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The Index of Vulnerability: An anthropological method linking social-ecological systems to mental and physical health outcomes



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ABSTRACT

Researchers need measures of vulnerability that are grounded in explicit theoretical and conceptual frameworks, that are sensitive to local contexts, and that are easy to collect. This paper presents the Index of Vulnerability (IoV), a quantitative yet anthropologically-informed method connecting social-ecological systems to mental and physical health outcomes. The IoV combines measures of five life domains; food insecurity, water insecurity, access to healthcare, social support, and social status. Scores on this index increase for each life domain where the individual falls into a “high risk” category. Thus, individuals with the highest IoV scores are those who are at risk across multiple life domains. This approach makes the IoV malleable to local contexts, as scholars can choose which measure of each life domain is most appropriate for their study population. An anthropological study conducted among 225 Awajún adults living in the Peruvian Amazon from March to November of 2013 showed that men with higher IoV scores had significantly lower summary fat skinfolds, lower triglyceride levels, and a greater probability of reporting moderate to severe somatic symptoms and poor perceived health. Awajún women with higher IoV scores had significantly elevated perceived stress levels and a greater probability of reporting poor perceived health and moderate to severe somatic and depressive symptoms. Importantly, comparing the IoV to its constituent parts shows that it predicts a wider range of mental and physical health outcomes than any of the life domains alone. The IoV is presented here in relation to the broader political-economic and cultural context of the Awajún, forwarding a *critical biocultural approach* within anthropology, and demonstrating the IoV’s utility for other scholars and practitioners.

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1. Introduction

We live in an era of rapidly increasing ecological and social change (Fischer-Kowalski and Haberl, 2007), where unprecedented resource exploitation is creating biological and cultural extinctions (Maffi, 2001). An issue of significant anthropological interest is to understand *how* changes in our social-ecological systems, defined as ecological systems intricately tied to one or more social systems (Anderies et al., 2004), relate to human health and wellbeing (McDade and Nyberg, 2010). The concept of vulnerability has potential to shed light on these issues. So in 2013, nine months of anthropological research was conducted in four Awajún communities in the Peruvian Amazon to examine how recent ecosocial changes have created vulnerability to poor health outcomes.

Historically, Awajún individuals lived in widely dispersed households, practicing small-scale subsistence farming, hunting, and fishing. However, in the 1960s and 70s, construction of a highway, government-supported colonization, and the activities of Evangelical missionaries sparked major lifestyle changes in Awajún communities (Greene, 2009). Jorge, an Awajún teacher described this transition saying:

Before, all the people understood to conserve the plants, animals, and fish. That’s how they increased before. But now the people don’t understand. They hunt for themselves ... no more. Before it was not like that, before we shared. Now everything depends on money. If you don’t work, you don’t eat. The Awajún are going to change. They are going to lose ... they are going to lose their culture. And it will be different. It will be total integration.

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The objective of this article is to use a *critical biocultural*

approach to examine how the integration Jorge speaks of has created vulnerability to poor health among the Awajún. A critical biocultural approach in anthropology is a theoretical perspective that examines how biocultural factors intersect to affect health and wellbeing and combines rigorous, standardized methodologies with descriptions of the ways that larger political-economic contexts relate to on-the-ground realities (Leatherman and Goodman, 2011).

On the quantitative side, this study details how the Index of Vulnerability (IoV), a novel, multi-dimensional measure of stressor exposure was developed. This involved combining ethnographic evidence from the 2013 study among the Awajún with empirical studies to demonstrate why the domains of food insecurity, water insecurity, access to healthcare, social support, and social status are relevant to operationalizing vulnerability in this context. Details on how the IoV was constructed using a “risk-based approach” are then discussed to demonstrate its utility in contexts outside of the Amazon. Finally, a regression analysis provides evidence for the power of the IoV in predicting health outcomes among a sample of Awajún men and women.

1.1. Vulnerability

Reviews of the concept of vulnerability (see Alwang et al., 2001; Adger, 2006) show that there are myriad definitions and approaches to measuring vulnerability that differ based on epistemological position and research objectives. These include a focus on entitlement failures (Sen, 1981), assets (Moser, 1998), livelihood strategies (Bohle, 2007; Baro and Deubel, 2006), and climate change (reviewed in Füssel and Klein, 2006). With such a diversity of uses, it is important to be clear on three issues. First, what theoretical frameworks are central to the researchers' perspective? Second, what is the hypothesized 'outcome' that a person or population is vulnerable to (Ellis, 2003)? And third, what are the legitimate potential measures of vulnerability that fit with the chosen approach and outcome (Adger, 2006)?

