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CONTRIBUTIONS OF ETHNOGRAPHIC AND COMMUNITY-BASED METHODS TO INTERDISCIPLINARY STUDIES OF PASTORALIST HEALTH AND WELLBEING

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Introduction

Their focus on socio-environmental systems relying on human, animal, and landscape interactions has made interdisciplinarity a natural fit for pastoralist studies. This has been evident in anthropology for the past several decades (Casimir, 1991; Leslie & Little, 1999; Netting, 1981), providing a rich foundation for recent trends toward interdisciplinary research. The integration of ethnography with other methods has a value in bringing lived experience into analyses, which can increase accuracy, precision, and depth of inquiry in quantitative studies. Further, ethnography can facilitate the interpretation of quantitative findings. Ethnography's integration mainly happens in two ways: ethnography is included to contextualize quantitative data findings; or ethnography is fully integrated—influencing research questions, methods, data collection, and analyses. The latter approach, especially, can be part of community-based research (CBR) and participatory action research (PAR).

In this chapter, we explore the history of these integrative interdisciplinary approaches as they pertain to pastoralist health and wellbeing, offer case examples, and raise questions about what these approaches have added and where we might need to go next. Our key cultural anthropological concepts will include *classic ethnographic methods*, as well as *decolonizing methods* that include *CBR* and *PAR*—both implemented upon *long-term partnerships* to avoid extractive practices and instead recognize the agency of local communities (Méndez et al., 2017). Community-engaged research methods are applied in public health to co-design solutions with greater potential for sustained impacts. Additionally, we will examine the concept of *planetary health,* an interdisciplinary field, a movement, and evolving practice that originated in public health and has gained especial relevance for pastoralist studies. We will address the following questions:

1 What is the disciplinary history that has led to incorporating ethnographic, CBR, and PAR methods into pastoralist health and wellbeing research?

DOI: 10.4324/9781003487852-33

2 What are the previous successes and ongoing challenges in these integrative methodological practices?
3 What are the benefits/value added of ethnography and community-engaged methods in pastoralist health and wellbeing studies?

In exploring these concepts and addressing these questions, we will start with a general background section that offers a brief history of convergences between classic ethnographic methods in anthropology, community-based methods within and beyond anthropology, and the inherently interdisciplinary planetary health framework as it pertains to pastoralist studies. Next, we will offer case studies that illustrate these convergences in practice. In our conclusion, we will synthesize important points from the case studies to highlight their contribution to understanding health and wellbeing in pastoralist systems.

Historical overview of disciplinary convergences: from anthropology to planetary health

Research questions in anthropological pastoralist studies have frequently been driven by the environmental unpredictability of these systems, human-animal interactions, and external pressures over time (most notably from colonialism and the state). This has led anthropologists to work across disciplines themselves or collaboratively with scholars in other fields. The predominant ethnographic strand of this work has focused on pastoralist identities and subsistence strategies in their historical and political contexts, and has included sole-authored approaches integrating ethnography historically, linguistically, politically, and economically (Beck, 1986; Schlee, 1989), and editorial collaborations between cultural and linguistic anthropologists, ethnoarchaeologists, and historians (Fratkin et al., 1994; Haskel & Bartosiewicz, 1999; Spear & Waller, 1993). Together, these works coincided with a shift in anthropology first modeled by Evans-Pritchard (1949), toward historically and politically economically contextualized work that provided an important ethnographic foundation for interdisciplinary approaches in pastoralist studies.

Another group of anthropologists took a cultural ecology approach that reflected the influence of Julian Steward (1938, 1955). This led to a rich and varied body of work in pastoralist studies that was inherently interdisciplinary in ways that often integrated ethnography with quantitative approaches. Robert McC. Netting's (1981) *Balancing on an Alp: Ecological Change and Continuity in a Swiss Mountain Community*, applied his "ecological way of seeing" to the Törbel agropastoralist community. Based on research he conducted in the early 1970s, his work on Törbel was innovative for its use of historical demographic records analyzed with computer software, and applied to social, economic, and ecological analyses.

Within East African pastoralist studies, the work of Neville and Rada Dyson-Hudson has had a substantial and long-lasting impact for interdisciplinary work relevant to pastoralist human biology, health, and wellbeing (Dyson-Hudson, 1966, 1972). Both received their PhDs from Oxford University in the 1950s—Neville in anthropology; Rada in zoology but she subsequently shifted to anthropology. They were awarded individual and joint funding to conduct research in Karamojong pastoralist communities in Uganda, which they undertook together for three years, from 1955 to 1958. Due to Uganda's civil war, the two were unable to return to Uganda but eventually initiated work with Turkana pastoralists in northwest Kenya that would form the basis of a multi-year, multidisciplinary study (The South Turkana Ecosystem Project—STEP) that brought together anthropologists, medical researchers, and ecologists (Gray, Mirzeler, & Little, 2017). STEP supported several generations of multi-disciplinary collaborative and individual interdisciplinary research on human

biology, nutrition, and human-environmental interactions (Leslie & Little, 1999). Collaborations with public health practitioners is a natural step for scholars influenced by this prolific body of work.

