ResilientChild: Mali Final Report July 2016





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Abbreviations

ECD	EARLY CHILDHOOD DEVELOPMENT
FGD	FOCUS GROUP DISCUSSION
IEC	INFORMATION, EDUCATION, AND COMMUNICATION
KII	KEY INFORMANT INTERVIEW
NGO	NON-GOVERNMENTAL ORGANIZATION
PCA	PRINCIPAL COMPONENTS ANALYSIS
SAS	STATISTICAL ANALYSIS SOFTWARE
SEM	STRUCTURAL EQUATION MODELING
TLU	TROPICAL LIVESTOCK UNITS
TU/DRLA	TULANE UNIVERSITY DISASTER RESILIENCE LEADERSHIP ACADEMY
UN	UNITED NATIONS
UNICEF	UNITED NATIONS CHILDREN'S FUND
USTTB	UNIVERSITY OF SCIENCE, TECHNIQUES AND TECHNOLOGIES OF BAMAKO
WASH	WATER, SANITATION, AND HYGIENE





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- Ministry of Decentralization and City
- Ministry of Economy and Finance
- Ministry of National Education
- Ministry of Employment and Vocational Training, Youth, and Socially Responsible Construction
- Ministry of Solidarity, Humanitarian Affairs, and North Reconstruction
- · Ministry of Promotion of Women, Children, and the Family
- Ministry of Health
- Ministry of Sports

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Executive Summary

Malian children face myriad challenging life and societal conditions and demands including chronic poverty, food insecurity, violence, and deprivation—that affect their wellbeing and positive youth development. To address this critical need, in 2015, UNICEF included resilience as a key strategic pillar in its Mali country program (2015–2019) to support planning, programming, and policy. In 2014, UNICEF brought together Tulane University's Disaster Resilience Leadership Academy (TU/DRLA) and the University of Science, Techniques and Technology of Bamako (USTTB) to generate greater understanding of child resilience in Mali through the ResilientChild: Mali project and the application of a resilience analytical framework.

The purpose of the ResilientChild: Mali collaboration was to design, apply, and validate a highly contextualized, multi-method approach to knowledge creation that captured a holistic and comprehensive understanding of child resilience. The ResilientChild: Mali project applied the TU/DRLA systems approach to understand child resilience in Mali through an iterative process that integrated contextual knowledge, resilience theory and metrics, and measurement. This ResilientChild: Mali Analytical Framework was applied to select communities to build knowledge sequentially, with each investigation informing and refining the next. Each level of discovery and new knowledge built on prior findings to establish a foundation of contextualized knowledge that drew on different stakeholder perspectives and employed multiple means of data collection. The ResilientChild: Mali Analytical Framework reflects a step-by-step process that integrates local priorities, key stakeholder engagement, and tailored indicator development to produce contextually relevant measures of pathways to resilience.

The systematic document review comprised 498 documents, of which 172 contained specific recommendations related to child resilience, and focused mainly on best practice in terms of child education and child health. Qualitative stakeholder engagement comprised focus group discussions (FGDs) and key

informant interviews (KIIs), which helped shape contextual knowledge and contribute to the development of a theoretical model and appropriate metrics. A cross-sectional quantitative survey was administered to 1,069 households in 15 villages across three regions: Gao in the north of the country, Mopti in the center, and Sikasso in the south. The survey sought to better understand the individual, household, and community factors that contribute to child resilience in Mali. These basic research tools were supplemented by advanced statistical analyses to better understand the predictors of and pathways to child resilience in Mali.

The ResilientChild: Mali Analytical Framework assumes that "child resilience" represents a set of measureable resources and capacities in varying contexts that children use to respond to shocks and stressors. This assumption is represented in the mathematical equation below, representing the resilience index, which comprises individual (child), household, and community resources and capacities.

$R_t = f (IPPC_t, HHC_t, CCt)^1$

The cumulative resilience scores differed significantly by region (p<.001). Sikasso had a significantly higher resilience score than either Gao or Mopti. Differences were significant across all regions for all resilience dimensions (child development, household functioning and community resources), with the exception of community participation. Significance levels were consistent at the p<.001 level, with the exception of child depressive symptoms, for which differences across regions were significant at the p<.01 level.

In order to establish statistically significant pathways to child resilience in Mali, the ResilientChild: Mali team used Structural Equation Modeling (SEM) to confirm the relationships and associations among the various observed resilience dimensions. This pathway analysis included mapping factors with direct links among the

¹R is resilience; IPPC is individual physical and psychological capacities; HHC is household capacities; and CC is community capacities.

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various strata (individual, household, community) as well as relationships that were theorized to be moderated through or correlated with other important resilience dimensions.

Although numerous pathway models were developed, one model that linked access to and quality of education services to child school attendance was dissected to provide a deeper understanding of the resilience dimensions and specific elements that predict child school attendance. Increased child school attendance is associated strongly and directly with parental support, household wealth, improved household water and sanitation facilities, and social cohesion within the community. Programming investments in these areas (parental support, wealth, household water and sanitation, and social cohesion) would result in improved outcomes around child school attendance in Mali, expanding programming efforts beyond sector-specific investments in the education sector.

However, in order to arrive at a deeper understanding of the drivers of child resilience in Mali, a logistic regression analysis was run on the factor loadings of four proximal predictors of child school attendance-parental support, wealth, social cohesion, and individual elements of household water and sanitation. In terms of parental support, all elements of this scale were significantly associated with child school attendance and comprise parents' comfort in communicating with their children and ability to engage them more actively in communication. Household wealth, in terms of the basic assets of tables, chairs, and a radio, was a positive predictor of child school attendance, as were elements of social cohesion related to general trust in neighbors and community. In terms of household water and sanitation, improved drinking water was significantly associated with child school attendance. These finding provide more granular understanding of specific pathways to select child resilience outcomes and more important, of the interconnectedness among sectors that could be leveraged strategically to contribute directly to child resilience. These findings led to important programming and policy recommendations that seek to strengthen strategic development efforts to enhance child resilience in a way that maximizes investment and impact.

The ResilientChild: Mali team recommends including select resilience dimension scales and indices in national-level surveys to provide greater power of analysis and specificity of findings for future pathway modeling efforts. This level of data analysis will provide greater insight into the relationships among various resilience dimensions and enhance understanding of the multitude of factors that can strengthen the resilience of children. The ResilientChild: Mali Analytical Framework provides a sound basis for ongoing measurement and knowledge creation in resilience research, equipping decision makers with information needed to improve targeted programming and ultimately achieve the desired outcome of more resilient children, families, and communities in Mali and beyond.

Key findings:

- Higher child school attendance was directly associated with parental support, wealth (basic household assets), household water and sanitation (specifically improved source of drinking water), and social cohesion (the feeling that neighbors are trustworthy and able to help solve community problems).
- Improved child psychological wellbeing was directly associated with parental support, access to and quality of education services, and perceived representation of government.
- Parental support was positively associated with household wealth, access and quality of education services, and perceived representation of governance.
- The region of Sikasso received a significantly higher overall child resilience score than Gao and Mopti.

Programmatic recommendations

1. Invest in and integrate program planning for the following areas to improve child school attendance:

- Parental support behaviors (comfort in communicating with children and engaging them actively in communication)
- Economic security (increase wealth among the poorest households)
- Improve household drinking water
- Social cohesion

2. Invest in and integrate program planning for the following areas to improve child psychological wellbeing.

- Parental support behaviors (comfort in communicating with children and engaging them actively in communication)
- Increase access to and quality of education services

3. For scale-up and replication of the ResilientChild Analytical Framework

• Include specific resilience dimension scales and indices in national-level surveys to provide greater power of analysis and specificity of findings for future resilience pathway modeling efforts.

• Test pathway models of resilience with geographically representative samples that allow for statistical, sub-group comparisons to ensure consideration of contextual differences.



Introduction

Resilience refers to the potential of individuals and communities to "bounce back better" from adverse circumstances. It is defined as the process of harnessing key resources to sustain wellbeing (Panter-Brick & Leckman, 2013) and is a multi-dimensional process rather than a specific, solitary outcome (TU/DRLA, 2011).

Resilience has become a major area of research in child wellbeing. Unlike the study of risk factors, which identifies threats and deficiencies, resilience study focuses on how children and adolescents can maintain positive adaptation (Rutter, 1987) to "distressing life conditions and demanding societal conditions" such as violence, poverty, stress, trauma, deprivation, and oppression (Gitterman, 1991). This research supports conceptual and programmatic approaches that promote child wellbeing, survival, and development. Thus a resilience approach redirects research and intervention away from weakness and fragility to recognizing and building on local capacities to promote child wellbeing.

A recent policy brief on resilience (Ager et al., 2014) highlights four distinctive elements in a resilience-based approach. First, as discussed above, the approach emphasizes identifying capacities (local strategies) that help children do well despite poverty or insecurity, rather than deficits. Second, it emphasizes preventing problems early, during sensitive periods of child development, rather than intervening after cognitive, social, or economic problems have become evident. Third, the resilience-based approach considers several levels of potential influence on and action to strengthen child resilience—home, school, clinic, policy, and media. Finally, the approach focuses on synergistic gains to maximize the chances of healthy development, targeting action to "tipping points" that can transform the community of care around children.

A resilience-focused approach requires good knowledge of child health and development, but also good knowledge of the community that provides the necessary care for children. However, much of what is known about child resilience comes from research in Western countries, primarily regarding empowerment of and advocacy for at-risk children, with little research from developing countries (Catalano, 2004). Resilience can mean different things in different contexts. To deepen knowledge of child resilience in developing countries, specifically in Mali, Tulane University's Disaster Resilience Leadership Academy (TU/DRLA), in partnership with the University of Science, Techniques and Technology of Bamako (USTTB) and UNICEF Mali (the ResilientChild: Mali team), set out to design and test a resilience research framework for children in Mali (the ResilientChild Analytical Framework). This collaborative effort aims to generate greater understanding of resilience and child wellbeing in Mali.



1.1 Mali Context

Malian children face myriad distressing life and societal conditions and demands violence, chronic poverty, food insecurity, and deprivation, among others—that affect their wellbeing and positive youth development. Since early 2012, Mali has experienced a number of crises, including conflict in the north, political instability in the south, food insecurity, malnutrition, and seasonal flooding that have affected the quality of life of children and their families. These crises have augmented the vulnerability of communities across the country, one of the poorest and least developed in the world. Nearly one-half (49.3 percent) of Mali's population survives below the international poverty line, earning less than US\$1.90 purchasing power parity (PPP) per day (World Bank, 2009). The national monetary child poverty rate is 46 percent, and approximately 24 percent of children are ultra-poor (de Milliano & Handa, 2014). Mali ranks third worldwide in infant mortality, with 176 deaths per 1,000 live births (OCHA, 2013) and has an under-five mortality rate of 128 deaths per 1,000 live births (Castle, Scott, & Mariko, 2014).

