Understanding the Impacts of the Work Environment on Waste Management Safety in Ghana

January 2023

Mensah-Akoto JULIUS

Understanding the Impacts of the Work Environment on Waste Management Safety in Ghana

A Dissertation Submitted to
the Graduate School of Science and Technology,
University of Tsukuba
in Partial Fulfillment of Requirements
for the Degree of Doctor of Philosophy in Environmental Studies

Degree Program in Environmental Studies
Degree Programs in Life and Earth Sciences

Mensah-Akoto JULIUS

Abstract

As the world's population and urbanization increases, waste management has become one of the major challenges humanity faces. In particular, developing nations are seriously grappling with this challenge and struggling for finding ways to protect and improve the working conditions of waste management workers. The volume of the municipal solid waste generated in world's urban areas is about 3.5 million tons per day. It is projected that there will be a possible rise to about 6.1 million tons per day by 2025.

In Ghana, with a current population of 30 million people, about the half live in urban areas such as Accra and Kumasi. Ghana's capital, Accra, alone is projected to generate 4,419 tons of solid waste per day by 2030. Of this, only 3,535 tons can be collected with the current capacity of waste collectors. We still do not know why it has been so difficult for the Ghanaian government to enhance waste collection. Past studies showed that an organization can improve its profitability by increasing the physical dimensions of the work environment. In so doing, a proper treatment of employees can increase job efficiency. Also, the work conditions of every organization affect the organization's output. This suggests that the attitude of employees can enhance or reduce its performance levels.

Taking these into consideration, this thesis attempts to understand what safety issues and current working conditions waste collectors face and what can be done to improve in the future. It focuses on the perceptions of municipal and metropolitan waste management field workers in Accra, Kumasi, and Sunyani of Ghana. To achieve this main objective, the following specific objectives are examined: (1) to investigate existing programs and policies for waste collection in Ghana; (2) to examine the work conditions among waste management workers in Ghana, and (3) to assess the impact of COVID-19 on the activities of waste management workers.

To answer my specific objectives, the second chapter of this thesis investigates existing programs and policies for waste collection in Ghana based on a systematic review of existing government documents and academic research papers. As a result, it was found that (1) existing government policy documents mainly focus on protecting the environment but are silent about implementation guidelines; and (2) policies did not consider the poor conditions of service and low remuneration for waste collectors but only emphasized professionals in the sector.

The third chapter examines work conditions among waste management workers in Ghana. A field survey was conducted in September 2020 by randomly sampling 150 Zoomlion

waste management workers. Out of the 150 respondents, 60 were in Accra, 50 in Kumasi and 40 in Sunyani. Questions attempted to find their social security benefit, health insurance package, child support, the extent of working hours challenges, the extent of workload challenges and monthly salary satisfaction. I found that 87% of the respondents in Accra belonged to the age groups between 20-49 years old. Regarding education, 44% had completed tertiary education. Regarding social security benefits, about 72%, 64%, and 55% of the respondents in Accra, Kumasi, and Sunyani, respectively, were the recipients. Working hours were found to be too heavy for the respondents in Accra and Kumasi.

With the third objective that assesses the impact of COVID-19 on the activities of waste management workers, I examined conditions in Accra. I also attempted to find out about respondents' safety concerns over the COVID-19 pandemic. A questionnaire survey was conducted among 60 respondents who worked for the Zoomlion company. The results showed that 58% of the respondents were worried about the COVID-19 pandemic while 20% was not even sure of the existence of the COVID-19 pandemic. In managing pandemic risks, about 40% of the respondents had access to face masks/shields and about the same percentage used them at work. A similar result was observed in terms of accessibility of hand sanitizers and the use among 30% of the respondents.

Key Words: Work environment; Workers' safety; Work conditions; COVID-19; Ghana

Table of Contents

Acknowledgement

I would like to express my utmost gratitude to my chief supervisor, Professor Kenichi Matsui, for his assistance and advice during my doctoral program. His teachings and principles are something that I will always remember and live with throughout my life. Without his help, this dissertation would not have been possible. I would also like to express my gratitude to my sub-supervisors, Professors Helmut Yabar, Myra Villareal, Tomoyuki Yokoi and Zhongfeng Lei and Professor Uchida for their valuable comments and remarks that helped in shaping this dissertation.

I would like to thank my colleagues at the Governance and engagement Working Group in Matsui's laboratory for their contributions, constructive criticisms and support during working group discussions and seminar hours. I will forever remain grateful. I further extend my gratitude to the Mitsubishi Corporation Scholarship Foundation for supporting me financially. I was able to complete my doctoral studies on time because of the scholarship award.

I would like to extend my gratitude to the District and Municipal officers of Zoomlion Ghana limited in Accra, Sunyani and Kumasi for accepting to respond to my questionnaires. I also Thank my father Manu Yaw Augustine and my mother Bossman Christiana for being there for me financially and emotionally throughout my study.

List of Tables

List of Figures

Chapter 1 Introduction

1.1 Significance of the Study

Waste management has become one of the major challenges humanity face as a result of population increase, urbanization and income growth (Debra et al., 2021). The volume of the municipal solid waste generated in world's urban areas is about 3.5 million tons per day. It is projected that there will be a possible rise to about 6.1 million tons per day by 2025 (World Bank, 2019). Therefore, managing a huge volume of waste especially within the rapid growing areas of developing countries will become very challenging (Samsudin et al., 2013).

Ghana has a population of about 30 million people which produces about 3 million tons of solid waste per year with per capita generation of 0.45 kg per day (Abubakar et al., 2020). According to Miezah et al., (2015), Ghana's capital, Accra, alone tends to generate 2,654 metric tons of solid waste per year with a generation per capita of 0.75kg per person per day. Of this, only 80% is collected per day where the remaining 20% is left uncollected due to the inadequate capacity of the waste collectors to efficiently collect the waste. Also, in a by the waste management of the Kumasi metropolitan assembly (2012) suggests that between 1995 and 2011, the city of Kumasi being the busiest city in Ghana recorded an increase of solid waste generation from 600 tons per day to 1,500 tons per day (Table 1.1).

Ghana's national policy implementation for waste management falls under the responsibility of the Ministry of Sanitation, but responsibilities are delegated to metropolitan, municipal and district assemblies. However, due to the poor collection rates under district and municipal assemblies, waste collection operations were outsourced to private companies to help ensure proper waste management services and managerial competence (Kyere et al., 2019).

One of these and most prominent one is Zoomlion Ghana, which received government commission in 2006 to efficiently manage the waste across the country. The rationale behind this decision was to strengthen public-private partnership. It was also to employ most of its workers through the National Youth Employment Agency. (Amo-Asamoah et al., 2020). The company has been mandated to render services for solid waste collection, landfill management, and city beautification. This company also provide indoor janitorial and cleaning services (Afrane et al., 2021).

Since then, Zoomlion Ghana employees have organized numerous strikes and protests against poor working conditions. These events raised concerns about worsening employee turnover and poor waste management. Employees in some cities complained about heavy

workload, lack of proper supervision, poor environmental conditions and insufficient benefits/incentives. According to Owusu-Sekyere (2019), waste pickers or so-called *kaya bola* faced risks from handling sharp objects and other hazards in the waste collection and disposal processes (Figure 1.1). Silva et al. (2020) affirmed this and added that these risks were largely due to inadequate protective equipment and poor supervision on the use of protective equipment.

Braccini et al. (2018) argued that an organization can improve its profitability by increasing the physical dimensions of the work environment. By so doing, proper treatment of employees can increase job efficiency. The work conditions of every organization affect the organization's output (George and Jones, 2008). This suggests that the attitude of employees in an organization can enhance or reduce its performance levels.

1.2 Past Studies on Solid Waste Management in Ghana

The issue of solid waste management is the most difficult for the authorities of both small and major cities in developing countries (Hussein et al., 2018). According to Dixit et al., (2022), municipal solid waste generation has mainly been attributed largely to people lifestyle, urbanization and income. It is made up of waste collected from households, offices, small-scale institutions and commercial enterprises. However, this often consists of kitchen waste, yard waste, paper and cardboard, plastic and rubber, metal, glass, electronic waste, inert materials and miscellaneous thrash (Nanda and Berruti, 2021). The composition and characteristics of hazardous waste and municipal solid waste varies substantially (Ding et al., 2021; Nanda and Berruti, 2021; Sharma and Jain, 2020), as the majority of waste is generated by households which is complex and may contain poisonous and hazardous materials, whilst companies are responsible for a variety of different sorts of hazardous waste (Gutberlet and Uddin, 2017).

Poor management of solid waste poses significant threat to waster workers, pickers and the general public in the form of disease transmission due to exposure to infectious organisms (Das et al., 2021). Nanda and Berruti (2021), argue that municipal solid waste mostly in most middle-income and third-world countries is frequently disposed of at unregulated landfills, roadsides, and open areas accompanied by open burning. The poor waste management practices tend to have a negative implication on public health, safety, environment, and climate change (Nanda and Berruti, 2021; Prajapati et al., 2021; Victoire et al., 2020). Ensuring proper collection of waste, transportation and disposal with minimal health and safety risks has become a daunting task for many developing countries (Sharma et al., 2020).

Joshi and Ahmed (2016) claimed that the failure of municipal solid waste management

is primarily due to a lack of awareness, insufficient technical understanding, insufficient money, unaccountability, and the execution of legislation and regulations particularly for waste management. Other limiting issues for waste management in a developing country include a lack of technical knowledge and other scientific and economic resources (Sharma et al., 2020). Poorly managed waste can even promote urban violence (Wilson and Webster, 2018).

Solid waste management is an essential component for the sustainable development of any country (Dixit et al., 2022). Hussein et al., (2018) noted that the increased waste generation and landfilling globally highlighted the need for more sustainable and cost-effective waste management methods. They further claimed that effective planning and development strategies regarding the quantity and categories of such wastes are critical for sustainable solid waste management.

There have been numerous studies and reviews regarding waste management in various countries of the world. Victoire et al. (2020), assess solid waste management challenges and their impacts on people's livelihood in Kigali city of Rwanda. They found that poor waste disposal, failure to pay waste collection fees, poor assessment before selecting landfill and waste workers poor working condition, and transportation are the major challenges toward waste management in the area. Huang et al., (2020) studied socioeconomic drivers of solid waste recycling in China where they find that fixed capital formation, exports, and household consumption were the major derivers accounting for the increase in solid waste recycling. A similar study conducted by Sarmento et al., (2022) examined the impact of COVID-19 measures on waste production behavior in Lisbon. They found that there was a sharp decline in waste production during the lockdown period but the magnitude of the such decline varies based on the type of waste and location.

Past studies also highlighted policies effects of waste management. According to Muheirwe, et al. (2022), solid waste management continues to be a global challenge due to several factors, including policy inadequacies and ineffectiveness. It is necessary to develop appropriate management policies for regulating solid waste management based on the structure and production of solid waste (Guo et al., 2021). An exploratory study on the effectiveness of solid waste management policies in Australia by Du et al. (2023), found that regions with combined policies outperform in terms of increasing solid waste recycling rates. However, regions with no policy implementation showed a downward trend in recycling rates.

1.3 Main Objective and Specific Objectives

Considering these circumstances, the main objective of this thesis is to understand what safety issues and current working conditions of waste collectors in Zoomlion Ghana face and what can be done to improve in the future by focusing on the perceptions of municipal and metropolitan waste management field workers in Accra, Kumasi, and Sunyani of Ghana. In conducting research for these objectives, the following specific tasks were laid out:

(1) To examine work conditions among waste management workers in Ghana.
(2) To investigate existing programs and policies for waste collection in Ghana.
(3) To assess the impact of COVID-19 on the activities of waste management workers.

