

# Resilience as an Integrative, Measurable Concept for Humanitarian and Development Programming

Christopher B. Barrett\* and Joanna B. Upton<sup>i</sup>

**Keywords:** Resilience, development, poverty analysis, resilience measurement

\*Corresponding author: [chris.barrett@cornell.edu](mailto:chris.barrett@cornell.edu)

## Resilience in the humanitarian and development context

As recurring emergencies in low- and middle-income countries increasingly challenge international development and humanitarian agencies to reconsider how they simultaneously support both short-run recovery to adverse shocks and longer-run socioeconomic progress, many donor and operational agencies have gravitated to the concept of *resilience*. The concept of resilience potentially provides a framework for integrating programming and thinking around these two spheres, which had too often been treated quite separately. The emergent popularity of resilience as an integrative concept in the development and humanitarian communities is, however, quite recent. The watershed moment arguably came in 2011, when a global food price spike, widespread civil unrest in parts of sub-Saharan Africa and western Asia, severe drought in the Horn of Africa and the Sahel, and ongoing demands for recovery from the 2010 Haiti earthquake all challenged aid agency budgets and strategies. How best could aid agencies and their government and non-governmental organization (NGO) partners help current victims of natural disasters and violence to get on a sustainable pathway out of poverty, resilient to the myriad shocks and ongoing stressors that too often impede progress? Put differently, how could aid and operational agencies shock-proof continuous improvement in human well-being, especially in communities already experiencing intolerably high rates of poverty, malnutrition and other forms of severe deprivation?

Resilience has thus recently become a central feature of development and humanitarian programming. Yet, the development and humanitarian communities struggle with defining and measuring the concept. The United States Agency for International Development (USAID) defines resilience as “the ability of people, households, communities, countries and systems to mitigate, adapt to and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth” (REAL, 2018). Barrett and Constanas (2014, hereafter BC) conceptualize ‘development resilience’ as “the capacity over time of a person, household or other aggregate unit to avoid poverty in the face of various stressors and in the wake of myriad shocks. If and only if that capacity is and remains high over time, then the unit is resilient.” Two crucial features of the concept of resilience *for development* emerge from these two definitions (and there exist many others), in juxtaposition to more general academic definitions of resilience, for example the National Academy

---

<sup>i</sup> Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY, USA

Suggested citation: Barrett, C. B., & Upton, J. B. (2018). Resilience as an integrative, measurable concept for humanitarian and development programming. In Trump, B. D., Florin, M.-V., & Linkov, I. (Eds.). *IRGC resource guide on resilience (vol. 2): Domains of resilience for complex interconnected systems*. Lausanne, CH: EPFL International Risk Governance Center. Available on [irgc.epfl.ch](http://irgc.epfl.ch) and [irgc.org](http://irgc.org).

of Sciences': "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events" (NRC, 2012). First, in the development domain, the concept of resilience is explicitly normative. Because the central project of development is to improve human well-being among the under-resourced, merely stabilizing living standards around ex ante low levels, or accelerating recovery to an unacceptably low level does not advance these common goals. Within the international development community, resilience must reflect more than just recovery from (negative) disruption; it must expressly link recovery to acceptable living standards. Second, and relatedly, resilience as a concept must be applicable and decomposable from aggregate units to the micro level, or individual people and households. Resilience cannot be solely a community or system level property, because development and humanitarian objectives are rooted in individual human experience and human rights. In this view, the relation between micro-level measures and more aggregate ones is a matter of scale, although there may be separate processes operating at micro, meso or macro scales that reinforce one another across scales, much as is true for poverty (Barrett & Swallow, 2006).

Resilience is related to, but transcends, the concept of vulnerability. Both concepts emphasize risk exposure and the context-dependent shocks to which one might be exposed. But one might be vulnerable to an adverse shock – i.e., suffer significant losses – and yet highly resilient – i.e., the conditional likelihood of loss is acceptably low and/or the speed of recovery to an adequate standard of living, conditional on loss, is quick. Conversely, one might not be vulnerable and yet also not be resilient. For example, those who opt out of the labor market after extended, failed efforts to find work after losing a job may no longer be vulnerable to unwanted unemployment shocks due to business cycle downturns. One could hardly claim, however, that such a person is better off, in any meaningful sense of the concept, than an otherwise identical employed person who may now be vulnerable to lay off. Similarly, a homeless person may be less vulnerable to loss of property or life in an earthquake than a richer counterpart, but could hardly be deemed more resilient, so long as the resilience concept is rooted in normative standards of attaining an adequate level of well-being. Put differently, the absence of vulnerability to a shock from which one might or might not recover ought not to be sufficient for one to be classified 'resilient'. Both the ex ante normative state – one's standard of living, however measured – and the time path of standard of living following an adverse shock together define one's resilience.

