bureau of Statistics (CBS) implemented the NHBPS 2014/15 with funding support by African Development Bank (AfDB). The survey was planned as a panel study during which the same sample households would be revisited three times. This was done with the intent to measure seasonal effects. The two follow-up rounds in March and August administered only the consumption module. But the March-round did not administer module five which records non-food consumption with a twelve-month recall.

254. While data preparation was initially carried out in the same way as in 2009 and by the same team, partial consumption aggregates were averaged across rounds (within households). Data cleaning and preparation in 2015 was carried out in the same way and by the same team as in 2009 survey. Also, both surveys used the Population Census implemented in 2008 as a sample frame. However, the three consumption aggregates that resulted from three separate visits were then averaged within households across rounds. In addition, it was decided to drop households that were not reencountered in either round two or round three, an additional deviation from the 2009 survey, which entailed only one round of data collection.

Table 35: Effects of averaging of consumption aggregates on poverty incidence and inequality.

	CBS aggregates		WB aggregates (minimal data cleaning)			
	May 2009	CBS averaged aggregate (excl. rent and durables) (Nov '14-Aug '15)	November 2014	March 2015	August 2015	Average (Nov '14-Aug '15)
Poverty headcount: \$1.90	14.9	9.3	14.6	14.5	20.8	11.1
Poverty headcount: \$3.20	40.5	41.4	47.1	45.3	53.4	44.8
Gini index (p.c. consumption expenditure)	35.4	29.1	35.9	32.8	36.9	31.0
Gini index (p.c. food expenditure)	-	-	34.1	32.9	32.7	28.6
Real per capita consumption (Nov 2014 prices)	574	508	538	519	493	517

Source: Own calculations based on NHBPS 2014/15.

255. **Averaging of consumption aggregates results in lower estimated inequality and poverty at the USD1.90-threshold.** On theoretical grounds, averaging of consumption aggregates resulting from repeated measurements of the same households would be expected to remove both intra-seasonal variation in consumption as well as measurement error. Depending on the signal-to-noise ratio in the data, the amplitude of seasonal swings in consumption, as well as secular trends, one would expect that the distribution narrows and that one would thus obtain estimates indicating lower inequality than those from individual consumption aggregates. If the median household is non-poor, one would further expect measured poverty rates to be lower. This is exactly what is observed empirically: the Gini index based on the averaged aggregate is 29.1. But it is around three to eight percentage points higher in each round

individually (Table 35). Moreover, poverty at the USD1.90-threshold is 9.3 percent, compared to a range of 14.5-20.8 percent across individual rounds.

256. **Using an averaged aggregate for 2014/15 and a single-visit aggregate for 2009 would therefore result in misleading poverty and inequality trends.** It was therefore decided to use only one of the consumption aggregates in the 2014/15 data, the aggregate resulting from the first visit. The main reason for this is that the consumption data in the first round are expected to accord better with other information collected in the survey, especially incomes, wages, and employment.

257. **An additional complication is that the extent of survey fatigue in the second and third wave is unknown.** Further analysis should eventually explore and incorporate the consumption data collected in 2015. In particular, the extent of survey fatigue should be explored. If households are time-constrained and become increasingly familiar with the questionnaire, one concern would be that they report consumption of fewer items in order to avoid having to give lengthy explanations of the sources of their consumption, prices, etc. If that were the case, consumption would be increasingly underestimated over time and poverty overestimated. A comparison at the item-level of changes in the number of items consumed with consumption values might provide further insights.

258. **Two changes in the design of the questionnaire may have resulted in higher estimates of consumption in 2014/15; however, the effects of these changes are probably minor.** First, the 2014/15 survey has a food-recall period of ten days instead of seven days. This implies that different weekdays are covered by the recall depending on the weekday of the interview. In Sudan, consumption is usually higher on Fridays. Thus, households interviewed between Wednesday and Friday are likely to have higher consumption than other households. It is recommended to run a regression to identify the effects of the interview weekday and correct consumption correspondingly. Second, the 2014/15 survey includes 49 additional food items and 71 additional non-food items compared to the survey from 2009. Even though the previous survey included 'other' items to capture consumption of any items not included, it may be that those additional items were under-reported. Both changes are likely to have resulted in higher estimates of the consumption and thus lower poverty in 2014. However, both effects are unlikely to be large and are ignored in the analysis in this report.

