THE CURRENCY OF CONNECTIONS:

Why Do Social Connections Matter for Household Resilience in South Sudan?

AUGUST 2020 | Online Appendix: Quantitative Research Methods

Social connectedness module

Table S1 presents the Social Connectedness module. It is composed of 24 'raw' questions with their survey response options, which were tailored to respondents based on their self-reported displacement status and place of residence. The questions and response options have been reordered in the table below to be grouped based on the six social connectedness dimensions. The original survey module is available upon request.

The module was introduced to respondents with the following preamble: "As we noted earlier, we are trying to understand the ways in which households rely on their social networks during difficult times. We are trying to better understand who households can rely on, to get what resources and how these factors may have changed over time. Now I would like to ask you some questions to understand your household's social support network. As we go through these questions, please note that we are interested in all forms of assistance - no matter how big or small - which come from all sources (not just NGOs). For example, when we refer to assistance, we include a range of things such as advice and counseling, help finding work, livestock sharing/gifting, loans/credit, cash, and/or social function support. We iterate here again that all information you share with us is confidential and will not be shared with anyone outside our research team."

The survey inquired about social connectedness both inside and outside households' communities of residence. The survey auto-populated questions with the appropriate geographic unit of reference depending on the survey site (e.g. Panyijar County, Bentiu and Rubkona Town, or the Bentiu PoC). For respondents residing in the Bentiu PoC, the question auto-populated to inquire about the PoC; for all other research sites, the questions auto-populated to inquire about the boma, the smallest administrative unit in South Sudan.

Constructing the Social Connectedness Index and Dimensions

As noted in the Methods section of the report, the research team used 24 questions to measure the six dimensions of social connectedness in the survey. Prior to their construction into the dimension-specific indices and Principal Component Analysis (PCA)-generated Social Connectedness Index, all variables were standardized. Variables in the Social Connectedness module take two forms. The first is a summation across the number and variety of different types of people someone could turn for help to, provide help to, number of different types of help, etc. The second form is ordinal, such as a Likert scale (i.e. from strongly agree to strongly disagree) in response to questions around trust, confidence in receiving support, etc. In order to combine across these two types of variables and varying magnitudes of the summations, the research team standardized all 24 variables so that they would be on the same scale with a mean of zero and a standard deviation of one. For all variables and in turn the constructed indices, a higher score implies higher social connectedness, and a lower score, lower social connectedness.