Turning to public health then, the emerging paradigm of *planetary health* has been a congenial fit for pastoralist studies approaches that emphasize interdisciplinarity, especially ethnographic and CBR methods. Planetary health was originally defined as the "health of human civilization and the state of the natural systems on which it depends" by the Rockefeller-Lancet Commission on Planetary Health in 2015 (Whitmee et al., 2015). As a relatively new construct, however, there are evolving conceptualizations and interpretations. Planetary health builds on other frameworks such as One Health, Ecohealth, and environmental health, though it seemingly aspires to be more encompassing. The Planetary Health Alliance—a consortium of more than 340 universities, research institutes, government agencies, and NGOs—describes the construct as "global environmental change and its health impacts" (Myers & Frumkin, 2020). In this chapter, we embrace a broader construct that positions humans and their wellbeing in multi-dimensional relationship with other organisms in dynamic ecosystems.

A traditional strand of public health research relevant to pastoralist studies focuses on zoonotic disease coming from pastoralist and other herding populations who exist in close proximity to animals and includes a consideration of the challenges inherent in collecting data from mobile groups (Barnes et al., 2017; Schelling et al., 2016). Beyond this traditional comprehension of "one health," largely focused on human-animal interactions, pastoralists depend on a multitude of other environmental conditions and living organisms in the varied biomes of their work and existence. Ethnographies and CBR can yield important insights into their strategies for survival, conservation, and impacts of climate change and marginalization (Wilson et al., 2018).

Key concepts

Ethnography is a classic method of cultural anthropology stemming from the fieldwork practices of early twentieth anthropologists such as Bronislaw Malinowski, E. Evans-Pritchard, and Margaret Mead (Evans-Pritchard, 1940; Malinowski, 1922; Mead, 1928). Although the topics of anthropological ethnographies have shifted over time, up until the past decades or so, the methods have reliably emphasized periods of at least a year living with communities engaging in "participant-observation"—taking extensive observational field notes while simultaneously becoming part of communities to the extent possible (blurring the lines between insider and outsider) and participating in community events. Learning the mother tongue (and possibly additional lingua franca languages) spoken in the community has also been a central component of classic ethnography (Bernard, 2018; Whitehead, 2005).

By the early 2000s, these classic staples of cultural anthropological ethnography of long-term fieldwork that includes linguistic proficiency, community rapport, and participant-observation have been challenged by a combination of reduced available funding and the recognition that sufficient funding and time was always a challenge for underrepresented groups (Amit & European Association of Social Anthropologists, 2004; Burton, 2019). Indeed, there is an increasing mismatch between the traditional ideas about ethnography and actual practices that may be multi-sited, of shorter duration, and without achieving multi-lingual competency (Logan et al., 2023; Sepielak et al., 2023). Ironically, these critiques and realizations from within anthropology coincided with the dissemination of ethnography as a method into other fields, including health studies (Watts, 2011; Wilson et al., 2018).

Meanwhile, the reckoning within anthropology concerning anthropology's colonial legacy and at times questionable benefit to communities (Kaur & Klinkert, 2021; Negrón et al., 2024)

has had the positive consequence of an increase in valuing participatory methodologies, such as *PAR* and *CBR* in its various streams, such as participatory rural appraisal (Chambers, 1994) or community-based system dynamics (Hovman, 2013), which seek to enact an endogenous (emic, insider) perspective—the point of view that only communities themselves can hold by their cognitive circumstances (including their culture and language). These approaches should, from the outset, engage in processes of dialogue and reflection (Carrasco-Torrontegui et al., 2024; Méndez et al., 2017). However, what is less often recognized is the need for a bridge between sociocultural worlds—a role that can be fulfilled by outsider ethnographers who collaborate respectfully (including active listening) and negotiate meaningfully with communities. This bridging function can also be supported through team-based methods that bring together diverse competencies and perspectives (Negrón et al., 2024).

Successful achievement of participatory, team-based, and *decolonizing methods* is challenging and requires considerable time investment, patience, and compromise. Approaches like PAR recognize community members as experts and valued, equal members of research teams and embrace different epistemologies also as equal (Carrasco-Torrontegui, 2025; López-García et al., 2021). Due to their specialized training in rapport building and immersive participation, ethnographers can play a central role in working respectfully with communities. This is especially the case when ethnographers commit to *long-term partnerships* with communities—avoiding practices of knowledge extraction and departure (Negrón et al., 2024).

