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Social Connectedness and Dietary Change of Young Adults in Transitioning Pastoral Communities in Rural Tanzania

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Abstract

A key driver of food preferences and dietary shifts is social connectedness through the social and cultural norms observed and modeling behaviors. This sub-study reviewed data from focus group discussions (FGDs) of a larger study examining the drivers of dietary changes in pastoralist communities at varied levels of sedentarization. Eighteen FGDs were analyzed using a Grounded Theory approach, which led to the development of a conceptual framework visualizing how social connectedness impacts dietary preferences and changes through the process of sedentarization. Key drivers that result in a shift of social connectedness and subsequently alter diets are education, religion, interethnic exchange, and population migration. These shifts most often occur through increasing access to information and, in turn, alter social connectedness and its manifestation within the pastoral communities in this study. The greatest shifts in diet were seen among youth in intensive sedentary communities. Dietary changes seen are a movement away from traditional foods with high nutritional quality (such as milk and blood) and towards previously tabooed foods such as poultry, eggs and cultivated vegetables. The avoidance of fish, chicken, and eggs are decreasing among youth of extensive and intensive sedentary communities but remain an important principle for extensive pastoralists. Cultivated vegetable access has increased, while the practice of foraging for fruits and vegetables in the forest has declined. Nutrient poor, foods such as processed items, chips, and soda also increased. In the case of pastoralists facing varying levels of sedentarization, diets are shifting to include more processed foods, breads, and maize and less milk and blood. Ultimately, the possibility of increased dietary diversity exists, yet the nutrition status for many has decreased or remained the same as sedentarization levels climb. This leaves the population vulnerable to malnutrition, infectious diseases, and poverty.

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Chapter 1: Introduction

1.1 Introduction and Significance

In Africa, pastoral and agro-pastoral populations are estimated to be 268 million in number with at least 50 million pastoralists residing in Sub-Saharan Africa (Abdulahi, 2007; World Bank, 2014). Pastoralism is challenging to define and quantify due to the large degree of heterogeneity that exists across pastoral populations as well as within each community. That said, literature most commonly defines a pastoralist as someone who relies on the use of rangeland for the production of domestic livestock with the goal being to meet the household's income, material, and food-related needs (Fratkin and Roth, 2005 and FAO, n.d.). The various systems of pastoralism can be differentiated by species of livestock, type of management, geographic location, or, in some cases, ecology of the environment (FAO, n.d.). Pastoralists often inhabit and move across hard to utilize lands, such as mountains and semi-arid ranges. This greatly increases the amount of land that is economically benefiting the country (Zinsstag, 2016; Fratkin, 2005; Abdulahi, 2007). Livestock most often handled in these communities are cows and goats. For the purposes of this study in Tanzania, two key types of pastoralism are discussed. The first type practice transhumance, or the fixed movement of livestock between summer and winter rangelands. The second type, agro-pastoralists, participate in some mixed form of both crop cultivation and pastoralism. Various derivations of these two pastoral 'types' exist across some 19,681 villages in Tanzania (Ellis et al, 2013), including the Maasai, Sambaa, Mbulu, Pare, Wamburu, and Ziqua ethnic groups.

In recent years, there has been a significant shift towards sedentarization and agricultural practices of pastoral Tanzanian communities. While pastoralists have rich histories dating back centuries, in today's agricultural and industrialized world, they are often forced to settle or

forbidden to mobilize their livestock for a variety of reasons. Climate change, population growth, economic pressures, government interference or neglect, political uncertainties, and the need for steady access to resources each play a role in the settling of pastoralists (Fratkin, 2005; Finklestein, 1990; Salzman, 1980). Because pastoralists rely so heavily on land and water, they are especially vulnerable to the above environmental and socio-economic fluctuations. An increase in the frequency of droughts and severe weather events, such as flooding, have diminished pastoralists' access to water sources and grassy rangelands. Furthermore, these climactic changes lead to an escalated risk of burning rangelands, an influx of invasive species, and changes in composition of grasses eaten by livestock (Sangeda, 2014). Population growth of both Tanzanians and livestock further strains the limited rangelands and resources available to pastoralists, often resulting in land conflicts over the ownership of rangelands between farmers and pastoralists. Government rangeland policies, boundaries defined by politics, and unpredictable land tenure changes further fuel land conflicts, stigma, and disagreements between pastoralists and farmers. Frequently, pastoralists are left out of critical community discourses on rangeland strategies or government-led initiatives that aim to alleviate the challenges of impoverished citizens (Behnke et al, 2013). Together, these factors push pastoralists to leave their mobile lifestyles in search of spaces and lifestyles where resources and opportunities are more readily available.

Towns offer income generating activities and access to markets, clean water, schools, and health care that pull pastoralists to a more sedentary and urban lifestyle. Given the poverty and disease that pastoralists face, settling in a place with a market to sell products, a hospital for medicine, schools for children to get an education and employment to assist the family is highly appealing. Altogether, this creates pressure for pastoralist groups to settle in towns and shift to a

mixed agricultural/livestock, or purely agricultural, lifestyle (Fratkin, 2005). While pastoralists are no longer practicing what some consider to be a 'primitive' or 'backwards' lifestyle, they still face stigma and conflict within the towns they settle in (Abdulahi, 2007).

Impacts due to the shift of pastoralism to a more sedentary lifestyle has led drastic alterations in diet, food preferences, and food valuation. Historically, most Tanzanian pastoralists used cow or goat milk, blood, and meat products as their main form of sustenance, which were highly valued in their mobile communities (FAO, n.d.; Bhatia, 2012). Milk intake is also beneficial to children's health. As sedentarization occurs, the availability of milk decreases while the intake of high calorie, low protein foods increase (Shell-Duncan, 2000; Fratkin, 2004). Several studies reveal that over time increased settlement of pastoralists results in either unchanged or decreased nutrition levels and increased rates of stunting in children, increased risks of infectious diseases, and increased poverty (Fratkin, 2004; Galvin, K.A; Shell-Duncan, 2000).

1.2 Rationale

For decades, Tanzanian pastoralists have struggled with poverty, isolation, and pressures to become sedentary. The impacts of these struggles not only negatively affect the individual but also pastoral and agro-pastoral communities in whole. While the Tanzanian government has attempted to provide basic social services to pastoralists since independence of the country in 1961, these efforts have often been misaligned with the real needs of pastoralist communities (Mlekwa, 1996) and have encouraged sedentarization. Further complicating these efforts are the impacts of climate change, population growth, and conflict (Fratkin, 2005; FAO, n.d.).

While sedentarization allows for some benefits, there are also negative consequences. For example, previous research has observed decreased nutritional intake and a valuing of unhealthy

food items, but the mechanisms of these effects are not well understood and can depend on the population context (Salzman, 1980; Fratkin, 2005).

Within the context of sedentarization, social connectedness plays a unique and significant role on the livelihoods of pastoralists. Social connectedness, defined as "the experience of belonging and relatedness between people" (Van Bel et al, 2009), is interactions with others that provides information about the people around us and our community, and leads to the development of one's overall social network and view of accepted social norms. As sedentarization occurs within agro-pastoral and pastoral communities, there is an overall increase in interactions and exchanges with people of different ethnic groups, ages, and backgrounds, shifting social connectedness with it. While this means in some cases there are increased opportunities for bartering and knowledge exchange, it can also mean increased risks of conflict or stigma (Fratkin, 2005).

A lack of strong understanding of the benefits and consequences of sedentarization means that current efforts to alleviate pastoralists' nutrition struggles are not as effective as they could be and that there is likely not a straight-forward solution for all. There is a need for a comprehensive, community-driven strategy that is inclusive of both pastoralists and agro-pastoralists and allows them adequate access to rangelands for their livestock and farmland for growing a variety of nutritious vegetables and fruits. As young adults are the future of Tanzania, a government led plan that retains these advantages, such as increased access to health care, while mediating against the disadvantages and providing space for the practice of pastoral traditions is urgently needed.

