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# RESILIENCE PROFILE - AWEIL

2019

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# RESILIENCE PROFILE - AWEIL

# 2019

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# KEY RESULTS

## DESCRIPTIVE ANALYSIS

- In Aweil 25% of mothers and 40% of fathers live outside the household.

- Most households identify as Christian, predominantly Catholic or Pentecostal, with a small percentage of Anglican, Adventist and Islamic representation. Aweil is quite ethnically homogenous; over 98% of households surveyed are Dinka.

- Our results suggest that communities look most to paramount chiefs and other traditional chiefs, as well as local government for leadership. Most households indicated that traditional leaders play a larger role than political leaders. Aweil's traditional leaders are mostly elected and viewed as very important players by most surveyed households.

- Most households identify as Christian, predominantly Catholic or Pentecostal, with a small percentage of Anglican, Adventist and Islamic representation. Aweil is quite ethnically homogenous; over 98% of households surveyed are Dinka, with small populations of Zande, Jur/Luo and other ethnic minorities.

- Over 30% of households indicated that traditional leaders play a larger role than political leaders and 10% believed they have equal importance. A slight proportion (3.5%) believed political leaders had more influence, but over half of surveyed households did not know which played the more important role.

- Nearly all qualitative responses from interviews and focus groups were critical of political leadership, but had a favorable view of traditional leaders, NGOs, FBOs, churches or peace committees. However, many responses were critical of the effect NGOs and agencies had on the community—that of fostering a sense of dependency and laziness, steering the communities away from self-reliance.

- Only a modest proportion (21%) of households in Aweil are familiar with the humanitarian, development and service agencies in their region, yet over 30% of households stated that NGOs or other agencies affect their household; the difference may indicate data error or poor job by the agencies to properly introduce themselves. Among households familiar with agencies, World Food Programme (WFP) is the most familiar, followed by UNICEF, FAO and MSF. Figure 1.9 indicates the agencies familiar to households that know of at least one agency, bearing in mind that aware households are the minority in all counties.

- Compared to other PAs, the prevalence of households affected by social risks is relatively low in Aweil. Outside the home, households reported burglaries as the most common risk. Within households, the strongly associated risks of alcohol abuse, domestic violence, child abuse and teen pregnancy are common, with particularly deleterious effects on women and children. Nearly 10% of households indicated rape was a prevalent social risk.

- Comments in Aweil indicated the role of trauma and discouragement among youth, leading boys take up arms and go to the bush or see that they have no jobs and feel discouraged about the

future. A focus group of young men commented that "the market is busy with boys and young men trying to drink alcohol to cope with this suffering."

- Focus groups discussions reiterated the effect of conflict and violence on domestic life. Women and children face violence, sexual assault, abandonment; some are forced into marriage for financial or cultural reasons. Women face additional political violence—even from children. Many women generally feared retribution for themselves and their communities from reporting rape. Commentary expressed that young people are "too traumatized" because of constant death.

- Compared to other 7 PAs, Aweil has low-to-moderate rates of literacy and household members that have been to school. Like other PAs, the difference between male and female literacy and education rates is severe. Overall, low literacy and education rates in the PAs are associated with communities where a larger percentage of households live more than 5 km from a primary school.

- Conflict has serious implications on education. Respondents in focus groups complained of how the conflict has closed school, raised costs, led families to migrate to neighboring countries (for children's education), and made transport to school too far, too costly or too dangerous. Comments indicated a dearth of qualified teachers, and that many have left due to conflict or inflation ("due to the dollar"). Focus groups discussions also indicate that dropouts increase as school fees increase, as do class sizes (which may relate to rising costs); a young male focus group complained "In order to maintain quality condition of the school, children should be 45 or 50 in one class and when you go beyond 100, then you cannot control them." Other young males called for an "emergency feeding program that will motivate the children to come to school" and for "resettlement fund to pay school fees."

- Relative to other PAs, households in Aweil have experienced the lowest quality health care services. Less than half of households are served by a qualified healthcare professional, less than 30% receive enough information during health visits, and only 15% were served on time. Focus group discussions highlighted the general discouragement with health services, noting the long distances to hospitals, absence of drugs in pharmacies, and that doctors have given up because of low pay or no facilities.

- The seven PAs generally have a poor view of government services, though opinions in Aweil may be more favorable, with a quarter of households rating the government's overall performance as "good" or "very good". Nonetheless, over 40% gave "poor" or "very poor" ratings. Aweil's population complained about electricity access, poor job creation and corruption. Most focus group discussions of government services complained of poor coordination and respect for local leadership, unequitable distribution of basic services, and natural resource conflicts (i.e. "The Government doesn't have any strategies or policies to prevent these natural resource-based conflicts").

- Most households in the seven PAs experienced lack of food over a 12-month period. Comparatively, Aweil's food insecurity rate of 63% falls within the PA average range. Climate and environmental shocks are the main drivers of food insecurity in Aweil. Hence, proposed agricultural interventions should incorporate agroecological practices that increase soil water absorption to mitigate negative consequences of both floods and drought, and support a diverse ecosystem of insects/animals that facilitates health for natural predators of pests.

- As in most PAs, many households responded to food insecurity by purchasing food with their own resources or relying on relatives or NGOs, including WFP. Gathering wild plants and animals also plays a notable role in curtailing food shortages. Given Aweil's dependency on foraging and hunting during food shortages, protection from regional violence and safe community access to local natural resources will be critical.

- With respect to farming, all PAs focus on carbohydrate-dense grains as the most important crops. Aweil prioritizes sorghum, with over 90% of households claiming it as the most important crop. The high dependency on sorghum can put households and community at risk when particular sorghum varieties fail, as well as compromising dietary diversity.

- Similar to the agriculture's central role in Yambio, Aweil focus group discussions highlighted agriculture's role in food security, as well as in cultural identity, peace and dignity – and mentioned that "when the dollar issue appeared, the State Authorities encouraged people to go for agriculture and advised them that there's no way out unless through agriculture.

- Most of Aweil's working population is engaged in crop production. Women and young females are more likely than males to work in catering and food processing, while males dominate construction, motor vehicle mechanic work and carpentry industries and livestock production. Market livelihood activities varied less by gender. Petty trade, casual labor, and firewood collection stand out as the dominant market livelihood activities.

- Aweil is highly dependent on agriculture for food and economic security yet faces severe agronomic, capital, environmental and market constraints. In addition to climate and market uncertainties, the internal and external conflicts/violence that communities face requires special attention to the social, educational and gender components of any agriculturally-based intervention. Qualitative data show strong resolve and desire for community-based self-sufficiency based in agriculture revealed how intimately vocation is intertwined with mental health resilience.

**RESILIENCE MEASUREMENT**

- For the Access to Basic Services pillar, variables reflecting access to high quality health care and access to markets play the strongest roles.

- The variables that contribute the most to the Adaptive Capacity pillar are those related to agricultural livelihood strategies: the number of agricultural livelihood activities and the number of crops planted.

- Access to remittances from South Sudan carried the most weight in the Social Safety Nets pillar, followed by knowledge of organizations doing humanitarian or development work in the community; access to remittances from outside the country played the smallest role

- As expected, the estimated resilience score has a positive effect on food security, as measured by the predicted numbers of household meals consumed and by the predicted Household Dietary Diversity Score (HDDS). Resilience has stronger impacts on quantities of food consumed than on dietary diversity, with the largest impacts on the number of meals consumed by the youngest age group (children 2–5 years old).

- Of the four pillars, only Assets and Adaptive Capacity have positive significant effects on the resilience score.

- Calculated pillar elasticities suggest that a one percent increase in the Adaptive Capacity and Assets pillars is expected to increase the resilience score by 0.51 percent and 0.46 percent, respectively.

- Increases in the resilience score in turn increase food security, with the strongest effect on feeding of young children. An increase of one percent in resilience is expected to increase the number of per capita meals for children aged 2–5 years by 0.46 percent. The corresponding elasticities for meals for children aged 6–12 years and children over 12 and adults are 0.27 and 0.28, respectively. The Household Dietary Diversity Score shows the lowest elasticity of 0.08.

- Female-headed households in Aweil have somewhat lower values for the Adaptive Capacity and Assets pillars and have worse outcomes for all of the food security indicators. This is particularly the case for the numbers of meals consumed, with especially stark disparities in meals consumed by older children and adults.

- For the Assets and Adaptive Capacity pillars, households in Aweil showed the lowest scores and households in Gomjuer had the highest. This is reflected in Gomjuer's strong performance on food security indicators.

- Female-headed households show significantly lower resilience than male-headed households, while households in Gomjuer have higher resilience than those in other areas.

- Improvements in governance have a significant positive effect on resilience, while improvements in institutions have a weakly significant positive effect.

# BACKGROUND AND INTRODUCTION

Following four decades of civil war, South Sudan's independence in July 2011 was met with international goodwill focused on putting the country on a development trajectory that finally brings about food security, health, education, and economic growth and development. However, a resumption of civil war in 2013 hindered the country's road to economic development. The protracted conflict has created a humanitarian crisis in the country that has left tens of thousands of people dead, displaced millions more, and worsened food insecurity in the country. Livelihoods have further been battered by the effects of climate change due to more frequent and prolonged droughts and floods as well as pest infestations. Food production has been destabilized by the war, droughts, and weak national institutions and policies, and as a result in early 2017, parts of South Sudan, particularly in the north, experienced a famine that affected about half of the population. More recently, the latest integrated food security phase classification shows that in January 2018, 48 percent of South Sudan's population (5.3 million people) was estimated to be facing crisis and emergency acute food insecurity.

The effects of a long-drawn-out conflict and climate change in the face of a weak national policy system and institutions have severely affected the food security, nutrition, and well-being of South Sudan's most vulnerable. Therefore, South Sudan requires a broad coalition of support to address not only the urgent humanitarian crisis but also to help restore production systems and help communities cope, recover, and build their resilience to shocks and crises. Restoring production systems and productivity is important because growth in the agricultural sector remains the most effective driver for poverty reduction and restoring livelihoods in many African countries.

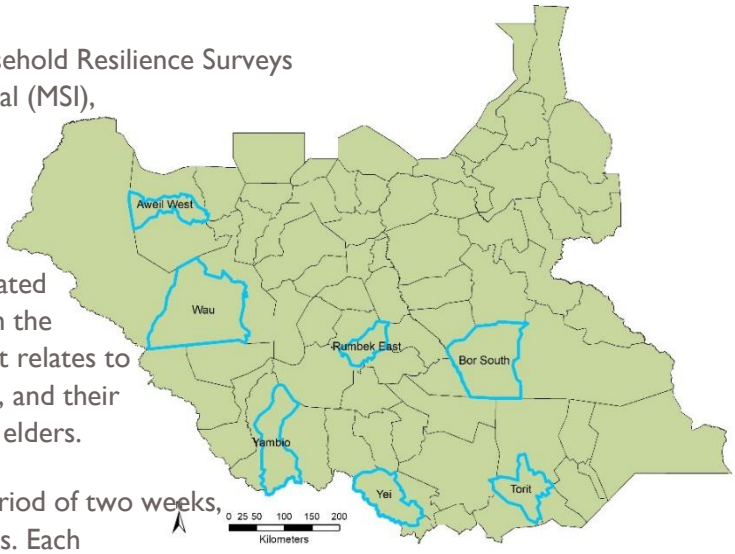
Given the multiple players involved and the weak national policy and institutional apparatus in the country, the United States Agency for International Development (USAID) in South Sudan has put together a Partnership for Resilience and Recovery (the Partnership, hereafter) in South Sudan that places community institutions at the center of efforts to build the resilience of livelihoods and production systems in the country. The proposed partnership is aimed at producing business models (interventions) for integrated humanitarian and development services through community-based delivery mechanisms that emphasize the productive sector as the foundation for resilience and recovery in five target regions: Torit, Wunlit Corridor, Wau, Aweil, and Yambio. The partnership provides a framework for the colocation of investments across all sectors; coordination of activities across partners; and collaboration among partners and stakeholders in defining and delivering interventions that achieve social cohesion, resilience, and recovery for long term development.

This report is an input into efforts to design interventions and investments in Yambio. It shares detailed findings from household data collection which shed light on living conditions, livelihood strategies, and household resilience in the region. The report has two major sections, which discuss findings from the descriptive analysis and from econometric analysis of resilience, respectively. Section one is divided into subsections on demographics; trust in people and institutions, including leadership, institutions and conflict; access to basic services, including education, health services, water, and other government services; and productive capacities, including food insecurity, agricultural productivity and market access. In section two, we implement the FAO's Resilience Index Measurement and Analysis-II (RIMA-II) methodology to explore the contribution of the factors discussed in section one to household resilience and food security. Section two discusses the calculation of the RIMA index and explores additional determinants of resilience. Both section one and section two end with a summary of key messages.

# DESCRIPTIVE ANALYSIS

## 1.1. DEMOGRAPHICS

This analysis is based on the Community Household Resilience Surveys completed by Management System International (MSI), in 2018. Data was collected from the seven counties, known as Partnership Areas (PAs) in South Sudan: Yambio, Awiel West, Torit, Wau, Bor South, Yei and Rumbek East. Consultations with various stakeholders facilitated the selection of these seven communities, with the objective of profiling community resilience as it relates to conflicts, livelihoods, poverty, shocks, markets, and their distinct impacts on men, women, children and elders.




Household surveys were conducted over a period of two weeks, including travel, training and fieldwork activities. Each enumerator surveyed roughly 60 households. Enumeration Areas were selected by probability proportion according to household size.
The sampling frame was based on the 2008 Population and Housing Census conducted in South Sudan, with some updated information (Lulbaale, 2018). Though sample sizes (n) differ for individual questions, the number of households surveyed is enough to validate the survey results as acceptable basis to guide policy design and implementation (Table 1.1). We also use qualitative MSI data gathered from focus groups discussions with farmer groups, adult females, adult males, male youth, female youth, schoolteachers, female farmers, male farmers, community-based organizations (CBOs), government peace committees, faith-based organizations (FBOs), and key informant interviews with local leaders, chiefs, executive directors, teachers and peace committees. All qualitative data in quotes comes from MSI focus groups and interviews.

The average size of the households surveyed in Aweil was 6.4 persons. Our results suggest that households in all PAs face displacement and migration of family members. The absence of parent(s) in the household can hinder resilience by increasing the dependency burden on other adult caregivers or teenage children; research indicates that lower dependency ratios facilitate higher the adaptive capacity (Vincent, 2007). The MSI survey indicates that in Aweil nearly 25% of mothers and 40% of fathers live outside the household. A negligible percentage of families reported a deceased parent(s) or that they do not know whether the parent living outside the household is alive or deceased (Figure 1.3).

Most households identify as Christian, predominantly Catholic or Pentecostal, with a small percentage of Anglican, Adventist and Islamic representation (Figure 1.2). As shown in Figure 1.1,
Aweil is quite ethnically homogenous; over 98% of households surveyed are Dinka, with small populations of Zande, Jur/Luo and other ethnic minorities.

Population distribution in Aweil suggests that there are more women than men (Figure 1.4), but there is a significant difference between adult (age 20-59) and young adult (age 10-19) women. Among older generations (age 60 and older) and young children, the distribution of men and women within households is more balanced (or dominated by males among elderly), suggesting that the gender imbalance onset

occurs as boys become adolescents or young men. Elderly men and young boys may be less likely to migrate or become involved in "bush" groups or conflict.

**Figure 1.1**

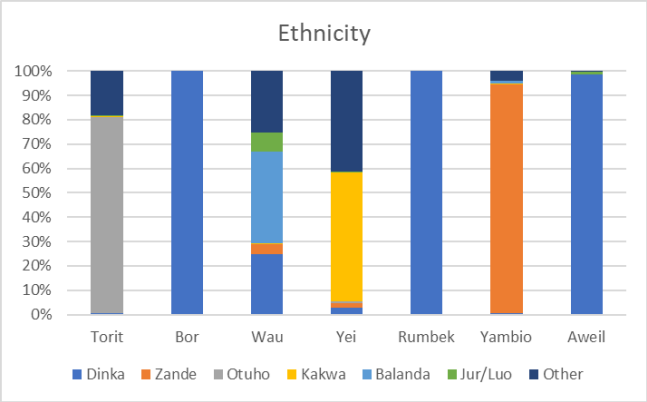



**Figure 1.2**

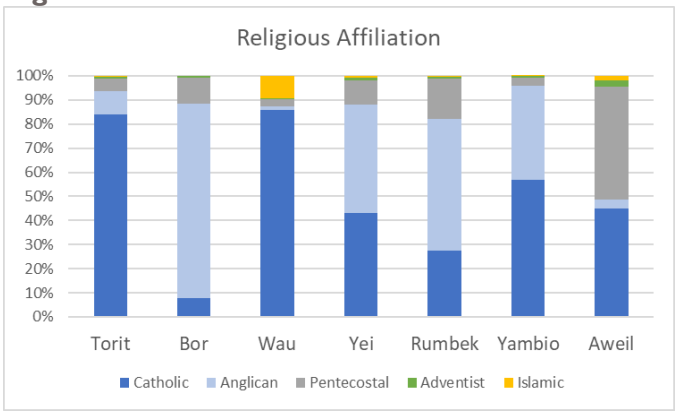



**Figure 1.3**

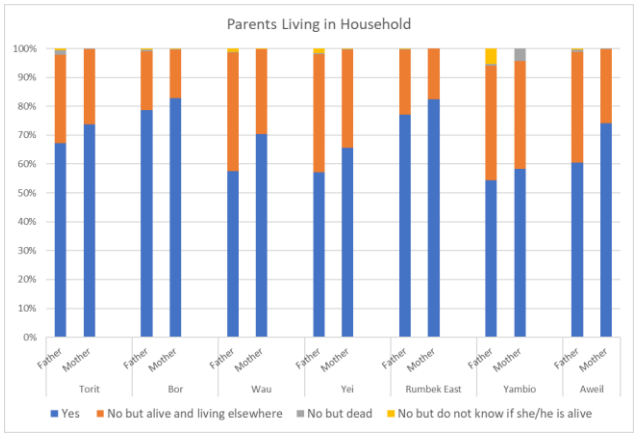
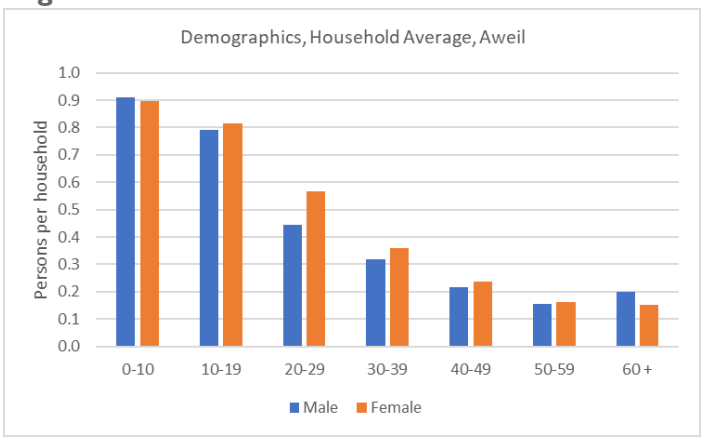



**Figure 1.4**




## 1.2. TRUST IN PEOPLE AND INSTITUTIONS

### LEADERSHIP AND INSTITUTIONS

Our results suggest that paramount chiefs and other traditional chiefs play the largest leadership role in Aweil, as well as local government and NGOs to a slightly lesser degree. Police and Peace and Land Committees do not play a significant role, and CBOs, FBOs and central government play a modest role (Figure 1.7).

