Livelihood Decisions “Choosing” Protein Deficiency: Relationship between Meat Consumption, Livestock Production, and Globalization in the Bangatan Household

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SIT Study Abroad

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Livelihood Decisions “Choosing” Protein Deficiency:

Relationship between Meat Consumption, Livestock Production, and Globalization in the Bangatan Household

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Spring 2013
Dedication
To my family! Mom, Dad, and Kels, who knows where I’d be without you. Thanks for always being there for me and making my life so amazing. Your support for this African adventure has meant everything to me. Thanks for helping this “child of the wild blue yonder” live out her random adventures and travel dreams!

“There’s a lesson here…”
-Tim Wood

“If I had no sense of humor, I would long ago have committed suicide.”
-Mahatma Gandhi

“An eye for an eye only ends up making the whole world blind.”
-Mahatma Gandhi
Acknowledgments

This project would not have been possible without the help of my wonderful translator and homestay brother Gifti. He went over and beyond the call of duty, was so easy to work with, was extremely flexible in scheduling, and made me even more excited about my study. He also cooked me an amazing feast at the end; overall the best brother!

I also owe immense thanks to Hosiana, Mama Joseph, and Moses for making my stay in Bangata so comfortable. The center was a beautiful sanctuary to live at.

The people of Bangata were even more amazing this time around. Thank you so much for welcoming me into your village. I felt even more at home during this stay and enjoyed our conversations in my very broken Kiswahili.

To the all the families whom I interviewed (especially the homestay families): you made this project almost too easy. Everyone was extremely helpful, informative, inviting, and receptive. Never imagined the interviews would go so well, and it is all thanks to your cooperation and welcoming arms!

Thank you Baba Jack and Baba Jerry for being the perfect teachers and mentors. You have both conquered the balance of letting of us explore independently but being there to rely on, talk to, and get advice from. Thank you!

Toots! Thank you so much for making this trip even possible. I never imagined this experience to be so fulfilling and am so grateful for your help in getting me here.

Mom, Dad, and Kels: Love you! Thank you for your love and encouragement. I thought of you guys everyday and am so thankful for your unconditional support.
Abstract

This study examines the protein deficiency in Tanzania from a livelihood, decision-based perspective, by looking at household decisions concerning meat protein consumption and production, in the Bangatan village area. More specifically it examines decisions regarding selling livestock rather than consuming it, the purpose of this cash generation, and globalization’s effects on these livelihood decisions. Predictions included: 1) no correlation or possibly a negative correlation between amount of livestock owned and meat protein consumed 2) families with more cash wealth eat more meat and 3) globalization has affected livelihood decisions regarding the direction of cash over the last 10 years by increasing cash demand, expanding the product market, and altering family priorities. The study involved nonrandom, semi-structured interviews with 30 different households (n=30) (20 of which were previous homestay families) and 3 key informant interviews, a local butcher, a local veterinarian, and the health clinic, in the Bangatan village area near the base of Mt. Meru, from April 5th to April 19th, 2013. The study found that meat consumption is more correlated to wealth (correlation coefficient= 0.276) than household livestock numbers (correlation coefficient= 0.079), although neither have a strong correlation. Families view livestock as business (not food sources) and most commonly use the cash generated from livestock for school fees, followed by household basics, followed by livestock restocking and care. There was also a lack of knowledge regarding protein and nutritional benefits of meat protein. Lastly, the said direction of cash from household livestock business (cash towards school fees) was representative of families’ priorities based on a random priority ranking list that the families completed (10 most important, 1 least important). When analyzing averages, school was number one (9.2), followed by electricity and plumbing (7.4), followed by food and nutrition (7.3) (n=10; range=1-10). Tanzania’s solutions for protein-energy deficiency must incorporate several livelihood factors, including: nutritional education, income, availability, money-spending behaviors and patterns, and changes in priorities.
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Introduction

One of World Health Organization’s largest efforts is improving malnutrition in developing countries. Nutrition is a vital requirement for body growth and increased defense against diseases (Akre et al., 1993). Protein-energy malnutrition is one of the most common forms of malnutrition, especially in children under the age of 5 (Akre et al., 1993). Protein is a vital part of one’s diet because it: builds body tissues, produces hormones, and enzymes, regulates body processes such as water balancing, nutrient transport, and muscles contraction, helps resist diseases that are common to malnourished peoples, and prevents fatigue by increasing stamina and energy (Georgetown University, 2005). The Food and Agriculture Organization of the UN and World Health Organization recommend 0.75g of protein per kg of lean body weight (Akre et al., 1993). (USFDA recommends an average of 55 grams of protein daily for a person weighing 150 pounds.) Western medicine identifies protein as an essential component to a diet “in order for the body to manufacture its own proteins…these essential amino acids are found in cereal (grains) and pulses (legumes) and also in meat, fish, and other foods of animal origin” (World Cancer Research Fund, 1997). These animal origin foods are called complete proteins and contain all of the important amino acids (Georgetown University, 2005). Examples of complete proteins include beef, chicken, eggs, goat, and milk.

In the North and East Africa region approximately 37 million are protein-energy malnourished (FAO, 2010). One of these East African countries is Tanzania. The fact that there is a protein-deficiency in the majority of Tanzanians’ diets is not new information. Numerous studies, usually Western-science based, have concluded that there are four main nutritional deficiencies in Tanzania: 1) Protein Energy Deficiency 2) Anemia 3) Iodine Deficiency Disorder and 4) Vitamin A Deficiency (Kavishe, 1987). In 1987, out of an estimated Tanzanian population of 25 million, 28.0% were affected by Protein Energy Deficiency, the second most common deficiency, just trailing anemia which was 32.0% (Kavishe, 1987). Of the Tanzanian population that is under the age of 5, 52.0% were affected by Protein Energy Deficiency (Kavishe, 1987). Although PED has slightly improved to 25%, it is still a major health issue, affecting the growth and immunity of people, especially children (Kavishe, 1987).