1.2 ResilientChild Analytical Framework

Child resilience represents a particular set of measureable resources and capacities that children use to prepare for and respond to shocks and stressors. The relationship between resilience capacity and child wellbeing can be expressed by the following simplified formula:

Child wellbeing = f (vulnerability, resilience capacity, shocks)

In the formula, child wellbeing is the cumulative outcome of broad dynamics in children's lives, specifically the extent or depth of their vulnerability, their capacities to be resilient in the face of stress, and the impact of shocks in their lives. The factors in the formula represent multi-dimensional variables and their interactions, but the formula does not specify what data should be collected, how data will be collected, or how data will be analyzed. To identify the important factors, relationships, and outcomes that reflect the dynamics of Malian children at multiple levels—individual (child), household, community, and society—the ResilientChild team developed an analytical framework that incorporates global and local knowledge about child resilience, qualitative stakeholder engagement, and tailored indicator development to produce contextually relevant dimensions of resilience, resilience indices, and pathways to resilience.

The ResilientChild Analytical Framework is grounded in Bronfenbrenner's ecological systems theory (1974), which suggests that humans develop not in isolation but in relation to their families, homes, schools, workplaces, communities, and societies. Each of these dynamic and multi-level environments, as well as the interaction among them, is critical for human development (Bronfenbrenner, 1977) and ultimately for resilience. The framework is child centered, drawing from the global inventory of child resilience research and seeking to establish an evidence-based and operational framework for Mali. Key to the ResilientChild:

Mali approach is the recognition that individual (or child) resilience depends on the resilience of other systems and the capacity for adaptation across all systems (Masten, 2015). These systems represent the broad range of interacting resources, capacities, and influences in a child's life—their personal selves, other individuals, family units, the dynamics of community, or entire ecosystems (Masten 2011, 2012). For example, evidence suggests that parent or caregiver availability, family functioning, and parental support have important effects on children's response or reaction to stressors (Garmezy, 1983; Garmezy & Rutter, 1985; Rutter, 1983). These promotive and protective factors may include close relationships with competent caregivers, good schools, and safe neighborhoods across settings (or systems) that can predict resilience pathways (Masten, 2001, 2007). These considerations allow further refinement of child resilience measurement in Mali.

Figure 1 illustrates the ResilientChild Analytical Framework's multi-step process of engagement and application.

In this model, contextual knowledge establishes the resilience priorities for the region of interest. Activities include a range of qualitative approaches, including a systematic document review and key stakeholder engagement comprising key informant interviews (KIIs) and focus group discussion (FGDs). These emerging priorities are then explored through iterative analytical processes to establish important priorities, factors, relationships, and outcomes with an emphasis on understanding the community perspective.

Theory and metrics builds on the findings from the establishment of contextual knowledge. A theoretical model is developed using the priorities, factors, relationships, and outcomes identified through the contextual knowledge processes. The theoretical model includes data-driven assumptions regarding the relationships among contexts, presenting a model that may be statistically validated. To clarify how the constructs in the theoretical model are measured, and ensure that each measure is specific to levels of intervention, an indicator table is used to track indicators and measurement tools at individual, household, community, and societal levels. For example, a construct of "mental health" may include individual, household, community, and societal applications that should all be considered potentially important influences. This level of conceptual clarity connects the qualitative processes to the development of specific, contextualized resilience indicators that reflect specific local realities, not generalized constructs, as shown in the example in Table 1.

Figure 1. ResilientChild Analytical Framework: Process and Application



Table 1. Example: Linking theoretical constructs to measurable indicators

Data E			
Resilience category (As determined by the qualitative processes)	Level of Influence Sub-Categories (As identified in the theoretical model)		Sample Indicators
Household Functioning		Household Demographics	• Age, Gender, Marital Status of Caregivers • Educational Level • Primary Livelihood
	Household	Wealth	Material Assets Household Characteristics Quality of Housing Livestock Ownership
		Role of national and international humanitarian actors	Receipt of Humanitarian Assistance • Type of Assistance
		Community and Social Capital	Community Involvement Feelings of Engagement
Community Resources	Community	Access to Sector-Based Services	 Access and Quality of Health Services Access and Quality of Safe and Public Spaces Access and Quality of Education Access and Quality of Nutrition Services Access and Quality of Psychosocial Services
		Security and social cohesion	Feelings of Safety Feelings of Fear
		Governace	Involvement in Governace Programs Trust in Leadership

Measurement: As noted above, child resilience represents a set of measureable resources and capacities that children use to respond to shocks and stressors in varying contexts. The theoretical model can be applied to build a more detailed equation to reflect child resilience. The mathematical equation below reflects a point of resilience, or level of resilience at a certain time, allowing point comparisons among communities, sub-groups, or (if a sample is large enough) households or children.

At time t, child resilience at the household level may be expressed in the following function:

$R_t = f (IPPC_t, HHC_t, CC_t, GSC_t)$

Where:

- R = Resilience
- IPPC = Individual physical and psychological capacities (e.g., physical and mental health, education, self-esteem, and agency)
- HHC = Household capacities (e.g., education of household head, wealth and livelihoods, food security, and household access to basic services)
- CC = Community Capacities (e.g., community capital, infrastructure, and community basic services)
- GSC = Government and societal capacities (e.g., governance, international humanitarian assistance, and security)

The measure of child resilience is thus a composite index that takes into account each of the dimensions listed above. This scale is dynamic because it can measure and explore change in the overall index over time (Rt+1 - Rt) as well as differences in each of the dimensions (for example, CCt+1 - CCt). The total (R) may be compared to other "R" scores for broad application.

To refine measures of resilience and support the development of targeted programs and applications, the ResilientChild Analytical Framework includes a second statistical model to explore "resilience pathways." These pathways examine how resilience extends through systems and how resilience factors affect each other. Figure 2 is a simplified version of the resilience pathway model, illustrating the analysis of relationships between factors and systems levels.

This figure may also be expressed statistically in the following equation:

$Y = B Y + \Gamma X + \zeta$

Where:

В	=	m x m coefficient matrix
Г	=	m x n coefficient matrix
Υ	=	p x 1 vector endogenous variables (e.g., children's wellbeing,
		household wealth)
Х	=	q x 1 vector of exogenous variables (e.g., earthquake, flooding)
ζ	=	p x 1 vector of errors in the equations

Figure 2. Simplified resilience pathway model



Studying resilience factors through relationships allows specific recommendations and applications. The ResilientChild approach to resilience pathways allows programs to identify areas where they can strengthen specific factors and ultimately build resilience in a targeted manner.



Application of ResilientChild Analytical Framework

The ResilientChild: Mali Analytical Framework was the result of a step-by-step process that incorporated current knowledge of child resilience and contextual data to create a Mali-specific theoretical model of child resilience. This model drove the development of a resilience measurement framework that comprises a child resilience index and a resilience pathway model to measure resources, capacities, and relationships that represent child resilience in Mali. This multi-step process is described in the following sections.

Figure 3. ResilientChild: Mali Analytical Framework



2.1 Contextual Knowledge

A series of qualitative data collection and analytical activities deepened understanding of child resilience in the Malian context. Activities included a systematic review and analysis of collected documentation, followed by KIIs and FDGs in select communities. These efforts provided the data necessary to develop a theoretical model and corresponding indicators.

2.1.1 Systematic Document Review

A systematic search of standard literature databases was complemented by a "thematic hand search" (Panter-Brick, et al., 2014) of relevant, primarily grey, literature in Mali across public, non-governmental, and academic sectors. This thorough review sought to identify and categorize literature related to child resilience over the past 5 years both in Mali and globally. The database was assembled and the analyses designed to identify the following factors:

- The range of child resilience definitions and themes
- Interventions and strategies to strengthen child resilience and the extent to which interventions have been evidence based
- Recognized best practices and gaps in child resilience programming
- Recommendations for addressing child resilience in Mali

The document review defined "child resilience" as the capacity of children, youth, and their families and communities to mitigate, adapt to, recover from, and learn from shocks and stresses in a manner that reduces vulnerability and increases wellbeing. Analysis of the ResilientChild: Mali database sought to respond to the following research questions:

- 1. What approaches are currently used to strengthen child resilience in Mali?
- 2. What evidence-based recommendations seek to strengthen child resilience in Mali?

The results of an initial search of 50 documents, primarily in English, allowed review and revision of the original typological framework. As anticipated, the review did not find the term "resilience" in the Malian context. Categories were therefore expanded to include the following thematic terms:

- Child health
- Child protection
- Child rights
- Early childhood development (ECD)
- Education
- Family and parenting
- Nutrition
- Psychosocial wellbeing

An external expert in child resilience in global adversity vetted the selection of thematic categories.

The searchable ResilientChild: Mali document database is housed on http://www2. tulane.edu/drla/drla-resilient-malian-children.cfm and is available for open use by stakeholders working to strengthen child resilience in Mali and the Sahel. Please refer to TU/DRLA's 2015 Resilient Malian Child Project, Contextual Analysis Report for a full account of the ResilientChild: Mali contextual analysis findings.

Database Characteristics

The ResilientChild: Mali database contains 498 unique documents. Approximately 80 percent are in French and 20 percent in English. The Government of Mali published 22 percent of the documents, and non-governmental organizations (NGOs) and UN agencies each published 21 percent.

In the systematic document review, sources of information or knowledge were differentiated by publisher type and place of publication. Documents published in Mali were internal knowledge, and documents published elsewhere were external knowledge (Table 2). Internal knowledge was represented primarily by government policy documents, and external knowledge by study reports and research documents. As knowledge about child resilience is based largely on Western research, it may not all be applicable to children in the Malian context.

Table 2. ResilientChild: Mali database knowledge source, by publisher type (n=498)

Malian Publishers:	Non-Malian Publishers:
Internal Knowledge	External Knowledge
Government of Mali Local NGOs Network Organizations	Foreign Governments UN Agencies International NGOs International Foundations Peer-reviewed Journals Academic Institutions Private/Other Donors Network Organizations

Resilience Definitions

Of the 498 documents reviewed, only 33 (5 percent of the total ResilientChild: Mali database) contained a formal definition of resilience. Most (94 percent) of these definitions represented external knowledge, with only two documents containing formal definitions of resilience from Malian publishers.

Resilience Dimension Recommendations

Of the 498 documents, 172 provided recommendations related to child resilience. Education and child health were the child resilience themes cited most often in the database across both internal and external sources. Recommendations related to nutrition and child protection were also well represented in the database. Less well represented were recommendations related to ECD (in only four documents), family and parenting (in 16 documents), and psychosocial aspects of child wellbeing (in 18 documents).

While internal and external knowledge agreed in terms of recommendations regarding education and child health, internal knowledge also highlighted child protection and external knowledge also highlighted nutrition.

Education

Most of the recommendations were related to integrated programming and increasing access to education, followed by ensuring gender equity by educating girls. Recommendations related to integrated programming often cited health-related programs, particularly family planning and reproductive health targeting adolescents. Recommendations related to facilitating access to education mostly suggested improving attendance, decreasing dropout rates, and prioritizing girls' education. Two-thirds of all recommendations related to education represented external knowledge. They differed from the internal knowledge documents in their emphasis on improving the quality of curricula.