Over 30% of households indicated that traditional leaders play a larger role than political leaders and 10% believed they have equal importance. A slight proportion (3.5%) believed political leaders had more influence, but over half of surveyed households did not know which played the more important role (Figure 1.5). Aweil's traditional leaders predominantly inherit their roles or are appointed; only 11% are elected (Figures 1.6). The uncertainty in Aweil about relative importance of traditional vs. political leaders may partly relate to the basis of authority. Across the seven PAs traditional leaders seem to carry more importance in the counties that predominantly elect them (Figures 1.5 and 1.6).

**Figure 1.5**

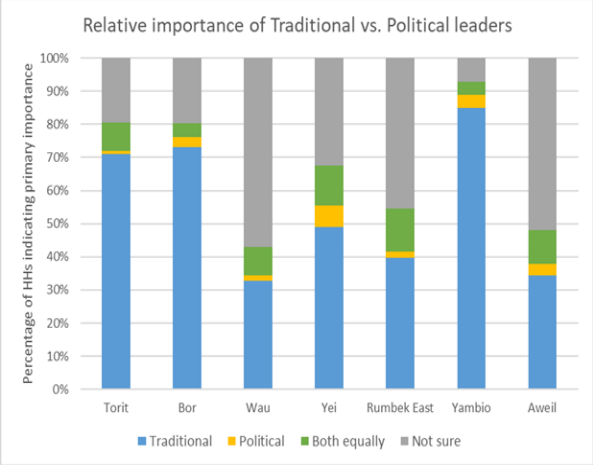
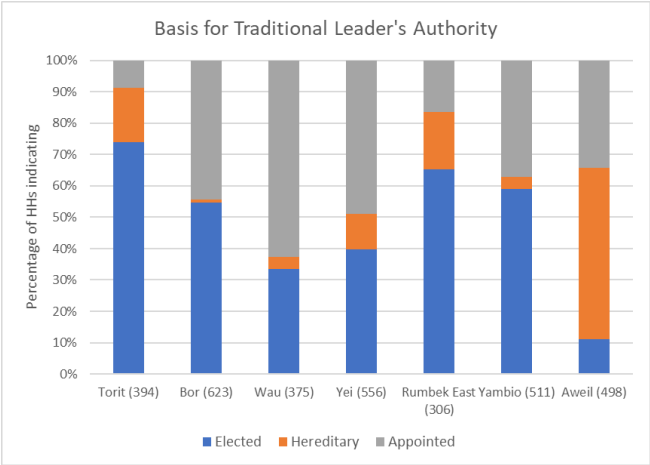



**Figure 1.6**




Nearly all qualitative responses from interviews and focus groups were critical of political leadership, but had a favorable view of traditional leaders, NGOs, FBOs, churches or peace committees. However, many responses were critical of the effect NGOs and agencies had on the community—that of fostering a sense of dependency and laziness, steering the communities away from self-reliance. As one paramount chief indicated "Our people are now very lazy because most of them got used to free food and they aren't as productive as they were two decades ago." There was a sense that "It is going to take us long to change such adopted attitudes and it would be easier if support addressed self-reliance, encouraged agriculture and microfinance."

Setting up peace committees was identified as the most positive government action, but most qualitative responses indicated extreme lack of trust in political leadership. Much like in Yambio, this distrust is most likely tied to the belief that politicians are characterized by greed, lack of transparency and accountability, especially related to finances and natural resources. As one young man stated, "Deng Nhial died because of this country. Garang Mabior also died because of this country. The leaders who remained to succeed the late Garang are now fighting for power because of greediness." Most comments indicated that politicians cling to power, appoint offices based on favoritism instead of qualification or education, and use money to buy weapons and protect themselves at the cost of others. Discussions revealed anger over government silence about atrocities, lack of support for victims, government threatening civilians, the absence of law, order and constitution, and limited contact with communities—highlighting the difference between towns and more rural areas "where they apply tradition Laws of Wanth-Alel." They emphasized that "decisions at the grassroots level made by traditional leaders/chiefs always refer to Wan Alail Laws as an agreed customary law which has adopted [here in Bahr-El-ghazal region]. Comments from Aweil also noted that government needed to improve its coordination with local government and traditional chiefs, and not undermine local leadership. As one key informant put it "Local government is weak, because at the national level, we don't have the local government ministry."

**Figure 1.7**

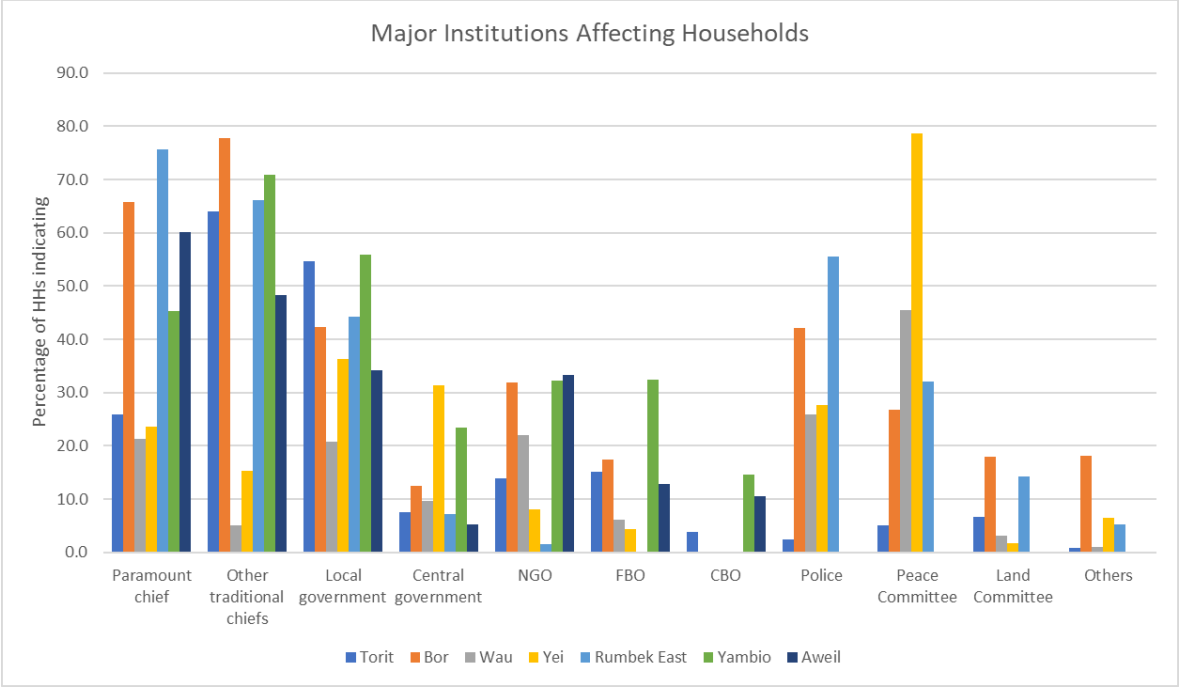
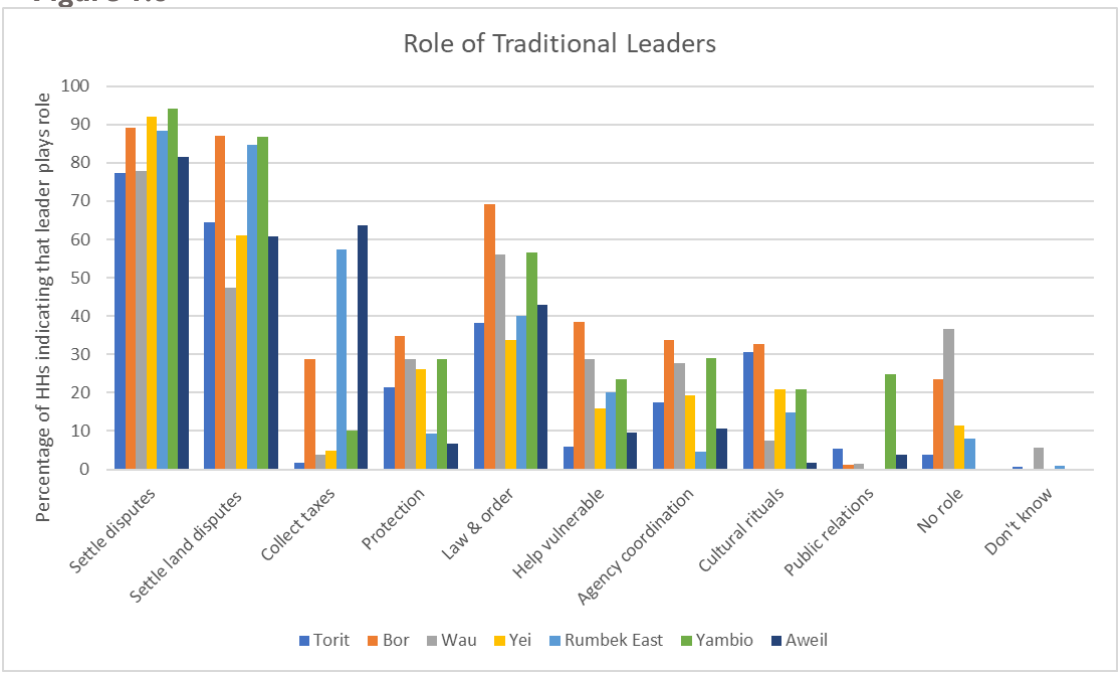



**Figure 1.8**

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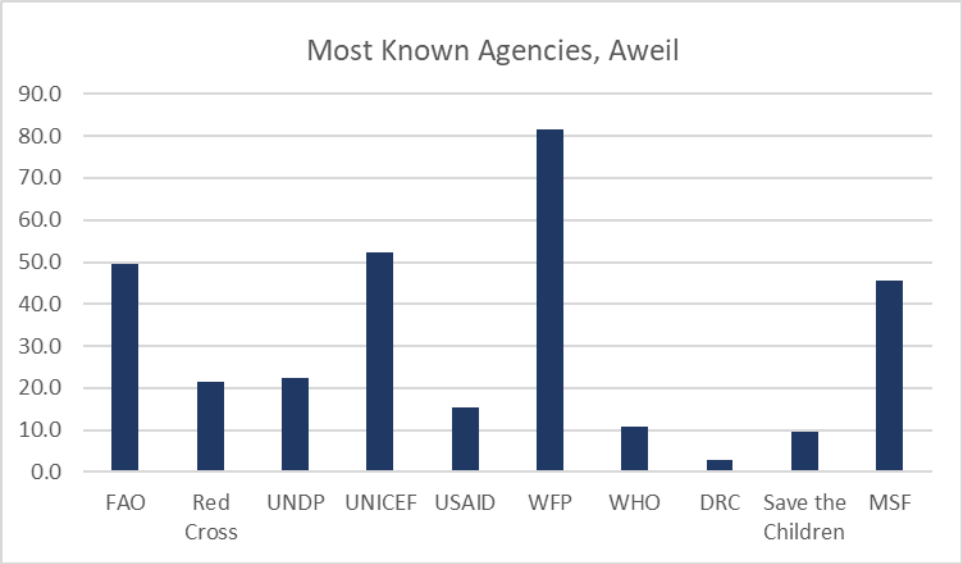
is the most familiar, followed by UNICEF, FAO and MSF. Figure 1.9 indicates the agencies familiar to households that know of at least one agency, bearing in mind that aware households are the minority in all counties.

**Figure 1.9**




## CONFLICT AND RESOLUTION

**Figure 1.10. Predominant Social Risks, by Country and Risk Type**

Figures 1.10 and 1.11 indicate the pervasive social risks and threats of violence in Aweil and other PAs, both domestically and outside the home. Compared to other PAs, the prevalence of households affected by social risks is relatively low in Aweil.


Outside the home, households reported burglaries as the most common risk. Within households, the strongly associated risks of alcohol abuse, domestic

violence, child abuse and teen pregnancy are common, with particularly deleterious effects on women and children. Nearly 10% of households indicated rape was a prevalent social risk.

**Figure 1.11**

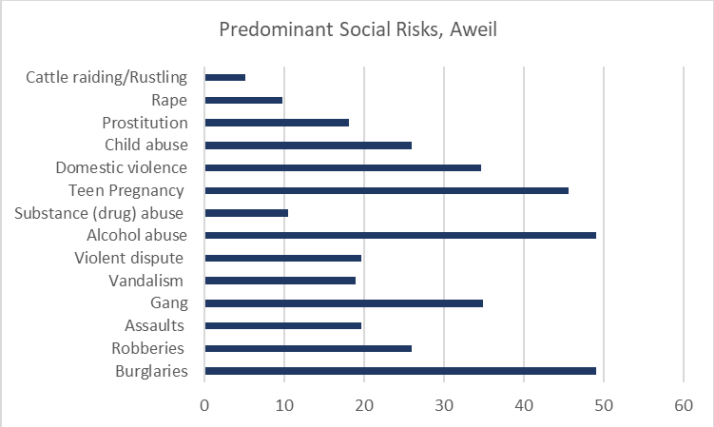



**Figure 1.12**

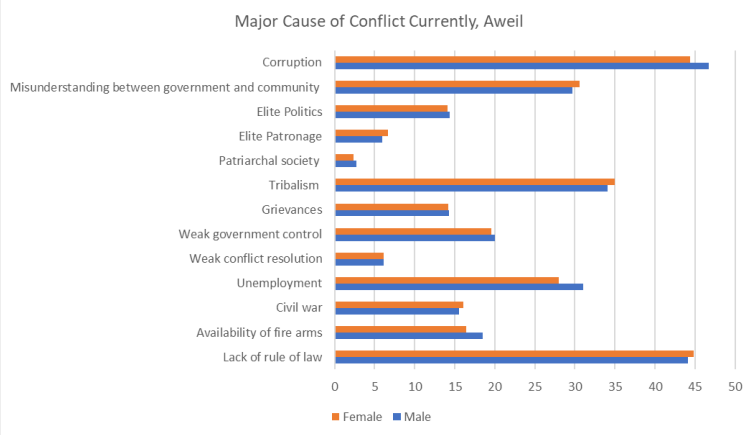
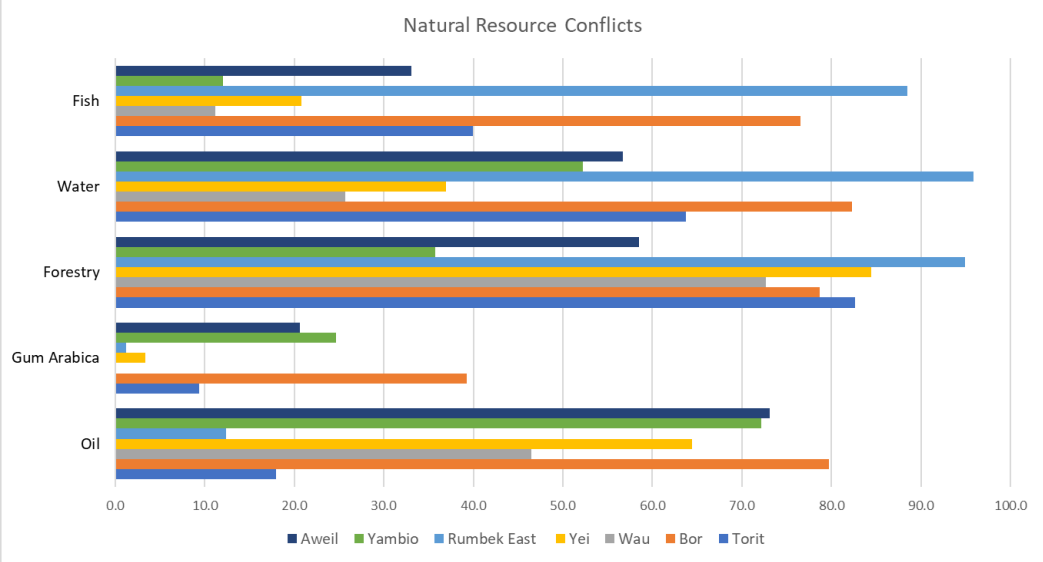
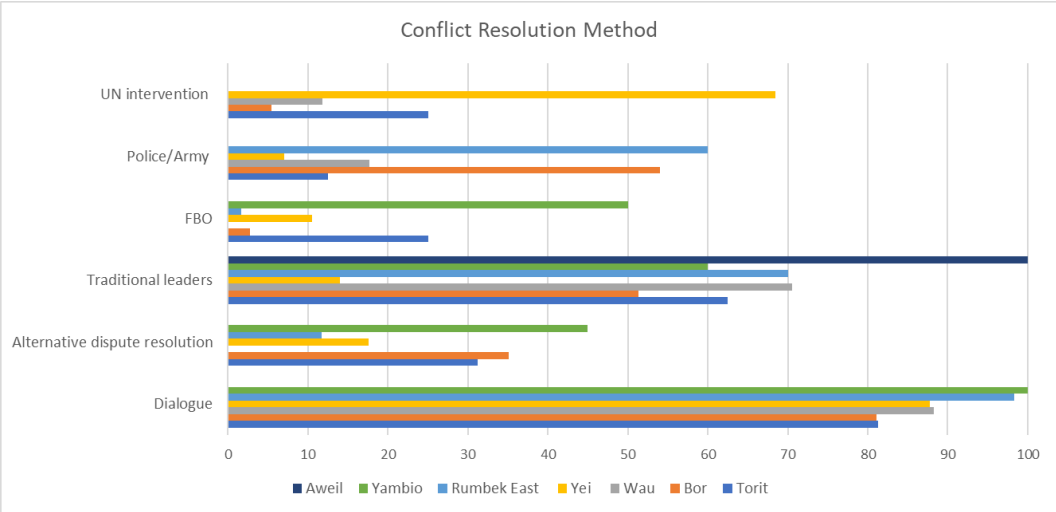



**Figure 1.13**




A number of surveyed households identified corruption and lack of rule of law as the main contributors to conflict, as well as tribalism, misunderstanding between government and communities, and unemployment (Figure 1.12). Overall, households cited various causes, including conflicts over natural resources, especially oil, forestry and water (Figure 1.13) According to the survey, 100% of households surveyed believe traditional leadership remains the primary method to resolve disputes. Households identified lack of trust and dishonesty among conflicting parties as the primary bottlenecks to conflict resolution. The role of political greed and external influence in Aweil (Figure 1.17) may relate to natural resource conflicts (Figure 1.13).

