

# RESILIENCE AND RESILIENCE CAPACITIES MEASUREMENT OPTIONS

## FULL APPROACH

Methodological Guide:  
A Guide for Calculating Resilience Capacity

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## ACRONYMS

BFS	Bureau for Food Security
CSI	Coping Strategies Index
FFP	Food for Peace
FIES	Food Insecurity Experience Scale
HDDS	Household Dietary Diversity Score
HH	Household
NGO	Non-governmental organization
PRIME	Pastoralist Areas Resilience Improvement and Market Expansion
REAL	Resilience Evaluation, Analysis, and Learning
RISE	Resilience in the Sahel Enhanced Project

## I. INTRODUCTION

This methodological guide<sup>1</sup> is one in a series of five guidance documents that is meant to be used together for measuring and analyzing resilience in relevant Food for Peace (FFP) or Feed the Future (FTF) initiatives. The other documents in the series include an introduction to – and comparison of measurement options for Light, Intermediate, and Full approaches to analyzing resilience, a household and a community questionnaire, and enumerator guidance (for both questionnaires). This document provides guidance on calculating individual components of resilience capacity as well as the three resilience capacity indices – absorptive, adaptive, and transformative capacities – and an overall resilience index.

All documents in the guidance series are formulated around the Full Approach, which represents the complete “menu” of possible questions, responses, and analyses. The Light and Intermediate Approaches involve subsets of this full menu.

**Together, the household and community questionnaires comprise the resilience instrument. It is recommended that both are implemented.**

## 2. MEASURING RESILIENCE

Resilience is captured by a set of capacities that enable households and communities to effectively function in the face of shocks and stresses and still meet a set of well-being outcomes. The ability to measure resilience involves measuring the relationship between shocks, capacities, responses, and current and future states of well-being. **Thus, there is no single indicator that measures resilience.** There is a need for a number of indicators to be analytically used as part of a measurement framework. There are four key factors to consider in measuring resilience:

- Identify the well-being outcomes to be achieved and measure resilience in relation to these outcomes.
- Identify the shocks and stresses that individuals, households, communities and systems are exposed to and the severity and duration of these shocks and stresses.
- Measure the absorptive, adaptive and transformative capacities in relation to these shocks and stresses at different levels.
- Identify the responses of individuals, households, communities and systems to these shocks and stresses and trajectory of well-being outcomes.

Key questions that can be further explored through resilience analysis include:

- Does shock exposure have a negative impact on food security and child nutritional status?
- Does greater resilience capacity have a positive impact on these outcomes?
- Which resilience capacities are critical to mitigate the negative effect of shocks on well-being?

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<sup>1</sup> Please note that this is a living document that will be continually edited and updated. Visit <http://www.fsnnetwork.org/REAL> for the current version.

From a practical measurement standpoint, resilience is the ability of a household, community, and higher-level systems<sup>2</sup> to manage or recover from shocks and stresses (i.e., stability or improvement in well-being outcome measures in the face of shocks and stressors) and takes into account whether that recovery took place with the use of negative coping strategies that undermine the ability to recover from future shocks and stresses.

This document describes how to calculate shock exposure, resilience capacities, responses, and recovery. The addendum provides a more detailed technical description for calculating the resilience capacities indexes. Examples of analytical approaches for measuring resilience can be found elsewhere.<sup>3,4,5</sup> Additional guidance on resilience measurement is available through the Resilience Evaluation, Analysis, and Learning (REAL) consortium.<sup>6</sup>

## 3. RESILIENCE INDICATORS

### 3.1 Well-being Outcomes

A number of outcome indicators can be used for measuring well-being in the face of shocks and stresses. Some examples include:

- Depth of Poverty: The mean percent shortfall relative to the \$1.90 poverty line
- Prevalence of households with moderate or severe hunger (Food Insecurity Experiential Scale; FIES)
- Prevalence of wasted children under five years of age
- Ability to recover from shocks/stressors

### 3.2 Shocks and Stresses

In resilience analysis, the primary measure of shocks/stresses is the shock exposure index, which measures the overall degree of shock exposure for each household. The shocks should be those that are experienced by the target population and may include: flooding /excessive rainfall; landslides/erosion; drought or unpredictable or insufficient rain; hail or frost; pests or disease outbreak (crop or livestock); human disease outbreaks (e.g., cholera); death in the household; unemployment for youths; market price fluctuation; theft/conflict; and other potential or actual risks identified by target communities. The index is based on household data regarding:

- Number of shocks to which a HH is exposed in the past 12 months
- Perceived severity of the shocks

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<sup>2</sup> This guidance focuses on the household and community levels.

<sup>3</sup> Smith L, T Frankenberger, B Langworthy, S Martin, T Spangler, S Nelson and J Downen. 2015. Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Project Impact Evaluation. Baseline Survey Report. Vol. 1: Main Report. <https://agrilinks.org/sites/default/files/resource/files/EthiopiaPRIMEVol1final.pdf>.

<sup>4</sup> Frankenberger T and L Smith. 2015. Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Project Impact Evaluation. Report of the Interim Monitoring Survey 2014-2015. Available at: [http://pdf.usaid.gov/pdf\\_docs/PA00MGHS.pdf](http://pdf.usaid.gov/pdf_docs/PA00MGHS.pdf).

<sup>5</sup> Feed the Future FEEDBACK. 2016. Resilience in the Sahel-Enhanced (RISE) Project Impact Evaluation. 2015 Baseline Report. Rockville, MD: Westat.

<sup>6</sup> <http://www.fsnnetwork.org/resilience-evaluation-analysis-and-learning-real-award>.

### 3.3 Resilience capacities

Resilience capacities are measured as a set of indices, one for each of the three dimensions of resilience capacity—absorptive capacity, adaptive capacity, and transformative capacity—and one overall index combining these three indexes.

**Absorptive capacity index.** Absorptive capacity is the ability to minimize exposure to shocks and stresses through preventative measures and appropriate coping strategies to avoid permanent, negative impacts. The absorptive capacity index is constructed from eight indicators, some of which are themselves indices. The indicators to be used include:

- Availability of informal safety nets
- Bonding social capital
- Access to cash savings
- Access to remittances
- Asset ownership
- Shock preparedness and mitigation
- Availability of/access to insurance
- Availability of/access to humanitarian assistance

**Adaptive capacity index.** Adaptive capacity is the ability to make proactive and informed choices about alternative livelihood strategies based on an understanding of changing conditions. This index is constructed from the following ten indicators, again some of which are themselves indices. The indicators are:

- Bridging social capital
- Linking social capital
- Social network index
- Education/training
- Livelihood diversification
- Exposure to information
- Adoption of improved practices
- Asset ownership
- Availability of financial services
- Aspirations/confidence to adapt/locus of control index

**Transformative capacity index.** Transformative capacity involves the governance mechanisms, policies/ regulations, infrastructure, community networks, and formal and informal social protection mechanisms that constitute the enabling environment for systemic change. This index is constructed from fifteen indicators, including some that are indices. The indicators are:

- Availability of/access to formal safety nets

- Availability of markets
- Availability of/access to communal natural resources
- Availability of/access to basic services
- Availability of/access to infrastructure
- Availability of/access to agricultural services
- Availability of/access to livestock services
- Bridging social capital
- Linking social capital
- Collective action
- Social cohesion
- Gender equitable decision-making index
- Participation in local decision-making
- Local government responsiveness
- Gender index

#### 4. RESILIENCE INDICATORS AND THEIR CORRESPONDING QUESTIONS

Table I presents the resilience capacity indicators and their respective survey questions. ***This table and subsequent guidance were developed for use with the Food for Peace (FFP) core household questionnaire. Other USAID offices (e.g., BFS) may need to adjust references of specific FFP modules/questions to match their own core questionnaire.***

These are required elements for calculating the resilience capacity indices and must either be included as part of the respective USAID core questionnaire (e.g., FFP, BFS) or the resilience instrument.