Table S1: Contextualized Social Connectedness Module by Dimension

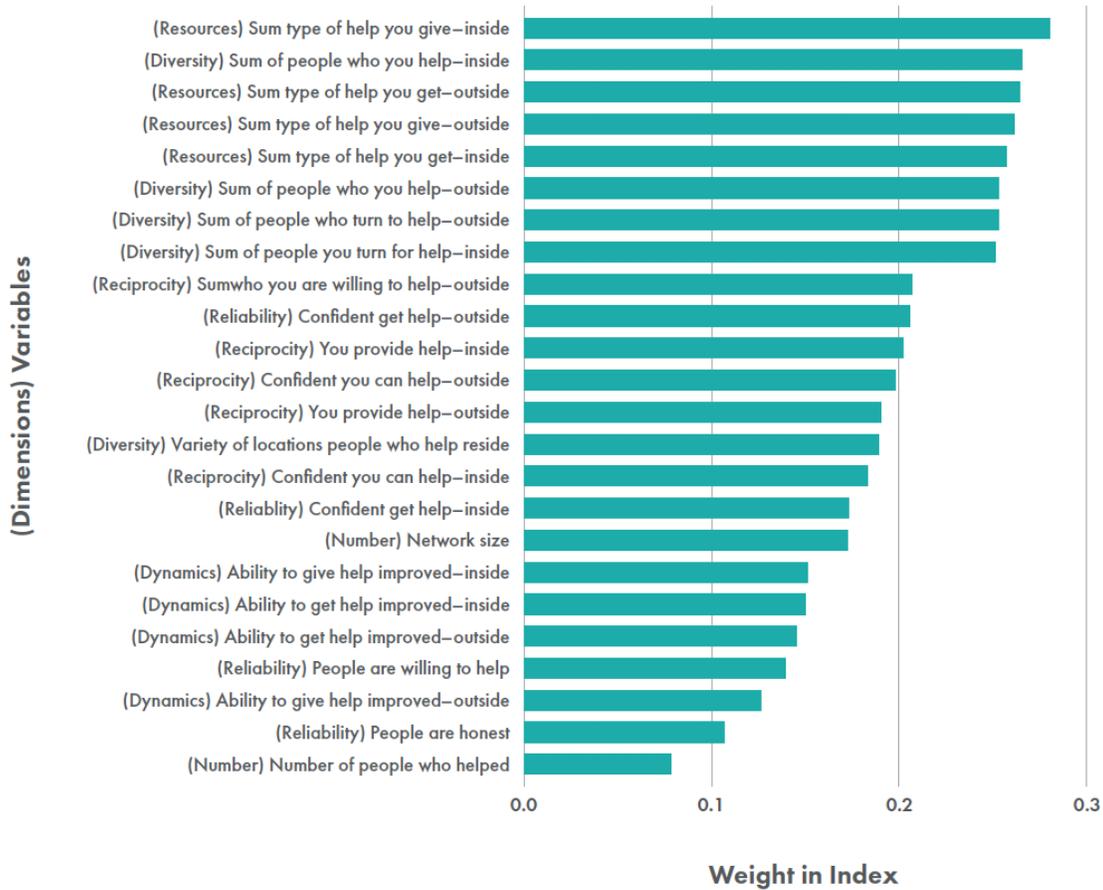| DIMENSION	MEASURE	SURVEY QUESTION(S)	SURVEY RESPONSE[1]
Number	The number of people a household can call during a time of need	If your household had a problem and needed help, how many people beyond your immediate family could you currently turn to who would be willing to assist you?	Integer
		In general, would you say that the network of people your household can turn to when you need help is:	1 large 2 average 3 small 4 does not exist (no network of people)
Diversity	The different types of social connections a household can call or be called upon during times of need	In the last 12 months, who INSIDE [PoC/boma] did you turn to for help?	1 relatives 2 non-relatives in my ethnic group/clan 3 non-relatives in other ethnic group/clan 4 someone from an age-set group (Nuer: gaar) that a member of my HH belongs/linked to 5 livelihood group(s) members of my HH belongs to 6 livelihoods group(s) a member of my HH does not belong to 7 non-governmental organization 8 government and local authorities 9 traditional authorities (e.g. chief, prophets) 10 community groups 11 other
		In the last 12 months, who INSIDE [PoC/boma] did your household provide help to?	
		In the last 12 months, who OUTSIDE [PoC/boma] did you turn to for help?	
		In the last 12 months, who OUTSIDE [PoC/boma] did your household provide help to?	
		Where do these people reside?	1 in a neighboring boma 2 in another payam in this county 3 in another county 4 in another state 5 in a neighboring country (Ethiopia, Kenya, Uganda, Sudan) 6 in other countries beyond East Africa (e.g. Europe, America, the Middle East, etc.) 7 other
Reliability	Confidence in a household's ability to call upon its social connections to mobilize resources in times of need	To what extent do you agree or disagree with the following statement: 'People inside [PoC/boma] are willing to help me if I need it'?	1 strongly disagree 2 somewhat disagree 3 not sure 4 somewhat agree 5 strongly agree
		To what extent do you agree or disagree with the following statement: 'If I lost something of value, most people inside would be honest enough to return it to me'?	

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[1] All responses include 888 'Do not know' and 999 'Refuse to answer'.