In reviewing the traditions of vulnerability research, Adger (2006) concluded that the most cutting-edge approaches emphasize multiple stressors and pathways in creating susceptibility to harm, powerlessness, and marginality. A characterization, rather than a definition, of vulnerability that lends visceral authenticity to this concept is the idea of “living on the edge” as the result of the confluence of multiple stressors. This graphic image “evokes the sense of a small push sending a person or people over the edge” (Ellis, 2003; 5) and articulates well with anthropological concepts such as a “space of vulnerability” (Leatherman, 2005), “syndemics” (Singer and Clair, 2003), the “matrix of domination” (Collins, 2002), and “structural violence” (Farmer et al., 2004), which suggest that existing along the social peripheries yields multiple insults and the greatest risk for poor outcomes.

What outcomes and level of analysis are we referring to? Vulnerability operates at different degrees of aggregation (Ellis, 2003) and can be analyzed on multiple levels with differing outcomes (Baro and Deubel, 2006). For example, the “Environmental Vulnerability Index” operates on a country-wide basis to predict sustainable development in developing countries (Kaly and Pratt, 2000). The “Social Vulnerability Index” is used on a state level for disaster management (Cutter et al., 2003) and the “Vulnerability Index” is based on individual level health information to inform housing decisions for the homeless (Cronley et al., 2013). The theoretical lens employed here is critical biocultural approach, which focuses on human health and wellbeing as the primary outcome of interest and looks to the broader political-economic, social, and ecological context as the source of structural inequalities that lead to disparities in *individual health* (Leatherman

and Goodman, 2011).

Therefore, the last preliminary question to answer is, what are the potential measures of vulnerability that are applicable to this theoretical approach and selected outcome? In the following section, data from empirical studies is combined with observations from ethnographic field work in Awajún communities to suggest that the life domains of food insecurity, water insecurity, access to healthcare, social support, and social status are the “legitimate potential measures” (Adger, 2006; 273) of vulnerability to poor health outcomes in this context and beyond.

1.2. Life domains

There are five domains of life that are significantly influenced by changes in social-ecological systems associated with globalized capitalism, are theoretically relevant to the concept of vulnerability, and were practically relevant to the field study that is the subject of this paper.

Food insecurity is defined as limited or uncertain availability of nutritionally adequate and safe food (Whitaker et al., 2006). It is intricately tied to the process of globalization as foods from hunting, fishing, and small-scale agriculture are being diminished by deforestation and other extractive activities aimed at producing commodities for sale on the global market (Aide and Grau, 2004). Yet access to healthy, non-local foods remains limited for many people living in rural areas (Kaufman, 1999).

In research conducted in the Awajún communities of Shushug, Mente, Pagki and Boca de Lobo in 2013, community members reported that previously, wild game and fish were abundant. Rodrigo, a community leader stated, “We used to cultivate the plants and live with sufficient food. But now ... we sell, eat little, and buy food from the market.” Raul, an Awajún teacher discussed the causes of this transition:

About fifty years ago, in our zone, there was an abundance of flora and fauna, which allowed my ancestors to live in a manner with sufficient resources. There were wild animals and fish in the streams. There were sufficient palms to create houses and wood for construction that now we cannot find. This then is a large change in comparison to how we live now. What is the motive of this change?

The entrance of the highway, in the marginal zone, has greatly influenced it. With the arrival of the highway came the arrival of shotguns, dynamite, and *tarafas* (fishing nets) as we call them. There were many things that my countrymen bought and utilized, like the shotgun that produced loud sounds. *Ruidoso* (noisy). In this manner, the animals were chased away. Also, the use of dynamite in the streams, which we didn't use in the past, these products destroyed the habitats of the fish. Understand? So that now, we don't have sufficient fish. There are no fish in the rivers. All of these factors led to the disappearance of species.

Raul continued to speak about shifts in subsistence strategies, stating that while his grandparents planted a variety of edibles in their gardens, community members currently focus on growing plantains and cacao for sale on the market. Because “now without money you cannot live.”

The stresses of market integration and a new sense of food insecurity have repercussions. Merly, a young mother, stated, “I get headaches. A lot of worrying. Sometimes I cannot sleep from thinking a lot, right? And there it comes to me. Sometimes I think, will we have food for my children?” Indeed, food insecurity is associated with an increased risk for poor reported physical health,

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