1.4 Study Areas

The research was conducted in the above-mentioned cities of Ghana. Accra is the capital city with a population of about 3 million people. It is divided into sub-metro areas, such as Ablekuma South Metropolitan district, Odododiodioo Constituency, Okaikoi South district and Ablekuma South district. It covers a land area of 225.67 km^2 with a waste generation of 1,500 tons per day with 0.80kg per capita (Deku et al., 2020). In recent years, due largely to rapid urbanization, informal settlement areas expanded with little planning. The population of Accra increased from 2.3 million in 2010 to about 3.2 million in 2020. During this period, waste generation increased from 2,654 to 3,390 tons per day. As of June 2020, the waste generation per person per day within the low-income areas in Accra such as capita waste Okaikoi, Odododiodio and Ashiedu Keteke was 0.51 kg per day which tends to be low as compared to other high incomes neighborhoods (Buor et al., 2020).

Solid waste composition in Accra differ by sectors. “Government institutions, hospitals, and schools tend to dispose plastic materials whereas restaurants, hotels, and banks mainly dispose organic waste. The waste generated by the public market consists of organic materials (56.27%), plastics (13.59%), textiles (13.17%), and paper (8.75%)”. (Oduro-Appiah, 2020). Through this, the waste collection rate per day is approximately below 80% with about 420 waste collectors in the business centers (Miezah et al., 2015).

Kumasi is the second largest city of Ghana and the capital of Ashanti region. It has a population of about 2 million people covering a land area of 254 km^2 (Ghana Statistical Service, 2018). It is located about 250 km north of Accra. The Kumasi central market is the largest market in Ghana. It has about 70% to 80% of waste collected with about 300 waste collectors

per day within the central market centers. The waste collectors in Kumasi are dominated by young men who use specially made tricycles. They collect garbage in densely populated areas and busy market centers. Waste classification in Kumasi include 40% organic waste, 21% ashes, and debris, 20% of plastics, 14 % of paper and textiles and 5% of wood, metal and glass (Majid et al., 2018).

The third area considered is Sunyani, the capital city of Bono region. It has a total population of about 208,496 with a land area of 1,289 km^2. About 80% of its population live in urban areas (Ghana Statistical Service, 2018). Waste generation in Sunyani is six metric tons with generation per capita of 0.53 kg (Miezah et al., 2015). Sunyani has over the years been recognized as one of the cleanest cities in Ghana due to the frequent waste collection by waste collectors (Yeboah, 2017) (Figure 1.3).

1.5 Methodologies

The research for this thesis is partly based on a questionnaire survey among Zoomlion Ghana workers administered in September 2020. The questions were divided into five sections. The first section clarified the respondents' socio-demographic characteristics such as age, gender, education, working hours and salary. The second section was about respondents' working conditions such as their eligibility of receiving benefits at the workplace. The third section sought to identify COVID-19 related matters at the workplace. Here the respondents were asked about their safety practices from COVID-19. The fourth and fifth sections sought to clarify their work conditions that affected waste collection. The questionnaire survey was mailed to three municipal and metropolitan offices and the answers obtained was mailed back to me with a cover letter.

My respondents were project leaders, skip loader drivers, team leaders, field potters (sweepers, tricycle riders, *kaya bola*). The project leaders are mainly municipal office administrators in charge of waste collection schedules and waste collector deployment. The skip loader drivers use skip loaders in levelling landfill sites in case of waste overflow. The team leaders as on-field supervisors ensure that all deployed workers are on schedule. The field potters are mostly women who sweep streets with broomsticks (figure 1.2). Tricycle riders use tricycles for waste collection and disposal. They mostly consist of men from twenty to thirty years old. *Kaya bola* are the field workers stationed around waste collection bins to gather and make sure the waste does not overflow from the bins and scatter along the streets (Amankwaa et al., 2013).

In this research, I purposely sampled a total of 150 waste management workers. In Accra, I sampled 60 respondents. In Kumasi, I sampled 50 respondents and another 40 in Sunyani.

The research further did a systematic review of waste management policy documents in Ghana. I reviewed four policy documents including Environmental Sanitation Policy, National Solid Waste Management Strategy for Ghana, National Plastics Management Policy, and National Environmental Sanitation Strategy and Action Plan.

1.6 Structure of the Thesis

This thesis is organized into five chapters. The first chapter has given a background information to waste management challenges and the privatization of waste collection in Ghana. The second chapter mainly focuses on existing policy frameworks and guidelines for waste collection in Ghana. The third chapter addresses challenges that affect waste management workers. For chapter four, the research examined waste management workers' health/safety concerns over their daily works during the COVID-19 pandemic in Accra. The last chapter discusses overall findings and provides recommendations to improve the current safety issues and working conditions of waste management workers in Ghana (Figure 1.4).

Table 1.1 Waste Generation of Kumasi (1995-2011)

Year	**1995**	**2005**	**2006**	**2008**	**2009**	**2011**
Waste generation (tonnes/day)	600	1,000	1,000	1,200	1,300	1,500

Source: WMD-KMA, 2012

Figure 1.1 Kaya borla workers at work

Source: The author, 2022.

Figure 1.2 Field potter sweeping a taxi station with a broomstick

Source: The author, 2022

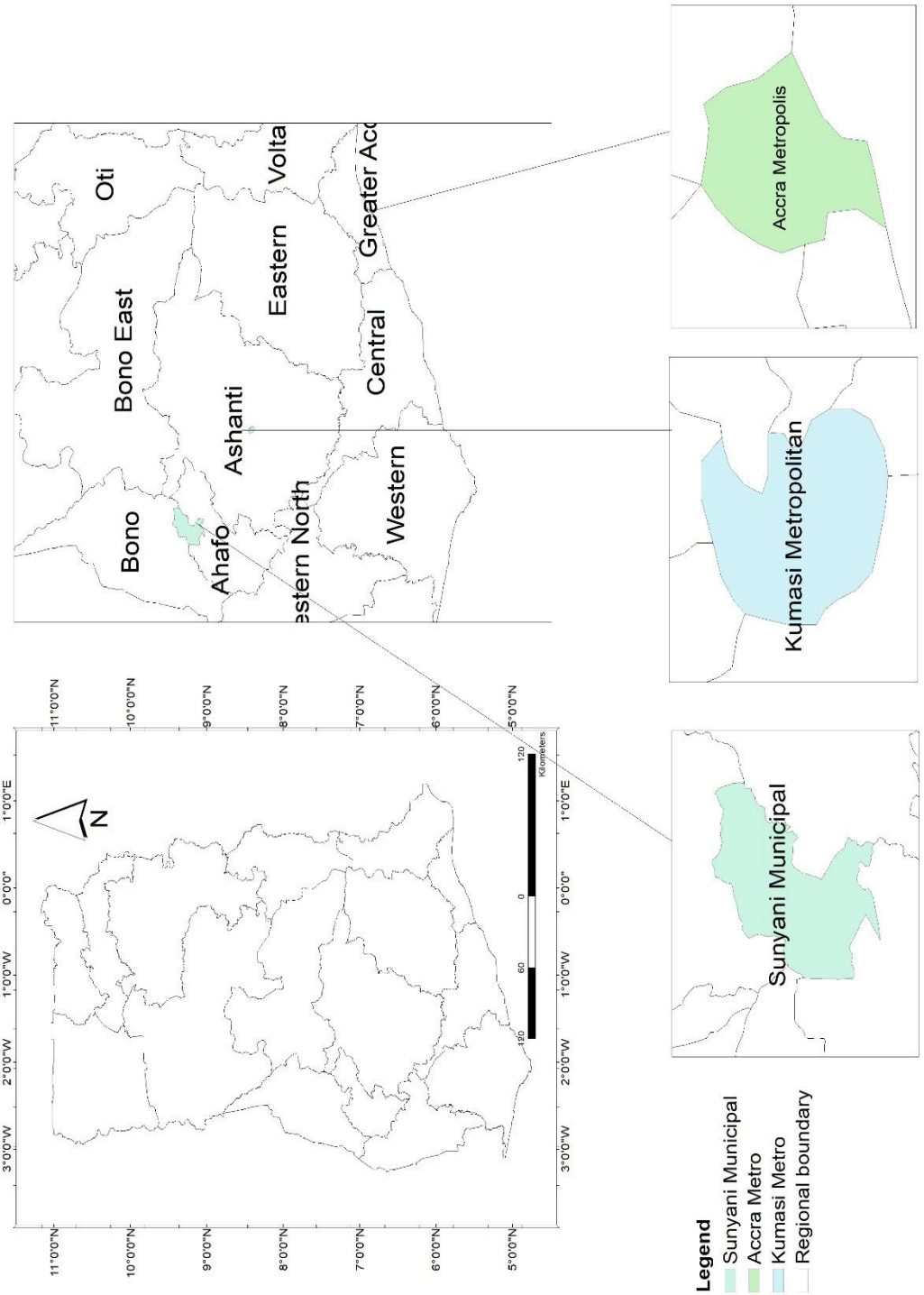

Figure 1.3 Map of Ghana showing the three metropolitan areas
Source: Modified from Ministry of Regional Integration, Ghana, 2022

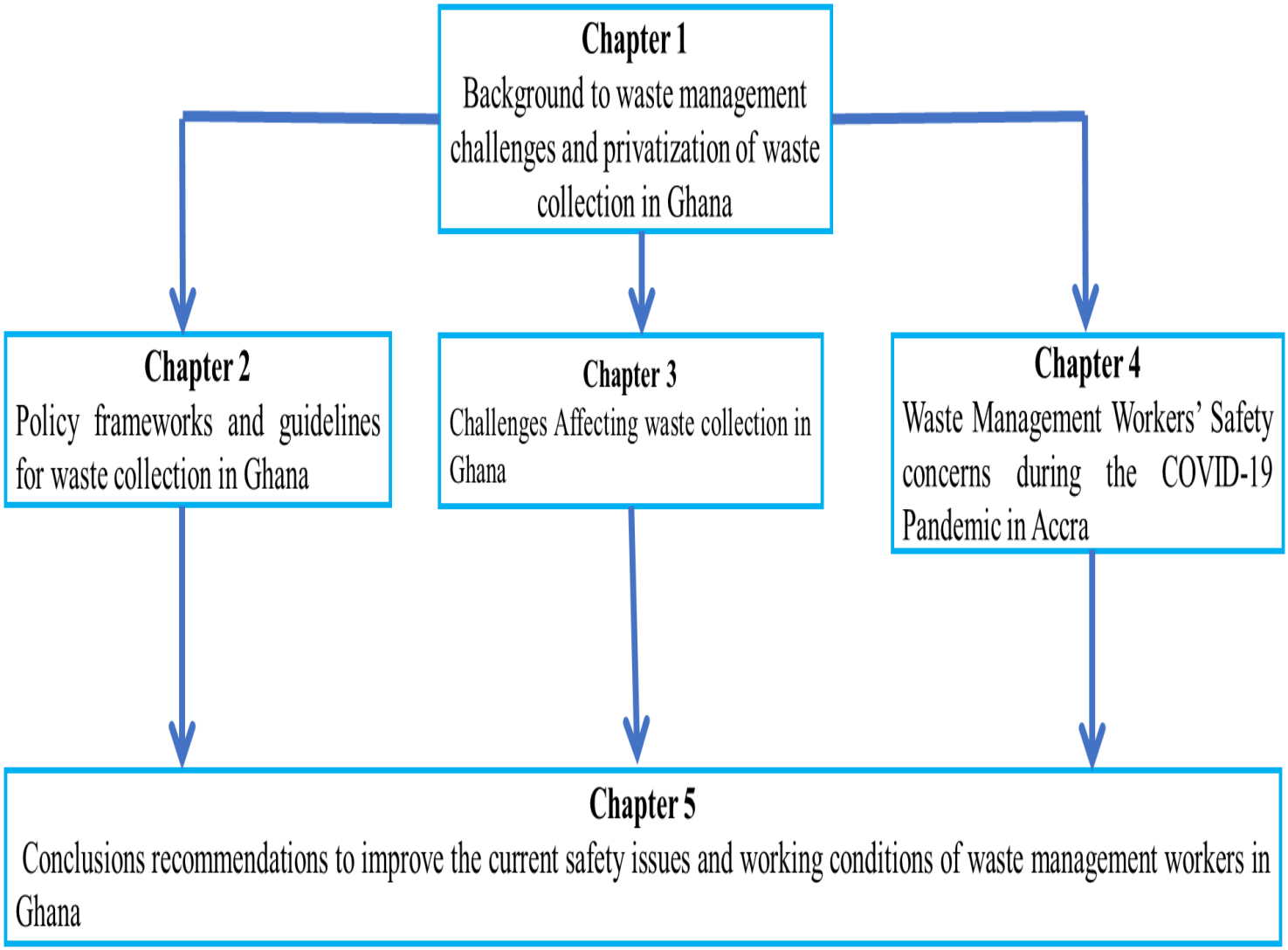

Figure 1.4 Structure of the dissertation

Chapter 2 Policies and Program of Waste Management in Ghana

2.1 Introduction

Waste management in Africa continues to remain a critical concern to governments. In Ghana, the government response has not been adequate to fully address the situation (Kyere et al., 2019). An estimate shows that only 10% of 12,710 tons of solid waste generated in the country was collected and deposited at dumping sites (Miezah et al., 2015).