Severe Protein Energy Deficiency can lead to kwashiorkor or marasmus. According to the Ministry of Health’s Food and Nutrition Policy For Tanzania (1992), Kwashiorkor’s
symptoms include retardation, swelling, non-responsiveness, loss of hair and hair color change, sores in the mouth, ears, and buttocks, loss of appetite, and severe weight loss. Marasmus’ symptoms include impaired growth, old age appearance, loose skin, extremely large appetite, and acute underweight (The Food and Nutrition Policy for Tanzania, Ministry of Health, 1992).

World Cancer Research Fund estimated that the average Tanzanian diet is 4% meat consumption, 3% milk/dair products, and 4% vegetables and fruit (World Cancer Research Fund, 1997). “Protein intake on a population basis generally varies between 10% and 18% total energy. In the developing world, most protein consumed is of plant origin, in the developed world, most is of animal origin” (World Cancer Research Fund, 1997).

When considering complete proteins (animal sources), livestock numbers and conditions are a major factor. Tanzania ranks third in Africa for livestock numbers (Tanzania National Website). “Out of 3.7 million households in the country, 3% are pastoralists and 7% are agro-pastoralists. Approximately 99% of livestock sub-sector belongs to traditional (small) owners, with big ranches and dairy farms constituting the remaining 1%” (Tanzania National Website). Cattle comprise about 75% of livestock, with mostly goats, sheep, poultry, and pigs comprising the remaining 25%. (Tanzania National Website). “Livestock sub-sector generates over one-quarter of agricultural GDP” (Tanzania National Website).

Lastly, “livestock numbers have been increasing steadily, at roughly the same rate as human population growth” (Tanzania National Website).

Yet, increased livestock does not necessarily correlate to increased animal protein consumption. “Despite rich resource, the per capita consumption of livestock products by the country (Tanzania) with a population of 29 million is only 70 kg of meat, 20 liters of milk, and 11 eggs per annum. The recommended consumption for normal human health is 500 kg of meat and 200 liters of milk per annum” (Batumuzi, 2003).

Western studies are quick to point out solutions in areas of nutritional education, protein availability, and protein distribution. However, not enough attention is given to peoples’ personal livelihood decisions regarding protein consumption. A family’s livestock numbers may be increasing, but their animal consumption may be the same or even decreasing. An increase in demand for cash, due to an increase in demand for cash goods, has resulted in changes in livelihood decisions. As the market of products bought with cash expands, a person’s demand for cash increases. Hence, many families keep livestock as a cash-making business, rather than a household resource for protein consumption.
Globalization, or “the development of an increasingly integrated global economy marked especially by free trade, free flow of capital, and the tapping of cheaper foreign labor markets”, continues to introduce new products into the Tanzanian market (Merriam-Webster 2013). Some examples of goods high in demand include electricity, cellphones, motorcycles, computers, internet, televisions, radios, and fuel. Roughly 27% of Tanzanian adults own a cellphone (Matthews pers. comm. 2013) and in 2010 roughly 14% had electricity (Gaddis, 2012). There are several definitions of globalization, however this study will focus on the economic, “product-market” side of the term, in the sense that it increases the demand for cash. Several families, especially in peri-urban areas, rely on cash crops and livestock to generate cash. They are choosing to sell these resources, rather than consume, in order to use the cash elsewhere. For example, a family may choose to raise chickens for the sole purpose of cash-generation, in order to pay for college school fees.

What are the motivations behind sacrificing household animal consumption for cash profit? And what exactly are people buying with this cash?

**Study question:** This study examined livelihood decisions concerning the meat protein consumption and production in the Bangatan village area.

**Sub-questions:** Are people choosing to sell protein resources rather than consume them? If so, what is the motivation behind doing so: where does this cash go? What products are people buying with their cash? Is protein deficiency avoidable for some families, but families are deciding to sell this protein or use their cash elsewhere for other products, such as school fees, electricity, etc.? When it comes to livelihood decisions, where do nutrition and consuming adequate protein lie in this priority list?

**Predictions:** I predicted that there would be no correlation or possibly a negative correlation between amount of livestock owned and meat protein consumed. I predicted that families who rely more on outside employment and salaries would consume more meat than those who rely more on household production and selling (in other words families with more cash wealth will eat more meat).

I also predicted that livelihood decisions have changed rapidly over the past 10 years. Globalization has increased cash demand, changed product demands, and altered priorities. This in effect has influenced livelihood decisions such as choosing to increase cash generation for electricity or college, or increasing livestock numbers to sell more (not consume more) in order to generate cash for college or electricity.
**Study Site**

I conducted my study in 4 different villages near the base of Mt. Meru: Bangata, Midawe, Engikaret, and Ngiresi, all part of the Arumeru district of the Arusha Region of Tanzania. The area is just off the Arusha-Moshi tarmac road and about 10-15 kilometers from clock-tower area of Arusha. The four villages all neighbor each other. Midawe is closest to the base of Mt. Meru (and furthest from the tarmac road). Bangata is the just below Midawe and the largest village of the four. Engikaret is west of Midawe and north of Bangata. And Ngiresi is closest to the tarmac road, southwest of Bangata, and located on the base of Kivesi hill.

According to the 2002 “Population and Housing Census General Report” performed by the Government of Tanzania (2002), the population of Bangata (a ward in Arusha Region District) is 7,612 people. The Mt. Meru village area is representative of the top 15% of Tanzania in terms of wealth (Matthews, 2013).

The land is fertile and the majority of families own multiple smaller farm plots and livestock. Roughly 4 years ago a road was paved from the Arusha-Moshi tarmac road through the villages all the way up to the base of Mt. Meru. There are multiple primary schools and a secondary school, located in Midawe (which is also a recent development). There are several dukas, butchers, churches, a corn mill, and a few bars throughout the area.