**Figure 1.14**




Responses from focus groups and interviews echo the threats from alcohol, domestic and gender-based violence, resource-based conflicts, tribalism and fire arms availability. Qualitative data largely corroborates the survey data but offers further nuance, particularly regarding the effects of trauma, gender-related threats, the role of propaganda and youth, and the various ways that livestock play into conflicts.

Comments in Aweil indicated the role of trauma and discouragement among youth, leading boys take up arms and go to the bush or see that they have no jobs and feel discouraged about the future. A focus group of young men commented that "the market is busy with boys and young men trying to drink alcohol to cope with this suffering." Female farmers indicated that "Right now youth have joined the army which is not right because they are supposed to be in school but due to the conflicts, they were forced to join." Tribal communities are recruited into conflict events, such that revenge spreads from singular victimized households to entire communities. Many comments cited political manipulation, particularly of youth, as a lynchpin of sustaining violence. "Politics is a driver of conflict because people are using those people at grassroot level who do not know what they are doing and then they institute certain propaganda."

Respondents reported resource conflicts over timber, oil and suspicion about external oil interest and other countries using South Sudan. Comments addressed land and water competition from migrating livestock, which may destroy agricultural crops or contaminate drinking water. "Jur (Arabs) is the conflict actors because when they come to our place, we welcome them and when we go to their place they attack us, instead of welcoming us…. The problem of Jur is when the land is dry, they bring their cattle here to graze and drink water. Some comments noted that the government has banned grazing in select areas due to conflict violence. Land resource conflicts arise between tribes, sometimes leading to cycles of conflict/revenge, but also due to the land policy and community confusion about what it means to own

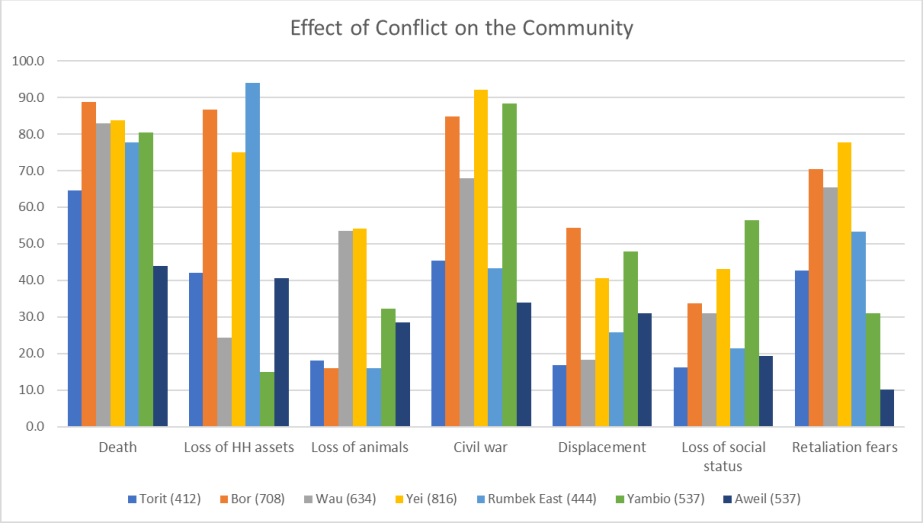
land. "We are not aware of what it means to own land, especially here in Northern Bahr-El-Ghazal." Cattle conflicts relate to communal natural resources as well as theft, including cattle-raiding for marriage purposes, or settling conflicts: "For someone who steals one's cows or goats or somebody who impregnates a lady, he must pay three cows, but if you impregnate someone's wife, then a number of seven cows must be paid as a fine." Male youth identified that "Culture is a driver of conflicts because of cattle raiding for cows to enable marriages."

Focus groups discussions reiterated the effect of conflict and violence on domestic life. Women and children face violence, sexual assault, abandonment; some are forced into marriage for financial or cultural reasons. Women face additional political violence—even from children. Many women generally feared retribution for themselves and their communities from reporting rape. Commentary expressed that young people are "too traumatized" because of constant death.

Focus groups and interviews further illuminated the types of conflict resolution that resonate with communities. Across various groups (male, female and youth) people emphasized the need for understanding and forgiveness instead of revenge. Comments about traditional and paramount chiefs corroborated the survey responses, highlighting local and traditional leaders' role in gathering people to listen, solve conflict and ensure united communities. As one local leader described, "As a community, we organize ourselves such that if a girl is impregnated, instead of fighting because of that mistake, then we sit down, talk about it and solve it as a community." Discussions reflected the positive role of peace processes through the church. Both men and women articulated the benefits of gender-based training for building familial trust and equality.

Many comments from youth focus groups revealed a strong desire for peace clubs, though they appear to be mostly absent in Aweil, "There are number of school students who are looking for a peace club to join, so that they can demonstrate it and encourage others to join." Other comments indicated praise for male and female sports and cultural activities such as dances that "bring people together and shows that they are understanding and learning more about each other."

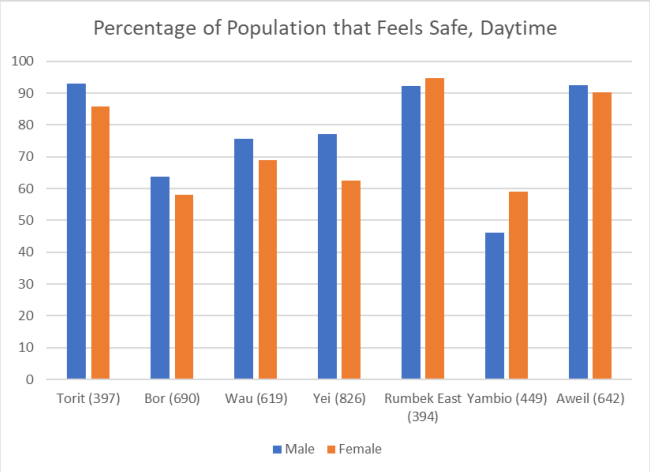
**Figure 1.15**




Most of households identified civil war, loss of household assets and death as the primary effects in their community (Figure 1.15). While a majority of men and women feel safe during the day in their

communities, far fewer women feel safe at night (Figure 1.16). Qualitative data also echoed the felt sense of fear and trauma's hold on communities. Though the psychological trauma and mental health disorders that stem from conflict, violence and social risks are difficult to quantify, they will likely play a major role in household and community resilience (Michalopoulos et al., 2015).

**Figure 1.16**



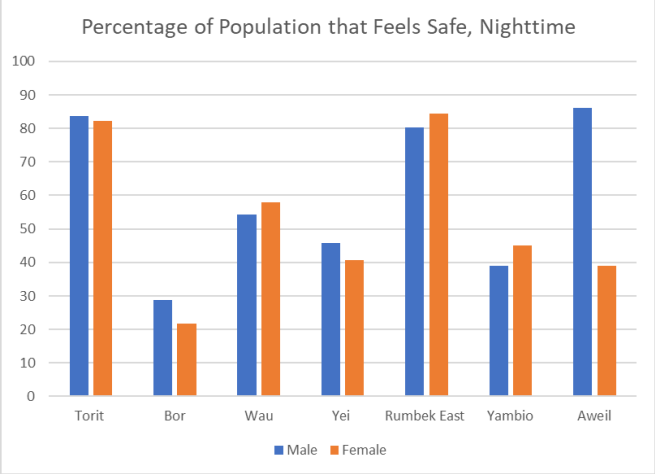
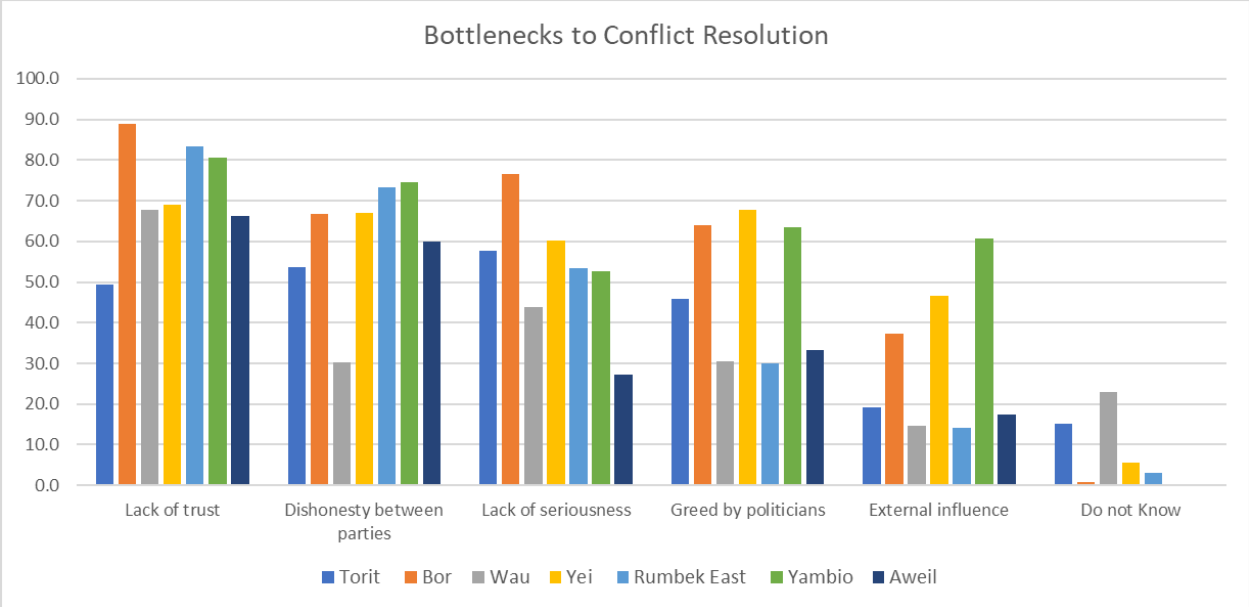




**Figure 1.17**




## 1.3 ACCESS TO BASIC SERVICES

### EDUCATION

Compared with the other 7 PAs, Aweil has low-to-moderate rates of literacy and household members that have been to school. Like other PAs, the difference between male and female literacy and education rates is severe. Overall, low literacy (Figure 1.18) and education rates (Figure 1.19) in the PAs are

associated with communities where a larger percentage of households live more than 5 km from a primary school (Figure 1.20) and where no secondary school exists (Figure 1.21), even though these communities often identified cultural barriers, not school distance, as the predominant reason not to attend school (Figure 1.22). Qualitative responses (below) reveal more nuanced perspectives on the barriers to school attendance. In Aweil, most schools are government-funded (Figures 1.23 and 1.24), with a modest proportion of privately-owned schools.

**Figure 1.18**

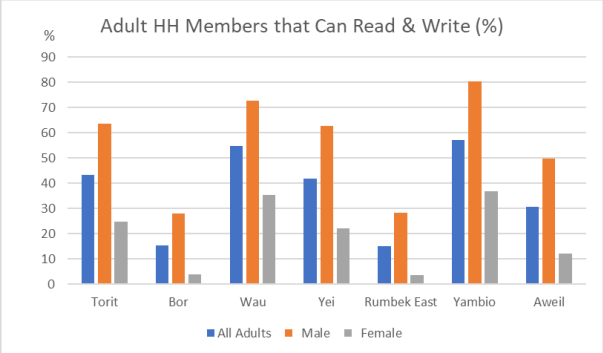
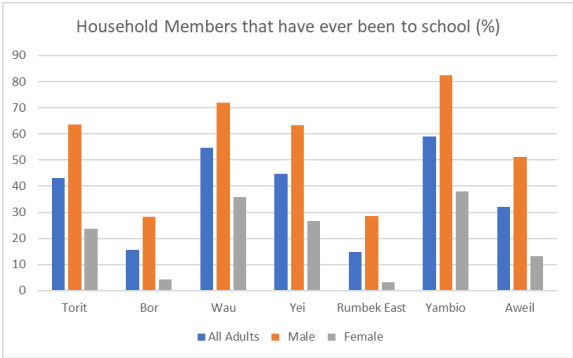



**Figure 1.19**



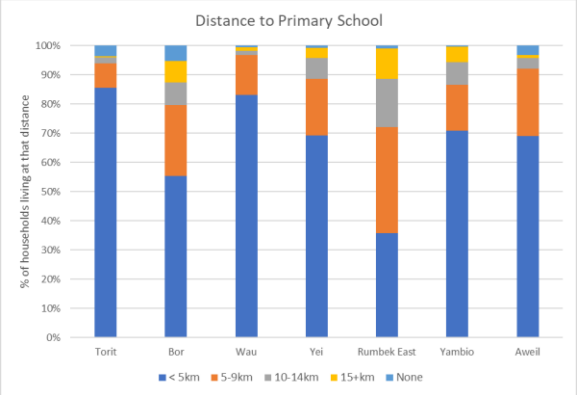




**Figure 1.21**

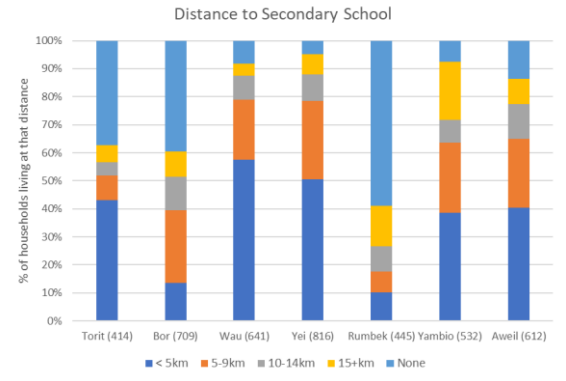


**Figure 1.22**

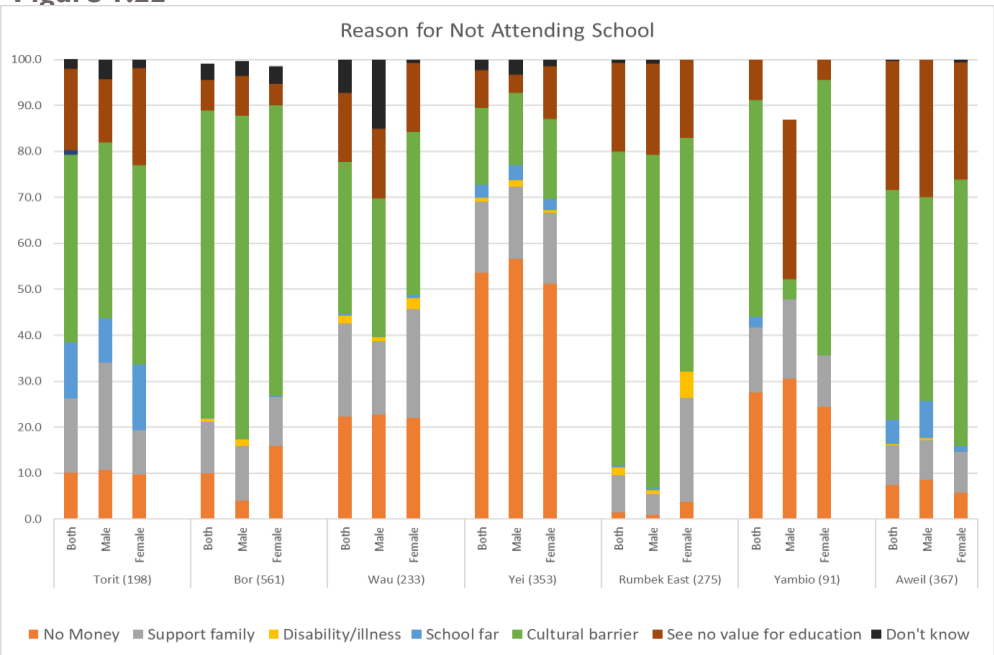



**Figure 1.23**

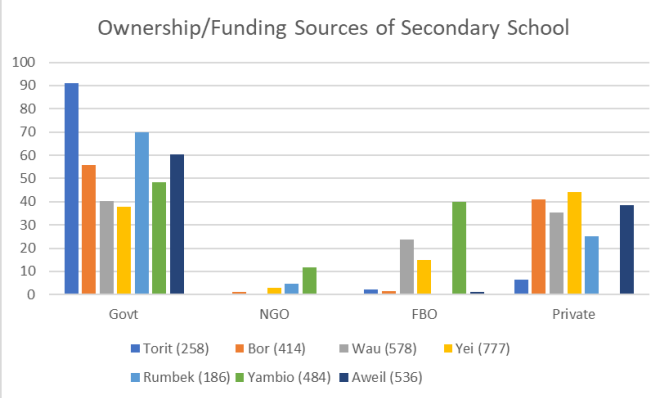
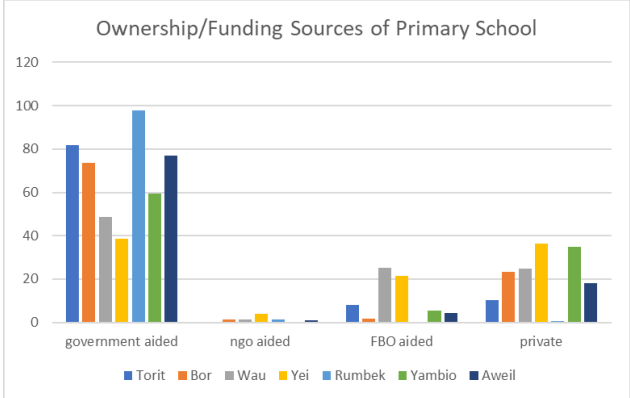