1.3 Purpose Statement

The purpose of this study was to understand how social connectedness influences the diet of young adults of transitioning, or settling, pastoralist communities across the Morogoro and Tanga regions of Tanzania. Through an analysis of longitudinal data from focus group discussions with young adults in these regions, this study explores how young adults' networks of social connection and changes in these contribute to diet change. The goal of this research study is to explain how social connection influence dietary changes among young adults in settling pastoralists communities, with a view to provide research evidence for policy and program development or implementation.

1.4 Aims

Aim One: How do diets of young adults in pastoral communities change as they transition to settlement?

Aim Two: What is the nature of social connectedness amongst young adults in pastoral communities and how is this influenced by settlement? sedentarization.

Aim three: What is the relationship between social connectedness and dietary changes among young adults?

1.5 Definition of Terms

Agro-pastoralism: A pastoralist that participate in a mix of both crop cultivation and pastoralism (Fratkin, 2006).

Food preference: What is "good to eat" as defined by social constructs (Smith, 2008)

Food valuation: The determination of a food or food groups worth, either individually or within a group.

Pastoralism: A pastoralist who relies on the use of rangelands for the production of domestic livestock with the goal of meeting the household's income, material, and food-related needs (Fratkin, 2005).

Social connectedness: The experience of belonging and relatedness between people (Van Bel)

Sedentarization: The act of transitioning to a more stationary, or less mobile, lifestyle and community. Also known as geographically settling, it is not a unidirectional process. (Fratkin, 2004).

Social capital: A social network that has common values or norms which promote collective action (OECD, n.d.).

Transhumance: A type of nomadic pastoralism where livestock are moved across rangelands in a seasonal pattern (Britannica, n.d.).

Zero grazing: A system in which fodder is brought to the livestock, rather than moving the livestock to feed (Lawal-Adebowale, 2018).

Community: Both tangible and intangible, community is a set of individuals defined by a common physical, political, social, or moral boundary (Diclemente, 2009).

Chapter 2: Literature Review

2.1 Introduction

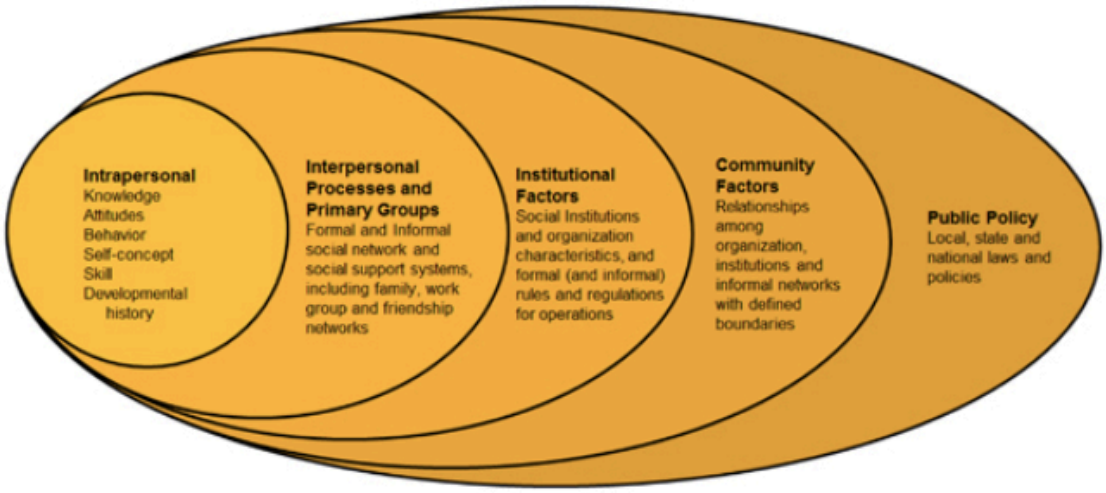
This chapter reviews published literature related to social connectedness, young adults in pastoral communities, the sedentarization of pastoralists, shifting diets in pastoral communities, how these shifts in diet have impacted nutrition, and, lastly, areas in which research gaps exist. This literature review highlights existing research around how social connectedness impacts diet change and food preferences for young adults and applications of these impacts in transitioning pastoralist communities.

2.2 Social connectedness with young adults

There is strong evidence that being socially connected is a basic psychological need held by all (Pavey et. al, 2011; Sreenivasan, 2016). Evolutionary history reveals that social adaptations, such as living and caring for offspring in group, has led to more biological success of humans regarding population growth, fitness and adult reproductive success. Author Matthew Lieberman of *Social: Why Our Brains Are Wired to Connect* goes so far as to say that "these social adaptations are central to making us the most successful species on earth" (U.C. Berkeley, n.d.; Lieberman, 2013). Due to the efforts of social scientists like Lieberman, social connectedness and social capital are now known to have significant implications for both societal wellbeing and individual health determinants (Uchino, B.N et al, 1996; Kim, H.S et al, 2006; Riley, C. et al, 2017). While this study focuses on social connectedness with isolated themes of social capitol, it is important to highlight that there are significant overlaps with social capital and social connectedness in existing literature. Social capital is a relatively new term that is typically defined as a social network that has common values or norms that promote collective action (OECD, n.d.; Claridge, 2013). Social capital consists of three areas: bonds, bridges, and

linkages. Bonds are the relationships that individuals hold with people like themselves (such as family, friends, or neighbors); bridges are the connections people have with those outside of their perceived self-identify; and linkages are relationships held with people at different perceived levels of social status. (OECD, n.d.) Generally, studies of social connectedness tend to highlight solely an individual's bonds with another, while social capital centers around networks or groups of people.

The link between social connectedness and health is particularly clear in literature on chronic disease and mental health (Saeri, K.S., 2018; Cockerham, W.C, 2017; Uchino, B.N, 1996; Cohen, S., 2004). Social connectedness varies across numerous demographics, making differences between age groups, location and gender particularly crucial to understand as it relates to young adults. For populations of young adults and youth, social connections and the types of relationships they value play a critical role in cognitive development, physical fitness, nutritional choices, and the prevention of mental illness, such as depression (Putnam et al, 2012; Czyz et al, 2012; Neely et al, 2014). This population relies on the opportunities for interaction in school or school-related activities, religious organizations, community gathering areas and travel to cultivate strong social connections among friends, family, peers, and community members. These relationships act within a social-ecological model to impact young adults' dietary choices with the most proximate level of influence being personal psychosocial and biological tendencies, followed by interpersonal relationships with others and lastly larger societal influences, such as school or community environment and cultural norms (Story, 2002). For example, food items are deemed as 'cool' and 'not cool', 'poor' and 'rich', and 'healthy' and 'unhealthy' are largely driven by social influences.



The Social-Ecological Model (https://www.acha.org/HealthyCampus/HealthyCampus/Ecological_Model.aspx)

While evidence exists that both positive and negative attitudes and knowledge can be disseminated through social ties, one goal of incorporating mechanisms to improve social connectedness is not to disrupt these existing networks that have negative implications (such as the spread of obesity), but rather to leverage these networks to spread behaviors and knowledge that support healthy habits. This can be done through the use of social ties to disseminate key health knowledge (in a training of trainers model) and to shift social norms (such as handwashing before cooking). Furthermore, when people feel connected to their community their psychological wellbeing improves and they are able to more effectively shield against stressful situations (Cohen, S, 2004). Social connectedness has been found to have both direct and indirect influence on the brain's structure and function. Specifically, the social network size of a human is linked to the size and function of brain regions that further support social behavior and when satisfaction of one's social network is missing there is a higher risk for depressive symptoms and of overall morbidity and mortality (Lamblin, 2017). These symptoms of depression, loneliness, and isolation have long been linked to higher body mass indexes among

adolescents and young adults (Carroll-Scott, 2015). A cyclical pattern of negative health impacts is further solidified by the inadequate intake of fruits and vegetables being linked to poor social connection (Neumark-Sztainer, 1996). That said, for young adults social connectedness can have both positive and negative implications towards risk-taking behaviors, which most often appears in literature as it pertains to sexual risk behaviors, but also arises within food choice (de Voux, 2017; Martino, 2015). Communal eating has been shown to increase trust of others, overall happiness levels, number of friends, and community engagement (Dunbar, R.M., 2017). This means that for the inclusion of social connection efforts in public health interventions, there must be a strong understanding of the relationships held by young adults in the community.