Child Health

Most of the recommendations were related to access to health services; service delivery; and information, education and communication (IEC) strategies. Access recommendations included improving physical access (proximity) or facilitating financial access through subsidies or free health care for select populations. IEC recommendations included hygiene and vaccination, with frequent mention of educating mothers on the importance of taking children to health facilities for care and monitoring of health status.

Child Nutrition

Most of the recommendations were related to programming, followed by IEC and access to nutrition services. Recommendations related to programming to combat malnutrition often cut across multiple areas, including food security and water, sanitation and hygiene (WASH).

Child Protection

Most of the recommendations on child protection related to programming, conflict and violence, and capacity building, followed closely by policy and regulation. Recommendations related to programming suggested integrating child protection and child rights into core programming. Recommendations tended to promote strengthening awareness and prevention and response mechanisms, especially related to gender-based violence (GBV).

New Knowledge: Perspectives from Emerging Health Scholars

A separate database was created of 194 student dissertations sourced from the USTTB's Faculty of Medicine and Dentistry, the only faculty in Mali that requires a dissertation for award of degree. Although biased toward child health, these dissertations represented emerging knowledge from Malian student scholars and provided an interesting comparison with recommendations from the established sources of knowledge presented in the previous sections.

Most of the dissertations contained recommendations related to child health and to family and parenting, followed by education and nutrition. Both this emerging and the established knowledge sources emphasized recommendations related to child health and education. However, the emerging knowledge sources emphasized recommendations related to family and parenting, including exclusive breastfeeding during the first 6 months of life, feeding diverse foods during the weaning period, growth monitoring for early detection of child malnutrition, and routine assessment of nutritional status.

Co-occurrence

A binary analysis of the 172 documents from established knowledge sources that contained recommendations related to child resilience showed interesting patterns of co-occurrence along child resilience dimensions. The recommendations that co-occurred most often were associated with education and referred to child health, child nutrition, child protection, and child rights (Figure 4).

Figure 4. Co-occurrence of recommendations, internal and external knowledge (n=172)



The findings from the systematic document review demonstrated that much is known about best practice in terms of educating children and child health, and to a lesser extent, child nutrition and child protection. However, little is known about ECD in the Malian context. Aside from emerging knowledge noting the importance of family and parental behavior for child health, family and parenting appear to be an area where additional knowledge is needed. To validate (or invalidate) these findings, the ResilientChild: Mali team engaged with key stakeholders to better understand the knowledge acquired from the systematic document review.

2.1.2 Qualitative Stakeholder Engagement

The findings from the systematic document review informed stakeholder engagement to seek opinions related to child resilience from adults (parents) and youth as well as heads of local programs. To identify the dimensions that represent child resilience in the Malian context, the ResilientChild: Mali team carried out an iterative review of qualitative data transcripts from KIIs and FGDs across the three regions selected for study.

KIIs and FGDs

The objective of the KIIs and FGDs was to understand how child resilience was perceived and defined in the Malian context and to identify child resilience dimensions in a socio-cultural context across three very different regions. Figure 5 shows the study sites, selected based on estimated child deprivation rates reported by UNICEF (De Milliano & Handa, 2014).

Study sites were selected based on:

- Poverty (according to the UNICEF Poverty Index Commons)
- Livelihoods (agriculture, fishing and livestock)
- Proximity to a town or large market

According to UNICEF, Mopti and Sikasso regions have the highest incidence of child deprivation, though for different reasons. Gao in the north was selected to provide insight into an area experiencing Mali's security crisis and ongoing instability. Three districts were selected in each of the three regions based on poverty indices. In each district, three villages were selected based on subsistence levels and proximity to a town or market. Given the security issues in the northern region, only one village in Gao was included in the study. Table 3 lists the districts and villages selected and the number of KIIs and FGDs conducted in each village.



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Table 3. Distribution of KIIs and FGDs

Region	District	Village	# of Klls	# of FGDs	
Bamako	Bamako	-	4	0	
	-	Wabaria 2		3	
Monti	Bandiagara	Djiguibombo	2	3	
Mopti	Douentza	Boni	2		
Sikarra	Bougouni	Flaboula 4		2	
SIKASSO	Yorosso	Zandiéguela	-	2	
		TOTAL	13	12	

Klls were also carried out in Bamako with regional heads of government and international NGO programs for women and children, as well as local authorities and program personnel. Klls sought to gain new knowledge about:

- · General understanding of child-focused interventions
- Organizational or institutional engagement for child resilience
- Contextual description of intervention sites specifically related to child resilience
- Perspectives on child resilience, specifically factors contributing to child resilience and their prioritization

Before recruiting KII and FGD participants, the ResilientChild: Mali team obtained authorization from local administrative authorities. Informed consent forms were provided to potential participants following an explanation of the qualitative data collection objectives and methods, risks and benefits of participation, and the option of non-participation. The consent process also included an explanation that compensation would not be provided, although FGD participants received refreshments.

In each of the three regions and Bamako, KIIs were conducted with people from Government of Mali agencies, NGOs, and communities. Community participants included local leaders, child specialists, and members of local associations. Participants were selected based on the following criteria:

- Participation in interventions targeting children and/or their communities
- · Availability and consent to participate in the KIIs

In Gao and Mopti, separate FGDs were held with men, women, and youth. Youth in Sikasso were unavailable to participate in FGDs because of their responsibilities in the fields. FGD participants were selected based on the following criteria:

- Age (15 years or more)
- Membership in a community association related to child issues
- Availability and consent to participate in a FGD
- Parenthood

Results

Although most findings from the KIIs and FGDs (like findings from the systematic document review) related to education and health strategies to reduce child vulnerability, FGD participants identified additional strategies in response to the shocks and stresses of physical and food insecurity. In terms of family and parenting, strategies to reduce child vulnerability focused on keeping children safe and supervised. In terms of child nutrition, strategies to reduce child vulnerability focused on ways to strengthen food security via seed banks, water storage, agriculture and livestock raising, and creation of associations.

The results of the qualitative stakeholder engagement were discussed with research teams from USTTB and TU/DRLA in Bamako and UNICEF Mali. These discussions led to the development and refinement of a series of conceptual models. In each model, factors were assessed according to available knowledge and relevance to child resilience. This process provided an opportunity to share perspectives and understanding based on a close and iterative review of qualitative data transcripts; discuss the varying contexts in the three regions; and reach consensus on important factors, relationships and outcomes to include in the theoretical model.

Contextual knowledge comprised findings from the systematic document review and qualitative stakeholder engagement, the latter comprising KIIS and FGDs. The findings from the systematic document review demonstrated that much is known about best practice in terms of educating children and child health, and to a lesser extent, child nutrition and child protection. However, little is known about ECD in the Malian context. Aside from emerging knowledge noting the importance of family and parental behavior for child health, family and parenting appear to be an area where additional knowledge is needed.

Most of the findings from the KIIs and FGDs were related to education and health strategies to reduce child vulnerability. However, FGD participants identified additional strategies in response to the shocks and stresses of physical and food insecurity. Strategies to reduce child vulnerability also focused on family and parenting to keep children safe and supervised. In terms of child nutrition, strategies to reduce child vulnerability focused on ways to strengthen food security via seed banks, water storage, agriculture and livestock raising, and creation of associations.

2.2 Theory and Metrics

A theoretical model was developed on the basis of the contextual knowledge that emerged from the systematic document review and qualitative stakeholder engagement. The theoretical model guided the identification of resilience dimensions and development of indicators for measurement.

2.2.1 Theoretical Modeling

The ResilientChild: Mali team, drawing on the conceptual model, created a theoretical model of child resilience in the Malian context. The model provides a hypothesis about how different dimensions relate to one another and promote or diminish child resilience. Building on the findings from the systematic document review and qualitative stakeholder engagement, the team shaped important factors, relationships, and outcomes into a theoretical model (Figure 6).

This theoretical model reflects the dynamics of Malian children at multiple levels—individual (child), household, and community. Resilience measures require this type of multi-dimensional and multi-level conceptualization of the lives of children, recognizing that many internal and external influences shape the dynamics of resilience.

The ResilientChild: Mali Analytical Framework acknowledges that resilience depends on the interaction of other systems and the capacity for adaptation across all systems (Masten, 2015). To explain further, the protective and promotive factors within and around a child create individual capacities for resilience and internal skills to respond to shocks and adapt to stress. The macro systems of community and society, where children must interact and respond to larger formal and informal processes and institutions, support and shape those protective and promotive factors. No specific component, layer, or outcome in itself, represents "resilience." Instead, the entire theoretical system, including the various components and their interactions with one another, constitute resilience.

In Figure 6, the resilient Malian child is the result of individual, household, and community factors that interact in ways that mitigate and/or support resilience. At the community level, governance (perceived representation) influences access to services (health and education services, safe spaces in the community, nutrition services, and psychosocial services). Those services both influence and are influenced by community participation and social cohesion. Services may facilitate community cohesion, and community cohesion may facilitate access to those services.

Blue = individual factors Purple = household factors Teal = community factors

Figure 6. Theoretical model of the child resilience in Mali



At the household level, shocks and stressors change the relationship between households and communities. They influence wealth, use of humanitarian assistance, and access to sector-based services. However, both wealth and humanitarian assistance modify the effects of those shocks and stressors on parenting. Parenting influences the child-specific individual factors of child school attendance, psychological wellbeing, and use of health care services. Use of health care services is influenced by humanitarian assistance and parenting. Humanitarian intervention may shape parenting, and parenting may influence how humanitarian assistance is sought and integrated into the household. Wealth influences child school attendance, as household wealth may protect children from labor and keep them in school. Psychological wellbeing is the product of education and health, shaped by parenting practices. In sum, these factors work together to create child resilience.

The next sections describe how this theoretical model is operationalized in a quantitative tool.



Table 4. Resilience Capacities Indicator Data Structure

Data E	ements for Resi	lience Capacity			
Child Resilience Categories	Level of Influence	Resilience Dimensions	Indicators		
		Child Demographics	• Age • Gender		
		Use of Health Services	Child Health Service Usage		
Child Development	Individual (Child)	Education	School Attendance Educational Agency		
		Psychological Wellbeing	Emotional Skills Moods and Feelings (e.g. depressive symptoms)		
		Parenting	Parental discipline Parental support		
Household Functioning	Household	Household Demographics	 Age, Gender, Marital Status of Caregivers Educational Level 		
		Food Security	Household Hunger		
		Wealth	Material Assets Household Characteristics Quality of Housing Household water and sanitation Tropical Livestock Units		
		Role of national and international humanitarian actors	Receipt of Humanitarian Assistance Type of Assistance Received		
		Community participation and social cohesion	Community Participation Social Cohesion		
Community Resources	Community	Access to Sector-Based Services	 Access to Quality of Health Services Access to Quality of Education Services Access to Quality of Nutrition Services Access to Quality of Psychosocial Services Access to Quality of Safe and Public Spaces Access to Quality of Basic Utilities (electricity, water, and sanitation) 		
		Security	Feelings of crime in the community		
		Governance	Perceived Representation		

2.2.2 Resilience Dimensions and Indicators

The theoretical model identified child resilience assets and capacities under the broad categories of child development, household functioning, and community resources. These categories also align with different levels of intervention influence (individual, household, and community), as shown in Table 4.

