DOW SUSTAINABILITY FELLOWS
UNIVERSITY OF MICHIGAN

Upcycling Shea Waste: Improving Sustainability and Profitability for Ripples Ghana

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Dow Sustainability Fellows Final Report

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I. Executive Summary

Background

Shea butter production is a rapidly growing industry, and Ghana is the largest exporter across the globe.[1] It is produced almost entirely by women and serves as their primary source of income. As climate change and deforestation worsen, the production of shea butter is becoming less predictable, and this is straining this typically reliable source of income. Simultaneously, there are many challenges the women face throughout the production process. One key issue voiced by the women is the buildup of the waste products, called shea cakes, that consumes their limited space with no current utility. Various sustainable solutions for upcycling this waste have been attempted, however no one clear option is readily identified, and the most appropriate solutions vary with the particular community needs, resources, and capacity of the women.

Deliverables

Our project's final deliverable included a comprehensive list of potential strategies towards addressing shea waste management. Within this list, we included the benefits, potential barriers and challenges, and impact each strategy would offer for Ripples and their workers. Our strategies included shea waste incorporation into chicken feed, briquettes for fuel, construction and building materials, anaerobic digestion and biogas, and compost and fertilizer for satellite gardens.

Anticipated Impact

The anticipated impact for our project deliverables, in correspondence with the Sustainable Development Goals from the United Nations[2], includes as follows:

- Decent Work and Economic Growth
- Reduced Inequalities
- Responsible Consumption and Production
- Climate Action
- Partnerships for the Goals

[1] Entering the European market for shea butter | CBI. (2022, March 29). cbi.Eu. Retrieved November 5, 2023, from https://www.cbi.eu/market-information/natural-ingredients-cosmetics/shea-butter-0/market-entry

[2] United Nations Development Programme. (2023). Sustainable Development Goals. Sustainable Development Goals; United Nations. https://www.undp.org/sustainable-development-goals

Recommendations

Our final recommendations for strategies towards reduction and reuse of shea waste include use in fertilizer, compost, and chicken feed. Considering all factors of economic development, machinery availability, cultural appropriateness, community interests, and community partnership availability, we believe these recommendations are the most feasible, adaptable, and apt for Ripples.

II. Introduction and Background

Today, shea butter, derived from shea nuts, is found internationally in many kinds of products including lotions and beauty products, pharmaceuticals, candies, and confections. Demand for shea butter has grown rapidly over the past decade and that growth is expected to continue at a compounded annual growth rate of 7.6% through 2028[3]. Most of the world's shea trees grow in West Sub-Saharan Africa (as shown in Fig. 1). Within this region and globally, Ghana is a leading exporter of shea nuts and one of the largest exporters of raw shea butter.[4]

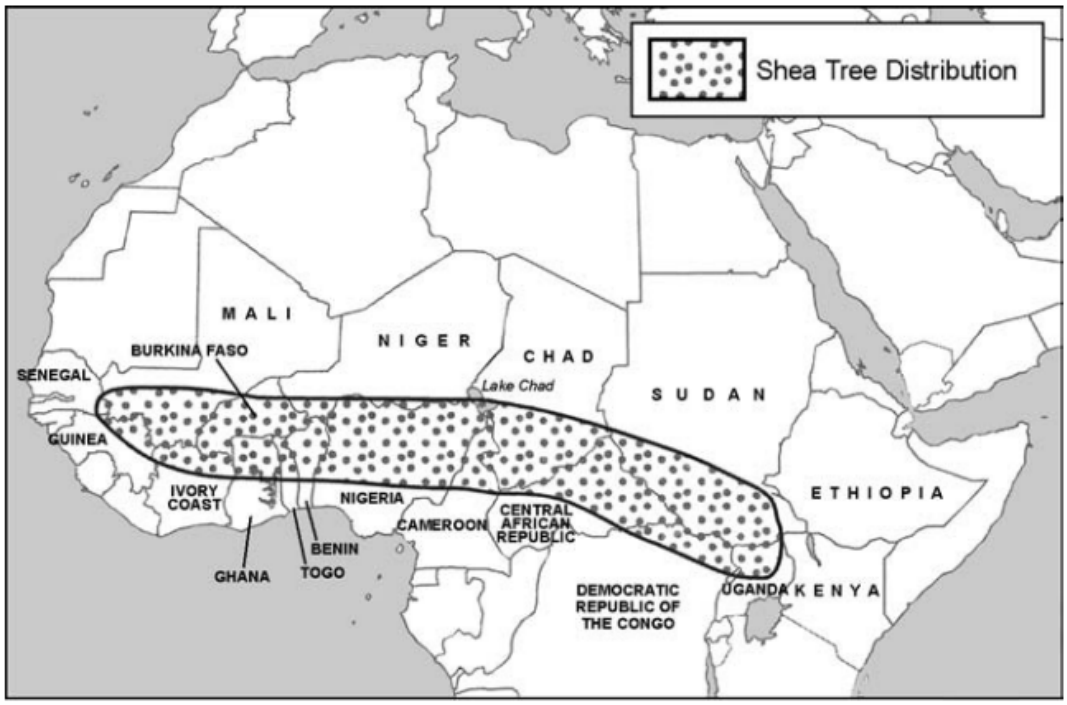

Figure 1. A map generally illustrating the distribution of shea trees in Sub-Saharan Africa. From the figure, it can be seen that shea grows exclusively in Ghana's northern region.[5]

[3] The Global Shea Butter Market size Is Anticipated to Rise at a CAGR of 7.60% Over the Forecast Period of 2022 To 2028, Says. (2022, October 14). Bloomberg.com.

[4] Entering the European market for shea butter | CBI. (2022, March 29). cbi.Eu. Retrieved November 5, 2023, from https://www.cbi.eu/market-information/natural-ingredients-cosmetics/shea-butter-0/market-entry

[5] Elias, M., & Carney, J. A. (2007). African Shea Butter: A Feminized Subsidy from Nature. Africa: The Journal of the International African Institute, 77(1), 37–62. https://doi.org/10.1353/afr.2007.0018

Shea butter picking and processing in Ghana and much of the region is done almost exclusively by women, serving as a key source of income for over 470,000 women in Ghana, alone.[6] This gender dynamic results from the broader patriarchy of the region wherein men control land ownership and access to capital.[7] Since shea trees grow wild in the savanna and picking and processing the shea nuts requires minimal investment, picking and processing shea is one of the few sources of income women in the region can maintain independently.