Finally, the concept of planetary health is important to this chapter's topic and case studies. As exemplified in the case studies, pastoralists live in and adapt to varied and changing environments. Their livelihoods and wellbeing depend on the viability of these ecosystems. Environmental conditions of altitude, temperature, and precipitation, shape landscapes and influence the health and wellbeing of these groups. Ethnography infused with other disciplinary methods can paint a more nuanced portrait of this reality and deepen our understanding of the pastoralist way of life. Contemporary practitioners integrating CBR and ethnography within the planetary health framework have benefited from anthropology's internal critique with respect to careful ethical practices as well as the layered intellectual insights resulting from ethnography's adoption by other disciplines. Increasingly, those working within the planetary health framework are emphasizing the importance of both ethnography and CBR not only to increasing validity and rigor based on the inclusion of cultural and community experts, but to recognizing the epistemological legitimacy of different ways of knowing (Anderson et al., 2016; Antoniolli & Flamand, 2025; Hepp et al., 2024; Perez et al., 2025; Wilson et al., 2018).

Nevertheless, there are obstacles to the integrative approaches we have described. These include continued scholarly resistance to valuing Indigenous knowledge and beliefs, hierarchies that privilege the perspectives of senior scholars over junior scholars and/or accord more weight to scientific over community priorities, competition between interdisciplinary team members for first author status, as well as barriers to securing funding for large, interdisciplinary projects (Antoniolli & Flamand, 2025; Wilson et al., 2018). Successful integration of ethnography and CBR into interdisciplinary studies of pastoralist wellbeing, including those within the planetary health framework, requires patience and sustained effort, careful coordination and logistics, and constructive mechanisms for dialogue that respects disparate views.

Impacts of climate change on Samburu nutrition and health

The Samburu are pastoralists with a population of 307,957 people (Kenya National Bureau of Statistics, 2019), living in semi-arid and arid lands in north central Kenya whose subsistence is

characterized by cattle, goat, and sheep rearing, with some farming mixed with livestock herding in the limited areas that receive sufficient rainfall, and camel herds included in the most arid areas. Samburu subsistence pastoralism is fully integrated with the cash economy through the livestock trade, in which all livestock-owning families participate. Samburu in urban areas rely on wage labor, temporary contracts, and petty hawking, but nevertheless invest in livestock if they can manage it (Holtzman, 2009; Iannotti et al., 2022; Lesorogol, 2008, 2022; Straight, 2013; Straight, Hilton, et al., 2025).

Within their home country of Kenya, Samburu are ethnic minorities with a history of political and economic marginalization that has included loss of high-quality dry season grazing lands (Lesorogol, 2008) and reduced access to health and educational services compared to other Kenyans, and has translated into lower literacy rates and worse poverty rates compared to the Kenyan national average (KNBS & ICF, 2023; National Bureau of Statistics-Kenya and ICF International, 2016). This historical and ongoing political-economic marginalization in combination with the climate change-exacerbated challenges of pursuing livestock agriculture in semi-arid and arid lands has led to increasing precarity. At the same time, Samburu have continued to demonstrate resilience and ingenuity in their livelihood strategies and have much to contribute to conversations about health policy and climate coping in pastoralist systems. From Samburu perspectives, the pastoralist system is a way of life, with Samburu living in a landscape enlivened by ancestral substance and animals with their own personhood (Straight, 2013; Straight et al., 2016). Ceremonial cycles continually enact and respect these relationships (Holtzman, 2009; Straight, 2013). Ethnographic and CBR approaches are therefore an effective and promising avenue for understanding pastoralist systems and resilience factors from pastoralists' own perspectives.

Samburu make a distinction between what they refer to as *ldonyio* ("mountain, tall hill") on Leroghi Plateau (1,700–1,800 feet, historical mean land surface mean temperature 32.8°C) and *lpurkel* ("low place with few trees") surrounding the plateau (900–1,200 feet, historical mean land surface temperature 41.5°C) (USGS EROS, 2021). In addition to marked differences in altitude, rainfall, and temperature, Samburu identify ldonyio as more "modern" and lpurkel as more "traditional." At a practical level, homesteads are more dispersed in the hotter, lower elevation lpurkel (eight to nine persons/sq. mile compared to 45 persons/sq. mile on ldonyio) (Kenya National Bureau of Statistics, 2019), and access to markets, schools, and health services requires traveling farther distances compared to the cooler, higher elevation ldonyio (REACH, 2020). However, Samburu living on ldonyio consider Samburu living in the lpurkel to be more knowledgeable on key cultural matters, including timing and nuances of ceremonial events (Holtzman, 2009; Straight, 2013). Although families tend to maintain their stake in one or the other area, patrilocal marriage practices mean that women may move between ldonyio and lpurkel, and in times of stress, young family herders (boys especially, but also some girls) may crisscross with their livestock as well—calling upon their kin and friends for access to pasture and other resources (Bollig & Lesorogol, 2016; Holtzman, 2009; Iannotti et al., 2022; Straight, 2013; Straight et al., 2016; Straight, Hilton, et al., 2025).