**Figure 1.24**




Conflict has serious implications on education. Respondents in focus groups complained of how the conflict has closed school, raised costs, led families to migrate to neighboring countries (for children's education), and made transport to school too far, too costly or too dangerous. Comments indicated a dearth of qualified teachers, and that many have left due to conflict or inflation ("due to the dollar"). Focus groups discussions also indicate that dropouts increase as school fees increase, as do class sizes (which may relate to rising costs); a young male focus group complained "In order to maintain quality condition of the school, children should be 45 or 50 in one class and when you go beyond 100, then you cannot control them." Other young males called for an "emergency feeding program that will motivate the children to come to school" and for "resettlement fund to pay school fees."

Unfortunately, no focus groups among young women in Aweil were conducted, so it is difficult to ascertain their perspectives. However, in other PAs, mothers and even young females have taken incredible initiative to pay for school, working and saving up before courses begin. In Aweil, several female farmers expressed their heavy responsibility in covering children's school fees: "We have no other source of income apart

from this small business because without this business, our children will not be able to go to school and we will also not get treatment in the hospital," and "I lost my husband in 2005 and am just trying hard to earn a living and things are very hard for me. My kids stopped studying because I can no longer afford school fees and enough food for them;" and "I try saving money after selling my farm products, so that I can be able to pay my children's school fees. That is the only way we are pushing on with life."

Several respondents indicated the significance of language in education—and how NGOs and international agencies have disrupted the value of local languages. As a male youth pointed out: "The Government is saying that English should be the official language, but I think that is creating challenges among the people." Another pointed out the educational and livelihoods difficulties related to this shift: "Language variation is one the challenges—when you are told to go to English, but you have a foundation in Arabic." The need for Arabic or English language skills has shifted over time. Now many are attuned to the value of learning English due to NGO work opportunities and requested that languages be taught earlier than in high school. Youth also called on their parents to teach their children the languages they know even before sending children to school, to take advantage of existing knowledge at home. Cultivating language-learning in the home could protect against potential future shifts in dominant institutions. As one young man complained "I know some who are working in the NGOs and they don't know Arabic. NGOs want English speakers and if you don't know English, then you cannot work." The language tension may represent a broader tension about access to job market, education and sending children away for education, which is often possible only for more wealthy households. Or, as a peace committee stated, "If the level of education in a certain place is low, then educated ones see themselves as elites and manipulate the rest; this inevitably creates political conflict between the elites and uneducated ones in power."

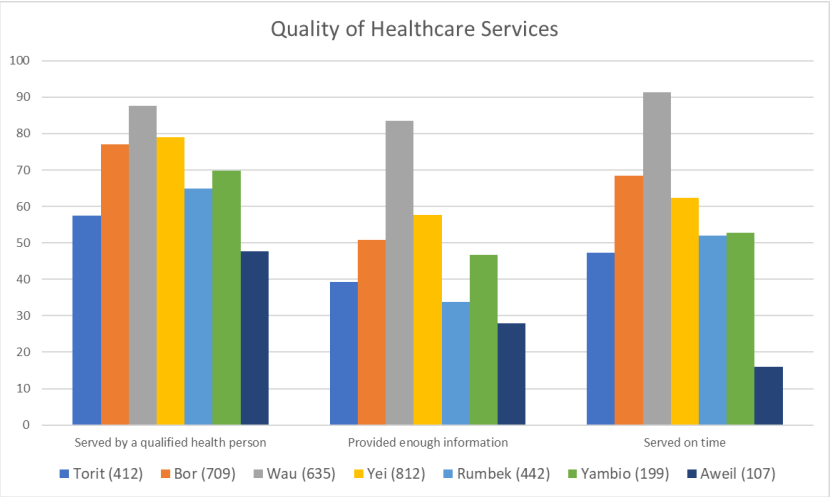
Focus group respondents revealed a hunger for education across many group (i.e. youth, females, local leaders, FBOs, CBOs, peace committees, teachers). As one youth called for a desperate recruiting measure: "What I think is that they should go and move in the market and call the parents to talk to them." Nonetheless, safety barriers and the lack of will and resources to put teachers on the ground persist. Cultural, social and economic hindrances continue, including paltry education facilities and teachers, and the low the expected value of education. FBOs and peace committees called for schools to teach more vocational skills to help sustain one's life and livelihood. Community leaders and organizations note that schools provide leadership and direction for youth—potentially keeping them out of conflict. Because of the severe cost barriers to education, organizations could consider facilitating non-cash-based options to pay teachers or school fees in situations where exchange of goods or services may be appropriate.

### HEALTH

Relative to other PAs, households in Aweil have experienced the lowest quality health care services. Less than half of households are served by a qualified healthcare professional, less than 30% receive sufficient information during health visits, and only 15% were served on time (Figure 1.25). Focus group discussions highlighted the general discouragement with health services, noting the long distances to hospitals, absence of drugs in pharmacies, and that doctors have given up because of low pay or no facilities. In addition to poor healthcare services, there are also issues with access and other failed markets and infrastructure: "We have only one hospital. That one hospital is very far, in case your kid falls sick and you don't have transport to take him/her, the kid might end up dying on the way because there are no cars." The impact for women's health can be severe: "Most of the women die at childbirth because we lack doctors." A focus group of young men expressed the sense of abandonment as it relates to NGO presence: "There

are no health facilities, which have caused most of the skilled doctors to leave and go work in NGOs." In addition to formal services, respondents described less community investment in caring for the sick and disabled, and called for support on trauma awareness and reconciliation.

**Figure 1.25**




## WATER

While multiple water sources may be available in each community, most households depend on one or two primary sources. Hand pumps provide the predominant water source in Aweil (Figure 1.26). Most households travel less than 15 minutes to the available water source (Figure 1.27). Few focus groups comments dealt with water and sanitation access. Commentaries on water primarily related to floods/drought or resource conflicts, not water access or sanitation.

**Figure 1.26**

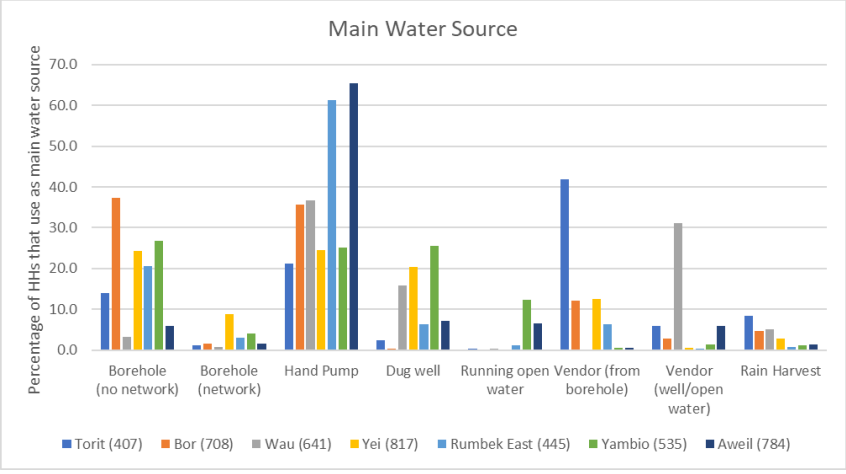
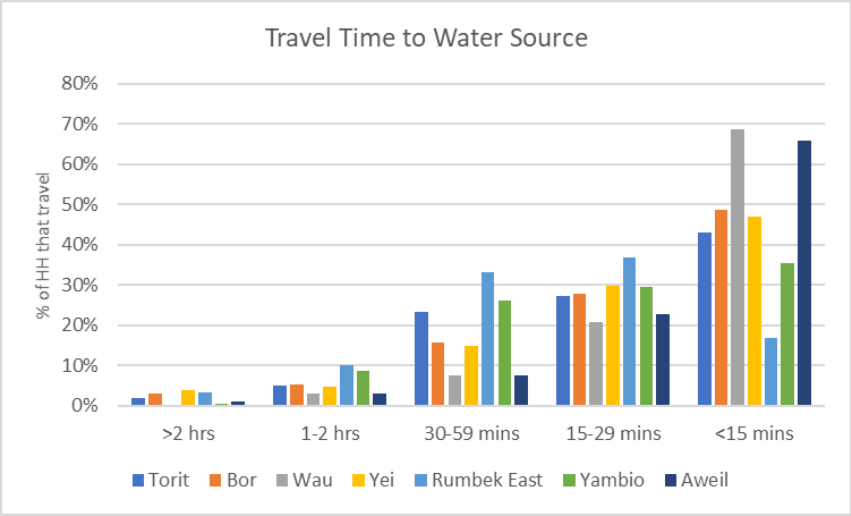
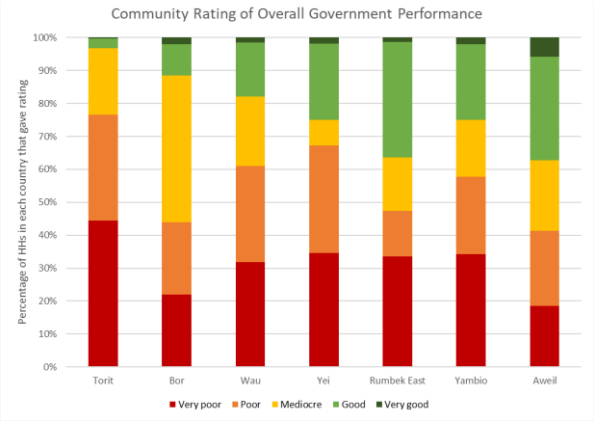


**Figure 1.27**


Travel Time to Water Source
80%
70%
60%
50%
40%
30%
20%
10%
0%
% of HH that travel
>2 hrs
1-2 hrs
30-59 mins
15-29 mins
<15 mins
Torit
Bor
Wau
Yei
Rumbek East
Yambio
Aweil

## QUALITY OF GOVERNMENT SERVICES

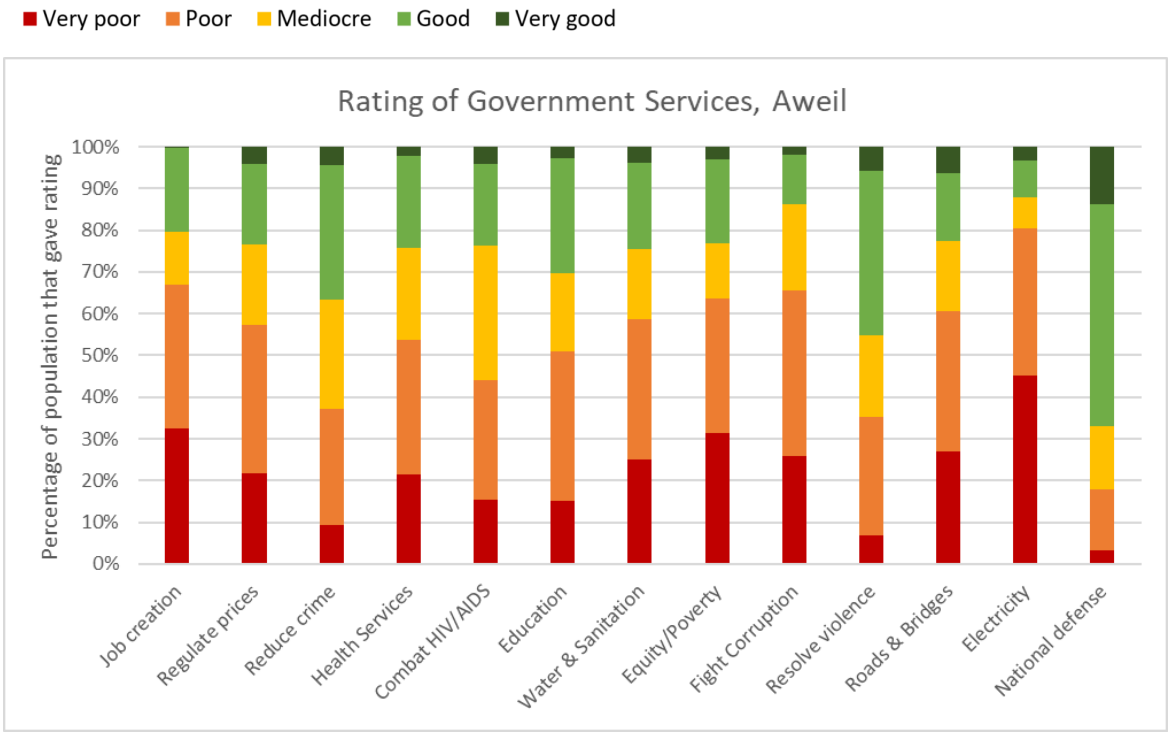
**Figure 1.28**




The seven PAs generally have a poor view of government services (Figure 1.28), though opinions in Aweil may be more favorable, with a quarter of households rating the government's overall performance as "good" or "very good". Nonetheless, over 40% gave "poor" or "very poor" ratings. Aweil's population complained about electricity access, poor job creation and corruption (Figure 1.29).

Most focus group discussions of government services complained of poor coordination and respect for local leadership (described in section 1.2), unequitable distribution of basic services, and natural resource conflicts (i.e. "The Government doesn't have any strategies or policies to prevent these natural resource-based conflicts"). Comments expressed the need for better coordination "Anything to do with the community must come through the local government, because local government must lead the process to combine the county commissioners with the community leaders." FBOs and CBOs echoed this expression: "We in the church would like to see traditional leaders and politicians working closely together." Comments expressed the sense that the government is so wrapped up in conflict, it pays not attention to infrastructure such as basic services and road access. Many complained about inflation tied to the dollar, the need to reach distant rural communities with services, and the paucity of schools, hospitals, law and order. Responses also reflect a general decline in infrastructure, including road and market access.

**Figure 1.29. Rating of Government Services**

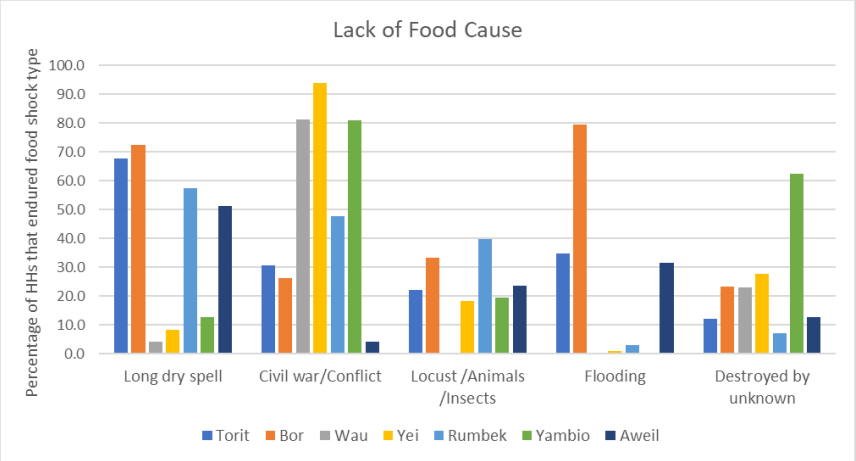


## 1.4. PRODUCTIVE CAPACITIES

### FOOD INSECURITY AND AGRICULTURAL PRODUCTION

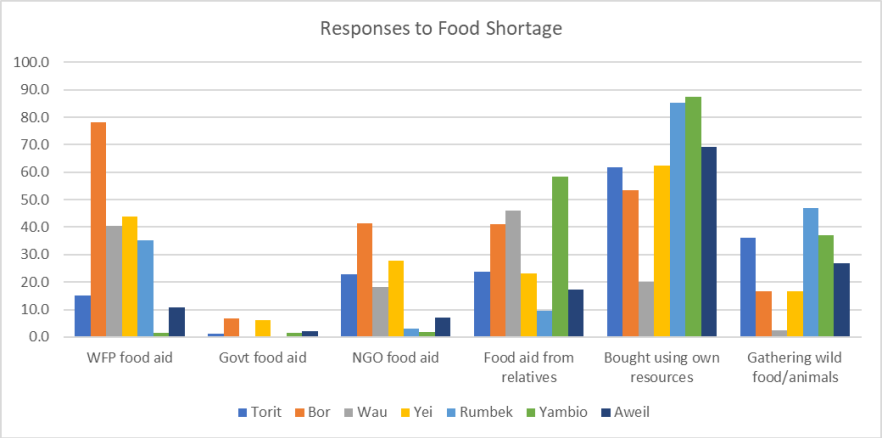
Most households in the seven PAs experienced lack of food over a 12-month period. Comparatively, Aweil's food insecurity rate of 63% falls within the PA average range. Climate and environmental shocks are the main drivers of food insecurity in Aweil Figure 1.30). Hence, proposed agricultural interventions should incorporate agroecological practices that increase soil water absorption to mitigate negative consequences of both floods and drought, and support a diverse ecosystem of insects/animals that facilitates health for natural predators of pests. The environmental risks in Aweil may make it particularly suitable for perennial intercropping that simultaneously enhances biodiversity and supports multi-level and constant root structure to improve soil porosity, stability and depth of water access (Basche & Edelson, 2017).