While the income from shea butter is critical for women in the region, it is insufficient for women to sustain themselves and their children. Part of this is a consequence of the seasonality of shea as well as the broader systemic sources of poverty. However, in recent years additional factors have come about and worsened the burden on women shea pickers and processors, such as (1) climate change, which has increased and worsened drought and flood events, putting greater stress on the shea trees, (2) deforestation, driven by people using the wood for fuel and clearing land for agriculture, and (3) increased corporate infiltration of the industry and mechanization of shea processing.[8]

Our client, *Ripples Ghana*, is a nonprofit organization that works alongside rural women in Ghana to improve their financial circumstances through business model innovation and training. Ripples tasked us with researching pilotable opportunities for upcycling – creating a value-add product from a low-value material – shea waste. For every metric ton of shea nuts processed, it's estimated that approximately 450-600 kg of waste "cake" is produced.[9] By upcycling the cake, we aimed to both increase the women's income and reduce the environmental damage caused by the current practice of dumping high concentrations of shea waste on the land surrounding shea processing sites.

III. Methods

Onboarding for this project involved learning about the cultural context relevant to the women in the Northern regions of Ghana and the industry surrounding shea butter production. We were given educational materials, a talk about on-the-ground cultural engagement, and learned more about the country of Ghana and its colonial history to contextualize our own positionality within

[6] Restoring resilience of women in shea. October 2022. UNDP. Retrieved November 18, 2023, from https://www.undp.org/ghana/news/

[7] Yokying, P., & Lambrecht, I. (2020). Landownership and the gender gap in agriculture: Insights from northern Ghana. Land Use Policy, 99 (January), 105012. https://doi.org/10.1016/j.landusepol.2020.105012

[8] Lovett, P., & Denzil, P. (2018). Agroforestry Shea Parklands of Sub-Saharan Africa: Threats and Solutions. Leaves, 54. https://www.profor.info/sites/profor.info/files/Shea_Case Study_LEAVES_2018.pdf

[9] Abdul-Mumeen, I., Zakpaa, H.D., & Mills-Robertson, F.C. (2013). Proximate and bio-phytochemical properties of shea nut cake. Journal of Chemical and Pharmaceutical Research, 5(12):961-970

this space. We were taught about the patriarchal societal structure present within the primarily Muslim northern regions and the clear rules and dynamics within which these women work to provide income to their children and husbands. This foundation helped to orient us prior to traveling to Ghana for our field research trip.

While in Tamale, Ghana we gathered information through various methods. We held open-dialogue interviews with the Ripples Ghana team, including Madam Rabi and Imoro Abu Kassim who provided us with a foundational understanding of the operations of Ripples on the ground and the projects they have been focusing on with the women. We also garnered information from doing site visits to the various villages surrounding Tamale, the shea nut harvesting fields, the pre-processing and processing sites for the shea butter, and the farms and additional facilities. We met and talked with collectives of women working with Ripples and conducted semi-structured, open-dialogue interviews in a town-hall format to gather information. These were conducted with interpretation by our Ripples colleague, Kassim. These interviews included questions regarding the following topics: (1) the steps and labor involved in shea butter processing, (2) the different sources of income for the women, (3) the financial challenges the women face, (4) the state of the childcare and schooling of their children and barriers to keeping children in school, (5) aspirations for their own primary work and their children's futures, (6) their own health concerns, and (7) their most pressing needs to support themselves and to continue their work in the shea butter processing.

In addition to conducting interviews with the women collectives and the Ripples employees, we searched out other non-profit organizations and companies in the region that are working in the shea butter industry. We sought to talk with and learn about the organizations' own projects and means of support solutions for the common challenges the women face in the production of shea butter. This helped us to better understand the landscape of the shea industry and the local and global markets.

At the conclusion of our trip, we wrote a summary of our findings and discussed this with the Ripples partners on the ground to share this information and our perspectives to ensure mutual understanding. Upon returning from Ghana, we then presented the information we gathered and our reflections to the Ripples partners in order to finalize our scope and deliverables. We proposed options and came to an agreement with Ripples on researching and providing potential solutions for use of the shea waste.

We combined our knowledge from our time in Ghana with online research and literature reviews to learn about the various options for use of the shea waste products. We synthesized our knowledge of the women we engaged with to help inform the recommendations for which solutions would be most culturally appropriate and feasible logistically and monetarily. These

solutions were then written up and our final report and recommendations were presented to our Ripples partner.

IV. Deliverables and Recommendations

The final deliverable focused on providing a comprehensive suite of potential strategies and solutions for addressing the challenges associated with the accumulation of Shea waste at production sites for the Ripples women. Grounded in extensive fieldwork, our team was able to conduct research and interviews by visiting production sites in the various communities. These efforts not only allow us to map out the infrastructural barriers but also allow us to gain a first-hand understanding of the underlying cultural dynamics at play. This allowed for the development of culturally relevant and sustainable waste management strategies that will potentially foster economic independence for the Ripples women in Ghana, while reducing the negative impact of shea waste on the environment.

Current waste management efforts employed at the processing sites are leaving basins of waste slurries from kneading machines that separates the solid shea oils from the liquid and cake materials. This has led to the accumulation of shea waste behind production sites. This unsustainable practice is no longer feasible for the women because of lack of space with growing production demands and also ecological challenges this presents.

Image 1. Shea Waste water left to dry in basins after production (Ripples Ghana, Tamale Northern Region). While grass grows around the homes adjacent to the shea processing site, the ground is visibly barren and degraded where the shea cake has been deposited.

Our team meticulously developed a series of waste management strategies, each of which is accompanied by a thorough evaluation of its possible strengths and weaknesses. Furthermore, we have identified crucial steps and potential collaborators for their effective implementation.

Image 2. Left panel: the inside of a mechanical kneading machine, which separates the solid shea oils from the liquid and cake material. This machine replaced a grueling hand kneading process. Right panel: a woman managing the waste slurry (a mix of shea liquid and cake material) as it is released from the bottom of the mechanical kneader.

Waste Solution Strategy	Description	Strengths	Limitations	Potential Collaborators
Chicken Feed	Recommends bagging up shea waste cakes and selling to the poultry industry for the supplementation of their chicken feed. Another potential route will be for the women to establish their own poultry farms and use shea waste as chicken feed supplements.	-Implements a circular economy. -Economic advancement for Ripples women and the poultry industry -Requires less complex machinery for its implementation. -Source of food and nutrition for the women and their families.	-More research needed to ensure safety of shea waste as feed supplements.	-Poultry industry -University of Development Studies, Tamale Ghana. For research evaluations. -Government programs focused on sustainability, climate change, and women empowerment.