Questions sourced from the FFP core household baseline questionnaire are preceded by “BL”, those from the household resilience questionnaire are preceded by “R”, and those from the community resilience questionnaire are preceded by “CR”.

**Table I. Resilience indicators and components of resilience capacity and their sources**

Indicator/Component	Source/Question <sup>7</sup>
Ability to recover	R108, R109
<b>Shock exposure index</b>	
<b>Exposure:</b> Number of shocks experienced in the past 12 months	R103

<sup>7</sup> Numbers may vary slightly across FFP and other USAID questionnaires.

<b>Indicator/Component</b>	<b>Source/Question<sup>7</sup></b>
<b>Shock severity:</b> Impact of shock on income security Impact of shock food consumption	R104 R105
<b>Absorptive capacity index</b>	
Availability of informal safety nets	CR401, CR402
Bonding social capital	R1304, R1307
Access to cash savings	R601
Access to remittances	R1101, R1103, R1105, R1107
Asset ownership	BL H7.02, H7.03; R201, R201A, R201B*
Shock preparedness and mitigation	CR501-CR504(11), CR350, R901, R902, R110
Availability of/access to insurance	CR364, R508, R509
Availability of/access to humanitarian assistance	CR501-CR504, R1301-R1302
<b>Adaptive capacity index</b>	
Bridging social capital	R1305, R1308
Linking social capital	R1309-R1314
Social network index	CR401, R807-R809
Education/training	BL B21; R1327-R1332, R1334
Livelihood diversification	R1001, R1002
Adoption of improved practices	BL G13b, G16, G18, G21
Exposure to information	R701
Asset ownership	See above
Availability of financial resources	CR360-CR363
Aspirations	R1401, R1402, R1404, R1405, R1412, R1414
Locus of control	R1413, R1415-R1417
Confidence to adapt	R1403, R1407-R1411
<b>Transformative capacity index</b>	
Availability of/access to formal safety nets	R308, R309(5,6), R1301, R1302(5,6), CR366-CR368, CR501-CR504(5,6)
Availability of markets	CR347, CR351, CR354
Availability of/access to communal natural resources	CR208, CR211, CR214, CR217
Availability of/access to basic services	CR313, CR314, CR320-CR324, CR330-CR334, CR358-CR359, CR360-CR363
Availability of/access to infrastructure	BL F04; CR306-CR308, CR309-CR311, CR313-CR315
Availability of/access to agricultural services	CR343-CR345
Availability of/access to livestock services	CR335-CR339

Indicator/Component	Source/Question <sup>7</sup>
Bridging social capital	See above
Linking social capital	See above
Collective action	R901, R902
Social cohesion	CR404-CR406, CR408-CR409
Gender equitable decision-making index	R1701-R1708
Participation in local decision-making	R801, R802
Local government responsiveness	CR804-CR806
Gender index	CR901-CR905

\* Do not include assets from the R201B Consumption Assets module if modules BL H7.02 and H7.03 include these assets (i.e., do not double count).

In order to eliminate duplication of questions between the FFP core questionnaire and resilience instrument, Table 2 maps specific changes to FFP's questionnaire that are required and assumed as part of this methodological guide. For those users who are not utilizing FFP or BFS questionnaires, the required questions are provided in Annex A in *Resilience Measurement Options: Full Approach. Household Questionnaire* and should be inserted into the resilience instrument.

Similarly, those sections/questions identified as not necessary in the FFP core questionnaire must be deleted in order to not duplicate those in the resilience instrument, which is designed specifically with a resilience focus. The same type of mapping and adjustment will be necessary if other USAID core questionnaires are used (e.g., BFS).

**Table 2. Assumptions regarding FFP household questionnaire**

FFP questionnaire includes: <sup>8</sup>		FFP questionnaire does not include: <sup>9</sup>	
FFP modules/sections	Questions	FFP modules/sections	Questions
Identification and Informed Consent	Module A	HHS	C16-C21
Household roster, with maximum level of education	B21	Assistance	C22-C24
HDDS	C3-C15	Shocks/stresses	C25
Main source of drinking water	F04	Livestock care/raising	G15
Improved practices for crops	G13B	Access to hazard insurance	G09
Improved practices for livestock	G16		
Improved practices for natural resources	G18		
Improved practices for crop storage	G21		

<sup>8</sup> If the FFP (or other USAID) questionnaire does NOT include modules/questions listed here, they need to be added in the resilience instrument (i.e., household questionnaire). See Annex A in *Resilience Measurement Options: Full Approach. Household Questionnaire*.

<sup>9</sup> Items listed here are preferred in the resilience instrument and need to be removed from the FFP (or other USAID) questionnaire.

FFP questionnaire includes: <sup>8</sup>		FFP questionnaire does not include: <sup>9</sup>	
FFP modules/sections	Questions	FFP modules/sections	Questions
Durable goods expenditures	H7.02, H7.03		

## 5. CALCULATION OF SHOCK EXPOSURE AND MEASURES OF RESILIENCE

Throughout this document, the explanation for how each index or indicator is calculated is followed by the relevant questions from the baseline survey<sup>10</sup> and resilience instrument (i.e., household and community questionnaires) used for each index (in red print). Those from the baseline household questionnaire are preceded by “BL”, those from the household resilience questionnaire are preceded by “R”, and those from the community resilience questionnaire are preceded by “CR”.

It should be noted that the specific calculations for how each resilience element is calculated can change slightly, depending on the results of the pre-baseline contextualization process in which relevant response categories, etc. are defined. Thus, this document outlines the construction of the three resilience capacities based on non-contextualized household and community resilience surveys and some analysis details may vary accordingly.

### 5.1 Ability to recover

**1) Ability to recover index.** Ability to recover index is based on estimation of the ability of households to recover from the typical types of shocks that occur in the program areas, based on data regarding the shocks households experienced in the year prior to the survey. Since each survey household did not experience the same types of shocks/stressors of the same severity, it is necessary to create a “shock exposure corrected” index to measure ability to recover.

First, a base “ability to recover” variable is calculated based on responses to two questions:

“To what extent has your ability to meet food needs returned to the level it was before the shocks and stressors you experienced in the last 12 months?” With possible responses and weighted values:

- Ability to meet food needs is the same as before the shocks (= value of 2)
- Ability to meet food needs is better than before the shocks (= value of 3)
- Ability to meet food needs is worse than before the shocks (= value of 1)

AND

<sup>10</sup> In this instance, the FFP core household questionnaire.

“In light of the shocks you faced in the last 12 months, to what extent do you believe you will be able to meet your food needs in the next year?”, with possible responses and weighted values:

- Ability to meet food needs will be the same as before the shocks (= value of 2)
- Ability to meet food needs will be better than before the shocks (= value of 3)
- Ability to meet food needs will be worse than before the shocks (= value of 1)

The responses to the two questions are combined into one variable that has a minimum value of 2 and a maximum value of 6.

Survey questions: R108, R109

## 5.2 Index of shock exposure

A measure of shock/ stressor exposure and severity is created that takes into account the shocks or stressors to which a household is exposed out of the total number of shocks or stressors (e.g., 18), and the perceived severity of the shock on household income and food consumption.