**Figure 1.30**




As in most PAs, many households responded to food insecurity by purchasing food with their own resources or relying on relatives or NGOs, including WFP. Gathering wild plants and animals also plays a notable role in curtailing food shortages (Figure 1.31). Given Aweil's dependency on foraging and hunting during food shortages, protection from regional violence and safe community access to local natural resources will be critical.

**Figure 1.31**




In addition to social and environmental factors that inhibit food security (Figure 1.30), additional human activities disrupt ecosystems, which threatens food security, human health and livelihoods. Mining, toxic dumping and fishing chemicals affect Aweil, and bush burning, timber lumbering and charcoal burning are rampant (Figure 1.32). Despite the obviously present value of bush burning and timber lumbering, they have various deleterious future effects, so efforts must be made to prune, plant and preserve – and encourage applied agroecological or agroforestry knowledge, thus enhancing food security by building healthy soils and ecosystems. Bush burning and lumbering threaten resilience by deteriorating soil structure, decreasing agricultural productivity and biodiversity, and exacerbating erosion and runoff pollutants (Ozaslan et al., 2015; Vagen et al., 2005). While it is difficult to make sweeping generalizations about the impact of bush burning due the particularities of ecosystems and the intensity and regularity of burning, the potential effects can be devastating to soils inherent fertility—one of the foundations of food security resilience and flood and drought resilience. Bush burning can severely diminish soil's ability to absorb and retain water. Stripping soil of its sponge-like capacity worsens the impacts of both floods and droughts. The chemical changes from burning and the devastation to soil organic matter and plant biomatter in the ground exacerbate water repellency and erosion, stripping away topsoil as well as essential soil micronutrients, microbiota and fungal life. Destroying shade systems can further heat and dry out soils, exacerbating erosion and salinization. Timber lumbering further threatens shade cover, roots systems and biodiversity resilience. Strong efforts should be made to protect, prune and plant, so that the immediate financial benefits of burning and lumbering do not devastate future ecosystems, soil health, food security and resilience.

**Figure 1.32**

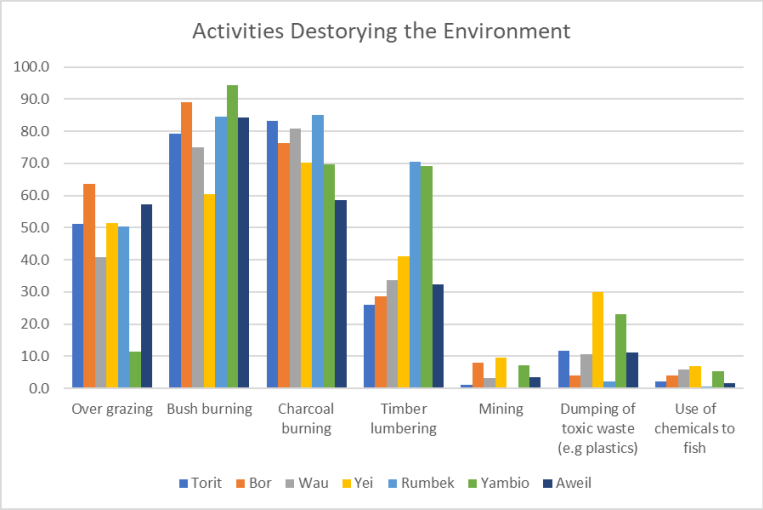
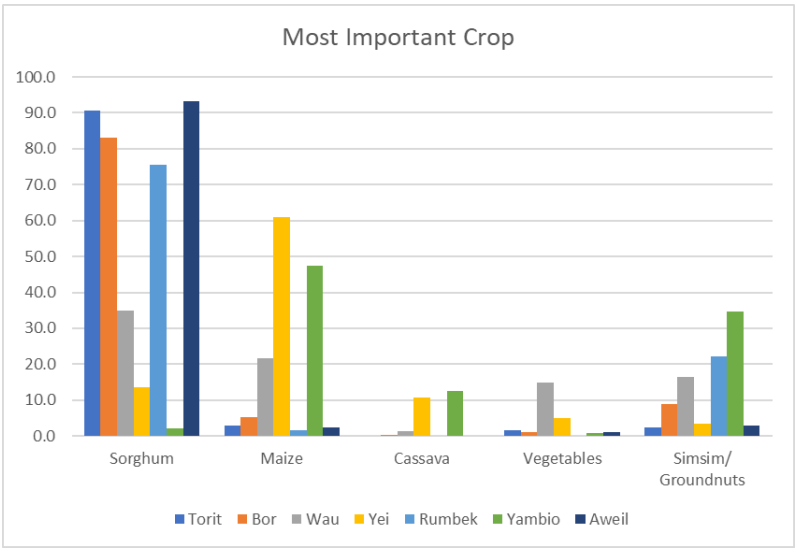
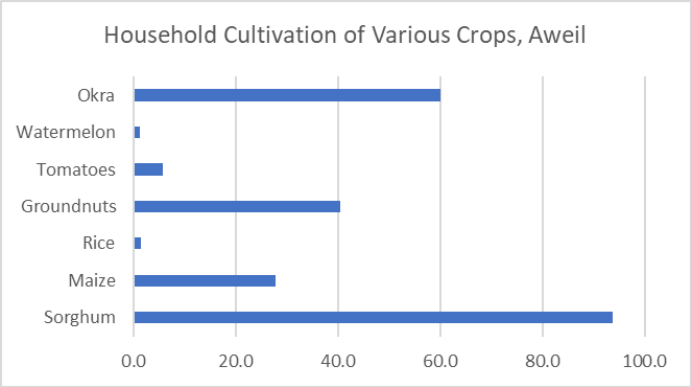



**Figure 1.33**




With respect to farming, all PAs focus on carbohydrate-dense grains as the most important crops. Aweil accordingly prioritizes sorghum, with over 90% of households claiming it as the most important crop. The high dependency on sorghum can put households and community at risk when particular sorghum varieties fail, as well as compromising dietary diversity. It is known that agricultural diversification can reduce household and regional vulnerability to climate and market shocks (Brenda, 2011), and benefit health—provided households diversify with nutrient-rich crops and animal-source foods (Kennedy et al., 2010; Hoddinott et al., 2002). Figure 1.34 presents the most common crops grown by Aweil households; according to surveys, few households in Aweil cultivate a wide variety of crops. Sorghum, okra and groundnuts dominate, with nominal representation from fruits and vegetables. It is unlikely that most households purchase diverse foods in the market, meaning that the majority of Aweil's population would not meet minimum dietary diversity recommendations.

**Figure 1.34**




Similar to the agriculture's central role in Yambio, Aweil focus group discussions highlighted agriculture's role in food security, as well as in cultural identity, peace and dignity – and mentioned that "when the dollar issue appeared, the State Authorities encouraged people to go for agriculture and advised them that there's no way out unless through agriculture." Many comments praised farming for food security at the community and household level, yet others expressed a sense of vulnerability in agricultural survival and the need for training by extension services. Many respondents expressed a sense of collective strength in agriculture for information-sharing, unity and coordination. Some comments addressed the risks of agronomic knowledge being lost, speaking of more diverse cultivation by previous generations, and the need to maintain agronomic education. Respondents identified several threats to agricultural productivity, namely lack of tools and skills, crop pests and security. Comments called for help to bring garden tools, pest management knowledge and insecticides. Given the volatility of recent market access, promoting education on agroecological systems that naturally suppress pests by attracting pest predators through a diverse ecosystem may be key to long-term resilience in the face of both environmental and political shocks.

## LIVELIHOODS

Most of Aweil's working population is engaged in crop production. Women and young females are more likely than males to work in catering and food processing, while males dominate construction, motor vehicle mechanic work and carpentry industries and livestock production (Figure 1.35). Market livelihood activities varied less by gender (Figure 1.36). Petty trade, casual labor, and firewood collection stand out as the dominant market livelihood activities. It's relatively low alcohol-brewing activity (compared to other PAs) may contribute to its relatively lower incidence of alcohol abuse, domestic violence and child abuse, which are less prevalent in Aweil than most other PA communities. Though firewood collection has immediate economic benefits, its long-term consequences (described above), when harvested unsustainably, could undermine future food security; to achieve more resilient futures, sustainable livelihood practices should incorporate regenerative ecological practices.

**Figure 1.35**

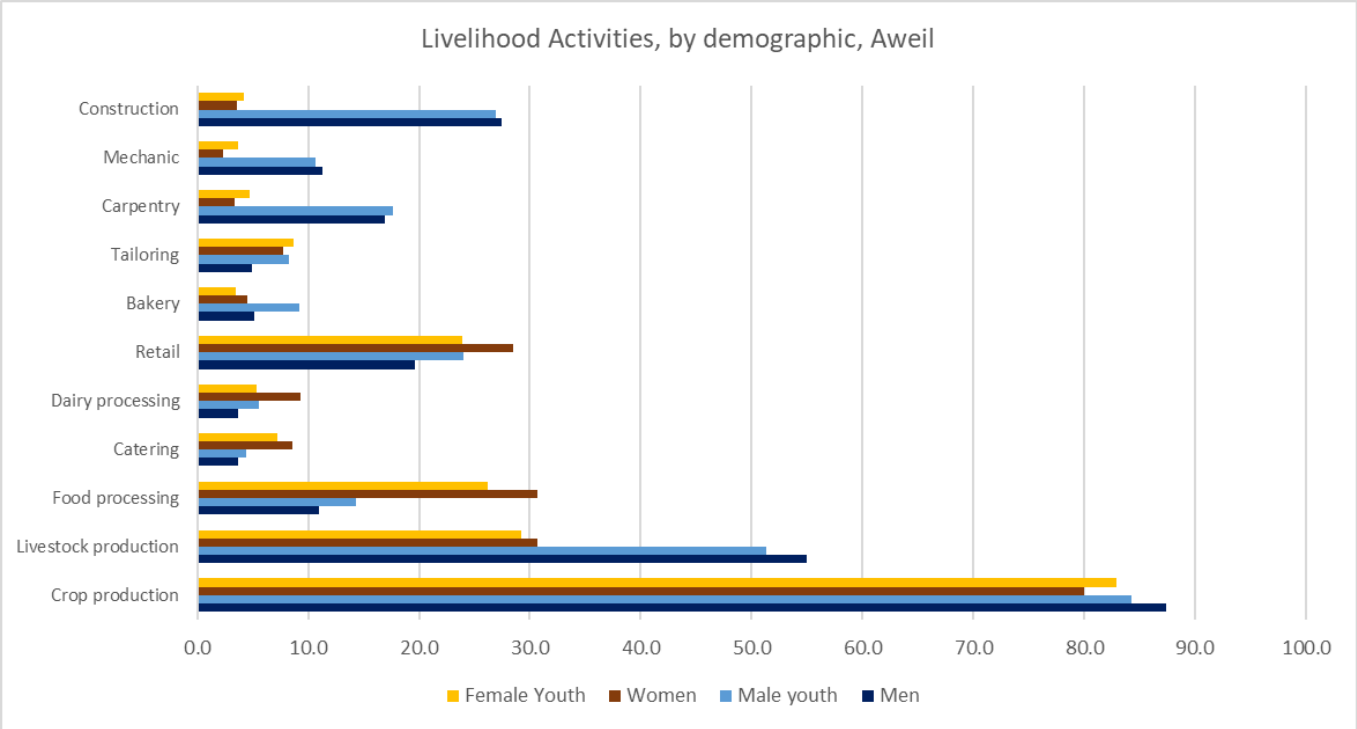
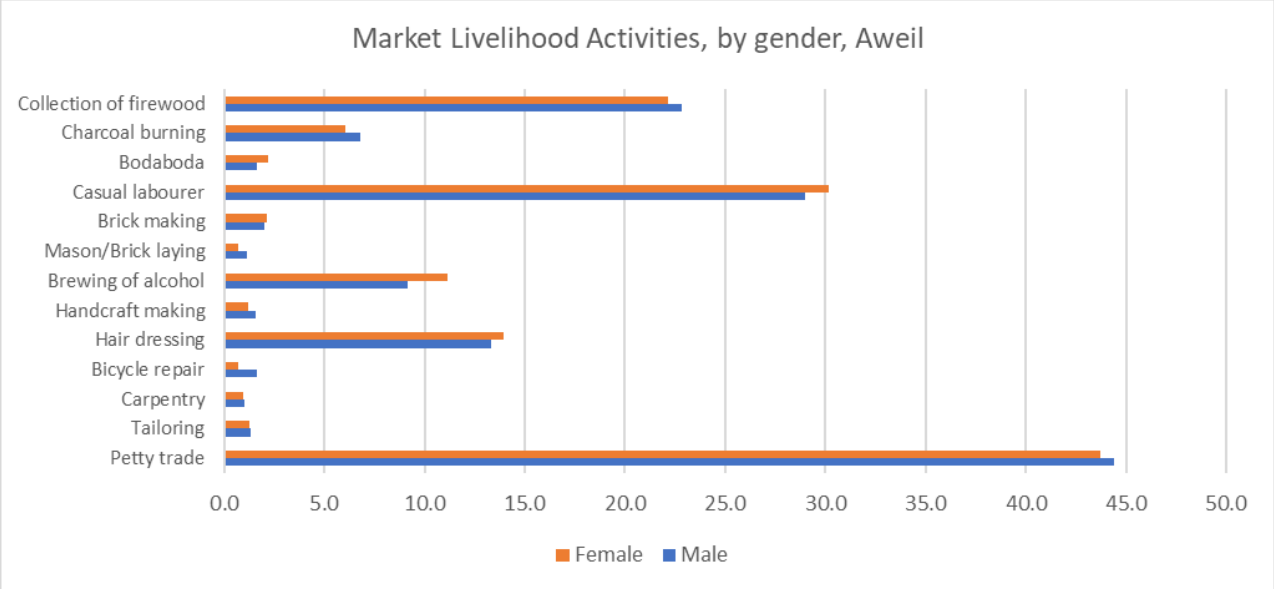
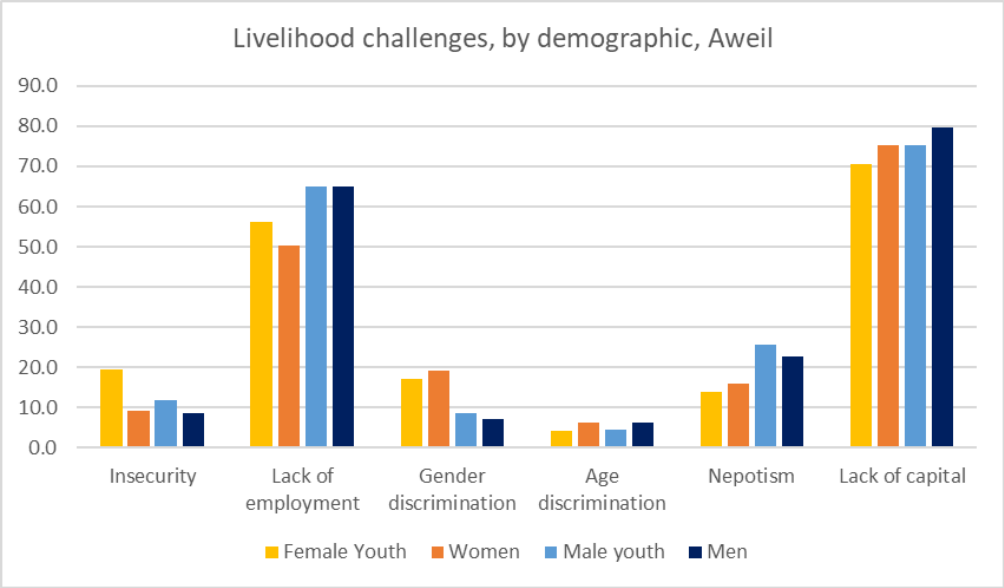



**Figure 1.36**




Males and females of all ages in Yambio generally agreed on the obstacles to livelihood activities, with the exception that females encountered far more gender discrimination (Figure 4.9). All lack of capital and employment are listed as the primary livelihood obstacles.