Resilience must also be contextualized within the complex social-ecological systems (SES) in which poor populations commonly reside (Folke, Hahn, Olsson, & Norberg, 2005). System-level shocks can affect individual-level behaviors, which aggravate system-level disturbances (Barrett & Constanas, 2014). For example, drought shocks can lead herders to change the range over which they graze livestock, leading to initially-isolated resource conflict that quickly scales into ethnic violence, as has occurred repeatedly in east Africa (Little, McPeak, Barrett, & Kristjanson, 2008).

The concept of resilience can inform a meaningful resilience strategy, as opposed to just poverty reduction or risk management strategy, helping organizations structure their programming in keeping with this broader picture. Development is ultimately about how policies and programs improve well-being sustainably over time in the face of shocks and stressors.

## Resilience measurement

As the resilience concept has become central to development and humanitarian programming, the need to measure resilience has grown more urgent. At a minimum, one needs a resilience measure in order to evaluate whether or not ‘resilience building’ interventions indeed achieve their aim. As unsettled as the definition of resilience remains within the development and humanitarian communities, even less consensus exists around measurement methods.

In order to remain true to the theoretical grounding of the concept in the stochastic dynamics of individual (and collective) well-being, measurement of development resilience must include indicators of well-being outcomes, as well as measures of shocks and/or stressors that motivate a concern for resilience. A good measurement method must also attend to the distinction between *ex ante* (pre-shock) resilience capacities, and the time path of the well-being outcome variable(s) of interest *ex post* (post-shock) (Hoddinott, 2014). This necessarily demands longitudinal data, ideally at reasonably high (e.g., seasonal) frequency, with which to measure pre-shock exposure and capacities as well as the time path of post-shock recovery (Headey & Barrett, 2016).

The initial generation of methods, developed and advanced largely by the Food and Agriculture Organization of the United Nations (FAO), focused on developing a resilience index reflecting a diverse set of assets and livelihood activities thought to enhance one’s *ex ante* capacity to be resilient to particular shocks (Alinovi, Mane, & Romano, 2008; Alinovi, D’Errico, Mane, & Romano, 2010). The FAO method has been subsequently refined into a resilience capacity index that is popular among many European aid agencies and international agencies such as the United Nations Children’s Fund and the World Food Programme (d’Errico, Romano, & Pietrelli, 2018; d’Errico & Pietrelli, 2017). An alternative method, developed by the consulting firm TANGO and recently adopted by USAID and many US-based organizations, uses factor analysis as a data reduction method to define distinct absorptive, adaptive, and transformative capacity indices from a myriad of variables that they argue capture features of those capacities, including assets, human and social capital, livelihood activities, access to services, and psychosocial beliefs and characteristics (Smith & Frankenberger, 2018). These index methods have proved useful to agencies struggling to implement measurement methods for resilience programming. But they focus heavily on *ex ante* capacities, rather than on *ex post* recovery, and do not lend themselves well to impact evaluation since the indices are intended solely as explanatory variables. As such, they more help explain resilience than define or measure it. Yet as development agencies increasingly program explicitly to ‘build resilience’, the concept has *de facto* become a targeted outcome, even if it is conceptualized as purely a set of explanatory capacities. Toward that end, TANGO and USAID now also use a separate outcome measure to try to capture resilience, a simple indicator variable reflecting whether a household’s post-shock food security is greater than or equal to its pre-shock food security (Smith & Frankenberger, 2018, Sagara, 2018). That measure lacks a normative anchor, however, as one could fully recover to an unacceptably low standard and yet still be assessed as resilient.

Cissé and Barrett (2018, hereafter CB) offer a method that directly implements the BC conceptualization of development resilience as reflecting the time path of conditional probabilities of being poor, however measured. In the CB approach, well-being (or absence of poverty) can be operationalized as an outcome using any of a wide range of indicators familiar to poverty analysis: assets, expenditures, health status, income, literacy, or some combination of those, potentially captured in an index measure (Alkire et al., 2015). The CB method relies on longitudinal, individual-

level observations to capture both the underlying (and potentially nonlinear) dynamics of the system and the possible mediating effects of specific interventions on the effects of shocks on well-being. Early applications of the CB method have demonstrated its usefulness in rigorous evaluation of the impacts of resilience interventions, such as index insurance (Cissé & Ikegami, 2017) or livestock transfers (Phadera, Michelson, Winter-Nelson, & Goldsmith, 2018). McPeak and Little (2017) find that threshold-based resilience measures like CB significantly outperform alternative measures that define resilience as recovery to ex ante state. Most resilience measurement has been shock/stressor specific because most have been designed around ex ante capacities that are shock/stressor/setting specific. One of the virtues of the CB method is that it can accommodate shock/stressor-specific capacities as mediating variables while also allowing for a fully general representation of resilience to the full range of perils.