Identification of these indicators allowed the team to target questions to specific areas and audiences for the quantitative survey, enhancing the validity of the questions in gathering data to measure what they intended to measure, and to translate relationships from the theoretical model into quantitative questions.

2.3 Measurement

This section describes the survey methodology, including sampling, data collection, and data analysis.

2.3.1 Overview: Survey Methodology and Database Characteristics

To understand the individual, household, and community factors that contribute to child resilience in Mali, a survey team led by USTTB researchers administered a cross-sectional survey to 1,069 households in 15 select study villages. The team interviewed heads of households or other available adults in the households over a 1-month period.

Theory and Metrics

The *ResilientChild: Mali* theoretical model provides a hypothesis of child resilience in Mali – identifying potential resilience dimensions and their hypothesized hypothesized relationships to one another across system levels:

System Level	Resillience Dimensions
Child	Child Emotional Skills Child Moods and Feelings Parental Support Parental Discipline
Household	Household Hunger (Food Security) Wealth Tropical Livestock Units (TLU) Household Water and Sanitation Number of Types of Assistance Received
Community	Access to Basic Services Community Particpation Social Cohesion Security (Physical) Governace

These resilience dimensions will be analyzed statistically to determine applicability in the Malian context and to identify differences across regions, ultimately providing resilience scores for comparison and resilience pathways to better understand child resilience in Mali.

²A new administrative structure was adopted while this study was being implemented. This report was drafted based on the previous structure.

Table 5. Study areas, with population of regions and communes

N°	Region and Population	Cercle	Commune and Population	Village	Number of Households
1		Ansongo	Bara (18,507)	Bara	66
2	Gao (665,000)		Anchewadi (25,210)	Djebock	66
3		Gao	Gounzoureye (33,414)	Wabaria	66
		Bandiagara	Doucombo (25,550)	Djiguibombo	67
		Djenné	Ouro Ali (13,276)	Senossa	67
6	Mopti	Douentza	Haïré (36,799)	Boni	67
	(2,497,001)	Mopti	Soye (26,026)	Soye	66
8		Teninkou	Togoro Kotia (16,745)	Kadial	67
9		Youwarou	Deboye (28,391)	Akka	66
		Bougouni	Gounzoureye (33,414)	Wabaria	66
		Kadiolo	Anchewadi (25,210)	Djebock	66
12	Sikasso	Koutiala	Bara (18,507)	Bara	66
13	(3,242,001)	Sikasso	Missirikoro (5,403)	Missirikoro	67
14		Yanfolila	Wassoulou Balle (63,134)	Bounounko	67
15		Yorosso	Yourosso (27,730)	Zandièguéla	67
TOTAL	3	14	15	15	1000

Source: Annuaire statistique du Mali 2014.

Sampling

Mali is administratively divided into eight regions and the capital district, Bamako.² The regions are each divided into 49 *cercles*, which are further divided into rural and urban *communes*. There are 703 communes in Mali. Within *communes* are villages, whose sizes vary, as households cluster together and may move or migrate. Table 5 breaks down the study areas, with population information as available.

No population estimates were available at village level. Given the exploratory nature of this study, representativeness was not of particular concern. Rather, it was important to gather a sample large enough to ensure adequate power when comparing regional effects in the analysis. For this reason, sampling with probability proportionate to size was not performed. Rather, targets of six villages per region and 67 households per village were established as the goal. It should be noted that given security concerns in Gao, only three villages from this region were included in the quantitative survey. Sample sizes were computed based on a 10 percent margin of error and 90 percent confidence interval to determine what was realistic for both the survey and estimated village size (Table 6).

Given varying village populations, estimates were made for each village (as opposed to combining the village estimates and creating a desired sample size). Keeping a random sample at the village level allowed results to be representative of the villages themselves, not the region or *commune*. The sample size estimation aimed for representativeness at the village level.

The USTTB team randomly sampled households in the study villages. Enumerators and field supervisors worked with village leaders to collect local census lists and used the lists to randomly select a targeted number of households to maintain a confidence interval of 90 percent. Adults (defined by age over 18 years) were interviewed based on their location in their households at the time of the survey. Adults selected for participation in the survey had to reside in the households where the survey was conducted. There was no target number of men or women. For questions related to a specific school-age (6–18 years) child residing in the household, the child was randomly selected by drawing the name of one child from smalls bits of paper containing the names of all school-age children within the household. Based on the calculations for a 10 percent margin of error and confidence interval of 90 percent, the total survey population minimum was set at 1,000 as a baseline goal. The total sample size for this survey was 1,069.

Region	Study Village	10% of Commune Population*	Sample Size for 10% Margin of Error, Cl 90%
	Bara	18,507	66
Gao	Djebock	25,210	66
	Wabaria	33,414	66
	Akka	28,391	66
	Boni	36,799	67
Mopti	Djiguibombo	25,550	67
	Kadial	16,745	67
	Senossa	13,276	67
	Soye	26,026	66
	Badalabougou	50,955	67
	Bounounko	63,134	67
C 111	Flaboula	71,800	67
SIKKasso	Missirikoro	5,403	67
	Zandièguéla	27,730	67
	Zangasso	23,913	67
	Total	466,853	1,000

Table 6. Village population and sample size estimates

* Estimates of the populations of the villages plus surrounding communities



Survey Process

The ResilientChild: Mali team created a tablet-based survey application and trained enumerators with prior tablet experience to interview each sampled household. USTTB adopted the Electronic Data Capture process for the quantitative survey and used the MERISE method to model the information system. Based on the Case Report Form (CRF), the team designed the data dictionary and the Conceptual Data Model (Entity-Relationship Model) and Physical Data Model.

SQLite, a robust open relational database management system compatible with all Android systems, was selected to design the encrypted ResilientChild: Mali database. Android Visual Studio was used to design the mobile application with Logical Security (username/password login) including user interfaces, validation rules, record attribution, and the ability to track each change to the data automatically on a Samsung Galaxy cellphone. The encrypted SQLite database and application were installed on the Samsung Galaxy smartphones to be tested by programmers and field team leaders. The reported errors and bugs were updated prior to system validation. This process enhanced quality control in the sample (making it more difficult, for example, for enumerators to skip questions or enter responses incompletely) and accelerated data cleaning and manipulation.

During a 4-day workshop, 21 preselected enumerators (10 for team one and 10 for team two, plus one reserve) and two field team leaders worked to master the survey questionnaire and the mobile device application. The workshop included the following sessions:

- The ResilientChild: Mali Project
- Human subject research ethics
- Review of the questionnaire and translation into Bambara
- Using the Samsung Galaxy tablet to collect data
- Collecting practice data and troubleshooting

The application was installed on each of the 22 devices and distributed to field team leaders and investigators on the third day of the workshop. At the end of the training, the last version of the application and a fresh copy of the survey database were installed on each mobile device. Data were collected over a 4-week period. Team 1 collected data over 22 days in the nine villages in Gao and Mopti, and Team 2 collected data over 21 days in the six villages in Sikasso. The average time for household interviews varied by enumerator, ranging from 30 minutes to 1 hour. For safety reasons, part of the survey was conducted on paper forms in the villages of Bara and Djebock in Gao. A new enumerator team was recruited and trained locally in Gao. Five enumerators from Team 1 then entered the collected data into the tablets.

Data Analysis

The ResilientChild: Mali team used SPSS to analyze the data. Data were cleaned manually, ensuring all categorical variables were structured to increase correspondence to greater scores of a value for ease of inclusion in scale development. Univariate and bivariate analyses were performed. Tests of homoscedasticity, as well as mean and frequency tests, were analyzed in the univariate analysis. The appropriate test of association was calculated in bivariate analysis (t-tests, ANOVA [Analysis of Variance] and chi-square) to identify significant bivariate relationships.

Using Statistical Analysis Software (SAS), the ResilientChild: Mali team used SEM to confirm the linkages among the various observed resilience factors identified in the formative qualitative analysis. All included factors were mapped with direct links among the various strata (household, community), as well as relationships that were theorized to be moderated through or correlated with other important resilience dimensions. Maximum Likelihood Estimation was used for most models. Weighted Least Square estimators were used for all models that included the dichotomous child education variable as an outcome, including the final model presented here. Goodness-of-fit was assessed using likelihood ratio tests on the residual covariance matrix, and only significant relationships (p<= 0.05) are reported.



2.3.2 Survey Results

Of the 1,062 respondents surveyed, 64 percent were male, 46 percent were 45 years or older, 93 percent were married, and 62 percent reported having no education. Village-level differences were noted across all households in the sample. Table 7 shows select demographic characteristics of respondents.

Although respondents in the survey population were overwhelmingly male, 60 percent of respondents in Gao were female. The population sample was evenly distributed across age range, although respondents under the age of 24 only accounted for 3 percent of the respondents in Mopti. Over 62 percent of all respondents (and 70 percent in Sikasso) reported having no education. Only 2.5 percent of all respondents reported obtaining high school education or higher. Only 7 percent of the total number of respondents reported being married, although this percentage was higher in Gao (19 percent).

Table 7. Respondent characteristics, by region

Characteristic		Gao		Mopti		Sikasso		Total	
			n		n		n		n
Candan	Male	43.1	88	67.4	288	69.8	301	63.7	677
Gender	Female	59.6	116	32.6	139	30.2	130	36.3	385
	Under 24	9.3	19	3.1	13	9.3	40	6.8	72
	24-34	25.5	52	19.2	81	23.4	101	22.1	234
Age (years)	35-44	24.0	49	25.9	110	25.1	108	25.2	267
	45-54	21.1	43	18.8	80	17.4	75	18.7	198
	55-64	9.3	19	18.1	77	13.9	60	14.7	156
	65 and Over	10.8	22	15.1	64	10.9	47	12.5	133
	No School	56.4	115	56.7	238	70.8	305	62.4	658
Education	Less than High School	27.0	55	19.3	81	22.5	97	22.1	233
Level	High School and Higher	2.5	5	2.1	9	2.8	12	2.5	26
	Other	14.2	29	21.9	92	3.9	17	13.1	138
Marital	Not Married	18.8	39	5.4	23	2.8	13	6.9	74
Status	Married	81.2	168	94.6	406	97.2	419	93.1	993

Table 8 shows select demographic characteristics of household heads as reported by all survey respondents.

Gao had the highest percentage of female-headed households (18 percent), and Sikasso had the highest percentage of male-headed households (97 percent). Less than 10 percent of female-headed households were represented in the survey sample. Heads of household tended to be slightly older, although Gao had fewer respondents 55 years of age and older (31 percent) than Mopti and Sikasso. Less than 15 percent of heads of household were under the age of 34. Education distribution among heads of households was similar across regions, with 59 percent of the sample reporting that the heads of the households had never gone to school. The majority of heads of household (68 percent) had only one spouse, a finding consistent across regions.

