



Climate change through a gendered lens: Examining livestock holder food security



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ABSTRACT

Livestock holders experience increased food insecurity because of climate change. We argue that development programs, public health specialists, and practitioners must critically examine gendered impacts of climate change to improve food security of livestock producers. This review illustrates the differential experiences of men and women and how vulnerability, adaptive capacity, exposure and sensitivity to climatic stimuli are gendered in distinct ways between and among livestock holding communities. We propose a gendered conceptual framework for understanding the impact of climate change on food security among livestock holders, which highlights potential pathways of vulnerability and points of intervention to consider in global health strategies for improving household food security.

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1. Introduction

Climate change is a socioeconomic and environmental problem that receives attention for its impact on global food security. Climate-change related risks to livestock-based livelihoods include decreases in crop yields and crop failure, livestock loss, increased water scarcity, and destruction of other productive assets (see [FAO, 2008](#)). This paper focuses on the nexus of gender, livestock production, and food security.

Livestock systems are rapidly changing. Dynamic parts of the agricultural economy, especially in developing nations where demand for animal products continues to increase. Globally, more than 60 percent of rural households keep livestock ([FAO, 2009a](#)); smallholder livestock production in many developing countries provides income, food, fuel, building materials, draft power, and fertilizer for the general population. As with other smallholder

agricultural systems, livestock contributions to sustainable livelihoods, food security, and nutrition have become increasingly unpredictable with accelerations in climate change ([Morton, 2007](#)). Much like crop and aquaculture systems, livestock systems are subject to risk from instability in weather and damage from extreme events such as heat stress, drought, and flooding ([Jones and Thornton, 2009](#)). There is limited research into the direct effects of climate change across diverse livestock production systems, despite similarities in smallholder livelihoods and productivity risks.

Extensive research on gender, in regards to food security or climate change, suggests that pre-existing social stratifications exacerbate the negative impacts of climate change on food security ([Weiler et al., 2014](#)). The relative dearth of research on how climate change influences dynamics between livestock production, gender relations, and food security calls for conceptual frameworks to improve our understanding of the mechanisms underlying effective adaptations. This review examines how gender influences climate related vulnerability of food security among livestock holders. By applying a gendered lens to an existing framework, we link climate change to food security and highlight gendered pathways of vulnerability. By identifying key points of

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intersection between gender and vulnerability, practitioners can use the framework to promote appropriate climate change adaptation activities in international research and development initiatives.

2. Application of cross-cutting terms and conceptualizing relationships

We provide working definitions for the following terms to facilitate cross-disciplinary use and application of this conceptual framework.

- **Adaptation:** Adjustment or preparation of natural/ human systems to a new/changing environment in order to moderate harm or exploit beneficial opportunities (EPA, 2013).
- **Climate change:** Significant changes in the measures of climate lasting for an extended period of time, including temperature, precipitation, or wind patterns that occur over several decades or longer in a given geographic area (EPA, 2013).
- **Gender:** The socially constructed norms, roles, and behaviors for men and women in a society. Gender determines social expectations for men and women, as well as access to resources. This is distinct from the concept of sex, which refers to the biological and physiological characteristics (WHO, 2013).
- **Livestock:** Any domestic or domesticated animal–bovine (including buffalo and bison), ovine, porcine, caprine, equine, poultry and bees raised for food or in the production of food. Does not include wild animals captured from hunting or fishing (FAO, 2001).
- **Livestock Holder:** A member of a community that incorporates livestock rearing as a necessary component to their livelihood. We use this concept broadly to include pastoral populations, farming and communities who own and manage livestock.
- **Malnutrition:** A broad term for nutritional status that includes both under-nutrition and over-nutrition. Under-nutrition stems from inadequate calories, protein, or micronutrients for growth and maintenance or inability to fully utilize nutrients. Over-nutrition stems from excess calories, and nutrients beyond what the body requires for normal growth and metabolism (UNICEF, 2009).
- **Mitigation:** Intervention to reduce human impact on the climate system, encompasses strategies to reduce greenhouse gas emissions and sources, and enhance greenhouse gas sinks (EPA, 2013).
- **Pastoralism:** Livelihood strategy that derives more than half of household income from livestock and livestock products.
- **Resiliency:** The capability to anticipate, prepare for, respond to, and recover from multi-hazard threats with minimum damage to social well-being, the economy, and the environment (EPA, 2013).
- **Urban Livestock Agriculture:** Livelihood based on raising animals for food and other uses (e.g., selling at markets) within and around cities (de Bon et al., 2010).
- **Vulnerability:** The degree that systems (e.g., households, communities, and organizations) are susceptible to loss, damage, suffering and death in the event of a 'natural' hazard or disaster (Adger, 2006).

