



Health and safety in Micro-business - Shea butter processing in Ghana

Institution of Occupational Safety & Health

Report by: Duncan Spencer CFIOSH, Head of Advice & Practice, IOSH

Ably assisted by:

- Dr. David Arku, CMIOSH, Chair, IOSH-Ghana.
- Judith Afriyie Kyei-Sakyi, TechIOSH, Chairwoman, Internship Committee, IOSH Ghana.
- Helena Naayd Abotiwine, Local Expert.

Introduction

This report was commissioned in response to the interest shown by the International Labour Organisation and Investment Banks in economic investment that improves safety, health, and local lives. Workers in northern Ghana, mostly women, are employed on a piece-meal basis for subsistence pay to harvest shea nuts and process to extract shea butter. The conditions of work are hazardous and hard.

In July 2023 the Institution of Occupational Safety and Health (IOSH) commissioned one of its members to visit the industry on location and gather information. The purpose of this report is to highlight the significant risks identified during that visit and offer ideas for investment that will transform the lives of those employed in this industry.

Discussion of issues encountered

- The operation is described in Appendix A.
- All stages of the process were labour intensive from harvesting the shea nuts, transportation of materials needed (e.g., finding wood for the cooking stages), processing to extract the oils and selling them at market. Lack of knowledge and tools coupled with long hours causes fatigue and increases exposure and the likelihood of incidents occurring.
- All the labour observed was conducted by women of all ages. Their hard work in this process is additional to their domestic duties.
- The principal hazards at each stage of shea butter production are outlined in Appendix B.

Possible Control Strategies

To help these women workers the following considerations need to be made:

- a. They live a life earning barely enough to feed themselves and their families. They do not have the means to invest and improve their conditions. External

funding from investment or charitable donation will be necessary if change is to be achieved.

- b. In general, the workers have not had a good education. They may well struggle with explanations regarding the biology of the human body, i.e., adopting appropriate manual handling techniques or neutral postures to avoid injury.
- c. Expertise will need to visit the locations to carry out any building projects, provide equipment, train and educate.
- d. Some hazards cannot be avoided (e.g., local fauna hazards).
- e. Any training and equipment provided could reduce the amount of labour needed. This will provide an opportunity to improve production or release time for the workers to secure additional sources of income.
- f. Any equipment adopted must be able to withstand the rugged environment and easily fixed using local resources if possible.

Working at Height

The investigative team pointed at the instability of the branches on the shea butter trees. Yet the nuts in the upper reaches of the trees must still be shaken loose. Extendable aluminum poles with a suitable hooked end would provide the means of reaching the upper tree branches to shake loose the nuts. Being made of aluminum reduces the handling stress that would come from a heavier wooden pole. Provision of a ladder is not recommended due to issues with footing the ladder and the need to carry it long distances. Ladders should not be regarded as working platforms when it can be avoided. It is likely that branches could break if ladders are leant against them.

Drying the Nuts

Drying nuts on the floor in the sun is inefficient. It provides an opportunity to introduce contaminants into the process. The provision of solar dryers and solar box cookers would improve the reliability of the process and be more efficient. It would also save time and have ecological benefits as less wood would be needed from the local environment to fuel fires. Such equipment would also reduce fire risk and worker exposure to smoke inhalation. The equipment would potentially be more stable, thus reducing possible spills of boiling water and oil in the process.

Extracting the Oil

The washing and extraction process described in Appendix A is inefficient. The provision of screw presses would be a more efficient way to firstly crack the nuts and secondly extract the oil from the flesh of the nut. It would eliminate the risks from fire, smoke inhalation, dermatitis and fungal infections arising from hand mixing the wet nut slurry for long periods. It would also preserve water in an arid environment. The process is likely to be quicker too. At the very least rubber gauntlets would be required to protect the hand.

The use of short-handled ladles to skim off the oil puts the workers' hands close to the hot fluids in the pans. The use of mechanical filter screens would again speed up the process and eliminate this hazard.