The villages’ close proximity to Arusha city and higher level of cash income (compared to other Tanzanian villages) made them ideal for a study on the relationships between meat protein consumption, livestock raising, livelihood decisions, and globalization. It is referred to as a peri-urban area, and there is a high level of commute between Arusha and the village area. In terms of globalization, the Bangatan ward is more exposed to the global market and flow of capital, due to its location and wealth. Several households have communicative products such as tvs, radios, cellphones, and a few have computers or laptops. In addition, roughly half have electricity (based on my study) and just over 60% have plumbing (based on my study).¹

¹ percentages of families with electricity, plumbing, cellphones, tvs, radios, computers/laptops, cars/ motorcycles, and outside, salary-based jobs given on page 13)

Appendix A: Map of Study Area with Interview locations
Further, I lived in Bangata during my SIT 3-week family homestay, from February 19, 2013 until March 9, 2013, so the area is familiar with the SIT program. And hence, the SIT homestay families I interviewed were familiar with my background.
Figure 1: Location Map of Study Site: Map of Bangatan Village Area (Bangatan Ward)
**Methodology**

In order to test my predictions that meat consumption (and animal product consumption \{eggs and milk\}) is not dependent on livestock numbers, but income, and globalization has increased cash demand and affected spending patterns, I needed to stay in a peri-urban area and interview about livestock, meat consumption patterns, and globalization. I conducted my study from April 5\(^{th}\) until April 25\(^{th}\) in the Bangatan village area by completing non-random interviews with 30 different households and 3 key informants: a local butcher, a local Bangatan veterinarian, and the Bangatan health clinic.

**Sample Frame:** I interviewed families in Bangata, Midawe, Engikaret, and Ngiresi, all villages located near the slopes of Mt. Meru.

**Sample Population:** I interviewed the homestay families of 19 other SIT students. (Excluded my own family and one homestay family declined to interview). All SIT students participated in a 3-week long homestay in either Bangata, Ngiresi, or Midawe (all neighboring villages), from February 17, 2013 until March 9, 2013. The families were pre-selected by SIT staff and vary in household characteristics. I also interviewed 11 non-SIT families that were non-randomly chosen by my translator and Bangatan homestay brother Gifti. All families consisted of at least one child and a mama (the majority have a mama and baba with multiple children). Houses varied: some have electricity and plumbing and are made of brick, while others do not and are made of “mud and stick.” The 19 homestay families were aware of the SIT program, and I have pre-existing relationships with some of the people. Of the SIT homestay families 2 households were located in Midawe, 5 in Ngiresi, and 12 in Bangata. Of the 11 “non-SIT homestay” families interviewed, 6 were located in Bangata, 2 in Midawe, and 3 in Engikaret. 28 of the 30 families owned livestock (93.3%), hence only 2 (6.7%) did not. Whether the mama or baba was interviewed was nonrandom and depended on who was home and willing. Of the 30 interviews, 20 (66.7%) were conducted with mamas and 10 (33.3%) with babas.

My key informants included the Bangatan Veterinarian, the Bangatan Health Clinic, and the local Bangatan butcher.

**Sample Size:** n=30 households & 3 key informants. Household= family in either Bangata, Midawe, Ngiresi, or Engikaret and consisted of at least a mama and one child.
**Non-random sampling:** 19 of my interview families were pre-selected based on the fact they had previously participated in the Spring 2013 SIT homestay. Gifti chose the remaining 11 families because he either a) knew the family or b) interviewed them last fall for a different ISP. The 2 homestay families I did not interview were my own (due to biases) and one other because the mama declined. Regarding the key informants, the butcher and veterinarian were chosen because they were located in Bangata and willing to participate. The health clinic was chosen because it is the only one in the area.

**Time:** I stayed at the SIT center in Bangata from April 5th until April 19th. I interviewed 3-4 families a day. My translator and I walked from household to household and the interviews took roughly 30-40 minutes (sometimes including chai time). The interviews were not scheduled. My key informant interviews also took roughly 30 minutes and were performed half way through the stay.

**Interviews:** The interviews were semi-structured, consisting of open-ended questions. Questions were broken into 4 categories: demographics, livelihood, household production (shamba and livestock), household protein (complete proteins: animal and animal products) consumption, perspective (regarding cash, protein, livestock, and nutrition). After the interviews, the mama or baba interviewee filled out a priority list, numbering one through ten what was most important to them to what was least important. The list consisted of school, food/ nutrition, electricity/ plumbing, cellphone, computer/ internet/ other technology, tv/ radio, medicine, car/ motorcycle, farm/ livestock, and savings account. The interviews were conducted in Kiswahili, and my homestay brother Gifti, who lives in Bangata, translated. In addition to basic demographics and family characteristics, the questions aimed to understand their meat consumption patterns, their household livestock businesses (ex. prices, who they sell to, when/why they sell, etc.), their perspective on protein, their cash flow (especially the flow of cash generated by livestock), and how globalization has affected their spending patterns.

**Modes of Analysis:** Several tables and figures were created on excel regarding meat consumption in a month, wealth (based on school fees and household products: electricity, plumbing, tv, radio, laptop/computer, cellphone, motorcycle/car), livestock numbers, and responses to cash spending questions and meat consumption.
Linear trend lines and correlation coefficients were calculated and compared for meat consumption vs. livestock numbers and meat consumption vs. wealth. To do so I created a “wealth point system” and specific way to count livestock. (Explained in results.)

A figure was created based on the families’ priority lists, with averages (10 being most important, 1 least).

Bars graphs, percentages, and pie charts were also created and analyzed for: monthly meat consumption, perspective on whether they need more, changes in meat consumption in the last 5-10 years, family numbers in different livestock businesses (ex. milk business, bull business, poultry business), number of owners for different globalization “products” (electricity, plumbing, tv, radio, cellphone, car/motorcycle, laptop/computer), perspectives on whether livestock is food or business, and where the cash from livestock goes: school fees, household basics, and restocking or caring for the livestock.