Overall, children, adolescents, and young adults in their twenties form the labor backbone of Samburu pastoralist livelihoods. By the age of four, children assist with taking goat kids in and out of their pens, and soon after, they become apprentices to older siblings eight years and older. By their tweens, both girls and boys are tasked with more challenging herding tasks, including covering longer distances and taking animals to water points. Girls and women are considered goat and sheep specialists, while boys and young men perform most of the cattle and camel herding, including in areas vulnerable to attacks by neighboring pastoralist groups, such as Turkana and Pokot pastoralists. However, if boys are unavailable in a family, girls care for the larger stock at

livestock camps in violence-prone areas (Straight, 2020). Samburu young people experience considerable water and nutritional stress, are exposed to intercommunity and interpersonal violence, and experience dangerous wild animal encounters in the course of their livestock obligations, and thus, partnering with them on issues contributing to their vulnerability and resilience are of considerable importance (Straight, Hilton, et al., 2025).

In this case study, we discuss research partnerships with Samburu communities in three separate studies that highlight the contributions of ethnographic and CBR methods to producing knowledge about Samburu health and wellbeing that are simultaneously culturally meaningly and scientifically rigorous.

The first study involved the partnership between an anthropologist (Carolyn Lesorogol) and a public health nutritionist (Lora Iannotti). The question driving this research was fundamentally ethnographic, comparing children's nutritional wellbeing—which is central to Samburu women's identities and roles, to changes in livestock livelihoods that alter the ratio of high-quality foods that Samburu themselves value, to agricultural products that they criticize (Holtzman, 2009; Iannotti & Lesorogol, 2014a, 2014b). The research integrated longitudinal ethnographic, economic, and dietary data to document the nutritional vulnerability of children in Samburu households, finding that cattle ownership positively associated to dietary diversity as well as nutritional adequacy. Additionally, milk contributed importantly to dietary sufficiency in Samburu children, but milk consumption was declining as consumption of agricultural products increased, and, on average, children were undernourished relative to international standards (Iannotti & Lesorogol, 2014a, 2014b). Environmental and political pressures over time have forced the Samburu to diversify livelihood strategies and increase agriculture production to survive. Iannotti and Lesorogol found maize now comprises nearly half (49%) of all calories consumed, and while milk has dropped to only 11% of energy, it provides critically important nutrients of vitamin A, B12, and C, compromising children's growth.

Lesorogol's ethnographic knowledge of Samburu practices relevant to the study reflected a decade engaged in participatory development work in Samburu communities prior to pursuing doctoral studies, her fluency in the Samburu vernacular, and over 35 years of accumulated experience in Samburu. Her knowledge about Samburu women's roles and practices in food provisioning within their households and of the complexities of Samburu household economies enhanced the study's rigor, enhancing the likelihood that they were measuring what they thought they were measuring and that their results and interpretations were both accurate and culturally meaningful. Moreover, the study's important insights about trends over time in Samburu pastoralist systems relevant to nutritional wellbeing were possible due to the interdisciplinary collaboration with Iannotti.

The second study aimed to open a conversation between qualitative description and statistical models to holistically understand Samburu adolescent vulnerability and wellbeing. The study reflected a partnership with Samburu adolescents in both lpurkel and ldonyio that integrated their knowledge as experts of their own lived experiences, with ethnography, human biology, and nutrition. Reporting on their experiences, Samburu adolescents identified their "scariest" lifetime experiences, the top three of which in descending order were severe drought, wild animal encounters, and war/intercommunity violence. They also reported increased food and water insecurity during severe drought. Additionally, adolescents reported higher mobility, more intensive livestock obligations, and lower educational access (especially for girls) in the hotter, dryer lpurkel compared to ldonyio. Girls tended to have more posttraumatic stress symptoms compared to boys. These lived experiences and emotional distress manifested in differences in cell-mediated immune function: being a girl, reporting food insecurity during severe drought, and living in the lpurkel manifested

in more immune dysregulation (Straight, Hilton, et al., 2025). In other interdisciplinary, planetary health analyses based on the same study, public health nutritionist Iannotti and ethnographer and biological anthropologist Straight found high probability of nutrient inadequacies among the adolescents, although location complicated the picture, with lowland lpurkel adolescents worse off on some mineral nutrients (e.g., zinc) but better off on others (e.g., copper and selenium) (Iannotti et al., 2022). Place of residence (highlands/ldonyio vs lowlands/lpurkel) was similarly a determinant of heavy metal concentrations in adolescent blood (e.g., higher lead in highland/ldonyio and higher cadmium in lowland/lpurkel) (Ashley-Martin et al., 2022).