Perceived severity is measured using two variables: impact on income security and impact on food consumption. The variables are based on respondents' answers to the questions, “How severe was the impact on your income?” and “How severe was the impact on household food consumption?” which are asked of each shock or stressor experienced. The possible responses are:

- No impact = value of 1
- Slight decrease = value of 2
- Severe decrease = value of 3
- Worst ever = value of 4

The responses to the two questions are combined into one variable that has a minimum value of 2 and a maximum value of 8.

The shock exposure measure is then a weighted average of the incidence of experience of each shock (a variable equal to one if the shock was experienced and zero otherwise), weighted by the perceived severity of the shock. The shock exposure index ranges from 1 to 144 (i.e., 8\*total number of shocks).

Survey questions: R103, R104, R105

## 5.3 Absorptive capacity index

The absorptive capacity index is constructed from eight indicators, some of which are themselves indices. The indicators and explanations of their calculation are as follows.

**1) Availability of informal safety nets.** This indicator is the total number of community organizations that typically serve as informal safety nets that are available in a community and have been active in the 12 months prior to the survey. The six groups are:

- Credit or micro-finance group
- Savings group
- Mutual help group (e.g., ritban, afoosha, ofera/webera, burial, eqqub, etc.)
- Religious group
- Mothers' group
- Women's group

Survey questions: CR401, CR402

**2) Bonding social capital index.** The bonding social capital index is based on the responses to two questions:

- Whether the household indicates it would be able to get help from various categories of people living WITHIN their community if they needed it;
- Whether the household indicates it would be able to give help to people living WITHIN their community who needed it.

The possible responses for whom a household could get help from or to whom they would give help are: "relatives", "non-relatives/neighbors within my ethnic group/clan", "non-relatives/neighbors of other ethnic groups/clan", and "no one". An additive index ranging from 0 to 6 is calculated based on the responses to each of the two questions, with "no one" = 0 and each of the other responses = 1.

Survey questions: R1304, R1307

**3) Access to cash savings.** This indicator is a binary (dummy) variable equal to 1 if the respondent reported that a household member regularly saves cash.

Survey question: R601

**4) Access to remittances.** This indicator is a binary (dummy) variable equal to 1 if the respondent reported that the household receives remittances.

Survey questions: R1101, R1103, R1105, R1107

**5) Asset ownership index.** Asset ownership is measured using the number of consumer durables, productive assets, and livestock owned. [Note: Do not include assets from the R201B Consumption Assets module if modules BL H7.02 and H7.03 include these assets (i.e., do not double count).]

Survey questions: BL H7.02, H7.03, R201, R201A, R201B (if applicable)

**6) Shock preparedness and mitigation.** Summary variable ranging from 0 to 4 summing up the points assigned to the following:

- There is a government and/or NGO disaster planning and/or response program in the village (1); **Survey questions: CR501-CR504 (11)**
- There is an emergency plan for livestock off-take in the village if a drought hits (1); **Survey question: CR350**
- Household reports participating in any of the following activities: soil conservation activities, flood diversion structures (i.e., protection of land/infrastructure from flooding), planting trees on communal land, or improving access to health services (1); **Survey questions: R901, R902**
- Household reports engaging in any of the following ways of protecting their household from the impact of future shocks: increasing savings, putting aside grains/fodder, switching to different crops/livestock, added ag activity to non-ag activity, added non-ag activity to ag activity, acquiring crop insurance (1); **Survey question: RI10**

**7) Availability of/access to insurance.** This indicator is a binary (dummy) variable equal to 1 if crop, livestock, health or another type of insurance is available in the respondent's village OR the respondent's household reports having crop, livestock, health or any other type of insurance.

**Survey questions: CR364, R508, R509**

**8) Availability of/access to humanitarian assistance.** This indicator is a binary (dummy) variable equal to 1 if government or NGO emergency food or cash assistance is available in the respondent's village OR the household reported receiving emergency food or cash assistance from the government or NGO during the 12 months prior to the survey.

**Survey questions: CR501-CR504, RI301-RI302**

Detailed guidance describing the methodology used to calculate the absorptive capacity index is provided in the Addendum at the end of this methodological guide.

## 5.4 Adaptive capacity index

The adaptive capacity index is constructed from ten indicators, including some of which are indices. The indicators and calculations are as follows.

**1) Aspirations/confidence to adapt/locus of control index.** This index is based on indicators of the underlying concepts around people's aspirations, confidence to adapt, and a sense of control over one's life.

The **aspirations** index is based on two sub-indices: a) absence of fatalism, and b) belief in the future. The absence of fatalism sub-index involves two sets of binary variables. The first is based on two binary (dummy) variables equal to 1 if the respondent agrees that:

- Each person is responsible for his/her own success or failure in life. (1)
- To be successful one needs to work very hard rather than rely on luck. (1)

The second set of variables regarding fatalism is based on a 6-point agreement scale regarding two statements. For each question, calculate a binary (dummy) variable equal to 1 if the

respondent reports they “strongly agree”, “agree”, or “slightly agree” with the question. Reverse-code where indicated.

- My experience in life has been that what is going to happen will happen. (reverse-code)
- It is not always good for me to plan too far ahead because many things turn out to be a matter of good or bad fortune.

The belief in the future sub-index is based on two binary (dummy) variables equal to 1 regarding the respondent’s view of the future.

- They are hopeful for their children’s future. (1)
- The level of education they want for their children. (binary=1 if they want their children to graduate from secondary or post-secondary school)

**Survey questions:** R1401, R1402, R1404, R1405, R1412, R1414

The **confidence to adapt** indicator is based on six variables regarding the degree to which the respondent is exposed to alternatives. Three binary variables each equal to 1 if the respondent:

- Is willing to move somewhere else to improve his/her life.
- Communicates regularly with at least one person outside of the village.
- Engaged in any economic activities with members of other villages or clans during the week prior to the survey.

The remaining three variables are based on binary (dummy) variables to the following questions:

- How many times in the past month have you gotten together with people to have food or drinks, either in their home or in a public place?
- How many times in the past month have you attended a church/mosque or other religious service?
- How many times in the past month have you stayed more than two days outside of this kebele?

To create the binary variables: binary=1 if response > 1, otherwise binary=0.

**Survey questions:** R1403, R1407-R1411

The **locus of control** indicator is constructed from a 6-point agreement scale of four questions. For each question, calculate a binary (dummy) variable equal to 1 if the respondent reports they “strongly agree”, “agree”, or “slightly agree” with the question. Reverse-code where indicated.

- My life is chiefly controlled by other powerful people. (reverse-code)
- I can mostly determine what will happen in my life.
- When I get what I want, it is usually because I worked hard for it.
- My life is determined by my own actions.

**Survey questions:** R1413, R1415-R1417

The aspirations/confidence to adapt index is calculated by combining all of the binary variables into an additive index. The index ranges from 0 to 16.

**2) Bridging social capital.** The bridging social capital index is based on the responses to two questions:

- Whether the household indicated it would be able to **get help** from various categories of people living OUTSIDE OF their community if they needed it;
- Whether the household indicated it would be able to **give help** to people living OUTSIDE OF their community who needed it.

The possible responses for whom a household could get help from or to whom they would give help are: “relatives”, “non-relatives/neighbors within my ethnic group/clan”, “non-relatives/neighbors of other ethnic groups/clan”, and “no one”. An additive index ranging from 0 to 6 is calculated based on the responses to each of the two questions, with “no one” = 0 and each of the other responses = 1.

Survey questions: R1305, R1308

**3) Linking social capital.** The linking social capital index is based on answers to questions regarding whether household members know a government official and/or NGO leader and whether they believe the official/leader would help their family or community if help was needed. The index ranges from 0 to 6.