Table 9 shows select demographic characteristics of targeted school-age children, randomly selected by enumerators, of whom specific questions were asked on the survey.

Across all three regions, 52.1 percent of school-age children were female. The children targeted for the survey questions accounted for over 50 percent of all children reported in the survey, again consistent across all three regions. A little over one-half (55 percent) of the children targeted for survey questions had attended school in the past year. Respondent households in Mopti reported the lowest attendance level (47 percent), and respondent households in Sikasso the highest (62 percent).

Table 10 shows that differences were significant across the three regions in the use of health services (p<.01) and school attendance (p<.001) of survey-targeted children in the previous 12 months. Children living in Sikasso were more likely to seek health care and to have attended school in the previous 12 months than those living in Mopti.

Table 8. Household head characteristics, by region

Characteristic		Gao		Mopti		Sikasso		Total	
			n		n		n		n
	Male	82.1	170	87.6	376	97.0	418	90.3	164
Gender	Female	17.9	37	12.4	53	3.0	13	9.7	103
	Under 24	1.0	2	0.7	3	2.1	9	1.3	14
	24-34	15.0	31	10.7	46	13.9	60	12.8	137
	35-44	19.8	41	24.5	105	29.9	129	25.8	275
Age (years)	45-54	33.3	69	23.3	100	20.0	86	23.9	255
	55-64	16.9	35	21.0	90	20.2	87	19.9	212
	65 and Over	14.0	29	19.8	85	13.9	60	16.3	174
	No School	54.1	111	53.3	225	67.5	291	59.3	627
Education	Less than High School	23.4	48	20.4	86	23.2	100	22.1	234
Level	High School and Higher	3.9	8	2.1	9	3.7	16	3.1	33
	Other	18.5	38	24.2	102	5.6	24	15.5	164
Number of	One	64.6	133	67.7	289	69.3	298	67.7	720
Spouses	More than One	35.4	73	32.3	138	30.7	132	32.3	343

Table 9. Select child characteristics, by region (n=923) Particular

Characteristic		Ga	10	Mo	pti	Sika	isso	То	tal
			n		n		n		n
Canalan	Male	49.4	85	48.0	180	47.3	207	47.9	472
Gender	Female	50.6	87	52.0	195	52.7	231	52.1	514
	Under 24	50.6	89	56.8	208	57.5	219	55.9	516
Age	24-34	27.3	48	22.7	83	22.0	84	23.3	215
(years)	35-44	22.2	39	20.5	75	20.5	78	20.8	192
Education	No School	44.4	92	52.7	226	37.8	163	45.1	481
Level	Less than High School	55.6	115	47.3	203	62.2	268	54.9	586

Table 10. Child use of health and education services, by region

Child Use of Health and		Gi	90	Mo	pti	Sika	1550	То	tal	Significance
Education Services			n		n		n		n	
Health Care Sought	No	15.5	32	16.4	70	10.0	43	13.6	145	p< .01
	Yes	84.5	175	83.6	357	90.0	387	86.4	919	
School	No	44.4	92	52.7	226	37.8	163	45.1	481	n < 001
this Year	Yes	556	115	47.3	203	62.2	268	54.9	586	p<.001

2.3.3 Resilience Index

The ResilientChild: Mali team created a resilience index incorporating the multiple scales and indices to reflect the specific resilience dimensions emerging from the theoretical model and to provide the metrics necessary to measure resilience (Table 11).

The team used principal components analysis (PCA) to analyze factors and created a composite score for each scale (Annex I describes all scales and indices). Various hypothesized items measuring particular aspects of these concepts were analyzed using factor analysis. All factors that loaded over 1.0 were analyzed for inclusion, and individual items were retained or eliminated based on their factor loadings.

Next, Chronbach's alpha was calculated for each scale, with an alpha of 0.6 as the threshold for defining whether or not the scales were acceptably reliable for use. All of the scales included in this report were above the 0.7 level. These scales were standardized for radar graphs, with 0 as the mean value and the standard error equal to 1. The z-scored scales were used for bivariate analysis to allow easy comparison across groups. For multivariate analyses, the original composite scores were used.

As noted earlier, the ResilientChild: Mali team's analytical approach assumes that "child resilience" represents a set of measureable resources and capacities in varying contexts that children use to respond to shocks and stressors. This assumption is represented in the mathematical equation below, representing the resilience index, comprising individual (child), household, and community resources and capacities.

$R_t = f(IPPC_t, HHC_t, CC_t)$

Where:

- R = Resilience at time t
- IPPC = Individual physical and psychological capacities (child emotional skills, child depressive symptoms, parental support, parental discipline)
- HHC = Household capacities (food security, wealth and livelihoods, household water and sanitation, assistance received)
- CC = Community capacities (access to basic services, community participation, social cohesion, physical security, governance)

Table 12 presents a cumulative score of all the resilience dimensions across the different systems levels that contribute theoretically to child resilience in Mali.

These cumulative resilience scores differed significantly (p<.001) by region. Sikasso presented the highest resilience score and differed significantly from scores for Gao and Mopti.

Table 13 presents the individual resilience dimension scores across the three regions.

Resilience Category	Resilience Dimension–Scales and Indices
Child Development	Child emotional skills Child moods and feelings (depressive symptoms) Parental support Parental discipline
Household Functioning	Household hunger Wealth Tropical Livestock Units (TLU) Household water and sanitation Number of types of assistance received
Community Resources	Access to basic services Community participation Social cohesion Security (physical) Governance

Table 11. Scales and indices for resilience dimensions

Table 12. Child resilience scores (Rt) by region

	Gao	Mopti	Sikasso	Significance
Rt – All dimensions	-0.114	-0.148	0.199	p<.001

Table 13. Resilience scores, by region

Resilience Dimension	Gao	Mopti	Sikasso	Significance
Emotional Skills	0.071	-0.126	0.081	***
Depressive Symptoms	-0.075	-0.054	0.09	*
Parental Support	-0.095	-0.158	-0.001	***
Parental Discipline	-0.163	-0.217	0.309	***
Household Hunger (food insecurity)	0.85	-0.045	-0.367	***
Wealth	-0.24	-0.189	0.298	***
Tropical Livestock Units (TLU)	-0.337	0.097	0.048	***
Household Water and Sanitation	0.141	0.008	-0.079	**
Number of Types of Assistance	0.165	0.26	-0.12	***
Access to Basic Services	0.222	-0.041	-0.063	***
Community Participation	0.104	-0.055	0.004	-
Social Cohesion	0.096	-0.135	0.004	***
Security (Physical)	-0.673	-0.021	0.346	***
Governance	-0.513	0.105	0.149	***

Differences were significant across all regions for all resilience dimensions, with the exception of community participation. Significance levels were consistent at the p<.001 level, with the exception of child depressive symptoms, for which differences across regions were significant at the p<.05 level. Higher scores for depressive symptoms indicate fewer issues in regulating moods and feelings or fewer exhibitions of depressive symptoms.

Child development dimensions comprised child emotional skills and child depressive symptoms, based on responses related to a specific, school-age child chosen randomly in each household. In terms of child psychological wellbeing constructs, emotional skills and depressive symptoms were significantly different across the three regions (p<.001 and p<.05, respectively). Scale scores of emotional skills for children were highest in Sikasso, followed by Gao. Scale scores for depressive symptoms, indicating fewer issues, were highest in Sikasso and lowest in Gao. Scores for parental support and parental discipline were highest in Sikasso and lowest in Mopti. Scores for both parenting scales in Gao fell in the middle, but tended toward the low end.

Differences in resilience dimensions were significant for household functioning at the p<.001 level across all three regions, with the exception of household water and sanitation facilities, where differences were significant at the p<.01 level across all three

regions. The score for household hunger was highest in Gao and lowest in Sikasso. The score for wealth was also highest in Sikasso and but lowest in Gao, where the score for livestock numbers (converted to Tropical Livestock Units, or TLU) was lowest. Mopti had the highest TLU score. Households in Gao had the highest score for household water and sanitation, indicating more improved facilities, and households in Sikasso the lowest. Households in Mopti accessed more assistance options than households in either Gao or Sikasso.

Differences in resilience dimensions were significant for community resources, excluding community participation, at the p<.001 level across all three regions. Scores for access to basic services were highest in Gao and lowest in Sikasso. Scores for community participation and social cohesion were also highest in Gao, but lowest in Mopti. The score for physical security was lowest in Gao, where perceived representation of government was lowest, and highest in Sikasso, where perceived representation of government was highest.

Perceptions of child risk and the reported cumulative number of stressors and shocks experienced by households differed significantly across the three regions at the p<.001 level (Table 14).

Table 14. Perceptions of child risk and reported number of stressors and shocks, by region

Resilience Dimension	Gao	Mopti	Sikasso	Significance
Perceived Child Risks	0.274	-0.179	0.039	***
Number of Stressors Experienced	0.69	-0.026	-0.303	***
Number of Shocks Experienced	0.516	0.178	-0.398	***

*p<.05 **p<.01 ***p<.001

The score for perceived child risks was highest in Gao and lowest in Mopti. Households in Gao also reported more stressors and shocks experienced by households than those in either Mopti or Sikasso. Scores for the number of stressors or shocks experienced by households were lowest in Sikasso.

The ResilientChild: Mali team developed radar graphs to better understand potential relationships among the resilience dimensions of perceived child risk, stressors, and shocks and to visually capture differences or similarities across the three regions. Figure 8 presents the relationships among child psychological development outcomes, perceived child risks, number of stressors experienced by the household, and parenting dimensions.

In Gao, where child risks were perceived to be relatively high and households experienced a high number of stressors, parental support and discipline were quite low. In contrast, in Sikasso, where child risks were perceived to be relatively low and households experienced a low number of stressors, parental support and discipline were quite high. Children exhibited fewer depressive symptoms (higher score) in Sikasso, with higher parental discipline and parental support, reduced perceptions of child risks, and a lower number of stressors. Children exhibited more depressive symptoms (lower score) in Gao, with lower parental discipline and parental support, increased perceptions of child risks, and a higher number of stressors.

Figure 9 shows mean scores for childhood development, including parenting dimensions, for the three regions, by number of shocks.

Figure 8. Relationships among child psychological outcomes, perceived child risks, number of stressors experienced, and parenting dimensions, by region





Figure 9. Child development and parenting, by number of household shocks experienced

The number of shocks experienced by households differed significantly by region (p<.001). In Gao and Mopti, where households reported a high number of cumulative shocks, parental support and parental discipline were lower than in Sikasso. Children exhibited more depressive symptoms (lower score) in Gao than in Sikasso, where households reported experiencing fewer shocks.

Table 15 shows that child psychological outcomes differed significantly (p<.001) in contexts of high or low perceived child risks, but parenting dimensions were not significantly different. Responses to questions related to child risks were based on respondent perceptions within the community.

Figure 10 presents these results graphically.