Briquettes	Turning shea waste into briquettes for fuel in the shea butter production process	-Provide a pilot project that has already been implemented -Minimal technological machinery needed -Cleaner methods for production -Minimizes deforestation and promotes biodiversity.	-Reliance on solar energy and dry conditions for the production of briquettes. -Health and safety concerns -Resource sustainability issues.	-The World Bank's Forest Carbon Partnership Facility -Government agencies combating deforestation. -Other Non-profits in the shea space.
Building Material	Using shea waste as part of building material input.	-New avenue for income -Potential internal Use -overall environmental solution	-Partner commitment issues -Limited knowledge of the field -Internal use if not continuous.	-Eco Bricks Tamale
Anaerobic Digestion/Bio gas	Using shea waste for the production of biogas	-Environmental benefits -Financial benefits -Improves the overall health of the women	-High cost -Technical concerns for its maintenance	-University of Missouri: Anaerobic Digester Facts sheets -University of Development Studies, Tamale Ghana.
Compost, Fertilizer for Satellite Gardens	Turing shea waste into fertilizer for satellite farms at production sites	-Supports Ripples general goals -Promotes a circular economy -Diversification of income streams. -Improve crop yields as a food source.	-Inconsistent use of waste -Resource sustainability issues -Logistical constraints -Prolong and multi-step process -Potential failure of crop yields.	-Department of Agriculture, University of Development Studies, Tamale Ghana.

Final Recommendations:

Our final recommended waste management strategies were based on the current economic, infrastructural, and culturally relevant factors that ultimately make them feasible for the Ripples women. Some of these factors include:

- Methods that foster economic development and independence for the Ripples women, while contributing to overall sustainability goals.
- Methods that require less complex machinery for their implementation and maintenance.
- Methods that were culturally appropriate and aligned with the current infrastructure and resources available to the Ripples women.
- Methods that were exciting to the Ripples women and had their interests at their core.
- Methods that could be easily piloted and implemented with easier collaborations with community partners and academic institutions.

We finally recommend the Compost and Fertilizer and the chicken feed strategies as the most feasible as of now for the Ripples community based on the factors above. We strongly believe that these strategies embody a holistic and culturally relevant approach that will empower the Ripples women financially, while promoting both sustainability and health community partnerships.

V. Impact

At the initiation of this project, Ripples Ghana expressed they were on a sustainability mission for reduction of shea waste and economic advancement of their farmers and processors. Ripples Ghana will utilize our final recommendations and deliverables by integrating sustainable solutions for the high accumulation of shea waste. We have based our final recommendations based on the current state and climate of this organization. However, by offering multiple solutions, Ripples Ghana will be able to revisit the solutions as they grow, expand, develop, or change. We anticipate the organization finding impact and benefit from the reduction of shea waste with circular economy, the economic advancement from diversification of income, community benefit from sources from additional food and nutrition, and increase in community partnerships such as University of Development Studies, Tamale Ghana.

Figure 2. A list of Sustainable Development Goals as outlined by the United Nations Development Programme[10]

The impact of our project deliverables also aligns with certain Sustainable Development Goals from the United Nations' list[11]. Our project addresses those goals as follows:

- 8 - Decent Work and Economic Growth
  - This project pushes toward the United Nations' target of this goal which calls for advancement of economic productivity through diversification and innovation.
- 10 - Reduced Inequalities
  - Our final recommendations and deliverables push towards achieving and sustaining income and economic growth irrespective of sex and gender.
- 12 - Responsible Consumption and Production
  - Through our deliverables, Ripples Ghana will target this goal by introducing substantial and sustainable reduction of waste through reuse and by strengthening their capacity to move towards these solutions.
- 13 - Climate Action
  - Implementation of these recommendations directly address climate action through new mechanisms towards capacity building towards effective management of waste in the environment including focusing on women, youth and local and marginalized communities.

[10] Zwick, Steve. (2016). Opinion: Why The UN Sustainable Development Goals Really Are A Very Big Deal. Ecosystem Marketplace. https://www.ecosystemmarketplace.com/articles/opinion-why-we-should-all-be-paying-close-attention-to-the-un-sustainable-development-goals/

[11] United Nations Development Programme. (2023). Sustainable Development Goals. Sustainable Development Goals; United Nations. https://www.undp.org/sustainable-development-goals

- 17 - Partnerships for the Goals
    - Within these recommendations, Ripples Ghana is encouraged to outreach and establish partnerships with their local community and their local University, The University of Development Studies, Tamale Ghana. This can build on experiences and resources of existing work while enhancing means for sustainable development.

Overall, the impact of this project and its deliverables are in alignment with the goals of both Ripples Ghana and the United Nations Development Programme. Through all of what we have learned, we expect that the implementation of the recommendations can lead to the reduction of waste, advancement in economic growth, establishment of community relationships and partnerships, and sustainability of all of these impacts.

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Ripples Africa
EMPOWERING AFRICAN WOMEN

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Appendix

I. Shea Production Process

1. Walking to the bush

2. Harvesting the nuts

3. Shea nut with fruit

4. Shea nuts after fruit was removed

5. Boiling nuts

6. Drying nuts (~3 days)

7. Bagging nuts

8. Bagged nuts

9. Shea nuts after chaff was removed

10. Crushing shea nuts to grit

11. Drying shea grit

12. Roasting shea grit

13. Milling shea grit into paste

14. Kneading – oil & chaff separate

15. 1st boil to remove liquid

16. 2nd boil – further refines oil

17. Oil cooling into butter

18. Packaged shea butter

II. Field Notes from Tamale: April 22, 2023 – May 2, 2023

Contents

Appendix

Key themes:

1. Healthcare
    a. – Safety hazards associated with work
    b. – Carbon monoxide exposure
    c. + Health screenings
    d. – Heat exhaustion
        i. Symptoms:
            1. Can't sleep after work
            2. Dizziness
        ii. Remedy: Electrolytes and medicine
2. Business case
3. Incremental improvements
4. Difficult to disentangle Ripples and shea industry from the broader context (Ghana, lack of development, culture (patriarchal society))
5. Generational passing down of shea work (picking and processing)
6. With fewer corporate partners/buyers, each corporate customer, particularly Maltiti, has immense control over price and demand of Ripples' product

Bigger systemic problems that contextualize Ripples

1. Unreliable infrastructure (electricity, roads, etc.)
2. Patriarchal society
    a. Women are undervalued and largely dependent on their husbands for resources
        i. If women farm it is because their husband gives them a plot of land
3. Women are the only caretakers for children
4. Lack of high quality professions - education in school doesn't necessarily lead to a good job because the economy is so poor
    a. Oftentimes, the best option is learning trades (carpentry, mechanic, welding, medical training, electrician, etc.)
5. Wood and charcoal are a key source of fuel for cooking, etc.
6. Rapid development and need for fuel is leading to rapid deforestation/desertification of the savanna
    a. Men are cutting down (shea) trees. In contrast to shea, this is a consistent albeit unsustainable source of income.
7. Limited (if any) access to capital
    a. Exploitative banks – interest rates are ~22%
    b. Common statement from women: "We know how to do a lot, but we don't have the money to create a business"
8. Have to navigate politics
    a. Nested governmental system
        i. Federal→State→Local→Municipal→municipal chief→area chief→village chief
            1. Chiefs are considered "custodians of the area" and control how land is sold and used
                a. Need permission from the chief(s) to build, farm, etc.