2.3 Pastoralism

Globally, pastoral and agro-pastoral populations are estimated to be 360 million in number with 50 million pastoralists residing in Sub-Saharan Africa (Fratkin, E. et al, 2005). These communities range from full reliance on livestock to a mix of reliance on agriculture and livestock. All pastoral communities practice some form of mobility to maintain their livestock. Pastoralism is inherently challenging to define and quantify due to the large degree of heterogeneity that exists across pastoral populations, observed as a spectrum along which many forms of pastoralism lie. That said, a pastoralist is broadly defined as someone who relies on the use of rangeland for the production of domestic livestock with the ultimate goal being to meet the household's income, material, and food-related needs (Fratkin, E. et al, 2005; FAO, n.d.).

Pastoralists have rich histories of living nomadically on the land that date back centuries, with recently discovered evidence revealing the herding of cows across Egypt as early as 9500 BC (Smith, 1992). Today, the various systems of pastoralism can be explained by species of livestock, type of management, geographic location, or, in some cases, ecology of the

environment (FAO, n.d.). Notably, pastoralists often inhabit and move across lands that are otherwise difficult to utilize for cultivation, for example mountains and semi-arid lands, increasing the total area of land that is economically productive on a national scale. The groups typically move in strategic patterns, known as the practice of transhumance, that allow for access to sufficient amounts of grass and water during the various seasons and times of drought (Catley, 2016). These strategies vary depending on the season, route of movement and the type of rangeland (Overseas Development Institute, 2009). Livestock, most often being cows and goats in East Africa, also serve as key drivers of movement strategies as they need to be provided with water every two to three days while crossing land (Opiyo, F.E et al, 2011). A common doctrine among many pastoralist communities is that livestock quantities should be maximized. This has historically resulted in condemnation from some anthropologists and scientists as available grazeland declines and drought frequencies increase yet maximizing the number of livestock was believed to serve as a form of insurance, security for family needs, and a method to cultivate alliances (Oba, 1987). Additionally, the larger the herd the more milk available for consumption, sale, or trade. Milk is a vital component for many pastoral ethnic groups, serving as the focal point for sustenance, ceremonial practices, trade, medicine, and commerce. For many groups, fresh cow blood plays this role as well, making livestock the foundation to the health and success of all pastoralist communities.

For the purposes of this study as related to Tanzania, two key types of pastoralism along this spectrum are discussed. The first is pastoralists that practice transhumance and a second form is agro-pastoralists who participate in some mixed form of both crop cultivation and pastoralism. Various forms of these two pastoral 'types' exist across some 19,681 communities in Tanzania (Ellis et al, 2013), including the Maasai, Sambaa, Mbulu, Pare, Wamburu, and Zigua

ethnic groups. For a majority of these pastoral Tanzanian communities, there has been a large shift towards sedentarization and alternative economic gains through agricultural practices in recent years. In today's agricultural and industrialized world, they are now often forced to settle or legally and socially forbidden to mobilize their livestock. These reasons are often based on a variety of factors involving the nation's economics, policies and the political state, environment, and population growth and migration (Fratkin, 2005).

2.4 Young adults in pastoral communities

Young adults play a variety of crucial roles in pastoral communities. Due to the labor-intensive nature of a pastoral lifestyle, young adults must contribute heavily to the cattle workload to increase food access and economic security for their family. Prior to sedentarization, young men were expected to fully support transhumance efforts and thus spent a significant amount of time traveling across land with herds (Fratkin, 2005). As a result, historically pastoralist communities often refrained from participating in the state-led education, health care, and economic systems.

Today, involvement in these systems has increased as a result of the sedentarization of pastoralists in towns (Fratkin, 2005). This reveals a contradiction that pastoralist families struggle to navigate: balancing the benefits of youth being in school with the needs for assistance in maintaining enough livestock for familial needs and wellbeing. School is a growing priority for pastoralist communities as they strive towards economic security and wellbeing (Fox, 2017; Fratkin, 2005). In many communities both young men and women are being increasingly encouraged to attend school with the perception that it will increase income for the family, yet for women this often also coincides with the added responsibilities of augmented income generation (such as selling milk at the markets) and domestic welfare (IFAD, 2012) and overall

enrollment rates remain low (Fratkin, 2005). Outside of education, young women will often capitalize on sedentarization by participating in income-generating activities, such as selling milk or wage-labor like farming, and young men might gain more power originally held by elders and play a role in the trading or selling livestock and meat (however the role of women in this area is growing) (Fratkin, 1995; Fratkin, 2005). Young pastoralists have also begun engaging more in trainings for job opportunities and the various levels of governance (Kesa, 2011). While educational participation has clear benefits on breaking the cycle of poverty, pastoralists are observing that it comes at the cost of practicing full transhumance and the ability to continue practicing cultural traditions and rituals. Additionally, increased responsibilities for young women and reliance on young men for the grazing of cattle means that pastoralism is not being practiced by many of the young adults in pastoralists communities (Mung'ong'o, 2003).

Shifting Social Connectedness

Prior to sedentarization, much of pastoral groups' lives were spent in isolation from other groups, traveling through forests and across arid landscapes. For the most part social connectedness was historically defined by the bonds you had with individuals from your same ethnic group as there was little involvement with 'outside' groups (Fratkin, 2005). Yet, since the start of a long shift towards sedentarization, there have been drastic impacts on the social connectedness of pastoralists. As pastoralists move to towns and participate in more diverse income-generating activities, an expansion in interethnic exchange and interactions overall are observed (Yurco, 2011; Mung'ong'o, 2003). Furthermore, young women are beginning to support trading or selling across a wider population through building interethnic relationships, as they have historically been absent from land and clan conflicts (Flintan, 2011). There have been reports of a reduction in the supremacy of male elders paired with greater autonomy for women

through growing and selling farm crops (Fratkin, 2005). While little research focuses on social connectedness specifically, it can be observed that a shift occurs due to shifting climate, increased selling at markets, and more pastoralists moving to towns or urban centers. (Fratkin, 2005; Fratkin, 2006; Shell-Duncan, 2000; Mung'ong'o, 2003).

2.5 Sedentarization of pastoralists—Causes and Impacts

The causes of sedentarization and increased agricultural reliance are numerous and complex. Climate change, population growth, economic pressures, government interference or neglect, political uncertainties, and the need for steady access to resources each play a role in the settling of pastoralists (FAO, n.d.; Fratkin, 2005; Salzman, 1980). Their movement and reliance on land and water results in pastoralists being vulnerable to a variety of difficulties, particularly the impacts of climate change. An increase in the frequency of droughts and severe weather events, such as flooding, have diminished pastoralists' access to water sources and grassy rangelands. Furthermore, these climate changes lead to escalated risks in burning rangelands, an influx of invasive species, and changes in composition of grasses eaten by livestock (Sangeda, 2014). Population growth of both Tanzanians and livestock and a government focus on the commercialization of large-scale farms further strains the limited rangelands and resources available to pastoralists, often resulting in land conflicts over the rangeland ownership and access between farmers and pastoralists. As climate change and population growth push pastoralists away from rangelands, the resources available in towns and encouragement of settling by national and international organizations pull pastoralists to permanent town life. Towns offer income generating activities, such as farming, and access to markets, clean water, schools, and health care. A lack of regular access to these resources place unique burdens on pastoralist

populations and put them at high risk of falling into poverty now that food insecurity, climate change, and political strive are additionally at play.

