EUROPEAN UNION

THE COCONUT WASTE PROJECT

BASELINE SURVEY REPORT

The Coconut Waste Project (COWAP)

CERATH DEVELOPMENT ORGANIZATION (CDO)

APRIL 2021

ACCRA, GHANA

Implementing Organizations:

CERATH DEVELOPMENT ORGANISATION

La NKWANTANANG MADINA MUNICIPAL ASSEMBLY

TREE CROPS CENTER

BLANK PAGE

ACKNOWLEDGEMENTS

CERATH Development Organization (CDO) would like to thank the almighty God for His mercies, guidance and wisdom in conducting the Coconut Waste Project baseline study.

Our sincerest appreciation also goes to the European Union for their financial support for the implementation of the Coconut Waste Project. Furthermore, CDO would like to express our gratitude to the partner organizations for providing technical and intellectual guidance during every step of this study. More specifically we are thankful to the team of experts at the Municipal Planning Unit and Environmental Health and Sanitation Unit of La Nkwantanang-Madina Municipal Assembly for the knowledge shared with the project team.

The team will also like to express its sincere gratitude to the project beneficiaries (coconut vendors, households, market actors, individual waste collectors) for sharing information related to the coconut value chain and on coconut waste with the survey team. We would like to thank Dr Benjamin Doe of the Department of Planning, Faculty of Built Environment, College of Art and Built Environment, Kwame Nkrumah University of Science and Technology (KNUST) for reviewing the report.

Last but not the least, we would also like to thank the field officers, CDO Staff and the Coconut Waste Project team for their tremendous support and valuable inputs in the study and preparation of this report.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF ABBREVIATIONS & ACRONYMS

ANOVA	Analysis of variance
CDO	CERATH Development Organization
COWAP	Coconut Waste Project
DF	Degree of Freedom
EU	European Union
FGD	Focus Group Discussions
GABBSO	Ghana Association of Barbers and Barbering Saloon Owners
GDP	Gross Domestic Product
GHABA	Ghana Hairdressers and Beauticians Association
GH₵	Ghana Cedi
GPS	Global Positioning System
GSS	Ghana Statistical Service
ICAG	Institute of Chartered Accountants, Ghana
ID	Identification
JHS	Junior High School
Kg	Kilogram
KII	Key Informant Interviews
KNUST	Kwame Nkrumah University of Science and Technology
LaNMM	La Nkwantanang-Madina Municipality
LaNMMA	La Nkwantanang-Madina Municipal Assembly
LI	Legislative Instrument
M&E	Monitoring and Evaluation
MCWM	Municipal Coconut Waste Management
MEL	Monitoring, Evaluation and Learning
MoFEP	Ministry of Finance and Economic Planning
MS	Mean Squares
NHIS	National Health Insurance Scheme
PAYT	Pay-as-you-throw
SE	Standard Error
SHS	Senior High School
SS	Sum of Squares
SSS	Senior Secondary School
TCC	Tree Crops Center
UG	University of Ghana
UPSA	University of Professional Studies, Accra
USD	United States Dollars

EXECUTIVE SUMMARY

CONTEXT OF THE PROJECT

The Coconut Waste Project (COWAP) is a four-year project funded by the European Union under the Circular Economy and Local Development Programme. This project aims at achieving a green-circular economy and creates livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang-Madina Municipality. The baseline study was conducted to assist in the project management and implementation of the Coconut Waste Project. The overall aim of this study was to understand the current situation of the project environment to inform the implementation of the Coconut Waste Project.

BASELINE STUDY OBJECTIVES

The baseline sought to specifically (1) investigate the socio-demographic characteristics of project beneficiaries to inform project monitoring, evaluation and learning (MEL), (2) analyse the existing context of the coconut waste value chain (specifically coconut vendors, individual "value" pickers/collectors, and end-users of coconut waste value-added products) within the project area, (3) map-out coconut vending sites and coconut waste disposal sites and, (4) To gather baseline data for all required indicators in the project monitoring and evaluation plan

METHODOLOGY

The baseline study adopted the cross-sectional survey design to examine and understand the existing situation of the project environment. The study also applied the mixed-method approach to collect and analyse data for the study. In achieving the research objectives, 411 households and 308 coconut vendors within the project area were selected for the study using the simple random sampling technique. Also, 11 Key Informant Interviews (KII) and 1 focus group discussion (FGD) with coconut vendors were conducted as part of the study. Four coconut waste value chain market actors were also conveniently sampled whilst 5 individual waste collectors, and 2 relevant departments within the La Nkwantanang-Madina Municipal Assembly were purposively selected for the KIIs. The study also used the Global Positioning System (GPS) technology to map out all coconut vending and coconut waste dumping sites within the project area.

KEY FINDINGS

The study revealed that the majority of coconut vendors (97%) are males with an average age of 29 years. Most of the coconut vendors (51.1%) have had education up to the Junior High level with nearly 2% having had education up to the tertiary level. About 70% of the coconut vendors have a household size of 1-3 members. The study also found that 60% of the coconut vendors are migrants from the Central Region of Ghana who have migrated to the project area to engage in the coconut vending business. About 58% of household heads interviewed in the project area were also found to be females with a mean age of 34 years. Likewise, the study realized that almost all individual coconut waste collectors in the project area are males. The majority of the households interviewed for the study have household members of between

1-3. Also, most of the household respondents (51.6%) are engaged in their businesses while 20.9% are currently unemployed. In terms of the ownership status of dwelling among the household respondents, about 56% of the households live in compound houses with almost 6% of them living in kiosks/containers, nearly 59% of them live in rented apartments whiles 1.5% of them are just caretakers of the houses they occupy. More than a quarter (30.4%) of the households was revealed to have been living in the project area for 10 years and above. Households within the project area earn a mean income of GH₵1,407 (€201.23) per month.

The current coconut waste value chain in the project area involves coconut vendors, households, individual waste collectors, market actors, and the state. However, individual coconut waste collectors provide coconut waste to recycling companies outside the project area. The generation of coconut waste is at both the household level and the coconut vendor level. A household within the project area was found to generate an average of 3.42kg whiles a coconut vendor generates an average of 111.99 kg daily.

An average volume of 64 tonnes of coconut is procured daily by coconut vendors in the project area which generates an average of 34 tonnes of coconut waste per day. The mean price of coconuts sold at the source (farm gates, distributing points/aggregating points/depots, local markets, distributing vans) is GH₵1.29 (€0.18) whiles the mean price of coconut sold to consumers in the project target areas is GH₵2.4 (€0.34). On average, a coconut vendor generates a total revenue of GH₵235.20 (€33.65[1]) per day, GH₵7,056 (€1,009.50) per month, and GH₵84, 672 (€12,114.04) annually. These sales are mostly made during the dry season (December-March) even though coconuts are seen to be in abundance during the wet season (April-November). A majority (58%) of the coconut vendors were found to have a form of financial account. The study also revealed that 33% of coconut vendors have signed on to a form of insurance policy, particularly the National Health Insurance Scheme.

The study further revealed that individual waste collectors are the main actors that collect and transport coconut waste within the project area. Coconut waste within the project area is given to caterers to be used as fuel; recycling companies for the manufacturing of coconut waste value-added products; or dumped at undesignated places. On the average, individual waste collectors charged between GH₵5 (€0.71) to GH₵50 (€7.15) per vendor to collect and dispose of their coconut waste. However, most of them charged GH₵12 (€1.70) per 25kg fertilizer bag full of coconut waste. The state plays a regulatory and coordinating role in the management of solid waste (including coconut waste) in the municipality. However, the state appears not to play a direct role in the management of coconut waste at the coconut vendor level.

In addition, the study found that there is a market for coconut waste value-added products such as cocopeat, paper bags and activated charcoal. Shopping malls and restaurants mostly rely on paper bags to

[1] 1 Euro to 6.83 GH₵ as at 23 July, 2021 (Source: https://www.bog.gov.gh/treasury-and-the-markets/historical-interbank-fx-rates)

package products for customers. These companies purchase paper bags from local manufacturing companies. Again, major agroforestry/horticultural companies also purchase cocopeat from local companies to plant trees, crops and to nurse seedlings. However, activated carbon charcoal which is produced from coconut shells and widely used by the mining sector is mostly being imported from countries such as South Africa, Sri Lanka, and Thailand (Ghana Chamber of Mines Report, 2017).

The study shows that activated carbon charcoal production appears to have the highest economic value compared to cocopeat and paper bags. The study revealed that a hospitability company may demand 4,400 pieces of paper bags a month. The average price of a piece of a paper bag was found to be GH₵0.70 (€0.099). The finest quality of cocopeat is sold at GH₵120 (€16.93) per 5kg of which an agroforestry/horticultural may demand an average of 50kg per month. In addition, it was also found that a large-scale mining company may demand an average of 33 tonnes per month which is sold at GH₵17,355.00 (€2,448.95) per tonne.

CONCLUSION

Socio-demographic characteristics of project beneficiaries

- The coconut vending business is a male-dominated venture with an average age of 29 years.
- The majority of the coconut vendors are migrants from the Central Region of Ghana to the project area to engage in the coconut vending business
- Most of the household heads in the project area are females and have lived in the area for 10 years and above. They earn a mean income of GH₵1,407 (€199.57) per month.

Existing context of the coconut waste value chain

- The main actors in the coconut waste value chain in the project area include coconut vendors, households, individual waste collectors (*aboboyaa*[2] riders), market actors, and the state.
- No coconut waste recycling company exist in the project area as at the time of the baseline study.
- Coconut waste is generated at two levels; thus, at the coconut vendor and household levels.
- Currently, coconut waste in Ghana is mainly recycled into cocopeat, charcoal, and paper bags.
- An average volume of 34 tonnes of coconut waste is generated per day in the project target area. Nearly 18 tonnes of coconut waste are generated per day in LaNMM alone.
- There is a local market for cocopeat, paper bags, and activated carbon charcoal. However, the majority of market actors that uses activated carbon charcoal imports it from South Africa, Sri Lanka, and Thailand.

[2] A human-powered tricycle commonly found in the streets of Ghana. It is normally used to carry both passengers and loads

Baseline data on relevant project indicators

- The majority of the households do not separate coconut waste from other solid waste before they dispose of it off.
- 69.4% of households out of 411 households give their solid waste to private/individual waste collectors.
- None of the households give their coconut waste to coconut waste processing factories.
- Almost half of the coconut vendors give their coconut waste to individual aggregators (Aboboyaa riders)
- The majority of coconut vendors own a form of financial account, about 33% of them have signed on to a form of an insurance policy.
- The majority of coconut vendors have never accessed a form of loan/credit facility.

RECOMMENDATIONS

In light of the key findings of the survey, the following strategies are recommended to guide the implementation of the project:

1. Sensitization on waste separation should be conducted for households.
2. Households should be sensitized to proper coconut waste management practices which include giving their coconut waste to aggregators to be supplied to the project factory.
3. Considering the harsh nature and conditions of the coconut vending business, the project should sensitize and encourage coconut vendors to sign on to social protection services including insurance packages. This will be successful when the project collaborates with various social protection service institutions.
4. The project should collaborate with relevant financial institutions to build capacities of coconut vendors on owning financial accounts, savings and having access to loans/credit facilities. This will enhance financial inclusion among the coconut vendors.
5. The project should facilitate the establishment of a well-structured informal trade association for coconut vendors within the target area. This will enhance social inclusion and overall social well-being for the coconut vendors.
6. If possible, the project should adopt these associations as the project's learning groups to capitalize on its positive impacts on livelihood improvement, income intensification, and social learning.
7. The establishment of an aggregating system within the project area should consider licensing of tricycles, licensing for tricycle riders, and capacity building on tricycle riding.
8. The establishment of an aggregating system should emphasize training and sensitization regarding key issues such as proper coconut waste handling, solid waste sorting, and integrated waste management practices.
9. To ensure that coconut waste can be aggregated from all parts of the target areas especially in areas farther from the proposed factory site, the project should consider procuring mini pickup

vehicles. These vehicles can travel long distances as compared to tricycles and can transport huge volumes of coconut waste to the project factory.

10. The project should collaborate extensively with the municipal assembly in the establishment of the aggregating system and the recruitment of youths as aggregators. This will also help to ensure that all processes and regulatory frameworks are known and adhered to by aggregators that will be recruited as part of the project.
11. The project should encourage the participation and inclusion of females especially as coconut vendors, coconut waste aggregators, and factory workers.
12. The project should include COVID-19 sensitization programs in its implementation.

CHAPTER 1: INTRODUCTION

1.1 Country Context

Ghana, a fast-growing and middle-income West African country is surrounded by Ivory Coast to the West, Burkina Faso to the North, Togo to the east and the Gulf of Guinea (Atlantic Ocean) to the south (Country Studies Report on Ghana, 2012). The country has a total land area of 238,540 km^2 and a total coastline of 550km (Dadson et al., 2016), stretching from Aflao in the West to Axim in the East. The country's GDP grew from 6.3% in 2018 to 6.5% in 2019 (Ghana Statistical Service (GSS), 2020). The population of the country continue to increase steadily with an estimated population of 30 million in 2020 compared to 24.66 million as of 2010 (GSS, 2012; GSS, 2020). An estimated 56.7% of the population live in urban areas in 2020 compared to about 50.9% in 2010 (GSS, 2012; 2020).

The increase in population implies that government will have to implement pragmatic policies to tackle issues of sanitation, unemployment, infrastructure deficit among others. While the government has achieved significant strides in addressing particularly sanitation issues, there continue to be a challenge in waste management and to a larger extent transforming waste into a resource in the country. Throughout history, several policies have been implemented to ensure adequate waste management practices and local economic opportunities (Kyere et al., 2019). Key among these policies is the increasing involvement of the private sector in waste management in urban areas (Keesman, 2019). These are expected to result in improved sanitation situations, improved climatic conditions and access to economic opportunities.

Coconut (*Cocos nucifera*) is a member of the family *Arecaceae* (palm family) and the only species of the genus *Cocos*. Globally, coconut and coconut waste continue to become important agricultural products contributing to local economic development. About 92 countries worldwide engaged in coconut production on approximately 11.8 million hectares (Clarence, 2016). Indonesia is the largest producer of coconuts producing about 18,300,000 tonnes of coconut (Clarence, 2016). In India for instance, it is estimated that coconut plantation covers an area of 2.08 million hectares with an average annual production of 23,904.10 million nuts between 2016 and 2017 (Maheswarappa & Sumitha, 2018). These tonnes of coconuts usually generate waste that is processed into coir and cocopeat and exported for foreign exchange (Murthy, 2018). The coir which is extracted from the outer husk of the coconut can be used for doormats, brushes and mattresses. In Sri Lanka, the Export Development Board postulates that the coconut industry continues to play a major role in foreign exchange earnings and job creation (Sri Lanka Export Development Board, 2019). In 2017, the world ranking on exports reported that Sri Lanka's export position on coir related products and coconut oil was 1st and 3rd respectively (Sri Lanka Coconut Development Authority, 2018). In 2019 for example, export proceeds from coconut kernel products, coconut fibre products, and coconut shell products in Sri Lanka were USD296 million, USD 188 million and USD 104 million respectively (Sri Lanka Export Development, 2019). Additionally, in 2018, export proceeds from activated carbon, (coco peat, fiber pith & moulded products), and mattress fibre was USD 99 million, USD 12 million and USD 120 million respectively. The situation is no different from

Thailand and other Sub-Saharan African Countries. Thailand continues to commit investment to research and development initiatives on coconut varieties, efficient coconut production and coconut value-added products such as coir fibre and activated carbon

Ghana is ranked the 16th producer of coconut in the world producing about 224 million nuts annually (Codjoe et al., 2021). According to Oduro-Yeboah et. al (2020), coconuts are found along the entire coast of Ghana and employs about 76,000 people nationwide. Although coconut was first introduced in the Volta region, recent reports indicate that the bulk of its production comes from the Western Region (Yeboah, 2009). The coconut business generates significant income for many rural dwellers engaging in the production and selling of nuts. The majority of Ghanaians in the urban areas consume coconuts for their nutritious value. It is also a source of raw material in many food products such as coconut milk and cream, coconut oils, coconut chips, and toffees, etc (Oduro-Yeboah, 2020). Obeng et al. (2020), found out the importance of coconut husk to serve as an energy production process while sustaining the environment due to its energy content.

Despite the socio-economic benefits of coconuts in Ghana, their contribution to waste generation is enormous with minimal measures for its management. In Ghana, indiscriminate disposal of coconut waste is evident in major urban areas in Accra, Kumasi and Takoradi. It is estimated that over 30,000 tonnes of coconut shells from coconut related activities are generated annually (Buah & Kumah, 2012). A study conducted by Clarence (2016), estimated that 2.54 to 2.94 tonnes of coconut waste is generated per month within the Kumasi metropolis. It further revealed that 91% of the coconut waste ends up at the dumping sites with about 8.9% and 0.10% used as fuel and doormats respectively.

The La Nkwantanang-Madina Municipality (LaNMM) is not immune to the indiscriminate disposal of coconut waste. The situation continues to derail the efforts of the municipal assembly to manage its waste. Coconut vendors continue to dump coconut husk waste at undesignated waste dumping sites within the municipality. On the other hand, the municipality is not able to harness the economic opportunities within the coconut waste value chain. This requires the implementation of alternative actions which will improve the sanitation conditions emanating from indiscriminate disposal of coconut waste whiles creating livelihood opportunities. The Coconut Waste Project presents an integrated approach of contributing towards a green-circular economy while contributing to local economic development within the La Nkwantanang-Madina Municipality. This report presents findings of a baseline situation of the project environment to facilitate monitoring and evaluation of project interventions.

1.2 Overview of the Coconut Waste Project (COWAP)

Background

The La Nkwantanang-Madina Municipality is one of the densely populated and cosmopolitan municipalities in the Greater Accra Region. The municipality's population was estimated to be 146,913 people in 2018, with women constituting about 51.5% and 48.5 % being men distributed within 23 major settlements

(Ministry of Finance and Economic Planning (MoFEP), 2020)[3]. The population density of the municipality has been estimated at 1,391 persons per sq. km in 2010 (LaNMMA Planning Coordinating Unit, 2015). The municipality is characterized by a mixture of medium and low-income households. The low-income homes are manifested with the presence of slums often known as "Zongos[4]".

As indicated by the municipality's governing agency i.e. La Nkwantanang-Madina Municipal Assembly (LaNMMA), waste is a major challenge particularly solid waste from households, schools, businesses and markets. A common solid waste seen in the municipality is coconut husks. This stems from the high consumption of coconut within the municipality, facilitated by the presence of numerous (in different locations) vendors.

Unfortunately, the consumption of coconut coupled with poor management of the husks (waste) has led to the indiscriminate disposal of this resource as waste (CDO, 2020). According to LaNMMA, it is estimated that about 94-151 tonnes of coconut husk waste is generated on daily basis within the municipality (LaNMMA Planning Coordinating Unit, 2019). Through a joint field survey to further assess the challenge, interactions with coconut vendor groups in the municipality, revealed that the main means of disposing of the coconut waste include dumping them at waste sites at the market centres, streets, and uninhabited lands within the municipality (CDO, 2020). Other coconut vendors resort to the services of tricycle carted waste collectors, locally known as "*Aboboyaas*". Unfortunately, these *Aboboyaas* resort to dumping the husks on shrub lands close to the Atomic junction, the University of Ghana (UG), and the University of Professional Studies, Accra (UPSA) (CDO, 2020). In recent times, the husks are left to dry and later burnt hence contributing to carbon emissions. Other coconut vendors also resort to supplying the husks to kenkey (a local delicacy made of maize) vendors (CDO, 2020). These kenkey vendors utilize the dried form of the husks as fuel for cooking.

The Municipal Assembly is challenged with knowledge and expertise to transform the coconut husks into useful resources. Nevertheless, coconut husks are useful raw materials to produce an array of products including cocopeat, paper, pallets, coir mattresses, and charcoal. Unfortunately, these opportunities have not been tapped, and thus represent lost economic opportunities for the municipality and Ghana as a whole. The Coconut Waste Project was thus developed mindful of these challenges.

The Coconut Waste Project is a four-year project funded by the European Union under the Circular Economy and Local Development Programme. This project aims at achieving a green-circular economy and creates livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang-Madina Municipality. It is expected that the project will promote public-private partnerships through a collaboration with the municipal assembly, Civil Society Organization and private entrepreneurs. Additionally, the project will utilize global positioning system technologies to track coconut waste volumes

[3] https://en.wikipedia.org/wiki/La_Nkwantanang_Madina_Municipal_District

[4]

daily, essential for the implementation of the coconut waste project. The objectives of the project include to:

- Establish a coconut waste aggregation system in the target municipality
- Institute a processing centre to convert coconut waste into selected useable products such as cocopeat, paper, and charcoal.
- Create linkages with market actors to procure coconut waste value-added products
- Implement a monitoring and evaluation system for waste management, learning, and scaling of the project.

It is anticipated that:

- An average of 100 tonnes of coconut waste will be aggregated on daily basis.
- Also, the aggregation of the coconut husk is expected to employ 100 youth within the municipality.
- Additionally, 50 youths will be trained on various entrepreneurial schemes and sustainable waste management practices.
- Furthermore, a coconut processing factory with an output capacity of 25 tonnes will be constructed to recycle the aggregated coconut husk.

These outputs are expected to improve sanitation conditions, and employment opportunities for marginalized people (particularly youth, women and persons with disabilities) in the municipality.

1.3 An integrative model to livelihood improvement (The theory of change)

Many scholarly arguments have concluded that the majority of poor people in developing countries live in rural areas (Finn, 2010). However, a more recent body of literature have revealed that the urban poor found in developing countries face a persistent struggle to make a living (Owusu, 2020; Panori et al., 2019). It further argues that absolute figures of the rural poor have dropped significantly whiles that of the urban poor has increased over the same period (Finn, 2010). Urban poverty has been linked to several factors including spillover effects of urbanization such as poor sanitation and waste management conditions, lack of access to employment opportunities, and inadequate capacity to leverage opportunities (Kudus et al., 2020). This invigorates special attention to institute pragmatic measures to improve the living conditions of the urban poor as a way to tackle the root causes of urban poverty.

The theory of change that underlies the Coconut Waste Project asserts that coconut husks are major waste materials and when harnessed can provide socio-economic opportunities with the La-Nkwantanang-Madina Municipality (the project area) and its surrounding municipalities. To harness its embedded opportunities, an integrated and multi-dimensional approach focusing on technologies, employment creation, ready markets for processed products are needed. This is based on the awareness that coconut husks (waste) are very common in the project area, a cosmopolitan area where the consumption of coconut is relatively high. Unfortunately, the project area has neither prioritized nor invested in the coconut waste economy to improve the livelihoods of its inhabitants.

The theory hinges on numerous assumptions. First, it assumes that all relevant actors acknowledge the need to change the status quo on coconut waste management. In this regard, the project assumes that coconut husks (waste) can be processed into useable products which can be used for other productive activities such as agriculture, forestry, packaging, mining, and construction. Again, it is assumed that some technologies and systems can leverage these waste materials for production. Lastly, the action assumes that there is a market for processed coconut husk products which can lead to a viable and sustainable circular economy for coconut husks. The activities of the action are expected to lead to outputs including aggregating 100 tons of coconut waste daily, employing at least 100 youth in coconut waste aggregation, and establishing a factory to process 25 tons of coconut waste per day. The factory is expected to hire about 50 people as factory workers with at least 2 off-take agreements signed with coconut waste market actors. These outputs will lead to outcomes including improved sanitation conditions, and employment opportunities especially for the marginalized people in the project area. The impact will be felt in the area of sustainable and healthier environments with the creation of local employment opportunities to reduce urban poverty.

Table 1: Project Summary

TITLE	The Coconut Waste Project
STARTING DATE	1st January 2021
DURATION	48 months
PARTNERS	CERATH Development Organization (CDO), Tree Crops Center (TCC), La-Nkwantanang-Madina Municipal Assembly (LaNMMA)
TARGET AREA	La-Nkwantanang-Madina Municipality (LaNMM)
BENEFICIARIES	Coconut Vendors, Unemployed youth, Coconut waste value chain market actors, La-Nkwantanang-Madina Municipality (LaNMM), communities within LaNMM, Communities surrounding LaNMM.
CO-FUNDING COST	€1,584,000.00
FUNDING SOURCE	European Union (EU)

1.4 Baseline Study Objectives

The overall objective of the baseline study is to understand the current situation of the project environment to inform the implementation of the Coconut Waste Project. The specific objectives are:

1. To investigate the socio-demographic characteristics of project beneficiaries to inform project monitoring, evaluation and learning (MEL)
2. To analyse the existing context of the coconut waste value chain (specifically coconut vendors, individual "value" pickers/collectors, and end-users of coconut waste value-added products) within the project area.

3. To map out coconut vending sites and coconut waste disposal sites

4. To gather baseline data for all required indicators in the project monitoring and evaluation plan

1.5 Structure of the baseline report

The baseline report is divided into four (4) main sections including the introduction, methodology, results and findings, and conclusions and recommendations. The introductory section presents a contextual analysis of the economic opportunities of coconut waste, and the coconut waste generation and management situation in Ghana and LaNMM. The section also gives a brief overview of the Coconut Waste Project and the objectives of the baseline study. The second section describes the methods and approaches adopted for the baseline study. It discusses the description of the project area, project indicators determined by the study, sampling and sample size determination, recruiting, training and supervision of enumerators, data collection and analysis. The next section presents the key findings of the baseline study. The final section summarizes conclusions from the study and relevant indicators and presents recommendations for project implementation, monitoring, evaluation and learning.

CHAPTER 2: METHODOLOGY AND APPROACH

2.1 Description of the project area (La-Nkwantanang-Madina Municipality)

The La Nkwantanang-Madina Municipality (LaNMM) is among the 29 Metropolitan, Municipal and District Assemblies (MMDAs) in the Greater Accra Region (https://www.ghanadistricts.com/Home/District/115). It was carved out of the Ga East Municipality in March 2012 by Legislative Instrument (LI) 2131 (LaNMMA Planning Coordinating Unit, 2019). The municipality covers a total land area of about 70.887 square kilometers and occupies about 2.18% of the region's total land area (GSS, 2014; LaNMMA Planning Coordinating Unit, 2019). It is bordered on the North by the Akwapim South District, North-East by the Kpone Katamanso Municipality, West by the Ga-East Municipality, East by the Adentan Municipality, and South by the Ayawaso West Municipality.

The composite budget of the Municipality for the fiscal year 2016 reports that large and unrelenting migration from rural and urban areas conditioned the creation of LaNMM (LaNMMA, 2016). The municipality is generally urban with major urban areas such as Madina which is the municipal capital. Other urban areas in the municipality include North Legon, Akatsi Abor, Okataban, Social Welfare Institute, and La Nkwantanang. In addition to these, other major settlements within the municipality include Pantang, Oyarifa, Otinibi, Danfa, Kweiman, Teiman, Adoteiman, Ayimensah, and Amrahia. The 2020 projected population of the municipality is estimated at 157,250 with women constituting about 51.5% and 48.5% being men (LaNMMA Planning Coordinating Unit, 2019). The municipality is characterized by a mixture of medium and low-income homes.

In terms of economic activities, commerce, agriculture, service and manufacturing are the major economic activities within the municipality especially Madina. The private informal sector employs about 69.7% of the working population in the municipality making the sector the largest employer in the area (GSS 2010).

However, the municipality continues to be challenged with sanitation issues due to the rapid population growth within the municipality. The municipality generates a total of 750 tonnes of solid waste daily out of which 490 tonnes is collected (LaNMMA Planning Coordinating Unit, 2019). Also, 81% of the solid waste is collected by private waste collection companies (LaNMMA Planning Coordinating Unit, 2019). A common solid waste seen in the municipality is coconut husks. This stems from the increased consumption of coconuts within the municipality, facilitated by the numerous presence (in different locations) of coconut vendors (CDO, 2020). Equally, issues such as high levels of unemployment and underemployment especially among the youth and the vulnerable; weak enforcement of existing sanitation laws; inadequate and limited coverage of social protection programmes for the youth and vulnerable groups continue to stunt the development of the municipality. Figure 1 depicts a map of the La Nkwantanang-Madina Municipality and surrounding shrubs used for coconut waste disposal.

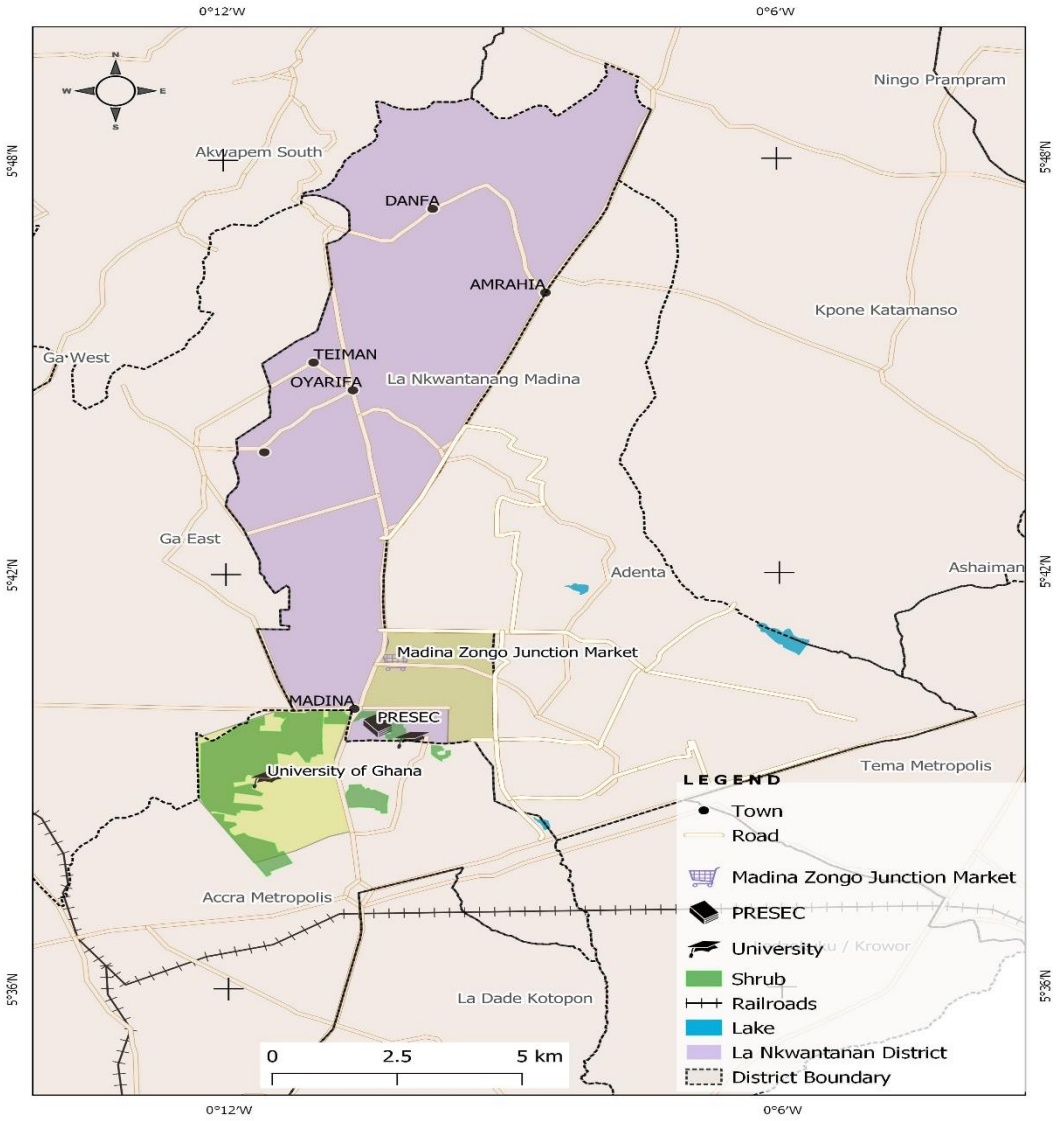


Figure 1: Map of the project area and surrounding shrubs used for coconut waste disposal

Source: CDO, 2020

2.2 Project Indicators

The baseline study also seeks is to measure relevant indicators (impact, outcome and output levels) set in the Coconut Waste Project (COWAP). These indicators will be measured frequently according to the Monitoring and Evaluation (M&E) Plan of the Coconut Waste Project. The project has 2 impact indicators, 3 outcome indicators and 9 output indicators. However, 2 impact indicators and 2 output indicators are addressed by this study. The remaining indicators will be measured before relevant activities begin. Table 2 presents the various indicators addressed in this report.