**Figure 1.37**




Like the quantitative survey data, focus groups results highlight the lack of capital. Comments articulated the need for micro-finance, small-income generation and education to help build financial and human capital and meet strong demand for small-business. They also called for the development of vocational skills and tools. One local leader stated, "Giving food to people without work makes them lazy which isn't good; the important thing is to train people in farming skills, fishing skills in the river and giving people tools and at the time when they get the skills, then you give them seeds." Other repeated call for tools; "If an organization can bring hoe, axe and other tools, then this can help the community to cultivate." A FBO comment believed that if people could be "skilled and equipped with modern tools to grow a variety of crops, then their production could be more than enough to absolutely be sustainable."

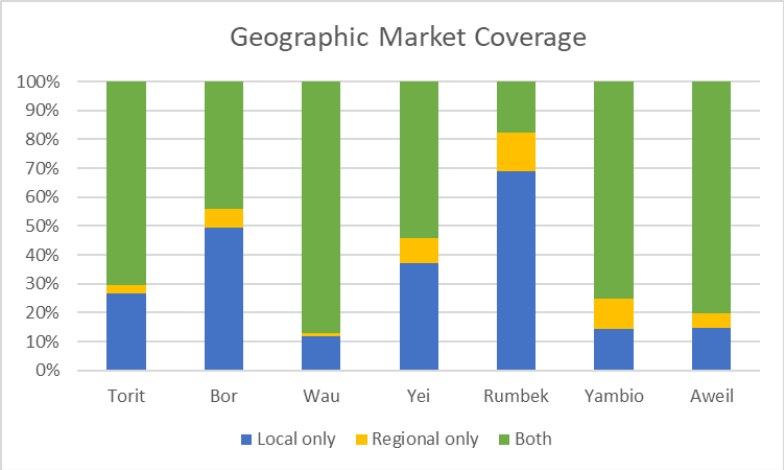
The presence of cooperatives, including women's and girl's cooperatives, was less apparent in Aweil, it is possible this was due to the lack of data (no focus groups conducted among these populations). Therefore, it's difficult to ascertain the role of women and young women in driving local business and supporting themselves and local economies. However, one local leader indicated "When you mobilize the young ladies, give them skills and send them to the market, they can maintain themselves and this is very important also with the youth."

Livestock play a particularly contentious role in communities, due to the powerful income-generation and nutritional benefits they offer, but also the threat of theft, violence and resource conflicts associated with livestock. Furthermore, livestock plays a complicated socio-cultural role; many comments connected cattle-raiding to marriage, "because without livestock there is no marriage."

### MARKET ACCESS

Eighty percent of Aweil's households have regular access to a common open market, and nearly 90% of those households have daily access. Most markets are both regional and local, potentially facilitating access to wider variety of foods and goods (Figure 1.38).

**Figure 1.38**




Focus groups discussions point to the limited market access and especially high prices due to the indexation to dollar: "The only shock is that the ongoing devaluation of the local currency against the US Dollars keeps on changing. Most comments are about poorly-functioning markets or greed, rather than mere limited physical market access: "Business people will also come and sell the food stuff highly also so that we cannot afford. Since our money is no longer considered because of the dollar has gone up we can no longer depend on anyone." Producers and consumers complained of price uncertainty, limited or dishonest buyers: "In case you want to buy anything, the seller will have to first consider the rate of dollar before selling anything to you." Consumers complained that commodities in the market are still very expensive. Both consumers and producers expressed anxiety over price uncertainly tied to the dollar.

Aweil is highly dependent on agriculture for food and economic security yet faces severe agronomic, capital, environmental and market constraints. In addition to climate and market uncertainties, the internal and external conflicts/violence that communities face requires special attention to the social, educational and gender components of any agriculturally-based intervention. Qualitative data show strong resolve and desire for community-based self-sufficiency based in agriculture revealed how intimately vocation is intertwined with mental health resilience. In this regard, a diversity of agricultural development methods should be considered since some regions—particularly remote communities vulnerable to shocks—may not be suited to conventional agricultural development practices. In the absence of well-functioning markets with consistent access to agricultural inputs and consumer demand, farmer adoption of typical production-enhancing technologies could weaken resilience over the long-term because many modern technologies fail to improve long-term soil health, and biodiversity-based pest management. In Aweil the need for diverse cultivation is all the more urgent due to poor agricultural diversity in household cultivation and lack of access to market products due to high and volatile prices. Research has demonstrated that some agroecological systems simultaneously enable communities to improve nutrition outcomes and recuperate the inherent productivity of degraded soils, such that it reduces dependency on external markets and enhances climate resiliency—even in semi-arid regions (Tittonell et al., 2011; Boyd et al., 2013). Higher forms of agroecology include both environmental and socio-economic components that could strengthen natural resources, livelihoods, and foster peace community relations (DeLonge et al., 2016). In some localized efforts, stronger gender and community relationships and farmer-to-farmer education go hand-in-hand with improved livelihoods and sustainable management of natural resources, demonstrating powerful socio-ecological-economic dimensions (Kerr et al., 2013; Gubbels, 2011). Holistic agroecology can offer protective measures for nutrition and food security and provide sustainable livelihoods.

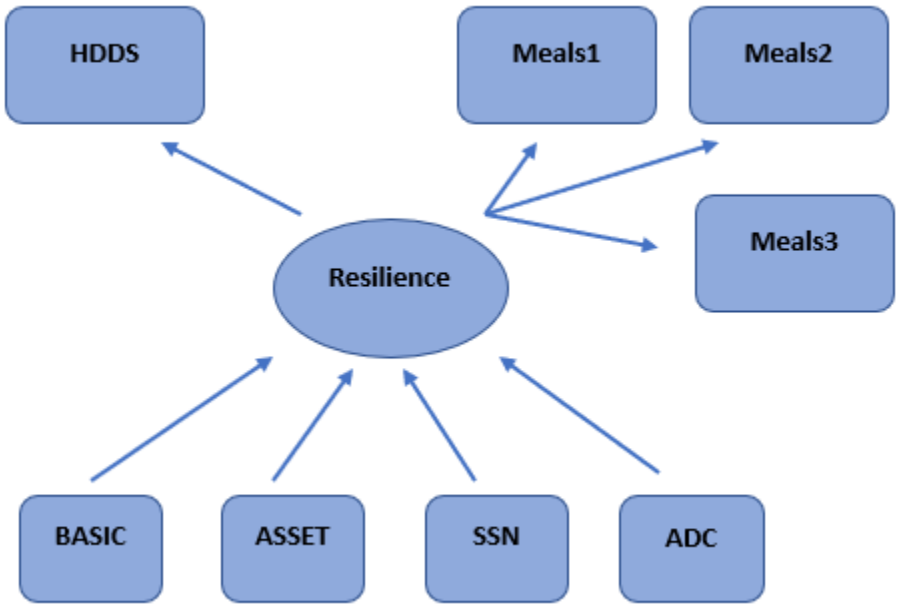
# MEASURING AND EXPLAINING RESILIENCE

## 2.1. METHODOLOGY AND DATA

We adapt the FAO's Resilience Index Measurement and Analysis-II (RIMA-II) methodology, which, along with its predecessor RIMA, has been implemented in around 15 African countries to estimate households' ability to maintain well-being in the face of shocks (FAO, 2015; FAO, 2016). In RIMA and RIMA-II, resilience is estimated as an index, based on observed indicators of assets, livelihoods, and access to services and safety nets, which are organized into pillars.

It should be noted that whenever the RIMA/RIMA-II methodology is applied to cross-sectional data, it would be accurate to interpret the resulting measure in terms of capacity to prevent vulnerability rather than resilience per se. Indeed, because resilience is a dynamic concept, it usually is defined as the ability to maintain a minimum level of well-being despite stressors or shocks. Thus, it is best measured with panel or longitudinal data in which changes in well-being over time, as a result of shocks, are observed. In a cross-sectional setting, the RIMA-II methodology measures the contribution of different variables to current well-being (usually represented by food security outcomes), rather than measuring the maintenance or improvement of well-being over time as a result of shock. In the remainder of this section, we will refer to the latent variable estimated as "resilience," but it is better understood as a capacity index associated with household and location characteristics, grouped under the pillars, which contribute to resilience and ultimately to the desirable well-being outcomes. Figure 2.1 demonstrates the resilience measurement framework graphically.

**Figure 2.1. Resilience measurement framework**




Source: Authors, based on FAO (2016)

Note: BASIC—Access to Basic Services; SSN—Social Safety Nets; ADC—Adaptive Capacity; RES--Resilience; HDDS—Predicted Household Dietary Diversity Score; Meals1—Per capita number of cooked meals consumed the previous day by children over 12 and adults; Meals2—per capita number of cooked meals consumed the previous day by children aged 6-12 years; Meals 3—Per capita number of cooked meals consumed the previous day by children aged 2-5 years.

Following the computation of the resilience index we use regression analysis to estimate the effects of household characteristics and other factors on resilience. To account for the social and institutional environment, we construct variables to represent the quality of governance as perceived by households, strength of institutions, and exposure to conflict, based on a set of underlying variables.

We apply the RIMA-II methodology to cross-sectional household survey data collected by Management Systems International (MSI) in the 7 Partnership Areas (PAs) in 2018 to estimate the resilience of households in Aweil. Like FAO, we use indicators of food security as the outcomes of resilience. Data were collected on household characteristics and livelihood sources; the availability of livelihood opportunities; weather shocks and conservation; food security and coping strategies; health and health care; community participation by women and children and community organization; violence and insecurity; conflict; and perceptions of the quality of governance and the causes of conflict. The variables constituting each pillar are listed in Table 2.1.1

**TABLE 2.1. RESILIENCE PILLARS AND INDICATORS**

| PILLAR | INDICATORS |
|---|---|
| Access to Basic Services | **Education:** |
| | Distance to primary school |
| | Distance to secondary school |
| | Participation in vocational training |
| | Existence of agricultural extension workers |
| | **Markets:** |
| | Access to a common open market |
| | Market located along trade routes |
| | **Health services:** |
| | Number of health facility types where household members go when sick |
| | Health facility provides free care |

1 The specific lists of variables used for resilience analysis in each PA are subsets of the list in Table 2, as some variables were dropped in some PAs due to missing values or other issues.

| | |
|---|---|
| | Time to reach the health facility |
| | Respondent was satisfied with quality of health service |
| | Respondent was served by a qualified person |
| | Time spent waiting until attended to |
| | Health provider treated respondent with respect |
| | Respondent was served on time |
| | Health personnel give respondent enough time |
| | Respondent was provided with enough information |
| Social Safety Nets | Access to remittances from within South Sudan |
| | Access to remittances from outside of South Sudan |
| | Number of ways in which household overcame lack of food (e.g., food aid from WFP, government, friends and relatives, etc.) |
| | Knowledge of organizations doing humanitarian / development work in the community |
| Assets | Predicted landholdings |
| | Predicted numbers of wheelbarrows; beds; sponge mattresses; chairs; tables; radios; televisions; cellphones; mosquito nets; motor bikes; bicycles; flat irons; stoves; solar panels |
| Adaptive Capacity | Educational attainment of household head |
| | Number of types of fuel used by household for cooking |
| | Number of agriculture-related livelihood activities household members are involved in |
| | Number of non-agriculture-related livelihood activities household members are involved in |
| | Number of formal employers of household members |
| | Number of crop types planted in 2018 |
| | Access to information to warn about natural disaster |

The variables used to construct the institutions and governance scores are listed in Table 2.2. The governance score is composed of variables representing respondents' perceptions of the quality of the

governments' performance in different areas, including creating jobs, reducing crime and corruption, improving access to education, etc. Thus, the governance score directly measures perceptions and can serve as a proxy for actual governance quality.

**TABLE 2.2. INSTITUTIONS AND GOVERNANCE INDICATORS**

| PILLAR | INDICATORS |
|---|---|
| Institutions | Number of organizations/groups named that support this community |
| | Number of community institutions named that affect households' daily lives |
| | Presence of a traditional leader |
| | Frequency of community meetings held by traditional leaders |
| Governance | Respondents' ratings of government's efforts to create jobs; keep prices down; reduce crime; improve basic health services; combat HIV/AIDS; address educational needs of the country; provide water and sanitation services; ensure that everyone has enough food; fight corruption; resolve violent conflict between communities; maintain roads and bridges; provide a reliable supply of electricity; defend the country |

Following FAO (2016), we implement the RIMA-II methodology using four pillars: i) Adaptive Capacity, representing households' ability to absorb and adapt to shocks and stressors; ii) Social Safety Nets, representing the availability of formal or informal social protection and other resources to lessen the impact of shocks; iii) Assets, representing a households' physical assets and income; and iv) Access to Basic Services, indicating the households' access to and use of services such as education, extension, markets, and health facilities. Since the MSI survey data does not include detailed information on assets, we used predicted values of household assets and landholdings based on recorded assets and landholdings of similar households in the same areas from data collected by WFP and FAO. For each PA, we use the WFP/FAO data to run truncated tobit regressions for landholdings and numbers of different assets owned (e.g. mattress, cell phone, bicycle, etc.), using as explanatory variables location attributes and household characteristics which are also recorded in the MSI data (e.g., age, sex and education level of household head, type of toilet, and main water source). We then use the regression results to predict level of each asset for households in the same PA in the MSI data, based on household characteristics. These predicted land and asset levels are used to calculate the Assets pillar.

The pillars are indices composed of several observed variables; the computed pillars are then used to estimate a resilience index as a latent variable. Theoretically, all pillars should contribute positively to household well-being via the latent variable measuring resilience. It should be noted that in practice, the construction of each pillar index is sensitive to the extent to which the indicators composing the pillar are correlated with each other. When pillar variables are negatively correlated, it becomes difficult to predict the overall effect of the pillar on outcomes; for this reason, we drop variables if necessary to avoid negative correlations between pillar variables.

As pointed out above, the RIMA-II methodology as implemented by the FAO measures "food security resilience," or the ability to maintain food security in the face of stressors and shocks; food security indicators are functions of resilience. The MSI data contains only one binary variable indicating whether a given household lacked food within the past 12 months. This food security measure has very little variation across households and thus is not very informative for the purposes of resilience analysis. The proportion of households which experienced lack of food in the past 12 months was over 75 percent in four out of the seven PAs, which reflects the widespread food insecurity in the priority areas.

Instead, we opted to use four predicted food security variables—the Household Diet Diversity Score (HDDS) and the numbers of meals consumed by different age groups—as the resilience outcome variables. The HDDS measures the number of food groups consumed in the past 24 hours; the variables on meals measure the per capita number of warm and cooked meals consumed in the previous day by children aged 2-5 years, children aged 6-12 years, and children over 12 and adults. The variables were measured in the data collected by WFP/FAO in the same PAs, and were predicted for each household in MSI dataset based on the values of similar households in the WFP/FAO data using the methodology employed for the predicted Asset variables described above. In addition to the greater variation, the predicted variables offer richer information than the binary food security variable in the MSI data. Dietary diversity variables such as the HDDS have been found to be good predictors of undernutrition indicators and to reflect the influence of shocks and stressors (Headey and Ecker, 2013).

## 2.2. PILLAR CONSTRUCTION

In Table 2.3, we report the weight2 of each variable in the Access to Basic Services pillar. Variables reflecting access to high quality health care and access to markets play the strongest roles.3 Access to extension services and vocational training contribute the least to the pillar. Only one-fourth of households in Aweil use a health facility that provides free health care, while only around 30 percent of respondents were satisfied with the quality of health care received at their last visit. Market access is higher, with nearly 80 percent of households having access to a common open market. Around 55 percent of the sample travel less than 30 minutes to reach their health facility, while the remaining 45 percent have longer travel times; over a quarter of the sample travel one hour or more to the health facility. Access to extension services and vocational training are fairly low, with 4 to 6 percent of households reporting access to or usage of each service.

**TABLE 2.3. ROLE OF VARIABLES IN PILLAR ESTIMATION: ACCESS TO BASIC SERVICES**

| PILLAR VARIABLES | WEIGHT | MEAN VALUE |
|---|---|---|
| Health facility provides free care | 0.760 | 0.243 |
| Respondent satisfied with quality of health service | 0.694 | 0.295 |
| Access to a common open market | 0.529 | 0.798 |

2 Pillars are constructed using principal component analysis; the weights of each variable are the factor loadings of the first factor.
3 Only variables used in the Aweil analysis are shown in Tables 2.3-2.8. Additional variables shown in Table 2.2 were not used due to high numbers of missing values, negative correlations with other pillar variables, and other factors.

| | | |
|---|---|---|
| Time to reach the health facility | 0.486 | 2.513* |
| Existence of agricultural extension workers | 0.096 | 0.057 |
| Participation in vocational training | 0.029 | 0.040 |

Note: Unless otherwise noted, variables are 0-1 binary indicators

*0: more than 2 hours; 1: 1–2 hours; 2: 30–59 mins; 3: 15–29 mins; 4: less than 15 mins

The Assets pillar (Table 2.4) is constructed from the predicted numbers of household assets, based on asset holdings of similar households in the more detailed FAO-WFP dataset. The predicted numbers of cell phones, sponge mattresses and mosquito nets make similar contributions to the overall pillar. Most households did not own these assets. Despite showing the lowest average per-household value, households were most likely to have at least one mosquito net, with around 17 percent of households owing one or more mosquito nets. Only 3 and 4 percent of households owned at least one cell phone or sponge mattress, respectively.