In the past, settlement has been promoted by governmental, nongovernmental, and religious organizations as a way to reduce inter-ethnic conflict around land resources, increase their access to town resources and famine relief, integrate them into the national agenda and economy, and rid them of their "primitive" lifestyle. In some cases, land, tools, and building supplies were offered as rewards for settlement within a specific area (Fratkin, 2005). Altogether, the push and pull of these factors create a strong drive among some pastoralist groups to settle in towns and shift to a more mixed agricultural/pastoral, or purely agricultural, lifestyle. An additional factor of sedentarization is government manipulation or neglect. Government rangeland policies and privatization interests, boundaries defined by politics, and unpredictable land tenure changes has often been neglectful (non-intentionally and intentionally) of the needs of pastoralists. Each of these factors has led to additional land conflicts, stigma, and disagreements between pastoralists and farmers, further pushing pastoralists to leave their mobile lifestyles (HPG, 2010; Fratkin, 2005; Regassa, 2018; Chatty, 2007). The effects of sedentarization are complex due to the benefits and repercussions that simultaneously result from this change in lifestyle. Additionally, sedentarization impacts are also highly situational because of the large variability that exists between pastoral groups. That said, generally speaking a key characteristic of sedentarization is that regular access to healthcare and increased attendance at schools for pastoralists lead to increasing interactions with healthcare providers and educators. Additionally, farms are seen as a more dependable form of income than animals, which rely greatly on availability of grass, water, and large spaces (Fratkin, 2005). Another characteristic observed at times is that pastoral women typically experience greater autonomy and, as a result,

regard their less mobile lifestyles as improvements (Fratkin, 2005). Notably, social connectedness and social capital have shifted (often increasing), which cultivate opportunities for improved cognitive development, physical fitness, and mental wellbeing through strengthened bonds, bridges, and linkages (OECD, n.d.; Fox, 2017). Moreover, encouraged sedentarization in some cases has resulted in a decrease in conflicts, as seen in Kenya when the Rendille were persuaded to settle by the African Inland Church and other Christian groups (Fratkin, 2005).

From these factors, sedentarization has negatively impacted physical health for many pastoralist populations. Studies reveal that, after centuries of a nomadism and a high-fat diet of primarily milk and dairy products, cholesterol regulation is maintained in a homeostasis due to genomic changes (Wagh, 2012; Bhatia, 2012). A shift away from this high fat, high protein diet can have detrimental impacts. As a result of decreased access to rangelands from settlement the number of livestock that were maintained diminished, negatively impacting the communal sharing and offering of livestock that cultivated relationships among and across pastoral groups. It is determined that the ratio of people to livestock necessary for sustainable production and nutritional benefits is 3.5 to 4 livestock units per person, yet settlement in towns has caused many pastoralists herds to drop below this ratio due to decreasing access to rangeland. This results in the availability nutritious dairy and meat products and the sustainability of their herds to decline (HPG, 2010). Although sedentarization was encouraged as a measure to decrease interethnic conflict surrounding land use, pastoralists are still exposed to violence and conflict within towns (Mung'ong'o, 2003). Migration to towns where land and resources were already strained paired with the stigma and lack of understanding of pastoralists meant that conflict has remained a part of their lives (Fratkin, 2005; HPG, 2010; Pike, 2018; Pike, 2009).

Given the extensive diversity that exists within pastoral communities, the conviction that universal sedentarization projects will improve the social and health outcomes of all pastoralists are flawed. Many sedentarization efforts were implemented without an accurate and thoughtful understanding of what the true effects on pastoralist community systems, health, and individual well-being would be. With the upcoming presidential elections and growing unrest between farmers and pastoralists, Tanzania is in a unique position to create policies and initiatives that uplift the pastoral practices that economically benefit the country while upholding the importance of farming and agriculture. A comprehensive strategy has the potential to alleviate many of the pressures that result from sedentarization of pastoralist communities.

2.6 Shifting diets in pastoral communities

Proponents of sedentarization projects believed that settling would increase the nutritional statuses of pastoralist populations due to increased availability of food and healthcare, yet this has not been proven to be the case and is, in reality, highly dependent on a number of individual, household, and community-level factors (Fratkin, 2004, Shell-Duncan, 2000; Sellen, 1999). For transitioned pastoralist children, their nutritional status remains the same or worsens after settlement. A worsening nutrition status is revealed by increased prevalence of stunting and malnutrition of settled children when compared with nomadic children, upon controlling for the individual and household factors (Shell-Duncan, 2000; Sellen, 1999). This is more often seen in boys than girls, particularly in adolescence, and has continued physical and cognitive ramifications well into adulthood for all (Shell-Duncan, 2000; Sellen, 1999). Similarly, Dan Sellen found that nearly half of all the women and half of all the children within two seminomadic populations were malnourished. This prevalence grew higher for women that were lactating at the time of the study. (Sellen, 2000). Rates of diarrhea and respiratory infections have

also been found to be higher among settled children when compared to their nomadic counterparts (Shell-Duncan, 2000; Fratkin, 2004).

Sedentarization of pastoralists and the resulting shifts in social connectedness permeate several aspects of food intake. Historically, most Tanzanian pastoralists used milk and cow blood products as their main form of sustenance and additionally grilled or boiled meats while foraging for edible vegetation (O'Neil, 2011; FAO, n.d.). Fully nomadic pastoral diets are, even today, rich in protein and low in calories, but was also characterized by seasonal variations. Milk, blood, and meat are highly valued in mobile communities and serves as main forms of sustenance (with milk accounting for 30-66% of pastoral diets in East Africa) during the wet season (Galvin, 2015; Fratkin, 2005). Dry season diets consist of more cereals and grains to account for the decrease in productivity of livestock. For several Tanzanian pastoralist communities, fish, eggs, and chicken are considered taboo (Blench, 2001; Chege, 2015).

Since sedentarization there has been a shift, specifically among young adults and children, to eating more maize meal and processed foods (Hauck, 2017; Fratkin, 2006). Although milk has been shown to play a critical role in the health of pastoral children, upon settlement access to milk decreases due to both a decline in the number of livestock able to be maintained on small plots of land in towns and the lack of access to larger rangelands (Fratkin, 2004). Vegetables are cultivated as pastoralists shift to farming (Fratkin, 2005), yet little evidence exists on what proportion is sold versus eaten and whether or not this verifiably increases dietary diversity. These declines in nutritious foods are particularly detrimental for women of reproductive age and children under two, populations who have the greatest nutrition needs, and frequently correspond to an increase of anemia, malnutrition, and risk of infectious diseases (Fratkin, 2006; Galvin, 2015).

2.7 Gaps in Research

Pastoralist communities have historically been excluded from a majority of research efforts, resulting in a lack of sufficient publicly-available information on their history, demographics, social structures and norms, and dietary changes over time with which policy can be informed. Fully understanding how the negative and positive implications of sedentarization at its various levels manifests into social wellbeing and health outcomes is still not fully understood due to gaps in research around the high variability that exists across pastoral and agro-pastoral groups. Few studies include social connectedness or social capital and its influence on pastoralism, both prior to and post sedentarization. Additionally, it is rare to find studies highlighting the social determinants of health for pastoralist young adults and youth after the occurrence sedentarization. More globally, across all populations the effects of social networks and norms in healthy eating and health-seeking behaviors is lacking, as social connectedness and capitol in relation to diet are relatively new fields of thought. This has led to a lack of full understanding of the route in which diet change occurs, especially among the young adults of pastoral communities. It is the research team's hope that this study of how social connectedness influences dietary change will reveal the importance of further studying the links that exist between social connectedness and diets within young adults of pastoral and agro-pastoral communities.