The poor solid waste management in Ghana is partly due to the absence of well-planned and effective strategies (Lisa et al., 2021). About 50-70% of the operational budget of municipal authorities is allocated to addressing waste management (Rohilla et al., 2021). According to the Water and Sanitation Program (2012), Ghana loses Ghc 420 million (equivalent to US$290 million) annually due to poor sanitation and waste management.

Addressing poor environmental behaviors is critical to achieving meaningful progress (Mensah et al., 2019). Therefore, in attempts to address the alarming rate of waste generation in Ghana, the government adopted several waste management's measures such as environmental awareness creation and waste management programs (Addo et al., 2020). However, successive governments were unable to streamline these measures in relevant institutions due partly to poor planning, a shortage of sanitation facilities, and limited technological capacity (Fobil et al., 2010; Kanat 2010).

Considering this background, this chapter reviews some important waste management policy frameworks in Ghana. It first provides an overview of waste management in Ghana.

2.2 Methodology

This chapter is based on a systematic review of existing government documents and academic research papers. The documents include Ghana policy framework documents that inform strategies in addressing poor sanitation behaviors. In examining these documents, I focused on waste management policies and the national environment and sanitation policy. This focuses on achieving high quality and cost-effective solid waste management (SWM) service delivery in Ghana. I also examined the national plastic waste management policy which addresses plastic pollution control strategies based on the UN environmental regulations.

2.3 Past Waste Management and Environmental Policies in Ghana

During the precolonial era, municipal solid waste management in Ghana was handled locally (Asomani-Boateng and Haight, 1998). Domestic waste handling and disposal were performed mainly by women and the community. Community members were punished for indiscriminately dumping waste (Kwame, 1995).

In Ghana, under the British colonial regime, very poor sanitary conditions led to the passage of the 1848 Health Act. This Act emphasized the concept of municipal services such as street cleaning, waste collection, waste disposal, sanitation, and water supply (Gandy, 1993). Municipal waste management services were introduced as early as 1877 in Accra and other major cities (Dickson, 1969). Municipal councils provided essential urban services, including refuse collection and disposal, sanitation, safe drinking water supplies, and street lighting (Acquah, 1958).

After independence, Ghana created the Environmental Protection Council in 1973, which was authorized by the Provincial National Defense Council (PNDC) under Law 116 of the 1985 constitution. It was amended in 1988 to empower district assemblies for managing human settlements and the environment. It also empowered district assemblies to monitor and evaluate project execution (Ayee et al., 1996).

In 1989 the national government adopted an environmental action plan. This plan was sponsored by the World Bank, USAID, and the Overseas Development Agency (ODA) of the United Kingdom. It presented a draft environmental action plan for public review and comments. In this process, Ghana incorporated policy ideas from Canada, Australia, and the United Kingdom. However, these Western approaches met some challenges: (1) the failure of the Ghanaian government to harness available resources within communities at grassroots, (2) a total dependence of the Ghanaian government on outside ideas, goals, technology, and supervision, and (3) differences in physical, socioeconomic, cultural and political environments between the West and developing countries, and (4) more expenses for imported materials and technology.

Despite the establishment of the Ghanaian Environmental Protection Council (EPC) in 1973 and its adoption of foreign environmental strategies, there was no formal environmental assessment procedure in Ghana until 1995. There was only a systematic environmental review procedure in which the EPC was the main governmental body that decided whether or not an environmental impact certificate or permit should be issued to proponents of undertakings. This environmental harm exists in Ghana despite the presence of government policies and the EPC

(Wiggins et al., 2004).

2.4 Waste Management in Connection to the Environmental Sanitation Policy

The Environmental Sanitation Policy was first implemented in 1999. Facing several shortcomings to implement it effectively, it was later revised in 2009. The revision reflected contemporary development objectives and promoted sector actors (MLGRD, 2010). It established a clear national vision for environmental sanitation as an important social service and a key determinant for improved health and quality of life in Ghana.

To address this goal, the policy guidelines emphasized seven policy areas: (1) capacity development information, (2) education and communication, (3) legislation and regulation, (4) levels of service, (5) sustainable financing and cost recovery, (6) research and development, and (7) monitoring and evaluation. The policy guidelines highlighted some major challenges that continue to face the sector performance, including inadequate allocation of resources for environmental sanitation services at the national and district levels; widespread littering and indiscriminate dumping of refuse in drains and open spaces, low remuneration and poor conditions of service to sector professionals, lack of final treatment and disposal facilities, weak and poorly enforcement of environmental sanitation legislations (MLGRD, 2010). The guidelines emphasized the need to implement actions alongside other aspects of plans and programs in order to lay the basis for better compliance and enforcement management.

The National Environmental Sanitation Strategy and Action Plan (NESSAP) was created in 2007 to be implemented in phases. It promoted the devolution of power by delegating more responsibilities to the Ministry of Local Government and Rural Development, and Environmental Health and Sanitation Directorate. The NESSAP covers all aspects of environmental sanitation, including solid waste, liquid waste, storm-water drainage and sullage conveyance, education, enforcement management, healthcare and special industrial wastes. This led to a five-year (2010-2015) strategies for metropolitan, municipality, and district assemblies (MMDAs) (MLGR-EHSD, 2010).

The NESSAP highlights the need to improve the solid waste collection and transportation as well as final disposal practices. The NESSAP imposed specific levies on importers and producers of plastic products (MLGR-EHSD, 2010). To achieve the reduction-reuse-recycling-recovery (4Rs) policy it introduces source-separation of waste. The policy document also highlights the need for waste storage containers to increase house-to-house services, and to commence source-separation of biodegradable organic- fractions (BoFs)

(MLGR-EHSD, 2010).

The national solid waste management strategy was developed in 2020 in response to a situational analysis of solid waste management in Ghana. It outlined the strengths and weaknesses of the present solid waste management practices. The objective was to achieve a progressively high quality, and cost-effective SWM service delivery (MSWR. 2020). It further highlighted the need for coordinated action among government, municipal assemblies, private sectors, and development partners. The strategy focuses on seven interdependent pillars of action: (1) to strengthen sector governance, (2) to increase private sector participation, (3) to optimize service delivery and infrastructure, (4) to create positive social action on SWM, (5) to enable effective waste recovery, re-use, and recycling, (6) to ensure effective sector monitoring and evaluation, and (7) to establish sustainable sector financing mechanisms (MSWR, 2020).

2.5 National Plastics Management Policy

The guidelines concerning plastic waste management in Ghana followed the Local Government Act of 1994 (Act 462) and the Environmental Sanitation Policy (ESP) of 1999 (Owusu-Sekyere et al., 2013). These guidelines had four priority areas: (1) behavioral change, (2) strategic planning and cross-sectoral collaboration, (3) resource mobilization towards a circular economy, and (4) good governance, inclusiveness, and shared accountability. The guideline further expects to develop a road map to gradually reduce the use of plastics, and recover, recycle, and re-manufacture plastics. The strategic actions adopted are to create strategic support needed for industry and agencies in Ghana for planning those results in extensive market-driven recycling of plastics (METSI, 2021). Actions have been planned to create a synergistic framework that will reduce investment risk while encouraging domestic and foreign investment in the country. In 2019, Ghana became the first African country to join the Global Plastic Action Partnership (GPAP) to achieve a circular plastics economy by reducing plastic and pollution. Before the 5th meeting of the United Nations Environment Assembly (UNEA) in March 2022, where leaders were to formulate a global legal framework on plastic pollution, the government of Ghana had a ministerial conference with Ecuador, Germany, and Vietnam to address marine litter and plastic pollution (Erinosho, 2009).

The policy on national plastic management was first drafted in 2018 followed by a revised draft which was adopted in 2021. Earlier on, the general guidelines concerning the management of plastic waste in Ghana were included in the Local Government Act of 1994 (Act 462) and the Environmental Sanitation Policy (ESP) of 1999 (Owusu-Sekyere et al., 2013).

It aims to address the current environmental challenges through the comprehensive management of plastics and serve as a means of promoting sustainable development.

2.6 Summary

This chapter examined Ghana's waste management policies in connection to environmental protection, sanitation and plastic waste management. These policies have some guidelines and strategies to be implemented effectively. However, as the research will discuss in the next chapters, waste management situations in Ghana, especially in major cities, seem to be worsened in the last ten years or so.

Chapter 3 Challenges Affecting Working Conditions of Waste Management Workers in Ghana

3.1 Introduction

Studies on challenges affecting the waste management sector showed varied results by countries and regions. Damghani et al. (2008) found that the challenges of municipal solid waste management in Tehran, Iran, were largely attributable to improper waste collection and a lack of public education for reducing and separating household waste. In India, Singh et al. (2014) identified inadequate collection space, delayed sanctioning of new land fill sites and numerous open-dump sites as solid waste management challenges at Agra City. In the Netherlands, Guerrero et al. (2012) identified waste management challenges due to a lack of waste management strategic plan, inadequate management staff, low political priority on solid waste issues, poor inter-agency coordination and inadequate central government support.

Other studies focused on waste management in the health sector. For example, a study by Ali and Kuroiwa (2009) examined the situation of healthcare waste management in seven selected hospitals with a particular focus on handling practices, occupational safety and the implementation status of waste management policies in Thailand, Pakistan and Mongolia. Their findings revealed that medical waste management practices were underdeveloped in Mongolia and Pakistan due to lack of clear and detailed guidelines for hospital waste sorting and disposal within their national policy document.

Though these past studies emphasized on some challenges affecting the waste management sector in other parts of the world. They seem to be silent on work condition challenges of waste management workers. Therefore, in this chapter I investigated the challenges affecting the working conditions of waste management workers in Ghana.

3.2 Methodology

To better understand the challenges affecting the working condition of waste management workers, a structured questionnaire was used for my data collection. The field survey was conducted in September 2020 by randomly sampling 150 Zoomlion waste management workers. Out of 150 respondents, 60 were in Accra, 50 in Kumasi and 40 in Sunyani. The workers comprised of project leaders, skip loader drivers, team leaders, field potters (sweepers, tricycle riders, *kaya bola*). The roles of these category of workers have already been discussed in the methodology section of chapter 1. I collected information from the respondents by asking them

about challenges affecting their working conditions. Questions about their social security benefit, health insurance package, child support, the extent of working hours challenges, the extent of workload challenges and monthly salary satisfaction were asked. I entered and coded the collected responses using Statistical Package for Social Sciences (SPSS version 23) worksheet.

3.3 Results and Discussion

3.3.1 Socio-demographic Characteristics of the Respondents

The first part of my questionnaire addresses the socio-demographic characteristics of the respondents. These socio-demographic characteristics included age, gender, marital status, education, work experience, and monthly salary. I further discussed these characteristics by cities.