**Biases:** A nonrandom selection of 19 SIT homestay families and 11 “Gifti-chosen” families may not be representative of the Bangatan village area. Responses may be biased due to: my presence and known SIT student background, translation difficulties, Gifti’s relationship with the families (he lives in Bangata), the orientation of the questions, and the potential of meat’s correlation with wealth. Lastly, I created the priority list categories, creating a bias.

My analysis is biased due to the “wealth point” system I created and used and due to the way I counted livestock. (explained in results).
Results

1. Meat Protein Correlations:

Figure 1a: Monthly Meat Consumption vs. Livestock Numbers

1a) Correlation coefficient = 0.0787. Therefore no correlation.

Figure 1b: Monthly Meat Consumption vs. “Wealth Points”

1b) Correlation coefficient = 0.2758. Therefore little correlation.

Neither livestock nor wealth have a very strong correlation to meat consumption. However, wealth does have a stronger correlation than livestock owned (0.2758 vs. 0.0787).
2. Meat Consumption

Figure 2a Monthly Meat Consumption (pie)

Monthly Meat Consumption (# times per month, n=30 families)

<table>
<thead>
<tr>
<th># times per month</th>
<th>Families</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

2a) Percentages of families that consume meat 1-12 times per month based on interview responses to question 3 of “Household Consumption.” 56.7% eat meat once to four times per month. (17/30 families)

Figure 2b Monthly Meat Consumption (bar)

2b) Number of families that consume meat 1-12 times per month based on interview responses to question 3 of “Household consumption.”

Figure 2c: Type of Meat Consumed

Type of Meat (n=30)

- 13.30% beef
- 3.30% kuku
- 3.30% goat
- 96.70% pork

2c) Based on responses to question 3 of Household Consumption. Can have more than one answer.

Figure 2d: Perspective: Need more meat?

Need More Meat? Responses

<table>
<thead>
<tr>
<th># Families</th>
<th>Needs more meat</th>
<th>Does not need more meat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5x Per</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>6-12x Per</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Totals</td>
<td>19</td>
<td>14</td>
</tr>
</tbody>
</table>

2d) Number of families (n=30) who responded need more meat vs. do not need more meat, broken into monthly meat consumption (based on responses to question 7 of “Perspective”).
2e) Comparing responses to question 6 of “Perspective” (left) and question 7 of “Perspective” (right).

Table 2a: Meat Consumption Change (in last 5-10 years)
63.3% said consume less meat now compared to past (19/30 families)
10% consume more meat now compared to past (3/30)
23.3% consume the same amount of meat compared to past (7/30)
*based on responses to question 5 of “Household Consumption.”

Table 2b: Source of meat: buying
86.7% buy their meat from local butchers
Saturday butcher Jospeh: 6,000 Tz shillings for 1 kg of beef
7,000 Tz shillings for 1 kg of special meat (ex. liver)
Joseph buys 1 grade-1 cow each Friday at Kikatiti in Arusha for 700,000 to 800,000 Tz shillings. Transports it back to Bangata. Takes 2 hours to slaughter. Keeps skin to sell and sells the meat on Saturday and sometimes Sunday. Sells about 10 kg of cow fat and 100 kg of meat. 2 years ago the price was 4,000 Tz shillings for 1 kg of beef, now 6,000 Tz shillings. Has never purchased a cow from a local neighbor.
26.7% buy their meat from Arusha

3. Livestock Production

Table 3a: Livestock Businesses
86.7% said livestock is for business: selling animals products and sometimes animals (not household consumption of animals). (26/30)
6.7% do not participate in livestock business. (do not own livestock). (2/30 families)
73.3% participate in pikipiki milk business. (22/30 families)
26.7% participate in poultry business. (8/30 families)
23.3% participate in bull business. (7/30 families)
(at least) 50% have sold an animal (most often cow) in the last 3 years. (15/30 families)
*1 family can participate in more than one business.

Table 3ai: Most profitable livestock animal:
73.3% said dairy cow and/or bull.
26.7% said chicken.
6.7% said goat.
(“Could have said more than one answer.”)
Table 3b: Livestock Number Changes

13.3% own more livestock right now than last year. (4/30).
63.3% own less livestock right now compared to last year. (19/30).
13.3% own the same amount of livestock as last year. (4/30).

*Important to note that December is a common time to sell bulls and June/July is a common time to buy bulls.

Animal totals (30 families): 60 cows, 453 chicken, 45 goats, 10 pigs, 5 rabbits, 5 sheep

Table 3c: Slaughtering for Household Consumption Responses

Do you (ever) slaughter your own livestock for household consumption?

46.7% said yes (but only chicken and 64% of this said less than once a month)
- rarely slaughter sheep or goat; only very special occasions
- no one slaughters cow for household consumption

4. Priorities/ Money Spending

Figure 4a: Averages of Families’ Priorities

4a) Based on lists completed by all 30 families. 10 = most important, 1 = least important. School: averaged highest priority: 9.2. Food/ nutrition: averaged third highest: 7.3. (electricity/ plumbing: between, 2nd highest)
Table 4a: Spending Livestock Money
63.3% said the money from livestock business (selling animal products or sometimes animals) goes to school fees. (19/30)
60.0% said money from livestock business goes to household basics (e.g. food, house construction, savings, farm). (18/30)
30.0% said money goes to restocking and caring for the livestock. (9/30)
("Could have more than one answer, open-ended question")

Table 4b: Spending Money in General
Where does most spending cash go? (question 15 of “Livelihood”)
70.0% of families said school (21/30 families)

Table 4c: Employment
43.3% have outside, salary-based job. (13/30)
43.3% have local job (ex. pikipiki milkman, duka, church gardener, selling crops, selling firewood). (13/30)
13.3% did not list any job. (4/30)