		How confident are you that you will be able to get support from someone INSIDE [PoC/boma] if you needed help in the next 12 months?	1 not at all confident 2 somewhat confident 3 very confident
		How confident are you that someone OUTSIDE [PoC/boma] would support you if you needed help in the next 12 months?	
Reciprocity	A household's ability to provide help to its social connections in times of need	In the last 12 months, has your household provided help to someone INSIDE [PoC/boma]?	1 yes 2 no, I was not able to 3 no, I was not willing to 4 no, no one asked for help in the last 12 months
		Who OUTSIDE [PoC/boma] would you be willing and able to help if they needed help?	1 relatives 2 non-relatives in my ethnic group/clan 3 non-relatives in other ethnic group/clan 4 someone from an age-set group (Nuer: gaar) that a member of my HH belongs/linked to 5 livelihood group(s) members of my HH belongs to 6 livelihoods group(s) a member of my HH does not belong to 7 non-governmental organization 8 government and local authorities 9 traditional authorities (e.g. chief, prophets) 10 community groups 11 other
		In the last 12 months, has your household provided help to someone OUTSIDE [PoC/boma] ?	1 yes 2 no, I was not able to 3 no, I was not willing to 4 no, no one asked for help in the last 12 months
		If someone INSIDE [PoC/boma] needs help in the next 12 months, how confident are you that you will be willing and able to provide it?	1 not at all confident 2 somewhat confident 3 very confident
		If someone OUTSIDE [PoC/boma] needs help in the next 12 months, how confident are you that you will be willing and able to provide it?	1 not at all confident 2 somewhat confident 3 very confident
Resources	The different types of economic and non-economic resources a household receives and/or provides to its social connections in times of need	In the last 12 months, what kinds of help did you receive from someone INSIDE [PoC/boma]?	1 cash (with no payback expected) 2 loans (cash with repayment expected) 3 credit (i.e. in-kind) 4 food 5 non-food household commodities (e.g. clothing, bedding, cooking utensils, etc.) 6 livestock gift and sharing (e.g. lactating cow,

		In the last 12 months, what kinds of help did you provide to someone INSIDE [PoC/boma]?	calves, goats, sheep, chicken, etc.) 7 help finding work (wage labor, jobs) 8 livelihood inputs and information about livelihood strategies/techniques 9 market information (e.g. prices, where/who to sell goods) and support (e.g. selling things for someone else at a market or stall) 10 labor exchange
		In the last 12 months, what kind of support did you receive from someone OUTSIDE [PoC/boma]?	11 transportation (of people or goods) 12 advice and counseling (emotional support) 13 social function support (e.g. bride wealth, funeral, compensation support) 14 other Only included when inquiring of receipt of help:
		In the last 12 months, what kinds of help did you provide to someone OUTSIDE [PoC/boma]?	15 none, I did not need help in the last 12 months 16 none, I tried but could not get help from anyone
Dynamics	Changes to a household's ability to receive and provide economic and/or non-economic resources to its social connections in times of need	Overall, in the last 12 months, how has your ability to get help from someone INSIDE [PoC/boma] changed?	
		Overall, in the last 12 months, how has your ability to help those in need INSIDE [PoC/boma] changed?	1 increased 2 stayed the same 3 decreased
		Overall, in the last 12 months, how has your ability to get help from someone OUTSIDE [PoC/boma] changed?	
		Overall, in the last 12 months, how has your ability to help those in need OUTSIDE [PoC/boma] changed?	

The goal of using a PCA approach is to reduce the dimensionality of the multiple variables used to understand social connectedness in this study. PCA aims to transform a large set of variables into a smaller one that still contains the same information as the larger set, by removing redundancy (i.e. information that is highly correlated) and instead creates a combination of new variables that are uncorrelated with the information across the initial variables compressed into one index. Using PCA analysis, these standardized 24 standardized variables were also constructed into an overarching Social Connectedness Index variable.[2] The associated weight of the 24 variables included in the Index is presented in Figure S1.

Figure S1: Relative Weight of Variables in PCA-generated Social Connectedness Index

For each of the six dimensions of social connectedness, constituent standardized variables were summed into dimension-specific indices. An overarching Social Connectedness Index was constructed using PCA. All dimensions of social connectedness, including the PCA-generated index variable, are all significantly ($p<0.01$) and positively correlated but to varying degrees (**Table S2**). Of all of the dimensions, Diversity and Resources have the strongest correlation, while Reliability and Dynamics have the weakest association.