In Accra, 87% of the respondents belongs to the age groups between 20-49 years. Only 13% of the respondents were 50 years old and above. The female respondents consisted of 52%. Regarding education, 44% had completed tertiary education. About 18% and 38% had completed junior high school education and senior high school education, respectively. Regarding monthly salary, compared to Ghana's monthly minimum wage of Ghc 405, 48% of the respondents received between Ghc1000 and 2000. About 25% received more than Ghc 2000.

In Kumasi, 96% of the respondents were 20-29 years old. Only 2% of the respondents were 50 years old and above. The respondents were dominated by males (76%). Whereas 84% had some level of education, 16% had no formal education. Regarding work experience, 28% had worked for 3-5 years, 54% for 6-8 years, and 18% for more than 8 years. About their monthly salary, 98% earned Ghc 500-2000. The rest received below Ghc 500.

In Sunyani, 90% of the respondents fall between 20 and 49 years old. Only 10% was 50 years old or older. About 53% of the respondents were males. Regarding education 88% had a formal education. In terms of work experience, 60% had 3-5 years, 2% had 6-8years, and 38% had less than 3 years. About 62% earned Ghc500-2000 monthly and another 38% had below Ghc500.

3.3.2 Challenges to Respondents' Work Conditions

In the next section of the survey, I identified major challenges at work for the respondents. These challenges are presented to the respondents to choose inadequate access to social security benefit, non-availability of health insurance package, non-availability of transportation

allowances, inadequate supply of personal protective equipment, and inadequate waste collection vehicles.

Regarding social security benefits, about 72%, 64%, and 55% of the respondents in Accra, Kumasi, and Sunyani Metropolis, respectively, were positive (**Error! Reference source not found.**). This relatively large percentage of recipients means that the respondents wanted to participate in pension schemes that provide a greater financial security after retirement. The respondents who did not receive social security benefits had monthly income that is not substantial enough to carter for their livelihood.

With regards to health insurance package (Figure 2.2), I asked respondents if they receive health insurance package. The results in figure 2.2 indicates that 100%, 38%, and 53% of the respondents from Kumasi, Accra and Sunyani, respectively answered affirmatively. According to O'Brien (2003), workers desire health insurance for both themselves and their family in order to safeguard against the high expense of serious illness and to guarantee simple access to medical care. On the other hand, 62%, and 47% of the respondents from Accra and Sunyani had no access to health insurance package. In Ghana, the cost of enrolling onto health insurance package is expensive and time consuming due long queues and network failures.

With respect to working hours, I asked the respondents how many hours do you work in a day? Table 2 shows that in Accra 21.7% of the respondents work for 1-4 hours, 48.3% work between 5-8 hours and 30.0% worked more than 8 hours. In Kumasi, 30.0% work between 1-4 hours, 54.0% work from 5-8 hours while 16.0% also worked more than 8 hours. Respondents (30.0%) in Sunyani work between 1-4hours, 45.0% work from 5-8 hours and another 25.0% work for more than 8 hours. The finding shows that most of the respondents work between 5-8hours. The reasons for the long hours of work could be linked to the fact that most of the respondents are engaged in other jobs to increase their income. I further asked the respondents the extent to which working hours at the workplace is a challenge to them. The results revealed that respondents from Sunyani (68%) agreed that working hours pose some challenges to them at their workplace. The reason could be linked to the fact that, Sunyani tends to be lower in terms of traffic congestion and the waste disposal centers are usually located at the outskirts of the city as compared to Accra and Kumasi. According to Gaba et al., (2002) workers engaged in long working hours may become fatigue which brings about errors and higher levels of daytime sleepiness. However, respondents from Kumasi (76%) strongly disagree. Also, respondents from Accra (47%) were somewhat not sure about working hours challenges at the workplace.

3.3.4 The Extent of Respondents' Workload

I further asked the respondents to clarify the extent of workload challenges at their workplace. The results in figure 3 shows that in Sunyani 40% of the respondents strongly agree, 10% indicated agreed, 30% were neutral, another 8% disagree while 12% affirmed they strongly disagree. In Kumasi, 18% of the respondents agree. 30% of the respondents in Sunyani were uncertain. However, 56% of the respondents disagree that workload is a challenge at the workplace. Regarding respondents in Accra, 60% of them strongly affirmed that workload poses a challenge to them in the workplace. This could be attributed to the high increasing rate of waste within the city centers. 23% of the respondents indicated that they agree, while 7% of the respondents indicated they were neutral, and disagree respectively. Only 12% of the respondents show that they strongly disagree to workload being a challenge at the workplace.

3.4 Summary

This chapter investigated some challenges affecting the working conditions of waste management workers in Ghana. The findings showed that more than 50% of waste management workers from Accra and Sunyani Metropolis agreed about having experience with workload challenges. For working hours challenges, more than 70% of waste management workers from Kumasi disagreed about having experience with workhours challenges. Regarding workload challenges, 100% of the respondents from Sunyani and Accra Metropolis strongly agreed that workload poses a challenge to them at their workplace.

Table 2.1 Socio-demographic characteristics of the respondents

Socio-demographic	Description	Accra	Kumasi	Sunyani
Age	20-29	18(30%)	1(2%)	16(40%)
	30-39	23(39%)	23(46%)	12(30%)
	40-49	11(18%)	24(48%)	8(20%)
	50-59	6(10%)	2(4%)	2(5%)
	>59	2(3%)	0	2(5%)
Gender	Male	29(48%)	38(76%)	21(53%)
	Female	31(52%)	12(24%)	19(47%)
Level of education completed	No formal Edu.	0	8(16%)	5(12%)
	Primary	0	15(30%)	15(38%)
	Junior High	11 (18%)	21(42%)	8(20%)
	Senior High	23 (38%)	6(12%)	6(15%)
	Tertiary	26 (44%)	0	6(15%)
Work experience	0-2	10(17%)	0	15(38)
	3-5	37(62%)	14(28%)	24(60)
	6-8	11(18%)	27(54%)	1(2%)
	Above 9 yrs	2(3%)	9(18%)	0
Hrs of work in a day	1-5	6(10%)	38 (76%)	18(45%)
	6-10	54(90%)	12 (24%)	22(55%)
Monthly Salary	below GH₵ 500	0	1(2%)	15(38%)
	500-1000	7(12%)	45(90%)	19(47%)
	1000-2000	29(48%)	4(8%)	6(15%)
	2001-3000	13(22%)	0	0
	Above 3000	11(18%)	0	0

Table 2.2 Respondents' working hours

working hours	**Accra (n=60)**		**Kumasi (n=50)**		**Sunyani (n=40)**	
	Respondents	(%)	Respondents	(%)	Respondents	(%)
1-4 hours	13	21.7	15	30.0	12	30.0
5-8 hours	29	48.3	27	54.0	18	45.0
Above 8 hours	18	30.0	8	16.0	10	25.0

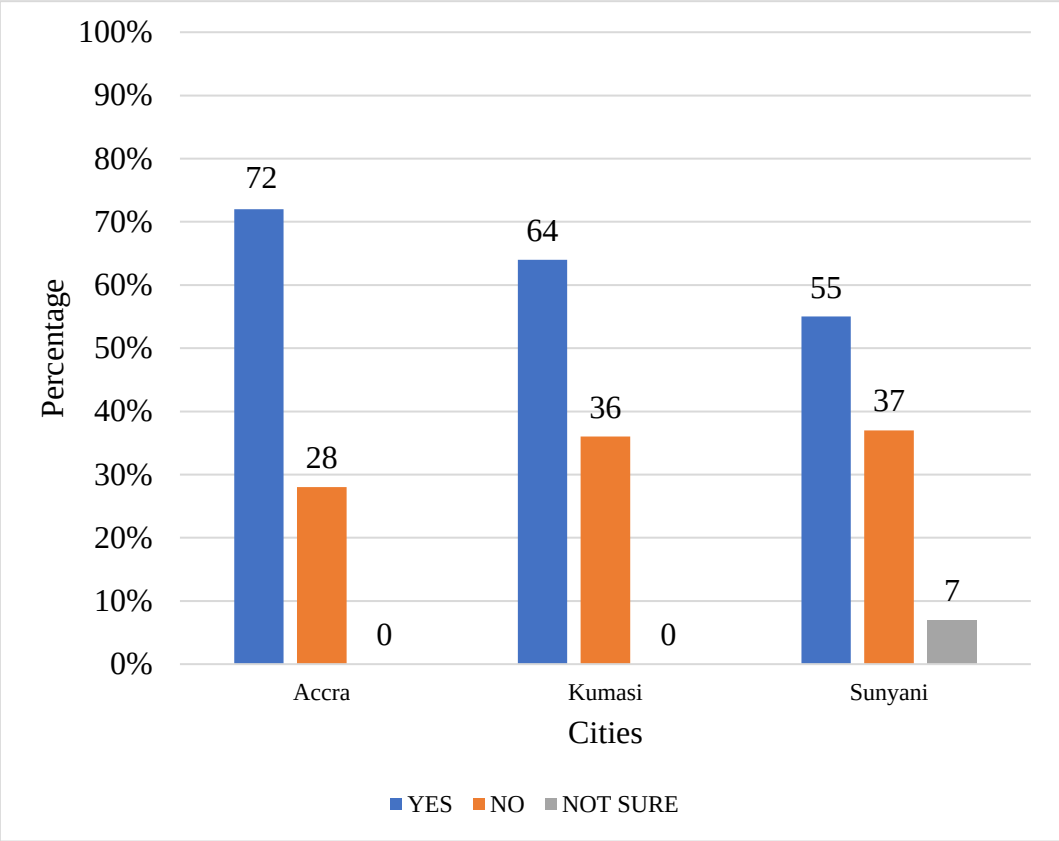

Figure 2.1 Access to social benefits by the respondents

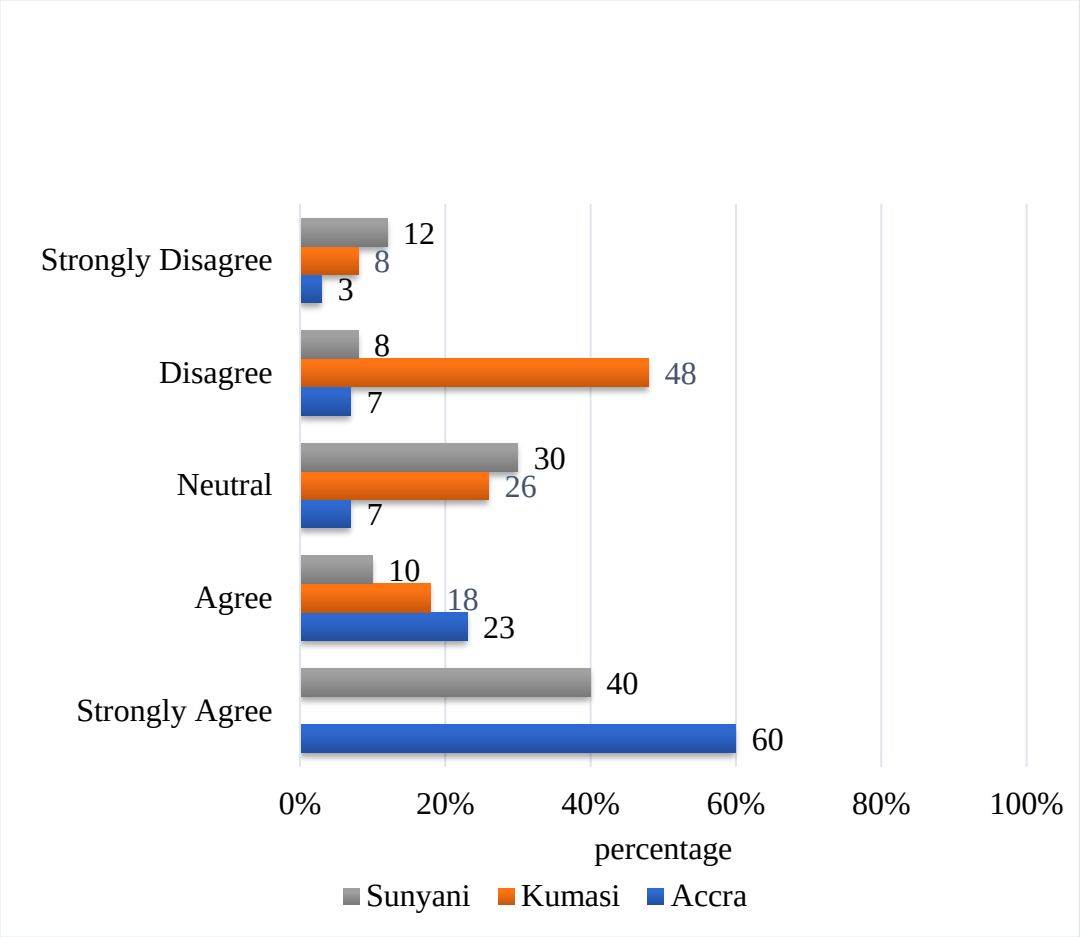

Figure 2.2 Extent of respondents' workload.