3. Food security

There are three hierarchical dimensions which must be assured in achieving food security: nutritious and culturally appropriate food must be available, accessible, and consumed. The well-

established threat of climate change to food security may disrupt any one of these dimensions (Schmidhuber and Tubiello, 2007). Drought and flooding associated with changes in rainfall patterns may reduce agricultural production, limiting the *availability* of food. Climate variations can contribute to the spread of infectious diseases in livestock, compromising their health and limiting the safety and *availability* of animal products for food. Increased frequency and severity of extreme events affect fodder and water availability for livestock, and reduce *access* to food for people who rely on market exchange of animal products for grains (Battisti and Naylor, 2009). Researchers and practitioners often disregard the final dimension of food security—consumption—in climate change discussions despite links between climate-related environmental change and issues central to consumption. The time women allocate to household labor is associated with both climate change and choices about childcare and has a direct effect on household nutrition. A woman with increased demands on her time may spend less time breastfeeding or initiate complementary feeding at an earlier age, consequently reducing *consumption* of appropriate food by younger children. Even when food is available, accessible, and consumed, climate change may affect the nutrient density or the safety of food and fodder. Models predict that the effects of climate change will lead to a 55% increase in severe stunting in sub-Saharan Africa by 2050 (Lloyd et al., 2011). Dwindling livestock numbers, lowered agricultural productivity, and poor crop yields associated with climate change can leave individuals and households in a calorie and nutrient deficient state.

Although over the long-term, climate change occurs in conjunction with changes and improvements in public infrastructure to rural areas (rural water supplies, electrification) and urban technologies that can improve food security and household nutrition, new climate-related phenomena continue to emerge that undermine food security and highlight the relevance of research directed at understanding the mechanisms linking human-induced climate change to disparities in women's workloads, household health, and resource security.

4. Livestock holders

The FAO estimates that livestock products provide roughly one-fifth of total caloric intake and half of total protein consumed in developing countries (FAO, 2009b). Livestock holders are more likely to consume meat and other nutrient significant animal products, such as milk and eggs, than non-livestock holders because of their increased proximity and access to animal-based nutrient rich foods (Leroy and Frongillo, 2007). Livestock are also a source of income, traction, fuel and fertilizer (FAO, 2011). Many traditionally crop-based agricultural communities have shifted to livestock production to mitigate the adverse effects of climate change (Jones and Thornton, 2009). A study in southern Mali found that crop producers stress the importance of livestock production as a livelihood strategy for coping with climate change (Ebi et al., 2011). Among traditional livestock holders, adaptations to climate change include shifts in herding strategies, such as reductions in herd size and changes to herd composition, and changing settlement patterns. Research indicates that these coping mechanisms only work in certain circumstances. Pedersen and Benjaminsen (2008) found that the diversification of livelihoods associated with sedentarization of transhumant herders had a significant negative impact on food security. Typically, livestock products are exchanged at a lower calorie per kilogram (kcal/kg) value than cereals, creating a favorable exchange for livestock holders who trade for grains. When harvests are poor, this advantage backfires as kcal/kg values of grain rise significantly. Livestock holders exchange their livestock quickly to avoid animal

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