2. Random: Kula = contribution to the chief
    a. Used when we met with the chief of Buiyili

Shea Butter process – picking to sales

1. Harvest:
    a. Walking to the bush
        i. Depending on the community, women walk anywhere from 0-6(?) km, each carrying:
            1. 2 big bowls
            2. 1 bucket for picking
            3. Any number of children
    b. Picking
        i. One woman will go into the tree, and shake it to release the nuts
            1. Best practices are to only pick those nuts that have fallen of their own volition
        ii. The rest of the women will walk around the trees and collect the nuts in a bucket
        iii. Once their bucket is full, they will transfer the nuts to a bowl
        iv. This process is repeated through the ~6 hour picking process
    c. Return to the village
        i. With 2 bowls full of buckets (~10-15 kg each), the picking bucket, and their children, the women make the return trip to the village
2. Pre-Processing:
    a. Remove fruit
    b. Boil nuts
        i. 1 hour
    c. Dry for ~3 days
        i. Can dry for 2 weeks to store longer
    d. Bag dried nuts
    e. Shake – way of checking if nuts are ready to crack
    f. Crack and remove chaff
3. Processing:
    a. Washing – cleaning the nuts
    b. Sorting – remove black nuts from good nuts
    c. Crushing – in machine, nuts are crushed into grit
    d. Drying – grit is spread out on concrete slabs to dry before roasting
    e. Roasting – rotated by hand, nuts are roasted in a rotisserie nut roaster over an open fire
        i. Many sites are trying motorized roaster
    f. Milling – in machine, grit is ground into a paste
    g. Kneading – in machine (previously by hand), paste is kneaded to separate the liquid from the fat
        i. A lot of liquid comes out of this phase which then begins a second sub-process – Shea Cake Sub-process:

1. Simple collection and drying:
    i. Pouring: Liquid is poured into channel that takes liquid from kneading station to concrete drying pads
    ii. Evaporation: after several (4-5) days of evaporation, dry/muddy contents are collected
b. Biogas (opportunity to plug in T.H. Culhane)
    i. Pouring: Liquid is poured into channel that takes liquid from kneading station to collection area with sump pump
    ii. Transfer to AD: Once water reaches certain height, sump pump transfers water to bigger collection container which then goes through a series of reservoirs before reaching end of process.
c. This process has many issues:
    1. They don't know if it works
    2. This doesn't solve the issue of what to do with the liquid
    3. They don't have a solution for collecting, using, or storing the gas
    4. This creates further difficulties in terms of collecting the cakes
    5. The sump pump often gets clogged and does not work (currently this is a manual process)
    6. Uncollected AD is worse environmentally than simple land application that they were doing previously
    i. from kneading is poured through concrete channels goes through its own stage of sitting outside and drying into a shea cake or is sent through an incomplete anaerobic digestion system depending on the site
1. Shea cakes can be used for fuel (burned) or potentially to feed chickens
2. Are shea cakes sold in market?

h. Boiling – kneaded (mostly fat) paste is cooked and, through the evaporation and regular stirring, the water is removed.
    i. Stirring happens for approximately 1 hr
    ii. They have added a (relatively ineffective) chimney and closed much of the fire to reduce the smoke and heat that the women have to deal with
i. Second boil – same as first boil but this time the oil is further refined
    i. Stirring happens for approximately 1 hr
j. Cooling – oil is transferred to plastic buckets and left to cool in cooling rooms
    i. Women stir butter as well while it cools (unclear how long)
k. Packaging – purified, hardened butter is transferred to bagged boxes to be transported
l. Transport – Boxed shea butter is stored at the processing facility (packaged nuts often have shared warehouse that sits centrally between several more remote picking communities)

i. Generally corporate partners will pick up product in a tricycle pickup truck

m. Payment – depends on which part of the process women are involved in, if:
   i. Pickers – paid upfront directly by processors when buying the nuts
      1. Price varies depending on availability of nuts (4-20 CD per bowl)
   ii. Processors – paid by corporate partner after supplying the finished butter
      1. It seems that 22 CD per kg is standard for corporate partners
   iii. Independent sales – haggle price at market and sold in various quantities
      1. Biggest problem with this is labor involved and inconsistent demand

Output:

1. Harvesting Season
   a. Lasts 2-3 months
      i. In bountiful seasons, trees fruit more than once (can extend season to 3-4 months)
   b. Oftentimes women store the nuts until they can earn a better price for selling
2. Production
   a. Capacity: 100-150 kgs of nuts? per week
   b. Reality: maximum production only occurs when there is demand (order from corporate partner)
      i. Sometimes women will sell in small markets independently (as they did pre-Ripples)

Pricing and conversions:

1. Women are paid by the quantity of nuts picked or butter produced
2. 75-85 kg Raw nuts ” 25 kg unfiltered butter unfiltered butter
   a. 40-60 bowl = 1 sack
   b. 1 sack = 100-160 kg
3. Standard Pricing:
   a. Nuts:
      i. “wet” nuts = 10 CDs per bowl
      ii. “dry” nuts = 13 CDs per bowl
   b. Butter
      i. Standard shea butter is being sold for 22 CDs per kg
4. Organic
   a. Comes in an 85 kg bag and they are able to get ~25 kg of butter from that
5. When shea nut price went up to 20 CDs per bowl, what happened to the price of shea butter? Where did the increase get felt (women making less, Maltiti lost money and sold at same price, buyers paid more)?
6. Ask Kassem about production/sales numbers

Problems with shea industry

1. Shea harvesting is seasonal, which leads to:

a. Limited period of time women can work in shea
b. Price fluctuations – after the season, shea nut prices increase due to lack of supply
    i. Some harvesters have taken advantage of this by storing their nuts to garner higher prices for their product