Table 2: Indicators determined by the Baseline Study

Level	Indicator
Impact	Percentage of households with improved sanitation conditions due to the adoption of proper coconut waste management practices
Impact	Percentage of coconut vendors who have adopted proper coconut waste management practices
Output	Number of tools developed or adapted to promote green circular economy
Output	The number of beneficiaries with social protection services.

2.3 Study design and approach

The cross-sectional study design was adopted for the baseline study. The cross-sectional design helped in collecting relevant data at a given point in time. According to Olsen & St. George (2004), all data collected under the cross-sectional design describes the situation at the particular time the data was collected. In effect, the adoption of the cross-sectional design also means that the situation being studied may give different outcomes if another time frame was selected. The design best fits the purpose of the baseline study at a time where the project seeks to ascertain the current project environment to inform the project implementation.

The mixed-method research approach was used to collect and analyse different types of data from the relevant respondents. This means that the baseline relied heavily on both qualitative and quantitative methods in collecting and analysing data used for the study. This mixed-method approach aided in studying the project environment more completely and holistically (Bryman, 2006).

2.4 Scope of the baseline study

Geographically, the household survey of the baseline study covered 5 communities within the La Nkwantanang-Madina Municipality (LaNMM), thus; Madina, West Adenta, Oyarifa, Pantang Hospital, and Pantang Village. These communities were purposely selected based on the extent of urbanization and socio-economic activities, and the presence of coconut vendors within the communities as compared to other communities within the municipality. On the contrary, coconut vendors in selected communities within 4 Municipalities were selected for the coconut vendor survey. These Municipalities include the project area (LaNMM), and its surrounding municipalities namely Adentan, Ga East, and Ayawaso West Municipalities. The coconut vendor survey was conducted in surrounding Municipalities mindful of the fact that the project intends to aggregate coconut waste from the project area (LaNMMA) and its surrounding Municipalities. In this light, it was imperative to understand the coconut waste situation from the perspectives of coconut vendors within these target areas (LaNMM and its surrounding Municipalities). It is worthy to note that 10 communities within LaNMM were selected for the coconut vendor survey based on the number of coconut vendors located in the communities. However, only communities (Haatso, Adenta, Agbogba, Abokobi, East Legon, West Legon) with numerous presence of coconut vendors within Municipalities surrounding

LaNMM were selected for the study. Tables 3 and 4 show the geographical coverage of the household survey and the coconut vendor survey respectively.

Table 3: Geographic Coverage of Household Survey

Municipality	Community
La Nkwantanang-Madina	Madina
	West Adenta
	Oyarifa
	Pantang Hospital
	Pantang Village

Source: Field survey, 2021

Table 4: Geographic Coverage of Coconut Vendor Survey

Municipality	Community
La Nkwantanang-Madina	Madina, West Adenta, Oyarifa, Pantang Hospital, Pantang Village, Teiman, Adoteiman, Danfa, Otinibi, Kweiman
Adentan	Adenta
Ga East	Haatso, Agbogba, Abokobi
Ayawaso West	East Legon, West Legon

Source: Field survey, 2021

Contextually, the study is limited to understanding the current situation of the project environment to inform the implementation of the Coconut Waste Project. Specifically, the baseline study is limited to investigating the socio-demographic characteristics of the project beneficiaries (coconut vendors and households); analyse the existing context of the current coconut waste value-chain in the project target area; map out coconut vending and coconut waste disposal sites; and gather baseline data for all required indicators in the project monitoring and evaluation plan. The study also limits itself to the coconut waste value chain commencing from those that generated the waste (coconut vendors and households, coconut waste transporters (individual waste collectors); regulators of coconut waste (the state); and the end-users (market actors). Also, the contextual analysis of the study focused extensively on coconut waste generation and management with limited emphasis on other types of solid waste.

2.5 Definition of the units of enquiry

A spectrum of basic units of enquiry was drawn for the baseline study based on their relevant role, knowledge and interest in the project environment and to a larger extent the project implementation. The units of enquiry include coconut vendors, household heads, individual waste collectors, coconut waste value chain market actors, and relevant departments within the La-Nkwantanang-Madina Municipal Assembly.

2.5.1 Coconut Vendors

The coconut vendors generate a significant amount of coconut husks waste by retailing the nuts. They indiscriminately dispose-off the waste and thus worsening the poor sanitation conditions in LaNMMA. They are part of the key beneficiaries of the project and would be relied upon profoundly to supply the factory with coconut waste. Data was collected from coconut vendors who were selling at their permanent joints and those who are into mobile vending. Data from the coconut vendors helped to understand the nature

of the coconut vending business, perform a market analysis of the coconut vending business, and to ascertain the coconut waste generation and management situation at the coconut vendor level.

2.5.2 Household Heads

The study also focused on information from households since they form a core of the project. At the household level, the study extensively focused on data from the household heads. In situations where the absence of the household head was met at the time of data collection, the next of kin to the household or an adult member of the household with adequate knowledge of the required information was interviewed. Data from the household level was necessary to ascertain the coconut waste generation and management circumstances at the household level.

2.5.3 Individual Waste Collectors

The individual waste collectors interviewed for the baseline study comprises informal waste collectors who usually move around in a tricycle which is predominantly known as "*Aboboyaa*". These waste collectors are well known for providing reliable regular service to their customers than the municipal assigned companies. These tricycle waste collectors provide spot-to-spot waste collection using improvised ways in signalling their arrivals. These solid waste collectors serve both households and coconut vendors within the project area. It was important for the project to interview existing waste collectors within the municipality to ascertain the waste collection systems they adopt, establish the gaps and improve upon them for instituting the project's coconut waste aggregation system. Data sourced from the individual waste collectors include fees they charge to dispose of waste of vendors, the quantity of coconut waste they dispose of daily and where they mostly dispose of the waste.

2.5.4 Coconut Waste Value Chain Market Actors

The market actors consist of medium to large scale companies within and outside Ghana that rely on the processed products of coconuts husks. These market actors cut across the agricultural/forestry, horticultural, construction and hospitality industries. For example, cocopeat which is a nursing material for tree seedlings is utilized by most plantation companies in Ghana. Also, in the quest by some hospitality outlets to go green in their packaging, most hospitality industries use paper bags (which are degradable) to replace the use of plastics. The Coconut Waste Project seeks to engage at least 10 market actors to purchase coconut waste value-added products processed at the project factory. In the light of this, the baseline study needed to engage market actors within the value chain. Market actors selected for the baseline study consisted of companies within the mining sector, hospitality sector, and the agricultural/forestry sector. Key data collected at this level included the economic feasibility of selected coconut value-added products with which the projects seek to produce at the project factory.

2.5.5 Relevant departments within the La Nkwantanang-Madina Municipal Assembly

The municipal assembly plays a critical role as actors and decision-makers within the coconut waste value chain. In this regard, the Municipal Planning Department and the Municipal Environmental Health Department of the La Nkwantanang-Madina Municipal Assembly were interviewed to assess the general

situation of the coconut waste value chain and to ascertain their role in ensuring proper waste management in the municipality.

2.3 Sampling and Sample size estimation

The process of sampling for the baseline study is embedded in approaches that aid the study to make meaningful and scientific generalizations from the sample under study.

2.6.1 Sample Size Estimation of Coconut Vendors

According to a census report from the La Nkwantanang-Madina Municipal Assembly (LaNMMA), the population of coconut vendors within the La Nkwantanang-Madina Municipality (LaNMM) was 38 in 2016 (LaNMMA, 2016). However, field observations and expert engagements indicated a significant increase in the number of coconut vendors within the La Nkwantanang-Madina Municipality. This has been attributed to continuing rapid urbanization, population growth and the increase in the number of unemployed youth that migrate to the La Nkwantanang-Madina Municipality with a hope of better employment opportunities and a better future. In this regard, the baseline study adopted the Snoran (Hybrid) sampling method to get the sample size from the unknown population of coconut vendors. The Snoran (Hybrid) sampling method is necessary to ascertain an appropriate sample size from an unknown population to provide better representative inferential statistics (Premarathne, 2015). The following procedures were used in adopting the Snoran (Hybrid) sampling method:

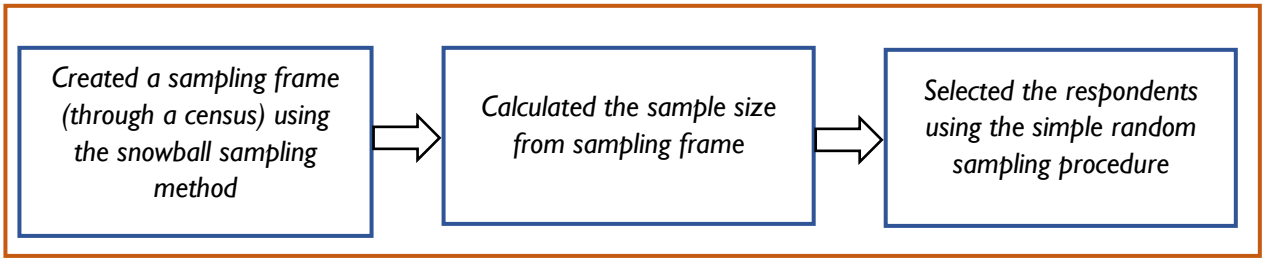


Figure 2: Snoran (Hybrid) sampling method procedures

Source: Premarathne (2015)

In adopting the Snoran (Hybrid) sampling method procedures, 318 coconut vendors were counted in communities within the La Nkwantanang-Madina Municipality and selected communities surrounding the LaNMM. With the snowballing method, a coconut vendor who has been conveniently selected and counted was asked to refer the next coconut vendor to be included in the census. The population in the census was then used as the sample frame. Slovin's sampling mathematical formula was then used to determine a sample size from the sample frame. Slovin's mathematical formula is given as $n = \frac{N}{1+N(\alpha)^2}$ where; "n" is the sample size, "N" is the sample frame; "α" is the margin of error and 1, a constant. The calculation was done using a 0.01 margin of error and a 99% confidence level. Since the study initially conducted a census on the coconut vendors before the coconut vendor survey, the baseline survey assumes that data from 99% of the coconut vendors will be true and certain for the entire coconut vendor population since they exhibit similar characteristics. Hence, the use of a 99% confidence level and 0.01 margin of error for calculating the sample

size of the coconut vendors. The census further gave the project team certainty of not achieving a non-response bias hence, the study did not adjust the coconut vendor sample for non-response.

Based on the results of the calculation, 308 coconut vendors across various communities in the project target areas were selected for the study. The selected communities in the target areas were then categorized into three study zones (urban, peri-urban and rural areas) based on their population size and socio-economic characteristics (GSS, 2014). Table 5 depicts the breakdown of the sample as calculated for the three study zones.

Table 5:Coconut Vendor Sample Size Determination

Study Zones	Selected Communities	Estimated Sample Size	Sample Proportion (%)
Urban	Madina+ selected neighbouring communities (Haatso, Adenta, Agbogba, Abokobi, East and West Legon)	244	79.2
	West Adenta	41	13.3
Peri-urban	Oyarifa, Pantang Hospital, Pantang Village	20	6.5
Rural	Teiman, Adoteiman, Danfa, Otinibi, Kweiman	3	1
Total		**308**	**100**

Source: Field survey, 2021

2.6.2 Sample size estimation of Households

The sample size of households was drawn from the population of households in the project area. The population of households within the project area was calculated using the 2010 population census statistics from the Ghana Statistical Service (GSS, 2014). Slovin's sample size calculation formula was then used to determine the sample size based on the population of the households in the communities within the project area. The calculation was done using 0.05 as the margin of error and 95% confidence level. Slovin's formula yielded a sample size of 394 households. However, the study adjusted the sample size by 5% for non-response and non-availability to a maximum sample size of 414 households. Table 6 shows the sample size determined for the various communities within the project area.

Table 6: Household Sample Size Determination

Community	Total households (2010)	Estimated Sample size	Sample Proportion (%)
Madina	20,586	331	80
West Adenta	3,289	53	13
Oyarifa	1,109	18	4.3
Pantang Hospital	398	6	1.4
Pantang Village	390	6	1.4
Total	**25,772**	**394 households - Minimum** **414 (5% adjustment) - Maximum**	**100**

Source: Field survey, 2021

Moreover, one (1) respondent was selected from stakeholders within the coconut waste value chain for the Key Informant Interviews. These respondents were selected based on prior knowledge and expert consultations on their role within the value chain. It was realised from prior information that the heads of the various institutions/departments were the appropriate respondents to contact for the data; hence, it was imperative to select one head from each institution. The institutions/departments selected for the study include the Municipal Planning Department and the Environmental Health Department of the LaNMMA. The project conveniently selected and interviewed two (2) companies within the hospitality industry, one (1) company within the mining industry, and one (1) company within the forestry industry.

Also, five individual waste collectors within the project area were selected for the baseline study. Expert consultations on the activities of individual waste collectors within the project area are similar, thus anyone selected from the population of individual waste collectors in the project area is worthy to provide the needed data for the study. Table 7 presents the number of respondents selected for Key Informant Interviews.

Table 7: Distribution of respondents selected for Key Informant Interviews (KIIs)

Institution/Department	Number of Respondents
LaNMMA Planning Department	1
LaNMMA Environmental Health Department	1
Individual Waste Collectors	5
Mining industry	1
Hospitality industry	2
Forestry/horticultural industry	1
Total	**11**

Source: Field survey, 2021

2.7 Sampling Techniques

The purposive non-probability sampling procedure was adopted to select the study areas. This was done in line with the target beneficiaries of the Coconut Waste Project. The snowball sampling was used in conducting a census on the coconut vendors within the target areas before adopting the simple random sampling to select the required number of coconut vendors for the study. Simple random sampling was used to select households within the project area as part of the study. The sampling procedure ensured that each household had an equal chance to be selected for the study. The individual waste collectors were conveniently selected based on their availability, accessibility and willingness to participate in the study.

The purposive sampling was also adopted to select departments within the La Nkwantanang-Madina Municipal Assembly to be interviewed. In selecting the market actors, a multi-stage sampling procedure was adopted. In the first stage, the purposive sampling procedure was used to select the industries that rely on coconut-value added products for their activities/operations. In the second stage, the convenience sampling technique was used to select companies within the industries. Twelve (12) representatives of coconut vendors within the project area were also selected to participate in a focus group discussion (FGD).

2.8 Data Collection

The study adopted the mixed-methods approach for data collection. The mixed-methods of data collection helped to gather both qualitative and quantitative data. The mixed-methods of data collection provided a more detailed understanding of the project environment which may be difficult to understand in detail using a single method of data collection (Creswell, 2010).

2.9 Data Types, Sources and Methods of Collection

The baseline study relied extensively on both secondary and primary data. The sources of the primary data included household heads, coconut vendors, coconut waste value chain market actors, relevant departments within the La Nkwantanang-Madina Municipal Assembly, and individual waste collectors. On the other hand, secondary data were sourced from credible and relevant published and unpublished sources including institutional and departmental reports that were essential for the analysis of the baseline study. The methods of primary data collection adopted for the baseline study are detailed as follows:

2.9.1 Household Surveys

A structured questionnaire was used to conduct household surveys for the study. The key data retrieved include their socio-demographic characteristics, household characteristics, and coconut waste generation and management at the household level.

2.9.2 Coconut Vendor Surveys

Coconut vendor surveys were conducted using a structured questionnaire with coconut vendors within the La Nkwantanang-Madina Municipality and selected surrounding communities. Key data collected at this level included the nature of the coconut vending business, market analysis of the coconut vending business, and coconut waste generation and management situation at the coconut vendor level.

Plate 1: An enumerator interviewing a female coconut vendor at Otinibi Community

Source: CDO, 2021 © Coconut Waste Project

Plate 2: An enumerator interviewing a male Coconut Vendor at Madina Social Welfare

Source: CDO, 2021 © Coconut Waste Project

2.9.3 Focus Group Discussions

Focus Group Discussions (FGDs) was conducted to retrieve qualitative data from representatives of coconut vendors within the La Nkwantanang-Madina Municipality. The FGD was made up of 12 participants. It served as venues to raise similar areas of concern as the surveys but with chances of probing further to obtain a clearer picture of the critical issues within the coconut vending business and coconut waste generation and management which are relevant to the project.

Plate 3: Focus Group Discussion with representatives of Coconut Vendors

Source: CDO, 2021 © Coconut Waste Project

2.9.4 Key Informant Interviews (KIIs)

KIIs were held to gather relevant data from coconut waste value chain market actors, relevant departments (Municipal Planning and Environmental Health and Sanitation departments) within the La Nkwantanang-Madina Municipal Assembly, and individual waste collectors.

2.9.5 Global Positioning System (GPS) Mapping and On-site Observation

The study used the Garmin handheld GPS MAP 64X device to map out coconut vending and coconut waste dumping sites. With an accuracy of 1 meter for outdoor mapping, the device obtained accurate coordinates to be used for the mapping. This then helped the project team to develop accurate maps of coconut vending sites and dumping sites within the project area to inform the project implementation. The structured observation method was adopted to obtain direct information and pictorial evidence on the nature of designated and undesignated coconut waste dumping sites within the project area. Table 8 represents the summary of key variables, sources and methods used in collecting the data.

Plate 4: (a) A Garmin Handheld GPS MAP 64X & (b) A project team member taking coordinates of a coconut dumping site within the project area

Source: CDO, 2021 © Coconut Waste Project

Table 8: Data Variables, Sources and Methods for Collection

Study Objectives	Key data variables	Data Sources	Methods for collection	Tool(s) for Analysis
To investigate the socio-demographic characteristics of project beneficiaries to inform project monitoring, evaluation and learning.	Household socio-demographics, Coconut vendor socio-demographics, socio-demographics of market actors	Households Coconut Vendors Market actors	Structured questionnaires, Key Informant Interviews	Descriptive analysis Thematic analysis
To analyse the existing context of the coconut waste value chain (specifically coconut vendors, individual waste collectors, and end-users of coconut waste value-added products) within the project area.	Nature of the coconut vending business, coconut waste generation and management and coconut vendor level and household level, the role of market actors and individual waste collectors in coconut waste management, the role of LaNMMA in managing coconut waste	Households, Coconut vendors, individual waste collectors, market actors, LaNMMA	Structured questionnaires, Key Informant Interviews, Observation	Descriptive analysis Thematic analysis Pictorial evidence
To map out coconut vending sites and coconut waste disposal sites	GPS Coordinates of coconut vendor sites GPS Coordinates of coconut waste dumping sites Pictures of coconut waste dumping sites	Coconut Vending sites Dumping sites	Structured Observation Global Positioning System (GPS) technologies	Pictorial Evidence Maps

To gather baseline data for all required indicators in the project monitoring and evaluation plan	The extent of improved sanitation conditions, the extent of proper coconut waste management practices among households and coconut vendors, number of coconut vendors with access to social protection services, tools developed to improve green/circular economy	Households Coconut Vendors LaNMMA	Structured questionnaires, Key Informant Interviews, Observation	Descriptive analysis, Thematic analysis, Maps

Source: CDO, 2021

2.10 Recruiting, Training and Supervision of Enumerators

The La-Nkwantanang-Madina Municipal Assembly (LaNMMA) was relied upon extensively in the recruitment of the enumerators. An official request was sent to LaNMMA, clearly indicating the criteria for recruitment. In collaboration with LaNMMA, 15 enumerators were finally selected based on knowledge and technical skills in using electronic data collection platforms, fluent in communicating Twi and Ga (predominant native language spoken within the project area), availability from time of pre-field training to the entire data collection period, and with a minimum of tertiary qualification with experience in data collection. Five supervisors were also selected from the project team to supervise the data collection process and make sure that quality data are gathered by the enumerators. Thus, a 1-day training workshop was organized for the enumerators and supervisors at the office of the CERATH Development Organization on the use of Kobo Collect, methodology of the baseline study and the goal of the study. The workshop took place on 9th March 2021. Before the workshop, a pilot testing of the tools was conducted in Madina Zongo Junction, a suburb within the La Nkwantanang-Madina Municipality. Feedback from the piloting helped to further fine-tune and improve the tools. The data collection started on the 10th of March 2021 and ended on the 13th of March 2021. Each supervisor was assigned to three enumerators and the exercise was supervised from the day it commenced to the day it ended. There was also central supervision of the exercise by the Monitoring and Evaluation (M&E) officer. Issues identified were communicated and addressed.

Plate 5: Enumerators and Supervisors training workshop

Source: CDO, 2021 © Coconut Waste Project

2.11 Data Processing, Analysis and Presentation

The processing and analysis of the data collected were led by the project's M&E officer and the project manager in collaboration with relevant members of the project team. Since an electronic data collection tool (Kobo Collect) was used for the data collection, there was no need for data entry. However, the data was extracted from the Kobo Collect dashboard and exported to Excel. The data was then cleaned of all inconsistencies and errors using Excel. The data were descriptively analysed with Tableau and Minitab software. Tableau was used to visualize the various components and categories of the data obtained from the respondents. Minitab was used in performing further analysis on quantitative data such as analysis of variance (ANOVA) on income earned by coconut vendors, correlation analysis to check the relationship between two or more variables/ indicator variables. The quantitative data were presented in tables, graphs and charts depicting various frequency distributions and measures of central tendencies. In addition, data from KIIs and FGDs were recorded, transcribed and analysed using the thematic analysis method. The geospatial data (location coordinates, attribute information, and time at which location and attributes exist) were processed using ArcGIS and QGIS software to generate the map outputs. Pictorial evidence and maps were also used to present coconut waste dumping sites and coconut vendor sites within the project area.

The analysis of data relied extensively on univariate and bivariate analysis is to analyse the study variables in achieving the objectives of the study. The study used the univariate data analysis to analyse descriptive characteristics such as the socio-demographic characteristics, nature of the coconut vending business, solid waste generation among households, solid waste management among households, coconut waste generation, coconut waste management, market for coconut waste value-added products, and the role of the state in coconut vending business. The bivariate data analysis was used to analysed data with two variables. This was used to explain relationships or causes between two variables. For instance, the bivariate analysis was used to determine the relationship between the number of coconuts sourced and coconut waste generated, and the impact of COVID-19 on the coconut vending business.

2.12 Reliability, Validity and Ethical Considerations

The baseline study was guided by scientific research principles and processes to ensure the collection of quality data from the field as well as the outcome of data analysis. The tools were developed by the project team led by the Project manager and the M&E officer. The tools were tested within similar conditions and context of the project and results were integrated into the revision of the tools. At the data collection level, all enumerators were made to sign an engagement contract with a code of conduct and confidentiality agreements. Enumerators were trained not to influence respondents to change their responses.

An unambiguous questionnaire was used to ensure easy administration. The questionnaire was translated and administered in the predominant local languages (Twi and Ga) used by the people within the project area. During the data collection exercise, the enumerators ensured to keep the data obtained from respondents very confidential and to respect the privacy of respondents. They were mandated to ensure that the criteria to obtain respondents' informed consent during the study is duly followed. To avoid impersonations, enumerators were tasked to introduce themselves and their purpose before commencing the data collection.

2.13 Work Plan of the Baseline Study

As part of the baseline study, several activities were undertaken from inception to developing the final report. The key activities and their scheduling are presented in Table 9.

Table 9: Work Plan, Key activities and their scheduling

	March 2021				April 2021		
Activity	WK 1	WK2	WK3	WK4	WK 1	WK 2	WK 3
Discussion on baseline study methodologies and scope.							
Desk Review and development of study goals and objectives.							
Preparations of data collection tools; tools translation; field piloting; tools finalization							
Recruitment of enumerators, training and field data collection.							
Data transcription, cleaning and analysis							
Preparation of Preliminary Baseline Report							
Review and fine-tuning of Preliminary Baseline Report							
Finalization and submission of final Baseline Survey Report to Project Team							

CHAPTER 3: RESULTS AND FINDINGS

This section presents the results and findings as indicated by the respondents on the indicators to be determined under the baseline study. Objectives 1-4 of the baseline study are covered in this section.

3.1 Socio-demographic characteristics of respondents

The first objective of the baseline survey is to investigate the socio-demographic characteristics of project beneficiaries to inform monitoring, evaluation and learning. To address this objective, this sub-section presents results and findings of the background characteristics of coconut vendors and households. These characteristics include gender, age, religion, household size, ethnicity, educational attainment, marital status of coconut vendors and households within the targeted area.

Socio-demographic Characteristics of Coconut Vendors

3.1.1 Informed Consent

Although 308 coconut vendors were sampled, 307 respondents (99.7%) gave their consent to be part of the study.

3.1.2 Distribution of coconut vendors' gender, age, and marital status.

Overall, out of the 307 respondents interviewed, the majority (97%) of them were males whiles 3% were females. Also, the majority (53%) of the respondents fall between the ages of 19-29 years whilst 32% of them belong to the age group of 30-39 years. Only 2% are elderly people of 50 years and above. The average age of coconut vendors was found to be 29 years. The study also reveals that majority (68%) of the coconut vendors are single whilst 29% of the respondents are currently married; 3% of them were found to be divorced at the time of the study as shown in figure 3.

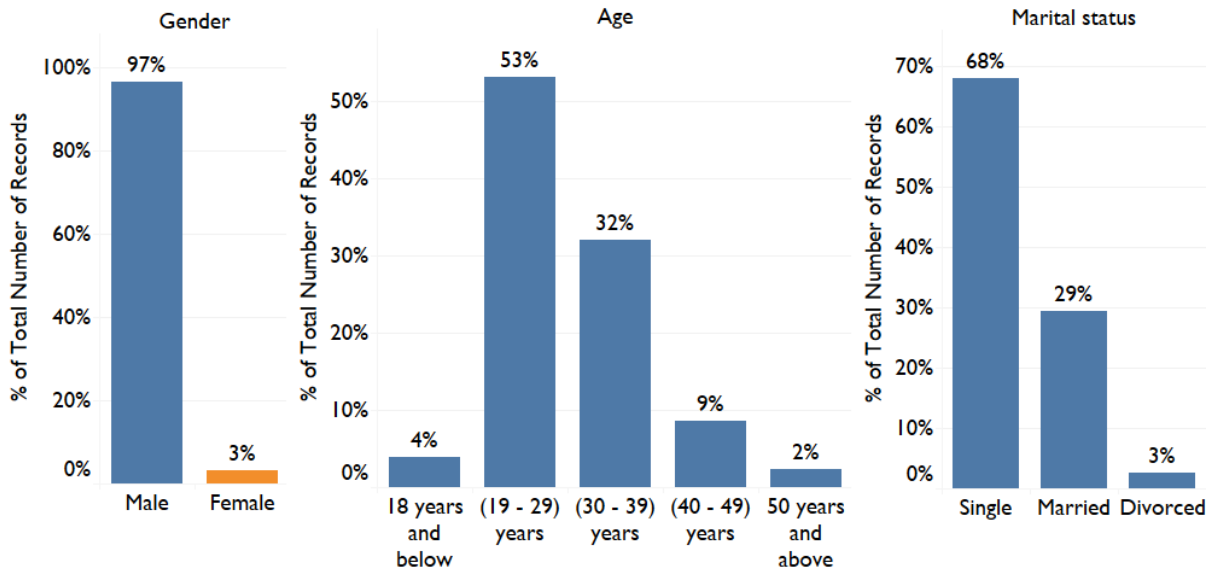


Figure 3: Distribution of coconut vendors' gender, age, and marital status

Source: Field Survey, 2021

3.1.3 Distribution of coconut vendors' academic qualification and ethnicity

The study found that 51.1% of the respondents have had education up to the Junior High School (JHS) level with only 1.6% of them having education up to the tertiary level. The means that the majority of the coconut vendors interviewed have had some form of formal education, with most of them having had education up to the basic level. It was also revealed that 8.5% of the respondents have no academic qualifications. Of all the coconut vendors interviewed, the study reveals that 85% constituting the majority of the respondents are Akans while Ewes (7%), Ga-Dangmes (3%), Mole-Dagbanis (2%), Gurmas (2%), Guan (1%) and Fulanis/Hausas (1%) constitute the rest. The distribution of the respondents' academic qualifications and ethnicity are presented in figure 4.

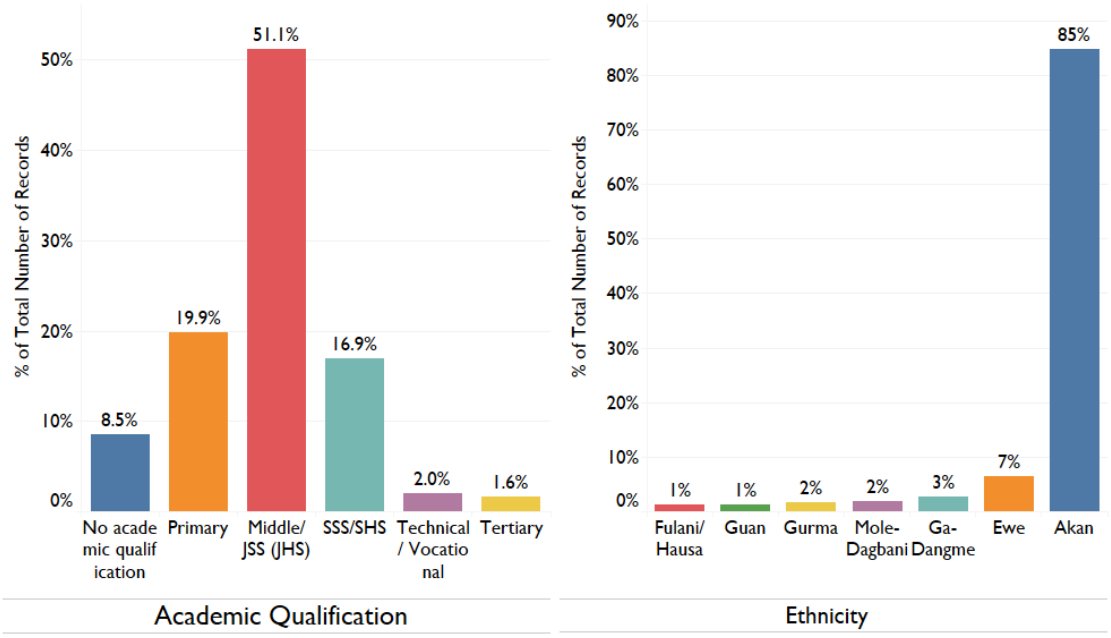


Figure 4: Distribution of coconut vendors' academic qualification and ethnicity

Source: Field Survey, 2021

3.1.4 Household size, religion and migration status of coconut vendors

The study collected data on the number of people that are currently members of households of the coconut vendors. Household size data is significant in understanding how the size of the households can be used to predict the socio-economic situation of the coconut vendors. To a larger extent, household size may determine the living conditions of households and the extent to which they will demand goods and services. The household size of the coconut vendors is presented in Figure 5.

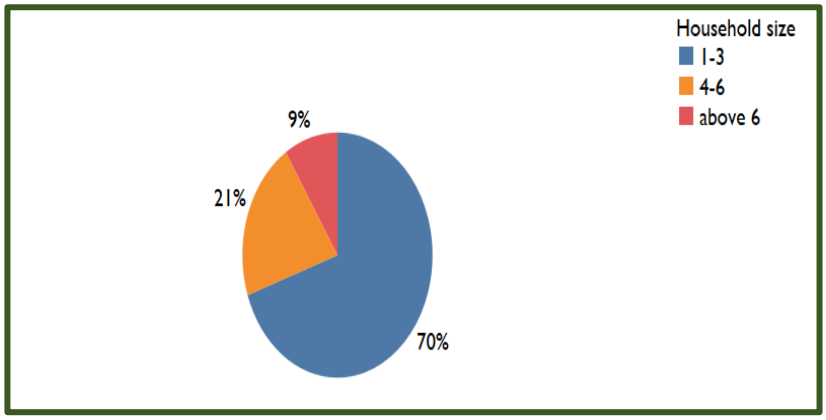


Figure 5: The household size of coconut vendors

Source: Field Survey, 2021

The study revealed that the majority of the respondents (70%) have a household size of between 1-3 whilst 21% of them have a household size of between 4 and 6. The study further discovered only 9% out of the 307 coconut vendors interviewed have a household size above 6.

Moreover, the study collected data on the religious backgrounds of the coconut vendors. According to Jenkins and Scott (2007), people's religious beliefs tend to influence their reasons to change and adapt to new forms of lifestyle. This postulates that the religious beliefs of coconut vendors can influence their decisions to adopt new forms and ways of managing coconut waste. Consequently, the study revealed that the majority of the respondents (89.6%) are Christians, 9.1% being Muslims with 0.3% belonging to the Traditional religion. Also, 1% of the coconut vendors indicated that they do not affiliate themselves to any religion or belong to other religious affiliations either than the three main religions in Ghana. The religious background distribution can be found in Table 10.