5. Globalization

Figure 5a: “Globalization Product” Numbers

"Globalization Products"

5a) n=30 families. % families that own the above products based on responses. A nonrandom list that I created to roughly represent ownership of products purchased with cash.
Discussion

Livelihood decisions have a large effect on meat protein consumption and livestock production in the Bangatan village area. Families are definitely choosing to sell protein resources rather than consume, in order to generate cash. Livestock is seen as strict business, not as a meat source. This cash is spent in different areas of the family life, but school fees was the most common response. Livestock business and spending is representative of the families’ priority lists. 76.7% (23/30) of the families listed school as a higher priority than food and nutrition. Considering that Bangata is representative of the top 15% of Tanzania in terms of wealth (Matthews pers. comm. 2013), meat consumption is less than I initially thought it would be. Families could consume more meat by reserving some livestock strictly for household consumption. However, they are choosing to reserve all livestock as money producers. Livestock, especially cows, are seen as banks, wealth reserves, or fast cash for emergencies or specific purchases. To better infer the data, I have broken the discussion into four subsections: meat consumption, livestock production, money, and globalization.

Meat Consumption

I predicted that there would be no correlation or possibly a negative correlation between amount of livestock owned and meat protein consumed and a strong correlation between wealth and meat protein consumed. Neither one had a strong correlation, however (when comparing correlation coefficients) wealth did have a stronger correlation than amount of livestock owned.

I began the project with two misconceptions: 1) a large portion of families’ meat came from their own livestock and 2) families ate more meat than they actually do. More than half of the families eat meat only once to four times a month. And all the families purchase their meat from either the local butchers (26/30 families) or Arusha (8/30 families). The local butchers very rarely purchase animals from Bangatan neighbors, and instead purchase in town (Arusha) (Joseph pers. comm. 2013). Only chicken is sometimes slaughtered for household consumption. (Goats and sheep for very special occasions). Availability is not a problem, considering that there were several butchers. Prices were usually 6,000-7,000 per kilogram of beef. Rather, purchasing meat ranks below other purchases. Several families mentioned that they consume less meat right now due to “finances.” Purchases that rank above meat buying include school fees, household construction, farming, livestock care and
feed, and food that is not meat, such as cooking oil (commonly mentioned, due to its higher price).

One major consideration is the lack of knowledge regarding animal protein, protein, and nutrition in general. Very few interviewees recognized the word “protini,” so my translator defined it as “nyama, mayai, maharage, na maziwa.” Even with this definition, interviewees were unsure of what these foods do for the body. The most common answers were: fighting disease, building the body, and creating fat. Clearly, a lack of knowledge on protein’s benefits will affect the priority of purchasing meat or animal protein. Considering that the concept of protein was somewhat foreign, the concept of protein-energy deficiency was even more foreign. Western medicine and aid organizations spend a large amount of time and energy on improving protein-energy deficiency, a diagnosis not recognized by nearly any of Bangatans interviewed, including the local health clinic.

**Livestock Production**

93.3% (28/30) of the families participate in some form of livestock business. (The 2 families that did not participate did not own any animals.) Livestock is for cash generation not household consumption. Most families regularly sell either milk, eggs, or poultry and only sell animals for specific purchases. For example, several families mentioned selling a cow specifically for school fees. One family in Midawe explained they sold a cow in order to purchase another farm plot. Another interviewee sold a cow in order to purchase a motorcycle. A common pattern is to sell a bull in December and then purchase another young bull in June/July and repeat this process. The most common business is the “pikipiki maziwa business:” selling your milk each morning to the pikipiki (motorcycle) milkman for about 400-600 Tanzanian shillings per liter, which he then sells in Arusha. Another common pattern is to sell a cow if its milk production is low and then use this money to buy another cow. Most families own less livestock right now compared to the recent past, and at least half of the 30 families have sold an animal in the last 3 years (usually a cow).

Clearly, livestock production’s purpose is not to produce meat for Bangatans to eat, but to produce cash. The meat consumed originates from Arusha. And when the families sell their animals (with the exception of chicken) they are selling to local neighbors, and these neighbors are not slaughtering the animals.

**Money & Spending Habits**

Overall, several families stressed that finances are low right now and prices are high. When asked the general question, where does most spending cash go, 70.0% (21/30) of
families said school. When asked the question, where does the money generated from livestock go, the most popular answer was school fees (63.3% 19/30). Clearly, livestock is a major contributor to paying for school fees, and school fees are a major expense.

Further, when analyzing the averages of the 30 priority lists, school outranks food/nutrition (school=9.2, food=7.3 {10=most important}). Both spending habits and the priority lists conclude that school comes before food/nutrition. This is not surprising, since the benefits of school are better known than the benefits of nutrition. Improving protein-deficiency is not a priority for Bangatans (because it is not recognized, nor easily translated), but improving education is. Hence, the money towards school usually outweighs the money towards animal protein to be consumed.

Globalization

I predicted that globalization has increased cash demand, changed product demands, and altered priorities. This then changed livelihood decisions to increase livestock numbers in order to increase cash generation.

To start, globalization is certainly playing a part in Bangatan life, at least in regards to the product market (cash-based). Numbers were higher than I initially thought they would be for owners of: cellphones, radios, plumbing, tvs, electricity, cars/ motorcycles, and laptops/computers (listed in order of most common to least common). Globalization has increased the families’ demand for cash (or arguably dependency), and broadened their product market.

The recent road development has certainly affected Bangatan lifestyle by increasing city-life connection. For example, the road has expanded the pikipiki maziwa business and availability of meat (local butchers buy their meat from Arusha). Further, it broadens private school options. But, most importantly, rather than making more products necessarily available, it has increased the amount of products potentially desired. Hence, globalization has increased Bangatans’ demand (or desire) for cash, but has not necessarily changed or increased the products they own.