Environment & Welfare

The ambient temperature ranges from 28 to 35 degrees Celsius. Shelter from the sun should be constructed to cover the production process area to protect the workers from the heat of the day. The sides of the structure should be open to allow the air to flow through and assist with cooling.

The photographs show that small stools are used to raise the bowls higher during the washing and churning stage. Nonetheless, these pictures also showed workers stooping to reach. Workstations should be organised to enable workers to stand and work safely at waist height. The building of workbenches and workstations would help achieve this.

Toilets, washing facilities, and somewhere sheltered to rest, should be provided.

Ergonomics

The photographs indicate that the workers do not understand poor posture and how that can give rise to musculoskeletal issues. Chronic pain developed over time can be easily avoided by designing good workstations and employees understanding poor posture, how to avoid it and why. A programme of training would greatly benefit the community, especially if it was done in a way in which they could pass on the knowledge to future generations. Perhaps by the creation of pictorial story boards that can be used on site. Training must also ensure that the workers understand the relevance and benefits of accepting new technologies in their occupation.

Conclusions

Significant improvement can be made for relatively small investment. The provisions would require greater investment. Manual handling would be further reduced with the provision of solar dryers and solar cookers to eliminate the need to collect firewood (e.g., [African oven solutions - Google Search](#) – 17 July 2023). This would reduce time and manual handling risk and help to preserve the pressure on local resources. The provision of a screw press and mechanical filtering would eliminate the exposure to hot fluids and dermatological hazards. This reflects the approach now being taken by other countries (e.g., [Shea Nut | ECHOcommunity.org](#) - 17 July 2023).

Educating the workers on the hazards, how they cause harm and how this can be avoided is of great importance. This should be completed in a way that the knowledge can easily be passed on to new workers by those more experienced.

Of greatest importance is enabling these communities to get the very best price for their labours. Legal advice and investment to support the development of cooperatives of a sufficient size to sell to the main exporters directly, cutting out the middleman, would greatly benefit these communities. With appropriate storage facilities and with sales knowledge or support, they would potentially be able to sell at the optimum times and receive the best price for their product. The time saved in the day by the use of mechanical tools would enable these workers to find other constructive ways to make money and make inward investment, thereby hopefully breaking the poverty trap they currently endure.

Appendices

- Appendix A: Description of the Shea Butter Process
- Appendix B: Hazards

Appendix A: Description of the Shea Butter Process

Assessment Date: 5th July 2023



Figure A1: Shea Butter process in pictures (each of the stages expose the workers to different hazards).