Knippenberg, Jensen and Conostas (2018) introduce an approach, developed in collaboration with Catholic Relief Services on a pilot project in Malawi, to measuring resilience as the non-persistence of shocks, which they label Measuring Indicators for Resilience Analysis (MIRA). MIRA uses high-frequency data to study the persistence of households' subjective reports of a range of adverse shocks they suffer, such as drought, flood, or illness. The method also allows for regression estimation of the relationship between estimated shock persistence and household attributes. Like the TANGO/USAID outcome measure, the focus of MIRA is on shock recovery without reference to the level of well-being to which one recovers.

### **Resilience to foster structural transformation**

With shocks seemingly increasing in intensity and frequency in low- and middle-income countries, the development and humanitarian communities are working energetically to embed the resilience concept into strategies to facilitate structural transformation. A central lesson of the related literature on the economics of poverty traps is that efforts to build resilience can conserve scarce resources, crowd in private investment, and help low-income populations accumulate productive assets and become secure in non-poor standards of living (Barrett, Carter & Chavas, 2018). So long as definitions of resilience remain normatively anchored in relation to living standards to which people routinely aspire, the risks of moral hazard, or the likelihood that resilience interventions inadvertently create adverse incentives for private investment, are relatively modest. Under very mild assumptions that people prefer better to worse living conditions and less to more downside risk exposure, they should routinely pursue strategies that reduce the conditional probability of adverse outcomes, i.e., that might reduce resilience. Indeed, in the face of poverty trap mechanisms associated with nonlinear well-being dynamics, resilience building activities may be more likely to crowd in than crowd out private responses that reinforce resilience (Barrett, Carter & Chavas, 2018). Such poverty trap mechanisms have been most clearly demonstrated in settings – like the Horn of Africa – where resilience strategy is increasingly central to development and humanitarian programming efforts.

The resilience lens adds value to conventional poverty analysis in multiple ways. First, resilience conceptualized in the BC way and operationalized using the CB method way can effectively distinguish between what Carter and May (2001) term stochastic versus structural poverty. Relatedly, by incorporating the underlying path dynamics of both standards of living and the key state variables describing the system in which people live, the BC approach and CB method allow for the potentially transitory nature of both favorable and unfavorable realizations of standards of

living. Development resilience analysis allowing accounting for (especially nonlinear) well-being dynamics and expanding analysis beyond the first moment of the conditional distributions of well-being outcomes, which matters for inference about program impacts (Phadera et al. 2018), for targeting of beneficiaries (Upton, Cissé, & Barrett, 2016; Watkins et al., 2017).

By facilitating integrative thinking and measurement around the myriad stressors and shocks confronting vulnerable populations, the resilience concept challenges the development and humanitarian communities to collaborate more, both in advancing better understanding of the complex dynamic systems in which poor people commonly reside and in building improved monitoring systems (Bené, Headey, Haddad, & von Grebmer, 2016). As BC explain, the closely coupled feedback between natural systems – e.g., fisheries, forests, rangelands – that may exhibit nonlinear dynamics and multiple stable states, and inter-temporal human decision-making that is limited by imperfect information, local financial market failures, sociocultural barriers, and other constraints, leads to complex dynamics beyond what analysts or practitioners in the development and humanitarian communities currently measure. Resilience, especially anchored in notions of capacities, emphasizes individual agency in ways that transcend the more passive condition too often implied in prior concepts of poverty and vulnerability. Programming aimed at building individuals', households', communities', and institutions' resilience against shocks as diverse as extreme weather events, market price shocks, and civil unrest, can help promote proactive collaboration not only among development and humanitarian agencies but between those agencies and target populations.