Table S2: PCA-generated Social Connectedness Index and its Dimensions Correlation Matrix (n 901)

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[2] All of the six dimensions of social connectedness, including the Social Connectedness Index, are significantly ($p<0.01$) and positively correlated, but to varying degrees.

	Index	Number	Diversity	Reliability	Reciprocity	Resources	Dynamics
Index	1.000						
Number	0.464	1.000					
Diversity	0.864	0.286	1.000				
Reliability	0.581	0.337	0.279	1.000			
Reciprocity	0.835	0.364	0.606	0.559	1.000		
Resources	0.853	0.273	0.851	0.280	0.583	1.000	
Dynamics	0.503	0.280	0.264	0.219	0.331	0.261	1.000

Sampling strategy and size

In order to determine the necessary sample size for the main household displacement status, the study first consulted the distribution of available food security data - a key measure of resilience in the study - using the Household Hunger Scale (HHS) from the World Food Programme for both Rubkona and Paniyjar from November/December 2017 and July/August 2018. As the data were not stratified by displacement status, a similar distribution was assumed for the purpose of sample size calculations.

Given a power of 0.80, and an alpha of 0.05, the study calculated that a random sample of approximately 200 households was required to achieve an effect size of 0.3, which would be equivalent to about a 25% difference in HHS across time or displacement status. With an attrition rate of 20%, the study estimated a sample size of 240 households across four main household displacement categories: Internally displaced persons (IDPs) in the Bentiu PoC, IDPs outside the PoC, returnees, and members of the resident community, for a total sample of 960 households at each time period, for a total of 1,920 observations across the two rounds of data collection.

During the first round of data collection (April to May 2019), 929 households were surveyed; approximately six months later (October to November 2019), nearly 90% of the households (n 828) were surveyed again. The final sample size by displacement and round is presented in **Table S3**. The final sample size did not match the original selection due to an unexpected finding that household self-identified displacement status did not always match what was on the target lists. A large proportion of households who were originally identified as either IDPs or returnees self-identified as residents (including in the PoC).

Table S3: Final Sample Size by Round and Displacement Status

Displacement Status	Round 1 (Apr.- May 2019)	Round 2 (Oct. - Nov. 2019)	Total
Residents	405	443	848
IDP PoC	198	215	413
IDP non-PoC	151	129	280
Returnee	160	41	201
Other	15	0	15
TOTAL	929	828	1,757

In overall sample analyses, the research team included <u>all</u> respondents, controlling for their displacement status and a host of other household- and community-level factors in models. Stratified analyses by self-

reported displacement status were only conducted for residents, IDP in the Bentiu PoC, and IDP outside of the PoC given the insufficient sample sizes for returnees and 'other' households.

There were some important key differences in the three main populations sampled: residents, IDPs in the Bentiu PoC, and IDPs outside of the PoC. For most households-level characteristics, IDPs outside of the PoC and residents can look quite similar. However, IDPs living outside the PoC, compared to residents, have significantly greater access to money senders, are slightly less likely to come from a rural area, are more likely to have a female head who are slightly more literate. The greatest observed difference, for key household demographics and access to services, is between IDPs in the PoC and the resident population. Other than access to water, IDPs in the PoC have significantly better access to almost all services compared to residents. In addition, their heads of households are more likely to be literate, come from an urban area, have a lower dependency ratio, and have experienced less displacement in the past 12 months (from when the surveys were conducted). In all analyses, as described below, households' self-reported displacement statuses and such household- and community-level factors are included in the fixed effects and random effects models.

Household Survey

In both rounds of data collection, the household survey included questions about a host of other conceptually and contextually relevant to an investigation of the linkages between households' connectedness and their resilience:

- Household demographics;
- Livelihood practices and coping strategies;
- Displacement and migration experience;
- Access to essential services;
- Market functionality;
- Receipt of external assistance;

- Participation in community organizations;
- Wealth proxies;
- Household experience of shocks;
- Household food security;
- Subjective resilience

During the second round, the household survey included additional questions about social cohesion, intent to migrate, access to information about security and safety, and another household food security indicator (Months of Adequate Household Food Provisioning). The survey is available upon request.