Therefore, globalization may affect livestock numbers and meat consumption by putting more pressure on reserving livestock for cash generation, but it is a stretch to directly connect the two. Connecting the sale of a cow to the purchase of a computer is a stretch. However, globalization has likely had a positive effect on keeping livestock for what families refer to as fast cash or emergency funds.
When analyzing the responses to livestock history, 63.3% (19/30) own less livestock now than previously. Hence my prediction that livestock numbers have increased for families is wrong. There is a possibility that a recent increase cash demand is responsible for this decrease, but a definite connection cannot be made.
**Recommendations and Limitations**

For future studies I recommend focusing on the household livestock as a business, since families reported livestock as business (for cash generation) and very rarely as food sources. Hence, investigation regarding the livestock business’s: history, changes in numbers and prices, patterns (buying and selling), input factors (cost of care and feed), and family’s perspective and reliance on the livestock. Creating some kind of economic short study would be ideal, including buying the animals, cost of care, selling the animals and animal products, monthly profits, and where this cash is spent.

Also, although difficult, more insight into the family’s income and employment would be useful.

Further investigation into “globalization products” and goods that families are saving for would be helpful. (My list was short: tv, radio, cellphone, laptop/computer, car/motorcycle.)

I also recommend studying school more, including differences between government-owned and private, costs/fees, and the number of kids actually attending school.

Lastly, I would again do nonrandom interviews, however I would try to pick families based on income levels, to make the population more proportionate in different income levels.

I limited my study to animal protein. I found it too difficult to study all protein because portion sizes of beans, nuts, vegetables, etc. was hard to measure, making total protein intake difficult to measure. However, I would advise more questioning on general diet. (My consumption numbers were limited to: meat, eggs, and milk).
## Conclusion

Ideally, increasing livestock numbers would increase complete proteins in the Tanzanian diet, hence decrease protein energy deficiency’s prevalence. However, from a livelihood perspective, the more likely scenario would be increased livestock numbers increases cash flow not household consumption. There is more pressure and desire to improve income not diet. This is due to 1) lack of nutritional education and 2) the increasing power of money. Globalization does play a part by increasing cash demand and expanding the product market.

Families could consume their livestock, but this could easily wipe out their stock and likely have more dire consequences than protein-energy deficiency. Livestock is a critical income contributor and reserve for emergencies.

Lastly, even wealthier families spend a relatively small amount of money on buying meat. This is due to a lack of knowledge regarding the benefits of protein and nutrients in general. “Protini” does not exist in the Bangatan vocabulary, hence protein energy deficiency does not exist. Therefore, there is not an effort to decrease PED prevalence.

School is the top priority for most Bangatans, hence a possible solution is incorporating more nutritional education in school curriculum. Knowledge regarding the benefits of a balanced diet is the most logical first step.

Western medicine and aid organizations are quick to point out the statistics and numbers regarding PED (28.0% of Tanzanian population is affected by PED and 52.0% of the population under 5 is affected by PED {Kavishe, 1987}). However, livelihood decisions are major factors that receive little attention. Families’ priorities decide where the money goes. Nutrition is not a top priority for Bangata. And whether it should be is not for an outside organization to decide. Providing Western education regarding nutrition is acceptable. Bangatans can then decide for themselves where to prioritize nutrition and food purchases.

Further, these livelihood decisions are always changing. The outside world will always have a strong influence on a family’s choices. Globalization is a player in the Bangatan household, via the television, radio, road, cellphone, and internet. “An increasingly integrated global economy” will affect people’s spending and livestock business. More specifically, it will increase the demand for cash and continually broaden the product market.
There are clearly several factors contributing to protein energy deficiency. It is not just based on income and one’s ability to purchase protein. It is a mix of preference, income, availability, education, employment, and other financial demands. There is a possibility that knowledge regarding PED could prioritize nutrition and food, however, these above factors will still play a major part.
Works Cited


Personal communication


Reese, Matthews. March 2013. Personal communication. SIT Study Abroad program Administrative Director. March 2013.
Appendix
Appendix A: Map of Study Area: Interviews

Appendix B: Interview questions (30 interviewees)

Demographics

Familia:
Past Mwanafunzi:
Una miaka ngapi:
Mama au baba:
Maritial status:
# household members:
# watoto:
Ethnicity:
Employment:
# Shambas:
Shamba size:
Livestock:
Number of each (n’gombe, mbuzi, kuku, pig, sheep):
Livelihood
1. How many of your children are currently in school? Which school? (private? Govt-owned?)
   *Watoto wako wangapi wapo shule? Na wanasoma shule gani? (private au serikali)*
2. How much does school cost for all watoto (include uniform, supply costs)?
   *Inakugarimu shilingi ngapi kwa watoto wako wote kuwaso mesha?*
3. Anyone in college? Or plans for college?
   *Kuna yeyote ambaye yupo chuo?*
4. Do you have electricity?
   *Una umeme?*
5. Do you have plumbing?
   *Una pump ya maji ou pipe yuko ya maji?*
6. How long have you been living in Bangata?
   *Umeishi kwa muda gani Bangata?*
7. Do you have a pikipiki/ gari?
   *Una gari au pikipiki?*
8. Do you have a tv? Computer? Radio? Cellphone?
9. Family extension in Bangata?
   *Kwenye familia yakwo unaishi ndna ndugu tofauti na mke na watoto wako?*
10. Daily chores?
    *Kazi za nyumbani za kila siku ni zipio?/ kazi zako za kila si ku ni zipi?*
11. Past jobs:
    *Kazi ya awali?*
12. Education level:
    *Kiwango cha elimu yako?*
13. Own house/ property?
    *Una miliki nyumba au mali yeyote?*
14. How has spending (where cash goes) changed over the past 10 years? (any major changes)
    *Kuna mabadiliko ya matumizi ya fedha tofauti na miaka kumi iliyopita?*
15. Most spending cash goes toward?
    *Matumizi yakwo ya fedha mara nyingi yanatumika wapi?*