### Annotated bibliography

- Alinovi, L., Mane, E., & Romano, D. (2008). Towards the measurement of household resilience to food insecurity: applying a model to Palestinian household data. In R. Sibrian (Ed.), *Deriving food security information from national household budget surveys*. Rome: FAO. Along with Alinovi, D'Errico, Mane, and Romano (2010), one of the earliest efforts to measure resilience quantitatively in a development context. Launched FAO's resilience capacity index.
- Alinovi, L., D'Errico, M., Mane, E., & Romano, D. (2010). *Livelihoods strategies and household resilience to food insecurity: An empirical analysis to Kenya*. European Report on Development. Along with Alinovi, Mane, and Romano (2008), one of the earliest efforts to measure resilience quantitatively in a development context, using the FAO's resilience capacity index.
- Alkire, S., Roche, J. M., Ballon, P., Foster, J., Santos, M. E. & Seth, S. (2015). *Multidimensional poverty measurement and analysis*. Oxford: Oxford University Press. This book explains the Multidimensional Poverty Index, a popular, new measure of acute poverty, understood as a person's inability to meet minimum international standards in indicators related to the Millennium Development Goals and to core functionings.
- Barrett, C. B., Carter, M.R., & Chavas, J.-P. (Eds.). (2018). *The Economics of Poverty Traps*. Chicago: University of Chicago Press and National Bureau of Economic Research. A compilation of current theoretical and empirical studies explaining the mechanisms that can give rise to poverty traps. Includes studies that explicitly study resilience at individual and system level.
- Barrett, C. B. & Conostas, M. A. (2014). Toward a theory of resilience for international development applications. *Proceedings of the National Academy of Sciences*, 111(40), 14625-14630. Probably the most cited and influential of the recent academic papers on resilience as applied

to international development and humanitarian response. The basis for the Cissé and Barrett (2018) method of resilience estimation and measurement.

- Barrett, C.B. & Swallow, B. (2006). Fractal poverty traps. *World Development*, 34(1), 1-15. Lays out an informal theory of poverty traps defined by multiple stable states that exist simultaneously at multiple (micro, meso and/or macro) scale of analysis and are self-reinforcing through feedback effects. Lays a foundation for linking community- or national-level resilience to individual- or household-level resilience measures and the mechanisms underpinning resilience at different scales of analysis.
- Bené, C., Headey, D., Haddad, L., & von Grebmer, K. (2016). Is resilience a useful concept in the context of food security and nutrition programmes? Some conceptual and practical considerations. *Food Security*, 8(1), 123-138. An especially insightful discussion of concepts as they apply to food security programming in international development.
- Carter, M. & May, J. (2001). One kind of freedom: Poverty dynamics in post-apartheid South Africa. *World Development*, 29(12), 1987-2006. This paper was among the first to differentiate conceptually and empirically between stochastic poverty - a realized living standard below the poverty line when one's endowments of productive assets (and markets and technology access) who predict a non-poor living standard -- and structural poverty -- a living standard that falls predictably below the poverty line based on one's endowments.
- Cissé, J. D. & Barrett, C. B. (2018). Estimating development resilience: A conditional moments-based approach. *Journal of Development Economics*, 135, 272-284. Lays out an econometric method to implement empirically the Barrett & Conostas (2014) approach to development resilience - as the time sequence of conditional probabilities of falling beneath some normative standard of living measure. This can be estimated from panel data at the level of individuals or households and aggregated into community-and-population-level measures akin to national and sub-group poverty measures
- Cissé, J. D., & Ikegami, M. (2017). Does insurance improve resilience? Measuring the impact of index-based livestock insurance on development resilience in northern Kenya. Cornell University working paper. Perhaps the first use of the Cissé and Barrett (2018) resilience estimation method for impact evaluation.
- Conostas, M., Frankenberger, T., & Hoddinott, J. (2014). *Resilience measurement principles: Toward an agenda for measurement design*. Resilience Measurement Technical Working Group. Rome: FAO. This report presents findings from the Resilience Measurement Technical Working group, a mixed group of scholars and practitioners jointly convened by the Food and Agriculture Organization and the World Food Programme, on unifying principles for the measurement of resilience for development applications.
- d'Errico, M., Romano, D., & Pietrelli, R. (2018). Household resilience to food insecurity: Evidence from Tanzania and Uganda. *Food Security*, 10(4), 1033-1054. A recent evaluation applying the Resilience Capacity Index to examine the determinants of resilience capacity, and its importance for food security outcomes after shocks.
- d'Errico, M., & Pietrelli, R. (2017). Resilience and child malnutrition in Mali. *Food Security*, 9(2), 355-370. Introduces the Resilience Capacity Index (RCI) as a means of estimating the impact of resilience capacity on, in this case, child malnutrition in Mali.
- Folke, C., Hahn, T., Olsson, P., & Norberg, J. (2005). Adaptive governance of social-ecological systems. *Annual Review of Environment and Resources*, 30, 441-473. One of the seminal social-ecological systems (SES) papers on resilience. It places a heavy emphasis on the complex social dynamics that underpin resilience, defined as the capacity of SES "to absorb

disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identify, and feedbacks," a popular systems-grounded definition.