For their part, young people expressed love for their animals and their landscapes, affectionately photographing their family livestock as well as their home landscapes, that they described as beautiful. Yet, they expressed a desire for changes that would improve their overall wellbeing, offering their own solutions to these multilayered challenges in the form of desires for increased educational access and alternatives to hazardous livestock tasks that exposed them to wild animal encounters and food and water stress, and girls longed for more gender equality.

The third and final study examined women's pregnancy experiences during severe drought and compared the growth and wellbeing of their children exposed to drought in utero to their same-sex siblings unexposed to drought in utero. For this study, Samburu community experts contributed to the design and instrumentation, including cultural dimensions of vulnerability during pregnancy. Ethnographic work characterized pregnancy further, especially as relevant to drought, heat, and emotional stress. The lived experiences of drought and heat during pregnancy manifested in children's wellbeing over time—with drought associating to lower body weight and accelerated biological aging, for example, and to changes at the molecular level that offered possible mechanisms for the differences found (Qiao et al., 2024; Straight, Hilton, et al., 2022; Straight, Qiao, et al., 2022). Heat exposure in utero, moreover, associated to molecular changes in children's lower leg length (an environmentally sensitive biomarker of life long health) near one gene that potentially identifies a precise mechanism for adaptation to heat and, conversely, near multiple other genes that potentially identify the mechanisms whereby the immune and metabolic costs of heat stress divert important physiological resources away from children's growth (Straight, Qiao, et al., 2025).

These latter two studies combined CBR with three decades of partnerships between the ethnographer (Straight) and Samburu communities to provide a strong foundation for understanding the lived experiences and vulnerabilities of Samburu adolescents and pregnant women and their children. The integration of ethnographic and community knowledge with quantitative approaches increased the precision for identifying stressors that were meaningful to Samburu and enhanced the accuracy and cultural relevance of interpretations. In both studies, Samburu characterized their own experiences and also considered potential solutions, but they sometimes pointed out intractable problems: during severe drought, young women have no choice but to engage in strenuous and even hazardous herding tasks in high heat with insufficient food and water, because of husbands traveling far from home with the most vulnerable portions of the herds. For both groups—adolescents and pregnant women, solutions require changes in the allocation of household labor. Community-led interventions will be necessary that explore what is possible for the sake of the most vulnerable, including pregnant women, fetuses, and children.

In sum, Samburu maintain a vibrant pastoralist livelihood in the context of environmental uncertainty. That livelihood is marked by the status of livestock as *persons* sharing an ancestrally enlivened landscape in which mingled substances (trees, livestock milk, human blood and saliva) merge the divine, human, and natural worlds (Straight, 2013). Yet colonial and postcolonial land losses and continued political and economic marginality have disrupted these relationships,

resulting in resource stresses that are being exacerbated by climate change. Research methods that leverage ethnography, CBR, long-term partnerships, and interdisciplinarity are crucial to high-resolution understanding of the health impacts of these factors and their potential solutions.

Agropastoralism and planetary health in the Andes

In the quiet hours before dawn and again at dusk, herds flow through the narrow streets of Andean villages—sheep, cows, a dog or two—guided by someone walking with a long stick. These daily movements are as much about kinship and conversation as they are about tending animals. In the Andes, pastoralism blurs the lines between subsistence, mobility, and social life; it is not only ecological management, but a relational practice woven into communal rhythms. Animals are members of the community. Within the Andean cosmovision, all beings—people, animals, plants, minerals, ancestors, and deities—are interrelated within *Pachamama*, or Mother Earth (Gallegos-Riofrío, Waters, Carrasco-Torrontegui, et al., 2021). Far more than a symbolic figure, *Pachamama* is a polysemous concept that also signifies time and space, expressing the inseparability of material, spiritual, and temporal dimensions (Gallegos-Riofrío et al., 2024). As such, Andean cosmovision encompasses the full existential experience, including the processes and mechanics of the universe—time, space, energy, and the interdependence of all beings. The Andean cosmovision, as expressed by Indigenous scholars and philosophers, is both a way of being and a way of knowing—an ontological and epistemological framework in which ideas and technologies are part of a lived, relational experience of the universe, including realms beyond the material plane (Gallegos-Riofrio, Zent, & Gould, 2022). As part of the community of beings, animals are held dear and recognized as sentient companions capable of emotion and relational presence. In traditional agroecosystems, this is reflected in the practice of pairing or grouping animals, such as a bull with a donkey, so the animal does not feel lonely or sad—fostering animal health (Carrasco-Torrontegui, 2025).