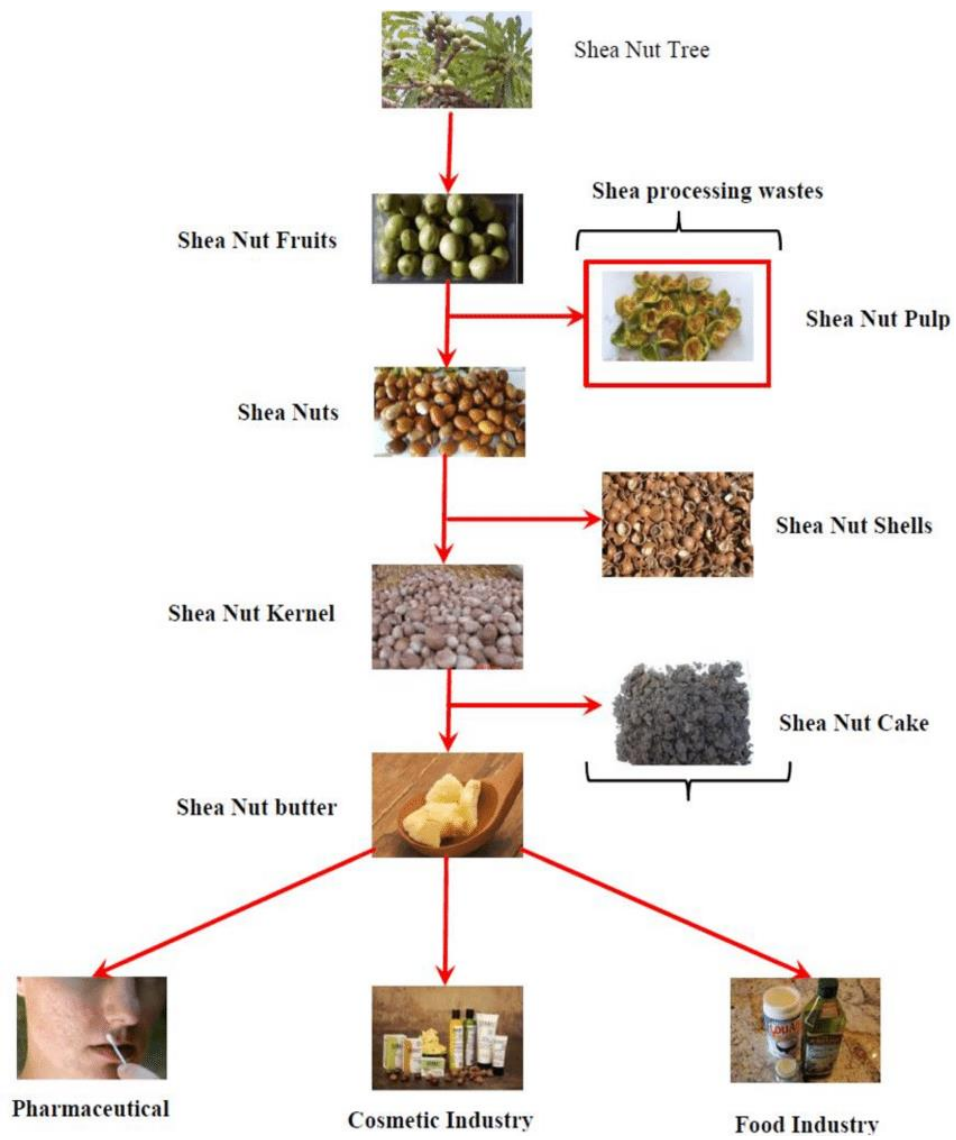
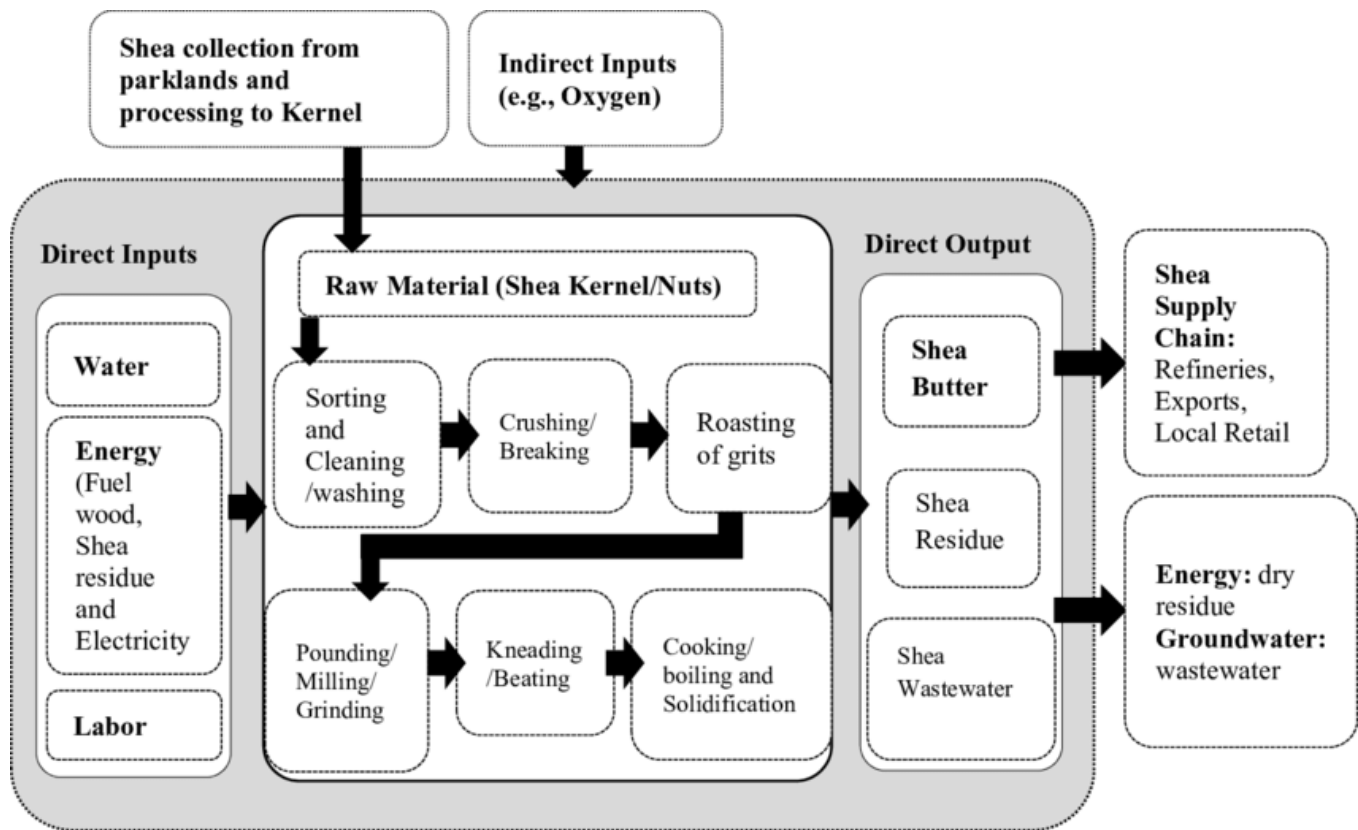