Table 10: Religious background distribution of coconut vendors

Religion	Frequency	Per cent
Christianity	369	89.6
Muslim	37	9.1
Traditional	1	0.3
Others (including no religious affiliation)	4	1
Total	**411**	**100**

Source: Field Survey, 2021

The study also sought to understand whether the coconut vendors interviewed are natives of the project area or they migrated from other regions to engage in the coconut vending business within the project area. Of the 307 coconut vendors interviewed, the study recorded that majority of the coconut vendors (183 coconut vendors representing 60%) are migrants who have moved from the Central region to the Greater Accra Region to engage in the coconut vending business. Others also migrated from the Eastern Region (60 coconut vendors representing 19.5%), Western Region (10 coconut vendors representing 3.3%), Ashanti Region (21 coconut vendors representing 6.8%), Volta Region (10 coconut vendors representing

3.3%), Oti Region (3 coconut vendors representing 0.9%), North East Region (3 coconut vendors representing 0.9%), Northern Region (3 coconut vendors representing 0.9%), Upper East Region (3 coconut vendors representing 0.9%), and the Upper West Region (1 coconut vendor representing 0.3%). Seven coconut vendors (2.3%) were found to be indigenes of the Great Accra Region whereas 1 (0.3%) coconut vendor indicated that he migrated from the Bono Region. The remaining mentioned that they migrated from the Bono East Region (0.3%), the Western North Region (0.3%). Figure 6 presents in detail the migration status of the coconut vendors as found by the baseline study.

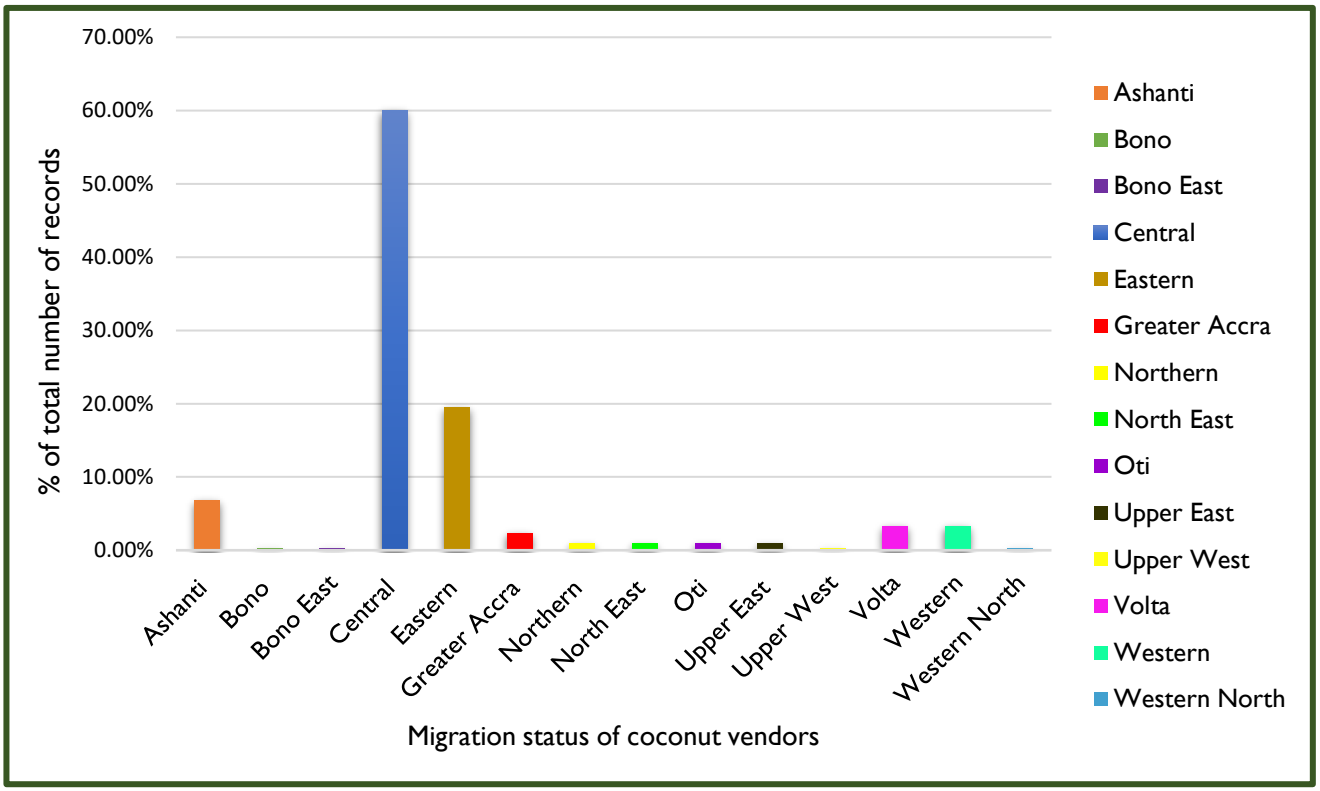


Figure 6: Migration status of coconut vendors

Source: Field Survey, 2021

Socio-demographic Characteristics of Households

3.1.5 Informed consent, gender and age distribution of households

The study interviewed 411 households although 414 households were initially sampled. This is because 3 households did not give their consent to participate in the study. The baseline study revealed that the majority of the respondents (58%-representing 240 household heads) were females whereas 42% representing 174 households were males. The study further showed that the mean age of household heads interviewed within the project area is 34 years.

3.1.6 Distribution of marital Status and level of education of households

Almost 47% of the household heads interviewed were found to be married whilst about 46% were single. Only 2.4% and 4.4% were found to be widowed and divorced respectively (Figure 7).

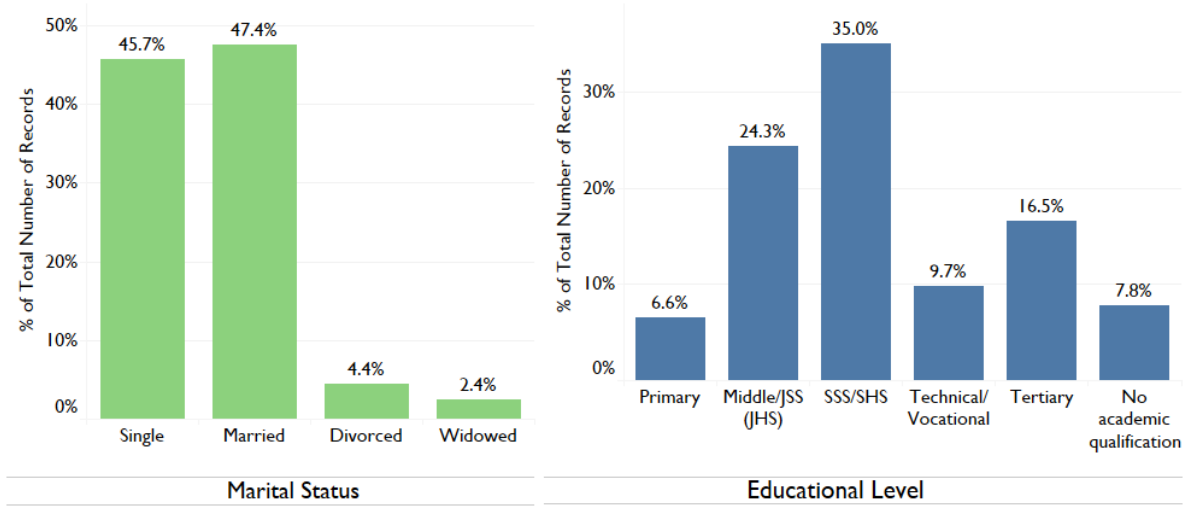


Figure 7: Distribution of marital Status and level of education of households

Source: Field Survey, 2021

The study further revealed that almost 92% of the household heads have had some form of formal education with about 8% having no form of formal education. However, the study shows that nearly 17% have had education up to the tertiary level with the majority (35%) of them having a formal education up to senior secondary/senior high level. The study also showed that 9.7% of the household heads interviewed have had a form of technical/vocational education whereas 24.3% have education up to the junior high level. Only 6.6% of the household heads have had low levels of formal education up to the primary level.

3.1.7 Employment status of respondents

The data recorded during the baseline study indicated that the majority of the household heads (51.6%) engage in their own business whereas a significant percentage of nearly 21% are unemployed. Seventeen per cent and almost 11% of the household heads were found to be employed in the private and public sectors respectively (see Figure 8).

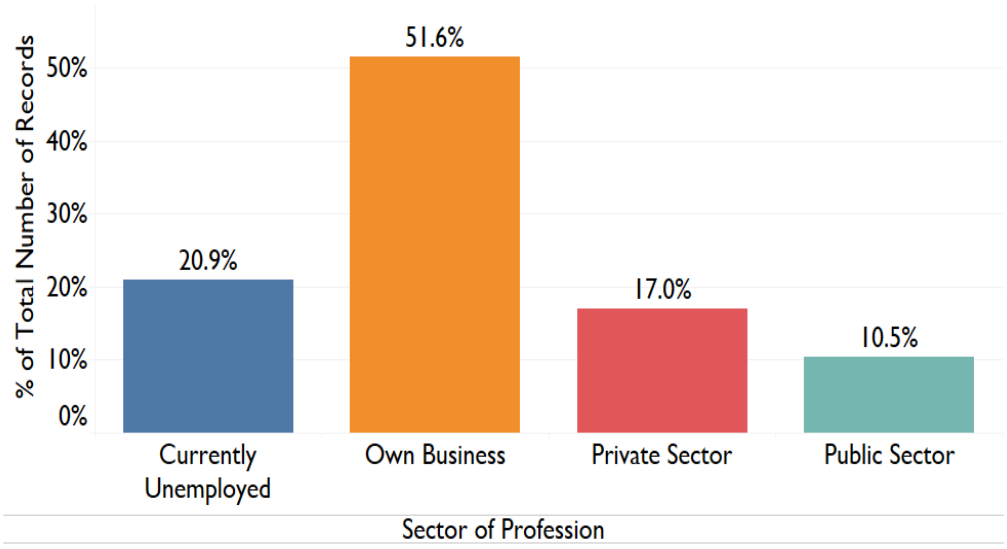


Figure 8: Employment status of household heads

Source: Field Survey, 2021

3.1.8 Ethnic and religious distribution of households

Ethnic distributions of households were found to be multifaceted. The Akans were found to dominate (38%) the project area followed by the Mole-Dagbanis, representing 15.3% of the respondents. Interestingly, only 11.7% of the households within the project area are Ga-Dangmes with nearly 15% being Ewes. It is to be noted that Hausas, Fulanis and other foreign ethnic groups were found to be inhabitants of the project area. These ethnic groups were found to be 4.6% of the households interviewed (see Figure 9).

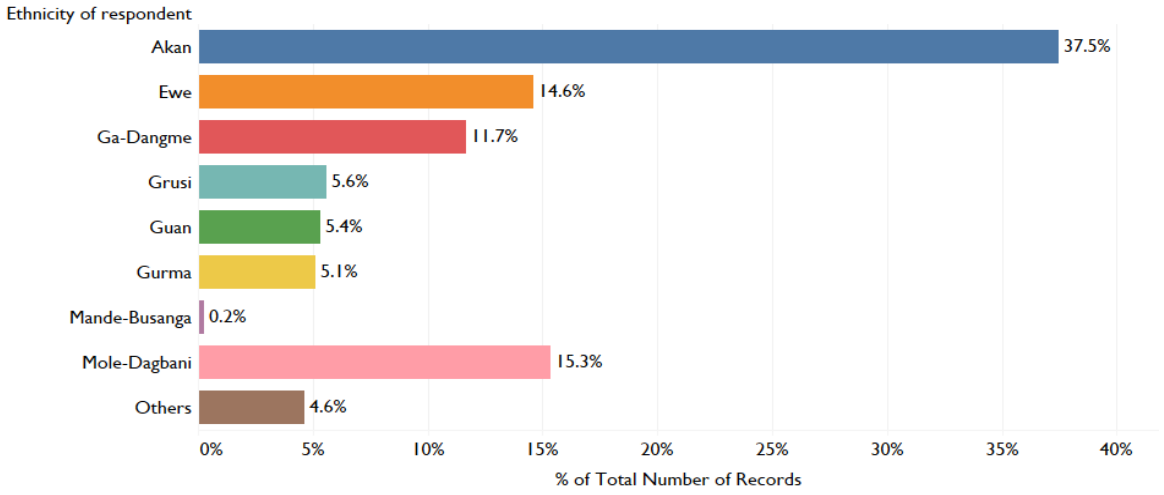


Figure 9: Ethnic distribution of households

Source: Field Survey, 2021

Figure 9, also depicts the remaining ethnic groups that were found in the project area. These include Grusis (5.6%), Guans (5.4%), Gurma (5.1%), and the Mande-Busangas (0.2%). In terms of religious distribution, Christians were found to be the dominant religious group in the project area. They constituted 64.3%, followed by Muslims (35%), Traditionalists (0.5%) and other religious groups making up the remaining 0.2% as presented in Figure 10.

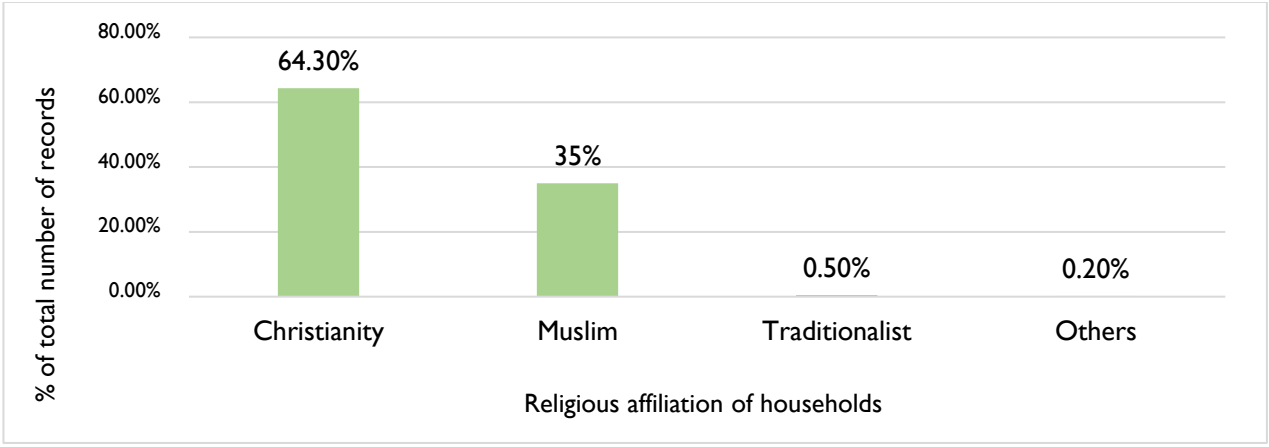


Figure 10: Religious affiliation of households

Source: CDO's Field Survey

It was revealed that respondents that do not affiliate themselves with the main religions in Ghana (Christianity, Muslim, Traditional) were very insignificant. Among the insignificant religious groups were those affiliated with the Rastafarian religion.

3.1.9 Household size and type of dwelling households occupy

The baseline study indicated that the majority of households (45%) interviewed have a smaller household size with household members between 1 and 3. Eleven per cent of the households have household members above 6 whereas 44% have members from 4-6 (Table 11).

Table 11: The household size of respondents

Household size	Frequency	Per cent
1 – 3	185	45
4 – 6	181	44
Above 6	45	11
Total	**411**	**100**

Source: Field Survey, 2021

Types of dwellings found in urban areas differ and may determine the socio-economic status of households including their decision to contribute towards achieving a proper sanitary environment. To find out the types of dwelling in the project area, households were asked to indicate the type of dwellings they occupy. It was observed that the majority of the households (56%) live in compound houses, 8.3% live in semi-detached houses, 6.3% detached houses, and 3.4% live in Flats. The study further showed that 10.2% of the respondents occupy chamber and hall apartments whereas 7.2% occupy single-room apartments. The study showed that multi-storey houses are the least type of dwelling occupied by households. However, the study showed that 6.3% of the respondents interviewed occupy kiosks/containers within the project area (see Figure 11).

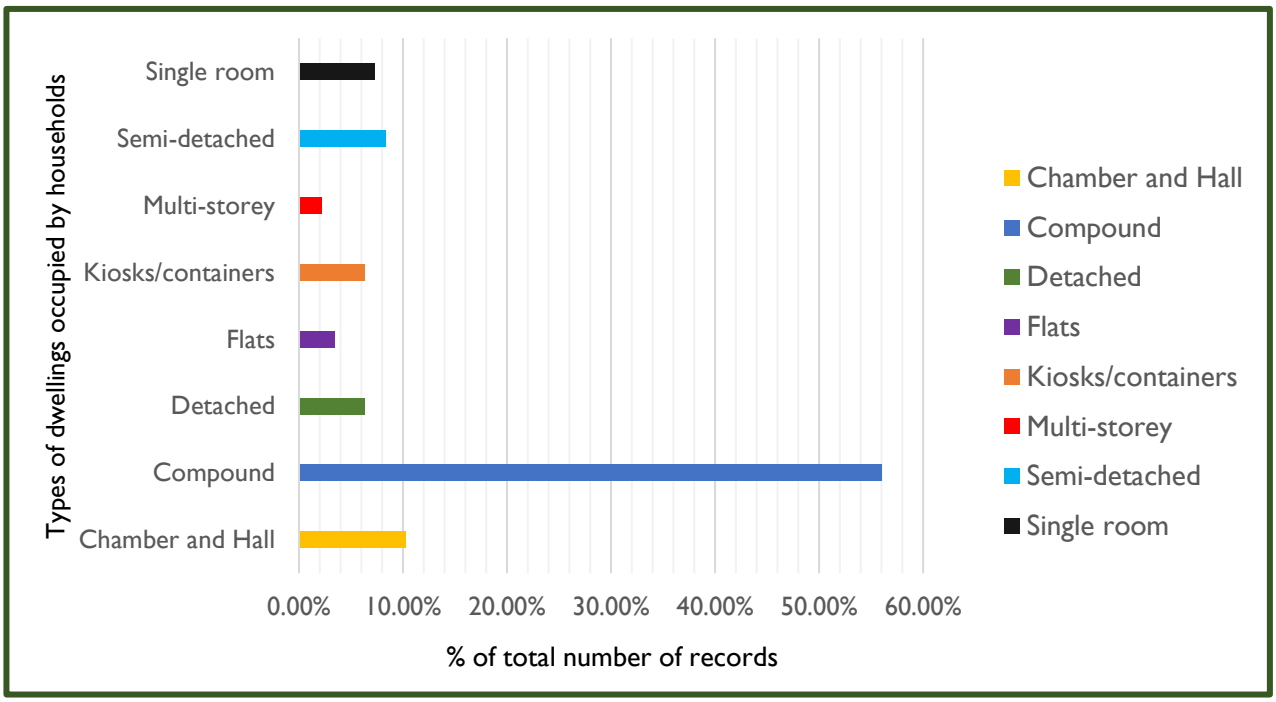


Figure 11: Types of dwellings occupied by households

Source: Field Survey, 2021

3.1.10 Household tenancy arrangements and number of years living in the area

Tenancy arrangements and house ownership have extreme effects on a household's ability to ensure proper sanitation. The data of the baseline study shows that the majority of the households interviewed (58.6%) occupy rented dwellings. Also, it was discovered that 22.4% of the respondents live in their dwellings whereas 17.5% live in family-owned dwellings. It further shows that only 1.5% of the respondents are care-takers of the dwellings they occupy (Figure 12)

Period of dwelling	
Under 1 year	3.9%
1-3 years	26.8%
4-6 years	29.2%
7-9 years	9.7%
10 years and above	30.4%

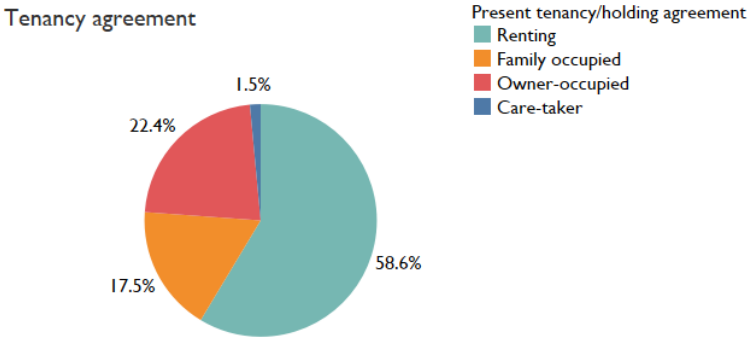


Figure 12: Household tenancy arrangements and number of years living in the area

Source: Field Survey, 2021

Despite the tenancy arrangements of the respondents, the study recorded that majority of the households (30.4%) interviewed in the project area have stayed in the area for 10 years or above. The data further indicates that 29.2% have stayed in the project area between 4 to 6 years whereas nearly 4% of them have lived in the area for less than a year.

3.1.11 Income Status of Households in Ghana cedis

The income status of urban dwellers has been seen to be crucial in taking sanitation decisions especially regarding their modes of waste management. To understand the income level situation of households within the project area, respondents were asked to indicate their level of income. Table 12 presents the income status of households interviewed in the project area.

Table 12: Income status of Households

Variable	Mean	SE Mean	StDev	Minimum	Median	Maximum
Household's average monthly income	1,407	102	2047	50	1000	30,000

Source: Field Survey, 2021

Table 13: Description of variables explaining income status of households

Variable	Description
Mean	Mean of household income recorded
SE Mean	Standard Error of Mean of income recorded
StDev	Standard Deviation
Minimum	The Least income recorded
Maximum	The highest income recorded

Source: Field Survey, 2021

From Table 12, it can be observed that the mean income earned by respondent households in the project area is GH₵1,407 (€201.23). The mean income recorded by the baseline study is nearly equal to the national average monthly income which is GH₵1387.05 (€198.31) recorded in 2014 (GSS, 2014). The study also shows that the minimum average monthly income earned by households in the project area is GH₵50 (€7.15) whereas the maximum average monthly income is GH₵30,000 (€4,289.24).

Solid waste generation and management among households

Waste generation rates and components differ from one sector of the society to the other especially between streets, households, and institutions. The majority of solid waste generated is at the household level (Miezah et al., 2015; Mensah & Larbi, 2016). However, available scholarly works assert that the volume of waste generated by households is not equal to the quantity of waste collected. In terms of waste composition, many studies specify that data on household waste mostly differs concerning the type of solid waste been discussed. In view of this, the baseline study sought to explore coconut waste generation and management at the household level.

3.1.12 Household-level of awareness on waste management systems in LaNMMA

The study analysed household awareness of waste management systems within LaNMMA. Out of 411 households interviewed, 288 households responded in affirmative for their level of awareness of waste management systems in LaNMMA, this translates into 70% of households interviewed. In contrast, 123 households responded in the negative about their level of awareness of various waste management systems within LaNMMA. The latter represents 30% of the households interviewed as seen in Figure 13.

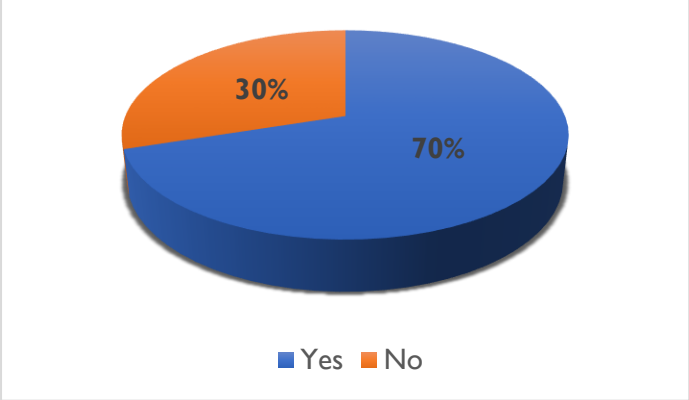


Figure 13: Household-level of awareness of LaNMMA Waste management systems

Source: Field Survey, 2021

To further ascertain the various forms of waste disposal methods practised by households, of the 70% that responded in the affirmative with regards to their level of awareness of waste management systems in LaNMMA, 228 households indicated that waste generated within their households were collected by private waste collectors. This represents 79.2% of households while 21 households dump their waste at designated dumping sites representing 7.3%. In addition, about 3 households reported that they dump their wastes in gutters while 24 households dispose of theirs in skip containers provided by themselves or their neighbours. This represents 1% and 8.3% respectively. Furthermore, 10 households dispose of their refuse in open spaces and 2 households resorted to public waste containers (skip containers provided by the municipalities). The former represents 3.5% of households while the latter represents 0.7%.

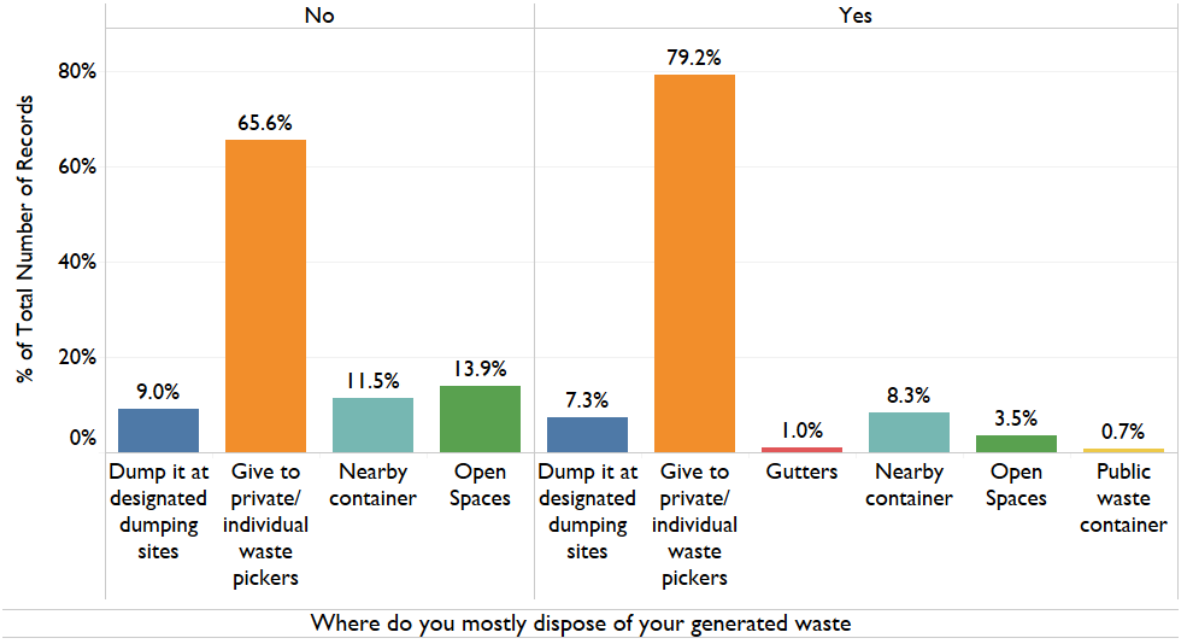


Figure 14: Modes of household waste disposal

Source: Field Survey, 2021

Figure 14 also depicts that even though 30% of the households indicated their unawareness of the waste management methods in the Municipality, 65.6% of the 30% stated that their waste is managed by private individual waste collectors whilst 9% mentioned designated dumping sites as their waste disposal unit. In addition, 11.5% and 13.3% of the 30% reported that their waste is disposed of in nearby containers and open spaces respectively. It is worthy to note that none of the respondents in this bracket indicated that they dispose of their waste in gutters and public waste containers provided by the Municipality.

3.1.13 Forms of waste storage among households

Moreover, in investigating household forms of waste storage, 58.6% and 34.8 % indicated that they store the waste in rubbish bins and plastic bags respectively. A few (1.2%) of the households specified that they resort to using cardboard boxes for waste storage and 0.5% of them mentioned that they have no form of waste storage. Other forms of waste storage practices mentioned by 4.9% of the households include fertilizer bags.

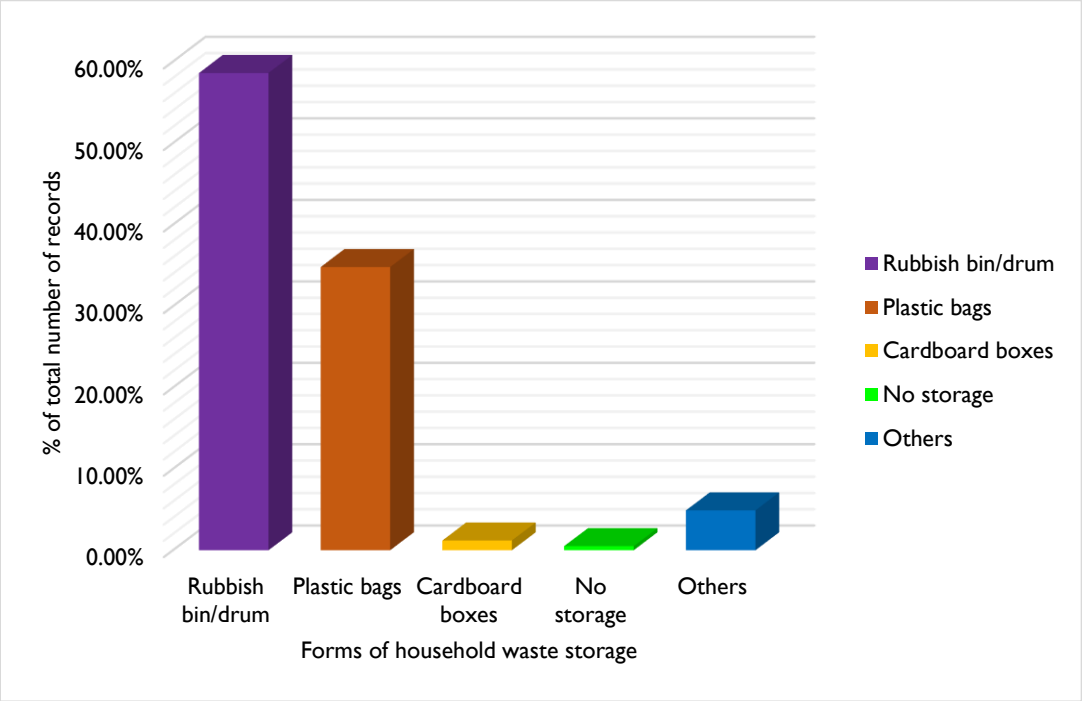


Figure 15: Forms of household waste storage

Source: Field Survey, 2021

3.1.14 Household expenditure on solid waste disposal

The study further explored the pay-as-you-throw (PAYT) policy within the project area. Of the 411 households interviewed, 87.3% of the households stated that they pay fees to dispose of their waste whereas 12.7% mentioned that they do not pay fees to dispose of waste. Households who do not pay fees for waste disposal cited reasons that depict that they use unapproved methods of waste disposal which do not require any pay as you dump charge. Specifically, the reasons include dumping their waste in nearby gutters, incineration and dumping at open spaces.

In analysing household's expenditure on solid waste disposal, the study revealed that households spend between GH₵1 (€0.14) to GH₵70 (€9.94) depending on the type of waste collection service they rely on and the frequency of waste collection. Consequently, a higher proportion of the households (42.5%) spend GH₵5 (€0.71) and below whiles, 5.8% of them spends GH₵40 (€5.68) and above on solid waste disposal. Figure 16 gives details on household expenditure on solid waste disposal.