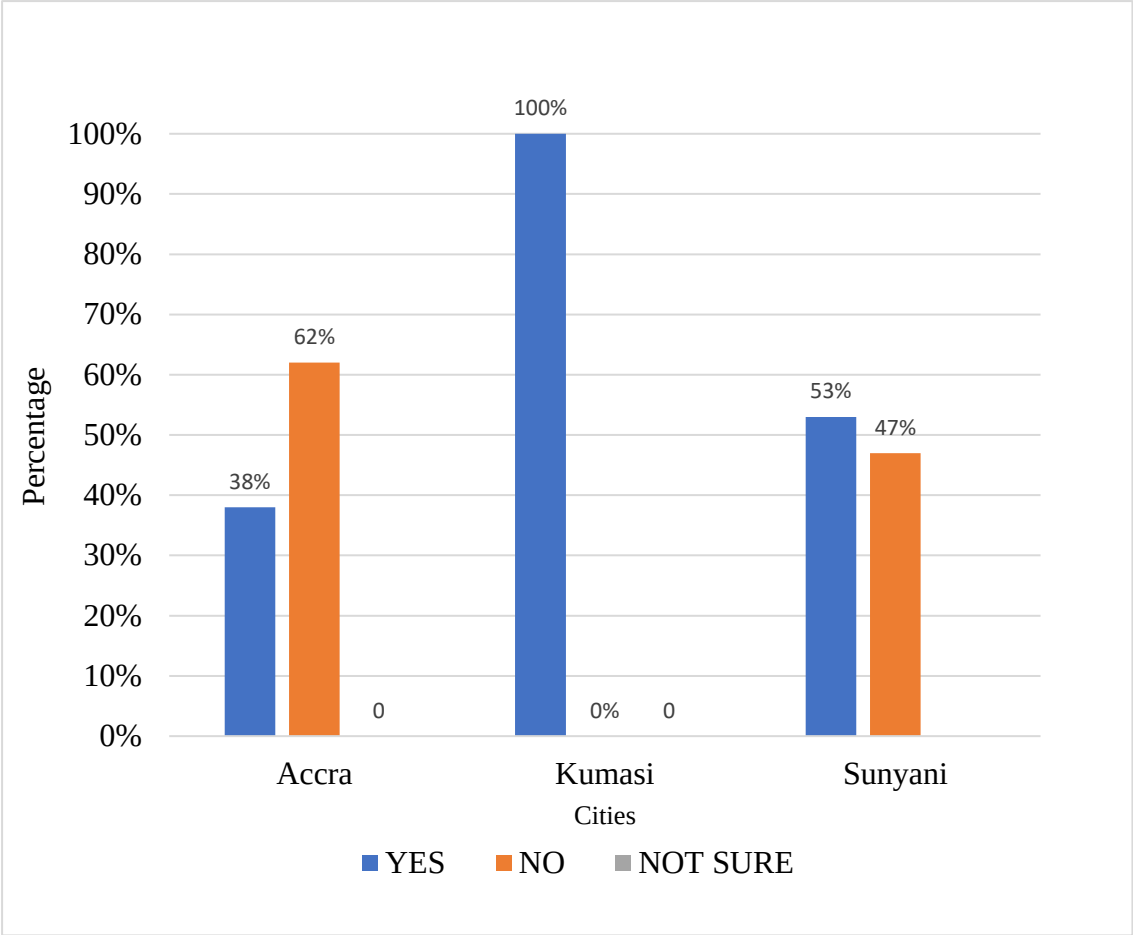

Figure 2.3 Access to health insurance packages by the respondents

Chapter 4 Waste Management Workers' Safety Concerns during the COVID-19 Pandemic in Ghana[1]

4.1 Introduction

Waste management is one of the major challenges' humanity faces today (Hossain, 2011). About 1.9 billion tons of solid waste is generated annually in the world (Lissah et al., 2021). In Sub-Sahara Africa, approximately 62 million tons of solid waste is generated annually. In rapidly growing cities like Accra in Ghana, the amount of daily waste generation is estimated to double from about 2,600 metric tons in 2010 to more than 4,400 metric tons by 2030 (Oteng-Ababio, 2010).

Ghana's waste collection was carried out by district and municipal authorities. However, due partly to the low collection rate (about 50%), the central government privatized waste collection services in 1999 (World Bank, 2020). Since then, private companies like Zoomlion Ghana emerged and have managed solid waste (Akaateba et al., 2013). These companies hire informal waste collection workers called *kaya bola* who empty waste bins by using tricycles or trucks (Owusu-Sekyere, 2019). They are sometimes stationed at community waste collection points to ensure proper waste disposal by individuals. In doing so, they face high risks of contracting infectious diseases and injury (Muthelo et al., 2019).

When the novel coronavirus (COVID-19) pandemic began to affect Ghana and western Africa, waste management workers faced unpredictable health/safety risks and delayed work efficiency (Giri et al., 2020; Sivasankaran, 2018). In handling waste with the risk of COVID-19 infection, workers were required to follow safety protocols against COVID-19, including the regular use of hand sanitizers. In response, some waste management workers complained about inconveniences in carrying out their tasks (Naser et al., 2020; Shammi et al., 2021). Although recorded cases of COVID-19 in the Sub-Sahara African region remained comparatively low in the first year compared to European countries and the U.S., Ghana experienced a constant rise in COVID-19 cases despite various government efforts (Ghana Health Service, 2020). Also, in the midst of the pandemic, the Ghanaian government

[1] The paper related to this chapter was published as Mensah-Akoto, J., and Matsui, K. (2022). Waste Management Workers' Safety Concerns during the COVID-19 Pandemic in Ghana. *Journal of Environmental Protection, 13*(9), 603-612. Also, it was presented at the international conference for world congress and pollution control, Venice Italy (WCPC22) March 2022.

decommissioned some landfill sites which displaced over 300 waste pickers (Hartmann et al., 2022).

The World Health Organization in 2015 developed its first global and comprehensive guidance document called “Safe Management of Wastes from Health-care Activities.” All member countries belonging to the World Health Organization were mandated to adopt it. Ghana adopted it in January 2016 into its national healthcare waste management medium development policy. It requires countries to establish a regulatory framework and minimize waste through recycling. It emphasizes the importance of planning waste management, handling processes, and proper transport and storage before treatment or final disposal. The document was aimed at managers to provide appropriate vehicles for transporting the waste, secure environmentally friendly waste disposal sites, and do sufficient monitoring and evaluation of the waste collectors. (Ali et al., 2017).

However, for these guidelines to be more effective in rapidly growing African cities like Accra, it is imperative to understand the working conditions of waste management workers under the COVID-19 pandemic. This study, therefore, examines the safety concerns of waste management workers during the COVID-19 pandemic in Ghana’s capital, Accra. It further provides suggestions to address these safety concerns.

Past studies examined waste management workers’ safety in various countries. For example, in Brazil, Gutierrez et al. (2017) found that about 90% of their respondents, who were waste collectors, did not have a place to claim about their concerns and needs over working conditions. For example, these respondents needed PPEs most. Regarding COVID-19 impacts, Karim et al. (2020) found that a social stigma existed toward seasonal workers in Bangladesh. Compared with full-time workers, these seasonal laborers had more psychological distress. In Japan, Sasaki et al. (2020) investigated employees’ mental health during the COVID-19 pandemic and found that those workplaces with a larger number of measures tended to have employees with less fear of and worry associated with COVID-19.

These studies gave some important insights on high-risk work conditions waste management workers experienced and had to cope with, we still do not know much about how those workers in developing countries with limited countermeasures against COVID-19 perceive health/safety concerns. This chapter, therefore, sheds some new light on waste management workers’ health/safety concerns over their daily works during the COVID-19 pandemic in Accra, Ghana.

4.2 Materials and Methods

4.2.1 The Study Area

Accra is important area to understand waste management workers' conditions in Africa. It is the largest city in Ghana and one of the largest cities of Africa with an area of 222.67km^2. It has a population of about 2,557,000 with a waste generation of 1,500 tonnes per day with 0.80kg per capita (Ghana Statistical Service, 2021). The metropolis is divided into Ablekuma South Sub-Metropolitan District, Ashiedu Keteke Sub-Metropolitan District, Okaikoi South Sub-Metropolitan District, Odododiodioo Constituency, Okaikoi South Constituency and Ablekuma South Constituency. There are about 100 waste collectors in each district. In recent years, due largely to rapid urbanization, informal settlement areas expanded with little planning. The most recent record shows that an average per capita waste generation in low-income areas like Okaikoi, Odododiodio and Ashiedu Keteke is about 0.51 kg per day. This amount is lower than that of their high-income areas, which is 0.91 kg, but the accessibility to waste management services is much lower in poor neighborhoods (Akuoko et al., 2018; Carboo and Fobil, 2005).

In Accra, the composition of solid waste differs by sectors. For example, government agencies, hospitals, and schools tend to dispose plastic materials whereas restaurants, hotels, and banks mainly dispose organic waste. The waste generated by the public market consists of organic materials (56.27%), plastics (13.59%), textiles (13.17%), and paper (8.75%) (Oduro-Appiah et al., 2020).

Some of the impacts Accra residents experienced during the COVID-19 pandemic include limited recovery and relief and food insecurity. Some scholars reported that most workers, especially *kaya bolas*, worked fewer days and earned less after the pandemic. Food price increase affected these workers with lower payment (Chen et al., 2021).

In Accra and other major cities of Ghana, *kaya bolas* collected garbage by using Veronica buckets, which are widely used in Ghana mainly for washing hands. *Kaya bolas* are also expected to use hand sanitizers, face mask/shield, hand gloves and soaps (Bonful et al., 2020).

4.2.2 Data Collection and Analysis

To get better insights into the safety concerns of waste management workers in the study area during the COVID-19 pandemic, we conducted a questionnaire survey among waste management workers in Accra in March 2021. I requested the Zoomlion Ghana company to allow us to conduct this survey and obtained its approval. I distributed the questionnaire among

60 workers in six districts by using a simple random sampling method and obtained 60 valid responses. Our respondents comprised of collectors, supervisors, and field potters. Collectors collect household waste from waste bins by using tricycles. Supervisors prepare daily schedules for the collectors. Field potters monitor and guide the collection process and evaluate collectors' performance.

The questions were divided into two parts. The first part attempted to identify the socio-demographic characteristics of the respondents. This included gender, marital status, income, and education. The second part tried to understand safety concerns of the respondents regarding waste collection under the COVID-19 pandemic. The collected responses were coded and entered using Statistical Package for Social Sciences (SPSS version 23) worksheet for analysis. This was done to find the distribution of respondents' safety concerns using percentages and frequencies.

4.3 Results and Discussion

4.3.1 Socio-Demographic Characteristics of the Respondents

Regarding the socio-demographic characteristics of the respondents, we found that the female respondents consisted of 52%. A 2022 World Economic Forum report found a similar gender ratio among 150 plastic waste collectors, in which about 64% was women (Milios et al., 2018). Regarding education, we found that all the respondents had some form of education. Among them, 44% had completed tertiary education. About 18% and 38% had completed junior high school education and senior high school education, respectively. Regarding monthly salary, compared to Ghana's monthly minimum wage of GH₵405, 48% of the respondents received between GH₵1000-2000 per month. About 25% received more than GH₵2000 (Table 4.1).