Figure A2: Shea Butter Process Flow Chart (each of the stages expose the workers to different hazards).



Shea Nut Processing (Wet and Dry):

The Shea Nuts are boiled, using wood fires and water gathered from boreholes via a semi-functioning hand-pump. The firewood used for the fires are gathered from deep within the forest and carried back a considerable distance on the heads of the farmers.

The boiled Shea Nuts are then spread on the floor and dried under the sun for 7 days, following which the shell of the nut is removed and discarded.



Image 7- Drying of Shea Nuts



Image 8- Drying of Shea Nuts



Image 9- Drying of Shea Nuts



Image 11- Drying of Shea Nuts



Image 10- Dried Shea nuts in a small basin



Image 12- Women crushing Nuts with stones.

Image 13 - Women crushing Nuts with

With workers sitting on the ground, the Nuts are crushed with stone to yield the Pulp.



stone.

Shea Butter Extraction:

The dried shea nuts are crushed with stone to make it easier to grind at the mill. The crushed nuts are cooked on a wood fire whilst being stirred in a pot. This increases the yield of the shea butter during subsequent grinding at the mill.

The fried shea nuts are then carried on the heads of the women to the nearest mill, which can be a considerable distance from their homes where the above handling processes take place. The ground shea nuts are then transferred into a steel pan where they are manually stirred for almost an hour and a half to extract the shea fat. Water is added to the churned mixture once bigger fat grains are formed. This stage requires the use of a lot of water to aid in the separation of the fat from the mixture. This stage requires the presence of at least two people; one who churns and the one who intermittently adds water. The extracted fat is thoroughly washed until water is considerably clear. The washed fat is collected into another pot ready to be boiled. This part of the extraction process lasts around 2 to 3 hours depending on the quantity of the mixture.



Picture 14 - Churning of Milled Shea Nuts



Picture 15 - Washing of raw shea butter

The leftover mixture from the butter extraction process is left to sit for a while. This causes the leftover shea particles to settle at the bottom of the basin. The settled particles are collected and sun-dried and balled up to be used as fuel for fires. (Circular economy).



Image 16 - Boiling of raw Shea Butter

The raw shea butter derived from the churning process is boiled in a pot on a wood fire until the shea butter forms. The froth on top of this butter is scooped off with a short-handled hand-scoop, and the remaining shea butter collected.



Image 17 - Decanting of raw Shea Butter

The shea butter is collected into desired container sizes and left to cool. The resulting product solidifies to become the shea butter in its finished state.