Chapter 3: Methods

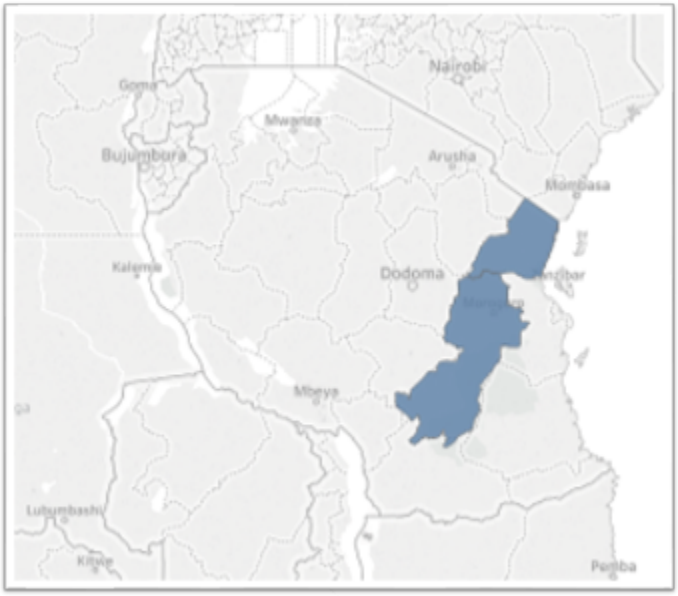
3.1 Introduction

In an effort to inform policies and practices that impact the livelihoods of Tanzanian pastoralists, this study examines how sedentarization affects social connectedness and impacts

the food preferences and diet of young adults in transitioning pastoral communities in Tanzania. This thesis uses data from a longitudinal, mixed-methods study implemented by a multi-disciplinary team of researchers from Emory University (EU; the lead institution), the International Livestock Research Institute (ILRI), and Sokoine University of Agriculture (SUA).

3.2 Population and sample

The study was conducted in Eastern Tanzania where Maasai, Sambaa, Mbulu, Pare, Wamburu, and Zigua pastoralist groups reside. The sampling frame included pastoralist communities across the two regions of Tanga and Morogoro and comprised 29 purposively selected communities. Purposive sampling was based on sedentarization levels, proximity to a market, and participation in the MilkIT program (a program developed by the ILRI to improve pastoralists ability to sell their dairy products).



Map of the Morogoro (southern) and Tanga (northern) regions where the study took place. (Image developed by author using Tableau)

From these 29 villages, 6 villages were again purposively selected to capture different levels of transition and sedentarization, access to rural and urban markets, and community demographics to achieve diversity in the sample of villages. Three sedentarization levels were

identified: Intensive sedentarization (n=1), extensive sedentarization (n=2), and extensive pastoralism (n=3). The extensive pastoralist communities were defined as having large herds of more than 20 cattle (typically indigenous breeds) and members of the household that practice transhumance. Of the three villages, all have multiple tribes cohabitating except for one, which is 100% Maasai. Two villages were categorized as extensive sedentary since these communities had smaller herd sizes of hybrid breeds and were also usually farmers. The community identified as intensive sedentary is due to its agricultural focus with households typically having small numbers of cattle per household managed using a zero-grazing system.

3.3 Data Collection

The larger study used a Grounded Theory approach to collect two rounds of qualitative research consisting of focus group discussions (FGDs), household in-depth interviews, market surveys, and key informant interviews, were performed in each village. Participant groups were stratified by ethnicity, age group and gender to ensure the collection of rich data across multiple perspectives. This sub-study focuses on the FGDs performed with male and female young adults aged 16-25 years in these communities. A total of 18 FGDs were conducted with young adults. Twelve of these occurred in the first round of qualitative data collection (two within each of the six communities, spanning all sedentarization levels) and six in the second round of discussions (two within each of the three communities, only done in extensive pastoralist communities). Round one, conducted in the lean season (Jan-April) explored existing diets (including preferred and avoided foods) and main food group types, food sustainability, availability and accessibility, market purchasing habits, food preparation and selection methods, food valuation, perceived health of foods, gender roles and how each of these are changing in all 8 villages. Round two conducted during the harvest season (Sept-Oct) further explored changes in the types of foods

people eat and the frequency of this, shifts in food preparation methods and why these are changing, the importance of milk and blood, how food and livelihood changes affect young adults, influencers of food choice, and the dissemination and usefulness of dietary information. Due to funding constraints, round two was only conducted in the three extensive pastoralist communities from round one. The round two focus group discussions also incorporated a ranking activity in which participants ranked what they believed to be the key drivers of dietary changes among the population. A ranking of one meant that topic was the most important with higher numbers consecutively declining in significance from the first. Furthermore, social and wellness outcomes that occur when these categories of food consumption are or are not achieved, household roles, decision-making, and responsibilities surrounding food production, sale, preparation, and consumption, and the time allocation of food-related work and the value of ease in decision-making surrounding food were also explored. Findings from the first round of data collection informed development of areas for further investigation and subsequent research tools used in the second round of data collection. During the FGDs, a multitude of participatory activities, such as pile sorting and free listing, were utilized to supplement the discussion questions. Across both rounds FGDs lasted, on average, 1 hour and 42 minutes and averaged 8 participants. Ethnic groups represented within the young adults FGDs included Maasai and Zigua pastoral groups. The FGDs were, with participant permission, recorded and later verbatim transcribed in Kiswahili. At the end of each field day, field supervisors conducted detailed debriefs of collected data to aid in rapid analysis or to quickly implement data quality solutions, such as a question being asked in a way that doesn't provide rich data. Upon verification of verbatim transcription, the documents were translated to English and again reviewed by bilingual team members for verification. Detailed notes were taken during the discussions to supplement

the transcripts. Recordings were also reviewed by supervisors to rapidly problem solve as needed.

3.4 Ethics and Informed Consent

This research study was approved by Emory, SUA, ILRI and Tanzanian ethical review boards. The study details along with the confidentiality and privacy of participant's information was clearly and completely explained in Kiswahili or Maasai language through the use of translators. Once fully explained, the participants gave verbal consent to participate. No young adults under the age of sixteen years, the age of consent in Tanzania, was interviewed. Compensation for participation included provided snacks and monetary remediation for transport.

3.5 Data Analysis

Upon verification of translated verbatim transcriptions, data were imported, memoed, segmented and coded in MAXQDA Analysis Software for verification. For this thesis, eighteen FGDs with young adults were analyzed using the Grounded Theory approach. Memoing was performed throughout all FGDs, which led to the development of the code book. A mix of inductive and deductive codes were produced to encompass both the emic perspective of participants and the theoretical perspective of existing literature. Deductive codes obtained from literature were then validated with the focus group discussion data. The code book was then tested and verified through the use of an Intercoder agreement. Early testing of the code book resulted in a 63% agreement, but this percentage improved over time. Code development stopped at saturation.

Analysis was done using constant comparative analyses. Comparisons by deductive and inductive sub-groups, specifically gender, location and pastoral livelihood status (i.e.

sedentarization level) were performed. These cross comparisons of specific codes, categories, and groupings allowed for the identification of patterns and deepened understanding of diet change and social connectedness among young adults in pastoral and agro-pastoral communities.

Preceding the conceptualization of data and theory development, categories of codes that represent broader concepts were grouped together. Literature was further reviewed to determine the similarities between previously developed categories and theories. These categorizations lead to clearer knowledge on the links between codes, leading to conceptualization of the data. A 'big picture' approach was taken for data conceptualization, in which a matrix of the links between codes were explored (Hennink, 2011). Visual diagrams were developed using R statistical software and Lucid Charts. Ultimately, these methods resulted in a theory of how social connectedness impacts the food preferences of young adults among transitioning pastoralist communities.

Chapter 4: Results

4.1 Results

Social connectedness is revealed as a key driver of dietary change among transitioning pastoral communities due to shifts that occur in education, religion, interethnic exchange, and population migration. These shifts most often occur through increasing access to information and, in turn, alter social connectedness and its manifestation within the pastoral communities in this study. These shifts in social connection have reshaped social and cultural food norms and accepted knowledge of foods. Varying degrees of these changes were observed across the intensive sedentary, extensive sedentary, and extensive pastoralist communities with the greatest shift being observed in the intensive sedentary communities. The process of how these occurred

was developed into a theory using the Grounded Theory approach (figure 1). Many of the FGDs cited negative consequences that were perceived to be a downstream result of sedentarization, including decreased livestock numbers and lack of food affordability. Interestingly, when positive results were noted as due to sedentarization, it was young adult women discussing them, as it pertains to increased autonomy. This is reflected in the analysis of sedentarization levels, stemming frequently from the opportunity for women to enter into income-generating activities as sedentarization increases.