Child psychological outcomes, measured by emotional skills and depressive symptoms, were significantly higher in contexts perceived as having higher child risk.

Measurement – The Resilience Index

The ResilientChild: Mali Analytical Framework assumes that child resilience is represented by a set of measurable resources and capacities that children use to respond to shocks and stressors in varying contexts. The resilience index for Mali comprises resources and capacities at individual (child), household, and community levels. Cumulative resilience scores for the three regions differed significantly at the p<.001 level. Sikasso had a higher resilience score compared to Gao and Mopti.

Scores for all the individual resilience dimensions across child development, household functioning, and community resources also differed significantly across regions (with the exception of community participation, not shown). The rankings below, high or low, indicate the highest or lowest score for that particular dimension in comparison to scores for the other regions.

Measurement – The Resilience Index

Resilience Dimension	Gao	Mopti	Sikasso
Emotional skills		Low	High
Depressive symptoms*	Low		High
Parental support		Low	High
Parental discipline		Low	High
Household hunger (food insecurity)	High		Low
Wealth	Low		High
Tropical Livestock Units (TLU)	Low	High	
Household water and sanitation	High		Low
Number of types of assistance	High		Low
Access to basic services	High		Low
Social cohesion	Hlgh	Low	
Security (physical)	Low		High
Governance	Low		High

*Depressive symptoms: A high score indicates that children exhibit fewer depressive symptoms.

Resilience Dimension	Low Perceived Child risk	High Perceived Child Risk	Significance
Emotional Skills	-0.21	0.21	***
Moods and Feelings (Depressive Symptoms)	0.159	0.398	***
Parental Support	0.251	0.262	
Parental Discipline	0.273	0.257	

Table 15. Child psychological outcomes, by perceived child risk context

*p<.05 **p<.01 ***p<.001



Figure 10. Child development and parenting, by perceived child risk context

2.3.4 Resilience Pathways

The ResilientChild: Mali team used SEM to identify pathways to resilience. Figure 11 illustrates these resilience pathways with all dimensions included in the model. Perceived representation of government/alignment with respondent priorities (governance in Figure 11)—was significantly associated with a host of factors on all levels of the SEM. Notably, it was not related to wealth, perceived security, or access to and quality of nutrition services. (In Figure 11, access to basic services is disaggregated into the specific sector services of education/ school, potable water, and nutrition.) More favorable perceptions of governance were associated with reduced child psychological wellbeing, reduced household hunger, and reduced access to and quality of safe drinking water. For all other significant relationships, higher perceived representation of government was associated with higher child school attendance, parental support, household water and sanitation (improved facilities), access to and quality of education services, and social cohesion.

Social cohesion was strongly positively correlated with child school attendance. Nutrition and community access to potable water were similarly positively associated with school attendance. Higher perceptions of physical security were associated with slightly lower parental support scores and lower household hunger scores. Access to and quality of nutrition services was also a significant positive factor in predicting parental support and wealth. School access was significantly associated with psychological wellbeing, parental support, and wealth. Community access to and quality of drinking water was similarly positively associated with psychological wellbeing and wealth, but had a negative association with parental support scores.

Psychological wellbeing and parenting were strongly positively associated. Increased access to potable water and wealth were associated with higher parenting scores as well. Access to potable water and wealth were positively associated with child school attendance and reduced household hunger.

SEM was also applied to sector-specific pathways to resilience to confirm the linkages among the various observed resilience dimensions. This analysis mapped dimensions with direct links among the various strata (individual, household, community) as well as relationships that were theorized to be moderated through or correlated with other important resilience dimensions. Figure 12 illustrates the linkages between access to and quality of education services and child school attendance over the previous 12 months.

Child school attendance was strongly and positively associated with parental support, wealth, household water and sanitation (improved facilities), and

perceived social cohesion in the community. Parental support was positively associated with household wealth, access to and quality of education services, and perceived representation of government. Parental support was negatively associated with physical security. Child psychosocial wellbeing was also positively associated with access to and quality of education services, which was positively correlated with wealth.

Figure 13 illustrates the linkages between access to and quality of water and sanitation services and child psychological wellbeing.

Child psychological wellbeing was directly and positively associated with parental support, access to and quality of drinking water, and perceived representation of government. Wealth and household water and sanitation (improved facilities) were also positively associated with parental support.

Figure 14 illustrates the linkages between access to and quality of nutrition services and household hunger.

Access to and quality of nutrition services in a community was positively associated with parental support, which was positively associated with increased child psychological wellbeing. Wealth was also positively associated with parental support and inversely associated with household hunger (greater wealth correlated with reduced household hunger). Perceived representation of government was directly associated with parental support, improved household water and sanitation, and increased access to and quality of nutrition services in the community.

While SEM is useful for identifying significant pathways, it cannot provide concrete programmatic recommendations. Further investigation is necessary to identify particular elements of the scales and indices that are significant predictors of resilience. One recommended next step is to regress on the rotated factor loadings for the significant proximal predictors of resilience. While it might be tempting to regress on all of the individual items used to create the scales, this is not recommended. The high between-item correlation will make identifying significant factors difficult. Adding more distal scales, such as governance and physical security, may not be appropriate for these models, as those factors are likely to influence resilience through more community and household-based factors rather than directly.







Figure 13. Sector pathways: Water and sanitation services and child psychological wellbeing







The SEM in Figure 12 shows four significant dimensions associated with the outcome of child school attendance. Three of those—parental support, wealth, and social cohesion—are scales. The fourth—household water and sanitation—is an additive index. To properly interpret the results of the regression analysis, it is first necessary to identify trends in the factor loadings in order to understand what elements of these dimensions are most significant in predicting the outcome. Annex II presents specific factor loading for each of the four significant dimensions in Figure 12.

Table 16 shows the results of the first logistic regression model, which included water and sanitation as a control. Parental support (parenting) factors were significant predictors of child school attendance, indicating that all of the elements of this scale are associated with greater child attendance in schools. The second wealth factor, comprising basic household assets (e.g., tables, chairs, a radio), was a significant predictor of child school attendance. This indicates that among the poorest households, those with rudimentary assets were more likely to have children in school than those without. The other two wealth factors, corresponding to greater household wealth, had no effect on child school attendance.

Similarly, the first social cohesion factor, feeling that neighbors are trustworthy and able to help solve community problems, was a significant predictor of child school attendance, while the second social cohesion factor, a higher level of intimacy (trusting neighbors with one's own children or one's own home), was not significant.

The one shortcoming of the model in Table 16 is the lack of detail in the household water and sanitation index. The household water and sanitation index was treated more as a control, without providing details about elements in the index that may be more or less significantly associated with child school attendance. Table 17 addresses this lack of detail by including each of the elements that were used to create this index. Much of the model is the same, particularly in regard to significance among the various factor components.

The regression model in Table 17 presents detail of the household water and sanitation elements that were significantly associated with child school attendance. Household drinking water source (rudimentary vs. improved) was the only individual factor from the household water and sanitation index that was significantly associated with child school attendance.

Measurement – Resilient Pathways

The pathway analyses identified important relationships between resilience dimensions and drivers of specific child wellbeing outcomes. Key relationships and select child wellbeing outcomes are presented here as identified in the pathway model linking education services to child school attendance.

Measurement – Resilient Pathways

Outcome	Direct, Positive Association
Child School Attendance	Child Emotional Skills Child Moods and Feelings Parental Support Parental Discipline
Child Psychological Wellbeing	Household Hunger (Food Security) Wealth Tropical Livestock Units (TLU) Household Water and Sanitation Number of Types of Assistance Received
Parental Support	Access to Basic Services Community Particpation Social Cohesion Security (Physical) Governance

 Table 16. Regression on child school attendance, with household water and sanitation additive index

Factors	Beta	Standard Error
Parenting Factor 1	.718***	.087
Parenting Factor 2	.565***	.078
Wealth Factor 1	024	.073
Wealth Factor 2	.391***	.075
Wealth Factor 3	082	.071
HH Water and Sanitation	.184***	.061
Social Cohesion Factor 1	.312***	.073
Social Cohesion Factor 2	.076	.072
Constant	291	.178

*p<.05 **p<.01 ***p<.001

 Table 17. Regression on child school attendance, with water and sanitation items included individually

Factors	Beta	Standard Error
Parenting Factor 1	.637***	.145
Parenting Factor 2	.583***	.130
Wealth Factor 1	049	.092
Wealth Factor 2	.407***	.124
Wealth Factor 3	.132	.107
Rudimentary vs. Improved Cooking Water Source	211	.341
Rudimentary vs. Improved Drinking Water Source	.702**	.330
Time to Water Source	.486	.261
Rudimentary vs. Improved Toilet	268	.264
Share toilet with 10 or More Households	.393	.354
Social Cohesion Factor 1	.319***	.112
Social Cohesion Factor 2	.087	.129
Constant	790	.378

*p<.05 **p<.01 ***p<.001



Discussion

Identifying resources and capacities that children, families, and communities use to support and maintain positive adaptation despite distressing and demanding conditions drives research on child wellbeing and youth development and interventions to strengthen child resilience. The ResilientChild: Mali Analytical Framework attempts to identify the range of potential resilience dimensions across individual, household, and community system levels and apply a pathway analysis to better understand the linkages among dimensions and system levels that lead to resilient child outcomes. The framework transforms indigenous knowledge and practices into systematic, concrete actions and policies that drive contextually relevant interventions and innovations to strengthen resilience.

3.1 Summary of the ResilientChild: Mali Analytical Framework and Findings

The approach used to develop the ResilientChild: Mali Analytical Framework, which sought to generate new knowledge and understanding, included the processes of 1) contextual knowledge, 2) theory and metrics, and 3) measurement. A systematic document review, combined with the results of qualitative stakeholder engagement, produced the understanding necessary to support the development of a theoretical model of child resilience in Mali. This theoretical model provided a hypothesis about how different dimensions relate to one another across system levels and promote or diminish child resilience. The theoretical model formed the basis for the identification of specific constructs of resilience and selection of contextually relevant indicators for measurement. These indicators then drove the design of a quantitative questionnaire and ensured that indicators reflected local realities.

The measurement component of the ResilientChild: Mali Analytical Framework further tested the applicability of indicators through statistical analysis of the data and creation of individual scales and indices to represent the various resilience dimensions and components. A composite score was created for each dimension and its sub-component, as relevant, and various hypothesized items that measured particular aspects of these constructs were analyzed using factor analysis. Scale items were retained or eliminated based on their factor loadings. These newly created scales or indices may be combined statistically to provide a total measure, or composite score, for resilience.

Analyses showed that resilience scores for Gao, Mopti, and Sikasso regions in Mali differed significantly, suggesting a need to tailor resilience strengthening interventions to the local context. All resilience dimensions across all the three system levels (individual, household, and community) except community participation differed significantly across regions (at a significance level of p<.001 for all resilience dimensions except household water and sanitation (p<.01) and child moods and feelings (depressive symptoms) (p<.05). The results of these composite score comparisons allow for broad application and may provide actionable recommendations at the community level, but they do not allow specificity for program planning that targets specific population sub-groups or areas of intervention.