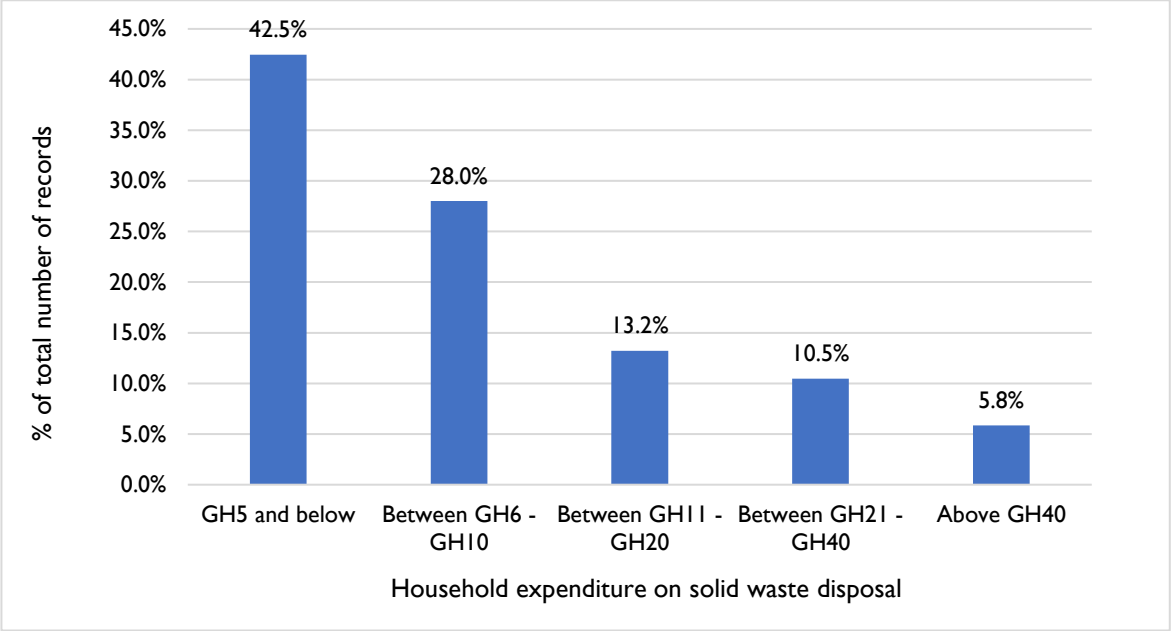


Figure 16: Household expenditure on solid waste disposal.

Source: Field Survey, 2021

Moreover, out of the 87.3% who pay fees for waste disposal, 57.7% indicated that the fees charged were affordable while 29.7% reported that the fees were very unaffordable to them. The study showed that the majority of the households (288 representing 70%) use the service of private waste collectors whereas 15.6% resort to public waste collectors. A lower proportion (14.4%) use different modes of waste collection including collecting and dumping it themselves in gutters, open spaces, bushes, backyard dugouts or burning them. The situation is presented in figure 17.

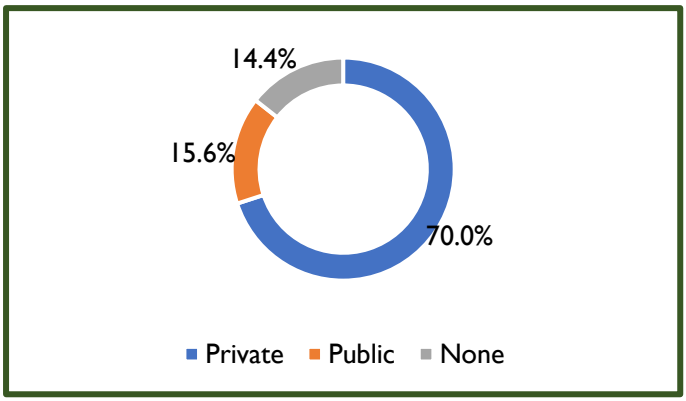


Figure 17: Waste collection preference among households

Source: Field Survey, 2021

In terms of the frequency of waste collection, both public and private waste collectors collect household waste at least once within a week as seen in Table 15. Among the private waste collection services relied upon by households, the study revealed that the majority of the households (69.4% representing 200 of the households) rely on individual waste collectors popularly known as *Aboboyaa*. The respondents further explained that:

Type of private waste collection service used by households (1)

I mostly rely on the guys that ride tricycles, mostly called Aboboyaa. This is because they are reliable and provides a relatively cheaper service as compared to other waste collection services. (Respondent 7, Household head, Madina, March 2021)

Type of private waste collection service used by households (2)

The Aboboyaa guys come here at least twice within the week so I always rely on them. They do not also complain of a shortage of fuels or damaged vehicles unlike the other waste collection services that use vehicles (Respondent 8, Household head, West Adenta, March 2021)

The rest of the households interviewed rely on private waste collection companies that operate within the project area. These include Alliance Waste Ltd., Asadu Royal Waste Management, Eagle Waste Management Service, Exdorf Waste, Jekora Ventures Ltd., Kotokoli Waste Management Company, Liberty Waste Limited, PREMKO Waste Management Services, and Zoomlion Ghana Limited as presented in Table 14.

Table 14: Distribution of waste collection services/companies used by households

Waste collectors	Frequency	Per cent
Aboboyaa	200	69.4
Alliance Waste Ltd.	21	7.3
Asadu Royal Waste Management	2	0.7
Eagle Waste Management Service	1	0.4
Exdorf Waste	2	0.7
Jekora Ventures Ltd.	5	1.7
Kotokli Waste Management Company	6	2.1
Liberty Waste Limited	2	0.7
PREMKO Waste Management Service	1	0.3
Zoomlion Ghana Limited	48	16.7
Total	**288**	**100**

Source: Field Survey, 2021

However, the Aboboyaa private waste collectors can collect household waste five times within the week.

Table 15: Frequency in household waste collection by waste collectors in LaNMM

Frequency in waste collection	Public Waste Collectors	Private Waste Collectors
Once	68.9%	61.5%
Twice	23.0%	26.4%
Thrice	3.3%	7.3%
Four times	3.3%	0.7%
Five times	1.6%	4.2%

Source: Field Survey, 2021

3.1.15 Coconut waste generation among households

In the quest to ascertain coconut waste generation and management among households in the project area, the baseline study inquired whether households regularly consumed coconuts. The majority of the households (321 representing 78%) responded in the affirmative whereas the remaining 90 households (22%) responded in the negative. Again, out of the 321 households who responded in the affirmative, 285 (89%) households stated that they mostly consume the coconuts at points of sale whereas the remaining 34 (11%) households consume their coconuts away from point of sale. The rate of coconut consumption and place of coconut consumption among households are presented in Table 16 and Figure 18 respectively.

Table 16: Rate of coconut consumption among households

Response	Frequency	Per cent
Yes	321	78
No	90	22
Total	**411**	**100**

Source: Field Survey, 2021

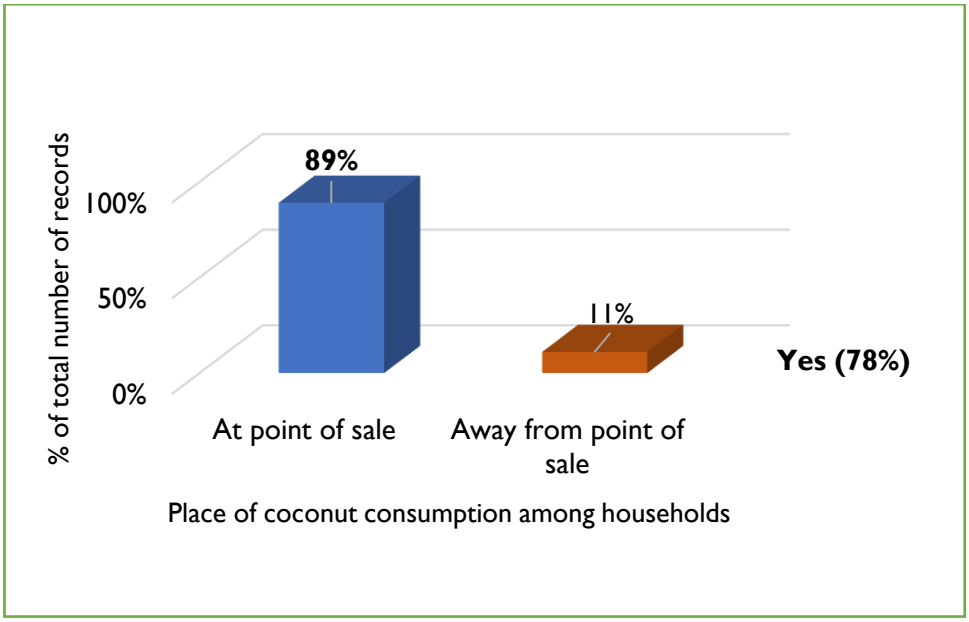


Figure 18: Place of coconut consumption among households

Source: Field Survey, 2021

The baseline study, however, sought to analyse the mean volume of coconut waste generated at the household level (away from point of sale) and those at the vendor level (at point of sale). It is important to note that, the baseline study assumes that all coconuts consumed by households away from point of sales were purchased from coconut vendors within the project area. Given this, it was discovered that on average, 3 coconuts are consumed away from point of sale by a household within the municipality. Thus, the data gathered from household consumption of coconut away from point of sale was used to compute the mean volume of coconut waste generated by households using the formula:

*Mean volume of coconut husk waste generated$_{HH}$ = (mean coconuts consumed away from point of sale per day) * (average weight of coconut husk).*

Where:

the average weight of coconut husk is given as 1.14kg and the mean coconut consumed away from point of sale is 3

= a mean of 3 coconuts consumed away from point of sale per day * 1.14kg

Therefore, the m*ean volume of coconut husk waste generated*$_{HH}$ = 3.42 kg per day.

This implies on average, a household within the project area that consumes coconuts away from point of sale approximately generates 3.42kg of coconut waste per day, 102.6kg per month, 1,231.2 kg (1.2312 tonnes) annually.

Given this, the baseline study further sought to compute the estimated coconut waste that is left at the vending points (at point of sale). Here, the formula is given as:

$$Mean\ Volume_{\ vending\ point} = Mean\ Volume_{total\ waste} - Mean\ Volume_{away\ from\ point\ of\ sale}$$

Where;
$Mean\ Volume_{vending\ point}$ is the mean volume of coconut waste at the point of sale,
$Mean\ Volume_{total\ waste}$ is the mean volume of coconut husk waste generated within LaNMMA (see Table 19)
$Mezan\ Volume_{away\ from\ point\ of\ sale}$ is the mean volume of waste generated away from point of sale.

This implies that the mean volume of coconut waste generated at vending point will be;

$$Mean\ Volume_{at\ point\ of\ sale} = 115.94\ kg - 3.42\ kg$$
$$Mean\ Volume_{at\ point\ of\ sale} = 112.52\ kg$$

Hence, the data stipulates that the mean volume left at a vending point within LaNMM per day is 112.52kg, 3375.6 kg per month, and 40,507.2 kg (40.5072 tonnes) annually.

3.1.16 Coconut waste management among households

The study revealed that in most cases, households mix their coconut waste with other solid waste and dump it. Others also use the waste as fuel, for medicinal purposes or dump it themselves at designated places. Again, the baseline study asked the households what they think is/are the best measure/measures in managing coconut waste. The responses of the majority of the households (65%) indicated that recycling coconut waste into value-added products is the best way to manage coconut waste. Others also stated that dumping them at a designated landfill site is a good measure to manage the waste whereas the rest gave opinions such as incineration of the waste, reducing the consumption pattern of coconut, using the waste as fuel, using the waste to fill potholes, and using the coconut waste for medicinal purposes.

The study further investigated households opinions regarding recycling coconut waste into value-added products. Of the 411 respondents interviewed, the majority of them representing 81% mentioned that coconut waste can be recycled into value-added products whereas the remaining 19% answered in the negative (see Figure 19). Those who agreed that coconut waste can be recycled into value-added products

indicated that coconut waste can be recycled into charcoal briquettes, activated carbon, coir doormat, mattress, cocopeat, paper bag, bath sponge, and soap.

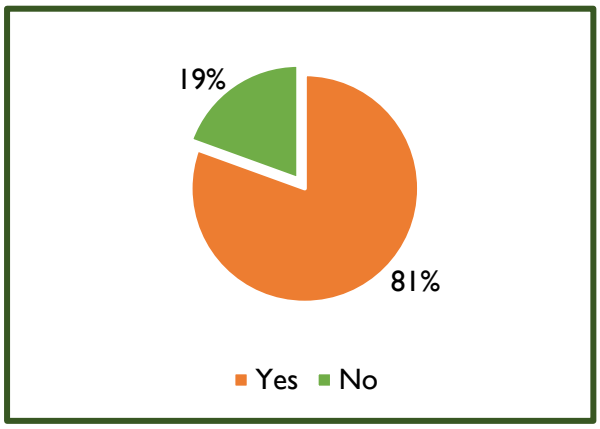


Figure 19: Households opinion on whether coconut waste can be recycled

Source: Field Survey, 2021

In addition to collecting data on the opinions of the respondents on whether coconut waste can be recycled, it was then imperative to examine the extent to which they are willing to give out their coconut husk for recycling purposes. The study showed that 54% (representing 221 of the households) strongly indicated that they are very willing to offer their coconut husk for recycling purposes whereas 32% (141 of the households) indicated that they are not willing to offer its coconut husk for recycling. These findings indicate that majority of the households will make their coconut husk readily available once waste tricycles request it. Conversely, about 13% (57 households) stated that they were undecided whereas 1% (4 households) of the households mentioned that they are not willing to offer their coconut husk for recycling purposes respectively.

3.1.17 Households' perception of indiscriminate coconut waste disposal

In the baseline study, 36% of the household respondents confirmed that they see other people dump coconut waste indiscriminately and at undesignated places within the project area. About 24% of these people reported that people's ignorance of the harmful implications of indiscriminate disposal of coconut waste leads them to dump the waste indiscriminately and at undesignated places. Also, 20% of the respondents mentioned that lack of law enforcement is a key factor in the behaviour of indiscriminate disposal of coconut waste. The rest mentioned inadequate designated dumping sites (24%), unavailability of collection containers (17%), and the cost of disposing of coconut waste as other factors resulting in the indiscriminate disposal of coconut waste.

The perception of the households on the effects of indiscriminate disposal of coconut waste within the project area was explored by the baseline study. The respondents expressed their opinions that indiscriminate disposal of coconut waste can cause the following:

- Flooding
- Drainage obstruction
- Widespread infectious diseases

- Waterway blockage leads to the infestation of flies, ticks and the breeding of mosquitoes that cause malaria.
- Water and air pollution
- Land pollution
- Injury/accidents

Notwithstanding, the majority of the respondents (59%) espoused that they are not satisfied with the current management of coconut waste within the project area whereas 41% stated that they are satisfied with the current management of coconut waste within the La Nkwantanang-Madina Municipality. Those that indicated dissatisfaction with the current management of coconut waste within the project area further stated their main reasons for the dissatisfaction as follows:

- High cost of disposing of solid waste including coconut waste in the municipality
- Over-reliance on household waste management at the expense of coconut waste management
- Unavailability of designated coconut waste dumping sites
- Lack of law enforcement and commitment to ensure proper coconut waste management within the project area.
- Unavailability of waste bins designated for coconut waste
- Lack of sensitization and systems on waste separation and coconut waste management
- Irregular collection of coconut waste from households and coconut vendors.

Ultimately, the baseline study asked a specific question to assess the degree of importance households place on leaving a healthy environment for future generations. In answering these questions, the study revealed that a significant majority of the respondents (71.5%) thinks it is very important to leave a healthy environment for future generations and they are ready to support an action that is related to it. Only 0.2% of the households stated that it is not important at all to leave a healthy environment for future generations as seen in Figure 20.

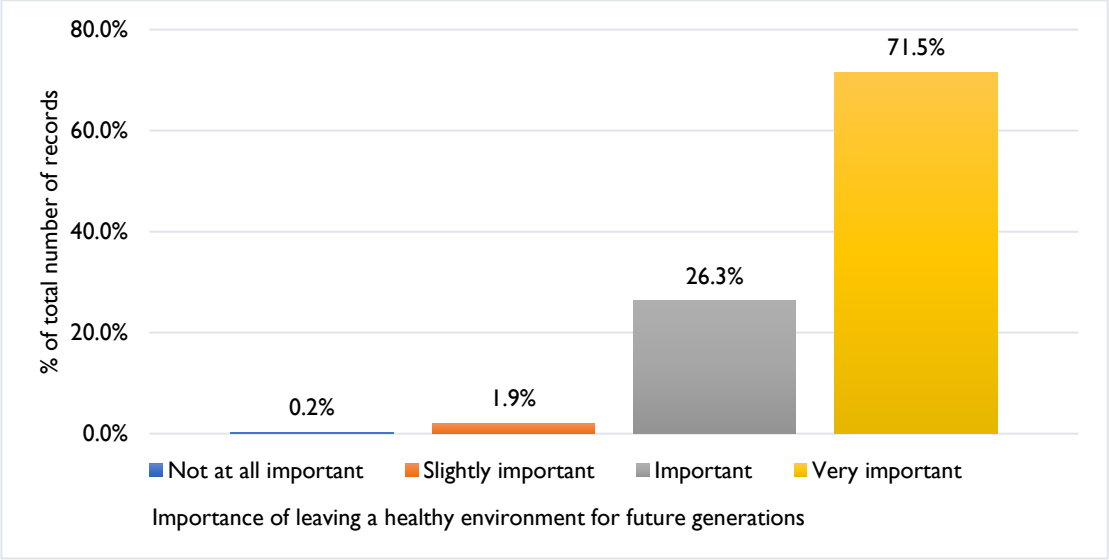


Figure 20: Importance of leaving a healthy environment for future generations

Source: Field Survey, 2021

3.2 Analysis of the existing context of the coconut waste value chain

Recent studies have indicated the importance of coconut waste in improving the socio-economic characteristics of countries across the globe. Eyzaguirre (2016) found that the majority of coconut waste generated worldwide now serves as income-generating ventures for many countries. Proper management of coconut waste means achieving improved sanitary conditions and improving the socio-economic livelihoods of citizens which is at the core of the Coconut Waste Project. Accordingly, the project seeks to process coconut waste into selected value-added products including paper, cocopeat, and charcoal. This only means that coconut husk waste is a significant raw material for the project. It was, therefore, important to understand the existing context of the coconut waste value chain beginning from coconut vendors, households (consumers), individual coconut waste collectors, and end-users of coconut value-added products.

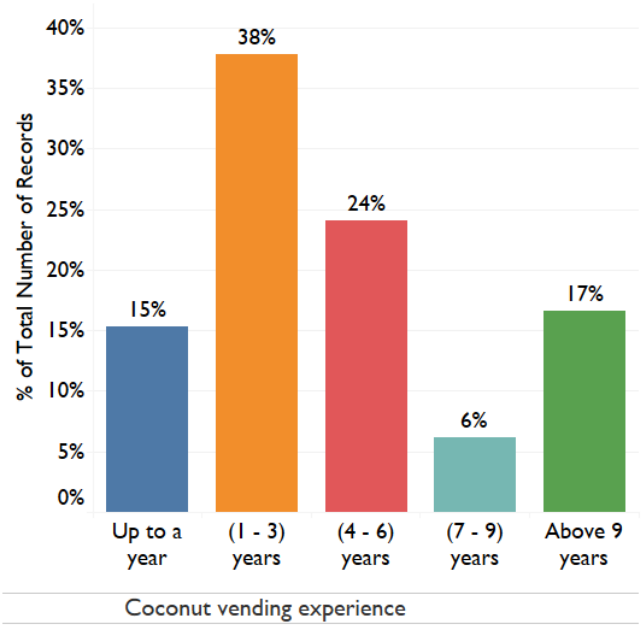
Nature of the Coconut Vending Business

To understand the existing context of the coconut waste value chain, the study sought to investigate the nature of the coconut vending business within the study area. This sub-section presents results such as years that coconut vendors have been in the vending business, factors that motivated them to join the coconut vending business, varieties of coconuts that the vendors mostly sell among others.

3.2.1 Coconut Vending Experience and Motivation for joining coconut vending business

The study revealed that a significant number of the coconut vendors interviewed are new to the business. It showed that 38% of the vendors have been in the business for about 1-3 years with 24% having 4-6 years' experience in the business. Also, the study indicated that 15% of the respondents have been in the coconut vending business a year and below. However, 17% of the respondents have been in the coconut vending business for more than 9 years.

To understand the operations of the coconut vending business, the study further inquired from the coconut vendors their motivation for becoming coconut vendors. The study found that up to 25.7% decided to join the coconut business due to unemployment. The study further established that approximately 23.5% of the coconut vendors joined the industry because of the profits that are accrued from it compared to other previous businesses they have engaged in. Ultimately, the baseline study found that key factors that motivate people to join the coconut vending business include high profitability of the business, unemployment, seeing the business as a source of livelihood, a way of continuing family business, increased passion for the business, peer influence, seeking financial support to further their education, a good business opportunity with low initial costs, saving some proceeds from the business to learn a trade in future, limited or no employable skills and education. Figure 21 gives a detailed presentation of the situation.



Motivation for vending	
Poverty	25.7%
High Profitability	23.5%
Unemployment	22.8%
Source of livelihood	11.4%
Family Enterprise	6.2%
Increased Passion for the business	4.2%
Peer influence	2.3%
Financial support to further my education	2.3%
Business opportunity with low initial costs	0.7%
To save and learn a trade in future	0.7%
Limited/No employable Skills and education	0.3%

Figure 31: Vending experience and motivation for joining coconut vending business

Source: Field Survey, 2021

Although a variety of factors motivates individuals to engage in the coconut vending business, there are different entry points for the vendors. Thus, the baseline study sought to know how the respondents were introduced into the coconut vending business. The baseline showed that 39.4% of the respondents got into the business with the help of their friends followed by 29.6% being introduced to the business by their families or relatives. Moreover, 28.3% of the respondents started the business on their own but not through friends, apprenticeships or family/relatives. This is presented in Table 17.

Table 17: modes of coming into the coconut vending business

Entry point elements	Frequency	Per cent
Apprenticeship	8	2.6
Family / relative	91	29.6
Friend	121	39.4
Started on my own	87	28.4
Total	307	**100**

Source: Field Survey, 2021

3.2.2 Staff structure of coconut vendors

The baseline study asked respondents if they work with other people as staff in their coconut vending business. The study further ascertained the staff strength of those who indicated that they work with other staff members. The baseline showed that the majority of the respondents (81%) work as individual vendors without the help of other employees. The study further revealed that 16% of the coconut vendors have a staff number of 1-3 members with the remaining 3% having employees above 4. The staff structure of the coconut vendors is presented in Figure 22.

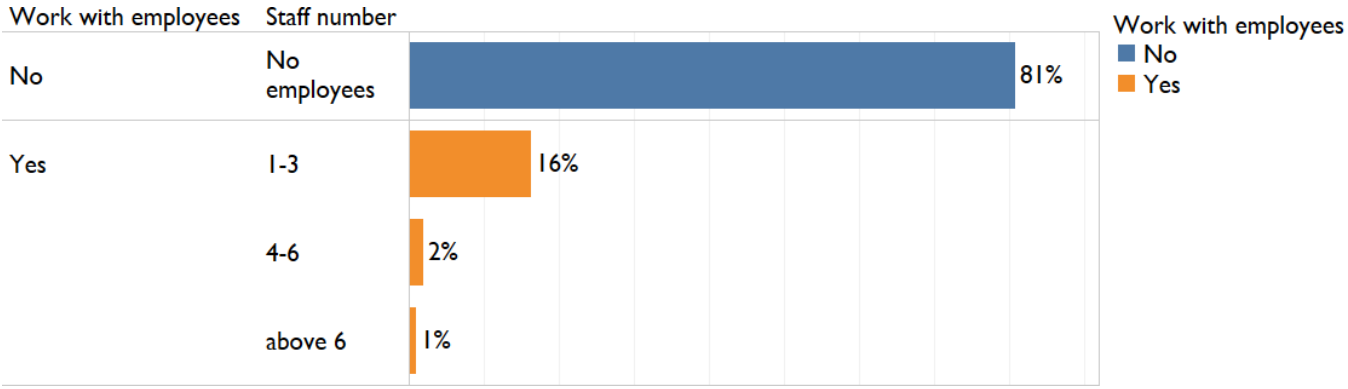


Figure 22: Staff structure of coconut vendors

Source: Field Survey, 2021

3.2.3 Vending Location of coconut vendors

In setting up a coconut waste aggregation system within the project area, it was important for the baseline study to consider locations of coconut vendors mindful of the fact that their actions commence activities along the coconut waste value chain. Out of the 307 coconut vendors interviewed, a majority (73%) of them indicated that they have permanent vending locations with 27% of them having no permanent locations. Out of the 27% without permanent locations, 41% are mobile vendors that moves around selling the nuts in wheelbarrows, pushcarts or head pans. On the other hand, the remaining 59% operates at temporal places with pushcarts or on tables. Refer to Table 18 for the detailed presentation of vendor locations of the respondents.

Table 18: Vendor location of respondents

Permanent vending location response	***Frequency***	***Per cent***
Yes	223	73%
No	84	27%

Total	**307**	**100**
Response on vendors that move around	***Frequency***	***Per cent***
Yes	125	41%
No	182	59%
Total	**307**	**100**

Source: Field Survey, 2021

Plate 6: An enumerator interacting with a mobile coconut vendor

Source: Field pictures, 2021 © Coconut Waste Project

The baseline study also revealed that key permanent locations for the coconut vendors include Madina Polyclinic, LaNMMA Old Office, Police station, Redco, Ideal College, Madina Overhead and Libya quarters. Others also have permanent locations at the Oyarifa bus stop enclave, Pantang Shalom Junction enclave and the Atomic Junction enclave. However, the mobile vendors indicated that apart from selling within the project area and its surrounding communities, they mostly go as far as communities within the Accra Metropolitan Areas, Ashaley Botwe in the Adentan Municipality and the University of Ghana enclave.

The study also found that coconut vending business is the main source of livelihood for the majority of the respondents (59%), and 41% of them having additional income generation activities such as farming, commercial driving, phone dealing, masonry, bus conducting, electrician, commercial motor and tricycle riders, carpentry, and hawking of different food products.

3.2.4 Varieties of Coconuts sold by coconut vendors

According to Oduro-Yeboah et al., (2020), coconut varieties sold by coconut vendors in Ghana include local variety and exotic varieties. The baseline study sought to understand the varieties of coconuts sold by the coconut vendors interviewed. The study showed that the majority of the coconut vendors (82%) mostly sell the local variety referred to as the West African Tall. Only 2% indicated that they mostly sell the Agric (Hybrid)/Exotic (Sri Lanka Dwarf, Equatorial Guinea Green Dwarf) variety with 16% selling both the local and exotic varieties. Figure 23 gives details of the distribution of coconut varieties mostly sold by coconut vendors within the targeted areas.

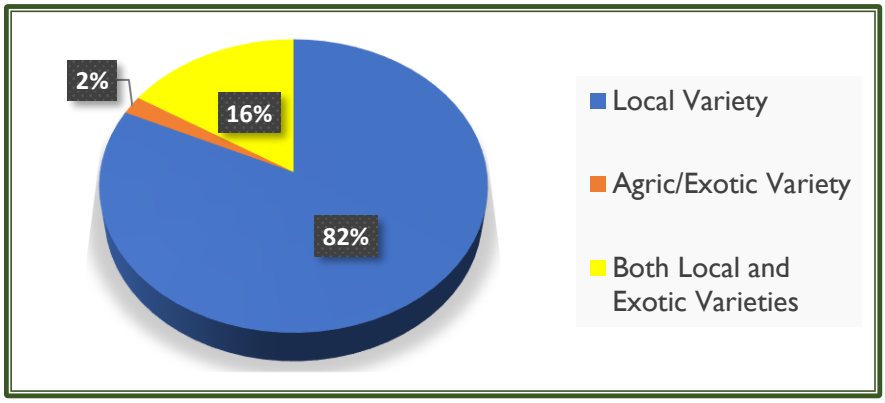


Figure 23: Distribution of coconut varieties mostly sold by coconut vendors

Source: Field Survey, 2021

The study also revealed the factors that inform the type of coconut variety mostly sold by coconut vendors. The factors include consumer taste and preference of the variety, the shelf life of variety, the price at source, and availability at the source. In answering these questions, this is how the respondents put it:

Variety of coconut mostly sold by vendors (1)

The Local variety is in abundance at my source of procurement and people prefer it more due to the natural water inside (Respondent 1, coconut vendor at Madina Zongo Junction, March 2021)

Variety of coconut mostly sold by vendors (2)

The local variety has less water but it is sweet. The exotic one has more water but it does not taste sweet. In selling both, I can meet the preference of various consumers (Respondent 2, coconut vendor at Oyarifa, March 2021)

Market Analysis of the Coconut Vending Business

3.2.5 Source of start-up capital

Access to start-up capital has been a barrier to both formal and informal enterprise development in Ghana. The baseline study explored sources of start-up capital by coconut vendors that participated in the study. Most respondents (65%) financed their coconut vending business through personal savings. The study further revealed that 17% of the coconut vendors relied on family and friends' contributions as a source of start-up capital with 2% of them going for loans to start their coconut vending business. Six per cent of the respondents specified that they depended on multiple sources for funds to start their business. See Figure 24 for the distribution of the sources of start-up capital for the coconut vendors.

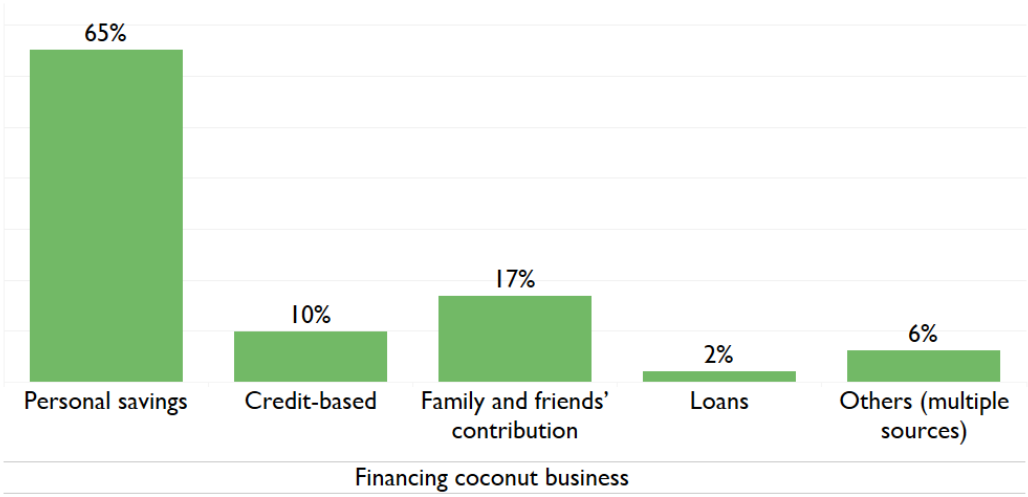


Figure 24: Sources of start-up capital for coconut vendors

Source: Field Survey, 2021

3.2.6 Source of coconut procured by coconut vendors

During the baseline study, the majority of the coconut vendors (44%) were found to procure their coconuts from farm gates whilst 31% of the respondents confirmed that they source their coconuts from distributing points/aggregating points/depots. The study further revealed that 17% of the coconut vendors procure their coconuts from other sources such as buying from distributing vans and acquiring the coconuts from households that have planted coconuts in their homes. Again, the baseline study showed that 8% of the respondents procure their coconuts from local markets within Accra such as Madina market, Kaneshie market and Achimota market (see Figure 25)

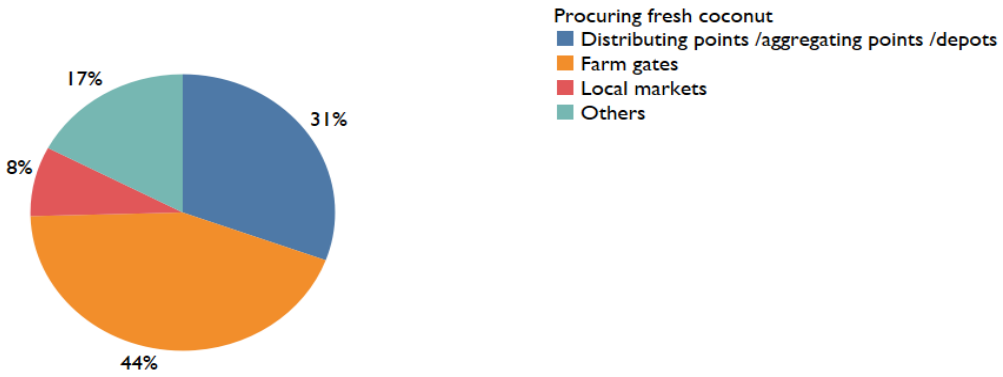


Figure 25: Source of coconut procured by coconut vendors

Source: Field Survey, 2021

The study further inquired on the regions from which the coconuts were sourced, if they are sourced from farm gates. Of the 107 respondents representing 44% that indicated that they source their coconuts from farm gates, the majority of them (73.8% - representing 79) said they source it from farm gates in the Central Region (Table 19). This also means that majority of the coconuts are sourced from farm gates in the Central Region to the project area.