Dietary Changes

Pastoralists' diets have shifted substantially over the past few decades. First, young adults are valuing food items differently from their elders within the same community. The items more often valued today are processed foods, sodas, and fruit juices, and the main method of cooking has shifted from boiling and grilling to frying. There is less concern in avoiding foods previously taboo to eat, such as chicken, eggs, and fish and, at the same time, a decrease in valuation of traditional pastoralist foods such as milk and blood. While differences exist between ethnic groups, (i.e. the Zigua do not traditionally drink blood but the Maasai traditionally do) we see this spanning the sedentarization levels where avoided foods held high cultural importance for extensive pastoralists, but less cultural importance among the extensive and intensive sedentary communities. Changes in food accessibility accelerates these shifts – over time cereals, milled grains and maize, and processed foods have become increasingly available and affordable. This is in sharp contrast to traditional foods such as dairy and meat products and gathered vegetables that formally constituted much of their diets and whose availability has declined substantially over the past several decades.

Social Connection

In many ways, the young adults in pastoralist groups have led the way in diet changes. The shifting dynamics of social connectedness, particularly that of males, has allowed them increased contact with people of other groups. Access to education, travel to nearby markets and townships, increased engagement with religious institution, and inter-ethnic exchange as result of migration drive these shifts in social connection and have led to increased knowledge of, and exposure to, new foods, drinks, and ways of cooking. With these experience, youth often bring home new knowledge of nutrition, flavors, cooking methods, and ideas about socially acceptability of foods or new ingredients. This information is then shared with women who cook for the entire household. Young adults are also frequently the household member who purchases items from markets or nearby, larger towns. This activity increases their exposure to the packaged and processed foods and their relative availability, affordability and convenience. As a result, valuation of processed foods is rising. Discussions with young adults about which foods are preferred, used during ceremonies or celebrations, or perceived to be foods for 'the rich' were increasingly identified as processed foods. For example, the demand for and incorporation of soda and fried items into weddings or naming ceremonies by young adults evidences the increasing valuation and social acceptance of these foods. In this broad way, the new connections young adults make through schooling, travel, and increased interactions with others drive the diets and preferences of the entire household.

In the next section we explore more explicitly each of factors creating shifts in social connection and how these contribute to diet change.

Drivers of Change in Social Connectedness

Interethnic exchange

Historically, pastoralists would spend their time navigating forests and not enter towns. With sedentarization there are higher levels of intermingling and cohabitating with other tribal groups. An example of what cohabitation of ethnic groups across one extensive sedentary community looks like is a categorization of 40% Zigua people, 40% Mburu people, and 20% other groups. This reveals the clear shift that is occurring from a time when pastoralists would interact only with their ethnic group to at least three ethnic tribes often residing in a town. Through daily life, social connection is built across tribal lines rather than solely within tribes. From these interactions, modeling of other people, social or cultural cues, and environmental cues can readily occur. Interethnic exchange, the most frequently recorded code among all age groups but especially youth, was most closely linked to changes in diet in extensive sedentary communities, followed by intensive sedentary and (lastly) extensive pastoral communities. This logically follows the number of interactions that occur outside of one's own ethnic group, with the fewest occurring in extensively pastoral communities (due to their time being nomadic with livestock) and the most in intensive sedentarization, which has ample opportunity for interethnic relationships). A young man from an intensive sedentary community put it clearly,

> "Nowadays food taboos have declined because of social interaction, people move from one place to another, on their movement they learn new customs and norms, and forget some of their tribal customs. For example, in past years people were not allowed to eat wild meat of [a type of animal called the] "red parahala" because it was said that when you eat its meat, you suffer from leprosy. Moreover, in the past years pregnant women were not allowed to eat eggs, more especially among the Sukuma people." (Youth Male).

Interethnic exchange is most heavily discussed as a driver of diet change as sedentarization levels increase in all villages except one extensive sedentary community. Given that this

community is comprised of at least three ethnic groups, its likely interethnic exchange is happening and perhaps it was being identified as falling within other drivers (such as access to information or education) by the focus group participants. This form of exchange happens across the community, as was previously mentioned through education and religion, yet also outside of the community when young men and women travel to nearby towns for income-generation (i.e. at hotels or markets). Interethnic exchange also has the opportunity to take play through interethnic marriages.

As a way to visualize the key findings that significantly alter food choice through shifting social connectedness, a network plot was developed (figure 2). The network plot serves as a 'cognitive map' with the larger and more central circles having more importance on shifting diet as shared within the FGDs. The lines connect any co-occurring topics with the line thickness representing the frequency of co-occurrence. The network plot developed reveals the central importance of interethnic exchange and access to information and education in driving the shifts being seen in pastoral diets. These topics then link to several other more peripheral topics, such as population migration and technology. Many of these topics inherently affect the others, yet the network plot allows for a visual representation of how this manifests.

Education

Education was a key topic for all communities, regardless of sedentarization level. Surprisingly, schools was just as much a source of pride for extensive pastoralist families than they were for intensive sedentary communities, with one female focus group discussion member stating

> "Yes, it is very important because if you have education, you will help your family and develop your society, because if you have education there are some development issues

which will be achieved, moreover you will educate and help your brothers and sisters" (Youth Female).

This prioritization of education across sedentarization levels and age groups might be historically rooted in the Tanzania's efforts to provide universal education to children as part of the Musoma Declaration in the 1970's (Chongo, 1994). One elderly pastoralist from an intensive sedentary community shared

> "So many people did not have some positive drive towards education; but with the mixing of tribes and getting ideas from various areas; this has changed and now many people like education and are sending their children to school" (Elder male).

This quote highlights the significance of education to various age groups and the pride they each hold. Additionally, education was mentioned in frequency only second to interethnic exchange and ranked highly by many, making it one of the top three drivers that alters social connectedness and diet. Education serves in this role by facilitating new relationships and interactions that promote the exchange of food norms and preferences. One young adult male from extensive pastoralist community states,

> "When kids/youth go to school they associate with different people from different other tribes and who have different ways of life (e.g. cooking) so the kids learn and adopt those ways and once they went back home they practice those new ways" (Youth Male).

The relationships students build at school shifts their awareness of foods and cooking, leading to them trying new food items (such as chips or processed foods) and encouraging those that cook in their households to fry items rather than boil them. Frying foods was an important finding that came from analyzing the impact of education as a driver for diet change.

Importantly however, school can only be achieved for some children in the household and rarely to completion as school fees and uniform prices are prohibitive. This frequently means that, while school is growing in importance for all genders, young boys will attend school longer than girls, a fact made clear by the less frequent mention of the benefits of education during young adult female discussions. While young pastoralist women overall are participating more in school, at the same time their responsibilities towards the family have increased as women are now participating in income-generating activities, such as selling chickens and milk at markets along with their typical household responsibilities to support the family. Furthermore, both young adult men and women attending school highlighted the nutrition education and hygiene measures that are taught at school as a driver of healthy diet change for them and their families.

Religion

Religion plays a key role in shifting social connection, and subsequently diet in much of the same ways as education. Through seeking religion and participating in new religious activities, young adults interact with people of different cultural and social backgrounds. Increased sedentarization allows for young people of different ethnic backgrounds to come together in the name of religion more frequently, and religious organizations might draw settling pastoralists in by offering resources for settlement and food aid. Once a relationship of trust is established, their understanding of food norms is altered, and they begin to practice modeling of the other person's or people's behaviors. Christianity is the main religion discussed as being present in the Tanga and Morogoro regions and altering diet choices. One male from an extensive sedentary community shared

> "We are educated. Many of us now know that it is not good to drink blood. But also we are forbidden in church. In the church they mobilize us not to drink blood; they say that is

only done by devils. Also we don't eat meat that has not been slaughtered. When your neighbors see you kill a cow without slaughtering it they won't eat neither will they buy the meat. So we slowly started to reduce the habit except for a few areas and occasions" (Youth male).