2. Dangerous across the early stages of the supply chain
    a. Harvesting
        i. Snakes
            1. Long term problems:
                a. When cold – pain and headaches
                b. Some women spit blood
            2. Short term:
                a. Day-weeklong hospitalization
        ii. Long walks through the heat
        iii. Carrying heavy loads
    b. Processing
        i. Moving around heavy weights
        ii. Risk of electrocution due to open electrical wiring
        iii. Potential accidents while using heavy machinery, operating over open flames, and working with hot oil
        iv. Heat exhaustion/stroke and dehydration from working over fires in 90+ degree heat
        v. Overworking – in high demand season, women are working as much as possible to earn as much as they can in a short amount of time
        vi. Lung problems from breathing in smoke while roasting nuts and purifying butter

Realities of life for Ripples women

1. Entering the shea industry
    a. Women in rural areas start young and learn how to pick and process shea (among other things) from their parents.
        i. Alternatively, many young women move to Accra or Kumasi and work as domestic help, etc.
2. Work for women
    a. Ripples instituted maximum of 5 working days with standard working hours:
        i. Women generally work more days and hours when demand is higher to make more income (paid by quantity produced)
    b. Women choose to work because added income allows the women to:
        i. Send their children to school
            1. School costs (from one community):
                a. 1,200 CD 🖬 ” 1/3 year of school
                b. 3,600 CD 🖬 ” full year of school
            2. Parents also have to pay for supplies, uniforms, etc.
            3. Government is working to help with school fees
        ii. Buy more appealing food options and other products

3. Men's farming takes precedence over women's farming
    a. Men get access to the tractor when it is optimal to use it and women may gain access to the equipment when the men are done
    b. Women often have to till by hand with a hoe
4. Work women take up in addition to shea
    a. Rice processing
    b. Shea picking (for farmers and processors)
    c. Shea processing (for pickers and farmers)
    d. Soap processing
    e. Dowa Dowa processing
    f. Cosmetics (lotions, etc.)
    g. Petty trading
        i. Vegetables
        ii. Prepared food
        iii. Peppers
        iv. Porridge
    h. Cola nut picking
    i. Farming
        i. Crops grown are both for personal consumption and used as cash crops
        ii. Crops grown:
            1. Rainy season:
                a. Cow pea
                    i. Largely focus on harvesting leaves (bangle)
            2. Dry season
                a. Vegetables
                    i. Bra
                    ii. Ayuyu
                    iii. Alefu
            3. Rainy and dry season
                a. Rice
                b. Maize
                c. Soy
        iii. Cow pea and soy are most consistent crops in terms of having good output
            1. Maize and groundnut vary a lot in terms of output
5. Work women would prefer to take up:
    a. Older women preferred:
        i. Selling soap
        ii. Processing rice
        iii. Processing shea
    b. Younger women preferred:
        i. Tailoring
        ii. Selling food
        iii. Petty trading

iv. Selling lotions

c. Girls preferred:

i. Attending school

6. School

a. Many women can't support their children to go to school, so the children stay home

b. Preferred options for children

i. Attend school

ii. Work with a relative or friend who can train them as an artisan (mechanic, carpenter, tailoring, etc.)

1. Oftentimes this requires payment

c. When children don't attend school or drop out, they can be an added burden

i. Children often don't want to go to school

1. Example of bribing kids with 1 CD to attend school

Ripples partners:

1. Corporate

(So far these are smaller buyers who act as middle men and then supply to bigger buyers)

a. Maltiti

i. Own building that Ripples is currently using

ii. Own processing centers (and farms?)

iii. Help connect the processors with farmers?

iv. Provide prefinancing to Ripples?

1. Women in Buiyili mentioned joining Ripples for prefinancing and access to customers, but do they need to be part of Ripples to get these from Maltiti?

a. What is benefit to Maltiti of women joining Ripples?

b. Tiyoyarba

c. Nwogu

d. Deluxe (Why were they never mentioned as a partner?)

i. Australian company

1. Fair Trade Certified

ii. Has unique contract with Kagbal cooperative for 20 tons of shea per year:

1. Deluxe buys organic nuts collected from Maltiti

2. Contracts Maltiti for processing

a. Has limited contract (1 month) with them

b. Pays for labor and facility

3. Deluxe then exports the finished butter **(?)**

2. NGO

a. UNDP

i. Provide a lot of resources and connections to Ripples

1. Competitive for winning grants and gaining resources

ii. Have a lot of goals associated with the shea industry

iii. Provided funding for shea waste biogas project
iv. Provided 7 mechanical roasters
1. Locally manufactured
2. Run on gas
3. Not currently in use (originally not enough gas came out, now waiting on gas?)

b. USAID
c. World Shea Alliance
i. Training:
1. Cooperative formation
ii. Funding the seedling nurseries
1. $150,000

3. Regulators
a. International auditors from where? – representatives inspect their facilities
i. Inspections can be announced and unannounced
b. Ghana Standards Authority (GSA) – provide product testing
i. Samples of the shea butter are sent to the GSA lab to ensure quality – this is a requirement before shea butter can be sold
ii. Unclear if Ripples send the product or Maltiti (likely Maltiti)
1. Want to develop their own testing capabilities because it can take months to receive lab results

Manufacturing sites:

1. Additions:
a. Currently building a new shea butter processing center
2. Improvements
a. Trying to get rid of wood burning from shea production centers by implementing gas production
b. Have mechanized the kneading process
c. Working to mechanize rotisserie aspect of the roasting process
d. Biodigesters – trying to use AD to process waste from shea kneading process
i. AD systems were funded through a UNDP grant
e. Supply chain tracking through RFID

Applying to join Ripples

1. Women apply through local partners (like Maltiti Enterprise)
a. Most women are 18+ years old
b. Women are grouped into 10 upon applying – this is often a subgroup within the bigger cooperative
2. Ripples conduct "needs assessment"
a. Training needed
b. Funding needed
c. Location logistics (if women are too remote then they can't work with them)
3. Applicant Qualifications

a. Applicant needs to have a baseline amount of resources to get started – Ripples is limited in terms of how much they can help
b. Have to want to farm, pick or process shea
c. Logistically functional (not too remote)

Benefits of joining Ripples

1. Women receive health screenings
    a. Is this a regular service? What are the healthcare options after the screening? Where are the doctors coming from?
2. Some cooperatives receive resources for picking and processing shea, including:
    a. Infrastructure – cement, electricity, storage rooms
    b. Machinery – kneaders, roasters, etc.
    c. Protective equipment for snakes
        i. Boots
        ii. Gloves
3. Women receive training on how to produce
    a. Shea butter
    b. Black soap
4. Access to capital?
    a. Madam Rabi noted that for 60% of women, Ripples opened a bank account
        i. Women don't get this sort of access to capital through their husbands
            1. Produces greater independence for women
                a. Aren't financially reliant upon husband
    b. Cooperative financial structure
        i. Cooperative Fund
            1. Produced from monthly dues contributions
                a. Monthly Dues = fixed amount that each woman in the cooperative pays
            2. Account is utilized for each cooperative's needs
            3. Account is managed by the treasurer
        ii. Individual Savings
            1. Account set up for women to save money and use when needed after building up wealth over 12 months
                a. Seems like they are trying to illustrate value of savings through this account ("look what you can save in just 12 months")
            2. Started 2 months ago, will reassess after 12 months
                a. Eventually hoping to develop savings and loans across the cooperatives?
5. Upgraded facilities
    a. Prior to joining Ripples, women could produce 2 containers in the house
        i. Pounded with mortar in their home
    b. Now, they are able to produce much more shea butter
    c. Less labor intensive now / fewer difficulties processing butter

d. Would these upgrades occur through Maltiti if not with Ripples? Were these upgrades happening prior to Ripples?