Survey questions: R1309-R1314

**4) Social network index.** This community-level indicator is a summary variable ranging from 0 to 6 based on the following household and community level variables:

- A binary (dummy) variable equal to 1 if there is a savings group in the village;
- A binary (dummy) variable equal to 1 if there is a mutual help group in the village;
- A binary (dummy) variable equal to 1 if there is a women’s group in the village;
- The proportion of households in a village that reports any household member participated in a group that provided food to someone in that village at least once in the last 12 months;
- The proportion of households in a village that reports any household member participated in a group that provided labor to someone in that village at least once in the last 12 months;
- The proportion of households in a village that reports any household member participated in a group that provided some other type of help to someone in that village at least once in the last 12 months;

Survey questions: CR401, R807-R809

**5) Education/training.** The variable is based on an index calculated from three variables:

- A binary (dummy) variable is equal to 1 if any adults in the household can read or write  
Survey question: R1334

- A binary (dummy) variable is equal to 1 if any household adult has a primary or higher education

Survey question: BL B21

- A binary (dummy) variable is equal to 1 if the respondent or any adult household member has had any of the following training: vocational (job) training, business development training (including financial literacy), early warning training, natural resources management training, adult education (literacy or numeracy), or how to use your cell phone to get market information (e.g., prices)

Survey questions: R1327-R1332

Compute an additive index with the three binary variables. The index ranges from 0 to 3.

**6) Livelihood diversification.** The total number of livelihood activities engaged in over the last year. The question asked to identify these livelihoods is “What were the sources of your household’s food/income over the last 12 months?” The possible options are:

- Own farming/crop production and sales
- Own livestock production and sales
- Ag wage labor (within the village)
- Ag wage labor (outside the village)
- Non-ag wage labor (within the village)
- Non-ag wage labor (outside the village)
- Salaried work
- Sale of wild/bush products (e.g., charcoal, firewood)
- Honey production
- Petty trade (reselling other products, e.g., grains, veggies, oil, sugar, etc.)
- Petty trade (own products, e.g., local beer, sex work)
- Other self-employment/own business (agricultural, e.g., buying/selling chat)
- Other self-employment/own business (non-agricultural, e.g., stone cutting, hair braiding, etc.)
- Rental of land, house, rooms
- Remittances
- Gifts/inheritance
- Safety net food assistance
- Other

Survey questions: R1001, R1002

**7) Exposure to information.** The number of informational topics received by anyone in the respondent’s household over the last year.

Survey question: R701

**8) Adoption of improved practices.** This binary (dummy) variable is equal to 1 if respondents report adopting three or more improved practices for crop production (including vegetables) OR respondents report adopting three or more improved practices for livestock production OR respondents report following one natural resource management practice or technique not related directly to on-farm production OR respondents report using any improved storage method.

Survey questions: BL G13b, G16, G18, G21

**9) Asset ownership index.** See above.

**10) Availability of financial resources.** The variable is equal to zero if there is no institution in a village that provides credit or savings support, to one if there is only one type of support, and to two if there are both types of support.

Survey questions: CR360-CR363

Detailed guidance describing the methodology used to calculate the adaptive capacity index is provided in the Addendum at the end of this methodological guide.

## 5.5 Transformative capacity index

The transformative capacity index is constructed from fifteen indicators, some of which are indexes. The indicators and calculations are as follows.

**1) Availability of/access to formal safety nets.** This community-level variable is the number of formal safety nets available in a household's village. The possible safety nets are:

- Places in a village where people can get food assistance
- Places in a village where people can get housing materials and other non-food items
- Places in a village where people can get assistance due to losses in livestock
- The availability of a government or NGO disaster response program
- Places in a village where people can get government or NGO help when they are faced with a shock
- Whether the household received assistance (i.e., formal safety net) from the government or NGO

Survey questions: CR366-CR368, CR501-CR504 (5,6), R308, R309 (5,6), R1301, R1302 (5,6)

Calculate as an additive index of the six binary (dummy) variables. The index ranges from 0 to 6.

**2) Availability of markets.** This community-level variable is the sum of the number of markets listed below that are available within 5 kms of a village. A binary (dummy) variable is equal to 1 for each of the markets the respondent reports are available within his/her village. The three binary variables are used to calculate an additive index that ranges from 0 to 3.

- Markets for selling agricultural products
- Markets for purchasing agricultural inputs

- Livestock market

Survey questions: CR347, CR351, CR354

**3) Availability of/access to communal natural resources.** This community-level variable is the sum of the number of communal natural resources listed below that are available in a village. A binary (dummy) variable is equal to 1 for each of the types of natural resources the respondent reports are available within his/her village. The binary variables are used to calculate an additive index that ranges from 0 to 4 (depending on the irrigation option).

- Communal grazing land
- Communal water source for livestock
- Communal source of firewood
- Communal source of irrigation water (optional)

Survey questions: CR208, CR211, CR214, CR217

**4) Availability of/access to basic services.** This community-level variable is the number of basic services available in a village and responses to questions regarding whether certain services generally provided by the government are of a minimum quality of service.

- Roads/trails. This binary (dummy) variable is equal to 1 if respondents report they live in a village whose main route is a paved, dirt or mixed paved/dirt road, AND people are not prevented from traveling at certain times of year due to “poor road/trail conditions”.

Survey questions: CR313, CR314

- Primary schools. A binary (dummy) variable is equal to 1 if there is a primary school within 5 km of the village AND its physical condition is “good” or “very good” AND there are enough teachers.

Survey questions: CR320-CR324

- Health services (post, clinic, center). A binary (dummy) variable is equal to 1 if there are health services within 5 km of the village AND its physical condition is “good” or “very good” AND there were no problems accessing services over the last year (3)

Survey questions: CR330-CR334

- Police/security force. A binary (dummy) variable equal to 1 if there are government security forces (local or national) that can reach the village within one hour.

Survey questions: CR358-CR359

- Financial services. A binary (dummy) variable equal to 1 if there are formal institutions (i.e., government regulated banks) in a village where people can borrow or save money.

Survey questions: CR360-CR363

The binary variables are used to calculate an additive index that ranges from 0 to 5.

**5) Availability of/access to infrastructure.** This community-level variable is the number of types of infrastructure available in a village, as determined by the following conditions:

- At least one-half of households in the village have access to piped water;
- At least one-half of households in the village have electricity from the main grid;
- The village either has mobile phone service/network coverage OR a public telephone/kiosk;
- The village can be reached with a paved road all year OR is served by a public transportation system

Survey questions: BL F04, CR306-CR308, CR309 -CR311, CR313-CR315

The binary variables are used to calculate an additive index that ranges from 0 to 4.

**6) Availability of/access to agricultural extension services.** This community-level variable is based on whether agricultural extensions services are available in a village and are of a minimum quality of service. A 3-point scale is constructed as follows:

- No agricultural extension services within 5 km (0)
- Agricultural extension services available within 5 km but there was a time in the last year when people were unable to get quality extension services when they needed them (1)
- Agricultural extension services available within 5 km and people were able to get the services they needed over the last year (2)

Survey questions: CR343 -CR344,

**7) Availability of/access to livestock services.** This community-level variable is based on whether livestock veterinary services are available in a village and are of a minimum quality of service. A 3-point scale is constructed as follows:

- No veterinary services within 5 km (0)
- Veterinary services available within 5 km but there was a time in the last year when people were unable to get quality veterinary services when they needed them (1)
- Veterinary services available within 5 km and people were able to get the services they needed over the last year (2)

Survey questions: CR335, CR336, CR338

**8) Bridging social capital.** See above.

**9) Linking social capital.** See above.

**10) Collective action.** A household-level summary variable based on the number of types of collective action a household engaged in over the last 12 months to benefit the entire community.