**TABLE 2.4. ROLE OF VARIABLES IN PILLAR ESTIMATION: ASSETS**

| PILLAR VARIABLES | WEIGHT | MEAN VALUE |
|---|---|---|
| Predicted number of cell phones | 1.000 | 0.411 |
| Predicted number of sponge mattresses | 0.999 | 0.648 |
| Predicted number of mosquito nets | 0.950 | 0.378 |

The variables that contribute the most to the Adaptive Capacity pillar are those concerned with agricultural livelihood strategies: the number of agricultural livelihood activities and the number of crops planted (Table 2.5). Access to information to warn of natural disaster, the number of formal employers, and the number of nonagricultural livelihood activities made smaller contributions to the pillar. On average, surveyed households were involved in 2.4 agricultural livelihood activities, ranging from 0 to 8, most commonly including cultivation of crops such as sorghum, maize, sesame, groundnuts and vegetables. Some households raised livestock including chickens, sheep or goats, or cattle. 24 percent of households had access to warning information on natural disasters. Most households derived income from informal activities, with only 37 percent of households having one or more formal employers. Households were involved in an average of 0.9 nonagricultural livelihood activities, ranging from 0 to 4; half of households engaged in one nonagricultural activity, while around 30 percent of households did not engage in any. The most common nonagricultural livelihood activities included petty trade, bodaboda (bicycle or motorcycle taxi), and hair dressing.

**TABLE 2.5. ROLE OF VARIABLES IN PILLAR ESTIMATION: ADAPTIVE CAPACITY**

| PILLAR VARIABLES | WEIGHT | MEAN VALUE |
|---|---|---|
| Number of agricultural livelihood activities | 0.683 | 2.428 |
| Number of crop types planted | 0.639 | 2.178 |
| Access to information to warn about natural disaster | 0.336 | 0.236 |
| Number of formal employers | 0.264 | 0.386 |
| Number of nonagricultural livelihood activities | 0.105 | 0.918 |

Note: "Access to information about natural disasters" is a 0-1 binary indicator

Access to remittances from South Sudan carried the most weight in the Social Safety Nets pillar, followed by knowledge of organizations doing humanitarian or development work in the community; access to remittances from outside the country played the smallest role (Table 2.6). Overall, access to social safety nets is low among surveyed households in Aweil. The difference in the weight of the remittances variables may reflect the smaller share of households receiving remittances from outside South Sudan—4.5 percent—while 10.5 percent received remittances from within the country. 21 percent of respondents knew of international or national organizations doing work in their community, suggesting that the presence of humanitarian and development organizations is limited in Aweil.

**TABLE 2.6. ROLE OF VARIABLES IN PILLAR ESTIMATION: SOCIAL SAFETY NETS**

| PILLAR VARIABLES | WEIGHT | MEAN VALUE |
|---|---|---|
| Access to remittances from South Sudan | 0.513 | 0.105 |
| Knowledge of organizations doing humanitarian / development work | 0.422 | 0.212 |
| Access to remittances from outside South Sudan | 0.275 | 0.045 |

Note: Variables are 0-1 binary indicators

Principal component analysis was also used to construct scores representing the quality of governance and institutions. Respondents were asked to rank the quality of the government's efforts in a variety of areas, including ensuring access to food and jobs, keeping prices low, improving basic health services and education, etc. Respondents' perceptions of the quality of governance in the areas of food access, health services, and water and sanitation carried the most weight in the overall Governance score, followed by variables related to other public services and to prices. Efforts in the areas of corruption, HIV/AIDS, and national defense played the smallest roles in the construction of the score. Rankings of the government's

efforts from 1 (very poor) to 5 (very good) averaged around 2.5 for most of the variables that carried stronger weight in the pillar; this corresponds to a medium-to-poor ranking of the quality of government. The highest average ranking (3.6) was provided for the government's efforts regarding national defense, while efforts to provide electricity received the lowest average ranking (1.9).

**TABLE 2.7. ROLE OF VARIABLES IN SCORE CONSTRUCTION: GOVERNANCE**

| SCORE VARIABLES | WEIGHT | MEAN VALUE |
|---|---|---|
| Food | 0.753 | 2.312 |
| Health services | 0.748 | 2.512 |
| Water and sanitation | 0.715 | 2.445 |
| Education | 0.683 | 2.671 |
| Prices | 0.674 | 2.487 |
| Roads and bridges | 0.667 | 2.414 |
| Electricity | 0.666 | 1.901 |
| Conflict | 0.550 | 3.087 |
| Crime | 0.530 | 2.947 |
| Jobs | 0.490 | 2.216 |
| Corruption | 0.488 | 2.242 |
| HIV/AIDS | 0.361 | 2.685 |
| Defense | 0.331 | 3.595 |

Note: Variables measure respondents' ratings of the quality of the governments' efforts in each area, ranging from 1 (very poor) to 5 (very good).

The variable representing the presence of a traditional leader carried the most weight for the construction of the institutions score. Around 54 percent of households in Aweil live in an area with a traditional leader. The other two variables used to construct the score measured the numbers of answers provided when respondents were asked about the organizations supporting their community and institutions affecting their daily lives. On average, respondents listed 1.3 organizations and 1.8 institutions.

**TABLE 2.8. ROLE OF VARIABLES IN SCORE CONSTRUCTION: INSTITUTIONS**

| VARIABLES | WEIGHT | MEAN VALUE |
|---|---|---|
| Presence of a traditional leader | 0.537 | 0.774 |
| Number of organizations supporting the community | 0.524 | 1.341 |
| Number of institutions affecting daily lives | 0.503 | 1.752 |

Note: "Presence of a traditional leader" is a 0-1 binary indicator.

## 2.3. RESULTS AND DISCUSSION

The results of the structural equation model for Aweil are presented in Table 2.9. As expected, the estimated resilience capacity index has a positive effect on food security, as measured by the predicted numbers of household meals consumed and by the predicted Household Dietary Diversity Score (HDDS). Resilience seems to have stronger impacts on quantities of food consumed than on dietary diversity, with the largest impacts on the number of meals consumed by the youngest age group (children 2–5 years old).

Of the four pillars, only Assets and Adaptive Capacity have positive significant effects on the resilience score. Access to Basic Services and Social Safety Nets have no effects. Although the presence of social safety nets can be expected to increase the resilience of beneficiaries, areas with greater levels of safety nets may paradoxically show lower resilience, if the presence of social safety nets reflect higher levels of poverty or vulnerability. Less resilient areas may also receive higher levels of remittances if vulnerability is reflected in higher rates of out-migration.

**TABLE 2.9. RESILIENCE STRUCTURAL EQUATION MODEL RESULTS FOR AWEIL**

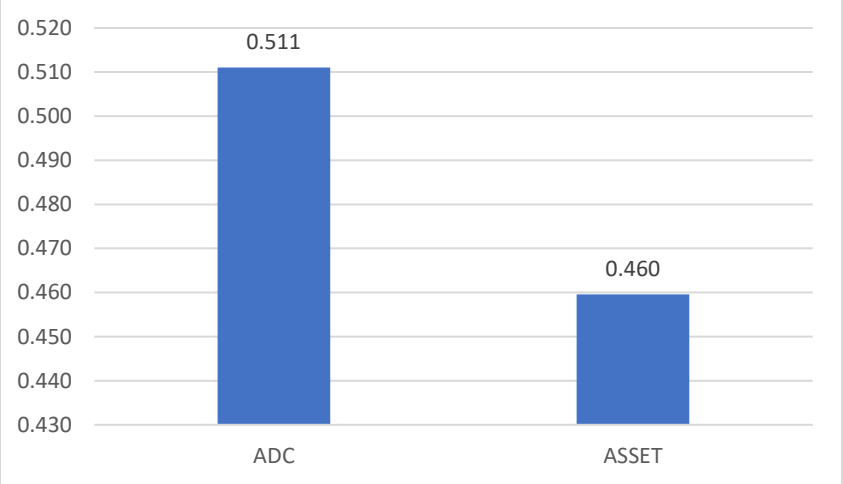
| VARIABLES | (1) RESILIENCE | (2) MEALS1 | (3) MEALS2 | (4) MEALS3 | (5) HDDS |
|---|---|---|---|---|---|
| BASIC | 0.0285 | | | | |
| | (0.0586) | | | | |
| SSN | -0.0616 | | | | |
| | (0.0650) | | | | |
| ASSET | 0.770*** | | | | |
| | (0.145) | | | | |
| ADC | 0.292*** | | | | |
| | (0.0756) | | | | |

| | | | | | |
|---|---|---|---|---|---|
| RES | | 1 | 0.731*** | 1.138*** | 0.274*** |
| | | (0) | (0.0438) | (0.0641) | (0.0422) |
| Constant | | 0.529*** | 0.411*** | 0.278*** | 0.632*** |
| | | (0.0484) | (0.0355) | (0.0552) | (0.0196) |
| Observations | 645 | 645 | 645 | 645 | 645 |

LR test of model vs. saturated: chi2(14) = 109.67, Prob > chi2 = 0.0000
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Note: Pillar variables are expressed as indices ranging from 0 to 1. BASIC—Access to Basic Services; SSN—Social Safety Nets; ADC—Adaptive Capacity; RES--Resilience; HDDS—Predicted Household Dietary Diversity Score; Meals1—Predicted per capita number of cooked meals consumed the previous day by children over 12 and adults; Meals2—Predicted per capita number of cooked meals consumed the previous day by children aged 6-12 years; Meals 3—Predicted per capita number of cooked meals consumed the previous day by children aged 2-5 years.

To estimate the response of resilience to the change in each pillar, we compute the elasticity of the resilience index with respect to each pillar (Figure 2.2). Elasticities are positive for Adaptive Capacity and Assets—for each pillar, a one percent increase in the pillar value can be expected to increase the resilience index by respectively 0.51 percent and 0.46 percent (Table 2.9).

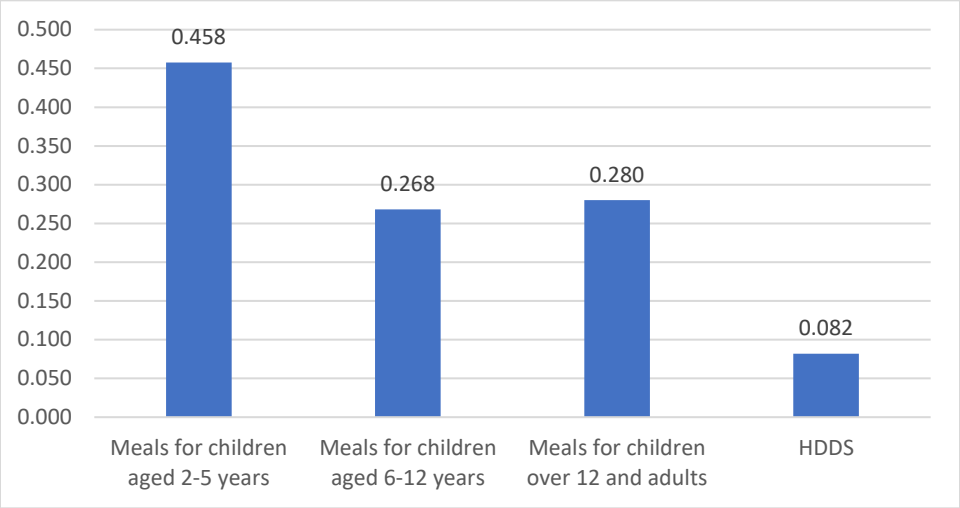
**Figure 2.2. Elasticities of resilience with respect to pillar values**




Source: Authors, from modeling results
Note: ADC—Adaptive Capacity

As expected, the elasticities of food security measures with respect to the resilience index are positive (Figure 2.3). Feeding of young children shows the strongest effect: an increase of one percent in resilience is expected to increase the number of per capita meals for children aged 2–5 years by 0.46 percent. The corresponding elasticities for meals for children aged 6–12 years and children over 12 and adults are 0.27 and 0.28, respectively. The Household Dietary Diversity Score shows the lowest elasticity of 0.08.

**Figure 2.3. Elasticities of food security with respect to resilience**




Source: Authors, from modeling results

Note: HDDS—Household Diet Diversity Score

**Box 1. Drivers of Resilience: Pillars and Underlying Variables**

The four pillar scores represent households' attributes in the areas of Access to Basic Services, Assets, Adaptive Capacity, and Social Safety Nets, respectively. Each pillar is calculated based on indicators reflecting aspects of the overall concept represented by the pillar. For households in Aweil, the **Adaptive Capacity and Assets pillars** are found to contribute positively and significantly to the resilience index. Increases in Adaptive Capacity have somewhat higher impacts on resilience than increases in Assets.

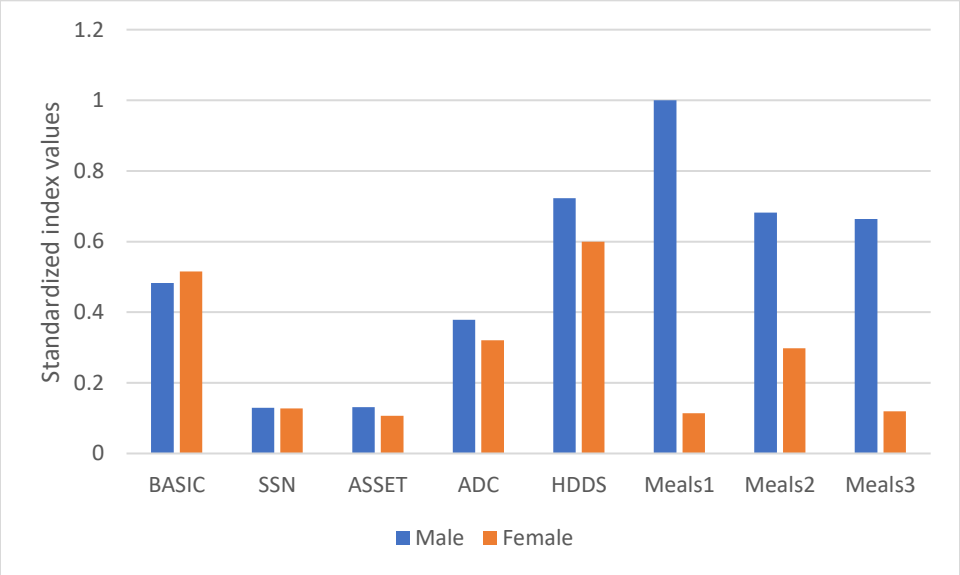
While social safety nets should normally be expected to increase households' resilience, there are several reasons for which the analysis might fail to capture these effects. In particular, the presence of social safety nets may be more pronounced in areas or for households with lower resilience. The social safety nets pillar is constructed from variables on remittances received by households; migration rates and therefore remittances received may be higher among poorer households. If the resilience-strengthening benefits of the remittances are not enough to outweigh the households' overall lower resilience, then higher levels of social safety nets could be associated with lower resilience scores. Greater access to services would normally expected to contribute positively to resilience as well. The lack of impact of the Access to Basic Services pillar in Aweil may be related to the low levels of services: variables related to health care access play the largest roles in constructing the pillar, but less than 25 percent of surveyed households had access to free health care and less than 30 percent were satisfied with the quality of health care provided at their last visit to a health facility.

To better understand how to increase resilience, it is important to look at the variables making up the Assets and Adaptive Capacity pillars and their weights in the pillar scores, which reflect their relative importance. The predicted numbers of cell phones, sponge mattresses, and mosquito nets made similar contributions to the Assets pillar, with somewhat higher weights for the first two indicators. The variables that contribute the most to the Adaptive Capacity pillar are those concerned with agricultural livelihood strategies: the number of agricultural livelihood activities and the number of crops planted. Access to

information to warn of natural disaster, the number of formal employers, and the number of nonagricultural livelihood activities also contribute to the pillar.

As shown in Figure 2.4, female-headed households in Aweil have worse outcomes than male-headed households for all of the food security indicators. This is particularly the case for the numbers of meals consumed, with especially stark disparities in meals consumed by older children and adults. Dietary diversity, as measured by the Household Dietary Diversity Score, is also moderately lower for female-headed households. Female-headed households have slightly better scores for the Access to Basic Services pillar and similar scores for the Social Safety Nets pillar. However, the two pillars which were found to positively impact resilience, Adaptive Capacity and Assets, show somewhat higher average scores for male-headed households.

**Figure 2.4. Average pillar values and food security scores for male- and female-headed households**



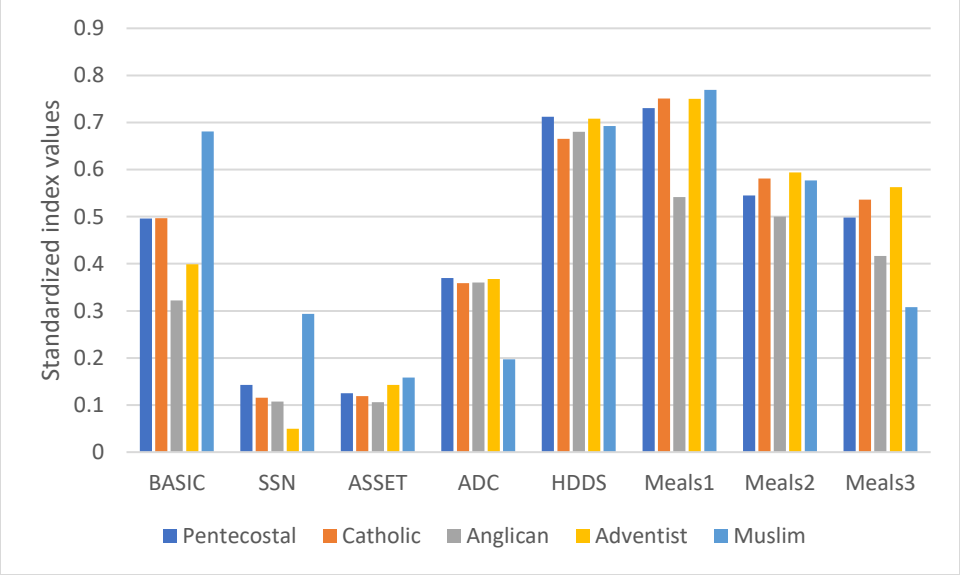

Source: Authors.