Resilience Scores and Implications for Programming:

Resilience scores across the three regions differed significantly with Sikasso presenting the highest score for child resilience. This difference in scores suggests the need to tailor child resilience strengthening programs to the local context. While the results of these resilience score comparisons may provide actionable recommendations at the community level, they do not provide enough detail for program planners to target specific sub-groups or areas of intervention. However, the measurement component of the ResilientChild: Mali Analytical Framework includes a higher-level statistical model that seeks to explore and identify potential resilience pathways. The pathway analyses examined how different dimensions of resilience relate to one another through the different system levels, providing a visual representation of relationships between resilience dimensions and desired outcome(s). The pathway models identified the extent to which resilience dimensions relate to other dimensions, contributing directly or indirectly to a desired outcome of resilience, and the direction of this relationship. Understanding resilience dimensions through specific relationships helps programmers develop specific and targeted recommendations and programming applications. Defined resilience pathways allow the identification of priority entry points for new and expanded interventions that may target specific resilience dimensions and factors and thus build resilience in a more targeted, effective, and efficient manner.

3.2 Application of the ResilientChild: Mali Analytical Framework

This section presents a detailed interpretation of the resilience index and the resilience pathway models as well as their implications for programming and policy decisions.

Resilience Index

As presented earlier, the ResilientChild: Mali team's analytical approach assumes that "child resilience" represents a set of measureable resources and capacities in varying contexts that children use to respond to shocks and stressors. This assumption comprises resources and capacities across individual (child), household, and community levels. The individual resilience dimensions and indicators that emerged from the systematic document review and qualitative stakeholder engagement led to a theoretical model of child resilience in the Malian context. A resilience index comprising the individual resilience dimensions was created to measure and compare cumulative resilience scores across the three regions of study (see Table 12). Sikasso received a significantly higher resilience score than Gao and Mopti.

Closer examination of individual resilience dimension scores can provide insight into how communities differ. For example, the mean scores of individual resilience scales for wealth, ownership of livestock, physical security (greater insecurity), and perceived representation of government were lower for Gao than for the other two regions (see Table 13). However, the resilience index does not lend itself to supporting recommendations for targeting specific areas of intervention or programming.

Resilience Pathways

The ResilientChild: Mali Analytical Framework includes a higher-level analysis to enhance programming decisions and improve targeting. Several pathway models developed for Mali (see Figures 11, 12, 13, and 14) demonstrate the relationships among resilience dimensions across system levels. All the pathway models presented in this report represent significant relationships. A closer look at the pathway model that investigates the relationship between access to and quality of education services in the community and child school attendance (Figure 12) reveals important associations (all significant) that suggest potential areas for targeted programming. For example, increased child school attendance was strongly and directly associated with parental support. Increased child school attendance was also strongly and directly associated with household wealth, improved household water and sanitation facilities, and social cohesion in the community. Programming investments in these areas (parental support, wealth, household water and sanitation, and social cohesion) would result in improved outcomes for child school attendance in Mali, expanding programming efforts beyond sector-specific investments in the education sector.

Additionally, the model demonstrates the positive and direct relationship between parental support and improved child psychological wellbeing outcomes (as measured by child emotional skill levels and reduced depressive symptoms). Thus, programming investments in parental support would yield positive child outcomes in both education and psychosocial sectors.

Interestingly, access to and quality of education services was not directly associated with child school attendance, but did affect this child-level outcome through a direct association with parental support. Access to and quality of education services was also directly related to positive child psychological wellbeing outcomes, again indicating potential areas for targeted program investments. Thus, the resilience pathway analysis facilitates specific and contextualized recommendations to build resilience among children, households, and communities.

However, in order to disaggregate further and arrive at a deeper understanding of the drivers of child resilience in Mali, the team ran a logistic regression analysis on the factor loadings of three proximal predictors of child school attendance— parental support, wealth, and social cohesion (household water and sanitation was used as a control). This analysis can identify specific factors of each resilience dimension. All elements of the parental support scale were significantly associated with child school attendance. These elements can be characterized as parents' comfort in communicating with their children and ability to engage their children actively in communication (see Table II.1 in Annex II). This finding allows program

planners to target specific parental behaviors in a household to strengthen parental support in order to improve child school attendance.

The logistic regression model also significantly associated household wealth in terms of basic assets (tables, chairs, a radio) with child school attendance (Table II.2 in Annex II). Elements of social cohesion that drive child school attendance are trust in neighbors and community (Table II.3 in Annex II). Again, these findings provide additional granularity of the drivers of child resilience in Mali and permit more targeted, and potentially integrated, program planning to leverage multiple dimensions of child resilience in Mali in pursuit of achieving increased child school attendance.

Since the metric for household water and sanitation was an index, an additional logistic regression model was run with each of the elements of this index (see Table 17) serving as factors. This analysis yielded the additional insight that improved household drinking water was significantly associated with child school attendance. Again, this finding provides more in-depth information that could strategically guide programming decisions and investment allocations, leveraging WASH initiatives in support of child school attendance.

3.3 Scale-up or Replication of the ResilientChild: Mali Analytical Framework

The ResilientChild: Mali pathway models were developed with all the resilience dimension variables for all the regions included in the analysis, to demonstrate and validate the application of the model in the Malian context. Pathway models of resilience should be tested with region-specific data, to take into consideration the important contextual differences in each region. This approach would require a larger and representative sample for each region under consideration but would provide more sensitive pathway models and better inform resource allocation and targeted programming decisions.

The ResilientChild: Mali team recommends including specific resilience dimension scales and indices in national-level surveys to provide greater power of analysis and specificity of findings for future pathway modeling efforts. This level of data analysis will provide greater insight into the relationships among various resilience dimensions and enhance understanding of the multitude of factors that have the potential to strengthen child resilience. The growing body of research on child resilience suggests that strategically well-timed and targeted interventions offer higher benefit-to-cost returns than efforts focused exclusively on reducing risks (Heckman, 2006; Masten, et al, 2009).

Considerations for Programming and Investment to Strengthen Child Resilience:

The resilience pathways and relationships among resilience dimensions identified in the ResilientChild: Mali Analytical Framework led to the following important recommendations for future child resilience research, and more important, for strategic programming and policy decisions that seek to strengthen development efforts to enhance child resilience in a way that maximizes return on investment and impact:

- Invest in parental support, wealth (basic household assets), household water and sanitation (improved source of drinking water), education services (access to and quality of), and social cohesion to improve child school attendance.
- Invest in parental support and education services (access to and quality of) to improve outcomes for child psychological wellbeing.
- Integrate programming where feasible to achieve desired child resilience outcomes.

Considerations for Scale-Up and Replication of the ResilientChild Analytical Framework:

- Include specific resilience dimension scales and indices in national-level surveys to provide greater power of analysis and specificity of findings for future resilience pathway modeling efforts.
- Test pathway models of resilience with geographically representative samples that allow for statistical, sub-group comparisons to ensure consideration of contextual differences and better inform programmatic and policy recommendations.

The ResilientChild: Mali Analytical Framework provides a sound basis for ongoing measurement and knowledge creation in child resilience research, providing decision makers with the information needed to improve targeted programming and ultimately achieve the desired outcome of more resilient children, families, and communities in Mali and beyond.



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Table I.1. Emotional skills scale

	Please indicate to what extent you agree or disagree with the following statements:
Emotional skills α=0.85	CHILD feels badly when someone else feels hurt CHILD happy when someone else succeeds CHILD understands how those close to him/her feel It is important to CHILD to understand how others feel

Table I.2. Moods and feelings index (depressive symptoms)

	Please indicate to what extent you agree or disagree with the following statements:
Moods and Feelings α=0.87	CHILD feels miserable or unhappy CHILD doesn't take pleasure in anything CHILD is so tired that he/she doesn't participate in anything CHILD feels useless CHILD cries a lot CHILD struggles to accurately reflect or concentrate CHILD struggles to accurately reflect or concentrate CHILD hates him/herself CHILD feels that he/she is a bad person CHILD feels alone CHILD feels unloved CHILD thinks that he/she can never be as good as other children CHILD thinks that he/she does everything wrong

Table I.3. Parental support index

	Please indicate how often the following occur:
Parental support α=0.89	I tell stories to CHILD I show CHILD that I am proud of him/her I show interest in CHILD's activities I listen to CHILD when he/she talks CHILD can count on me when he/she needs me CHILD is comfortable sharing his/her thoughts and feelings with me Even if CHILD finds that I am disappointed, he/she can come to me to help solve his/her problems You ask CHILD questions about his/her day You ask CHILD questions about his/her friends You ask CHILD questions about his/her forends You ask CHILD questions about his/her household chores You ask CHILD questions about his/her work CHILD asks me for advice when he/she must make important decisions You talk with CHILD about his/her projects for the future You congratulate CHILD whenhe/she behaves well

Annex I: Description of resilience dimension scales

Child Development

Emotional Skills

Emotional skills in children was conceptualized through a series of four questions adapted from the Childtrends.org indicators project. Respondents were asked to indicate how the child in the household responds to others. The composite score for this scale was created by averaging the four items in Table 1.1. For this scale, a higher score indicated greater emotional skills in children. The Cronbach's Alpha for this scale was 0.85.

Moods and Feelings

An index was developed to measure child moods and feelings. These questions were used in the Moods and Feelings Questionnaire (1995). The questions included in the index can be found below in Table 1.2. The composite score for this index was created by adding the 12 items, with a higher score indicating fewer issues in regulating mood and feelings in children. The Cronbach's Alpha for this scale was 0.87.

Parental Support

Parental support was conceptualized through questions regarding parent-child relationships and warmth towards the child. These questions were adapted from Childtrends.org. The composite score for this scale was created by averaging the 14 items in Table I.3. For this scale, a higher score indicated greater parental support. The Cronbach's Alpha for this scale was 0.89.

Parental Discipline

Parental discipline was measured through questions regarding behaviors and attitudes towards child discipline and were adapted from the Multi-Indicator Cluster Survey (MICS). The composite score for this scale was created by averaging the eight items in Table 1.4. For this scale, a higher score indicated stronger approaches towards child discipline. The Cronbach's Alpha for this scale was 0.74.

Table I.4. Parental discipline index

	Please indicate how often the following occur:
Parental Discipline α=0.74	I talk with CHILD about his/her mistakes I advise CHILD on how to act appropriately when he/she makes a mistake I teach CHILD to think about the consequences of his/her actions When CHILD misbehaves, you explain why it is misbehavior You talk about abuse/mistreatment with CHILD You take away privileges or forbid something that CHILD likes to do You don't allow CHILD to leave the house You explain to CHILD why his/her behavior is unacceptable

Household functioning

Household hunger

Hunger was measured through six questions about whether respondents or anyone in their households experienced any problems with food in the past 30 days. These questions were adapted from MICS. The composite score was created by averaging the six items in Table 1.5. For this scale, a higher score indicated greater risks of hunger. The Cronbach's Alpha for this scale was 0.84.