Survey questions: R901, R902

**11) Social cohesion.** A community-level summary variable based on binary (dummy) variables regarding whether groups come together either socially or to help others. Each binary variable is equal to 1 if a group of community members came together at least once during the 12 months prior to the survey in order to:

- provide labor to someone else in the village who needed it (1);
- provide food to someone else in the village who needed it (1);
- provide other types of help to someone else in the village who needed it (1);
- get together with other members of the village for social events (e.g., weddings, sports events, celebrations, etc.) at least once over the last 12 months (1); and
- get together with members of other villages for social events (e.g., weddings, sports events, celebrations, etc.) at least once over the last 12 months (1)

Survey questions: CR404-CR406, CR408-CR409

The binary variables are used to calculate an additive index ranging from 0 to 5.

**12) Gender equitable decision-making index.** Based on experience in Bangladesh, Mali and Nepal, where data used to construct this index were too limited (i.e., respondent restrictions resulted in a large reduction in sample size), this household-level variable is based on four types of decision-making control within households: control of income, control over health and nutrition decisions, control over household purchases, and control over children's education.<sup>11</sup>

The summary variable is constructed using a 5-point scale and ranges from 0 to 20 based on the primary female decision-maker's response to each of the four types of decision-making as follows:

- She has no say in the decision (0)
- Her spouse/partner or other male informs her of his decision but she does not have final say (1)
- Her spouse/partner or other male asks her opinion but she does not have the final say (2)
- She and her spouse/partner jointly decide (3)
- She asks other HH members their opinions but most always has the final say (4)
- She is solely responsible for the decision (5)

Survey questions: R1701-R1708

**13) Local government responsiveness.** This community-level variable is based on whether – and how – the local government responded to community requests for improving community assets or services over the 5 years prior to the survey. The community asset/service needs include:

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<sup>11</sup> Currently, the HH questionnaire allows for further research regarding this variable by including general and more detailed questions about household decision-making. Calculation of the index may change slightly if the data allow.

- Roads
- Schools
- Health center/post/clinic
- Piped water/boreholes/wells
- Natural resource conservation
- Irrigation systems
- Public transportation
- Security

Possible responses are:

- Completely addressed/being addressed (i.e., may be ongoing) = 6
- Partially addressed (i.e., response completed but need not fully addressed) = 5
- Positive response, will be addressed = 4
- Promised but not yet addressed = 3
- Not addressed, response pending = 2
- Not addressed, attempts failed = 1
- Leaders did nothing = 0

The local government responsiveness variable is a mean score, calculated as the sum of the response value for identified community asset/service needs divided by the total number of community asset/service needs for which any community member requested assistance from the local government. The mean score ranges from 0 to 6.

**Survey questions: CR804, CR805, CR806**

**14) Gender index.** This community-level indicator is a summary variable ranging from 0 to 4 based on binary (dummy) variables regarding gender-neutral practices at the community level. Each binary variable is equal to 1 if:

- Men and women regularly sit and eat together within their households (1);
- Men and women regularly sit together at public meetings (1);
- Men in the village help with childcare (1); and
- Men in the village help fetch firewood OR carry water for the household (1)

**Survey questions: CR901-CR905**

A household-level gender variable (adaptive capacity) may also be calculated.<sup>12</sup> For those households with husband and wife, the household-level component is a summary variable ranging from 0 to 2 based on whether the respondent and his/her spouse/partner:

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<sup>12</sup> It might be possible to combine the community and household gender indicators into a single gender index, depending on the sample size of households with both husband and wife, etc. but can only be explored during analysis of the data.

- Sit and eat together within their household (1)
- Sit together at public meetings (1)

The binary (dummy) variable is equal to 1 if doing so is:

- Culturally acceptable and the household engages in the behavior OR
- Not culturally acceptable but the household engages in the behavior

Two binary (dummy) variables are based on whether the spouse/partner helps with childcare, and whether the spouse/partner helps fetch firewood OR carry water for the household as follows:

- Male respondents
  - report they themselves care for OR help their spouse/partner care for the children (1);
  - report they themselves collect firewood OR help their spouse/partner collect firewood OR they themselves fetch water OR help their spouse/partner fetch water (1)
- Female respondents
  - report their spouse/partner cares for OR helps them care for the children (1);
  - report their spouse/partner collects firewood OR helps them collect firewood OR their spouse/partner fetches water OR helps them fetch water (1)

**Survey questions: R1501-R1505**

The binary variables are used to calculate an additive index ranging from 0 to 8.

**15) Participation in local decision-making.** A binary (dummy) variable equal to 1 if the respondent reports any household member’s level of participation in any group’s decision-making as “leader”, “very active”, or “somewhat active”.

**Survey questions: R801, R802**

Detailed guidance describing the methodology used to calculate the transformative capacity index is provided in the Addendum at the end of this methodological guide.

## **5.6 Index of community resilience**

The index of community resilience is constructed from five elements:

**1) Natural resource management groups.** A summary variable of the number of groups within a community that manage communal natural resources. Groups are: communal grazing land management group, communal group deciding who can gather wood and how much from communal land, communal livestock water management group, and communal irrigation management group (where relevant).

**Survey questions: CR209, CR212, CR215, CR218**

**2) Community disaster risk reduction index.** This index is constructed from three variables:

- A binary variable equal to 1 if there is an active disaster planning group in the community. **Survey question: CR401(l), CR402**
- A binary variable equal to 1 if any member of the household worked collectively with others to reduce the risk of possible disaster. Possible collective actions are: 1) soil conservation activities, and 2) flood diversion structures. **Survey questions: R901, R902(1,2)**
- The proportion of households in the community receiving early warning information on natural hazards (floods, hail, drought) in the last year prior to the survey. **Survey question: R701(a)**

The variables are combined into an index using factor analysis.

**3) Social protection index.** The social protection index is constructed from seven variables.

- A binary variable equal to 1 if there is an active (i.e., in the 12 months prior to the survey) savings group in the community **Survey questions: CR401(e), CR402**
- A binary variable equal to 1 if there is an active (i.e., in the 12 months prior to the survey) mutual help group (including burial societies) in the community **Survey questions: CR401(f), CR402**
- A binary variable equal to 1 if there is an active (i.e., in the 12 months prior to the survey) women's group in the community **Survey questions: CR401(i), CR402**
- The proportion of households who report having received any assistance from relatives or friends (i.e., non-relatives) within their community in the 12 months prior to the survey. **Survey questions: R1318, R1320**
- The proportion of households who report having provided assistance to relatives or friends (i.e., non-relatives) within their community in the 12 months prior to the survey. **Survey questions: R1315, R1317**
- The proportion of households who report they could turn to a relative or friend (i.e., non-relative) in their village if they had a problem and needed help urgently (e.g., food, money, labor, etc.). **Survey question: R1304**
- The proportion of households who report they would help a relative or friend (i.e., non-relative) in their village if they had a problem and needed help urgently (e.g., food, money, labor, etc.). **Survey question: R1307**

The variables are combined into an index using factor analysis (see Addendum at the end of this methodological guide).

**4) Managing and maintaining public goods.** A summary variable of the types of public goods maintained by the community. Public goods are: schools, health posts/centers, roads, tree planting on communal land, community irrigation systems, community sources of drinking water. **Survey questions: R901, R902**

**5) Conflict mitigation.** A community-level summary variable ranging from 0 to 3 based on three binary (dummy) variables, each equal to 1 if:

- The community has a conflict resolution committee;
- The committee has dealt with a conflict over the 2 years prior to the survey;
- The conflict was reduced as a result of their involvement.