Murra's (Santoro et al., 2010) concept of verticality offers a foundational lens for understanding Andean landscapes and cultures. A geography defined by verticality emphasizes the steep ecological, climatic, and cultural gradients shaped by elevation: for example, the Andean notion of *up* and *down* is directional but also deeply cognitive. Altitudinal floors define distinct zones of life and livelihood, often separated by changes in temperature, humidity, vegetation, and biodiversity, over short horizontal distances. Andean rural communities most often inhabit elevations between 1,500 and 3,500 m, where they have adapted to and manage this vertical diversity from millennia. The vertical structure has supported extraordinary biodiversity and agrobiodiversity. Indigenous Peoples and local communities in Andes have domesticated an estimated 7,000 plant species—yielding over 2.1 million varieties—while conserving 50,000–60,000 crop wild relatives (ETC Group, 2017). At the same time, pastoralists, livestock keepers, and small-scale farmers have bred approximately 8,800 varieties of domesticated animals and birds used in agriculture (Food and Agricultural Organization of the United Nations [FAO], 2018).

Verticality in the Andes encompasses a mosaic of ecological zones—shaped by valleys and plateaus—and includes emblematic highland ecosystems such as the paramo and puna. The paramo, a high-elevation neotropical ecosystem found mainly in the Northern Andes (Colombia and Ecuador), is characterized by wet grasslands, shrublands, and unique flora adapted to cold, humid conditions. In contrast, the puna, common in the Central Andes, features drier grasslands and rocky outcrops. Further south, the Altiplano—or Andean plateau—extends across southern Peru and Bolivia. This vast highland region, often referred to as the Altiplano-Puna bioregion, is defined by semi-arid conditions and encompasses puna grasslands, wetlands, and salt flats (Jordan

et al., 2010), all of which support diverse forms of pastoralism (Grant & Lane, 2018). These landscapes form the ecological foundation of Andean pastoralism, providing grazing grounds, migration routes, and water sources critical to livestock management across generations.

The concept of heterarchy is also useful for understanding agropastoralism in the Andes because it reveals how efficient decision-making emerges from distributed intelligence, rather than centralized authority (Gallegos-Riofrío, Waters, Carrasco-Torrontegui, & Iannotti, 2021). In the Bolivian Altiplano, Carrasco-Torrontegui et al. (2024) document how one heterarchically organized community divided its territory into four functional zones: a reforested pine area for forest management; a collective pasture designated for cattle; a secondary agricultural zone for tubers like potato and cañahua; and a primary agricultural zone that includes family homes and productive plots. These spatial arrangements exemplify how pastoralism is woven into broader ecological strategies, social cooperation, and territorial planning—demonstrating heterarchy not only as a form of governance but also as a mode of collective adaptation and resilience (Crumley, 2012, 2015; Stark, 2011). Responsive to shifting environmental and social conditions, these arrangements mirror ancestral Andean governance institutions—distributed, adaptive, and intergenerational—that sustained intensive agroecological infrastructure, such as the *minga* (i.e., collective work).

Scattered across the rugged terrain of what was once *Tawantinsuyu*—the Inca Empire, a territory that stretched from Peru northward into southern Colombia and southward into northern Chile and Argentina—despite the imposition of modern borders and centuries of colonization, contemporary Indigenous communities continue to inhabit and care for the Andean highlands. One of the most salient is language: Quechua, with its many regional variations—such as Kichwa in the Northern Andes (southern Colombia and across Ecuador)—continues to unify diverse communities across vast altitudinal and national divides. Today, however, these populations face persistent structural challenges, including poverty, chronic malnutrition, dual burden of diseases, and significant health disparities, often rooted in historical marginalization and compounded by unequal access to land, water, and basic services (Anderson et al., 2016; Freire et al., 2014; Gallegos-Riofrío, Waters, Carrasco, et al., 2021; Gallegos-Riofrío, Waters, Carrasco-Torrontegui, & Iannotti, 2021). Yet, within this landscape of inequity, some Indigenous communities stand out as positive deviances—offering insight into alternative, health-promoting pathways.

Diet and health are intimately linked in these settings, with traditional food systems shaped by agroecological knowledge and seasonal rhythms (Gallegos-Riofrio, Carrasco-Torrontegui, et al., 2022; Gallegos-Riofrío et al., 2024). Within these systems, animals play a critical role—not only for practical purposes such as fertilization, draft power, and food production, but also symbolically, as beings with social and spiritual significance in the Andean cosmovision (Carrasco-Torrontegui, 2025; Gallegos-Riofrío, Waters, Carrasco, et al., 2021).