Cooperatives

1. Structure:
    a. 10+ women per cooperative
        i. In communities with many women, there are multiple cooperatives that work collaboratively (in these cases cooperative is more to provide a manageable organizational structure)
    b. Cooperative leadership:
        i. Leader
        ii. Treasurer
            1. In several picking cooperatives this was often a male figure related to the chief
        iii. Organizer
2. Shea processors – All processing sites are owned by Maltiti(?)
    a. Gumo
    b. Dulzugu
    c. Katariga
        i. Smallest cooperative
        ii. 14 women
        iii. Women pick and process
        iv. Challenges:
            1. Not enough water
            2. Not enough large pots for boiling
            3. Not enough fire wood (1 tricycle = 250 CD)
    d. Salamba
        i. 18 women
        ii. Work closely with / sell product to Maltiti
        iii. Challenges:
            1. Not enough money to buy shea nuts
            2. Pots are too small
    e. Nwogu
    f. Chanzago
        i. 8+ women
        ii. Have a new processing facility
            1. Promotes gas as fuel source
                a. Funded by UNDP grant (1 million CD)
            2. Previously used processing facilities of other cooperatives
    g. Zugu processors
        i. 65 women total
        ii. Women also pick shea, farm, and help run nursery (see below)
        iii. Challenges:

1. Want a clinic because have to go to one of the two communities surrounding them to access medical care
2. Lack buyers -

3. Pickers/farmer
    a. Kagbal
        i. Remoteness problems:
            1. When bitten by snakes (5 bite incidents from the women we spoke with) women either go to:
                a. Tolong hospital – not always reliable (don't have antivenom)
                b. Tamale hospital – more reliable but hours away
        ii. 180+ women split into 6 cooperatives
            1. Some of these women work with Deluxe (How many?)
            2. Have a long term (indefinite?) contract with Maltiti and Deluxe
                a. The women identified this as a positive relationship
        iii. Joined Ripples in 2019
        iv. Improvements from Ripples:
            1. Built a dam for water capture 2 years ago – women complained (a lot) about the quality of the water (very very bad)
                a. Previously had 2 wells (both defunct)
            2. Some women have received boots
                a. Unclear how many still have and use them
        v. Many of the women independently process and sell butter
        vi. Previously, doctors came to help provide clean drinking water
            1. The community now has a black water storage container and tablets for cleaning/purifying water
                a. Unclear how much this is used
    b. Buiyili
        i. 90+ women in cooperative
            1. Age of collectors: 7-70 (not a typo)
        ii. Very remote with limited infrastructure:
            1. No electricity
            2. Limited water – get water from pond
        iii. Improvements from Ripples:
            1. Currently getting trained on organic shea
            2. Trying to get irrigation for farms using boar hole
            3. Building community processing center
                a. Still being finished
                b. Is going to be electric (still having problems with this)
                c. Machinery included:
                    i. Crusher
                    ii. Kneader
                    iii. Grinder
        iv. Each woman has ~2 acres of land

v. Challenges:
1. Carrying nuts from harvesting locations back to community
2. Dangers associated with picking (reptiles)
a. Due to remoteness, if someone is bitten, they have to take the victim 8 km to the hospital
i. Nearest clinic doesn't carry antivenom due to refrigeration needs
3. Limited access to water

c. Gburimani Tibogu
d. Bihinaayili Farm (also nursery – see below)
i. 14 community members are working with Ripples
1. Still registering the cooperative
a. Many women were attracted to Ripples because they saw the work they were doing to restore the shea trees and promote economic benefits for them
2. Some of the women help with the Zugu nursery (paid "allowance" since production takes a long time)

4. Warehouses
a. Design:
i. All warehouses are located (from what we could understand) centrally to the communities they service
ii. Women from the various communities transport their product to the warehouse where it is collected by corporate partners (**?)**
iii. Nuts stored in warehouses are tracked to pay women after pickups /Kpendua
b. Gburimani

5. Nurseries
a. Zugu
i. Currently under construction
1. Boar hole has been dug and currently building platform for water tank
ii. 15 of the women will work on the nursery
iii. Have biogas infrastructure constructed but not in operation
b. Bihinaayili
i. Started nursery in August 2022
ii. Run by Muhammad Mahmoud (great potential partner)
iii. Ripples provides resources:
1. Fencing
2. Boar hole
3. Shade tenting
4. Irrigation resources
iv. Tree seedlings grown:
1. Shea
2. Acacia

3. Mango
    a. 4-5 years to fruit (with grafting)
        i. Grafting also produces higher quality fruits
    b. Without grafting: 5+ years to fruit unknown quality mango
4. Cashew
    a. 4- years to fruit
        i. No grafting needed

v. Shea tree growing to planting process:
1. Plant the seeds
    a. Use combination of manure, soil, and rice husk (allows for aeration) for planting medium
2. It takes ~2 months for seed to germinate
3. After ~3 months, seed has grown into seedling
4. After ~4 months, seedling is ready to be grafted
    a. Use the base of the seedlings for grafting
    b. Grafting allows for more rapid fruit production
        i. With grafting: 6-10 years to fruit
        ii. Without grafting: 10+ years to fruit

vi. Aim to plant 70,000 shea trees over next 5 years
1. Part of government program collaborating with other organizations raising and planting seedlings
2. Currently, ~12,000 shea trees planted (unclear if this is Ripples or total)
    a. Aiming to plant 20,000 trees per year
3. Last year, planted 8,000 trees of different species but most didn't survive

Ripples Background

1. Ripples has 1,800 women who are Organic and Fair Trade certified
    a. Ripples is actually working with ~10,000 women though not all are certified
2. Progression
    a. Technically formed in 2011(**?**)
        i. When they began, focused on farming(?)
    b. Began focusing on shea in 2019
3. Staff in Ghana
    a. Madam Rabi – Leader
        i. Joined Ripples in 2010 and in 2011 started Morenga Farms Plantation
    b. Kassim – Number 1 person
    c. Maltiti (didn't meet because he's still in school)
    d. Muhammad
    e. Haruna Adam
    f. Muhammad

Anezu Gardens

1. Planting shea trees to replace those being cut down as part of a gov't initiative
2. Who is funding? Which gov't's initiative? What is success of project?