Note: BASIC—Access to Basic Services; SSN—Social Safety Nets; ADC—Adaptive Capacity; HDDS—Household Dietary Diversity Score; Meals1—Per capita number of cooked meals consumed the previous day by children over 12 and adults; Meals2—per capita number of cooked meals consumed the previous day by children aged 6-12 years; Meals 3—Per capita number of cooked meals consumed the previous day by children aged 2-5 years.

Nearly half (47 percent) of surveyed households in Aweil identified themselves as Pentecostal, with 45 percent identifying as Catholic. Around 4 percent were Anglican, with approximately 2 percent Adventist and 2 percent Muslim. Pentecostal and Catholic households show only minor differences in food security indicators and in pillar scores; Catholic households have slightly higher average numbers of meals and slightly lower dietary diversity. The less-represented religions show more differences, although these may reflect the presence of outliers in small subsamples. Anglican households had lower average numbers of meals consumed than most other households. Muslim households showed lower values for the numbers of meals consumed by the youngest children. Muslim households also had much higher scores on the Access to Basic Services and Social Safety Nets pillars than other households, and moderately higher

scores on the Assets pillar; however, their scores on the Adaptive Capacity pillar were substantively lower.

**Figure 2.5. Average pillar and food security values by religion**



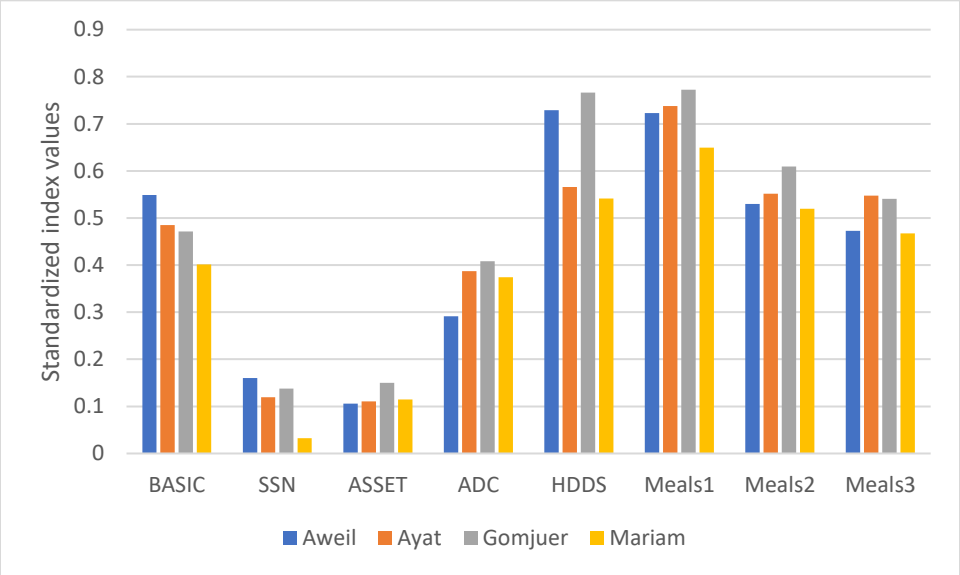

Source: Authors.

Note: BASIC—Access to Basic Services; SSN—Social Safety Nets; ADC—Adaptive Capacity; HDDS—Household Dietary Diversity Score; Meals1—Per capita number of cooked meals consumed the previous day by children over 12 and adults; Meals2—per capita number of cooked meals consumed the previous day by children aged 6-12 years; Meals 3—Per capita number of cooked meals consumed the previous day by children aged 2-5 years.

The surveyed households are located in approximately 10 different payams (the geographic division below county). We have opted to pool adjacent payams into payam groups in order to obtain larger subsamples—for example, the Gomjuer East, Gomjuer Center and Gomjuer West payams are combined to form a Gomjuer payam group. The largest payam groups are Aweil and Gomjuer, each containing 34 percent of surveyed households. 20 percent of households are located in the Ayat payam group and 12 percent in the Mariam payam group. Religion is associated with payam to some extent: although Catholic and Pentecostal households are found in each payam group, Catholics are more heavily concentrated in Aweil and Pentecostals in Gomjuer.

Patterns in pillar scores across payam groups differed by pillar. However, for both of the pillars which positively affected resilience, Assets and Adaptive Capacity, households in Aweil showed the lowest scores and households in Gomjuer had the highest. This is reflected in Gomjuer's strong performance on food security indicators. Households in Gomjuer and Aweil had higher dietary diversity than households in Ayat and Mariam, while households in Gomjuer and Ayat showed the highest numbers of meals consumed.

**Figure 2.6. Average pillar and food security values by payam**




Source: Authors

Note: BASIC—Access to Basic Services; SSN—Social Safety Nets; ADC—Adaptive Capacity; HDDS—Household Dietary Diversity Score; Meals1—Per capita number of cooked meals consumed the previous day by children over 12 and adults; Meals2—per capita number of cooked meals consumed the previous day by children aged 6-12 years; Meals 3—Per capita number of cooked meals consumed the previous day by children aged 2-5 years.

## 2.4. RESILIENCE DETERMINANTS

To understand the determinants of resilience beyond the pillar variables used to estimate the resilience score, we perform regression analysis using household characteristics and other variables. We first standardize the resilience score so that all values fall between 0 and 1. The first column of Table 2.10 displays the results of regression analysis exploring the effects of the gender and age of the household head, religion of the household, and payam group on the resilience score. Female-headed households show significantly lower resilience than male-headed households, reflecting these households' lower pillar scores and far worse performance on food security indicators (Figure 2.4). This echoes the findings of previous RIMA analyses in the Karamoja region of Uganda and in Somaliland, which found female-headed households to have lower resilience scores in most areas (FAO, 2017; FAO, 2018).

**TABLE 2.10. DETERMINANTS OF RESILIENCE**

| VARIABLES | (1) | (2) |
|---|---|---|

| | | |
|---|---|---|
| Female | -0.484*** | -0.488*** |
| | (0.0159) | (0.0159) |
| Age 26-35 | -0.126** | -0.123** |
| | (0.0498) | (0.0492) |
| Age 36-55 | -0.247*** | -0.249*** |
| | (0.0485) | (0.0479) |
| Age >55 | -0.244*** | -0.246*** |
| | (0.0493) | (0.0489) |
| Anglican | -0.0133 | 0.0137 |
| | (0.0395) | (0.0395) |
| Pentecostal | -0.0286* | -0.0303* |
| | (0.0157) | (0.0155) |
| Muslim | -0.0596 | -0.0757 |
| | (0.0519) | (0.0513) |
| Adventist | 0.0233 | 0.0427 |
| | (0.0466) | (0.0462) |
| Ayat | 0.0165 | 0.00703 |
| | (0.0209) | (0.0209) |
| Gomjuer | 0.0478*** | 0.0401** |
| | (0.0181) | (0.0180) |
| Mariam | 0.00474 | 0.00189 |
| | (0.0249) | (0.0248) |
| Yambio | 0.275 | 0.297 |
| | (0.185) | (0.182) |

| | | |
|---|---|---|
| Governance | | 0.132*** |
| | | (0.0354) |
| Institutions | | 0.0876* |
| | | (0.0519) |
| Constant | 0.882*** | 0.808*** |
| | (0.0500) | (0.0521) |
| Observations | 621 | 621 |

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Households with the youngest heads had the highest resilience scores, as demonstrated by the negative significant coefficients for the other three age categories. The omitted category, including households with heads of 25 and under, is the smallest, comprising only 2.3 percent of the sample. Wald tests for equality of coefficients between the second and third categories and the second and fourth categories suggest that households in the second category, with heads aged 26 to 35, also have higher resilience than households with older heads. Pentecostal households had slightly lower resilience, with a weakly significant coefficient, than Catholic households, the omitted category. Among payam groups, only Gomjuer showed significant differences with the Aweil payam group, the omitted category; the positive coefficient reflects the higher pillar scores and higher food security than other areas.

In column 2 of Table 2.10, we add scores representing the strength of institutions and perceived quality of governance. Each score ranges from 0 to 1. Higher values for each score increase resilience, although the effect is only weakly significant for the institutions score. Thus, households whose members had higher perceptions of the quality of the government's efforts tended to have higher resilience, suggesting the important role of governance in improving resilience and food security outcomes.

**Box 2. Drivers of Resilience: Demographics and Environmental Variables**

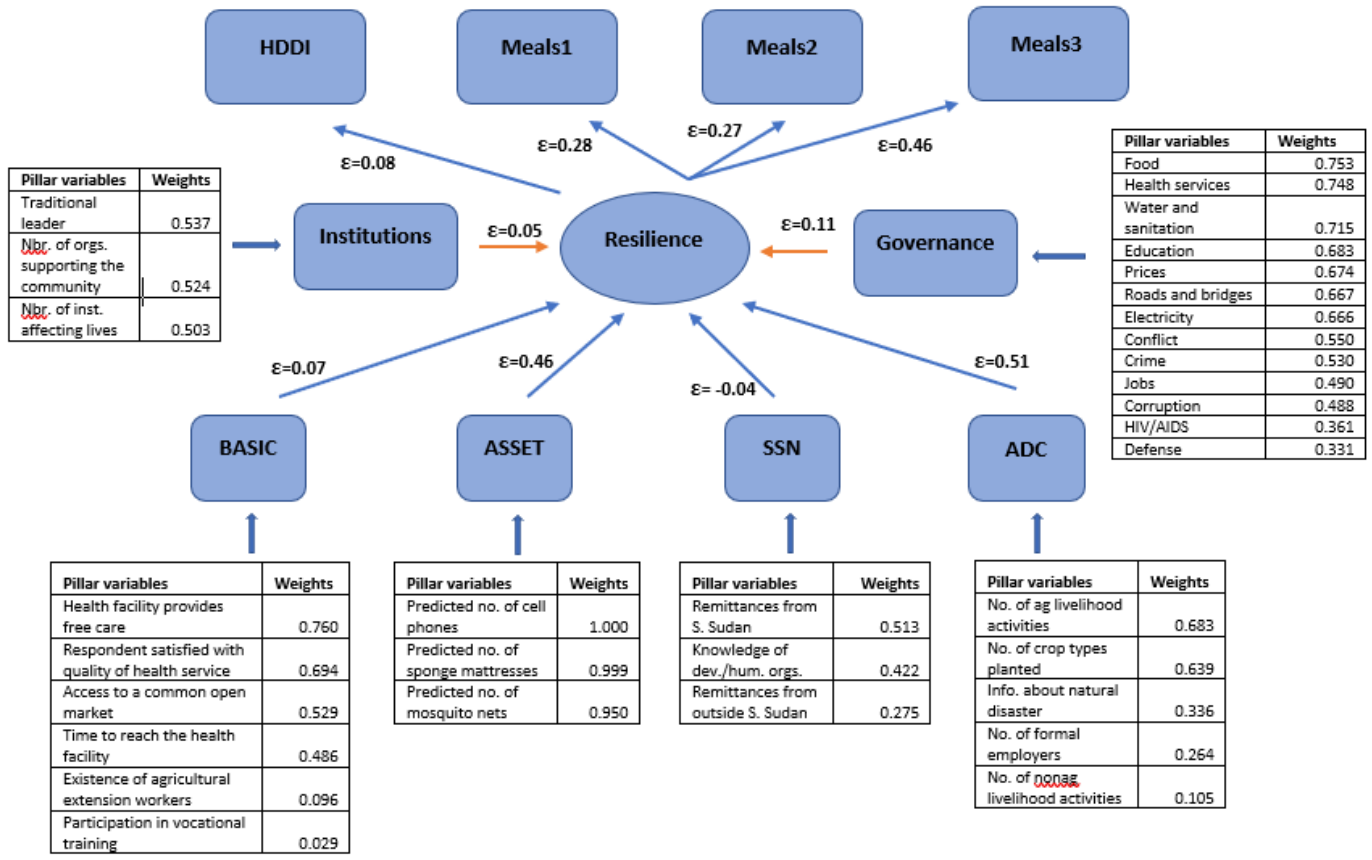
Household demographic characteristics as well as households' environments also affect their resilience. Female-headed households have lower resilience than male-headed households, as well as lower scores on the Assets and Adaptive Capacities pillars and worse performance on food security indicators, particularly the numbers of meals consumed by household members. Households with younger heads have higher resilience than their neighbors, with the highest resilience levels among households with heads under 26, followed by households with heads of 26 to 35 years old. Households' religion and geographic location are also associated with differences in resilience. Pentecostal households appear to have somewhat lower resilience than Catholic households, and households in Gomjuer payam (the administrative division below county) have significantly higher resilience than households in Aweil payam.

The analysis also tested the effects of environmental factors—namely the strength of institutions and the quality of governance—on household resilience. Higher-quality governance, as measured by households'

assessments of the effectiveness of the government's efforts at providing services, lead to greater resilience among households in Aweil. Stronger institutions, as measured by the presence of traditional leaders as well as households' knowledge of organizations and institutions active in their communities, also appear to contribute positively to resilience.

Figure 2.7 provides the complete pathway to resilience and food security for Aweil. For both resilience pillars and the crosscutting factors (governance and institutions), listed variables define the number, magnitude and nature of pathways policymakers and development partners ought to consider when planning to improve food security by increasing household resilience.

**Figure 2.7. Estimated pathways to resilience and food security**




| Pillar variables | Weights |
|---|---|
| Traditional leader | 0.537 |
| Nbr. of orgs. supporting the community | 0.524 |
| Nbr. of inst. affecting lives | 0.503 |

| Pillar variables | Weights |
|---|---|
| Food | 0.753 |
| Health services | 0.748 |
| Water and sanitation | 0.715 |
| Education | 0.683 |
| Prices | 0.674 |
| Roads and bridges | 0.667 |
| Electricity | 0.666 |
| Conflict | 0.550 |
| Crime | 0.530 |
| Jobs | 0.490 |
| Corruption | 0.488 |
| HIV/AIDS | 0.361 |
| Defense | 0.331 |

| Pillar variables | Weights |
|---|---|
| Health facility provides free care | 0.760 |
| Respondent satisfied with quality of health service | 0.694 |
| Access to a common open market | 0.529 |
| Time to reach the health facility | 0.486 |
| Existence of agricultural extension workers | 0.096 |
| Participation in vocational training | 0.029 |

| Pillar variables | Weights |
|---|---|
| Predicted no. of cell phones | 1.000 |
| Predicted no. of sponge mattresses | 0.999 |
| Predicted no. of mosquito nets | 0.950 |

| Pillar variables | Weights |
|---|---|
| Remittances from S. Sudan | 0.513 |
| Knowledge of dev./hum. orgs. | 0.422 |
| Remittances from outside S. Sudan | 0.275 |

| Pillar variables | Weights |
|---|---|
| No. of ag livelihood activities | 0.683 |
| No. of crop types planted | 0.639 |
| Info. about natural disaster | 0.336 |
| No. of formal employers | 0.264 |
| No. of nonag livelihood activities | 0.105 |

Source: Authors
Note: BASIC—Access to Basic Services; SSN—Social Safety Nets; ADC—Adaptive Capacity; HDDS—Household Dietary Diversity Score; Meals1—Per capita number of cooked meals consumed the previous day by children over 12 and adults; Meals2—per capita number of cooked meals consumed the previous day by children aged 6-12 years; Meals 3—Per capita number of cooked meals consumed the previous day by children aged 2-5 years.

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## ANNEX: DETAILED METHODOLOGY

We estimate the resilience measure in two steps, first by constructing the pillars from observed data, and second by estimating the resilience index based on the pillars and outcomes. We estimate the pillars using principal component analysis (PCA). Given that the variables composing the pillars are discrete, we first estimate polychoric correlations between the variables and then apply PCA to the correlation matrix.4 The pillars are then standardized using the min-max procedure5 so that all values fall between 0 and 1.

Following the pillar estimation, we estimate resilience as a latent variable based on the pillars and on four food security variables using structural equation modeling and a maximum likelihood estimator. We include the quadratic terms for each pillar to allow for the existence of thresholds, or minimum values required before an increase in a pillar value affects resilience. A resilience score is generated for each household and then standardized so that values fall between 0 and 1, with higher scores indicating greater resilience.

The mathematical expression of the RIMA framework is as follows (FAO, 2016):

$$y = \lambda\eta + \varepsilon \qquad (1)$$

$$\eta = \beta x + \zeta \qquad (2)$$

where η is the latent variable representing resilience; y is an indicator or outcome of resilience; and (x1, x2, ..., xn) are the determinants of resilience. In our analysis, as in typical RIMA-II analyses, food security indicators are used as y variables and the four resilience pillars enter as the x variables.

Following the computation of the resilience score, we perform regression analysis using tobit to estimate the effects of household characteristics and other factors on resilience, while controlling for payam (the administrative division under counties) specific effects. To account for the social and institutional environment, we construct variables to represent the quality of governance, strength of institutions, and exposure to conflict, using polychoric principal component analysis to estimate scores based on a larger number of underlying variables, as was done to calculate the pillars.

4 Standard methods of performing factor analysis (i.e., those based on a matrix of Pearson's correlations) assume that the variables are continuous and follow a multivariate normal distribution. If the model includes variables that are dichotomous or ordinal a factor analysis can be performed using a polychoric correlation matrix. See Kolenikov and Angeles (2009) for a discussion of the advantages of using polychoric correlations when performing PCA on discrete variables.
5 (Z-Zmin)/(Zmax-Zmin)