Survey questions: [CR802](#), [CR802a](#), [CR802b](#)

The overall index of community resilience is calculated using factor analysis (see Addendum at the end of this methodological guide).

## **5.7 Index of household resilience capacity**

Detailed guidance describing the methodology used to calculate the overall resilience capacity index is provided in the addendum at the end of this methodological guide.

## **6. RESPONSES TO SHOCKS AND STRESSES**

Program interventions that focus on resilience strengthening should be designed and implemented so that they lead to intermediate outcomes (e.g., strengthened resilience capacity of the target population), which themselves should then lead to appropriate response outcomes. Fundamentally, resilience interventions are about strengthening the ability of individuals, households, communities, and systems to choose what they perceive at that time to be the most viable and appropriate response(s). Resilience analysis should measure the effect of different resilience responses at multiple levels (i.e., households, communities, systems, local, provincial and national authorities). The current analysis involves only household and community levels. Table 3 shows the responses used to measure resilience and their respective survey questions.

As previously noted, questions sourced from the FFP core household baseline questionnaire are preceded by “BL”, those from the household resilience questionnaire are preceded by “R”, and those from the community resilience questionnaire are preceded by “CR”.

In the context of food security, the Coping Strategies Index (CSI) represents a viable response indicator as it measures the occurrence of specific detrimental coping strategies. However, the CSI focuses on short-term consumption-related behavior after a shock or stressor. Other short-term ex-post responses might also be relevant such as these focusing on cash or money-borrowing strategies, easily measured by indicators that capture access to or utilization of financial services (e.g., savings groups, credit). Improved resilience capacity, however, is not simply about avoiding detrimental short-term response strategies that undermine absorptive capacity in particular. It is also about nurturing or fostering the ability of actors to engage in positive and sustainable responses that improve all three resilience capacities, i.e., absorptive, adaptive, and transformative capacity.

Thus, a reduction in the adoption of detrimental coping strategies (i.e., a lower CSI) might serve as one universal indicator in resilience programs for improving absorptive responses. However, resilience response indicators should also measure changes in adaptive and transformative

behavior. These responses have to be understood in relation to the specific social and ecological contexts and constraints within which these households are operating.

**Table 3. Response indicators and sources.**

<b>Resilience response indicators</b>	<b>Survey questions</b>
<b>Absorptive responses</b>	
Coping Strategy Index (CSI)	RI601
Use of savings to deal with shocks	RI06a (aa), R604
Use of remittances to deal with shock	RI06a (bb), RI111
Use of hazard insurance	BL G09
Use of bonding social capital to deal with shock	RI06a (s,u)
Receipt of humanitarian assistance	RI301-RI302 (1,2), RI06a (x,y)
<b>Adaptive Responses</b>	
Application of information	R703
Adoption of improved agricultural practices	BL G13b, G16, G18, G21
Use of bridging social capital	RI06a (t,v)
<b>Transformative Responses</b>	
Participation in local decision-making	R802 (3,4,5)
Participation in collective action	R901, R902
Gender equitable decision-making index	RI701-RI708
Participation in safety net program	RI301-RI302 (5,6), RI06a (z)

## ADDENDUM: METHODS FOR CALCULATING RESILIENCE CAPACITY INDEXES

Building on the description provided in the Resilience Measurement Practical Guidance Note Series,<sup>13</sup> this addendum explains in more technical detail the method for calculating the resilience capacity indexes. Computation of the three resilience capacity indexes—absorptive, adaptive, and transformative—and overall resilience capacity index follows USAID/TANGO methods.

It should be noted that this document is intended as a “how to” guide, to be used by analysts with prior experience and training in constructing indexes, applying weights, and conducting factor analysis. This addendum explains how to calculate the resilience capacity indices for both the Full and Light Approaches to measuring resilience.

### Overview of Method for Calculating the Full Approach

USAID/TANGO methods to compute resilience capacity indexes across multiple rounds of data follow a four-step process. In this description, the indexes are compared over time across a baseline and end line survey (which may be panel or cross-sectional).

Each resilience capacity index is made up of a combination of indicators computed from household and community survey data, descriptions of which can be found in separate guidance documents.<sup>14</sup> When developing such an index, it is most important that it represent the concept(s) being measured as closely as possible. To achieve this, the analyst should always start by identifying a comprehensive set of valid and contextually-appropriate indicators. The indicators, referred to here as “index components,” should be correlated with each other and with the final index in the expected direction (i.e., positive or negative). The methods provided here for calculating the absorptive, adaptive, transformative, and overall household resilience capacity indexes do not change if the number or type of index components change, such as adding or omitting indicators based on the context. However, the analyst should clearly explain the rationale and the statistical tests (such as those described in Steps 1 and 2 below) used in selecting the final index components as meaningful measures of resilience capacity.

Table 4 provides the suggested index components for the full resilience approach, with an “(L)” marking those components included in the light approach. USAID/TANGO resilience analysis methods use exploratory *factor analysis* to combine these indicators of resilience capacity into indexes.

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<sup>13</sup> Sagara B. 2018. Resilience Measurement Practical Guidance Note Series 4: Resilience Analysis. Produced by Mercy Corps in consultation with TANGO International for USAID as part of the Resilience Evaluation, Analysis and Learning (REAL) Associate Award. Available at: <https://www.fsnnetwork.org/REAL>.

<sup>14</sup> The indicator guides, analysis plans, and example household and community questionnaires for the full, intermediate, and light approaches can be found at: <https://www.fsnnetwork.org/REAL>.

**Table 4. Resilience index components for the Full approach with the Light approach marked as (L)**

Household Resilience Capacity Index		
Absorptive Capacity Index	Adaptive Capacity Index	Transformative Capacity Index
1. Availability of informal safety nets	1. Aspirations/confidence to adapt	1. Availability of/access to: formal safety nets (L)
2. Bonding social capital index (L)	2. Bridging social capital (L)	2. ...markets
3. Access to cash savings (L)	3. Linking social capital	3. ...communal natural resources
4. Access to remittances	4. Social network index	4. ...basic services
5. Asset ownership index (L)	5. Education/training (L)	5. ...infrastructure
6. Shock preparedness and mitigation	6. Livelihood diversification	6. ...agricultural extension service
7. Availability of/access to insurance	7. Exposure to information	7. ...livestock services
8. Availability of/access to humanitarian assistance	8. Adoption of improved practices	8. Bridging social capital (L)
	9. Asset ownership index (L)	9. Linking social capital
	10. Availability of financial resources/services (L)	10. Collective action
		11. Social cohesion
		12. Gender equitable decision-making index (L)
		13. Local government responsiveness (L)
		14. Gender index: practices/ behaviors at community level (L)
		15. Participation in local decision-making

**What is factor analysis?**

Factor analysis is a multivariate statistical method that uses the relationship among observed variables to identify one or more underlying factors (see list of *Factor Analysis Resources*, p. 27). A “factor” is an unobservable or “latent” variable that can be understood through its relationship with other variables that can be observed and measured. In resilience measurement, we are seeking to measure an individual’s, household’s, or community’s resilience capacity but it is not possible to do so using a single variable because the concept of resilience capacity is multifaceted. In its place, a scale is developed based on multiple variables that capture various aspects of the factor. In all, the rationale for using factor analysis is to analyze the inter-correlations of the multiple variables in order to combine them into a single measure that represents the underlying factor. Ultimately, factor analysis allows the analyst to calculate the relative weights of the respective index components based on these inter-correlations, and then create a single variable (an index) to be used as a measure of resilience capacity.