Wealth

Wealth was measured through questions about commodities in the household and the principal material used for the home's floor and roof in Table I.6. These questions are commonly used to create wealth indices and are used in the MICS and Demographic and Health Survey (DHS). The composite score was created by adding responses to the three items. For this scale, a higher score indicated greater wealth. The Cronbach's Alpha for this scale was 0.71.

Table I.6. Wealth scale

	In your home, do you have:	Principal material of the roof:
	A radio	No roof
	A television	Thatch/palm leaf
	A refrigerator	Herbs/straw
	A CD/DVD/VHS player	Wood
	A gas heater	Mats
	A (some) table(s)	Palms/bamboo
	A (some) chair(s)	Wooden plank
	A (some) light(s)	Cardboard
	A (some) dresser(s)	Sheet (metal)
	A computer	Wood
Wealth	An internet connection	Zinc/cement fiber
α=0.71	An air conditioner	Tiles
	A fan	Cement/concrete
	A satellite dish	Shingle
	A generator	
	Principal material of the floor:	
	Soil/sand	
	Dung	
	Stone	
	Mats	
	Tile	
	Cement	
	Carpet	

Tropical Livestock Units (TLU)

Respondents were asked a series of questions about ownership of livestock (e.g., cattle, geese, pigs) as asked in the MICS (Table I.7). The standardized TLU weights were used to create a scale of livestock ownership for comparison of each type. The types of ownership were then added to create an index. The standard conversion factor for each type of livestock is: cattle = 0.7, sheep = 0.1, goats = 0.1, pigs = 0.2, chickens = 0.01. For this index, a higher score indicated higher levels of ownership.

Household water and sanitation

Questions about household water and sanitation facilities (improved or rudimentary) were used for the index, adapted from the MICS and DHS. A composite score was created by adding the six items presented in Table 1.8. A higher score indicates households have improved as opposed to rudimentary water and sanitation facilities.

Table I.5. Household hunger scale

Table I.7. Tropical Livestock Units

	Of the following animals, how many does your household possess:
	Cattle, dairy cows, or bulls
	Horses, donkeys, or mules
Tropical	Sheep
Livestock Units	Poultry
	Pigs
	Camel
	Guinea fowl/duck/turkey/geese

Table I.8. Household water and sanitation index

Household Water and Sanitation Facilities	How do you access water for cooking/cleaning in the home? What is the source of drinking water in your home? If you do not have a source of water in your home, how long does the trip to procure water (return trip) take? What type of toilet does your household use? Do you share this toilet facility with other households? How many households use this toilet facility?

Table I.9. Types of assistance index

Has your household received financial assistance in the past 12 months?
Has your household received educational assistance in the past 12 months?
Has your household received health assistance in the past 12 months?
Has your household received assistance with construction in the past 12 months?
Has your household received assistance with household products in the past 12 months?
Has your household received assistance in the past 12 months?
Has your household received assistance in the past 12 months?
Has your household received assistance in the form of tools in the past 12 months?
Has your household received assistance in the form of cattle or livestock in the past 12 months?
Has your household received food assistance in the past 12 months?

Table I.10. Access to basic services index

Access to Community Services	Do the children in your community have access to the following services and infrastructure: School Health services Nutrition services or support Psycho-social services Potable water Electricity Safe play areas Safe roads/paths
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Table I.11. Community participation scale

	Have you ever volunteered or given your time to an organization in the past month?
	Are you currently involved in any of the following community initiatives/organizations:
	Religious groups
	Savings groups/bank
	Sports/cultural group
Community	School association
Participation	Religious organization
α=0.81	Environmental organization
	Professional/business association
	Civil society
	Political party/group
	Community association
	In the past 12 months, have you joined other community members to address a
	problem or common issue?

Assistance Received

Respondents were asked a series of questions regarding about types of assistance they had received over the past 12 months, including financial aid, in-kind assistance, or services offered (Table I.9). These questions are used in the MICS. The composite score was created by adding the nine items. For this index, a higher score indicated more assistance.

Community Resources

Access to Basic Services

Community service access was conceptualized through a series of eight questions about the availability of particular services and facilities (Table I.10), as administered in the MICS. The score for this index was created as a cumulative count (from 1 to 8) of items identified as available for children. For this index, a higher score indicated access to more facilities and services.

Community participation

Table 1.11 shows the questions included in the community participation scale, adapted from "Measuring Social Capital and Mental Health in Vietnam: A Validation Study (http://www.younglives.org.uk/content/measuring-social-capital-and-mental-health-vietnam-validity-study). The composite score was created by adding the three items. For this scale, a higher score indicated greater community participation. The Cronbach's Alpha for this scale was 0.81.

Social Cohesion

Social cohesion was conceptualized through a series of seven questions about respondent relationships with neighbors and the community (Table 1.12), as administered in the MICS. The composite score for this scale was created by averaging the seven items. For this scale, a higher score indicated greater social cohesion. The Cronbach's Alpha for this scale was 0.83.

Table I.12. Social cohesion scale

Social Cohesion α=0.83For each of these statements, please tell me if you: Strongly agree, agree, neither agree nor disagree, disagree, strongly disagreeI ask my immediate neighbor to watch my house when I am away (If you have children) I have enough confidence in my immediate neighbor to let him/her take care of them for more than an hour, if necessary People in this community can be trusted People here are always willing to help their neighbors I turn to my neighbors for help or advice When a crime or problem arises, I cooperate with my neighbors to find a solution If I were in trouble, you could rely on friends or relatives who would be willing to help me.
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Security

A security scale was developed to measure whether fear of crime prevents respondents from doing activities in their community. These questions (Table 1.13) were adapted from the MICS. The composite score for this scale was created by adding the 10 items, with a higher score indicating a higher level of security. The Cronbach's Alpha for this index was 0.92.

Governance

Governance was measured through three questions about whether local government pays attention to respondents and the extent to which respondents think decisions of the local, regional, and central government reflect their priorities (Table I.14). These questions were adapted from the MICS. The composite score was created by averaging the three items. For this scale, a higher score indicated more favorable views towards governance. The Cronbach's Alpha for this scale was 0.80.

Stressors

Respondents were asked a series of questions about stress to their household related to illness, violence, and conflict over the past 12 months (Table I.15). These questions were adapted from the standard MICS questions. The composite score was created by adding the 10 items. For this index, a higher score indicated greater stress to the household.

Shocks

Respondents were asked a series of questions about shocks to their households over the past 12 months. These questions were adapted from the standard MICS questions. Questions related to accidents, death, income, cost of living, and disasters (Table I.16). The composite score was created by adding the 15 items. For this index, a higher score indicated greater shocks to the household.

Table I.13. Security scale

Security α=0.92	Does the fear of crime/banditry prevent you from doing any of the following in your community: Use public transport Do errands on foot Walk around the village Go into open areas such as the forest/bush Let children play freely in the village Let children walk to school unaccompanied Let your livestock or animals into the fields Start a small business Go to fairs Travel outside of the village
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Table I.14. Governance scale

Governance α=0.80	Do you agree with the following statement: "The local government pays attention to me and my opinion"? To what extent do you think that the decisions of local/regional governments reflect your priorities? To what extent do you think that the decisions of central government reflect your priorities?
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Table I.15. Stressors index

Stressors	During the past 12 months, has your household experienced: Security concerns Chronic illness Crop/plant diseases Temporary illness A cattle disease Erratic rains
	Erratic rains Concerns about the lack of drinking water
	Concerns about a lack of food
	Concerns related to living in a flood zone
	Displacement due to conflict

Table I.16. Shocks index

Shocks	Over the past 12 months, has your household experienced: Any accident that caused serious injuries needing medical attention The death of an adult Any other death The death of the head of household A sudden or abrupt loss/decrease of income A storm A fire A flood A cricket invasion A loss of employment An increase in food costs An increase in cost of supplies A drought Theft of resources Sudden insecurity
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Annex II: Description of rotated factor loadings

Rotated factor loadings were computed and analyzed for each of the resilience dimension scales found to be significantly associated with child school attendance. Principle Component Analysis was the extraction method.

Table II.1 lists the factor loadings for the two components of parental support. Component 1 captured level of comfort in communicating with children. Component 2 captured more active communication with children, such as spending time telling stories and asking questions about their daily activities.

Table II.2 lists the loadings on the three factors for the wealth dimension. Component 1 consists of basic items that are likely to be purchased when a household has more income, such as a refrigerator, air conditioner, or generator. Component 2 consists of basic items such as tables, chairs, house construction materials, and a radio. Component 3 includes higher-end "luxury" items such as CD/DVD/VHS players, gas heaters, and satellite dishes.

Table II.3 shows the rotated factor loadings for the social cohesion scale. Component 1 relates to general trust in the community and its support structures. Component 2 relates to willingness to trust neighbors with important people or assets for an extended period of time, possibly indicating more intimacy.

Table II.1. Rotated factor loadings for parental support

Plana ant	Component	
Element	1	2
I tell stories to my child	.483	.574
I show my child that I am proud of him/her	.806	.390
I show interest in my child's activities	.800	.418
I listen to my child when he/she talks	.866	.292
My child can count on me when he/she needs me	.849	.342
My child is comfortable sharing his/her thoughts and feelings with me	.791	.381
Even when my child finds that I am disappointed, he/she can come to me to help solve problems	.783	.356
I ask my child questions about his/her day	.397	.802
I ask my child questions about his/her friends	.333	.804
I ask my child questions about his/her household chores	.237	.841
I ask my child questions about his/her work	.406	.797
My child asks me for advice when he/she makes important decisions	.584	.616
I talk with my child about his/her projects for the future	.523	.635
I congratulate my child when he/she behaves well	.761	.468

Table II.2. Rotated factor loadings for wealth

Flowsant	Component		
Element	1	2	3
Radio ownership	104	.409	.172
Television ownership	.098	.553	.362
Refrigerator ownership	.569	.043	.280
CD/DVD/VHS player ownership	.300	.352	.453
Gas heater ownership	.062	018	.560
Table ownership	019	.696	.243
Chair ownership	.026	.667	.002
Light source ownership	022	.433	.396
Dresser ownership	.225	.198	.615
Internet connection	.588	019	.150
Air conditioner ownership	.739	.019	139
Fan ownership	.580	.120	.417
Satellite dish ownership	.440	.156	.556
Generator ownership	.782	.062	.085
Principle material of house floor	.203	.525	063
Principle material of house roof	.165	.614	456

Table II.3 Rotated factor loadings for social cohesion

Flowsout	Component	
Element	1	2
l ask my neighbor to watch my house when l am away	.239	.906
(If you have children) I have enough confidence in my immediate neighbor to let them take care of my child for more than an hour	.228	.913
People in this community can be trusted	.526	.378
People around here are always willing to help their neighbors	.752	.225
I turn to my neighbors for help or advice	.738	.160
When a crime or problem arises, I cooperate with my neighbors to find a solution	.690	.162
If I were in trouble, I could rely on friends or relatives who would be willing to help me	.726	.199

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