Religion was introduced as a key driver of decreasing raw meat and blood consumption by working to alter the social norms present within the religious context, religious organizations are able to create behavioral change. The quotes above show that in the FGDs, religion was especially salient as a driver of food preference change.

Other Key Drivers

Access to information is the overarching driver that spans across the three key drivers identified. It was observed that education increases access to information both through teaching (such as hygiene lessons) and also through increased interethnic interactions while at school. Unfortunately, this also sometimes leads to interethnic conflict. Access to information occurs within religion in a method similar to education. Through religious texts (often times the bible in these regions) and teachings along with trusting relationships, information is shared and disseminated, regardless of ethnic identity. Specifically, the information shared in church pertained directly to the cessation of drinking blood for many young adults in the FGDs. Lastly, when communicating with various types of people and ethnicities on a consistent basis, information is exchanged and new behaviors are tested. This included trying foods typically avoided and shifting to eating breads for breakfast instead of porridge, among others. Outside of education, all access to information was stated as being verbally received, except for one young female that highlighted the ability to read a newspaper due to participation in school. Particularly, verbal sharing was discussed as being present in defining what foods are healthy

and unhealthy, particularly in regard to soda, but was also highlighted as being absent in terms of passing pastoralism knowledge of foraging, traditional medicine, and food preparation methods down to younger generations. These verbal interactions that increased access to information also drove the new foods young adults tried and incorporated into their diet, such as pilau, chicken, chips, and eggs, some of which are culturally avoided foods. The majority of access to information topics were disclosed by young adult men, perhaps revealing the gender differences that remain across sedentarization levels.

Population migration was also identified as a factor transforming social connection with dietary implications. Migration into towns increases interethnic exchange and access to new information, yet at the same time further reduces grazing lands (due to increasing population density), which can incite strife and conflict. For both extensive pastoralists and extensive sedentary groups, this was perceived to be a negative driver, causing conflict and impacting milk consumption and food affordability because of these declines in available rangeland and fields. One male from an extensive pastoralist community noted

> " As changes, in the past it was very good. There were no conflicts people were living in peace, people were cultivating the land; but there are some of our colleagues who came here and started problems; it is now that we have conflicts from time to time" (Youth Male).

Cultural Expectations and Norms Shift

Changes in social connectedness influence diet in three significant ways. As social connectedness is altered, modeling of other people's behaviors and perceived social and cultural norms occurs (Cruwys, 2015). This has immense ramifications on eating behaviors for a population as modeling allows people to know what is acceptable to eat, how much to eat, and

how to eat. Food intake is greatly influenced by social influences, particularly if the person doing the modeling can relate to the other person or desires to be more like them. While much of this modeling is subconscious, evidence of this exists in participant's discussions of what foods were perceived to be "rich" and "poor" foods and what foods they sought or liked eating. There was significant overlap in the foods participants perceived, through social norms, to be "rich" and the foods they desired, often times being meat, chips, pilau (fried rice), and fruit juices. The frequently interlinking themes of interethnic exchange, religion, population migration, and access to information with changes in food preparation, food types consumed, and avoided foods reveals that community members are learning and shifting due to each other's presence through modeling actions and social norms.

Chapter 5: Discussion

5.1 Summary of Findings

Shifts in diet due to alterations in social connectedness occur within education, religion and interethnic exchange with access to information spanning all three topics. When changes in social connection occur due to these factors, community-wide shifts in dietary preferences and food intake takes place due to modeling of another person or group of people, environmental cues, and social and cultural norms. These changes mean that, while there is typically increased social connectedness with sedentarization, the nutritional practices and food values are typically negatively impacted. Young adults' diets are shifting to become less healthy, as characterized by an increased intake of processed foods, fried and bready items, maize meal, sweetened beverages (like sodas, juices, and tea), and palm or processed vegetable oil. Consumption of normally taboo and avoided foods, including chicken and eggs, has increased. Cultivated vegetable intake also

increased, although more research is needed to determine the frequency of this uptake and whether cultivation mainly for sale or mainly for consumption. A decrease in the consumption of blood, milk, foraged foods, porridges, cassava, and traditional medicines was observed. For one intensive sedentary community, food access concerns were expressed solely by men, while both men and women of all FGDs discussed concerns of food availability, regardless of sedentarization level. The significance of food availability in the FGDs was often paired with environmental shifts due to climate change and is being analyzed separately. Both men and women noted shifts in avoided foods, changes in food types, and shifts in foods deemed 'special'. Two extensive sedentary communities revealed that changes in food access were a concern of for all, with changes in food availability, avoided and special foods, and ceremonial food practices being notes. Within extensive pastoralist communities all shared that changes are occurring in food availability, preparations, types of foods eaten, avoided foods, and ceremonial food practices. Of note, extensive pastoralist communities-based food valuation on what was deemed healthy and unhealthy, while sedentary communities placed more food value on what was considered 'rich' versus 'poor'. This reveals the significance that sedentarization can have on social connection and modeling, leading to individual and societal revisions of how foods are valued and which foods are often eaten.

5.2 Key Findings within Literature

Several of the key findings of this sub-study aligned with literature around pastoral sedentarization. First, the literature reveals that sedentarization is caused by a multitude of factors, confirming the findings of this study that climate change, politics, population migration, and access to resources are a few key reasons for this pastoral shift. Additionally, literature shows that sedentarization often does not improve nutritional food intake, but rather increases

access and consumption of processed and maize-based foods, consequently negatively impacting health. This correlated closely with this sub-study in that foods of convenience, that is processed foods, maize meal, breads, tea, and fried items were often eaten by young adults. One area in which a lack of research resulted in inconsistencies was understanding the historical significance of foraging for foods and the practice of avoiding foods. It was discovered in this study that foraging for food in the forest was not practiced by youth as it had been by elders and, secondly, that there was a stark decline in the belief that chicken, eggs, and fish can't be eaten (as traditionally avoided foods). This implies a decline of pastoral traditions and culture, yet these findings are not reflected in current literature, seemingly due to a lack of previous research in these areas.

Little information about women's role in income-generation for the household was gathered in this sub-study, yet some young women discussed selling at the market and working at hotels in an urban area. Young women also identified increased autonomy as a benefit of sedentarization. These findings confirm literature discussing the shifting gender roles to include female pastoralists in income-generating activities. With these findings, we can also confirm that women's required responsibilities have, on average, increased to be able to continue successfully maintaining the family and household.

Current literature confirms the social connection findings of this study. As literature highlights a key link between social connectedness and dietary practices, so too does this sub-study within the contexts of education, religion, interethnic exchange and access to information (Lieberman, 2013; Uchino, B.N et al, 1996; Kim, H.S et al, 2006; Riley, C. et al, 2017). While little research exists on the role of religion within social connectedness, the effects of religion can still be linked due to the shifting of social norms (ceasing the ingestion of blood) within the

social ecological framework. Interethnic exchange and education are often highlighted in literature as a key driver of change of sedentarization in towns (Fratkin, 2005; Yurco, 2011; Mung'ong'o, 2003). In this sub-study, increased interethnic exchange was also paired with conflict as has been found through much of Elliot Fratkin and Ivy Pike's work along with the findings of organizations like the Humanitarian Policy Group (Fratkin, 2005; HPG, 2010; Pike, 2018; Pike, 2009).