Table 19: Regions where coconut vendors source their coconuts

Region	Frequency	Percent
Central Region	79	73.8%
Eastern Region	17	15.9%
Greater Accra Region	6	5.6%
Volta Region	3	2.8%
Western Region	2	1.9%
Total	**107**	**100.0%**

Source: Field Survey, 2021

Table 19 also shows that 15.9% of coconut vendors source their coconuts from farm gates in the Eastern Region, followed by Greater Accra Region (5.6%), Volta Region (2.8%), and the Western Region 1.9%). Although recent studies indicate that coconuts were first introduced in the Volta region (Clarence, 2016), the bulk of it is sourced from the Central region, particularly from Agona Swedru in the Agona West Municipality. It is worthy to note that the coconut vendor survey considered selected communities surrounding the La Nkwantanang-Madina Municipality. These communities include Haatso, Agbogba, Abokobi (Ga East), Adenta (Adentan Municipality), and East Legon and West Legon (Ayawaso West).

The study then compared the sources of coconut procurement by the various municipalities to understand where a majority of the coconut vendors in the project target areas procure their coconuts. The baseline study revealed that most coconut vendors in the target municipalities procure their coconuts from farm gates. However, the study showed that 40% of the coconut vendors in East Legon and West Legon (Ayawaso West) procure their coconuts from distributing points/aggregating points/depots. An equal percentage (40%) of coconut vendors in East Legon and West Legon procure their coconuts from farm gates as seen in Figure 26.

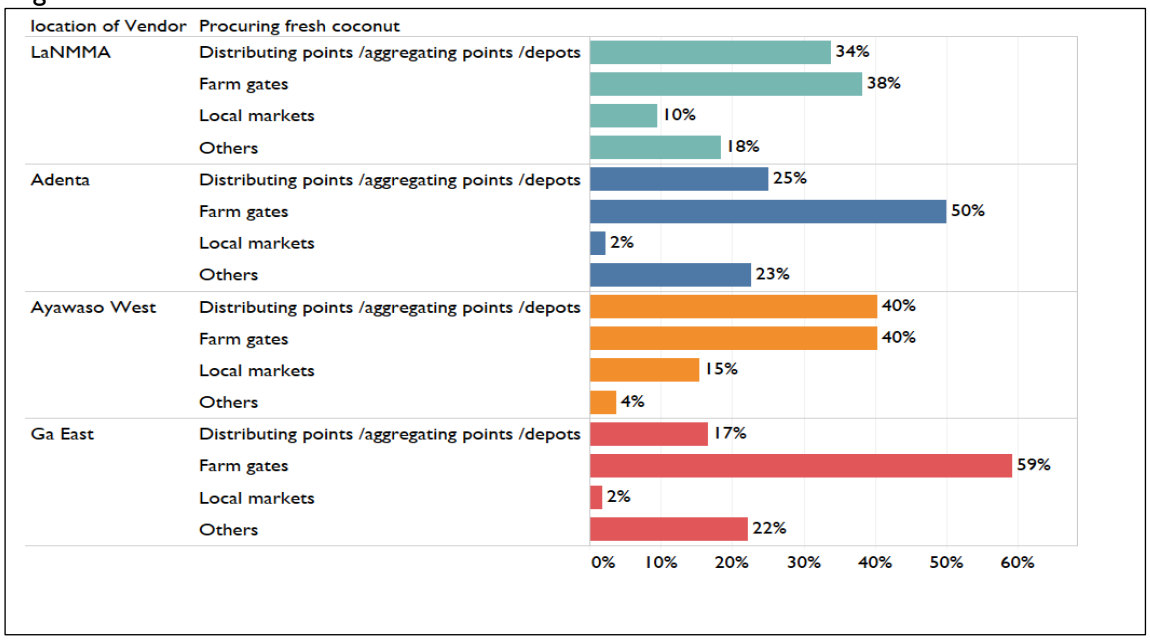


Figure 26: comparison of sources of coconut procurement across target areas

Source: Field Survey, 2021

3.2.7 Coconut sourced and sold per day by coconut vendors

Although the baseline study generally surveyed 307 coconut vendors out of the 308 sampled, data on coconut sourced and sold per day were analysed based on data from 300 coconut vendors. This is because 7 of the coconut vendors were unwilling to provide answers on coconuts they source and sold per day. Thus, the baseline study showed that on average, 42,365 coconuts are procured daily by the coconut vendors within the target areas. The mean coconut sourced daily by a coconut vendor was found to be 141 coconuts. The volume of coconut is estimated to be 1.5 Kilograms (Clarence, 2016). This means that the respondents procure an average volume of 63547.5 kilograms of coconut per day (63.5475 tonnes), 1,906,425 kilograms per month and 22,877,100 kilograms of coconuts annually. Table 20 presents details of coconuts procured by the respondents.

Table 20: Coconuts procured by coconut vendors per day

Location	Actual Number of response	Coconuts procured per day	Mean coconut procured per day	The average volume of coconuts procured per day (1.5 kg per coconut)	The average volume of coconuts procured per day (tonnes)
LaNMM	153	22706	148.41	34,059	34.059
Ayawaso West	52	5480	105.38	8220	8.22
Ga East	53	8287	156.4	12,430.5	12.4305
Adentan	42	5892	140.3	8838	8.838
Total	**300**	**42365**	**141.22**	**63547.5**	**63.547**

Source: Field Survey, 2021

Table 20 further showed that coconut vendors in La Nkwantanang-Madina Municipality (LaNMM) alone procures an average of 34.059 tonnes of coconuts per day. Also on average, 29517 coconuts are being sold daily by the respondents with an average of 98 nuts sold per vendor per day. Generally, 44275.5 kilograms (44.2755 tonnes) of coconuts are sold by the respondents each day as seen in Table 21.

Table 21: Coconuts sold per coconut vendors per day

Location	Actual Number of response	The average number of coconuts sold per day	Mean coconut sold per day	The average volume of coconuts sold per day (1.5 kg per coconut)	The average volume of coconuts sold per day (tonnes)
LaNMM	153	15561	101.71	23341.5	23.3415
Ayawaso West	52	4509	86.71	6763.5	6.7635
Ga East	53	5140	96.98	7710	7.71
Adentan	42	4307	102.55	6460.5	6.4605
Total	**300**	**29517**	**98.4**	**44275.5**	**44.2755**

Source: Field Survey, 2021

It is interesting to note that coconut vendors within the La Nkwantanang-Madina Municipality can sell an average of 15,561 coconuts per day even though they procure an estimated number of 22, 706 coconuts daily.

Further, the baseline study revealed that the price of coconut at the time of the study ranges from GH₵2 to GH₵3 (€0.43) depending on a myriad of factors. The average price of coconuts currently sold within the target areas is GH₵2.40 (€0.34). However, the study found that the average price of coconut at the various sources is GH₵1.30 (€0.19). At the municipal level, the baseline study indicated that the average price of coconut sold to consumers within LaNMM is approximately GH₵2.40 (€0.34) whiles that of Ayawaso West is approximately GH₵2.50 (€0.36). Table 22 gives a presentation of the situation.

Table 22: Average price of coconut sold by coconut vendors

Location	Mean price of coconut sold at source (GH₵)	Mean price of coconut sold to consumers (GH₵)	Percentage Change in prices
LaNMM	1.41	2.38	97%
Ayawaso West	1.72	2.49	77%
Ga East	1.2	2.37	119%
Adentan	1.14	2.45	131%
Total (n=300)	**1.29**	**2.4**	**111%**

Source: Field Survey, 2021

The baseline study also revealed that the majority of the respondents sell their coconuts to consumers at an average price of GH₵2.50 (€0.36). Although only 4% of the respondents indicated that they sell their coconuts at GH₵3 (€0.43), the study showed that a significant percentage of vendors in Adenta and LaNMMA sell their coconuts at GH₵3 (€0.43) (see Figure 27).

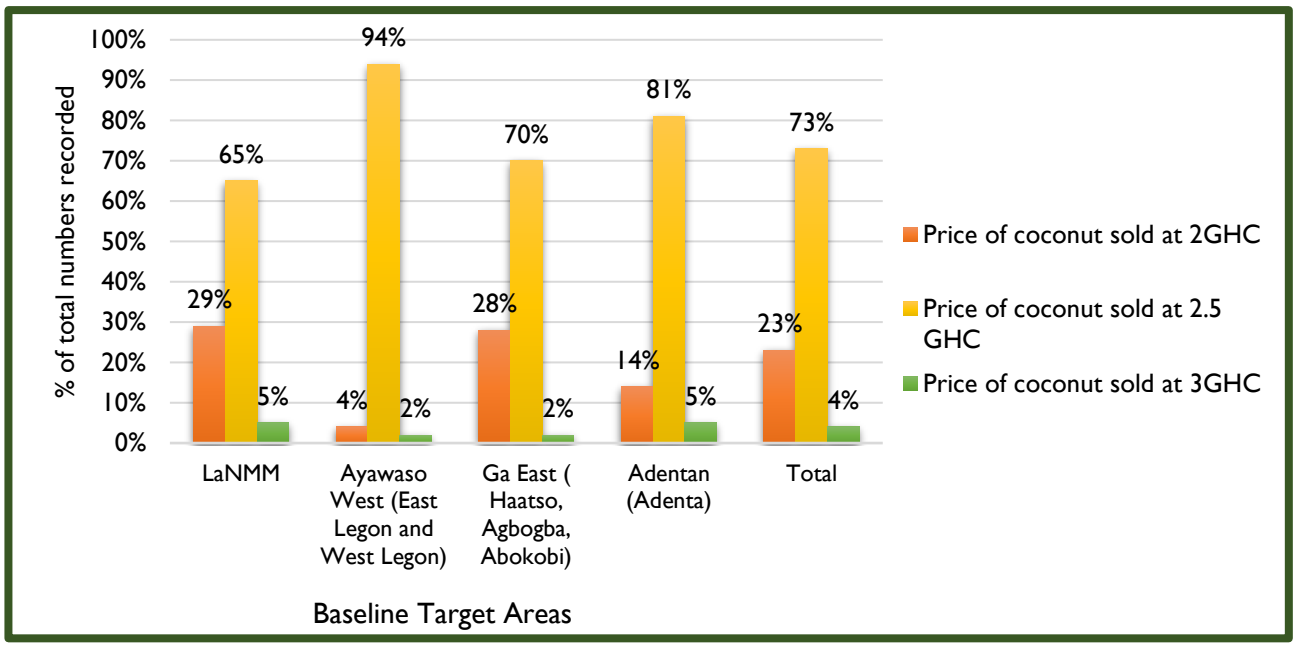


Figure 27: Average Price of Coconuts sold to consumers

Source: Field Survey, 2021

Based on this, the baseline study further estimated average total sales (total revenue) per day per coconut vendor within the target areas.

Formula

Average total sales per day = (mean coconuts sold per day) × (average price per coconut sold)

Average total sales per day = 98 coconuts × GH₵2.40 (€0.34)

Average total sales per day = **GH₵ 235. 20 (€33.56).**

On average, a coconut vendor generates total revenue of GH₵235.20 (€33.56) per day. This further depicts that a coconut vendor will accrue GH₵7,056 (€1,006.81) total sales per month and GH₵84, 672 (€12,081.69) annually. Comparing total average sales for the targeted areas, the study revealed that coconut vendors in LaNMMA make an average sale of GH₵241.50 (€34.45) per day whereas those in Adentan makes an average sales of nearly GH₵250 (€35.66) per day. Also, those in Ga East and Ayawaso West were found to make a total average sale of GH₵231. 50 (€33.02) and GH₵215 (€30.67) respectively. An analysis of variance was computed to compare the average sales of the coconut vendors within the study municipalities. From these results, the null hypothesis states that the average sales of coconut vendors of the study municipalities are equal. The p-value was computed to be 0.380 (refer to Table 23). This p-value is greater than the significance level of 0.01, thus, the study fails to reject the null hypothesis and conclude that the total average sales of vendors are equal across the study municipalities.

Table 23: One-way ANOVA: Sales generated versus the location of Vendor

Source	Degree of Freedom (DF)	Sum of squares (SS)	Mean Squares (MS)	F value	P-value
location of Vendor	3	35635	11878	1.03	0.380
Error	296	3416607	11543		
Total	**299**	**3452243**			

Source: Field Survey, 2021

The study further ascertained that factors influencing the price of coconuts sold to consumers include transportation costs, changes in wholesale price, changes in general market price, daily operational costs, and geographical location of the business. Other factors that inform the price of coconuts include market competition, the variety of coconut in abundance, and the availability or scarcity of coconuts at the source. In explaining the factors that influence the price of coconuts sold to consumers, most of the respondents explained that,

Factors that influence the price of coconuts sold to consumers (1)

It also depends on the daily operational cost I incur in the business. Cost like the price of buying plastic drinking straws, polythene bags, tissue papers, and disposing of waste (Respondent 3, Coconut Vendor at Madina, March 2021)

Factors that influence the price of coconuts sold to consumers (2)

It depends on the location, if it rich people we sell it GH₵2.50 (€0.36) or GH₵3.00 (€0.43) (Respondent 4, Coconut Vendor at East Legon, March 2021)

Concerning sales generation, the baseline study found that the majority of the coconut vendors (85.9%) generate the most sales during the dry season (December to March). Although coconuts have been established to be available all year round, the baseline study showed that coconuts are mostly in abundance at source during the wet season (April-November). It is interesting to note that, despite coconut being in abundance in the wet season, it does not generate the most revenue for the vendors compared to the dry season. The situation can be seen in Table 24.

Table 24: Sales and Availability of coconuts according to seasons

Season with most sales	***Frequency***	***Per cent***
Dry Season (December-March)	255	85.1
Wet season (April – November)	45	14.9
Total	**300**	**100**
Seasons with coconut in abundance	***Frequency***	***Per cent***
Dry Season (December-March)	57	19
Wet season (April – November)	243	81
Total	**300**	**100**

Source: Field Survey, 2021

The baseline study also sought to understand if the coconut vendors supply coconuts to a specific group, institution or people. Out of the 307 respondents, 10% indicated that they supply coconuts to specific groups, institutions, or people as seen in Figure 28.

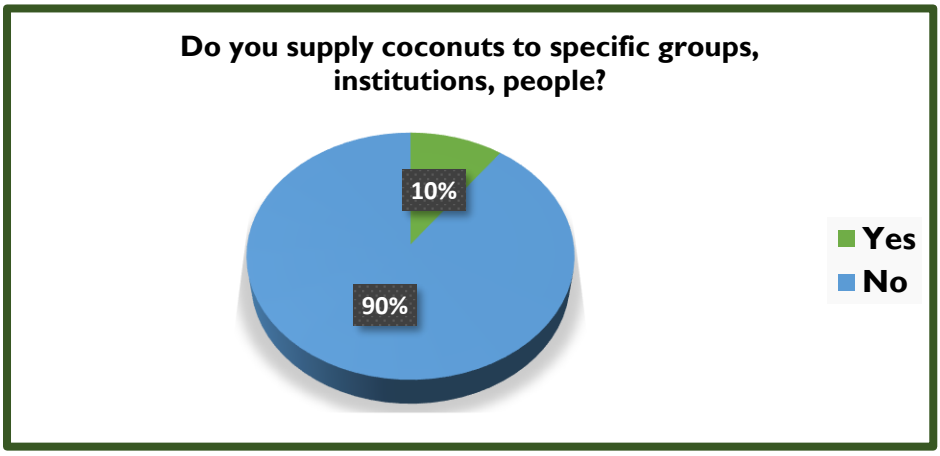


Figure 28: Supply of coconuts to specific groups/institutions, people.

Source: Field Survey, 2021

The study further revealed that 10% of the coconut vendors are engaged to supply coconuts to specific events, restaurants, schools, hotels, households, mechanical shops, offices, athletes, other mobile vendors, and coconut juice factories within Greater Accra Region.

The majority of the coconut vendors (80%) further indicated that males mostly buy coconuts from them compared to their female counterparts. The main reason given for this phenomenon was that the male gender tends to consume a lot of coconuts due to their known health benefits and medicinal value.

3.2.8 Demand generation and tax payments among coconut vendors

According to the baseline study, an array of strategies are used by the coconut vendors to attract demand for their coconuts. Key among them include selling in highly urbanized and populated areas and ensuring good customer relations with their regular customers. Others also indicated that they generate demand for their coconuts by ensuring that they provide tissues and plastic drinking straws to their customers. Others also provide relaxation chairs, canopies and present themselves neatly dressed as a form of generating demand for their coconuts. However, others also indicated that they do not use any special strategy in selling their coconuts. In answering this question, the majority of them puts it this way:

Demand generation (1)

I also have good customer relations. I always call the ladies with sweet names like First Lady and I mostly play with the kids if they're friendly (Respondent 5, Coconut Vendor at Madina Social Welfare, March 2021)

Demand generation (2)

I don't adopt any strategy. I am not there are any strategies to selling coconuts (Respondent 6, Coconut Vendor at Adenta, March 2021)

Demand generation (3)

I sing funny songs to announce my presence and most of the people like me and buy from me (Respondent 6, Coconut Vendor at UPSA, March 2021)

Moreover, the baseline study also showed that out of the 307 coconut vendors interviewed, 43% were found to pay a form of tax to authorities for selling coconuts within the target areas whiles 57% of them do not pay any form of tax. These taxes include Municipal Assembly daily tolls, markets tolls, bus terminal tolls, and land/space rents. Out of the 43% that stated that they pay a form of tax, 82% indicated that they pay these taxes daily whilst 7% indicated that they pay the tax weekly. Eleven per cent however revealed that they pay their tax monthly. Further, the baseline study revealed that these taxes range from GH₵0.50 (€0.070) to GH₵10 (€1.40) depending on the type of tax.

Coconut Waste Generation and Management

3.2.9 The average volume of coconut husk generated by coconut vendors

Coconut waste generation is a core component of the Coconut Waste Project. The volume of coconut husk waste generated tends to influence operations at the project's processing factory. In light of this, the study sought to ascertain the volume of coconut husk generated within the target areas. According to Clerence (2016) and Beura et al. (2020), the average weight of a coconut husk is approximately 1.14

kilograms. Against this backdrop, the average volume of coconut husk generated per day at the coconut vendor level within the target areas is calculated as:

The average volume of coconut husk generated = (average coconuts sold per day) × (average weight of coconut husk).

Table 25: Average volume of coconut husk generated by coconut vendors

Location	**The average number of coconut sold per day**	**Mean of coconut sold per day**	**The average volume of coconut husk generated per day (Kg)** *(1.14 kg per coconut husk)*	**The average volume of coconut husk generated in Tonnes**	**Mean of coconut husk generated (Kg)** *(1.14kg per coconut husk)*
LaNMM	15561	101.71	17739.54	17.73954	115.94
Ayawaso West	4509	86.71	5088.96	5.08896	97.86
Ga East	5140	96.98	5859.60	5.85960	110.56
Adentan	4307	102.55	4910	4.910	116.9
Total (n = 300)	**29517**	**98.4**	**33598.08**	**33.59808**	**111.99**

Source: Field Survey, 2021

Table 24 shows that on average, the target areas generate approximately 34 tonnes of coconut husks daily. This means that approximately 1,020 tonnes of coconut husks are generated within a month and 12,240 tonnes of coconut husks are generated annually. Generally, the study further indicated that a mean volume of approximately 112 Kg of coconut husks are generated at the individual coconut vendor level within the four (4) targeted municipalities. LaNMM alone generates an average of about 18 tonnes of coconut husks daily and a mean generation of about 116Kg daily.

3.2.10 Coconut waste management among coconut vendors

Coconut waste generated mostly becomes the burden of coconut sellers and the municipal assembly. The indiscriminate disposal of the waste contributes to poor sanitation which leads to a reduction in human wellbeing and socio-economic development. At the coconut vendor level, the baseline study showed that the majority of the respondents (42.7%) dispose of their coconut waste by giving it to individual waste collectors who mostly use tricycles (aboboyaa) or wheelbarrows to collect the waste. Approximately 26.2% of the respondents give their husks to caterers including kenkey sellers. Other modes of disposal adopted by the coconut vendors include burning the coconut husk (12.5%), heaping the coconut husk under/closer to their sheds/joints (6.4%), and dumping it themselves at places designated by the assembly (7.6%). It is important to appreciate that almost 5% of the respondents indicated that they dump their coconut waste themselves at undesignated places within the target areas. Also, none of the coconut vendors said they give their coconut husk waste to coconut waste processing factories. However, data from the FGD reveals that the majority of the coconut vendors are willing to give their coconut waste to a factory within the target areas to recycle it into value-added products. According to them, doing this will contribute to keeping the

environment clean and healthy, and also create jobs among the youth. The study also showed that the best way to aggregate the coconut waste at the vendor level to the processing factory is an establishment of a well-structured aggregation system where vendors can call aggregators to pick up their waste and send it to the factory at the end of the day.

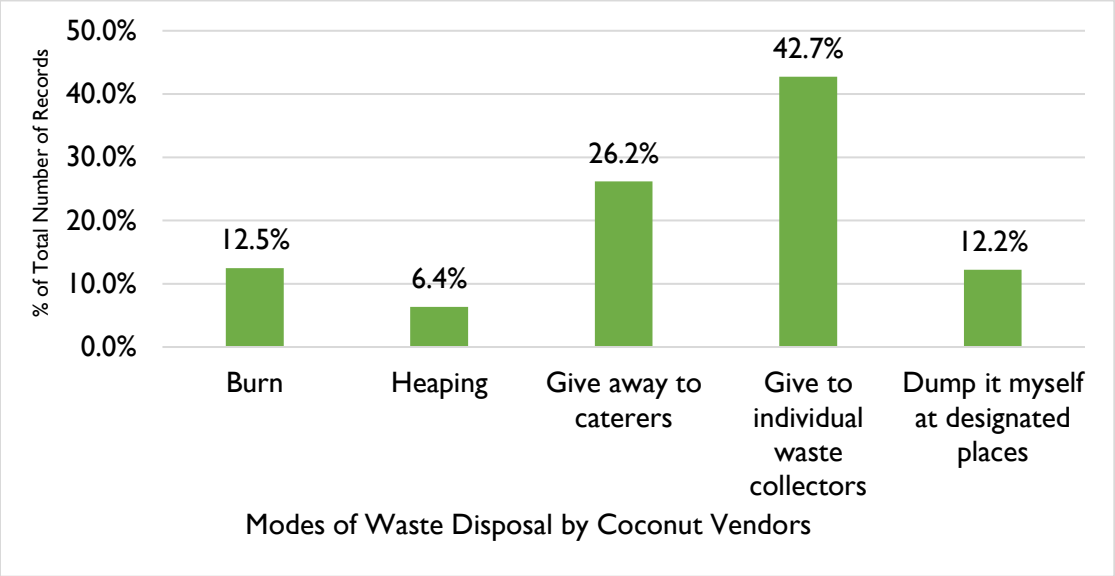


Figure 29: Modes of coconut husk disposal by coconut vendors

Source: Field Survey, 2021

The coconut vendors further stipulated that nothing will hinder them from giving their coconut waste to a factory to process into value-added products. Hence, their only motivation is to contribute to ensuring a clean and healthy environment which will also lead to the security of the business within the municipality.

The following places were reported as undesignated areas where 4.6% of the vendors dump their coconut waste:

- Bushes behind the University of Professional Studies, Accra (UPSA)
- Open spaces closer to the Institute of Chartered Accountants Ghana (ICAG) off trinity avenue, Okponglo.
- Behind Bear View Village in Atomic Junction,
- Behind Eddy's Pizza in East Legon,
- Bushes within the Oyarifa Special Ice enclave
- Bushes behind the University of Ghana (UG).
- Bushes around the Atomic Energy Commission office

Evidence gathered under this baseline study indicated that approximately 60% of the coconut vendors interviewed incur costs through the payment of fees when they dispose of their coconut waste. They further reported that disposing of their coconut waste cost them between GH₵5 (€0.71) to GH₵50 (€7.41) depending on the number of coconuts they can sell within the day. Information from the FGD showed that the majority of the vendors think coconut waste is not managed well within the project area.

Here, the vendors indicated that although they pay daily tolls to the municipal assembly, they are restricted from disposing of their coconut waste in public containers designated by the assemblies. This situation contributes significantly to the indiscriminate disposal of coconut waste within the project area.

3.2.11 Perception of coconut vendors on the impact of coconut waste disposal

The baseline sought to understand the perception of coconut vendors regarding the impact of indiscriminate disposal of coconut waste on the environment and the health of citizens within the target areas. Out of the 307 respondents interviewed, about 81% agreed that indiscriminate disposal of coconut waste poses a threat to the environment and the health of the citizens as seen in Figure 30.

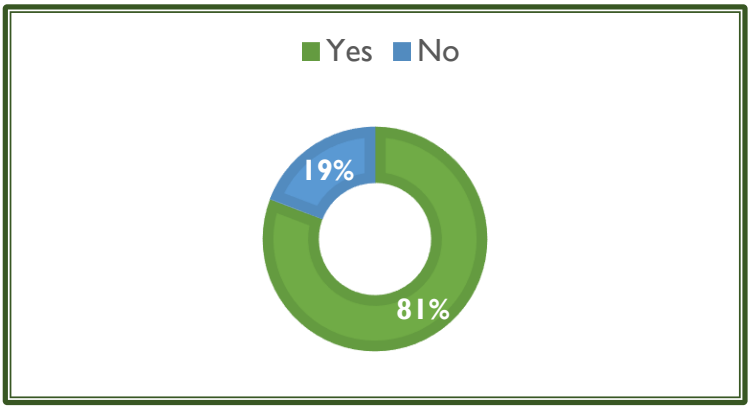


Figure 30: Perception of vendors on the impact of indiscriminate coconut waste disposal

Source: Field Survey, 2021

The respondents further reported that indiscriminate disposal of coconut waste poses a threat to the environment and the health of the citizens in many ways including:

- Waterway blockage leading to the infestation of flies, ticks and the breeding of mosquitoes that causes malaria
- Drainage obstruction
- Flooding
- Environmental pollution
- Accidents and injuries
- Widespread of diseases
- Serving as an abode for rodents, reptiles and harmful insects
- Fire outbreaks

In answering these questions, the respondents reported that:

Perception of vendors on the impact of coconut waste disposal (1)

If deposited at a place that is closer to human settlements or farms and it dries up, it easily catches fire that could destroy property (Respondent 7, Coconut Vendor at Pantang Village, March 2021)

Perception of vendors on the impact of coconut waste disposal (2)

It causes air pollution when it is burnt especially in an open space (Respondent 8, Coconut Vendor at Pantang Hospital, March 2021)

However, the baseline study shows that most of the coconut vendors have adequate information on coconut value-added products. They mentioned products such as cocopeat, doormats, soaps, fuel, biogas, car seats, charcoal and papers as some of the coconut waste value-added products.

3.2.12 Knowledge of coconut vendors on regulatory frameworks

The baseline study asked respondents about their awareness of policies or laws that regulate the coconut vending business and coconut waste management within the project area. This was to understand the level of knowledge that the vendors already have regarding policies or laws that regulate their sector. The baseline showed that only 2% of the respondents are aware of policies or laws that regulate their business whilst 98% have no idea of any regulatory instrument that controls their business. See Figure 31 for details of the situation. Two per cent indicated that they are aware of the municipal assembly bye-laws on establishing a coconut vending business including taking regular health screening as done by all street vendors within the municipalities.

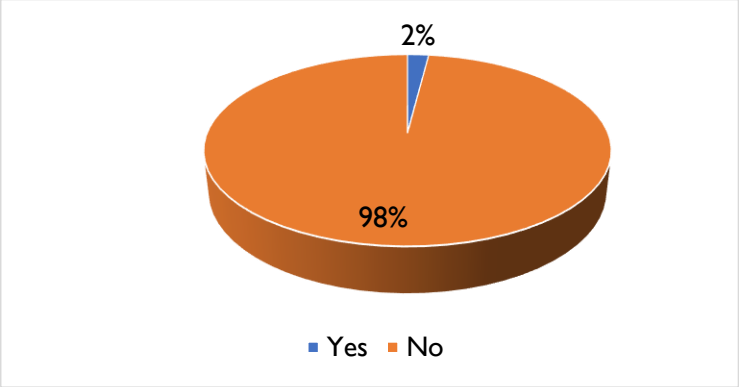


Figure 31: Knowledge of coconut vendors on regulatory frameworks

Source: Field Survey, 2021

Social Protection and Social Inclusion among coconut vendors

3.2.13 Coconut vendors and vendor associations

Creating an inclusive society and ensuring social protection demands that people relate to formalized associations. Belonging to associations increases social well-being, security and also provide opportunities for members to widen their networks, build friendships and personal relationships that can last a lifetime. Members in these associations share information and exchange ideas which increase access and availability of information within their sector. In ensuring efficiency and quality of work within their business, associations are vital to learning and guaranteeing best practices at work. When asked if respondents belong to any association/group, nearly 95% mentioned that they do not belong to any form of association/group. Only about 5% indicated that they belong to a form of association/group. Names of these associations/groups were given as "Adorye Kuo" in Madina and "Boys Boys" Group in UPSA. However, the respondents that reported that they belong to a group said their group is not related to coconut vending

although the majority of the members are coconut vendors. Out of the 5% that are members of a group, about 67% mentioned that they pay dues as a member of the group with dues ranging from GH₵5 (€0.71) to GH₵50 (€7.14) a month. About 33% also indicated that they do not pay any dues as members of the association/group. Further, 27% of the respondents who are also members of an association/group reported that there are no criteria for joining the association/group. The baseline further recorded that out of those who belong to an association/group, the majority of them (60%) mentioned that they have not benefited/are benefitting in any way since joining the association/group (see Figure 32).

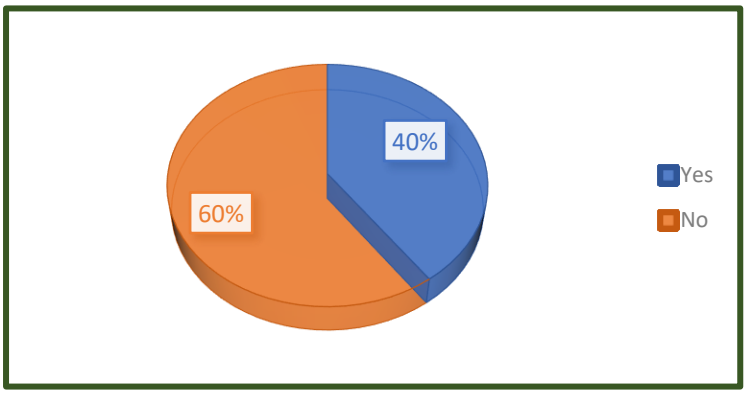


Figure 32: Response on benefits enjoyed/enjoying since joining association/group

Source: Field Survey, 2021

As seen in Figure 32 above, 40% of the respondents that belong to a group has ever benefited in a way from joining the association/group. The benefits include supporting them with donations when they were bereaved; donations during marriage ceremonies; financial supports; and ensuring their safety in the municipality.

Information from the FGDs shows that most coconut vendors tend to associate themselves as members of depots. The depots are aggregating points/wholesaling points where coconut vendors purchase bulk coconuts instead of farm gates or at local markets. From the FGDs, the study revealed that the key depots within the La Nkwantanang-Madina Municipality are UPSA depot, Madina Masalachi depot, Oman Fm-Redco Depot and Madina Police Station depot. However, members can join any depot only if they go there to purchase coconuts in bulk quantities. The study further revealed that there are no elected leaders at the depots. However, the one who owns the depot space and sells coconuts at wholesale price automatically becomes a leader of the depot. Although the depot system of association seems well established, the study indicates that the only benefit they enjoy is to be given preferential treatment during procurement. This means that those who belong to particular depots are always served before any other prospective buyer. In responding to this, a coconut vendor puts it this way:

Benefits of the depot system of association

I was once refused the opportunity to procure coconuts at the Oman FM-Redco Depot because I was new to the depot. They had to sell to all their members and it got finished before it reached my turn (Respondent 8, Coconut Vendor at Madina, March 2021)

Plate 7: A typical depot where coconut vendors purchase coconuts in wholesale basis.

Source: Field pictures, 2021 © Coconut Waste Project

Limited space to offload coconuts, robbery, absence of effective leadership systems and the absence of proper organizational structure are some challenges of the depot system of association. However, the coconut vendors during the FGD indicated that they must organize themselves into a well-structured association. They further expressed their commitment and readiness to organize themselves into an informal trade association such as other informal trade associations including Ghana Hairdressers and Beautician Association (GHABA) and the Ghana Association of Barbers and Barbering Salon Owners (GABBSO).