Ripples Goals and Initiatives:

1. Quality improvements/standards + standardization of facilities and production process
    a. Ripples pushes processors to improve the quality of their product
        i. Fair Trade Certification – so far no changes have come as a result because Ripples doesn't sell their product directly to Fair Trade buyers
            1. Fair Trade organization dictates many of the improvements Ripples has been making:
                a. Creating uniform processing centers with cement structures, well labeled/defined storage and operations rooms, roofs over all workspaces (except drying slabs), fences surrounding the facility
            2. Ripples needs to consolidate their product sell in greater quantities to get connected with these partners? Is there a desire to sell directly to the national/international markets at any point or was this a miscalculation?
            3. Why did they get certified as Fair Trade? Who indicated this would help business if there are now no Fair Trade buyers?
            4. What is the relationship between Fair Trade and Organic (Kassim seems to believe they are one in the same)?
        ii. Supply chain tracking through RFID
            1. Used by both processors/manufacturers of the butter and harvesters of the nuts (only true if shea nut is being grown by someone in network, which it seems like is happening less and less)
2. Gain access to better markets
    a. Organize women into cooperatives (of at least 10) so they produce more and therefore have a greater quantity to sell as one unit
        i. This consolidation has meant that women don't have to go to market on their own but rather can sell all of their product to one buyer (Madam Rabi / Maltiti Enterprise)
            1. Problems with going to market:
                a. Less consistent demand and price
                    i. Women have to haggle/negotiate with buyers
                    ii. More difficult to sell their product or know how much of their product will be bought
                b. Traveling with shea is an additional burden on the women
    b. <u>Despite improvement in demand through consolidation, women still can wait 2-3 months between production cycles due to lack of demand</u>
3. Trying to develop process for refined shea butter
    a. Currently only producing unrefined (raw) shea
    b. Believe the market is shifting to one that desires refined butter

4. Implementing better waste management/circular economy systems
    a. Composting
        i. Especially among farmers, they believe composting will help save them having to purchase fertilizer
        ii. Working to provide compost bins
    b. Biogas
        i. For liquid/slurry waste, have concrete biogas systems at several processing sites
        ii. Constructed by Gasco – local construction company
        iii. None are currently in operation

Quotes:

1. Women: We know how to do a lot of things but we don't have the money to do businesses
2. Because we have small farms, we mainly farm to feed ourselves
3. After being asked why they choose to pick shea nuts (the implication was meant to be why pick shea nuts instead of other work, opposed to why do you pick shea instead of nothing): If we're not here and we're in the house, what will we be doing?
4. There is no easy step to shea processing
5. After asking whether the women want their kids picking/producing shea, and answering that they don't because they want their kids to find a better life, Kassim: "These are bad answers, they should hope work gets easier so work is better and easier for their children"
    a. "Only the unsuccessful children should do shea business"
6. Beth (AAK) referencing a common expression in the north: "One finger cannot lift a stone"
7. Beth's hot take: "In the Ghanaian economy now, nothing is sustainable"

Appendix

Farming Prices for Buiyili (4/28/23)

Product	Cost per acre	Bowls needed per acre
Plowing	120	16
Soy seed	45	3 bowls
Herbicide	50	1 liter
Total cost/acre	215	

Farming Outputs from Buiyili

Product	Quantity	Price per unit	Total Income
Soy	3 bags (from 2 acres)	200	600
Profit	600-430 = 170		

Farming Prices from Zugu (4/26/23)

Product	Cost per acre	Bowls needed per acre
Fertilizer	640**	16
Cow pea seed	120	4 bowls
Rice	125	½ bag
Ayuyu	120	2
Bra	90	3
Herbicide	80	1 1/3 liters
Selective Herbicide	25	2/3 liters

**need to double check - In notes: “Fertilizer costs 40 CD per bowl – 24 bowls – 1.5 acres”

Tamale Market Pricing Survey (4/28/23)

Product	Size	Cost/size	Cost/kg
Shea nut	Sack – 85 kg	650	7.65
Shea butter	Small calabash – 6 kg	120	20
	Large calabash – 25 kg	550	22
Soy bean	Sack – 100 kg	550	5.5
Rice	Bowl – 1-2 kg	22	11
Cow pea	Bowl – 1-2 kg	25	12.5
Maize	Bowl – 1-2 kg	40	20
Ground nut (peanut)	Bowl – 1-2 kg	40	20
Guinea corn	Bowl – 1-2 kg	20	10
Sobu		17	
Dowa dowa	Small ball	1	
	Medium ball	2	
	Large ball	5	
Okra (dry)	Bowl – 1-2 kg	90	45

Okra (fresh)	Bowl – 0.125 kg	5	40
Alefu	Bundle (see photo)	2	
Tomato	5 fruits	10	
Onion	6-8 fruits	10	
Bra	Plate	2	
Black soap	Bar/wrap	7	
Ayuyu	Plate	2	
Laundry soap	Block	5	

Salamba Community Survey (4/25/23) – Children in school

Total Children	Children in school	Too young
5	4	
5	4	
5	3	
5	3	2
7	2	
6	4	
8	4	
7	4	
7	4	
6	4	
6	5	
5	4	1
5	4	
5	3	
4	3	1
6	4	
3	2	1
6	4	2

Reflections from Day 2: 4/25/23

1. Seeing everything through a filtered lens
    a. We don't get to hear directly from the voices of the women because of the language barrier
    b. Male translator may also reduce women's willingness to share
2. The women's working conditions
    a. They have noted that the work has gotten better with:
        i. More machinery
        ii. Working in a collective
        iii. Not having to sell on their own
    b. The things that still need improvement focused largely on improving the business operations
        i. Supplies (bigger pots, more firewood for fuel)
        ii. Supply and price of shea nuts
3. Children and education
    a. Why the children go to school
        i. To gain career opportunities that aren't so physically taxing
    b. IF they don't go to school, what are the children's options?
        i. Getting trained in a trade – optimal
        ii. Having to take care of them – worst case
4. Supplemental work
    a. A lot of bootstrapping
        i. Petty trading – selling vegetables, spices (dry peppers)
        ii. Processing – rice, ground nut, soy cakes (and selling it), locust bean, black soap, porridge
    b. This happens outside the 2-3 months that the women are processing shea during the season – Is the supplemental work their main occupation in terms of labor time spent?
    c. What percent of income is coming from the women versus the men?
5. Cooperative financial structure
    a. Monthly dues – goes into an account that is utilized for each cooperative's needs
    b. Savings – account set up for women to invest money and distribute profits
        i. Started 2 months ago, will reassess after 12 months
6. Lack of cross-cooperative sharing/cooperation
    a. E.g. women in first processing center mentioned wanting to learn how to process black soap, women in second mentioned being able to do this
7. How can African people learn to do things for themselves while gaining resources from outside of Africa (outsiders/donors should not dictate what happens to the African people and how the African people use those resources that are provided to them?)
    a. African leaders are awakening to their power to dictate their futures as they are being courted by the NATO and Communist nations (China, Russia)
    b. In this context, saving money may not be understood by the women, but this could be a habit that produces long term wealth – the women are operating in

the context of a western/globalized financial system and to create enduring wealth they need access to financial resources and education

c. What percent of the money that Maltiti makes is being reinvested into the women - processing centers, farms, etc.?