Household Production
Shamba
   *Umepataje shamba lako? Ndoa? Kuridhi? Kununua?*
2. What crops grow?
   *Mazao gani yanaota eneo hili?*
   a) Main crop? One grow the most of?
   *Zao gani linapatikana sana hapa?*
3. Of crops grown, which are sold, which are eaten?
   *Ni zao gani linaloota kuuzwa na kuliwa?*
Livestock (Mifugo)
1. What animals own?
   *Unamiliki mifugo gani?*
2. How many of each?
   *Katika kila mifugo yako iko mingapi kuoa kila moja?*
3. Where did you get them?
   *Ume Papa wapi mifugo yako?*
4. What animal products (eg. Milk) currently obtaining?
   *Unapata zao gani kutoka kwa mifugo yako mfano? (ex. maziwa)*
5. Sell any animals or animal products?
   *Unauza mifugo yakao au zao linalotokana na mifugo yakao?*
   a) If yes, where to/ to whom?
      *Kama ndiyo, kwa nani? Na wapi?*
   b) How much do you sell each (animal and product) for?
      *Unauza bei gani kila mo ja?*

6. Brief livestock history: *(Historia ya mifugo)*
   a) Recently owned animals: *(Mifugo unayomiliki kwa sasa)*
   a. own more animals now than last year/in past?
      *Je unamiliki mifugo mingi kuliko awali?*
   b) In past year? Month? How many animals sold? And how many slaughtered for household-consumption?
   c. Other major changes in numbers/conditions/any changes in livestock from past to now?
      *Mabadiliko yeyote ya idadi ya mifugo? Afya (hali)? Mabadiliko yeyote ya mifugo na hapo awali?*

7. Future plans *(Malengo ya baadae)*
   a) Going to sell any animals soon? (Why?)
      *Unaenda kuza mifugo wowote karibuni? Na kwa nini?*
   b) How many? To whom? For how much?
      *Unauza mingapi? Kwa nani? Kwa shilingi ngapi?*
   c) Going to slaughter any animals soon for household-consumption? (Why?)
      *Utachinja karibuni kwa matumizi ya nyumbani na kwa nini?*
   d) Going to buy any animals soon? (why?)
      *Utanunua mifugo mingine karibuni? Na kwa nini?*

8. Main reason for keeping livestock? *(ex. business, family eats)*
   *Sababu maalumu ya kufaga mifugo (mfano: biashara, familia)*

9. Most profitable animals?

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**Household Consumption (Matumizi ya nyumbani)**

1. How often slaughter own animals for eating?
   *Kwa muda gani umekula zao linalotokana na mifugo (efano: maziwa, mayai)*

2. How often eat animal products (ex. n'gombe maziwa, mbuzi maziwa, mayai)
   *Kwa muda gani umekula zaomifugo yakao linalotokana na mifugo (efano: maziwa, mayai)?*

3. How often eat meat? What kind?
   *Karibuni umekula nyama? Na nyama gani?*

4. How often buy meat? Where?
   *Hivi karibuni utanunua nyama? Na wapi?*

5. Brief history: *(Historia kwa ufupi)*
   a) Do you eat more meat now than you did in the past? Or less?
      *Unakula nyama sana kuliko awali?*
   b) How many meals do you eat a day?
      *Unakula milo mingapi kwa siku?*

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**Perspective (Experience/belief)**

1. Is diet important? Why?
   *Mfumo wakula ni muhimu? Kwa nini?*

2. What is protein? What does protein do for your body?
   *Protini ni nini? Na protini inafanya kazi gani kwenyu muuili wako?*

3. What foods have protein? (Which one has most?)
   *Vyakula gani vina protini? (Na vyakula gani protini kwa wingi/ zaidi)?*

4. What is your favorite meal to eat?
   *Chakula gani unapenda kula?*
5. Example of a healthy meal:
*Mfano wa vyakula venye afya?*

6. Do you get enough protein?
*Je unapata protini ya kutosha?*

7. Do you need more meat in your diet?
*Je unajitaji nyama nyinyi kwenye chakula chako?*


9. If livestock more for eating or for selling? (more business or more food)?
*Mifugo ina liwa au kuuzwa zaidi?*

10. Why do you sell your livestock rather than eat it? What does the money go towards?
*Kwa nini unauza mifugo yako zaidi kuliko kula? Mafumizi ya hala yanaenda kwenye nini?*

11. Do you sell more now than you did in the past? (has ratio of sell to consume increased or decreased or same now vs. 10 years ago?)
*Unauzaidi saa hivi kushindaa mwanzo? Uzaji wa mifugo umepungua au umeongezeka au ni sawa na miaka kumi iliyopita*

Appendix C: Priority List (completed by all 30 interviewees)

1= muhimu angalau, 10=muhimu zaidi

- School (Shule)
- Food (Chakula/ lishe)
- Electiricy/ plumbing (Umeme/ pump ya maji)
- Cellphone (simu/ mkono)
- Computer/ Internet/ Other Technology (Computer/ Internet/ Teknolojia nyingine)
- Tv/ radio (tv/ radio)
- Medicine (Dawa)
- Motorcycle/ car (piki piki/ gari)
- Farm/ livestock (Shamba/ Mifugo)
- Savings account (akiba kwa pesa)

Appendix D: Key informant interview: health clinic (answers are not exact, translated during interview)
1. What is the most common illness you treat?
A: malaria, pneumonia, wounds

2. Do you advise people on food/nutrition? If so what is the advice?
A: Yes. Lessons on salt, milk, fruit, vegetables and what they provide. We only advise on foods that are available.

