Place-Based Assessment of Intersection of Biophysical and Social Vulnerability to Flooding in Accra, Ghana

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ABSTRACT

The relationship between flood hazards and social vulnerability is firmly on the intellectual agenda of geographers in Ghana. In an attempt to theorize and empirically examine this relationship, scholars have commonly followed a one-sided methodological strand. In this article, a triple-helix approach that relies on the application of social vulnerability index; mapping potential flood hazard zones; and examining degree of coincidence between flood hazards and social vulnerability, is used. Situating the analysis within Hazards-of-Place Model of Vulnerability, the study identifies spatial disparities in biophysical and social vulnerability within the City. It emerged that communities in the Ashiedu Keteke sub-metro were the most vulnerable based on the hazards-of-place model. Significantly, while flood risk awareness was very high among community members, the perception of flood risk management was poor. The study argues that understanding place-based vulnerability is crucial in mitigating the effect of hazards and building resilient communities.

KEYWORDS

Accra, Biophysical Vulnerability, Flood Risk, Ghana, Hazards-of-Place, Place-Based, Social Vulnerability

INTRODUCTION

Recent geographical debates on Ghana's disaster profile shows a connection between anthropogenic factors and disaster severity. For instance, Ghana's National Disaster Management Organization - NADMO (2017) recognizes road traffic accidents and inter-tribal conflicts as claiming more lives (usually over 3000) per annum than deaths from all-natural disasters put together. This notwithstanding, counter arguments dominating the disaster literature posit that the lethal reputation of natural disasters in Ghana can be much more monumental but mostly, they go unnoticed. Arguments reinforcing the devastating effects of natural disasters often cite how perennial flooding

over the past decades have claimed several lives and destroyed infrastructure and property than any other form of disasters (Table 1).

The main objective of this paper is to contribute to existing literature by taking a deeper look at how the intersection of geophysical events and social vulnerability amplify or attenuate the impact of floods in Accra. Specifically, the paper determines the degree of coincidence between flood hazard and social vulnerability, and analyzes the awareness and perception of residents of the identified sub-metro on flood risk.

Framing Flood Hazards Through Hazards-of-Place Model of Vulnerability

The classic approaches that have influenced hazards studies in geography are the behavioral, structural, and place-based approaches. The behavioral approach understands the impact of disasters as a function of exposure to hazardous events and sensitivity of the entity exposed (White and Haas, 1975; Kates, 1996; Burton et al, 1993; Smith and Petley, 2009). Kates (1996) developed the idea of occupants' understanding of hazard characteristics and response options as key in both maximizing the impact of hazards management programs and maximizing the number of alternatives available to the occupants themselves. The argument is that a comprehensive flood management program should integrate physical control of floods with the recognition of the role of human behavior in exacerbating hazards. This approach has been criticized for refusing to take into account how social structures and institutions shape differential exposure and consequences of disasters (Jones, 2004).

The structural approach focuses on equity and see hazardous events as triggers of deeply rooted problems within societies (Blaikie et al, 1994; Watts, 1983; Susman et al, 1983; Smith and Petley, 2009). The concept of vulnerability is understood based on Sen's entitlement theory (that famine results from lack of access to, or inability to trade or labor for food). For example, Blaikie et al (1994) established the connections between the different phases of vulnerability with the pressure-release model and also put forth an "access model" which takes the household as the level of action. The Pressure and Release (PAR) model and "access model" have been developed to support research within this school of thought.

The place-based approach is a spatially-centered approach for analyzing how hazards intersects with social vulnerability to produce risks or disasters. Vulnerability is interpreted as a function of the position people occupy in both the physical and social systems. Thus, vulnerability entails degree of proximity to hazards and capacity to respond to the threat posed by the hazard (Cutter et al., 2008; Jones 2004; Cutter et al., 2003; Wu et al., 2002; Odeh, 2002; Cutter et al., 2000; Mileti, 1999; Mitchell, 1999; Clark et al., 1998). The place-based approach is supported by the Hazards-of-Place model of vulnerability (Figure 1). Flood risk is the likelihood of the event occurring and includes the potential source of the event, the impact of the event, and an estimate of the frequency of occurrence of the event (Cutter et al, 2000). Flood risk is either amplified or attenuated by a geographic filter as well as the social fabric of the place. The social fabric includes socio-demographic characteristics, perception of and experience with floods, and overall capacity to respond to floods (Cutter et al., 2000). According

Table 1. Select incidence of flooding in Accra

Date	Death Toll	People Affected
May, 1995	145	700,000
September, 1999	52	324,602
August, 2007	56	332,600
October, 2010	45	-
June, 2015	159	-

Source: Okyere et al., 2012; EM-DAT, 2015; Asumadu-Sarkodie et al., 2015

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