## Factor Analysis Resources

### Books and online resources

- DeVellis, RF. 2017. Scale Development Theory and Application. Chapter 6: Factor Analysis. Sage Publications.
- Kim, J and CW Mueller. 1978. Factor Analysis. Sage Publications. [Note: this is an older text but still a core resource on the topic.]
- Factor Analysis: A Short Introduction, Part I: <https://www.theanalysisfactor.com/factor-analysis-1-introduction/>
- Factor Analysis: <http://www.statisticssolutions.com/factor-analysis-sem-factor-analysis/>

### USAID/TANGO has or will use this method for the following studies:

- Resilience in the Sahel Enhanced (RISE) Project in Burkina Faso and Niger Midline Report (2018)
- Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Endline Report (forthcoming 2020)

## Computing the Resilience Capacity Index for the Full Approach

### STEP 1: Compute index weights

In the first step, factor analysis is applied to *baseline* survey data to calculate index weights that are then used for the calculation of the baseline index itself in addition to updated indexes using data from later survey rounds, in this example an end line survey.<sup>15</sup> Specifically, the weights used for calculating both baseline and end line index values, one for each index component, are computed using the *principal factors* procedure within factor analysis.

As a general rule analysts should only consider factors with an *eigenvalue* greater than 1.<sup>16</sup> Eigenvalues represent how much of the total variance in the index components is accounted for by each factor. Table 5 provides an example of a total variance table from a resilience study where Factors 1-3 would be retained (with eigen values >1) for consideration. The table also gives the actual proportion of the overall variance in the index components accounted for by each factor (the “Proportion” column).

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<sup>15</sup> Although the baseline weights should be applied to update indexes for subsequent rounds, factor analysis should still be run for each round to see whether the weights have changed substantially over time.

<sup>16</sup> See: <https://www.stata.com/manuals/l3/mvfactorpostestimation.pdf>.

**Table 5. Example of factor analysis output: Eigenvalues and proportion of variance**

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	1.76239	0.49134	0.2203	0.2203
Factor 2	1.27105	0.05443	0.1589	0.3792
Factor 3	1.21662	0.24624	0.1521	0.5313
Factor 4	0.97037	0.01937	0.1213	0.6526
Factor 5	0.95100	0.16631	0.1188	0.7714
Factor 6	0.78470	0.15490	0.0987	0.8701
Factor 7	0.62980	0.21573	0.0787	0.9482
Factor 8	0.41407	.	0.0518	1.0000

Note: This output table is from analysis performed as part of the USAID Nepal Resilience Research Study (For full report: [https://www.fsnnetwork.org/sites/default/files/nepal\\_resilience\\_research\\_report\\_-\\_final5087.28.17.pdf](https://www.fsnnetwork.org/sites/default/files/nepal_resilience_research_report_-_final5087.28.17.pdf)). Please note that this analysis can be implemented with any common statistical software.

The signs of the reported “loadings” associated with each factor (positive or negative), one for each index component, correspond to the signs of the weights that will be used for constructing the final index. Table 6 continues with the example factor analysis output provided above, now showing the factor loading matrix for Factors 1-3. The factor loadings are the correlation of the index components (in this case, indicators of adaptive capacity) with the factor.<sup>17</sup>

**Table 6. Example of factor analysis output: Factor loadings**

Variable	Factor loadings		
	Factor 1	Factor 2	Factor 3
Access to financial services	0.328	0.141	0.774
Human capital	0.510	-0.404	-0.237
Bridging social capital	0.339	0.514	-0.239
Linking social capital	0.616	-0.180	-0.044
Livelihood diversity	0.275	0.590	0.147
Exposure to information	0.640	0.104	0.068
Adoption of improved ag practices	0.387	0.263	-0.494
Asset index	0.599	-0.390	0.138

In the case of multiple factors as seen in this example, the final factor for constructing the baseline and end line indexes should be chosen based on two main criteria: 1) consistency with

<sup>17</sup> Note: As with Table 5, this table has been recreated from analysis performed as part of the USAID FFP Nepal Research Report. Please note that the adaptive capacity index example used in Table 6 does not include all of the components listed in Table 4. This is because the analytic model we use today has been updated and improved since the implementation of the study used in the example.

the *meaning* of the concept being measured, and; 2) proportion of variance accounted for by the factor (higher is better).

For example, if the underlying index components should all be positively correlated with the concept, then the loadings (and thus weights) should all be positive. If the components have been selected well from the start, the chosen factor is typically the first factor, the one contributing the most to the components' overall variance.

In the example in Table 6, Factor 1 appears to be the most consistent with the hypothesized concepts of resilience. That is, the factor loadings for Factor 1 are all positive, consistent with the hypothesized relationship between the index components and our factor (namely adaptive capacity). Further, it accounts for the highest proportion of variance (see Table 2). It is thus the final factor chosen to compute the index.

It should be noted that index components with factor loadings that have an opposite “expected sign” relative to the hypothesized relationship with the factor should be excluded from the index. If we were to leave those variables in the index, any increases in the indicator would result in reductions in our resilience capacity index, contrary to our underlying hypothesis. In practice, it is rare that hypothesized index components have to be omitted from the index, and the accompanying qualitative research may be used to better understand such results.<sup>18</sup>

Finally, weights for each index component, also known as “factor scores”, are derived from the factor loadings (using the “regression scoring” option). These weights will be carried forward from the baseline, in order to calculate future instances of the index.

## **STEP 2: Conduct KMO test**

Next, the Kaiser–Meyer–Olkin (KMO) test is used to confirm that the index components have enough in common to warrant a factor analysis.<sup>19</sup> The KMO test is selected here because it is simple to use and interpret, and available through common statistical software.

The KMO test values range from 0 to 1, with smaller values indicating that the variables have too little in common to warrant a factor analysis. KMO values less than 0.5 are considered to be “unacceptable” while values from 0.9 to 1.0 are considered “marvelous,” in line with the following interpretations:<sup>20</sup>

- to 0.49 unacceptable
- 0.50 to 0.59 miserable
- 0.60 to 0.69 mediocre
- 0.70 to 0.79 middling
- 0.80 to 0.89 meritorious
- 0.90 to 1.00 marvelous

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<sup>18</sup> While the weights are initially computed using baseline data, in this case, it may be appropriate to combine baseline and end line data and run the factor analysis on the combined data set to see if weights can be revised to include the variables at end line.

<sup>19</sup> See this manual for a description of the KMO test and interpretation:

<https://www.stata.com/manuals/l3/mvfactorpostestimation.pdf>.

<sup>20</sup> Ibid.

In practice, if the indicators have been chosen well and the data are of high quality, indexes constructed should pass the KMO test. In cases where the KMO value is too low (certainly below 0.5), the analyst could try different combinations of index components that might result in a better goodness-of-fit. One possible reason for a weak fit is that the underlying levels of resilience capacities in the sampled population are very low or have little variation across the population, which means the analyst may not observe strong correlations to form the index. If index fit is a limitation, analysts should attempt to understand why and clearly note the limitation in reporting.

### STEP 3: Calculate baseline index

The baseline index— whether of absorptive, adaptive, transformative, or overall resilience capacity—is calculated as a weighted sum of (standardized values of) the index components, where the weights are those calculated in STEP 1. For reporting purposes, the index can be placed on a scale ranging from 0 to 100 (using baseline minimum and maximum values).<sup>21</sup> Table 7 continues with our example, giving mean values of the adaptive capacity index scaled from 0 to 100 along with index component values for the sample as a whole and two program groups.<sup>22</sup> The means of the index component values are reported to help understand which ones contribute to the difference in the index across the two groups.