3. Do you know what protein is? What does protein do for the body?
A: builds the body and protects the body from disease

4. Do people here get enough food?
A: yes but diets are not necessarily balanced.

5. Do people here have a balanced diet/variety of food? Why/why not?
A: No, not everyone, because of financial status.

6. Do people here get all the required nutrients/vitamins?
A: No, depends on income/financial status.

7. Do you think diet is related to income?
A: yes

8. How do you advise people to stay healthy? What is most important in health?
A: We have health education on days of general clinic (once a month). The lesson/education depends on the season. For example cold season is lessons on pneumonia: its symptoms, sign, etc.

9. In your opinion, how many times a week or month should a person eat meat?
A: three times a week
   a) Do you advise one type of meat over another?
   A: No. We cannot advise due to peoples’ incomes.

10. What’s an example of a healthy meal?
A: ugali with meat, milk, fruit, and vegetables

11. What are some of the healthiest foods?
A: milk, fruit, vegetables

12. Have peoples’ diets changed over the last 10 years?
A: Not sure. We have not done a follow up on whether food education is working.

13. Has food availability changed over the last 10 years? Changes in peoples’ farming and/or livestock?
A: little change. Slight difference: green beans are relatively new here. Livestock is the same.

14. Have prices changed here (butcher prices, duka prices, etc.)?
A: Yes, prices are higher now. It is often cheaper to buy in town so people are buying less here.

15. Is there a protein deficiency here?
A: Yes, people need more meat but are limited by finances.

16. Do people know they need more meat?
A: Yes they know. They know the importance of meat and protein, but are limited by money.

Appendix F: Key informant interview: butcher (Joseph) (answers are not exact, translated during interview)

1. What are the prices for 1 kilogram of ngombe, kuku, sheep, goat, pig?
A: I only sell cow meat. 6,000 for 1 kilogram. 7,000 for special meat (ex. liver)

2. Do you have the same customers that come back routinely?
A: Yes, the same village customers and sometimes guests.

3. Can you describe the buying/slaughtering and selling process?
A: I only sell on Saturdays. Every Friday I go to Kikatiti in Arusha and buy 1 grade-1 cow for 700,000 to 800,000 shillings depending on the size. They transport it to Ngulelo (bottom of hill) and I walk it up here. It takes 2 hours to slaughter and prepare. I usually sell 100kg of meat and 10 kg of fat and save a little for my family.

4. Do you ever purchase cows from neighbors to slaughter and sell?
A: No, customers do not like that kind of breed.

5. Do you ever slaughter your own animals?
A: No
6. How long have you been doing this business? And have there been any major changes?
A: I have been doing this business for 2 years. Changes include: cow prices increase and cow meat prices have increased (2 years ago the price was 4,000 per kilogram, not it is 6,000 per kilogram)

Appendix G: key informant interview: veterinarian (interview done in English, answers paraphrased)
1. What is the most common animal you see?
A: Cattle followed by sheep and goats.
2. What is the least common animal you see?
A: Chicken and pigs
3. What is the most common illness you treat for the following animals: ngombe, kuku, mbuzi, sheep?
A: ngombe: pneumonia, mastitis, milk fever, trichomoniasis, anthrax
Kuku: newcastle disease, typhoid, influenza, fluopox
Mbuzi and sheep: none
4. Where are most of your customers from?
A: A list of villages. Each village has a extension/ technician. (Bangata is included)
5. Do people come to you if their dairy cow is not milking? How can you help them?
A: No. People only come for disease treatments and there is not a disease that stops milking, only reduction.
6. Do people do regular check-ups for their livestock?
7. What are your prices for treating these various illnesses?
A: The prices depend on the drug or antibiotic. But these are affordable.
8. Are some livestock less likely to get sick than others?
A: Cattle is the most commonly treated animal.
9. Are some breeds healthier than others?
A: Yes (for cows and chickens).
10. What livestock advise to you offer people? (ex. feed)
A: I strongly advise vaccination. Less than 50% vaccinate their animals. It is only 1,000 per animal but I cannot force.
11. Do you own livestock?
A: yes I own chicken
12. If someone’s chickens are not laying eggs is there a way to help them?
A: Yes, by improving the feed (maize brand). Also, some breeds are better than others.
13. If someone’s goat or cow is not milking properly is there a way to help them?
A: Again, some breeds are better than others. Also by improving the feed (maize, wood feed, hay, elephant grass, banana leaves, stems). More minerals in diet can improve milking.
14. Do you think keeping livestock or having a farm is more profitable? Why?
Livestock because land is limited and expensive. A cow requires less land than a farm.
15. In your opinion, is livestock more important so the family can eat the animal and/or animal products or because it can generate cash?
A: Both. “Domestic purposes and generate income to pay for school fees.”
16. In your experience are people owning more or less livestock than they did 10 years ago?
A: More than 10 years ago due to vaccinations (for livestock).
17. Do you have more customers now than in the past? Or less?
A: less due to the private sector (more competition). I’m in the government sector.
**Nuts and Bolts**

I definitely recommend staying at the center/school. I paid Hosianna 15,000 shillings a night and 22,000 for a gas tank (which I probably didn’t even use half of). If given the option again of paying extra for them to cook two times a day for me, I would probably choose this instead of cooking for myself. I’m a pretty poor chef but even worse when cooking on a propane tank. Beans were a struggle for me, so I resorted to cooking rice and boiling eggs that I bought from the nearby dukas. The dukas have more than I thought they would: milk, eggs, bread, oil, maadazi, candy, cookies, pens, notebooks, fruit, veggies, etc. They helped me during my cooking struggles.

If looking for a translator in Bangata, Gifti was fantastic. Ask Hosianna where he lives (she knows) and see if he’s home! He was great.

I paid my interviewees 2,000 shillings as a small thank you.

If you need to travel to Arusha, there are 2 daladalas that routinely go up and down the mountain, they just require patience in waiting for them (can take up to 2 hours). It’s 500 shillings per ride.

If you’re looking for an escape or if you’re bored, I found it very easy to run on the main road while there. Also the waterfall at the base of Mt. Meru was definitely worth the 4ish kilometer walk and 5,000 shilling fee.