Findings from the study showed that organizing the coconut vendors in a well-structured association with effective elected leaders will help them to:

- regulate their business including enforcing market policies
- ensure and adopt better practices such as regular health screening and proper coconut waste management practices
- Share ideas and information,
- network and build their social capital
- ensure safety and security for their members.
- participate in decision making at the municipal, regional and national level
- engage in training and capacity building for their members

However, the coconut vendors specified that the best way to mobilize them into a well-structured association is through the exhibition of seriousness and commitment among the leaders, and enhanced

regulatory framework and leadership structure and incentives for the prospective members. They also prefer that their meetings will be held only on Sundays after 4 pm since a majority of them work from Monday to Saturday and use Sundays for personal activities.

3.2.14 Financial Inclusion among coconut vendors

Recent studies suggest that financial inclusion has a positive impact on the lives of individuals, particularly for vulnerable populations. It helps them to reduce risk, build resilience, improve household consumption, investment in assets and grow businesses, safeguard savings, and better manage the consequences of unforeseen circumstances (Guilherme, 2016). In this study, the telecommunication form of mobile money (wallets) was considered as a form of financial service since it mostly performs services similar to that of other financial institutions. Key among these services include money withdrawals, deposits, savings, investments, bill payments, and remittance transfers. These services are mostly favourable to both the educated and non-educated.

The baseline study asked respondents if they have any financial account and to name the financial institution/telco where they access financial services. The baseline showed that the majority of the respondents (58%) own a form of financial account whereas 42% have no form of financial account. Out of the 58% that indicated that they own a form of financial account, 48.2% mentioned that they access financial service from only MTN mobile money, 4.6% reported that they access financial service from traditional banks with 1.6% indicating that they have financial accounts with Microfinance and Savings & Loans institutions. It is good to know that the rest of them access financial services from multiple actors as seen in Figure 33.

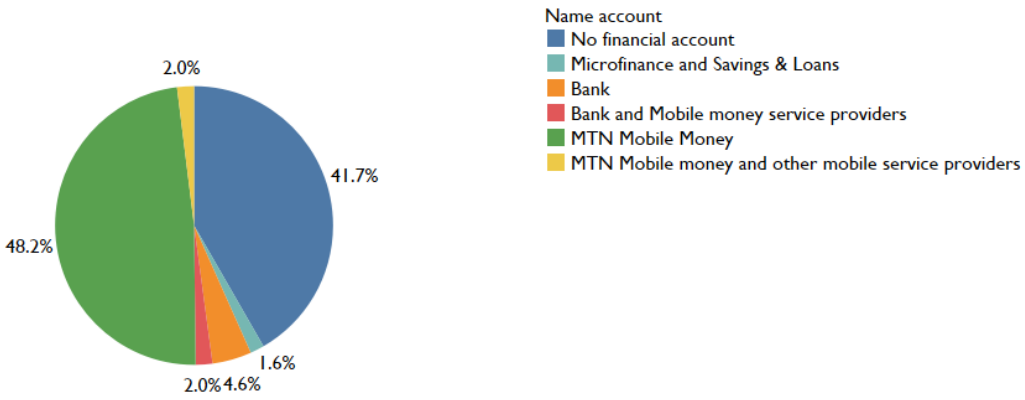


Figure 43: Ownership of financial accounts among coconut vendors

Source: Field Survey, 2021

The study further explored the reasons why respondents do not have a form of financial account. The respondents without any form of financial accounts attributed their reason for not owning a financial account to the following:

- Inadequacy of income
- Distrust in financial institutions

- Recent fraudulent activities within the mobile money sector
- Preference in adopting traditional ways of saving (home Susu/piggybanks, etc)
- Low financial literacy
- General lack of interest in owning a bank account
- Complex processes and procedures in accessing formal financial services
- Not having mobile phones and/or ID cards to register and access mobile money
- Unaffordable bank transaction fees

The baseline probed further to explore access to loans and credit facilities among respondents that own financial accounts. Out of the 58% that own a form of financial account, the majority of them (92%) reported that they have never requested any form of loan in a financial institution/mobile money.

Table 26: Request for loans/credit facilities by coconut vendors

Response	Per cent
Yes	8
No	92
Total	**100**

Source: Field Survey, 2021

Further, 80% of those who have ever applied for a loan stated that they were able to access the loan/credit facility. Failure to meet loan application requirements was found to be the main reason responsible for the inability of the remaining 20% to ever access a loan/credit facility as presented in Figure 34.

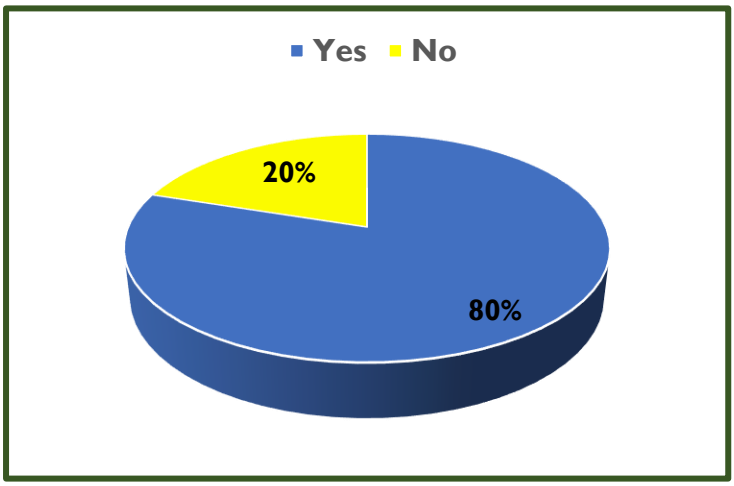


Figure 34: Access to loans/credit facilities by coconut vendors

Source: Field Survey, 2021

It was further important to ascertain the type of loans/credit facilities accessed by the respondents. Out of the 80% of respondents who have ever accessed a loan/credit facility, a majority (84%) mentioned MTN Qwikloan, 5% indicated that they accessed various forms of loans from Barclays Bank, Prudential Bank (5%), and the Sinapi Aba Savings Ltd (6%) as shown in Figure 35.

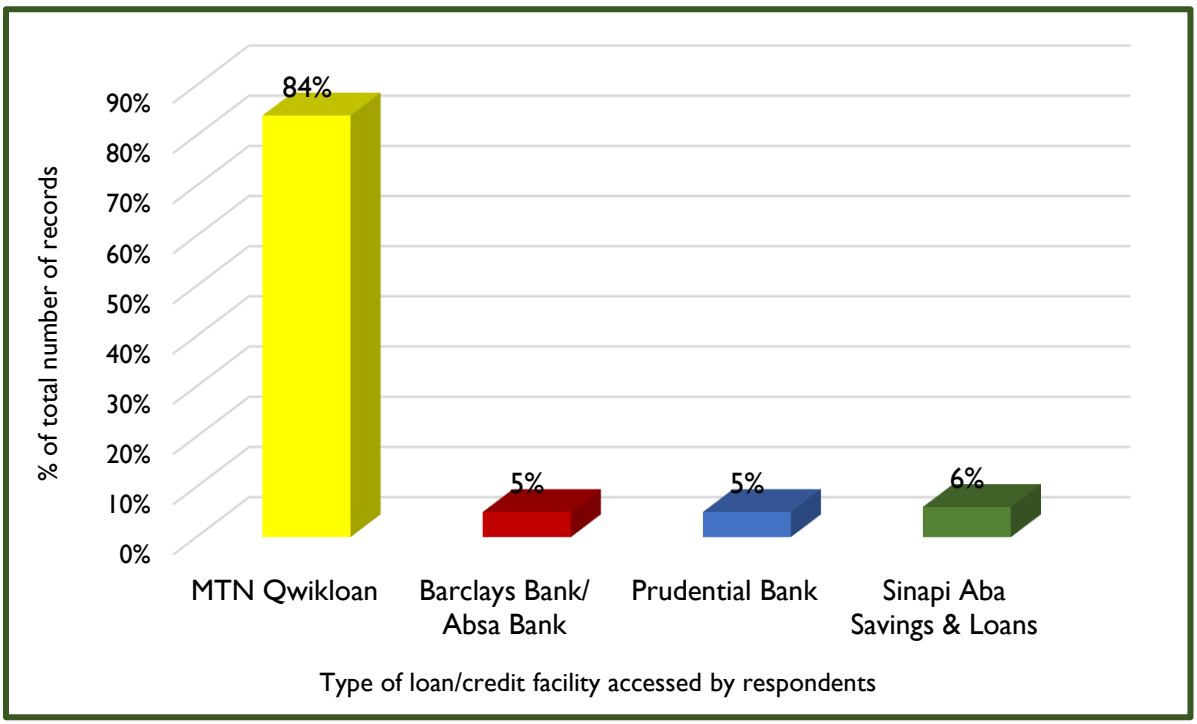


Figure 5: Type of loan/credit facility accessed by respondents

Source: Field Survey, 2021

3.2.15 Access to insurance schemes among coconut vendors

A lack of insurance policy was identified among a majority of the respondents. At the time of the baseline study, the majority of the respondents (67%) mentioned that they are not signed on any insurance policy whereas 33% stated that they are signed onto at least one form of an insurance policy. Out of the 33% that are on a form of insurance policy, 98% reported that they are on the National Health Insurance Scheme (NHIS) whereas 1% indicated that they have signed on to the MTN Ayo insurance package. It is important to emphasize that the remaining 1% indicated that they have subscribed to both the NHIS and the MTN Ayo insurance package as presented in Figure 36. Again, none of the respondents indicated to have signed on to a life insurance policy or property insurance policy.

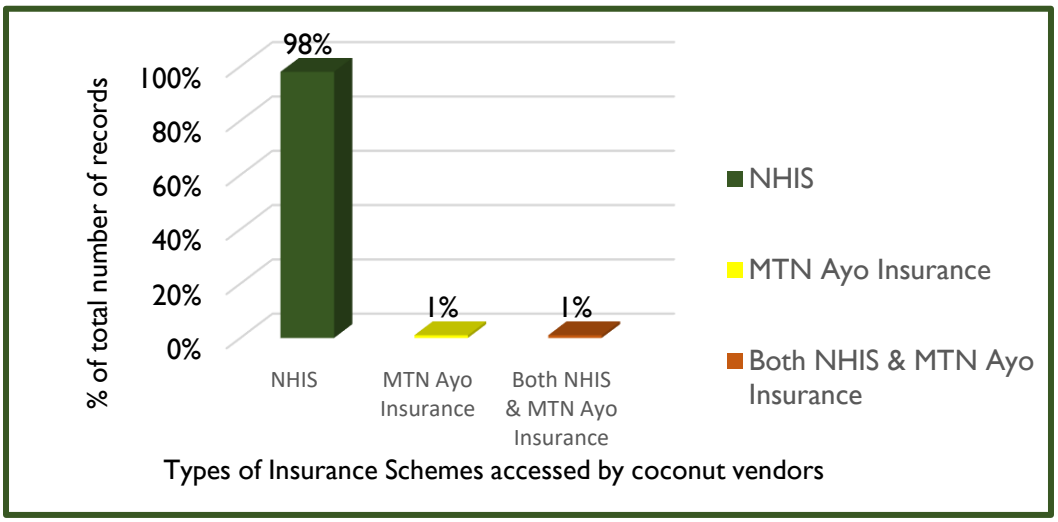


Figure 36: Types of insurance schemes accessed by coconut vendors

Source: Field Survey, 2021

Several factors were mentioned by the coconut vendors as reasons that motivated them to sign on to insurance packages. These reasons include catering for unexpected medical costs, using the card to register for a driving licence, and influence from peers to sign on to an insurance package. Other factors include gaining easy access to healthcare, using the ID cards for identification purposes, using the ID cards for school entry applications and satisfying job application requirements. Conversely, those who have not signed on to any insurance policy at the time of the baseline gave several factors responsible for this phenomenon. Key among these are affordability issues, distrust in insurance schemes, lack of interest in signing on to insurance schemes among others.

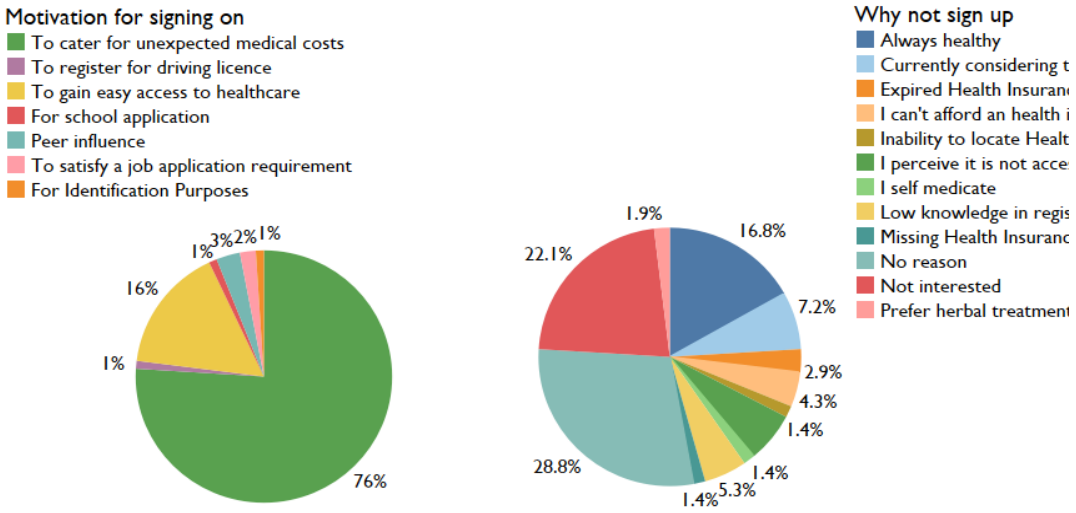


Figure 37: Motivation to access/not to access insurance schemes

Source: Field Survey, 2021

Figure 37 depicts that the majority of the coconut vendors (76%) stated that their main motivation for signing on to insurance schemes is to cater for unexpected costs whilst, 16% reported that they need the insurance to gain easy access to healthcare. On the other hand, 28.8% seems to have no motivation to sign on to an insurance policy whereas 22.1% have no interest in signing on to an insurance policy.

Ultimately, the study asked the respondents to mention some of the challenges they encounter in their line of business within the project district. Challenges reported by the coconut vendors include the following:

- Insults and discrimination from the public
- Injuries from knife cuts
- Coconut waste management including designated sites to dump their coconut waste
- Persistent increase in daily operational costs
- Poor accommodation
- Harassment from tax collectors and law enforcement agencies
- Harsh working conditions including excessive sun exposure and carrying of heavy loads of coconuts causing increased health problems such as body pains, eye problems, malaria, skin rashes.

3.2.16 COVID-19 and the Coconut Vending Business

Undoubtedly, the advent of the COVID-19 has affected all facets of life. The pandemic has brought unprecedented impacts on the lives and livelihoods of informal businesses across the world. Out of the 307 coconut vendors interviewed, the majority of them (97%) indicated they are aware of COVID-19 whereas 3% mentioned that they do not know about the pandemic. The baseline study found that 97% of the coconut vendors have at least heard of one of the COVID-19 protocols and the extent to which the pandemic is affecting people across the globe. Given this, the study further observed if the respondents were observing any of the COVID-19 protocols at their workplace. It was realised from the observation that the majority (56%) of the coconut vendors were not observing any of the COVID-19 protocols at their workplace whereas 44% were observing at least one of the protocols.

Plate 8: A coconut vendor having a hand washing station (arrowed).

Source: Field pictures, 2021 © Coconut Waste Project

Plate 9: A coconut vendor wearing a nose mask

Source: Field pictures, 2021 © Coconut Waste Project

The baseline study, through a Likert scale, ranked the level of awareness of the COVID-19 protocols among the coconut vendors. It was found that the majority of the respondents are very aware of wearing nose masks as a form of COVID-19 protocol. Again, the study reveals that 52% of the respondents are aware that washing hands with soap and water for at least 20 seconds is a COVID-19 protocol. Equally, 52% of them are aware that avoiding handshaking is also a COVID-19 protocol. Interestingly, 24.5% of the coconut vendors are not aware at all that calling designated health lines in their districts to report suspected COVID cases is a COVID-19 protocol. Consequently, the respondents (32.9%) who are somewhat aware of this protocol were not aware of the health lines to call to report suspected COVID-19 cases. The situation has been presented in Figure 38.

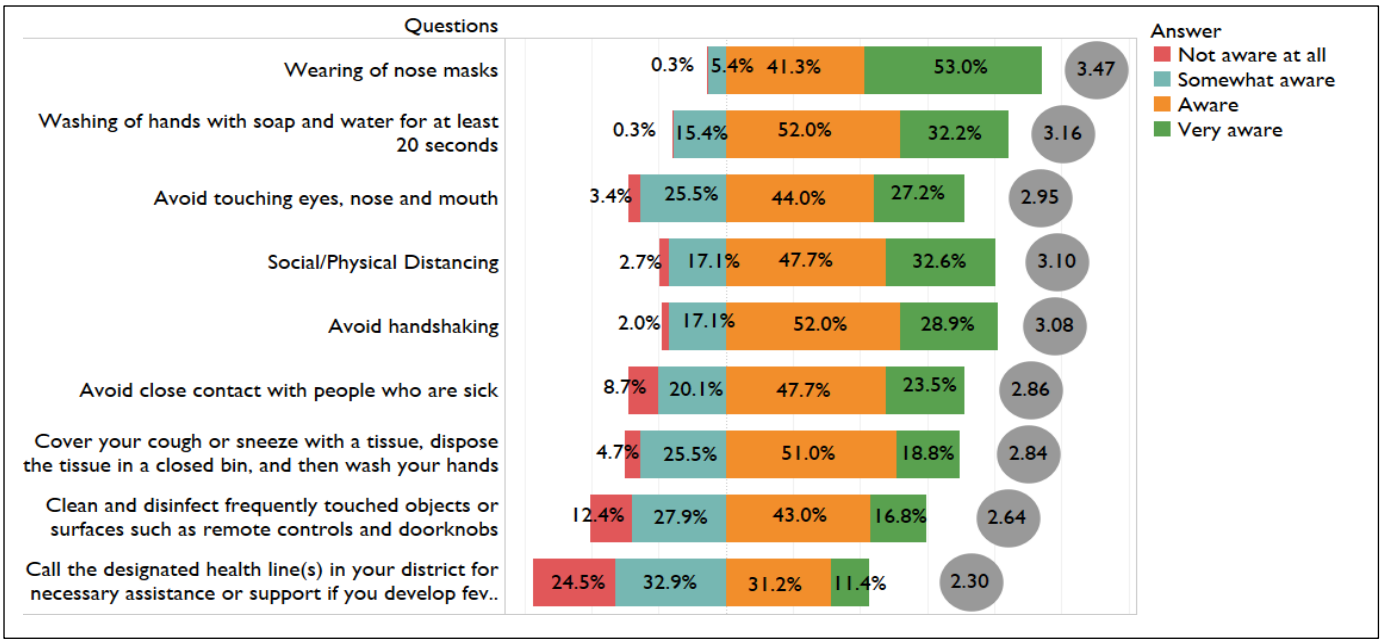


Figure 38: level of awareness of COVID-19 protocols among coconut vendors

Source: Field Survey, 2021

Figure 38 shows a percentage distribution and averages of responses on a Likert scale with 1 being "not aware at all" to 4 being "very aware". The COVID-19 protocol with the highest average after computing is taken as the protocol that the majority of the respondents are very aware of. The study reveals that wearing nose masks is the protocol with the highest average (3.47). This means that majority of the respondents are very aware of wearing nose masks as a COVID-19 protocol. The protocol with the least average (2.30) was found to be calling designated health lines to report suspected COVID-19 cases.

Also, 64% of the coconut vendors conveyed that the COVID-19 has affected their business whiles 36% of them mentioned that the pandemic has not affected their business in any way. The impacts of the pandemic on the business of the respondents were found to be as follows:

Table 27: Impact of COVID-19 on the coconut vending business

Negative impact	Positive impact
Decrease in general sales arising from low patronage due to lockdowns and restrictions in movements especially for schools, offices and churches.	Increased patronage arising from the notion that coconut water is nutritious and is recommended as an immune booster
The increased cost of operations including the cost of purchasing personal protective equipment (PPEs).	
Low patronage due to fear from customers to buy from street vendors is a measure to ensure social distancing.	

Source: Field Survey, 2021

Plate 10: A coconut vendor owns a hand sanitizer (arrowed) as a form of observing the COVID-19 protocols.

Source: Field pictures, 2021 © Coconut Waste Project

Coconut Waste Collection and Transportation

In most cases, the next step after the on-site coconut waste generation is a collection. A solid waste management report from the La Nkwantanang-Madina Municipal Assembly indicates that the majority of the solid waste collection depends on primary collection and transportation. Primary collection and transportation is generally the collection of solid waste from the point where is generated and transported to the disposal site/recycling/treatment site.

Information from the FGD showed that almost every coconut vendor within the project area relies on individual waste collectors who use tricycles mostly called "aboboyaa" and wheelbarrows for collecting and transporting their coconut waste to final disposal sites. The study revealed specifically that individual waste collectors play a key role in the coconut waste value chain within the project area.

Plate 11: An individual coconut waste collector who uses a wheelbarrow.

Source: Field pictures, 2021 © Coconut Waste Project

Plate 12: An individual coconut waste collector who uses a tricycle (Aboboyaa)

Source: Field pictures, 2021 © Coconut Waste Project

It is worthy to point out that majority of the individual waste collectors that use tricycles mix the coconut waste with other households solid waste. However, coconut waste takes about 70%-80% of the total solid waste they collect and transport. Also, other individual waste collectors collect only coconut waste without mixing them with other household waste. The study further revealed that almost the majority of the individual coconut waste collectors are males who have been in the business for about 2 to 5 years.

A key factor that determines the fees charged per waste and collection and transportation is the quantity of coconut waste they collect and transport. Thus, the majority of the individual waste collectors charge between GH₵5 (€0.71) to GH₵50 (€7.14) per vendor. Specifically, most individual waste collectors charge GH₵12 (€1.71) per 25Kg fertilizer bag. Also, the study revealed that individual coconut waste collectors pay between GH₵5 (€0.71) to GH₵40 (€5.71) to dispose of coconut waste at the various dumping sites. The findings from the interviews showed that about 70% of the individual waste collectors dispose of their coconut waste at undesignated places such as bushes at Legon and Okponglo, and UPSA. Those who use designated landfill sites mentioned the Tema, Kpone, and Nsawam (Akwan Dobro) landfill sites as the areas they dispose of the coconut waste. About 15% of them indicated that they sell it to caterers who used the coconut husk waste as fuel. Again, none of the individual waste collectors indicated that they give the waste to coconut waste processing companies within the project area to recycle them into value-added products. Nonetheless, about 15% of the individual waste collectors give the coconut waste to recycling companies outside the project area. Some of the companies include Fibrewealth Company Limited, Eco Fibres Company Limited, and Noir Fibre Company Limited.

The study further revealed that individual waste collectors mainly acquire their skills in the collection and transportation of coconut waste through an apprenticeship where at most times they learn how to operate and ride tricycles. Although it is required for these tricycle riders to acquire a licence to ride the tricycles, the study showed that most individual waste collectors within the project area do not have a driving license or finds it difficult to acquire a license to ride their tricycles. Hence, the majority of them rides their tricycles without a license. The findings further show that individual waste collectors do not have adequate knowledge of policies/laws that regulates their business. In responding to the challenges they face as individual waste collectors, they lamented that:

Challenges faced by individual waste collectors(1)

We don't have designated places for disposal within LaNMMA. The designated places available are outside the municipality, thus; we mostly find convenient places like bushes and dump them. (Respondent 9, Individual Waste collector, Madina, March 2021)

Challenges faced by individual waste collectors(2)

Ghanaians are not informed about the process of waste management and what happens to their waste after it has been collected. Households always want to give us a little sum of money so we just dispose of their waste anywhere

but they are unaware that we also pay for disposing of their final waste at designated landfill sites (Respondent 10, Individual Waste collector, Oyarifa, March 2021)

Challenges faced by individual waste collectors(2)

There are no dumping sites in Accra hence we have to travel to Nsawam to dispose of the refuse collected from the households. This is very far, in addition, we sometimes join long queues at the dumping site, the situation sometimes is so bad that we have to stay there overnight (Respondent 11, Individual Waste collector, Madina, March 2021)

Challenges faced by individual waste collectors (3)

Some of the collectors are bullied and cheated by tricycle owners because of illiteracy (Respondent 12, Individual Waste collector, Madina, March 2021)

Notwithstanding, the individual waste collectors called for an established waste collection and transportation system within the project area and further expressed a commitment to supply factories with coconut waste for the production of coconut waste value-added products.

The state and coconut waste management

Waste management in Ghana's urban areas is mostly dependent on both the public and private sectors. The public and private sectors play different but complementary roles to ensure efficient waste management in urban areas. The baseline study revealed that the state coordinates the management of solid waste within the municipality. Interactions with the Municipal Planning Department and the Environmental Health and Sanitation Department confirm the supervisory and coordinating role of the state. It further revealed that the state departments also monitor and evaluate the activities of outsourced private companies that manage municipal waste. The baseline study showed that the La Nkwantanang-Madina Municipal Assembly has outsourced private companies to manage waste within public places (markets, streets, car parks) and at the household level. However, the management of coconut waste has been left solely to the coconut vendors to manage it at their level. In responding to this the respondent asserted that:

Role of the assembly in coconut waste management (1)

Coconut vendors manage the waste themselves by dealing with the individual waste collectors at their level. Coconut waste management is not well structured within the municipality. They have mutual arrangements with the individual waste collectors to collect their waste for them. We don't play a role in coconut waste management in the municipality (Respondent 13, LaNMMA, March 2021)

Further interactions with the assembly showed that 750 tonnes of solid waste are generated daily in the municipality. It further stated that 65% of this waste is collected daily whereas 81% of the 65% is collected by private waste collectors including those that use tricycles or "*aboboyaa*". The assembly reported that a high volume of coconut waste is generated within the municipality but could not report the exact volume of coconut waste generated daily. At the time of the baseline study, it was discovered that coconut vendors are expected to be guided by three regulations including the payment of daily tolls, ensuring clean and

sanitary conditions at their vending sites and participating in routine health screening that is mandatory for all street vendors in the municipality.

The assembly stated that they seek to take measures including sensitizations, enforcement of sanitation bye-laws, and the provision of infrastructure to regulate the coconut vending business within the municipality. Besides, the interactions revealed that the assembly is also expected to play regulatory and supervisory roles in coconut waste collection and transportation. Yet, it was found that this role has been minimal due to insufficient data on the activities of individual coconut waste collectors especially those that use tricycles or *aboboyaas*. This supposedly contributes to the indiscriminate disposal of coconut waste at undesignated places by individual coconut waste collectors. However, registering the individual waste collectors and giving them licenses to operate within the municipality are some of the stringent measures the assembly seeks to undertake.

Role of the assembly in coconut waste management (2)

We don't have sufficient data on all the individual waste collectors so regulating them with the rules becomes a bit difficult. The assembly wants to register all these aboboyaa guys to ensure proper regulation of their activities in the municipality (Respondent 13, LaNMMA, March 2021)

The market for coconut waste value-added products

The key end-users for coconut waste value-added products include market actors in the mining sector, hospitality sector, and the agricultural/forestry sector. These actors consist of medium to large scale companies that rely on coconut waste value-added products in their line of activities.

The hospitality industry serves as a market for coconut value-added products such as coconut waste paper bags and charcoal briquettes. Many of the companies in the hospitality industry including shops, malls and restaurants rely mostly on the use of paper bags for packaging their products. This is their contribution to promoting a healthy and green environment. According to a respondent in the hospitality sector:

Willingness to procure coconut waste value-added products (1)

We are very willing to procure to also help eliminate the waste in our communities (Respondent 14, Shopping Mall, March 2021)

Willingness to procure coconut waste value-added products (2)

We're helping to rid of the country of plastic waste by substituting it with biodegradable paper bags (Respondent 15, Bakery Company, March 2021)

The hospitality companies currently purchase from local paper bag manufacturing companies and prefer doing business with local paper bag manufacturing companies. They are mostly informed by the price of the paper bags, quality, availability and the design of the paper bags before they decide to procure from a particular local producer. The major challenge they encounter in procuring from local producers/suppliers is the inconsistent supply of paper bags. To resolve such delays, they rely on substitutes such as polythene bags for the packaging of their products.

Challenges in procuring coconut waste value-added products (1)

We are currently looking at contracting other suppliers in case of disappointment but in the meantime, we use polythene bags as a substitute (Respondent 16, Bakery Company, March 2021)

Cocopeat is a by-product of processed coconut husk for coconut fibre. Cocopeat is an organic material and a proven natural alternative to mined peat moss. Cocopeat can be used for; growing seedlings, bedding plants, planters, gardens, greenhouse farming and large-scale tree planting. There is a growing market for cocopeat in Ghana. Major agroforestry/horticultural companies purchase cocopeat to plant trees, crops and other plants. Other agroforestry companies used cocopeat to plant trees for reclamation of lands that are destroyed by mining activities. The agroforestry companies procure their cocopeat locally from local manufacturers and suppliers. According to them, this helps to encourage and sustain local businesses whilst creating a healthy environment. Key facts that inform the purchasing of cocopeat in bulk include the number of trees/seedlings/plants/crops to be planted, the accessibility, availability and the existing market price.

Information from the baseline study shows that agroforestry companies in Ghana hope to continue to procure cocopeat from local manufacturers. However, they will focus on pricing, quality and accessibility before procuring from local manufacturers. The price of the cocopeat mostly depends on the quality of the product. The quality levels are categorized into low (fibre), medium (coconut coir), and the finest quality (peat). These quality levels also come at different prices and are mostly measured in Kilograms. The study revealed that organic compost/manure and inorganic fertilizers are sometimes substitutes for cocopeat. In responding to the differences between cocopeat and the substitutes, the respondents stated that:

Difference between cocopeat and its substitutes (1)

Produce from cocopeat is very buoyant and fresh although organic compost can also produce the same. However, farming with cocopeat is very good because of its high moisture content (15% to 20%). it can give your plant enough moisture for a long because it retains water for a long time and also using cocopeat is very difficult for your plants to be attacked by bacteria unlike using the soil (Respondent 17, Agroforestry industry, March 2021)

Difference between cocopeat and its substitutes (2)

The changing climate in Ghana is affecting the growth of trees/plants. The climate is really hot but with using cocopeat, plants can still survive with minimal irrigation even in a hot temperature. Cocopeat serves as a good option for farmers and plantation companies in Ghana with regards to climate change (Respondent 18, Agroforestry industry, March 2021)

Plate 13: A coconut husk being processed into cocopeat

Source: CDO, 2021 © Coconut Waste Project

Plate 14: A fertilizer bag of cocopeat

Source: CDO, 2021 © Coconut Waste Project

Another potential market for coconut waste value-added products is in the mining sector. The mining industry uses activated carbon charcoal which is mostly made from coconut shells for the absorption of gold after leaching. However, the existing mining companies currently import activated carbon charcoal from countries such as South Africa, Sri Lanka, and Thailand. The availability of the product, the quality of the product in terms of absorption rate, capacity, and attrition rate informs the purchasing of the activated carbon charcoal. The study revealed that mining companies in Ghana are very willing to procure activated carbon charcoal from local activated carbon charcoal manufacturing companies. Nevertheless, the quality, pricing, proactive scheduling, consistency and availability of the product will inform the decision to procure from local manufacturing companies.

Plate 15: A coconut shell activated carbon charcoal

Source: CDO, 2021 © Coconut Waste Project

The baseline study recorded that the only substitute for the use of activated carbon charcoal in the mining sector is the use of Zinc. However, other factors will inform the decision to substitute zinc over the activated carbon charcoal. In responding to this, the respondent mentioned that:

Substitute for Activated Carbon Charcoal (1)

If the substitute is proven to be effective and confirmed through laboratory test works and pilot scale. For instance, if the ore contains high concentrations of silver, the zinc precipitation method would be preferred to activated carbon absorption process (Respondent 19, Mining Company, March 2021)

In the mining sector, the activated carbon charcoal is found to be the only proven reagent to absorb and concentrate gold before subsequent processes (elution, electrowinning, and smelting) is performed. The difference between the activated carbon charcoal and its substitute was given by the respondents as:

For activated carbon charcoal, it absorbs the gold in its micropores before it is eluted into a pregnant leach solution. This is preferred for ores that have little to low preg-robbing minerals in them.