4.3.2 Respondents' Safety Concerns at Work

In the second part of the survey, respondents' perceptions about COVID-19 safety protocols were assessed. The United Nations Environment Program Report (2020) showed that COVID-19 had a major impact on solid waste management in developing countries (Nzeadibem et al., 2020). Before the onset of the pandemic, Ghana and many other developing countries had already faced difficulties in managing the growing volume of solid waste without advanced waste treatment facilities and proper personal protection equipment, among others (Khatib et al., 2007). Considering this situation, I first asked the respondents whether they were concerned about the on-going pandemic in conducting their works. In response, 58% of the respondents

answered yes. For us this result was somewhat surprising as we expected to have a vast majority of the respondents would answer positively. Also, 22% answered no and 20% was not sure. This result suggests a polarized opinion about the impact of the pandemic.

The next question asked the respondents about the availability of the following safety items at work: (1) disinfectants, (2) hand sanitizers, (3) hand gloves, (4) face masks/shield and (5) soap. In response 40% had masks/shields readily available at work, 25% had access to hand sanitizers, and 23% had soap (Figure 4). Only a small proportion of the respondents found hand gloves available (3%). Here we found that respondents' perceptions about face mask/shield availability (40%) was similar to their actual usage (40%). Also, their perceptions about hand sanitizer availability (25%) were somehow similar to the actual usage (30%). These results suggest that the availability of safety items was fully utilized by the workers. However, at the same time, having only 20%-40% with access to safety items means that the respondents had quite limited protection from infection.

Then we attempted to find out how the respondents were practicing workplace safety protocols. To do this, we asked the respondents how they protected themselves from COVID-19 infection at work by giving them the following options: (1) wear face mask, (2) wash hands frequently using disinfectants and soaps, (3) use Veronica buckets, and (4) wear hand gloves. These options were selected from preliminary interview done with the Zoomlion company before the questionnaire administration. I found that 40% of the respondents wore face masks/shields at the workplace and 30% used hand sanitizers. Another 27% used Veronica buckets. Veronica buckets were originally developed by a Ghanaian called Veronica Bekoe in 1993 to facilitate efficient hand washing especially in areas where potable water was not readily available (Oninku, 2021). Only 3% mentioned to have used hand gloves.These results imply that regardless of concerns over the pandemic, the respondents were aware of the safety protocols and did some kind of preventative actions from contracting COVID-19. As the Zoomlion company did not impose penalties on those who did not respond to the safety protocols, these actions were done somewhat voluntarily. Also, wearing masks has always been part of workers' safety protocols even before the pandemic so workers did not find it particularly difficult to use face masks.

As the use of hand sanitizers was promoted as one of the most important preventive measures, we asked the respondents how often they used hand sanitizers on site each working day. The results showed that all the respondents applied hand sanitizers on site each working day. Interestingly, 54% indicated that they applied hand sanitizer after each collection, 20% 5-

6 times, 13% 3-4 times, and another 13% 1-2 times (Figure 4.3). This result suggests that the respondents somewhat followed COVID-19 safety protocols. However, we also point out here that 46% of the respondents did not sanitize after each collection for some reason. Perhaps this result corresponds with 42% of those respondents who expressed their uncertain feeling about or disagreement with the pandemic impact.

Finally, we asked a question to understand whether the respondents could have a day-off from work due to COVID-19. I found that 43% of the respondents took a day-off once a week. Another 38% had day-off based on job availability. Those who had day-off for multiple days a week consisted of 19%. (Table: 4.2). This result shows that the respondents faced demanding work requirements. Having day-off is often considered as a measure to improve workers' safety, efficiency and productivity. Resting from work also help workers become more attentive to their work safety (WHO, 2020).

4.4 Summary

This paper investigated the safety concerns of waste management workers in Ghana during the COVID-19 pandemic. The survey found that respondents were overall better educated than the average Ghanaian people with relatively higher monthly income levels. Education and income, however, did not appear to explain the polarization of respondents' concerns over COVID-19 risks at work. We found that 58% of them showed concerns over COVID-19 while the rest was either not sure or not concerned. Regarding compliance with safety protocols at work, we found that the respondents had limited protection as only 40% found masks/shields available and used them. Another 25%-30% found hand sanitizers available and used them. All respondents did use hand sanitizers at work, but only 54% used after each collection. The respondents experienced demanding work conditions. This means that they were exposed to a higher risk of infection and injury.

Table 4.1 Socio-demographic characteristics of the respondents

Variable	Category	Frequency (Percent)
Gender	Male	29 (48)
	Female	31 (52)
Age	Below 20	0
	20-29	18 (30)
	30-39	23 (39)
	40-49	11 (18)
	50-59	6 (10)
	59+	2 (3)
Marital Status	Married	33 (55)
	Single	27 (45)
Level of Education Completed	No Formal Education	0
	Primary	0
	Junior High	11 (18)
	Senior High	23 (38)
	Tertiary	26 (44)
Monthly Income (Ghana Cedis)	Below 500	0
	500-1000	13 (22)
	1000-2000	29 (48)
	2001-3000	7 (12)
	Above 3000	11 (18)

Figure 4.1 Figure A picture of Veronica buckets
Source: The author (2022)

Table 4.2 Respondents day-off from work

Day-off	Respondents	%
Once a week	65	43
More than once a week	57	38
Once in 2 weeks	28	18.7