259. **The analysis in this note is based on sampling weights that were adjusted for attrition of households over the course of the three waves of data collection.** As noted above, the 2014/15 NHBPS consisted of three waves of data collection in November 2014, March 2015, and August 2015. During the 2015-waves, only consumption and expenditure data was collected. The aim of this design was to explore and account for seasonality. The national poverty analysis exercise relied on a sample of 11,953 households, with consumption averaged over the three waves. However, inspection of the item-level consumption and expenditure records showed that 13,733 households were initially interviewed.⁵⁵ The remaining 1,780 households, 13 percent of the initial sample, were dropped, typically because they were not interviewed in either wave two or wave three (or both). Sampling weights were scaled-up by CBS, with different scaling factors applied across PSUs. But it is not clear exactly how this was done.

⁵⁵ In addition to detailed expenditure and consumption data, the datasets obtained included household- and enumeration area-identifiers as well as information about the locality (state of residence and rural/urban locality).

Table 36: OLS regressions of key variables on binary indicator of attrition across waves (N=13,733).

	(1) Per capita consumption	(2) Poor (\$1.90)	(3) Poor (\$3.20)	(4) Household size	(5) Khartoum	(6) Darfur	(7) Urban
Attrited	64.053** (14.885)	0.012 (0.009)	-0.042** (0.013)	-0.455** (0.063)	-0.042** (0.007)	0.060** (0.012)	0.053** (0.012)

Source: Own calculations based on NHBPS 2014/15. Note: *, **, and *** denote significance at the ten-, five-, and one-percent level.

260. **Attrition is systematic, giving rise to concerns about sample selectivity bias.** To the extent that survey-nonresponse is random, there will be no concern about biases. However, just as income affects almost all behavior, it might be conjectured that this will also influence the willingness and availability of households to participate in a sample survey. This, in turn, can bias sample survey estimates of poverty and inequality measures. Attrition is clearly systematic: households that were dropped had higher per capita consumption, were less likely to be moderately poor, had fewer members, were less likely to reside in Khartoum but more likely to reside in Darfur, and were more likely to be urban (Table 36). Logit estimates of attrition further suggest that both high-income and low-income households and smaller households were more likely to attrite.

Table 37: Point estimates and confidence intervals of key variables under alternative samples and sampling weights.

Variable	Method	Point estimate	95-percent confidence interval	
			Lower bound	Upper bound
Per capita consumption	Initial weights (N=13,733)	532.6	512.6	552.6
	No adjustment (N=11,953)	531.5	510.7	552.3
	CBS adjustment (N=11,953)	530.7	509.7	551.8
Poor (\$1.90)	Initial weights (N=13,733)	14.1%	12.7%	15.4%
	No adjustment (N=11,953)	13.4%	12.2%	14.7%
	CBS adjustment (N=11,953)	13.5%	12.2%	14.8%
Poor (\$3.20)	Initial weights (N=13,733)	46.0%	44.0%	48.1%
	No adjustment (N=11,953)	46.0%	43.9%	48.2%
	CBS adjustment (N=11,953)	46.1%	44.0%	48.3%
Gini index	Initial weights (N=13,733)	34.6%	32.9%	36.3%
	No adjustment (N=11,953)	34.2%	32.4%	36.0%
	CBS adjustment (N=11,953)	34.2%	32.4%	36.1%

Source: Own calculations based on NHBPS 2014/15.

261. **Attrition had only very minor effects on average per capita consumption, poverty rates, and inequality.** CBS also provided data and Stata code that were used to obtain nominal consumption and included all households, including those that were subsequently dropped, as well as information on initial household sampling weights. This information was used to compare estimates of average per capita consumption, poverty rates, and the Gini index using the 13,733-household sample and the 11,933-household samples and based on adjusted and unadjusted sampling weights (Table 37). Differences were marginal quantitatively and not statistically insignificant from zero.

Appendix C – Welfare Changes Among Renters vs. Owners

262. **The appendix provides further analysis of the issue of rising rents.** As noted in chapter 0, there have been some reports that rents in Sudan, specifically in Khartoum, have increased rapidly since 2009. This is also consistent with increasing crowding in urban areas and with more pronounced declines in per capita expenditure among renters. This appendix aims to shed further light on the potential welfare effects of rising rents.