Wealth proxies

In order to better understand household wealth and to account for the evolving definition of wealth in the context, the study used several different proxies:

1. **Access to land**
2. **Asset ownership (using Morris Asset Index)**
   The Morris Asset Index (MSI) examines household assets and has been shown to be a good proxy of household wealth in rural Africa and countries in transition like Albania.[3] The MSI weights each

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[3] Morris, S.S.; Calogero, C.; Hoddinott, J. and Christiaensen, L. J. M. (2000) 'Validity of rapid estimates of household wealth and income for health surveys in rural Africa', *Journal of Epidemiology and Community Health* 54:381-387; Hagen-Zanker, J. and Azzari, C. (2010) 'Are internal migrants in Albania leaving for the better?', *Eastern European Economics* 48: 57-84.

durable asset owned by a household by the share of households within a sample that own that asset. Thus, households are considered better off if they own assets not owned by most of the households in the sample.

The specific assets included in the MSI for this study are mosquito net, radio, mobile phone, mattress, table, chair, stove, fishing tools, grain grinding tools, agriculture tools, solar panel, generator, wheelbarrow, bicycle, motorbike, and cart for donkeys or oxen.

3. **Livestock ownership** (using Tropical Livestock Units per capital)

   The Tropical Livestock Units (TLU) uses different weights to differentiate between more expensive animals (e.g. cattle or camel) and less expensive animals (e.g. poultry). To convert individual livestock ownership into TLUs, the study used the following conversion factors (based on relative value of the livestock): cattle = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chicken = 0.01. The total was then divided by the number of household members (Harvest Choice 2015). However, given cultural context, it is likely that livestock figures are under-reported. The TLU variable is likely to measure relative household wealth better than absolute.

4. **Annual total expenditure**

   Expenditures included in the index are food, transportation, rent, fuel, water, loan repayment, health-related expenses, livelihood/business related expenses, education, small household electronics, household furnishings, clothes and shoes, major medical expenses, and social function expenses (e.g. funeral expenses, dowry.)

Analysis

Given the panel nature of the data set, the research team used fixed effects and the random effects models. The fixed effects model assesses how changes in key time-variant household characteristics (e.g. age of household head, wealth, dependency ratio etc.) were associated with changes in the key outcome variables (e.g. Social Connectedness Index, measures of household food security and subjective resilience). The random effects model, on the other hand, captures how any variable was associated with selected outcomes (without looking at change over time). The analyses employed linear, logit, or ordered logit fixed regressions depending on the distribution of the outcome variable.

For **Research Question #2**, in order to examine the association between household- and community-level characteristics and households' social connectedness, the following variables were included in the analysis:

Social Connectedness (outcome)	Household- and community-level factors (explanatory)	Control variables

• Index • Number • Diversity • Reliability • Reciprocity • Resources • Dynamics	• Marital status of Head of Household (HoHH) • Gender of HoHH • Age of HoHH • Religion of HoHH • HoHH's number of years in education • Dependency ratio • Primary and preferred livelihood activities • Humanitarian assistance • Number of times displaced in the past 12 months • Migration of household member • Membership in community and livelihood groups • Wealth proxies • Market functionality • Access to money sender • Access to essential services	• Displacement status • Data collection round • Research site

For **Research Question #3**, in order to examine the association between households' social connectedness and their resilience, the following variables were included in the analysis:

Resilience (outcome)	Social connectedness (explanatory)	Control variables

• Food Security
  o Food Consumption Score
  o Household Hunger Scale
• Subjective resilience
	• Social Connectedness
	  o Index
	  o Number
	  o Diversity
	  o Reliability
	  o Reciprocity
	  o Resources
	  o Dynamics
		• Household- and community-level factors
		• Displacement status
		• Data collection round
		• Research site