Long before the arrival of the Spanish, Andean camelids—llamas, alpacas, vicuñas, and guanacos—were central to pastoralism (Gallegos-Riofrío et al., 2024; Marsh, 2015). The Inca domesticated llamas and alpacas, using them for transport, wool, fertilizer, and ritual purposes, while protecting wild vicuñas and guanacos, which held symbolic and ceremonial importance. These animals were integral to the economic, ecological, and spiritual systems of Inca society. Early chroniclers—including Pedro Cieza de León (1553), Garcilaso de la Vega (1609), and Guaman Poma de Ayala (2019) described not only the scale and organization of camelid herding but also the reverence with which these animals were treated.

With the arrival of Europeans, new livestock species—especially sheep, cows, and goats—were introduced into Andean agropastoral systems. Over time, these animals became embedded in what is now often referred to as "traditional agriculture" (Gallegos-Riofrío et al., 2024). Yet, as anthropologist Mary Weismantel (1989) insightfully notes, the very notion of "tradition" in

the Andes is segmented and historically layered. What is considered traditional today frequently blends pre-Columbian agropastoral practices—centered on camelids such as llamas and alpacas—with colonial-era introductions like ovine and bovine species. Thus, as Weismantel highlights, Andean pastoralism is not a static legacy but a living, adaptive practice shaped by centuries of continuity and change.

Andean ancestral wisdom is a crucial component of that living, dynamic practice. While conceptually related to what global frameworks define as Traditional Ecological Knowledge (TEK), ancestral wisdom is situated, culturally and linguistically rooted, and reflects a mode of co-generating life in ways that can be striking even to modern science—such as the Inca's Moray Agricultural Research Station in present-day Peru's Sacred Valley (Wright et al., 2011). Much like Native Science has been positioned in conversations around TEK (Cajete, 2018), Andean ancestral wisdom offers a distinct epistemology embedded in reciprocity, systematic observation, and long-term adaptation that can partly align conceptually with a scientific worldview. From this perspective, it is possible to view the region as an "evosystem," where human practice and evolutionary processes have co-produced resilient landscapes over generations (Mastretta-Yanes et al., 2024)—a dynamic that could be shaped, at least in part, by heterarchical structures that still sustain diversity, flexibility, and local agency.

Ancestral wisdom is recognized in the legal and policy frameworks of the Andean Community of Nations—enshrined constitutionally by member states such as Ecuador (2008) and Bolivia (2009)—and acknowledged in international forums such as COP23 and the UN Permanent Forum on Indigenous Issues, and is increasingly regarded as essential for addressing climate change, food sovereignty, and planetary health (Gallegos-Riofrio, Carrasco-Torrontegui, et al., 2022).

The Caliata Initiative is a long-term PAR effort launched in 2018 in the Indigenous community of Caliata, Ecuador. Led by researchers Carrasco-Torrontegui and Gallegos-Riofrío, the Initiative has used ethnography in PAR efforts to co-produce knowledge with local families around ancestral agroecological practices, land governance, health, and foodways.

Caliata stands as a powerful example of positive deviance in the Andes—a small Indigenous community that defies dominant trends of ecological degradation, dietary decline, and health inequity (Gallegos-Riofrío, Waters, Carrasco, et al., 2021). Rooted in the stewardship of *Pachamama* and shaped by heterarchical social organization, Caliata's agroecological space fosters biodiversity, nutrient cycling, and strong trophic interactions. The community consistently consumes minimally processed, self-grown foods, with fruits and native crops forming a central part of the diet. Despite demographic pressures such as aging and gendered labor divisions, chronic health conditions remain relatively infrequent.

Most recently, Carrasco-Torrontegui's work has deepened the PAR process through the application of agroecological principles—many of which are directly relevant to pastoralism. These include animal health, the integration of livestock into the agroecosystem, for example the use of post-harvest herds to simultaneously clear crop residues and fertilize the land. For older adults in Caliata, pastoralism holds deep emotional and social value, as animals provide companionship and herding remains one of their most meaningful forms of daily engagement and joy. Together, these efforts illuminate how traditional practices and distributed community knowledge continue to shape the sustainability and vitality of Caliata's biocultural landscape.

Food sovereignty here is practiced as an ecocentric system—grounded in seed exchange, reciprocal labor, and intimate knowledge of soil and land care. In doing so, Caliata offers a grounded model of planetary health—demonstrating how the wellbeing of people, agropastoral food systems, and ecosystems can be regenerated together through ancestral wisdom and agroecological stewardship (Gallegos-Riofrío, Waters, Carrasco, et al., 2021).