263. **As questions about actual and hypothetical rents were only included in 2014, the analysis relies on indirect reasoning.** For comparability across years, rents were not included in the calculation of the consumption aggregate. The lack of survey data on rents for 2009 suggests an indirect approach to the analysis that is based on a difference-in-difference-type analysis. Specifically, if rents have lowered living standards (or crowded other expenditure), one would expect to find that changes in consumption expenditure over time to be more favorable for owners. This is what is observed: renters' per capita consumption in 2009 was around 50 percent higher than that of owners ($p < 0.01$) yet the difference shrank to only around 17 percent in 2014 ($p < 0.05$) (Figure 55).

Table 38: OLS regressions - differences in consumption expenditure over time between renters and owners.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	Log consumption expenditure						Log food expenditure
Year: 2014	-0.097*** (0.025)	-0.070*** (0.024)	0.022 (0.024)	0.030 (0.020)	-0.069 (0.043)	-0.056 (0.036)	-0.104*** (0.033)
Log (HH income)						0.208*** (0.008)	0.196*** (0.007)
Renting household	0.200*** (0.034)	0.400*** (0.047)	0.102** (0.042)	0.073* (0.043)	0.058 (0.043)	0.051 (0.036)	0.027 (0.037)
Year 2014 X renting		-0.345*** (0.061)	-0.164*** (0.055)	-0.159*** (0.055)	-0.122** (0.055)	-0.085* (0.046)	-0.051 (0.047)
Urban			0.496*** (0.037)	0.306*** (0.074)	0.152* (0.081)	0.099 (0.071)	0.068 (0.082)
Year 2014 X urban			-0.289*** (0.049)	-0.303*** (0.047)	-0.010 (0.125)	-0.000 (0.101)	-0.086 (0.095)
State-urban fixed effects?				Yes.	Yes.	Yes.	Yes.
State-urban-year fixed effects?					Yes.	Yes.	Yes.
Additional controls?						Yes.	Yes.
Observations	17,875	17,875	17,875	17,875	17,509	17,509	17,509
R-squared	0.117	0.123	0.200	0.258	0.271	0.376	0.314

Source: Own calculations based on NHBS 2009 and NHBPS 2014/15. Note: Standard errors reported in parentheses are clustered at the year-EA level. *, **, and *** denote statistical significance at the ten-, five-, and one-percent level. In addition to those explanatory variables reported in the table, all regressions include the gender and age of the household head as controls as well as the log of the number of household members. Estimates in columns (6) and (7) also include the number of household members between zero and four, between five and 14, and 65 and above.

264. A more robust analysis of the issue of rents shows that the decline in per capita consumption among renters vis-à-vis owners are not driven by more pronounced declines in incomes in urban areas. Simple comparisons over time and between the consumption levels of renters versus owners may be misleading. For instance, renting is more common in urban areas, which might have been hit harder by recent macroeconomic shocks. In that case, allowing for diverging trends in per capita expenditure between rural and urban areas should account for the differences between renters and owners in changes over time. A series of regression models was estimated to explore whether the relationship between tenure status and

changes in per capita expenditure are robust to controls and different ways of modelling trends over time (Table 38). In particular, the inclusion of the interaction term between an urban dummy and the year dummy from column (3) onward should pick up any bias arising from otherwise unobserved heterogeneity in changes in consumption expenditure between urban and rural areas.

265. A more robust analysis of the issue of rents shows that the decline in per capita consumption among renters vis-à-vis owners are not driven by more pronounced declines in incomes in urban areas. The results of OLS regressions show that the difference in the decline is significant even if these factors are accounted for: in particular, the negative effect on the interaction term between the 2014-dummy and renting remains significant even if different trends between rural and urban areas are employed in the estimation.

266. There is also suggestive evidence that rising rents have crowded out other expenditure. Even after controlling for log household incomes (columns (6) and (7)), it is found that renters' per capita consumption expenditure declined by an additional eight percent vis-à-vis owners' while food expenditure declined by an additional five percent. As actual rents are not included in the consumption aggregate, this suggests that increasing rents may have crowded out expenditure on other categories of goods and services. Given Engel's Law, which postulates falling food shares with higher total consumption, it seems plausible that the measured effect is less pronounced for food expenditures only. And given that actual rents would constitute a share of around 10-11 percent of total consumption expenditure among renters, the estimates seem plausible. However, it should be noted that the coefficient estimate on the relevant interaction term in column (6) is significant only at the ten-percent level while the estimate in column (7) is statistically insignificant.