8. How do the economics of shea work if:
    a. Women are buying standard shea nuts currently for 10 CDs “wet” and 13 CDs “dry” per bowl
    b. It takes 40-60 bowls per sack
    c. Each sack can be 100-160 kgs
    d. Organic shea nuts comes in an 85 kg bag and they are able to get ~25 kg of butter from that
    e. Standard shea butter is being sold for 22 CDs per kg
    f. When shea nut price went up to 20 CDs per bowl, what happened to the price of shea butter? Where did the increase get felt (women making less, Maltiti lost money and sold at same price, buyers paid more)?
    g. Ask Kassim about production/sales numbers

Fair Trade:
Fair trade minimum price per ton for shea butter producers is $2,200, which is 34.55 CDs per kg

Reflections from Day 3: 4/26/23

1) New processing site
    a) Supposed to be the standard/model for gas-powered production (for roasting and boiling)
2) Refined vs unrefined shea
    a) All we've seen so far is unrefined. Still need to understand what refined shea is, process for producing it, and market for it
3) Fair Trade Certification clear up
    a) Ripples is certified but because Ripples is selling to corporate partners, nobody is getting fair trade benefits
4) Ripples got 1 million CDs from UNDP
    a) Ripples is using the funding for all of the improvement projects
    b) Many UNDP grants need corporate partners to:
        i) Ensure endured use/success of machinery and program
        ii) Match funding
5) Clarity on the savings accounts
    a) Weekly savings from each woman based off their capacity
6) Cooperative dues
    a) Monthly set contribution provided by each woman in the cooperative
    b) Each cooperative handles their own savings – no sharing of funds across cooperatives
7) Cooperative leadership
    a) 3 main roles – all are volunteers
8) Seedling site
    a) Initiative to plant 70,000 shea trees – Ghana shea landscape emission reductions project implemented by Ripples in partnership with Maltiti, funded by Green Climate Fund, Forestry Commission, Global Shea Alliance, and UNDP
    b) Growing
        i) Shea
        ii) Acacia – growing as sacrifice
        iii) Mango
        iv) Cashew
9) Bee keeping
    a) Currently happening in Tamale
10) Ripples Ghana office has been open since 2011 but only been operational with shea since 2019
11) Highly questionable economics going into the women's operations (shea, farming, etc.)
    a) Is this a seasonal anomaly or is this common/consistent?
12) What other farming strategies is Ripples thinking about/hoping to implement?

Call with Sara: 4/27/23

1. Ripples has their hands in a lot of baskets – how to narrow our focus to one of those baskets for the project
2. Very limited opportunity to develop partners on the ground, potential folks include:
    1. Kassim
3. Debrief meeting with Ripples on Tuesday – expectation setting re: what we are able to accomplish vs what they are hoping for
4. Next project: try to find a female translator/guide

Reflections from Day 4: 4/28/23

1. Children of pickers work in picking at a much earlier age than elsewhere
    a. Different reality of education and opportunities for their children
        i. Remoteness could be a very big part of this
2. Felt a lot more difficult to get true answers from women when men are attending the conversation
    a. Also these are smaller communities so difficult to navigate the dynamics of the men – e.g. a male secretary for the cooperative despite the cooperative supposed to be women only
3. Snake bites: women don't field treat their bites at all (torniquet, etc.)
    a. No infrastructure for antivenom and long distance to clinic – potentially long term damage from snake bites (women experiencing pain when it is cold)
4. There is a lack of financial accounting for how the women are doing / how the programs they are setting up are helping the women
    a. What is the deal with prefinancing – there needs to be metrics for measuring impact on the financial benefits that Ripples is producing through their programming
    b. They are giving out boots and gloves for women, but aren't tracking the whereabouts of those boots/gloves or the impact they're having on the women's health
    c. How many of the things that Ripples is providing to the women are actually staying with them? Are the men taking (e.g. boots and gloves, money, etc.) for themselves?
5. Ask: What tracking do they already have in place/what information do they have already from that tracking/What is the cadence of their tracking?

Closing meeting with Ripples: 5/1/23

1. Potential Deliverables (we need to talk with the other stakeholders involved but would love if you think one or two of these is most helpful to identify them as we will likely complete 1-2 of these)
    a. Safety / health / proactive care
        i. Snake bites
            1. We don't have a clear understanding yet of best practices in this context, but to the end of creating standardized practices, we are looking at developing a guide of how best to handle/treat bites
    b. Waste solutions
        i. Biogas – if they can utilize gas, less need for fire
            1. less smoke inhaled
            2. less emissions
            3. less wood cutting
    c. Water access (more specific to Kagbal)
        i. Currently:
            1. Aren't using filtration systems
            2. Don't have consistent access to water for farming
            3. Poor farming yield
            4. Unsafe drinking water and water scarcity concerns
                a. Undesired water
        ii. Clean, safe water for drinking
        iii. Water for farming
    d. Organization and tracking
        i. What are they currently tracking?
        ii. Currently:
            1. Seems like limited tracking
    e. Proposed project for testing the final shea product (this is a 5-year project)
2. Project timeline
    a. Phase 1 – Remote research
    b. Phase 2 – Field research
    c. Phase 3 – In August – come back to do targeted research on our deliverables and potentially begin implementation
    d. Final deliverable – November/December
3. Keeping in touch – it would be great to make sure that whatever we're doing is informed by what is practical and possible

In December, they will have their annual meeting of all the cooperatives – inviting us and other partners to return to hear about the progress of the program

AAK Meeting - Beth: 5/1/23 - ***Redacted***

ACDI/VOCA Meeting – Mike, Michael Owusu Maniampong, Cecil Osei: 5/2/23 - ***Redacted***