The Caliata Initiative exemplifies an integrative methodological approach to understanding agropastoral health and wellbeing—merging ethnographic immersion, PAR, and quantitative assessment. Over seven years of sustained engagement, PAR has been central to co-producing knowledge and community-driven visions for resilience, while ethnography has allowed for deep exploration of meanings, values, and cosmovisión-centered practices surrounding food, animals, and land. These qualitative foundations have been enriched by quantitative findings: household surveys, dietary diversity metrics, soil health indicators, and chronic disease data. For instance, Caliata's agrodiversity index (DMg = 9.06) is significantly higher than averages in projects where agroecological farming has been introduced (DMg = 2.01) (Gallegos-Riofrio, Carrasco-Torrontegui, et al., 2022). This notable agrodiversity correlates with the community's diverse, minimally processed diets and low prevalence of chronic disease among adults under 60 (Gallegos-Riofrío, Waters, Carrasco, et al., 2021). Landscape-level data reveal that pre-Columbian terracing systems not only support ecological resilience but reduce erosion risks on steep slopes (from 40–60% to 7%). This integration of data and dialogue has supported a five-year local vision rooted in ancestral technologies and planetary health values (HLPE, 2025). In doing so, Caliata demonstrates the strength of methodological pluralism: ethnography and CBR frame the inquiry, and quantitative methods provide actionable evidence that strengthens community agency and ecological understanding (Carrasco-Torrontegui et al. 2024).

Long-term engagement in Caliata has revealed how health is conceived relationally—interweaving animals, land, food, and spirit—and how this worldview informs everyday practices like herd management, food sharing, and seed exchange. Rather than serving as an add-on to quantitative methods, ethnography in this context shapes the research questions themselves, anchoring them in local epistemologies and ensuring cultural relevance, community ownership, and epistemic justice. The Andean experience thus exemplifies the chapter's central argument: that integrative methodological practices can transcend disciplinary silos, fostering approaches that are both relationally attuned and empirically robust.

Conclusion

We have shown how an integration of ethnography and CBR in interdisciplinary research fields as diverse as human biology, social epigenetics, and the planetary health framework have contributed to methodological rigor and accurate and culturally meaningful results. We conclude with the key takeaways for the importance of integrating ethnography and CBR in interdisciplinary approaches to pastoralist health and wellbeing.

For Samburu in northern Kenya, pastoralism is more than a livelihood, as livestock are named, loved, and connected to humans through an exchange of substances that merge the human and natural worlds. Samburu relationships to landscapes involve spiritual bonds and human-animal affection that persists beyond death—with cattle known, for example, to seek their deceased owners' smell in the bush. Understanding the propitious entanglements that characterize Samburu lived experiences across their lives in the context of continued political-economic marginalization and climate change is critical to meaningful research and community-driven policies. Our Samburu case study highlights this through studies that examine important trends in livelihoods over time as they affect children's health. The studies we have described integrate Samburu self-characterizations of their lived experiences; community-identified challenges to the entangled health of human, animal, and landscape persons; and scientific approaches that include human biology and social epigenetics.

Within the Andean framework, pastoralism is a spiritual and relational practice that strengthens bonds with Pachamama (Mother Earth) and nurtures planetary health. Animals, seen as sentient and vulnerable beings, often command greater responsibility than even human kin—precisely because they depend on people for their wellbeing. In agropastoralist communities such as Caliata, caring for animals becomes an act of spiritual attention, ecological reciprocity, and self-reflection. This perspective, deeply rooted in Andean cosmovision and with clear practical implications, offers a powerful alternative to extractive development logics—positioning planetary health not as an abstract goal, but as a practice lived daily through food, care, and connection. In the Andes, the integration of ethnographic and community-engaged approaches—particularly PAR—has been foundational to understanding health and wellbeing among agropastoralist communities. While quantitative tools such as dietary recalls, health surveys, mental health screenings, biomarkers, biodiversity inventories, and soil health assessments have enriched these inquiries, it is through ethnographic immersion, community diagnostics, and iterative dialogue that the lived complexity of pastoralist lifeways becomes truly legible.

Ethnographic contributions that reflect long-term partnerships and appropriate language skills in addition to including community members as equal team members valued for their TEK and pastoralist livelihood expertise are ideal. If long-term partnerships and/or linguistic competence are not feasible, CBR and PAR are all the more crucial. Ethnographically bottom-up and CBR methods can be challenging to accomplish in terms of time investment and the need for respectful dialogue and negotiation. However, the value added can lead to high impact work that identifies effective and culturally meaningful solutions to seemingly intractable dilemmas affecting pastoralist health and wellbeing. The questions we need to ask are about how to reduce barriers to integrating ethnography and community-based partnerships into study designs and what the costs are of not doing so—to rigor, precision, accuracy, and the meaningfulness and efficacy of results for improving the lives of pastoralists in a politically challenging and warming world.

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