Shea Butter Transport to Market:

The product is transported by the women by carrying them on their heads to the market where they are sold by women sitting on rocks under a makeshift canopy.



Image 18 - Market woman selling shea butter



Image 19 - Makeshift canopy and women sitting on rocks

Appendix B: Hazards

Stage 1: Shea nut harvesting

Hazard Present	ILO Reference	Existing Controls
Work Environment Women work under the sun, with average temperatures of 28.4°C, reaching a maximum of 35.2 °C. Dehydration and heat stroke which is potentially fatal.	Reference: ILO Code of Practice on Safety and Health in Agriculture, • 9.2 • 17.2	No controls present
Biological Poisonous snakes and scorpions are always present in the farms. Severe envenomation or anaphylactic response to scorpion stings are potentially fatal.	Reference: ILO Code of Practice on Safety and Health in Agriculture, • 11.6	No controls present
Dermatological Workers use their hands and feet to crush the Fruits gathered on the ground to extract the Nuts. This can create dermatitis and are routes of entry for disease such as tetanus.	Reference: ILO Code of Practice on Safety and Health in Agriculture: • 9.2	No controls present

Stage 2: Shea nut processing (wet and dry)

Hazard Present	ILO Reference	Existing Controls
Dermatological Whilst boiling (and frying) the shea nuts, the hot water (and boiling oil) can splash on the worker performing the boiling. Workers sit awkwardly on the ground adjacent to the fire and cannot easily react to a splash by getting out of the way. This can cause third degree burns.	Reference: ILO Code of Practice on Safety and Health in Agriculture • 6.1	No controls present

Hazard Present	ILO Reference	Existing Controls
Respiratory Health Workers inhale smoke from wood fires, especially when wind conditions cause smoke to be blown into their faces throughout. Particulate matter can cause respiratory conditions (e.g. Occupational Asthma, Chronic Obstructive Pulmonary Disease) and chemicals in the smoke are known carcinogens.	Reference: ILO Code of Practice on Safety and Health in Agriculture 14.5	No controls present
Fire The fires used are open and embers are often seen carried by the wind. There are many flammable materials around the worksite including dried wood and textiles. Dwellings are nearby. Uncontrolled fire can give third degree burns or cause death if trapped in a burning building.	Reference: ILO Code of Practice on Safety and Health in Agriculture 14.8 16.4	No controls present
Musculoskeletal Workers carry heavy loads of firewood weighing around 30kilogrammes or more on their heads and for a considerable distance. The workers stoop to pick up firewood from ground. This can result in pulled muscles. Repeated injury can cause long term chronic effects on joints that can be debilitating.	Reference: ILO Code of Practice on Safety and Health in Agriculture: 9.2 9.3	No controls present
Dermatological Workers who perform Manual Churning have their hands wet for long periods which can result in dermatitis and fungal nail infections (Onychomycosis)	Reference: ILO Code of Practice on Safety and Health in Agriculture 6.1	No controls present

Stage 3: Shea butter extraction

Hazard Present	ILO Reference	Existing Controls
Dermatological Workers scoop off the froth using a short-handled ladle, which they dip into the boiling fluid. Potential for splashes to cause third degree burns.	Reference: ILO Code of Practice on Safety and Health in Agriculture 6.1	No controls present

Stage 4: Shea butter transport to market

Hazard Present	ILO Reference	Existing Controls
Musculoskeletal and Ergonomic: Packaging of Shea Butter done in awkward postures and involves repetitive motions. The workers then place the packaging on their heads and walk miles to get to the market. Poor posture, lifting and carrying, can cause tendon and muscle issues leading to chronic conditions.	Reference: ILO Code of Practice on Safety and Health in Agriculture: 9.2.	No controls present

Recommended control measures:

See the International Labour Organization (ILO)'s Code of Practice on Safety and Health in Agriculture, 2010, found at:

https://www.ilo.org/safework/info/standards-and-instruments/codes/WCMS_161135/lang--en/index.htm#:~:text=This%20code%20of%20practice%20is,governments%2C%20employers%2C%20workers%20and%20other

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+44 (0)116 350 0700			

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