- Headey, D., & Barrett, C. B. (2015). Opinion: Measuring development resilience in the world's poorest countries. *Proceedings of the National Academy of Sciences*, 112(37), 11423-11425. Makes the case for the need for targeted, high frequency, longitudinal data collection at the micro scale of individuals and households so as to generate reliable indicators of resilience to inform humanitarian and development programming.
- Hoddinott, J. (2014). Looking at development through a resilience lens. In S. Fan, R. Pandya-Lorch, & S. Yosef (Eds), *Resilience for food and nutrition security*. Washington: International Food Policy Research Institute. A short, clear explanation of the concept of resilience as it applies to development and humanitarian programming, with brief descriptions of implications for measurement and policy.
- Knippenberg, E., Jensen, N., & Constanas, M. (2018). Resilience, Shocks, and the Dynamics of Food Insecurity: Evidence from Malawi. Cornell University working paper. Introduces the MIRA method and applies it to original, high frequency data collected in rural Malawi.
- Little, P. D., McPeak, J., Barrett, C. B., & Kristjanson, P. (2008). Challenging orthodoxies: understanding poverty in pastoral areas of East Africa. *Development and Change*, 39(4), 587-611. Discusses the interrelationship among climate shocks, conflict, drought and vulnerability among pastoral and agro-pastoral populations in northern Kenya and southern Ethiopia.
- McPeak, J.G., & Little, P.D. (2017). Applying the concept of resilience to pastoralist household data. *Pastoralism*, 7(14). This paper compares multiple resilience measurement methods using household-level panel data from northern Kenya and southern Ethiopia.
- National Research Council (2012). *Disaster resilience: A national imperative*. Washington: The National Academies Press. The National Academy of Sciences' description of the state of knowledge about resilience to hazards and disasters, framed around national resilience in the United States, focused on infrastructure and systems-level assessments and measurement.
- Phadera, L., Michelson, H., Winter-Nelson, A., & Goldsmith, P. (2018). Do asset transfers build household development resilience? University of Illinois working paper. This paper is among the first applications of the Cissé and Barrett (2018) method for impact assessment. They apply this to an asset transfer program in Zambia run by Heifer International.
- Resilience Evaluation, Analysis and Learning (REAL) Consortium (2018). *Resilience Measurement Practical Guidance Note Series*. Retrieved from <https://www.fsnnetwork.org/resilience-measurement-practical-guidance-series-overview>. This series of practical guides explains the USAID definition of resilience and offers practical guidance to practitioners who need to incorporate resilience measurement into program assessment, design, learning, monitoring and evaluation.
- Sagara, B. (2018). Resilience Measurement Practical Guidance Note Series 4: Resilience Analysis. Produced by Mercy Corps as part of the Resilience Evaluation, Analysis and Learning (REAL) Associate Award. Retrieved from [https://www.fsnnetwork.org/sites/default/files/GN04\\_Resilience%20Analysis\\_Final.pdf](https://www.fsnnetwork.org/sites/default/files/GN04_Resilience%20Analysis_Final.pdf). This is one note within the REAL guidance series produced for USAID.
- Smith, L.C., & Frankenberger, T.R. (2018). Does resilience capacity reduce the negative impact of shocks on household food security? Evidence from the 2014 floods in northern Bangladesh. *World Development*, 102, 358-376. The first peer-reviewed publication illustrating the TANGO method that uses factor analysis methods to reduce a broad range of specific assets and activities into indices representing three specific to three dimensions of resilience capacity: absorptive, adaptive and transformative.

Upton, J. B., Cisse, J. D., & Barrett, C. B. (2016). Food security as resilience: Reconciling definition and measurement. *Agricultural Economics*, 47(S1), 134-147. This paper demonstrates how the Cissé and Barrett (2018) resilience estimation method structurally actualizes the axioms implied by the internationally agreed definition of food security and its dimensions--availability, access, use, and stability--when applied using a food security indicator (such as dietary diversity or child health) as an outcome of interest.

Watkins, B., Nussbaumer, E., Upton, J., Campion, A., Riely, F., & Foster, L. (2017). *Phase II Famine Early Warning Systems Network Resilience Measurement Activity, Phase II: Methodology Report*. Washington, D.C.: USAID. This is a methodological report undertaken through a Kimetrica and Cornell collaboration, that utilizes available Living Standards Measurement Survey - Integrated Survey on Agriculture nationally representative data (collected in collaboration with the World Bank) to apply an extension of the Cissé and Barrett (2018) method in Ethiopia and Niger. The paper demonstrates advantages of the resilience method, over cross-sectional well-being measurement, for targeting of humanitarian resources.