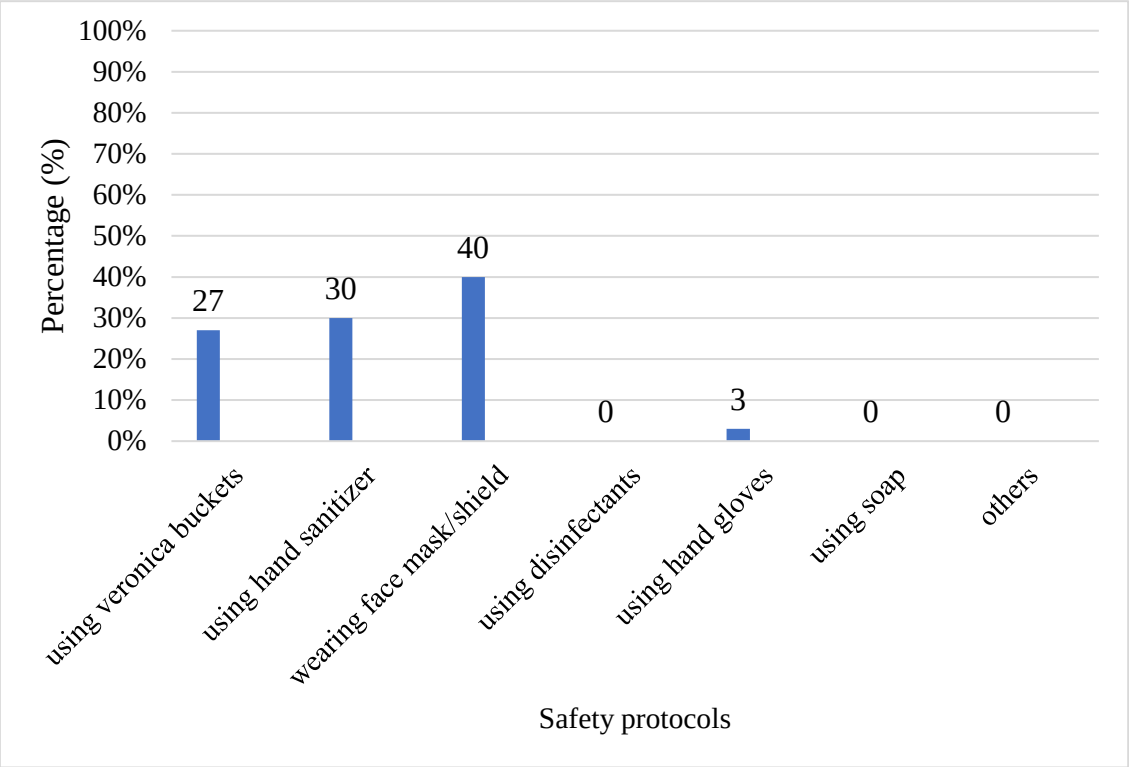

Figure 4.2 COVID-19 safety protocols practiced among the respondents

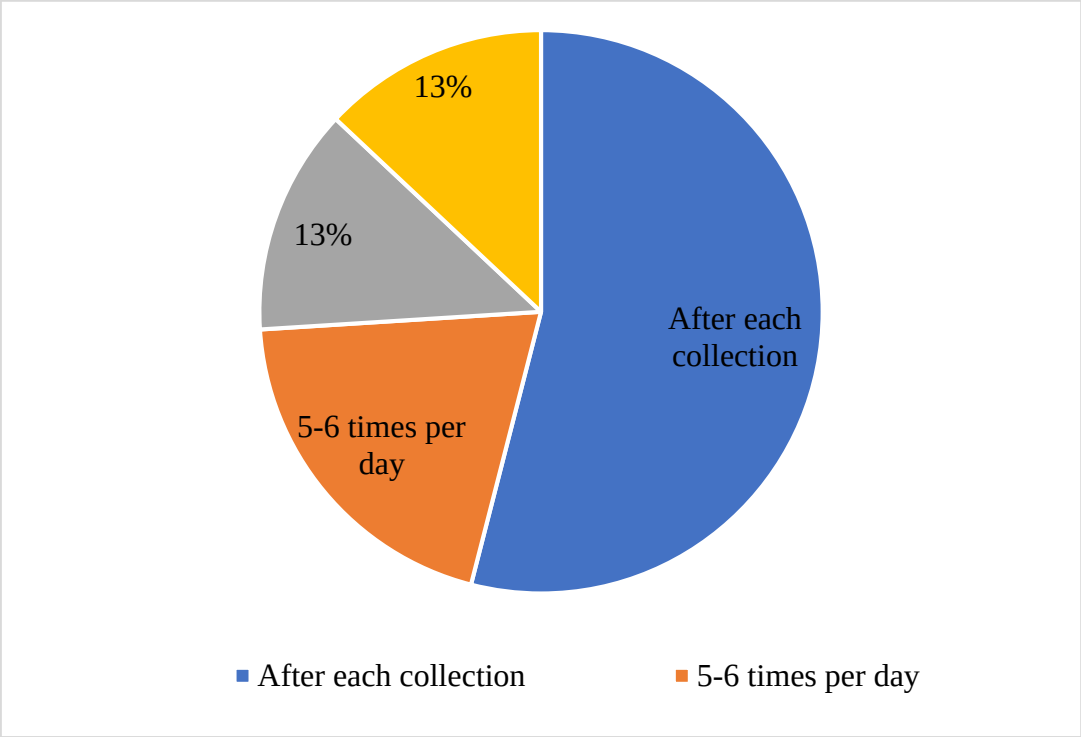

Figure 4.3 Frequency of hand sanitizer usage by the respondents

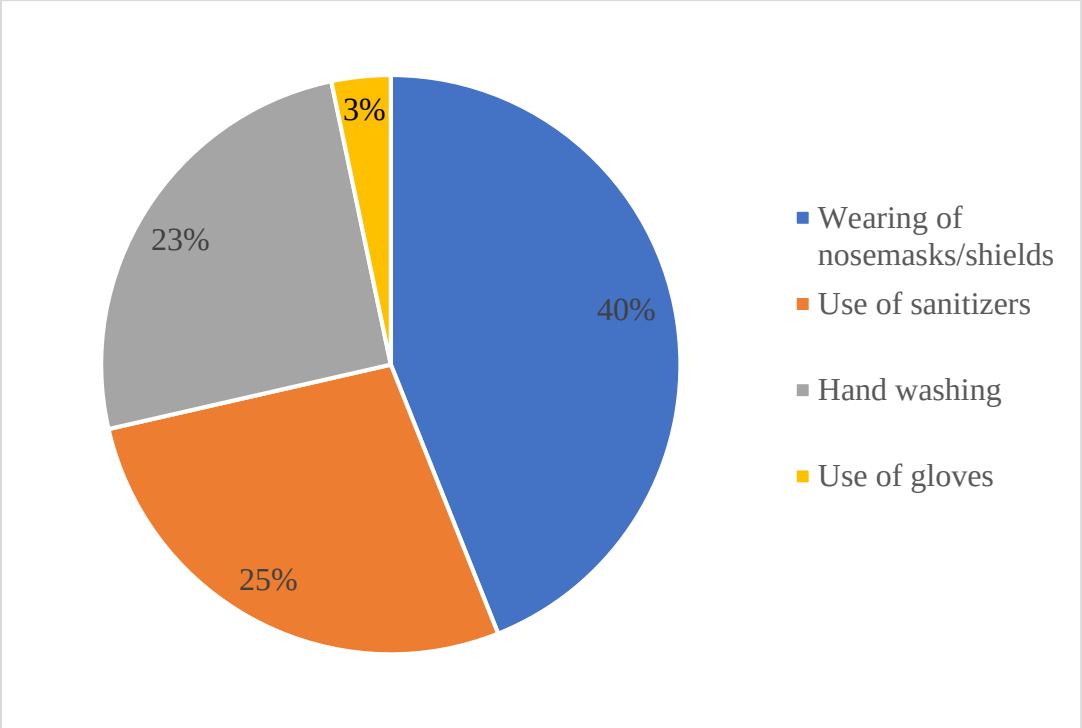

Figure 4.4 Available safety protocols observed while working

Chapter 5 Conclusions and Recommendations

5.1 Conclusions

In order to understand the impacts of the work environment on waste management safety in Ghana. It is better to understand what safety issues waste workers currently have and how their working conditions can be improved in future. In the previous chapters, the research examined the governmental policies and programs for waste collection in Ghana (chapter 2). It was found that, there were existing policy frameworks that mostly focused on professional and did not consider the actual field workers. In Chapter 3, the research assessed the work condition challenges these workers are facing. In chapter 4, the research assessed the impact of COVID-19 on their activities. It found out that, there were some existing safety practices they followed but other safety protocols were not observed.

In chapter 2, the research reviewed waste management programs and policies in Ghana which have been adopted to tackle the rapid waste generation problems in the country. Some of the related policies include Environmental Sanitation Policy (Revised, 2009), National Environmental Sanitation Strategy and Action Plan (NESSAP) 2010 – 2015, National Solid Waste Management Strategy for Ghana and the National Plastics Management Policy. From the review, it was found that the Ghanaian government over the years have initiated policies to improve waste collection. However, these policies seem not to consider the conditions of service and the low renumeration received by waste collectors. They only stressed on professionals in the sector neglecting the actual field workers. This makes it difficult for these workers to feel motivated to effectively to ensure proper waste collection.

In chapter 3, the research investigated the challenges faced by waste management workers in Ghana. The findings showed that more than 50% of waste management workers agreed about having experience with workload challenges. Within the waste collection companies in Ghana, most of these waste collectors identified as *kaya borla* are usually people deployed within large market spaces to gather enough garbage to be taken to the waste collection bins. This becomes very challenging because considering the length of the broomstick used for the gathering takes much time and makes the workload seem more challenging especially those who work within the busy and crowded areas. Again, most of the respondents did not receive social security benefit and health insurance package. The survey indicated majority of university graduate workers who have worked for only 3 years on contract basis may not be eligible for social security packages because this package is usually given to

permanent workers therefore graduate contract workers will not have this package. Health insurance package on the other hand seem available to some of the workers in other cities. Health insurance package usually depend on the individual worker therefore in much busier and crowded cities identified in the research like Accra, most people tend not to renew their health insurance cards after expiry due to avoidance to travelling to central Accra and also joining long queues for the renewal. Also, it found out that the high increasing rate of waste is making the workload of the waste collectors a challenge as reviewed in this research.

In chapter 4, the research assessed the safety concerns of the workers during the COVID-19. It was found out that, 58% of the respondents were concerned about COVID-19 at the workplace. The survey emphasized the fact that since the emergence of the COVID-19 pandemic, it was treated as a global pandemic where the WHO laid down some guidelines that waste management workers must follow in other to ensure their own safety at the workplace. However, 40% of the respondents have limited access to safety protocols especially, the use nose masks/face/shield. In terms of washing of hands, there still exist the traditional way by using the Veronica buckets which in this era does not seem more effective. Also, all respondents did use hand sanitizers at work, but only 54% used after each collection. This means that they were exposed to a higher risk of infection and injury which could make their working environment very dangerous.

5.2 Recommendations

5.2.1 Improvement in Waste Workers' Condition of Service and Low Remuneration

Government policies towards improving waste management both at national and regional level, should consider the condition of service and low remuneration of waste collectors. By so doing, the employees' ability and willingness to properly manage the waste will be enhanced.

5.2.2 Provision of Adequate Safety Protocols

From the study, few respondents used the available safety protocols. In other to prevent the spread of COVID-19 at the workplace, it is expected that all respondents adhere to the safety measures available at the workplace. The limited use of the safety protocols could be as a result unawareness by the respondents. To improve more usage of safety protocols at the workplace, government need to provide information about COVID-19 protocols. Again, providing more safety protocols to waste collectors could help reduce the dangers of future pandemics. Regular monitoring of the workers towards the use of the safety protocols should be encouraged in other

to have a safe working environment. Therefore, the Ministry of environment and sanitation in Ghana should ensure the supply of adequate safety equipment for effective and efficient service delivery.

5.2.3 Training of Graduate Unemployed Women

Given the higher number of tertiary graduate women who are engaged in waste collection in the urban areas, the government can set up training facilities to engage these women in other to be industrious and set up their own jobs rather than migrating to the big cities with the hope of getting more opportunities but ending up as waste collectors.

5.2.4 Enable Efficient Collection of High-volume Waste

By enabling the efficient collection of high volume of waste, government can consider more fuel-efficient collection and transport vehicles. Just as in Japan, there exist small compact garbage collection trucks that passes through the narrow roads in the residential areas for garbage collection. By so doing, much burden will be released from the tricycle riders who collect low amount of garbage from the narrow market and business centers and will also ease up their workload.

References

Acquah, L. (1958). Accra Survey, University of London Press.

Abubakar, R., Kumar, K. S., Acakpovi, A., Ayinga, U. W., Prempeh, N. A., Tetteh, J., and Kumassah, E. S. (2020). Convolutional neural networks for solid waste segregation and prospects of waste-to-energy in Ghana. Proceedings of the 2nd African International Conference on Industrial Engineering and Operations Management Harare, Zimbabwe, December 7-10, 2020.

Addo, I. A., Alhassan, O., Abokyi, S., and Kutor, S. (2020). Assessing Municipal Solid Waste Management Practices and Challenges in the Techiman Municipality, Ghana. West African *Journal of Applied Ecology*, 28(2), 118-131.

Afrane, S., Ampah, J. D., Jin, C., Liu, H., and Aboagye, E. M. (2021). Techno-economic feasibility of waste-to-energy technologies for investment in Ghana: A multicriteria assessment based on fuzzy TOPSIS approach. *Journal of Cleaner Production*, *318*, 128515.

Akaateba, M. A. and Yakubu, I. Householders' satisfaction towards solid waste collection services of Zoomlion Ghana ltd in wa, Ghana. *European scientific journal*, *9*(32), 2013.

Akuoko, I. S. G. *Solid Waste Management in Coastal Ghana*. University of Rhode Island, 2018.

Ali, M. and Kuroiwa, C. (2009). Status and challenges of hospital solid waste management: case studies from Thailand, Pakistan, and Mongolia. *Journal of Material Cycles and Waste Management*, *11*(3), 251-257.

Ali, M., Wang, W., Chaudhry, N. and Geng, Y. Hospital waste management in developing countries: A mini review. *Waste Management amd Research*, *35*(6), 581-592, 2017.

Al-Khatib, IA, Arafat, HA, Basheer, T., Shawahneh, H., Salahat, A., Eid, J. and Ali, W. (2007). Trends and problems of solid waste management in developing countries: A case study in seven Palestinian districts. *Waste management*, *27* (12), 1910-1919, 2007.

Amankwaa, E. F. (2013). Livelihoods in risk: Exploring health and environmental implications of e-waste recycling as a livelihood strategy in Ghana. *The Journal of Modern African Studies*, *51*(4), 551-575.

Ampofo, S. K. (2015). The options for the effective management of plastic waste in Ghana. Report on Management of Plastic Waste in Ghana-21-328-STASWAPA. pdf.

Amo-Asamoah, E., Owusu-Manu, D. G., Asumadu, G., Ghansah, F. A., and Edwards, D.J. (2020). Potential for waste to energy generation of municipal solid waste (MSW) in the

Kumasi metropolis of Ghana. *International Journal of Energy Sector Management*, *14*(6), 1315-1331.

Appiah, I., Wemegah, D. D., Asare, V. D. S., Danuor, S. K., and Forson, E. D. (2018). Integrated geophysical characterisation of Sunyani municipal solid waste disposal site using magnetic gradiometry, magnetic susceptibility survey and electrical resistivity tomography. *Journal of Applied Geophysics*, *153*, 143-153.

Asomani-Boateng, R., and Haight, M. (1998). Assessment of municipal solid waste management practices in Accra, Ghana. *Journal of Environmental systems*, 26(1), 41-55.

Ayee, J. R. (1996). The measurement of decentralization: the Ghanaian experience, 1988-92. *African Affairs*, 31-50.

Bonful, H. A., Addo-Lartey, A., Aheto, J. M., Ganle, J. K., Sarfo, B. and Aryeetey, R. Limiting spread of COVID-19 in Ghana: compliance audit of selected transportation stations in the Greater Accra region of Ghana. *PloS one*, *15*(9), 2020.

Braccini, A. M., and Margherita, E. G. (2018). Exploring organizational sustainability of industry 4.0 under the triple bottom line: The case of a manufacturing company. *Sustainability*, *11*(1), 36.

Buor, D. (2020). Perspectives on solid waste management practices in Urban Ghana: A review. *Journal of Waste Management and Disposal*, *2*(3), 1-8.

Chen, M., Grapsa, E., Ismail, G., Rogan, M. and Valdivia, M. COVID-19 and informal work: Distinct pathways of impact and recovery in 11 cities around the world, 2021.

Damghani, A. M., Savarypour, G., Zand, E. and Deihimfard, R. (2008). Municipal solid waste management in Tehran: Current practices, opportunities and challenges. *Waste management*, *28*(5), 929-934.

Debrah, J. K., Vidal, D. G., and Dinis, M. A. P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, *6*(1), 6.

Deku, P. S. (2020). *An Assessment of Sustainable Solid Waste Management in Accra-Ghana*. Southern Illinois University at Carbondale.

Dickson., B. K. (1969). A Historical Geography of Ghana, Cambridge University Press, Erinosho,B., (n.d). Ghana | UNEP Law and Environment Assistance Platform. Available at https://leap.unep.org/countries/gh/case-studies/ghana [accessed on 14/10/2022]

Ding, Y., Zhao, J., Liu, J.W., Zhou, J., Cheng, L., Zhao, J., Shao, Z., Iris, Ç., Pan, B., Li, X. and Hu, Z.T. (2021). A review of China's municipal solid waste (MSW) and comparison with international regions: Management and technologies in treatment and resource utilization. *Journal of cleaner production*, 293, 126144.

Dixit, A., Singh, D., and Shukla, S. K. (2022). Changing scenario of municipal solid waste management in Kanpur city, India. *Journal of Material Cycles and Waste Management*, 24:1648–1662. https://doi.org/10.1007/s10163-022-01427-4

Du, L., Zuo, J., Chang, R., Zillante, G., Li, L., and Carbone, A. (2023). Effectiveness of solid waste management policies in Australia: An Exploratory Study. *Environmental Impact Assessment Review*, 98, 106966.