**Table 7. Illustrative table showing the means for an adaptive capacity index and its components at baseline.**

Indicator	Program 1	Program 2		All
Adaptive capacity index (mean; range 0-100)	38.5	35.7	***	37.7
<i>Index components:</i>				
Access to financial services	81.6	71.6	**	78.8
Human capital	66.5	65.3		66.2
Bridging social capital	56.7	54		56
Linking social capital	18.9	19.8		19.2
Livelihood diversity	28.3	29.5	*	28.6
Exposure to information	21.9	18	***	20.8
Adoption of improved agricultural practices	53.1	74.2		59.1
Asset index	26.5	19.1	***	24.4

NOTE: Asterisks denote a statistically significant difference in means between the groups at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

<sup>21</sup> The formula for placing the index on a 0-100 scale is: [(baseline index value – min baseline index value)\*100 / (max baseline index value – min baseline index value)].

<sup>22</sup> See the full USAID Nepal Research Report at

[https://www.fsnnetwork.org/sites/default/files/nepal\\_resilience\\_research\\_report\\_-\\_final5087.28.17.pdf](https://www.fsnnetwork.org/sites/default/files/nepal_resilience_research_report_-_final5087.28.17.pdf).

#### **STEP 4: Calculate end line index**

Following Fry et al.,<sup>23</sup> to update the index using end line data the index components for the end line must first be standardized manually using baseline means and standard deviations. The index is equal to the weighted sum of the standardized variables, where the weights are those calculated in STEP 1.

Updating the index in this fashion (i.e., using baseline weights to compute the end line index) essentially puts the baseline and end line indexes in the same units and allows for valid comparisons of the index values across time. If the baseline indexes were put on a 0-100 scale as described in STEP 3, then the end line indexes must also be put on this same scale (using baseline minimum and maximum values).

### **Computing the Resilience Capacity Index for the Light Approach**

The components that are used for constructing the resilience capacity index for the Light approach include bonding social capital, bridging social capital, local government responsiveness, access to cash savings, asset ownership, education, access to formal safety nets, access to humanitarian assistance (recurrent crisis countries only), and women's empowerment/gender equitable decision making.

**1. Bonding social capital index.** The bonding social capital index is based on the responses to two questions:

- Whether the household indicates it would be able to **get help** from various categories of people living **WITHIN** their community if they needed it;
- Whether the household indicates it would be able to **give help** to people living **WITHIN** their community who needed it.

The possible responses for whom a household could get help from or to whom they would give help are: "relatives", "non-relatives/neighbors within my ethnic group/clan", "non-relatives/neighbors of other ethnic groups/clan", and "no one". An additive index ranging from 0 to 6 is calculated based on the responses to each of the two questions, with "no one" = 0 and each of the other responses = 1.

**2. Bridging social capital.** The bridging social capital index is based on the responses to two questions:

- Whether the household indicated it would be able to **get help** from various categories of people living **OUTSIDE OF** their community if they needed it;
- Whether the household indicated it would be able to **give help** to people living **OUTSIDE OF** their community who needed it.

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<sup>23</sup> Fry K, R Firestone and NM Chakraborty. 2014. Measuring equity with nationally representative wealth quintiles. Washington, DC: PSI.

The possible responses for whom a household could get help from or to whom they would give help are: “relatives”, “non-relatives/neighbors within my ethnic group/clan”, “non-relatives/neighbors of other ethnic groups/clan”, and “no one”. An additive index ranging from 0 to 6 is calculated based on the responses to each of the two questions, with “no one” = 0 and each of the other responses = 1.

**3. Local government responsiveness.** This community-level variable is based on whether—and how—the local government responded to community requests for improving community assets or services over the 5 years prior to the survey. The community asset/service needs include:

- Roads
- Schools
- Health center/post/clinic
- Piped water/boreholes/wells
- Natural resource conservation
- Irrigation systems
- Public transportation
- Security

Possible responses are:

- Completely addressed/being addressed (i.e., may be ongoing) = 6
- Partially addressed (i.e., response completed but need not fully addressed) = 5
- Positive response, will be addressed = 4
- Promised but not yet addressed = 3
- Not addressed, response pending = 2
- Not addressed, attempts failed = 1
- Leaders did nothing = 0

The local government responsiveness variable is a mean score, calculated as the sum of the response value for identified community asset/service needs divided by the total number of community asset/service needs for which any community member requested assistance from the local government. The mean score ranges from 0 to 6.

**4. Access to cash savings.** This indicator is a binary (dummy) variable equal to 1 if the respondent reported that a household member is participating in a group-based savings, micro-finance, or lending program.

**5. Asset ownership—consumer durables.** Asset ownership is measured using the number of consumer durable assets.

**6. Asset ownership—productive assets.** Asset ownership is measured using the number of productive assets.

**7. Education/training.** The variable is based on an index calculated from three variables:

- A binary (dummy) variable is equal to 1 if any adults in the household can read or write
- A binary (dummy) variable is equal to 1 if any household adult has a primary or higher education
- A binary (dummy) variable is equal to 1 if the respondent or any adult household member has had any of the following training: vocational (job) training, business development training (including financial literacy), early warning training, natural resources management training, adult education (literacy or numeracy), or how to use your cell phone to get market information (e.g., prices)

Compute an additive index with the three binary variables. The index ranges from 0 to 3.

**8. Access to formal safety nets.** This indicator is a binary (dummy) variable equal to 1 if the household reported participating in a productive safety net.

**9. Access to humanitarian assistance.** This indicator is a binary (dummy) variable equal to 1 if the household reported receiving emergency food or cash assistance from the government or NGO during the 12 months prior to the survey.

**10. WEAI-A.** This household-level variable is based on the six domains of the abbreviated Women’s Empowerment in Agriculture Index. The score—ranging from 0 to 6—reflects the total number of domains in which the female respondent in the household has reached adequacy.

## **CALCULATION OF THE RESILIENCE CAPACITY INDEX FOR THE LIGHT APPROACH**

- I. Calculate all indicators/sub-indices per guidance above.
- II. Transform all indicators to a 0 – 10 scale.
- III. Create an additive index ranging from 0 to 100, based on each of the components above.

**Note:** For countries/ZOIs with populations characterized by prominent livestock holdings, two index scores will be calculated. The first will be the RCI-Light score calculated in light of the three steps mentioned above. The second will be a RCI-Light score calculated adding in the number of livestock owned transformed to a 0 to 10 scale. The range for this second scale will be 0 to 110. This will ensure comparability and will not “penalize” countries/ZOIs that are not characterized by populations with sizable livestock ownership.

## About the USAID Resilience and Resilience Capacities Measurement Options

Given the range of USAID programs trying to capture changes in resilience promoted through their investments, there is a need for measurement options that better reflect the goals and available resources of these different programs.

This guidance presents Light, Intermediate, and Full approaches for analyzing resilience, each of which reflects a different level of effort—and budget—in terms of the survey instrument and analysis used.

This document is one of five resources intended to be used together for measuring and analyzing resilience in relevant USAID-funded activities:

- Resilience and Resilience Capacities Measurement Options
- Household Questionnaire
- Community Questionnaire
- Enumerator Guidance (for both questionnaires)
- Methodological Guide (this document)

Visit [www.fsnnetwork.org/REAL](http://www.fsnnetwork.org/REAL) for more information.



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