For zinc, it displaces the gold to form the Zinc Cyanide (ZnCN) and the gold is precipitated in the solution. This is mostly used for ores with high silver grades (100 g/t) (Respondent 19, Mining Company, March 2021).

Delaying in shipment schedule in times of emergency are some of the challenges the mining companies face in importing the activated carbon charcoal.

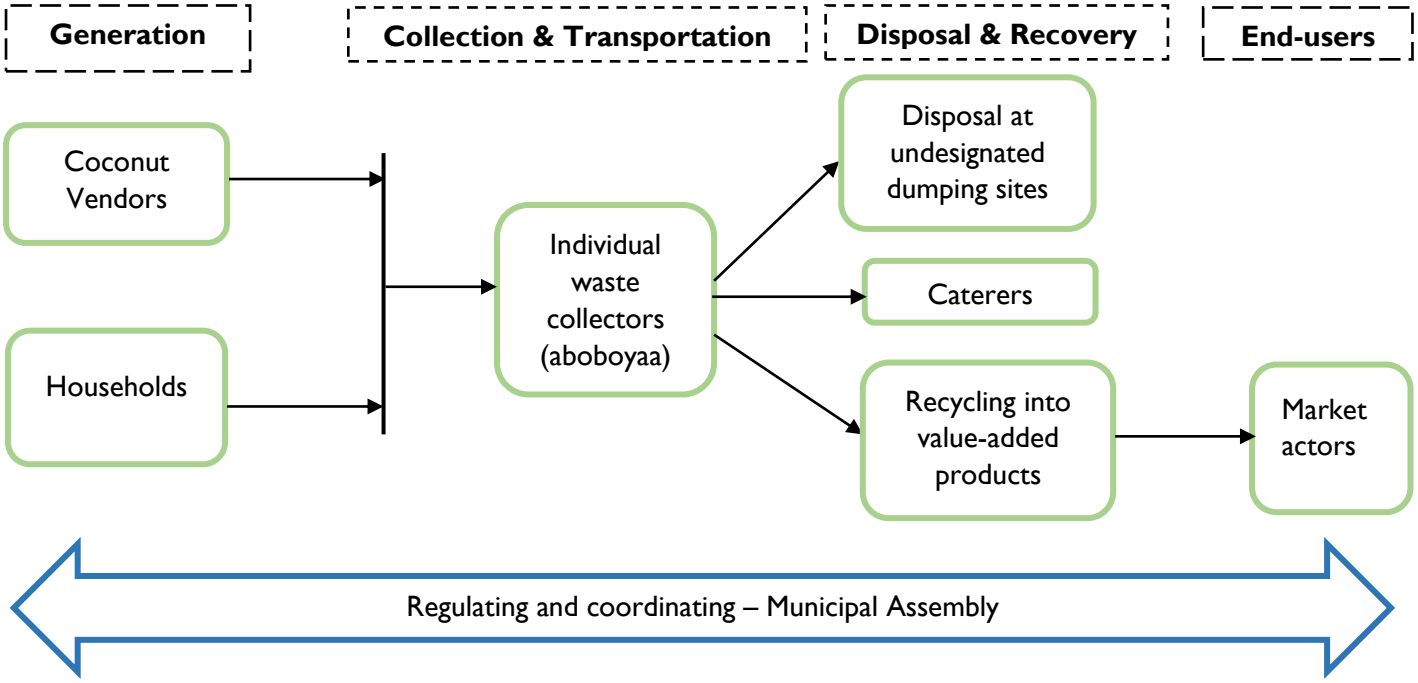


Figure 39: Coconut waste value chain Map

Source: CDO's Construct, 2021

Generation of coconut waste within the project target areas begins at the coconut vendor and household levels. The main actor that deals in coconut waste collection and transportation are the individual waste collectors (Aboboyaa) who disposes the coconut waste at undesignated dumping sites, give to caterers to be used as fuel or provide to recycling companies to process it into coconut waste value-added products such as paper, cocopeat, and charcoal. These recycled value-added products from the recycling companies

are supplied to end-users termed as market actors. The market actors are companies that rely on coconut waste value-added products. The majority of these companies can be found in the hospitality industry, agroforestry/horticultural industry, and the mining industry. The project explored the economic feasibility of coconut waste paper bags, cocopeat, and activated carbon charcoal as displayed in Table 26.

Table 28: Economic feasibility of coconut waste value-added products

Parameters	Paper bags	Cocopeat (finest quality)	Cocopeat (coco coir)	Activated carbon charcoal
Average quantity demand per firm per month	4,400 pieces	50kg	50kg	33 tonnes
Average price per unit	GH₵0.70 (€0.099)per piece	GH₵120 (€16.93) per 5kg	GH₵50 (€7.06) per 5kg	GH₵17,355.00 (€2,448.95) per tonne

Source: Field Survey, 2021

Activated carbon charcoal production appears to have the highest economic opportunity compared to cocopeat and paper bags. On the other hand, the economic value for the finest quality of cocopeat appears to be higher than that of coco coir (medium quality of cocopeat). Exploring the economic viability of coconut waste value-added products will support the project to select a viable value-added product to be produced by the project and also develop financial projections and analysis for the establishment and operations of the processing centre.

3.3 Mapping-out of coconut vending and coconut waste disposal sites

Spatial data on coconut waste disposal and coconut vending sites are essential for Municipal Coconut Waste Management (MCWM) decision making including aggregation route planning, law enforcement, and coordination. The baseline study used GPS devices to gather location data to map out coconut vending and coconut waste disposal sites. For coconut waste disposal sites, the mapping out shows about 14 undesignated sites within the project target areas. Figures 38 & 39 shows maps of coconut vending sites and coconut waste disposal sites respectively. The data shows undesignated coconut dumping sites within the project target area and surrounding communities.

Plate 16: A Picture of an undesignated coconut waste dumping site at Madina

Source: Field pictures, 2021 © Coconut Waste Project

Plate 17: A Picture of an undesignated coconut waste dumping site at Oyarifa

Source: Field pictures, 2021 © Coconut Waste Project

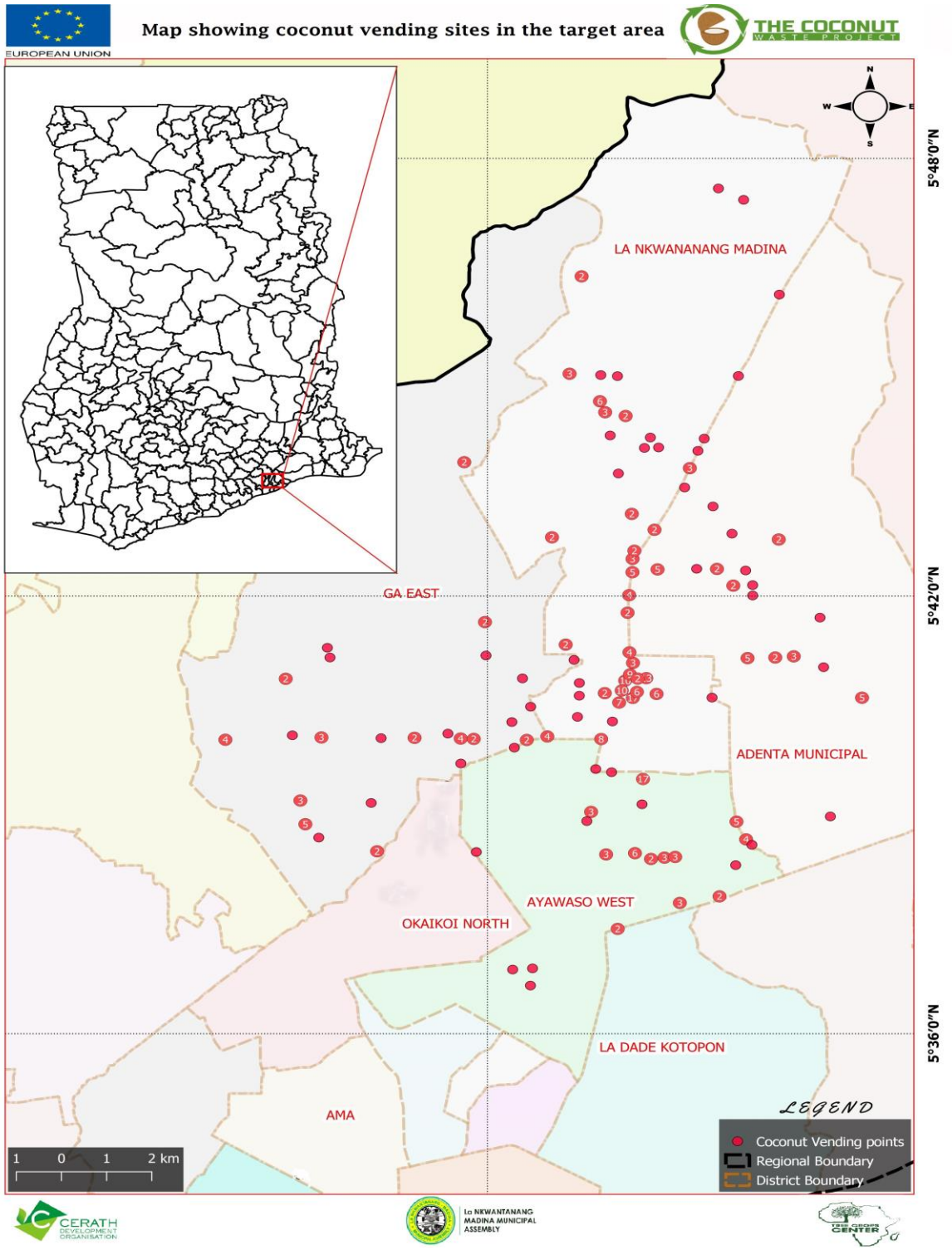


Figure 40: A sectional Map of the project target areas showing coconut vending sites.

Source: Field Survey, 2021

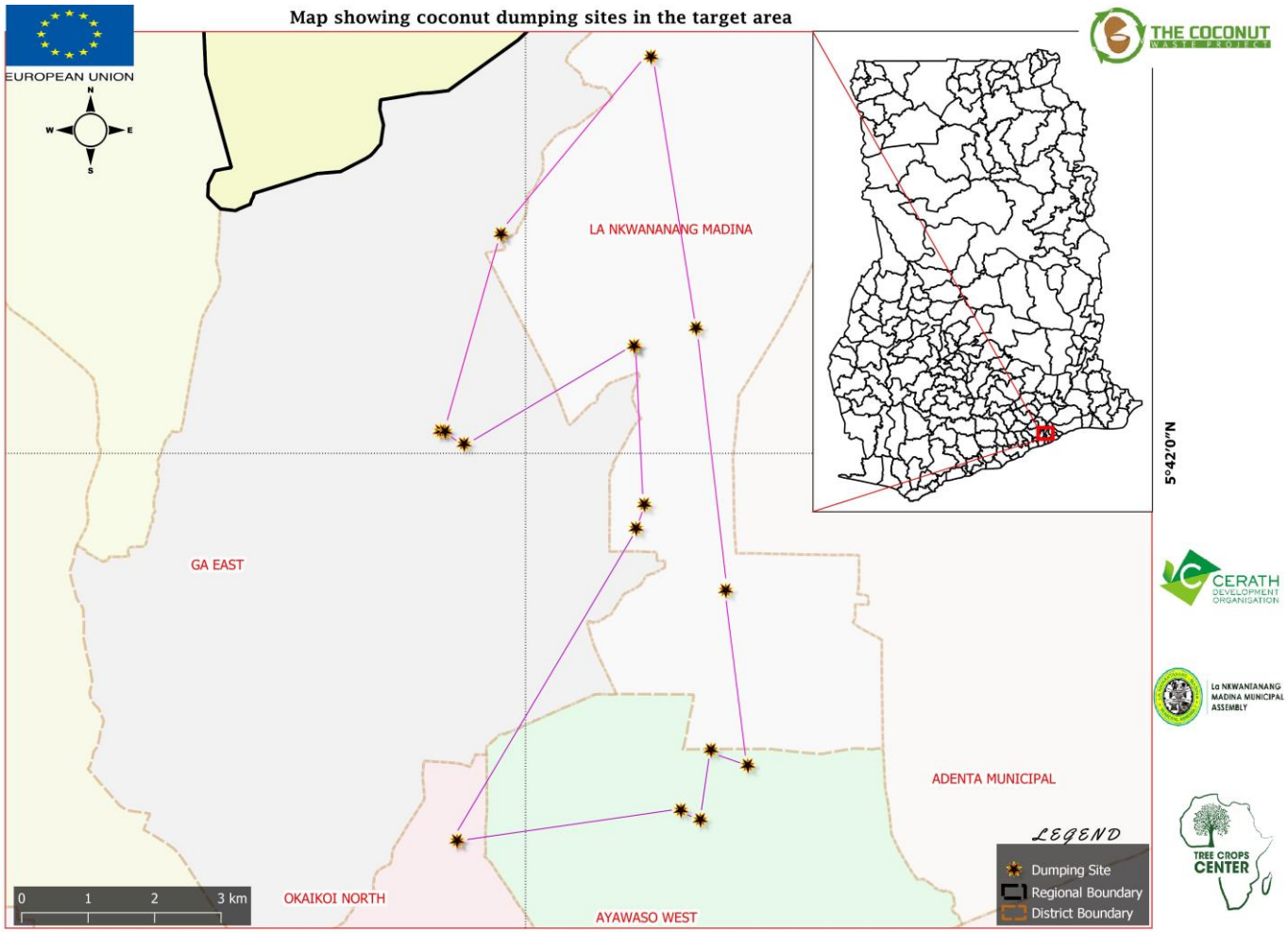


Figure 41: A sectional Map of the project target area showing undesignated coconut waste dumping sites.

Source: Field Survey, 2021

3.4 Baseline data on required project indicators in the M&E plan.

Table 29: Baseline data on required project indicators

Level	Indicator	Definition	Baseline Data
Impact	Percentage of households with improved sanitation conditions due to the adoption of proper coconut waste management practices.	Proper coconut waste management practices include proper ways of disposing of coconut waste by giving them to aggregators who dump it at designated places or supply it to coconut waste processing factories.	The majority of the households do not separate coconut waste from other solid waste before they dispose of it off. 69.4% of households out of 411 households give their solid waste to private/individual waste collectors. None of the households gives their coconut waste to coconut waste processing factories.
Impact	Percentage of coconut vendors who have adopted proper coconut waste management practices	Proper coconut waste management practices include proper ways of disposing of coconut waste by giving them to aggregators who dump it at designated places or supply it to coconut waste processing factories.	42.7% of coconut vendors out of every 307 coconut vendors give their coconut waste to individual aggregators 7.6% of coconut vendors out of every 307 coconut vendors dump it at designated places None of them gives their coconut waste to processing factories.
Outcome	The volume of coconut husk waste aggregated in LaNMM per day	The volume of coconut husk measured in tonnes.	18 tonnes of coconut waste are generated and aggregated in LaNMM per day
Output	Number of tools developed or adapted to promote green circular economy	The tools include maps of coconut vendors, coconut waste disposal sites and factory manuals.	2 maps. 1 coconut vending site map 1 coconut waste disposal site map
Output	The number of beneficiaries with social protection services.	It includes coconut vendors who have signed on to various social protection services. The social protection services include but are not limited to Health Insurance, Credit facilities and Pension Schemes.	178 coconut vendors (58%) out of every 307 coconut vendors own a form of financial account 101 coconut vendors (33%) out of every 307 coconut vendors have signed on to a form of insurance policy 25 coconut vendors (8%) out of 307 coconut vendors access a form of loan/credit facility

CHAPTER 4: CONCLUSIONS AND RECOMMENDATIONS

This baseline study was carried out to understand the current situation of the project environment to inform the implementation of the Coconut Waste Project (COWAP) This is also to aid in assessing the status of relevant COWAP indicators. This section presents conclusions that can be made from the baseline study and recommendations that will guide the project implementation.

4.1 Conclusions

4.1.1 Socio-demographic characteristics of project beneficiaries

The coconut vending business appears a male-dominated (97%) venture with an average age of 29 years. The majority of the coconut vendors fall between the ages of 19 years to 29 years with most of them have had a form of formal education. Specifically, most of the coconut vendors (51.1%) were recorded to have had education up to the Junior High School level with nearly 2% of them having tertiary education. The study also reveals that a significant majority (68%) of the coconut vendors are single whilst 29% of the respondents are currently married; 3% of them were found to be divorced. It can also be concluded from the study that the majority (85%) of the coconut vendors in the target area belong to the Akan ethnic group. Equally, about 90% of the vendors were also found to belong to the Christian religion. Regarding the household size of the coconut vendors, about 70% of coconut vendors have a relatively small household size of 1-3 household members. The majority of the coconut vendors were reported to be migrants from the Central Region of Ghana to the project target area to engage in the coconut vending business.

At the household level, the study concludes that most of the household respondents (58%) in the project area were females as compared to 42% who were males. The mean age of the household heads interviewed was found to be 34 years with a majority of them being married at the time of the study. The educational level of household heads interviewed appears to be similar to that of the coconut vendors. Thus, almost 92% of the household respondents were revealed to have had a formal education. The project area seems to be an Akan and Christian religion dominated area with a majority of the respondents being Akans (37.5%) and Christians (64.3%). The household size dynamics of the households were not different from that of the coconut vendors. The majority of the households have a household size of 1-3 members. Also, most of the household respondents (51.6%) are engaged in their own business while 20.9% are currently unemployed. In terms of dwelling distribution of the household respondents, nearly 59% of them live in rented apartments whiles 1.5% of them are just caretakers of the houses they occupy. Most of the households (30.4%) have also lived in the project area for 10 years and above. About 56% of the households live in compound houses with almost 6% of them living in Kiosks/containers. Households within the project area earn a mean income of GH₵1,407 (€199.57) per month.

4.1.2 Existing context of the coconut waste value chain

The main actors currently operating within the coconut waste value chain in the target area include coconut vendors, households, individual waste collectors, market actors, and the state. Although some of the coconut waste generated within the project area ends up at recycling companies, the study did not find any coconut waste recycling company operating within the project area. The generation of coconut waste is seen at two levels; thus, at the coconut vendor and household level. Individual waste collectors also referred to as "*aboboyaa*" are the main actors that collect and transport coconut waste to caterers, dump at undesignated dumping sites or coconut waste recycling companies. The recycling companies process coconut waste into value-added products such as cocopeat, paper bags, and charcoal. These value-added products are supplied to market actors in the hospitality, agroforestry/horticultural, and mining sectors. The state plays a regulating and coordinating role at various levels of solid waste (including coconut waste) management.

Almost 26% of the coconut vendors decided to engage in the business due to poverty whiles nearly 24% of them are in the business because of its high-profit returns. The majority of the vendors interviewed have been in the business for just 1-3 years. However, 17% of them have been in the business for over 9 years. About 73% of the coconut vendors have permanent locations as compared to 27% that do not have permanent locations. Major permanent coconut vending locations include Madina Polyclinic, LaNMMA Old Office, Madina Police Station, Redco, Ideal College, Madina Overhead and Libya quarters. Others include the Oyarifa bus stop enclave, Pantang Shalom Junction enclave and the Atomic Junction enclave. The majority of the coconut vendors (59%) do not have additional income generation activity making the coconut vending business their main source of livelihood.

Two main coconut varieties were found to be in existence in the project area. These varieties include the local variety (West African Tall) and Agric (Hybrid)/Exotic (Sri Lanka Dwarf, Equatorial Guinea Green Dwarf). About 82% of the coconut vendors mostly sell the local variety whiles 16% of them sell both the local and exotic variety. Most start-ups in Ghana face challenges with start-up capital which introduces various sources of start-up capital. Within the coconut vending business, 63% of the vendors used their savings as start-up capital. 44% of the coconut vendors procure their coconuts from farm gates whiles 31% procure their coconuts from distributing points/aggregating points/depots. In terms of those that procure from farm gates, almost 74% procure the coconuts from the Central Region, mostly from Agona Swedru.

An average volume of 64 tonnes of coconut is procured by the coconut vendors per day within the target areas. An average volume of 34 tonnes of coconuts is procured by coconut vendors in the La Nkwantanang-Madina Municipality alone. Conversely, an average volume of 44 tonnes of coconut is sold within the project target areas per day. In LaNMM alone, an average volume of 23 tonnes is sold per day by coconut vendors. The mean price of coconuts sold at the source is GH₵1.29 (€0.18) whiles the mean price of coconut sold to consumers in the project target areas is GH₵2.4 (€0.34). This

shows a percentage difference of 111% between the mean price at source and the mean price sold to consumers. On average, a coconut vendor generates total revenue of GH₵235.20 (€33.65) per day, GH₵7,056 (€1,009.50) per month, and GH₵84, 672 (€12,114.04) annually. These sales are mostly made during the dry season (December-March) even though coconuts are seen to be in abundance during the wet season (April-November). A higher proportion of 90% of the coconut vendors does not supply coconuts to specific groups/people/institutions as compared to the 10% that supply to specific events, restaurants, fruit juice factories, offices, athletes, schools, hotels, households, and mechanical shops. More than half (57%) of the coconut vendors do not pay any form of tax to authorities for selling their coconuts within the project target area. With those that pay a form of tax, the taxes include daily tolls, market tolls, bus terminal tolls, and land/space rents.

About 34 tonnes of coconut waste is generated within the target area per day. Approximately, 1,020 tonnes of coconut husks are generated within a month and 12,240 tonnes of coconut husks are generated annually. Nearly 18 tonnes of coconut waste is generated per day in LaNMM alone with a mean generation of 116Kg. Only 2% of coconut vendors within the target area have adequate knowledge of regulatory frameworks that guides their business. The majority (42.7%) give their coconut waste to individual waste collectors whiles 26.2% give it to caterers. About 4.6% of the coconut vendors dump the coconut waste at undesignated places. However, most of the coconut vendors have adequate knowledge of the impacts of indiscriminate disposal of coconut waste on the health of citizens and the environment.

Social protection and social inclusion is a development tool that can alleviate poverty. A higher proportion of 95% of the coconut vendors does not belong to any form of association as compared to 5% who belongs to a form of association. However, most of the coconut vendors associate themselves as members of depots. The depots are aggregating points/wholesaling points where coconut vendors purchase bulk coconuts instead of farm gates or at local markets. More than half (58%) of the coconut vendors own a form of financial account (including mobile money accounts) whiles nearly 42% of them do not own any form of financial account. Of the 58% that own a form of financial account, the majority of them access financial services from only MTN mobile money as compared to 4.6% that access financial service from traditional banks. Most of the coconut vendors access loans/credit facilities from the MTN Qwikloan compared to a few of them that have never access any form of loan/credit facility even though they own a form of financial account. About 67% of the coconut vendors are not signed on to any insurance policy whiles 33% are on a form of insurance policy notably the National Health Insurance Scheme (NHIS).

In the face of the COVID-19 pandemic, 97% of coconut vendors were found to be aware of the pandemic and its impacts on socio-economic livelihoods. However, 56% do not observe any of the COVID-19 protocols at their workplace as compared to 44% that observe at least one of the

protocols at their workplace. A high proportion of 64% of the vendors have their business being affected by the pandemic in ways of decreased sales, increase cost of operations and low patronage.

Nearly 79% of households within the project area give their solid waste (including coconut waste) to private waste collectors as a form of managing their solid waste. A higher proportion of 87.3% of the households pays fees to dispose of their solid waste with almost 59% of the households interviewed storing their household waste in rubbish bins/drums. Households who do not pay fees for waste disposal cited the following reasons that depict that their mode of waste disposal does not require any fees or pay as you dump charged. Only 11% of household heads interviewed consume their coconuts away from the point of sale and generates their coconut waste at their homes. Hence, an average of 3.42 kg (102.6kg per month, 1,231.2 kg (1.2312 tonnes) annually) of coconut waste is generated per day at the household level. This shows that majority of the coconut waste is generated at the coconut vendor level (mean of 112.52 kg per day) as compared to the household level (3.42 kg per day).

In disposing of their coconut waste, households mostly mix their coconut waste with other solid waste whiles others choose to use the waste as fuel or for medicinal purposes. Most households think that lack of law enforcement, inadequate designated place, and unavailability of collection containers leads people to dispose of coconut waste indiscriminately.

The individual coconut waste collection and transportation is also dominated by males who have been engaged in the business for about 2 to 5 years. On average, individual waste collectors charge between GH₵5 (€0.71) to GH₵50 (€715) per vendor to collect and dispose of their coconut waste. However, most of them charge GH₵12 (€1.70) per fertilizer bag full of coconut waste. Most individual waste collectors or aboboyaa learnt their trade through apprenticeship. At most times, they are required to learn how to operate and ride tricycles during the apprenticeship. They face challenges in terms of acquiring licenses to ride the tricycles within the project area.

The municipal assembly plays a regulatory and coordinating role in the management of solid waste (including coconut waste) in the municipality. Although a high volume of coconut waste is generated at the vendor level, the state seems not to play any significant role in coconut waste management at the coconut vendor level. The management of coconut waste is left solely to the coconut vendors to manage at their level. However, coconut vendors are expected to pay daily tolls, ensure a clean and sanitary environment at their vending sites and participate in routine health screening that is mandatory for all street vendors in the municipality. On the other hand, supervising individual waste collectors has become a challenge to the municipal assembly due to insufficient data on the individual waste collectors.

There is a market for coconut waste value-added products such as cocopeat, paper bags and activated charcoal. Shopping malls and restaurants mostly rely on paper bags to package their products. These

companies in the hospitality industry purchase paper bags from local manufacturing companies. Again, major agroforestry/horticultural companies also purchase cocopeat from local companies to plant trees, crops and other plants. However, activated carbon charcoal which is produced from coconut shells and widely used by the mining sector is currently being imported from countries such as South Africa, Sri Lanka, and Thailand.

About 4,400 pieces of paper bags are demanded by the hospitality sector every month with an average price of GH₵0.70 (€0.099) per unit. Again, the finest quality of cocopeat seems to have the highest economic value compared to cocopeat manufactured from coir. An average of 50kg of the finest quality of cocopeat is demanded by agroforestry/horticultural companies per month. The average price per unit for the finest quality of the cocopeat is GH₵120 (€16.93) per every 5kg sack bag. Activated carbon charcoal production, however, appears to have the highest economic value compared to cocopeat and paper bags.

4.1.3 Conclusion on required project indicators

Table 30: Conclusion on required project indicators

Level	Indicator	Definition	Baseline Data
Impact	Percentage of households with improved sanitation conditions due to the adoption of proper coconut waste management practices.	Proper coconut waste management practices include proper ways of disposing of coconut waste by giving them to aggregators who dump it at designated places or supply it to coconut waste processing factories.	The majority of the households do not separate coconut waste from other solid waste before they dispose of it off. 69.4% of households out of 411 households give their solid waste to private/individual waste collectors. None of the households gives their coconut waste to coconut waste processing factories.
Impact	Percentage of coconut vendors who have adopted proper coconut waste management practices	Proper coconut waste management practices include proper ways of disposing of coconut waste by giving them to aggregators who dump it at designated places or supply it to coconut waste processing factories.	42.7% of coconut vendors out of every 307 coconut vendors give their coconut waste to individual aggregators 7.6% of coconut vendors out of every 307 coconut vendors dump it at designated places None of them gives their coconut waste to processing factories.
Outcome	The volume of coconut husk waste aggregated in LaNMM per day	The volume of coconut husk measured in tonnes.	18 tonnes of coconut waste are generated and aggregated in LaNMM per day
Output	Number of tools developed or adapted to promote green circular economy	The tools include maps of coconut vendors, coconut waste disposal sites and factory manuals.	2 maps. 1 coconut vending site map 1 coconut waste disposal site map
Output	The number of beneficiaries with	It includes coconut vendors who have signed on to various social	178 coconut vendors (58%) out of every 307 coconut vendors own a form of financial account

	social protection services.	protection services. The social protection services include but are not limited to Health Insurance, Credit facilities and Pension Schemes.	101 coconut vendors (33%) out of every 307 coconut vendors have signed on to a form of insurance policy 25 coconut vendors (8%) out of 307 coconut vendors access a form of loan/credit facility

4.2 Recommendations

Based on the findings of the baseline study, it is imperative to take the following key strategies into critical consideration for the progress and success of implementing the Coconut Waste Project within the project target areas:

1. Sensitization on waste separation should be conducted for households and some sections of coconut vendors towards separating coconut waste from other solid wastes.
2. Households should be sensitized to proper coconut waste management practices which include giving their coconut waste to aggregators to be supplied to the project factory.
3. Considering the harsh nature and conditions of the coconut vending business, the project should sensitize and encourage coconut vendors to sign on to social protection services including insurance packages. This will be successful when the project collaborates with various social protection service institutions.
4. The project should collaborate with relevant financial institutions to build capacities of coconut vendors on owning financial accounts, savings and having access to loans/credit facilities. This will enhance financial inclusion among the coconut vendors.
5. The project should facilitate the establishment of a well-structured informal trade association for coconut vendors within the target area. This will enhance social inclusion and overall social well-being for the coconut vendors.
6. If possible, the project should adopt these associations as the project's learning groups to capitalize on its positive impacts on livelihood improvement, income intensification, and social learning.
7. The establishment of an aggregating system within the project area should consider licensing of tricycles, driving licensing for tricycle drivers, and capacity building on tricycle driving.
8. The establishment of an aggregating system should emphasize training and sensitization regarding key issues such as proper coconut waste handling, solid waste sorting, and integrated waste management practices.
9. To ensure that coconut waste can be aggregated from all parts of the target areas especially in areas farther from the proposed factory site, the project should consider procuring mini pickup vehicles. These vehicles can travel long distances as compared to tricycles and can transport huge volumes of coconut waste to the project factory.
10. The project should collaborate extensively with the municipal assembly in the establishment of the aggregating system and the recruitment of the youth as aggregators. This will also help

to ensure that all processes and regulatory frameworks are known and adhered to by aggregators that will be recruited as part of the project.

11. The project should encourage the participation and inclusion of females especially as coconut vendors, coconut waste aggregators, and factory workers.
12. The project should include COVID-19 sensitization programs in its implementation.

REFERENCES

Beura, S.S., Karna, A.K., Mishra, G., Nayak, P.K. and Sahoo, S.C. 2020. Performance of local germplasms of coconut (Cocos nuciferaL.) of Odisha. Green Farming Vol. 11 (4 & 5): 404-407; July-October, 2020

Bryman, A. (2006). Integrating quantitative and qualitative research: how is it done. *Qualitative research*, *6*(1), 97-113.

Buah, W. K., & Kuma, J. S. Y. (2012). Properties of activated carbon prepared from coconut shells in Ghana. *Ghana Mining Journal*, *13*, 51-55.

Clarence, O. A. (2016). PROJECT REPORT ON: ASSESSMENT OF QUANTITY OF COCONUT WASTE GENERATED AND MANAGEMENT IN THE KUMASI METROPOLIS, GHANA. *College of Engineering, Department of Agricultural Engineering* (Doctoral dissertation, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY).

Country Studies Report on Ghana (2012). Country Studies, *General Purpose.* Retrieved on 02/08/2021 from https://daraint.org/wp-content/uploads/2012/09/CVM2ndEd-CountryStudies.pdf

Creswell, J. W. (2010). Mapping the developing landscape of mixed methods research. *SAGE handbook of mixed methods in social & behavioural research*, *2*, 45-68.

Dadson, I. Y., Owusu, A. B., & Adams, O. (2016). Analysis of shoreline change along Cape Coast-Sekondi coast, Ghana. *Geography Journal*, *2016*.

Eyzaguirre P. B. (2016). Farmers' contribution to improving the value and uses of coconut through the maintenance and use of genetic diversity. Retrieved on 24/04/2021 from https://www.bioversityinternational.org/fileadmin/bioversity/publications/Web_version/198/ch03.htm#b1-Farmers'.