5.3 Recommendations

Using the model of community capacity, significance is placed on developing recommendations that seek to build upon the common ground and social connections within the community. At this time, the role of social connections and capital to enact positive and desired change in these pastoralist communities are key. Consensus-based, comprehensive solutions that respect pastoralists and their livelihoods are required to ensure that social ties and networks remain strong. This should be led by the community with governmental and non-governmental organizations that implement policy present. An assessment of community characteristics that can be employed (using a positive community assessment), such as community organizations and social networks, skills like foraging, and local physical resources, such as a community center, to create a call to action for the policy-makers and implementers. Outreach by community members and leaders must occur frequently to maintain high civic engagement that allows for depth of varied perspectives. Once a clear set of values and norms has been communicated to outline steps forward, mediating structures, such as community leaders, should be the disseminators of the message to the national or international organizations that play a role in the recommended changes. Additionally, the community can utilize horizontal leadership structures to encourage informal communications around health foods that are accessible for all members

of the community with resource support from the larger organizations. For sustainability, solutions to improve dietary and health outcomes must be built from within the community, while effectively using outside resources. This respects the native wisdom communities hold and the challenges they have faced.

Most critically, government and non-government organizations are ethically responsible for enacting the changes necessary to protect pastoral knowledge and practices, along with the rangelands they utilize. This requires land tenure systems to be more inclusive and comprehensible and pastoralists to be included in incentives supporting marginalized populations. Furthermore, appointed pastoralist representatives need to have a 'seat at the table' when policies are being developed that will impact them. For this to occur, the stigma surrounding the pastoralist livelihood must be dropped, which can be done through a national marketing campaign highlighting the cultural and economic contributions pastoralists make along with their history on Tanzanian land.

The effects of sedentarization are complex due to the benefits and repercussions that simultaneously result from this change in lifestyle. With the upcoming presidential elections and growing unrest between farmers and pastoralists, Tanzania is in a unique position to create policies and initiatives that uplift the pastoral practices that economically benefit the country while upholding the importance of farming and agriculture. A comprehensive strategy built on choice has the potential to alleviate many of the pressures that result from sedentarization of pastoralist communities.

5.4 Strengths and Limitations

The systematic use of grounded theory in analyzing these FGDs provided a theory that the research team hopes can then be disseminated to stakeholders and presented for policy

improvements. The use of Grounded Theory also allowed for the inclusive of context and gave a greater understanding of the full dietary and social changes taking place. Additionally, this study was led with local organizations that have existing relationships with the pastoralist communities of Morogoro and Tanga regions, and the FGDs were carried out by Tanzanian host country nationals in Kinyarwanda, all of which aided in the development of rapport. One weakness is that pastoral communities are very diverse. This means that the weight of each driver of diet change and the role of social connectedness will differ between communities. This means that caution must be taken when generalizing the results of this study to populations that are of different ethnic groups than those included here. It should be noted that factors biasing participants responses, such as seasonality, most recent foods eaten, and hunger at the time of the discussion could be present. Additionally, the lack of research among young adult pastoralists and social connectedness was limiting to the involvement of literature in deductive analysis.

5.5 Future Work

The results of this study will reveal how social connectedness influences diet change and food preferences in a rapidly changing community. These findings have the potential to show how and where social connections and networks can be used to facilitate knowledge sharing about food valuation and nutrition across the community. Tanzanian government agencies and universities, such as Sokoine University of Agriculture, the Ministry of Agriculture, Livestock Development, and Fisheries. Furthermore, international organizations like the International Livestock Research Institute (ILRI) are able to use these findings to plan and implement projects or programs that will support pastoralists across the full sedentarization spectrum. This study will contribute to the gaps in research that exist, specifically in terms of young adults, social connections, and social modeling within pastoralist communities. This will be disseminated as

part of a larger study revealing the key drivers of diet change within pastoralist groups across the Tanga and Morogoro regions with overarching goal of the full study being to inform policy decision-making.

5.6 Conclusion

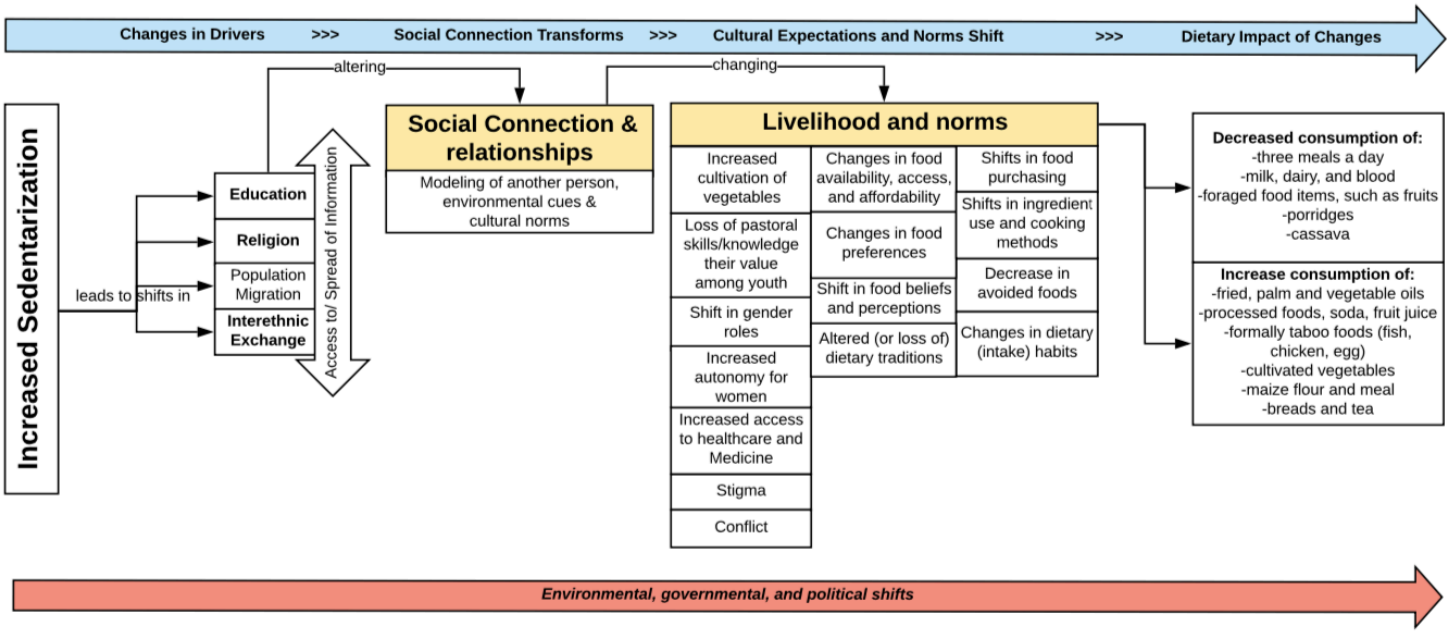
While sedentarization is a complex issue faced by pastoralists, this study provides information on the impacts of social connectedness on nutrition and food preferences when varying levels of sedentarization exist. By increasing access to information, interethnic exchange, religion, and education have critical roles in the dietary practices of settling pastoralist communities in Tanzania. Modeling of food valuation and behaviors, specifically in what is healthy and unhealthy, needs to take place in both extensive and intensive sedentary communities, which meets the proposed calls to action asked by FGD participants. The cultivation of increased education and awareness through community-wide events and classes must be community driven. This needs to be done in a manner that improves community capacity while still taking into account the context of the social ecological model and the community's place within this. Additionally, action should be taken to protect pastoral foraging and rangelands and diary practices, as these directly contribute nutritional wellbeing.

Appendices

Appendix 1: Network plot of key drivers of diet change across all age groups

This network plot represents all of the groups and is not stratified. The size of the nodes (circles) corresponds to the frequency of the code. The more a code was used in FGDs, the bigger the node. The lines show codes that co-occur and the size of the arrows approximately corresponds to the frequency of code co-occurrence. The color of the edges corresponds to the code that ranked higher on the list. [Created in R Statistical Software]

Appendix 2: Conceptual Framework of how social connectedness impacts diet



The conceptual framework above was developed using the Grounded Theory approach. It shows the progression of how sedentarization leads to shifts in social connection through education, religion, interethnic exchange, and population migration with access to information being the common link. This then leads to modeling of behaviors or uptake of norms, shifting livelihoods surrounding food. Finally, this alters dietary preferences, practices, and food valuation. Environmental, governmental, and political shifts can affect this process at any stage.

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