Ghana Chamber of Mines Report (2017). Local Content in Ghana's Mining Industry. Retrieved on 02/08/2021 from http://ghanachamberofmines.org/wp-content/uploads/2017/08/GCoM_LOCAL-CONTENT-IN-THE-MINING-INDUSTRY.pdf

Ghana Statistical Service (2012). 2010 Population and Housing Census; National Analytical Report. Retrieved on 14/04/2021 from https://statsghana.gov.gh/gssmain/fileUpload/pressrelease/2010_PHC_National_Analytical_Report.pdf

Ghana Statistical Service (2014). 2010 District Analytical Report; La Nkwantanang-Madina Municipality. Retrieved on 12/04/2021 from https://www2.statsghana.gov.gh/docfiles/2010_District_Report/Greater%20Accra/La%20Nkwantanang.pdf

Ghana Statistical Service (2020). Rebased 2013-2019 Annual Gross Domestic Product. *April 2020 Edition.* Retrieved on 02/08/2021 from https://statsghana.gov.gh/gssmain/storage/img/marqueeupdater/Annual_2013_2019_GDP.pdf

Ghana Statistical Service (2020). Social and Demography: *Population Projection*. Retrieved on 15/04/2021 from https://statsghana.gov.gh/nationalaccount_macros.php?Stats=MTA1NTY1NjgxLjUwNg==/webstats/s679n2sn87

Guilherme, S. (2016). Advancing financial inclusion through access to insurance: the role of postal networks. *Universal Postal Union and International Labour Organization*. Retrieved on 20/04/2021 from http://www.impactinsurance.org/sites/default/files/Paper_%20UPU_ILO_Financial_Inclusion_Postal_Networks.pdf

Jenkins, M. W., & Scott, B. (2007). Behavioral indicators of household decision-making and demand for sanitation and potential gains from social marketing in Ghana. *Social science & medicine*, *64*(12), 2427-2442.

Keesman, B. (2019). Market Survey Waste and Circular Economy in Ghana. *Commissioned by the Netherlands Enterprise Agency. Dutch Ministry of Foreign Affairs, The Hague*.

Kuddus, M. A., Tynan, E., & McBryde, E. (2020). Urbanization: a problem for the rich and the poor? *Public health reviews*, *41*(1), 1-4.

Kyere, R., Addaney, M., & Akudugu, J. A. (2019). Decentralization and solid waste management in urbanizing Ghana: moving beyond the status quo. In *Municipal Solid Waste Management*. IntechOpen.

La Nkwantanang-Madina Municipal Assembly Planning Coordinating Unit (2019). Profile of La Nkwantanang-Madina Municipal Assembly. *Unpublished report.*

La Nkwantanang-Madina Municipal Assembly Planning Coordinating Unit (2015). Profile of La Nkwantanang-Madina Municipal Assembly. *Unpublished report.*

Linn, J. F. (2010). Urban Poverty in Developing Countries: A scoping study for future research. *Wolfensohn Center for Development Working Paper*, (21).

Maheswarappa, H. P. (2018). Doubling farmers' income through palm-based cropping under different agro climatic regions of India.

Mensah, A., & Larbi, E. (2016). Solid waste disposal in Ghana. WELL Factsheet.

Miezah, K., Obiri-Danso, K., Kádár, Z., Fei-Baffoe, B., & Mensah, M. Y. (2015). Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana. *Waste management*, *46*, 15-27.

Ministry of Finance and Economic Planning (2016). The Composite Budget of the La Nkwantanang Madina Municipal Assembly for the 2016 Fiscal Year. Retrieved on 18/04/2021 from https://www.mofep.gov.gh/sites/default/files/composite-budget/2016/GR/La-Nkwantanang.pdf

Ministry of Finance and Economic Planning (2020). Composite Budget For 2020-2023 Programme Based Budget Estimates For 2020. *La Nkwantanang-Madina Municipal Assembly*. Retrieved on 02/08/2021 from https://www.mofep.gov.gh/sites/default/files/composite-budget/2020/GR/La-Nkwantanang-Madina.pdf

Murthy S. D. (2018). VMC generates coir from coconut shells. Retrieved on 21/04/2021 from https://www.newindianexpress.com/cities/vijayawada/2018/jun/28/vmc-generates-coir-from-coconut-shells-1834797.html

Obeng, G. Y., Amoah, D. Y., Opoku, R., Sekyere, C. K., Adjei, E. A., & Mensah, E. (2020). Coconut Wastes as Bioresource for Sustainable Energy: Quantifying Wastes, Calorific Values and Emissions in Ghana. *Energies*, *13*(9), 2178.

Oduro-Yeboah, C., Ackah, N. B., Akonor, P. T., Amponsah, S. K., & Mboom, F. P. (2020). Food safety knowledge and practices among fresh coconut vendors. *Scientific African*, *8*, e00392.

Olsen, C., & St George, D. M. M. (2004). Cross-sectional study design and data analysis. *College entrance examination board*, *26*(03), 2006.

Owusu, F. (2020). *Livelihoods. International Encyclopedia of Human Geography, 193–198.* doi:10.1016/b978-0-08-102295-5.

Panori, A., Mora, L., & Reid, A. (2019). Five decades of research on urban poverty: Main research communities, core knowledge producers, and emerging thematic areas. *Journal of Cleaner Production*, *237*, 117850.

Premarathne, W. (2015). SNORAN SAMPLING (HYBRID SAMPLING) METHOD. Retrieve on 17/04/2021 from https://www.researchgate.net/publication/315047536_SNORAN_SAMPLING_HYBRID_SAMPLING_METHOD

Sri Lanka Coconut Development Authority (2018). 2018 Annual Report. Retrieved on 20/04/2021 from https://www.parliament.lk/uploads/documents/paperspresented/annual-report-coconut-development-authority-2018.pdf

Sri Lanka Export Development Board (2019). 2019 Annual Report. Retrieved on 20/04/2021 from https://www.parliament.lk/uploads/documents/paperspresented/annual-report-srilanka-export-development-board-2019.pdf

Yeboah, S. E. (2009). Ghana Coconut Industry. Appraisal report. *Abankwah V, Aidoo R, Tweneboah-Koduah B (2010) Margins and economic viability of fresh coconut marketing in the Kumasi metropolis of Ghana. J Dev Agric Econ2 (12)*, 432-440

ANNEXES

Annex A: Household Survey Questionnaire

CERATH DEVELOPMENT ORGANIZATION

THE COCONUT WASTE PROJECT

CERATH Development Organization (CDO), The Tree Crops Center (TCC), and the La Nkwantanang Madina Municipal Assembly (LaNMMA) are implementing "The Coconut Waste Project (COWAP)" funded by the European Union (EU). The project seeks to achieve a green-circular economy and create livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang-Madina Municipality.

As part of implementing the COWAP, the project seeks to undertake a baseline survey. Your assistance will be needed in providing the project team with the needed information. The information provided for this survey is solely to assist in gathering baseline data for the implementation of COWAP and your confidentiality is extremely assured. The survey is anonymous and so it is optional for you to provide your name.

INFORMED CONSENT

Do you agree to participate in the survey Yes [ ] No [ ] (*If yes, continue with the survey. If not, end the survey*).

Section A: Demographic Characteristics

A1. Name of respondent (optional)……

A2. Study area (location of doing the study) ……..

A3. Age of respondent……

A4. Gender: Male [1] Female [2]

A5. Marital Status: Married [1] Divorced [2] Single [3] Widowed [4]

A6. Highest academic qualification of respondent: Primary [1] Middle/JSS (JHS) [2] SSS/SHS [3] Technical/Vocational [4] Tertiary [5] No academic qualification [6]: _____

A7. Respondent's sector of profession: Public Sector [1] Private Sector [2] Own Business [3] Currently Unemployed [4] Other (*Specify*) [5]: _____

A8. Ethnicity of respondent……. A9. Religion: Christian [1] Moslem [2] Traditional [3] Other (*Specify*): _____

Section B: Household Characteristics

B1. Size of household: 1-3 [1] 4-6 [2] above 6 [3]

B2. Type of dwelling household occupy: Compound [1] Detached [2] Semi-detached [3] Multi-storey [4] Chamber and hall [5] Flats [6] Single room apartment [7] kiosks/containers [8]

B3. What is the present tenancy/holding agreement of the household dwelling? Owner-occupied [1] Renting [2] Family occupied [3] Care-taker [4]

B4. How many years has your household been living in this house/community? Under 1 year [1] 1-3 years [2] 4-6 years [3] 7-9 years [4] 10 years and above [5]

B5. Can you please specify your household's average monthly income? (*Includes income from all members of the household*) …….

Section C: Solid Waste Management Practices among households

C1. Are you aware of the waste management systems within LaNMMA? Yes [1] No [2]

C2. Where do you mostly dispose of your generated waste? Nearby container [1] Open Spaces [2] Gutters [3] Give to private/individual waste pickers [4] Dump it at designated dumping sites [5] Public waste container [6]

C3. What do you store your household rubbish in? Plastic bags [1] Cardboard boxes [2] Rubbish bin/drum [3] No storage [4] others [5] …….

C4. Do you pay any fees for disposing of your waste? Yes [1] No [2]

C5. If yes in C4, how much do you pay as fees for disposing of your waste? ……

C6. If yes in C4, do you think the fees are affordable to your household? Yes [1] No [2]

C7. Which collection service do you use? Public [1] Private [2] None of these [3]

C8. If public, how many times within the week do the public institution picks the waste generated?

C9. If private, how many times within the week do the private institution picks the waste generated?

C10. If private, kindly indicate name of private waste collectors that take your waste (if any) ……

…….

C11. Do you mostly consume coconut? Yes [1] No [2] (If No, skip to C15)

C12. If yes, where do you mostly dispose-off the waste? At point of sale [1] away from point of sale [2] (skip to question to C15, if answer is 1)

C13. On the average, how many coconuts do you take away from the point of sale in a month? (*use it to estimate the volume of the waste the person generates away from the point of sale*) …….

C14. What happens to the coconut waste you generate when you take the coconut away from the point of sale? (tick as many) 1. Give it to the coconut vendors [1] 2. Use it as a fuel [2] dump it myself at designated places [3] dump it myself at undesignated places (bushes, gutters, road side, behind UPSA/UG, etc) [4] Mix them with other solid waste and dump it [5] Give it to factories that recycle coconut waste [6] others, please specify [7] ……

C15. Do you see other people/households dumping coconut waste at undesignated places (bushes, gutters, road side, behind UPSA/UG/atomic junction stretch, etc) (? Yes [1] No [2]

C16. If yes, why do you think people behave this way? (multiple choice) Inadequate designated dumping sites [1] unavailability of collection containers [2] ignorance of the harmful implications of indiscriminate disposal of coconut waste [3] lack of law enforcement [4] Cost of disposing of coconut waste [5] Others please specify …… [6]

C17. In your opinion, what are the effects of indiscriminate disposal of coconut waste? (multiple choice) Flooding [1] Drainage Obstruction [2] widespread infectious diseases [3] Cholera [4] Diarrhea [5] Typhoid fever [6] waterway blockage which leads to the infestation of flies, ticks and breeding of mosquitoes that cause malaria [7] Water and air pollution [8] Others please specify….[9]

C18. What, in your opinion is/are the best measure (s) in managing coconut waste? (*multiple choice*)

Incineration [1] Reduce the consumption pattern [2] Recycling into value-added products [3] Sanitary landfill [4]

C19. Do you think coconut waste can be recycled into value-added products? Yes [1] No [2]

C20. If yes, what value-added products do you think or know that coconut waste can be recycled into? Paper bag [1] Cocopeat [2] Charcoal briquettes [3] Coconut Shell activated charcoal [4] Coir doormats, brushes and mattresses [5] No idea [6] Others, [7]

C21. Are you currently satisfied with the current management of coconut waste within the LaNMM? Yes [1] No [2]

C22. If satisfied why?.....

C.23. And if not why?.....

C24. How willing are you to give your coconut waste to factories for recycling into value-added products? Not willing [1] undecided [2] willing [3] Very willing [4]

C23. What degree of importance do you place on leaving a healthy environment for future generations? Not at all important [1] Slightly important [2] Important [3] Very Important [4]

Annex B: Coconut Vendor Survey Questionnaire

CERATH DEVELOPMENT ORGANIZATION

THE COCONUT WASTE PROJECT

CERATH Development Organization (CDO), The Tree Crops Center (TCC), and the La Nkwantanang-Madina Municipal Assembly (LaNMMA) are implementing The Coconut Waste Project (COWAP) funded by the European Union (EU). The project seeks to achieve a green-circular economy and create livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang- Madina Municipality.

As part of implementing the COWAP, the project seeks to undertake a baseline survey. Your assistance will be needed in providing the project team with the needed information. The information provided for this survey is solely to assist in gathering baseline data for the implementation of COWAP and your confidentiality is extremely assured. The survey is anonymous and so it is optional for you to provide your name.

INFORMED CONSENT

Do you agree to participate in the survey Yes [ ] No [ ] (*If yes, continue with the survey. If not, end the survey*).

Section A: Demographic Characteristics

A1. Name of Coconut Vendor ……...

A2. Gender: Male [1] Female [2] A3. Age…….

A4. Location (zone) of vendor…… A4.1 Location (take coordinates) of vendor……

A5. Highest academic qualification of vendor: Primary [1] Middle/JSS (JHS) [2] SSS/SHS [3] Technical/Vocational [4] Tertiary [5] No academic qualification [6]: _____

A6. Marital Status of vendor: Married [1] Divorced [2] Single [3] Widowed [4]

A7. Size of household: 1-3 [1] 4-6 [2] above 6 [3]

A8. Hometown of vendor: ……. A9. Ethnicity of vendor: ……

A10. Religious affiliation of vendor: Christianity [1] Moslem [2] Traditional [3] Others, please specify [4] ……

A11. Phone number…….

A12. Where do you live?.....

Section B: Nature of the Coconut Vending Business

B1. How many years have you been in the coconut vending business? Under a year [1] 1 to 3 years [2] 4 to 6 years [3] 7-9 years [4] Above 9 years [5]

B2. What is your motivation for becoming a coconut vendor? Please specify…….

B3. Who introduced you to the coconut waste vendor business? Family relative [1] Friend [2] Apprenticeship [3] Started on my own [4]

B4. Do you have other staff working with you? Yes [1] No [2]

B5. If yes in B4, how many staff members do you have or work with? 1-3 [1] 4 to 6 [2] above 6 [3]

B6. Is this your permanent location? Yes [1] No [2]

B7. If No in B6, where is your permanent location? please specify…….

B8. If yes in B6, do you sometimes move around as itinerant coconut vendor with the use of pushcarts or head pans? Yes [1] No [2]

B9. Do you have any additional income generating activity apart from the coconut vendor business? Yes [1] No [2].

B10. If Yes in B9, please specify the additional income generating activity ……

B11. What are some of the varieties of coconuts you mostly sell? Local (West African Tall) [1] Exotic (Sri Lanka Dwarf, Equatorial Guinea Green Dwarf etc) [2] Agric (Hybrid) [3] Both Local and Exotic [4] Others, Please specify [5]……..

B12. What informs your decision to mostly sell a particular variety of coconut? Please specify……

B13. What is your general perception about women and/or Persons with Disability (PWDs) that engage in the coconut vending business?.....

……

Section C: Market Analysis of the Coconut Vending Business

C1. How did you finance your coconut vending business? Personal savings [1] Family and friends' contribution [2] Loans [3] Credit-based [4] Others, please specify [5] ……

C2. Where do you procure your fresh coconuts? Local markets [1] Farm gates [2] Distributors/aggregators/depots [3] Others, please specify [4] ……. (*Multiple selection*)

C3. On the average, how many coconuts do you procure per day? ……..

C4. What is the average volume of nut you procure per day?..... (use the figure in C3 to calculate the volume of husk generated- multiply the figure in C3 by 1.5 kg (average weight of coconut to get the weight.)

C5. What is the average number of coconuts are you able to sell within a day? ……

C6. What is the average price of a coconut at source currently?..... (GHs)

C7. What is the average price you sell coconut to consumers?..... (GHs)

C8. What factor(s) influence the average price of coconuts you sell to consumers? (*write as many as you can*)
.....
.....
.....

C9. Do you pay any tax (es) for operating the coconut vendor business? Yes [1] No [2]

C10. If yes in C9, kindly indicate the name of the tax that you pay?.....

C11. If Yes in C9. How much do you pay as tax?.....

C12. Which of the two genders mostly buy from you? Males [1] Females [2] No idea [3]

C13. Why do you think this group of gender mostly buy from you?.....

C14. How do you ensure demand generation (marketing) for your coconut business? (any marketing strategies?) ……..

C15. Do you supply coconut to certain specific group/institution/market/people? Yes [1] No [2]

C16. If yes in C15, Name the specific group/people/institution/market you supply coconut to?.....

C17. At what seasons do you have the most sales?

C17. At what seasons do you have your worst sales?

Section D. Waste generation and management

D1. What is the average volume of coconut husk you generate per day? ……... (use the figure in C3 to calculate the volume of husk generated- multiply the figure in C3 by 1.14Kg to get the weight.)

D2. How do you dispose-off your coconut waste? A. dump it myself at undesignated places [1] B. Burn [2] C. Heaping D. Give to individual waste collectors E. Give away to caterers [3]

F. Dump it myself at designated places G. Give it away to coconut waste processing factory H. Others, please specify [4], ……

D3. If you dump your coconut waste yourself, where do you dispose of it. A. Dumping sites behind UPSA [2] B. Dumping sites behind UG [3] C. Others [4], Name undesignated dumping site……

D4. Do you pay any fees for disposing-off the coconut waste? Yes [1] No [2]

D5. If yes, how much does it cost you to dispose-off the coconut waste daily?..... (GHS)

D6. Do you think that indiscriminately disposing-off coconut waste poses a threat to the environment and the health of the citizens within LaNMMA? Yes [1] No [2]

D7. If yes, in what way do you think it harms the environment and the health of the citizens with LaNMMA?.....

D8. Do you know of any policies or laws that regulate the coconut vending business? Yes [1] No [2]

D9. If yes in D8, please name the policy/policies or laws…….

D10. Are you aware of other uses of coconut waste? Yes [1] No [2]

D11. If yes in D10, what do you think coconut waste can be used for or processed into? ……..

Section E. Social Protection and Social Inclusion

E1. Do you belong to any coconut vendor association/group? Yes [1] No [2]…(*If yes, continue from E2. If No, move to E9)*

E2. If yes, please specify the name of the association/group…….

E3. Are there any criteria for joining the association/group? Yes [1] No [2] ……

E4. If yes in E3, what is the criteria for joining the association/group?.....
.....
.....

E5. Do you pay any dues to the association? Yes [1] No [2]

E6. If yes in E5, how much do you pay per month……...GHS

E7. Have you enjoyed/been enjoying any benefits since joining the association/group? Yes [1] No [2]

E8. If yes in E7, what are some of the benefits you have enjoyed/been enjoying since joining the group/association?.....

…….

E9. If No in E1, why do you not belong to any group/association? ……..

E10. Do you have a financial account/account (s) with any formal financial/telecom institution? (*include mobile money accounts*) Yes [1] No [2]

E11. If yes in E10, indicate the name of bank/Telcom……..

E12. If No in E10, specify the reason for not having a formal financial account?.....

E13. Have you ever gone to a financial institution to apply for a loan or credit facility? Yes [1] No [2]

E14. If yes in E13, were you able to access the loan or credit facility? Yes [1] No [2]

E15. If Yes in E14, what type of loan or credit facility did you access?.....

E16. If No in E14, what do you think led to your failure in accessing the loan or credit facility?.....

E17. Are you on any health or life insurance policy (*including NHIS and other private health insurance packages- mobile insurance inclusive*)? Yes [1] No [2]

E18. If yes in E17, indicate the type of health or life insurance policy package you have subscribed? (*Name as many as possible)*
…….

…….

E19. If yes in E17, what motivated you to sign on to the health or life insurance package?.....

E20. Why do you think coconut vendors must sign up on health or life insurance policies? ……

E21. If No in E17, kindly indicate the reason for not being on any health or life insurance policy……
……

E22. What are some of the challenges you encounter as a coconut vendor with LaNMMA?.....
.....

E23. How best do you think these challenges can be resolved?.....
.....

Section F: Covid-19 and the Coconut Vending Business

F1: Have you heard of the COVID-19 Pandemic? Yes [1] No [2]

F2: If yes in F1, what have you heard about the COVID-19 Pandemic? Please specify
……

……..

F3. Has the corona virus affected your coconut vending business? Yes [1] No [2]

F4. If yes in F3, how has the corona virus affected your coconut vending business? Please list as many as you
can……
……..

F5. If yes in F1, Kindly list some of the COVID-19 protocols you are aware of?

(*Enumerator, kindly indicate their level of awareness of the protocols)*

Protocol	Not aware at all (1)	Somewhat aware (2)	Aware (3)	Very aware (4)
Wearing of nose masks				
Washing of hands with soap and water for at least 20 seconds				
Avoid touching eyes, nose and mouth				
Social/Physical Distancing				
Avoid handshaking				
Avoid close contact with people who are sick				
Cover your cough or sneeze with a tissue, dispose the tissue in a closed bin, and then wash your hands				
Clean and disinfect frequently touched objects or surfaces such as remote controls and doorknobs.				
Call the designated health line(s) in your district for necessary assistance or support if you develop fever, cough, or difficulty breathing.				

F6. If yes in F1, what are some of the COVID-19 protocols you ensure/are ensuring at your workplace? (*List as many as you can) (enumerator kindly observe and take pictures if possible)*

……

……

……

Annex C: Discussion Guide for FGD with Coconut Vendor Groups

CERATH DEVELOPMENT ORGANIZATION

THE COCONUT WASTE PROJECT

CERATH Development Organization (CDO), The Tree Crops Center (TCC), and the La Nkwantanang Madina Municipal Assembly (LaNMMA) are implementing The Coconut Waste Project (COWAP) funded by the European Union (EU). The project seeks to achieve a green-circular economy and create livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang-Madina Municipality.

As part of implementing the COWAP, the project seeks to undertake a baseline survey. Your assistance will be needed in providing the project team with the needed information. The information provided for this survey is solely to assist in gathering baseline data for the implementation of COWAP and your confidentiality is extremely assured. The survey is anonymous and so it is optional for you to provide your name.

Section 1: DEMOGRPHIC DETAILS QUESTIONNAIRE

Please answer the following questions in the spaces provided, circle or tick the most appropriate options.

1. Age……..
2. Gender: Male [1] Female [2]
3. How many years have you been in the coconut vending business? Less than 1 year [1] 1-5 years [2] 6-10 years [3] above 10 years [4]
4. Location (zone) of vendor……
5. Where you live/ How many years have you been living here?
6. Phone number…….

Thank you for taking the time to complete this questionnaire

Section 2: DISCUSSION SESSION

Guiding questions

A. The nature of the coconut vending groups/Associations

A1. What is the overall nature of the "depot system of association? (probe: history, leadership, dues, welfare, joining, information sharing, payment of coconut procured etc)

A2. What benefits do you enjoy from the "depot system of association" as coconut vendors?

A3. What are some of the challenges you are currently facing with the existing "depot system of association"?

A4. Do you know of any "informal trade association" in Ghana? Let's name some

A5. Do you think it is necessary to organize coconut vendors into a formalised trade association?

A6. If No, why do you think it is not necessary?

A7. If yes, why do you think it is necessary for coconut vendors to have a formalised trade association?

A8. What are currently hindering coconut vendors ability to have a formalised trade association?

A9. What are some of the supports you will require to establish a formalised trade association?

A10. Are you ready to commit fully to forming a trade association? (vote on the Yes and Nos)

A11. How best do you think Cococnut Vendors can be mobilized into a formalised trading association?

B. Coconut vendors knowledge and perception on coconut waste management?

B1. Do you think coconut waste in LaNMM is managed well?

B2. If yes, why do you think it is managed well?

B3. If no, why do you think coconut waste is not managed well?

B4. What in your knowledge are the effects of improper management of coconut waste?

B5. How do you manage the waste after selling the nut to consumers? (probe- where they dispose of the waste)

B6. Do you think the way you manage your coconut waste is the proper way of managing it?

B7. If No, what do you think can be done differently to improve the management of coconut waste within the municipality?

B8. Do you think coconut waste can be recycled into value-added products?

B9. Mention some of the value-added products you think coconut waste can be recycled into?

B10. Do you see the creation of a healthy environment as important?

B11. In your opinion, how can this project create job opportunities for unemployed youths within the municipality?

B12. Are you willing to give your coconut waste to a factory within LaNMM to recycle it into Value-added products?

B13. If yes, why? If No, why?

B14. What will hinder/influence you from giving your coconut waste to a factory to process into value-added products?

B15. Do you have any motivation to sell your coconut waste to a factory to process into value-added products?

B16. What approach do you think is the best in aggregating the coconut waste from coconut vendors to the factory?

B17. Has there been any past initiative/project that engaged coconut vendors? Yes/No (If yes, probe-discuss initiatives and the role of vendors within that initiative)

B18. Was that initiative/project successful? What role did you play to make the initiative successful?

B19. What are some of the challenges you encounter as coconut vendors?

B20. What do you think can be done to improve the coconut vending business in the LaNMM?

Annex D: Interview Guide for individual waste collectors

CERATH DEVELOPMENT ORGANIZATION

THE COCONUT WASTE PROJECT

CERATH Development Organization (CDO), The Tree Crops Center (TCC), and the La Nkwantanang Madina Municipal Assembly (LaNMMA) are implementing The Coconut Waste Project (COWAP) funded by the European Union (EU). The project seeks to achieve a green-circular economy and create livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang- Madina Municipality.

As part of implementing the COWAP, the project seeks to undertake a baseline survey. Your assistance will be needed in providing the project team with the needed information. The information provided for this survey is solely to assist in gathering baseline data for the implementation of COWAP and your confidentiality is extremely assured. The survey is anonymous and so it is optional for you to provide your name.

INFORMED CONSENT

Do you agree to participate in the survey Yes [ ] No [ ] (*If yes, continue with the survey. If not, end the survey*)

---

1. What is your name?.....
2. Gender (*don't ask, just observe*)
3. Age of respondent?
4. Where are you located within the municipality? Where do you stay and where do you mostly collect the waste?
5. How many years have you been engaged in the waste collection business?
6. What motivated you to become an individual waste collector?

7. How did you finance your individual waste collection business? Buying the tricycle etc…
8. Do you collect coconut waste?
9. On the average, what percentage of your waste is from coconut?
10. How much do you charge per coconut vendor/household to dispose of their solid waste?
11. What factors in your opinion determine the fees charged per vendor to dispose of their coconut waste?
12. On the average, how many vendors are you able to pick their waste per day?
13. How do you dispose of the waste that you collect from the coconut vendors/households?
14. If you dump these coconut waste, where do you dump the coconut waste that you collect from the vendors?
15. Why do you dump the coconut waste at the site you mentioned in number 12?
16. Do you pay a fee for disposing of the coconut waste?
17. If yes, how much do you pay for disposing of the solid waste (including coconut waste)?
18. If no, why don't you pay a fee for disposing of the coconut waste?
19. Are you aware of other uses of coconut waste?
20. If yes, what do you think the coconut waste can be processed/recycled into?
21. Do you know of any policies/laws regulating your business?
22. Where did you acquire your skills from? Apprenticeship or formal technical education?
23. Do you require any skills or training to improve on your waste collection business? Yes [1] or No [2]
24. If yes in 21, what specific training do you require? Kindly state…….
25. What are some of the challenges you encounter as an individual waste collector?
26. What do you think can be done to tackle these challenges mentioned above?

Annex E: Interview Guide for LaNMMA

CERATH DEVELOPMENT ORGANIZATION

THE COCONUT WASTE PROJECT

CERATH Development Organization (CDO), The Tree Crops Center (TCC), and the La Nkwantanang Madina Municipal Assembly (LaNMMA) are implementing The Coconut Waste Project (COWAP) funded by the European Union (EU). The project seeks to achieve a green-circular economy and create livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang-Madina Municipality.

As part of implementing the COWAP, the project seeks to undertake a baseline survey. Your assistance will be needed in providing the project team with the needed information. The information provided for this survey is solely to assist in gathering baseline data for the implementation of COWAP and your confidentiality is extremely assured. The survey is anonymous and so it is optional for you to provide your name.

INFORMED CONSENT

Do you agree to participate in the survey Yes [ ] No [ ] (*If yes, continue with the survey. If not, end the survey*)

---

1. Name of respondent
2. Department of respondent
3. Position of respondent
4. What is the main role(s) of the environmental health & sanitation department (EH&SD) in ensuring solid waste management in the municipality?
5. Does the department or assembly have a management system for essential waste generated within the municipality? (essential waste may include plastics, coconut husk, metals etc)
6. What is the role of this department in coconut waste management in the municipality?
7. What is the current nature of the coconut waste value chain in the municipality?
8. How much in volume of solid waste is generated within the assembly and what quantity (in volume or percentage to total solid waste generated) of coconut waste is generated within the municipality?
9. Are there any structures in place to manage essential waste including coconut waste in the municipality?
10. What challenges does the department encounter in managing coconut waste and other essential waste in the municipality?
11. What are some of the measures taken or to be taken at a later time to improve the coconut waste situation in the municipality?
12. What are some of the policies or laws in place to regulate the coconut business in the municipality?
13. Can you estimate the number of coconut vendors that operates in the Municipality?
14. Does LaNMMA have any form of support for the coconut vendors in the municipality?
15. If yes, what specific support has/is available to coconut vendors in the municipality?
16. Does the department or assembly regulate activities of individual waste collectors working within the municipality? (If yes, brief us on the activities including dumping sites of the collectors)
17. What are some of the challenges the department encounter in dealing with individual waste collectors?

18. Are there any specific projects initiated by the department/assembly or in partnership with other organizations to improve the general sanitation in the municipality? (Brief on project)
19. What challenges did you encounter as an assembly in executing such sanitation-related projects?
20. What measures were put in place to address these challenges in Q19.?
21. What systems/procedures set up in the assembly needs to be considered in setting-up a factory (in value addition) in LaNMMA?

Annex E: Interview Guide – Market Actors

CERATH DEVELOPMENT ORGANIZATION

THE COCONUT WASTE PROJECT

CERATH Development Organization (CDO), The Tree Crops Center (TCC), and the La Nkwantanang Madina Municipal Assembly (LaNMMA) are implementing "The Coconut Waste Project (COWAP)" funded by the European Union (EU). The project seeks to achieve a green-circular economy and create livelihood opportunities through value addition to coconut husks waste in the La Nkwantanang-Madina Municipality.

As part of implementing the COWAP, the project seeks to undertake a baseline survey. Your assistance will be needed in providing the project team with the needed information. The information provided for this survey is solely to assist in gathering baseline data for the implementation of COWAP and your confidentiality is extremely assured. The survey is anonymous and so it is optional for you to provide your name.

INFORMED CONSENT

Do you agree to participate in the survey Yes [ ] No [ ] (*If yes, continue with the survey. If not, end the survey*).

Section A: Background of the Organization

A1: Can you give me the name of your organization?

A2. Is your company registered with the Registral General Department of Ghana?

A3. Does your company belong to any association? If yes, Name it/them?

A4. What is the number of people employed in the company?

A5. What does your company mostly deal in?

A6. How best will you describe the nature of your company? A. Hospitality B. Pharmaceutical company C. Mining Industry D. Plantation/Agro-forestry industry E. Horticultural F. Others, please specify.

Section B: Market Actors & the economic feasibility of coconut value added Products

B1. What coconut waste value-added product (s) do you use in your company?

B2. What do you use the coconut waste value-added products mentioned in QB1 for?

B3. Are there any coconut waste value-added products that you think will be suitable to be used in your organization? (Mention them)

B4. Do you import the coconut waste-added products or you procure it locally? (If locally, mention the name of the company and its location)

B5. If you import the coconut waste-added products. Which country (ies) do you procure it from?

B6. What informs your decision on where you procure the value-added product from?

B7. What is the average quantity (volume) of the value-added products do you procure? *(indicate volume and timeframe of procurement)*

B8. What informs the average quantity and timeframe of the procurement?

B9. What is the average price per unit of the coconut value-added product you procure? *(probe to know how much they buy a unit of the value-added product)*

B10. In your opinion, what are some of the factors that informs the pricing of the value-added products?

B11. Are there any substitute (s) for the value-added product you procure?

B12. What will inform the organization's decision to go in for the substitutes instead of the mentioned coconut-waste value-added product?

B13. Are there any differences between the two? *(Probe-Does one has an advantage over the other?)*

B14. How willing are you to procure coconut value-added products from other local processing factories?

B15. What will inform your decision to buy from other local processing factories?

B16. What are some of the challenges you encounter in procuring the coconut value-added product?

B17. What measures do you recommend to address these challenges?

B18. What informed the organization's decision to start using coconut waste-value added products?

B19. Do you think the use of coconut-waste value added products in your organization contributes to creating a healthy environment?

B20. If yes, kindly indicate why you think so? If No, indicate why?

Annex F: Selected Field-work Photos


ENVIRONMENTAL PROTECTION
ORGANIZATION
GREENWAY