Eliyana, A., and Ma'arif, S. (2019). Job satisfaction and organizational commitment effect in the transformational leadership towards employee performance. *European Research on Management and Business Economics*, *25*(3), 144-150.

Fobil, J., Kolawole, O., Hogarh, J., Carboo, D., and Rodrigues, F. (2010). Waste Management Financing in Ghana and Nigeria–How can the concept of Polluter-Pays-Principle (PPP) work in both countries. *International Journal of Academic Research*, 2(3), 139-142.

Gandy, M. (1993). Recycling and Waste: An Exploration of Contemporary Environmental Ghana Statistical Service. *GSS Estimated Statistics*, 2021.

Ghernaout, D. and Elboughdiri, N. Plastic Waste Pollution Worsen by the COVID-19 Pandemic: Substitutional Technologies Transforming Plastic Waste to Value Added Products. Open Access Library Journal, 8, 1-12. (2021).

Guerrero, L. A., Maas, G. and Hogland, W. (2013). Solid waste management challenges for cities in developing countries. *Waste management*, *33*(1), 220-232.

Guo, W., Xi, B., Huang, C., Li, J., Tang, Z., Li, W., Ma, C. and Wu, W. (2021). Solid waste management in China: Policy and driving factors in 2004–2019. *Resources, Conservation and Recycling*, 173, 105727

Gutberlet, J., and Uddin, S. M. N. (2017). Household waste and health risks affecting waste pickers and the environment in low-and middle-income countries. *International journal of occupational and environmental health*, 23(4), 299-310.

Gutierrez de Almeida, M. D. F., Figueiredo, P. S. and Dantas, J. The socioeconomic

conditions of waste pickers in bahia, and an evaluation of a workforce restructuring: a multiple case study. *Environmental and Social Management Journal/Revista de Gestão Social Ambiental*, *11*(1), 2017.

Hartmann, C., Hegel, C. and Boampong, O. The forgotten essential workers in the circular economy? Waste picker precarity and resilience amidst the COVID-19 pandemic. *Local Environment*, 1-15, 2022.

Hossain, M. S., Santhanam, A., Norulaini, N. N. and Omar, A. M. Clinical solid waste management practices and its impact on human health and environment–A review. *Waste management*, *31*(4), 754-766, 2011.

Huang, Q., Chen, G., Wang, Y., Xu, L., and Chen, W. Q. (2020). Identifying the socioeconomic drivers of solid waste recycling in China for the period 2005–2017. *Science of the total environment*, 725, 138137.

Implications for Modernization Strategies and Resilient Cities in Developing Countries. In *Strategies of Sustainable Solid Waste Management*, 3, 25-47 (2020).

Joshi, R., and Ahmed, S. (2016). Status and challenges of municipal solid waste management in India: A review. *Cogent Environmental Science*, 2(1), 1139434.

Kanat G. (2010). Municipal Solid Waste Management in Istanbul. Waste Management 30 1737-1745. Science Direct, Elsevier.

Karim, M. R., Islam, M. T. and Talukder, B. COVID-19′ s impacts on migrant workers from Bangladesh: In search of policy intervention. *World Development*, *136*, 105-123, 2020.

Kwawe, B.D (1995). Culture of Waste Handling: Experience of a Rural Community, *Journal of Asian and African Studies*, 30: 1-2.

Kyere, R., Addaney, M., and Akudugu, J. A. (2019). Decentralization and Solid Waste Management in Urbanizing Ghana: Moving beyond the Status Quo. In (Ed.), Municipal Solid Waste Management. *IntechOpen*. https://doi.org/10.5772/intechopen.81894

Lissah, S. Y., Ayanore, M. A., Krugu, J. K., Aberese-Ako, M. and Ruiter, R. A. Managing urban solid waste in Ghana: Perspectives and experiences of municipal waste company managers and supervisors in an urban municipality. *PloS one*, *16*(3), 2021.

Lissah, S. Y., Ayanore, M. A., Krugu, J. K., Aberese-Ako, M., and Ruiter, R. A. (2021). Managing urban solid waste in Ghana: Perspectives and experiences of municipal waste company managers and supervisors in an urban municipality. *PloS one*, 16(3), e0248392.London.

Majeed, A., Syeda A. B., and M. N. Chaudhry. (2018). Environmental quantification of the existing waste management system in a developing world municipality using EaseTech: The case of Bahawalpur, Pakistan. *Sustainability* 10 (7): 2424.

Mensah, J. (2019). Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review. *Cogent social sciences*, *5*(1), 1653531.

Miezah, K., Obiri-Danso, K., Kádár, Z., Fei-Baffoe, B., and Mensah, M. Y. (2015). Municipal solid waste characterization and quantification as a measure towards effective

waste management in Ghana. *Waste management*, 46, 15-27.

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

Milios, L., Esmailzadeh Davani, A. and Yu, Y. (2018). Sustainability impact assessment of increased plastic recycling and future pathways of plastic waste management in Sweden. *Recycling*, *3*(3), 33.

Ministry of Local Government and Rural Development – Environmental Health and Sanitation Directorate (MLGR-EHSD). (2010). National Environmental Sanitation Strategy and Action Plan NESSAP: materials in transition MINT, Accra, Ghana: Ghana, Ministry of Local Government and Rural Development. Available at: https://www.ircwash.org/sites/default/files/MLGRD-2010-National.pdf. [accessed on 8/10/2022]

Ministry of Sanitation and Water Resources (MSWR). (2020). National Solid Waste Management Strategy for Ghana.Republic of Ghana. Available at https://ghanawasteplatform.org/wp-content/uploads/2021/11/National-Solid-Waste-Management-2020.pdf [accessed on 12/10/2022]

Muheirwe, F., Kombe, W., and Kihila, J. M. (2022). The paradox of solid waste management: A regulatory discourse from Sub-Saharan Africa. *Habitat International*, 119, 102491.

Muthelo, D., Owusu-Sekyere, E. and Ogundeji, A. A. (2019). Smallholder farmers' adaptation to drought: identifying effective adaptive strategies and measures. *Water*, *11*(10).

Nanda, S., and Berruti, F. (2021). Municipal solid waste management and landfilling technologies: a review. *Environmental Chemistry Letters*, 19(2), 1433-1456.

Nzeadibe, T. C. and Ejike-Alieji, A. U. Solid waste management during Covid-19 pandemic: policy gaps and prospects for inclusive waste governance in Nigeria. *Local Environment*, *25*(7), 527-535, 2020.

O'Brien, E. (2003). Employers' benefits from workers' health insurance. *The Milbank Quarterly*, *81*(1), 5-43.

Ocran L. (2006). Waste Management Would Reserve the Fading Value of Ghana as a Tourist Site, The Chronicle, Wednesday June 7 Edition.

Oduro-Appiah, K., and Afful, A. (2020). Sustainable Pathway for Closing Solid Waste Data Gaps: Implications for Modernization Strategies and Resilient Cities in Developing Countries. *Strategies of Sustainable Solid Waste Management*.

Ofori-Adjei, D., Lartey, M. and Koram, K. A. Ghana and the COVID-19 pandemic. *Ghana Medical Journal*, *54*(4s), 1-2, 2020.

Oninku, E. A. The "veronica bucket" and the inventive step requirement under the patent law of Ghana: The "veronica bucket" and the inventive step requirement under the patent law of Ghana. *UCC Faculty of Law Journal*, *1*(2), 395-418, 2021.

Oteng-Ababio, M. Private sector involvement in solid waste management in the Greater Accra Metropolitan Area in Ghana. *Waste Management and Research*, *28*(4), 322-329, 2010

Owusu-Sekyere, E. (2019). Creative individuals,"Kaya Bola" exceptionalism and sustainable development in twenty-first century Ghana. *Journal of Global Entrepreneurship Research*, *9*(1), 1-17.

Owusu-Sekyere, E. (2019). Creative individuals,"Kaya Bola" exceptionalism and sustainable development in twenty-first century Ghana. *Journal of Global Entrepreneurship Research*, *9* (1), 1-17.

Owusu-Sekyere, E., Osumanu, I. K., and Abdul-Kadri, Y. (2013). An analysis of the plastic waste collection and wealth linkages in Ghana. *International Journal of Current Research* 5(1), 205-209. Policy, Avebury Press, Aldershot, England

Prajapati, K. K., Yadav, M., Singh, R. M., Parikh, P., Pareek, N., and Vivekanand, V. (2021). An overview of municipal solid waste management in Jaipur city, India-Current status, challenges and recommendations. *Renewable and Sustainable Energy Reviews*, 152, 111703.

Rohilla, S. K., Agyenim, F. B., Luthra, B., Padhi, S. K., Quashie, A. S., and Yadav, A. (2019). Integrated wastewater and faecal sludge management for ghana draft

guidelines.

Sasaki, N., Kuroda, R., Tsuno, K. and Kawakami, N. Workplace responses to COVID-19 associated with mental health and work performance of employees in Japan. *Journal of occupational health*, *62*(1), 2020.

Samsudin, M. D. M., and Don, M. M. (2013). Municipal solid waste management in Malaysia: current practices, challenges and prospects. *Jurnal Teknologi*, *62*(1).

Sarmento, P., Motta, M., Scott, I. J., Pinheiro, F. L., and de Castro Neto, M. (2022). Impact of COVID-19 lockdown measures on waste production behavior in Lisbon. *Waste Management,* 138, 189-198.

Shammi, M., Behal, A. and Tareq, S. M. The escalating biomedical waste management to control the environmental transmission of COVID-19 pandemic: A perspective from two south Asian countries. *Environmental Science and Technology*, *55*(7), 4087-4093, 2021.

Sharma, H. B., Vanapalli, K. R., Cheela, V. S., Ranjan, V. P., Jaglan, A. K., Dubey, B., Goel, S. and Bhattacharya, J. (2020). Challenges, opportunities, and innovations for effective solid waste management during and post COVID-19 pandemic. *Resources, conservation and recycling*, 162, 105052.

Sharma, K. D., and Jain, S. (2020). Municipal solid waste generation, composition, and management: the global scenario. Social Responsibility Journal, 16(6), 917-948.

Singh, A., Zaidi, J., Bajpai, D., Sharma, G., Yadav, A., Chauhan, D. S. and Ganesh, S. (2014). Municipal solid waste management challenges and health risk problematic solutions at Agra city, UP, India. *Adv Appl Sci Res*, *5*, 397-403.

Silva, A. L. P., Prata, J. C., Walker, T. R., Campos, D., Duarte, A. C., Soares, A. M., ... and Rocha-Santos, T. (2020). Rethinking and optimising plastic waste management under COVID-19 pandemic: policy solutions based on redesign and reduction of single-use plastics and personal protective equipment. *Science of the Total Environment*, *742*, 140565.

Sivasankaran, P., Mohammed, E.B., Ganesan, N. and Durai, R. Storage and Safe Disposal of Unwanted and Expired Medicines: A Descriptive Cross-Sectional Survey Among Indian Rural Population. *Journal of Young Pharmacists*. 10(5530), 2018.

Victoire, A., Martin, N. V., Abias, M., Pacifique, U., and Claude, M. J. (2020). Solid Waste Management Challenges and Its Impacts on People's Livelihood, Case of Kinyinya in Kigali City. *Journal of Geoscience and Environment Protection,* 08(06), 82–96.

https://doi.org/10.4236/gep.2020.86007

Water and Sanitation Program. (2012). Economic impacts of poor sanitation in Africa: Ghana. Africa: economics of sanitation initiative. Accessed on [5/02/2022] from https://www.ircwash.org/resources/economic-impacts-poor-sanitation-africa-ghana

Wiggins, S., Marfo, K., and Anchirinah, V. (2004). Protecting the forest or the people? Environmental policies and livelihoods in the forest margins of Southern Ghana. *World development*, *32*(11), 1939-1955.

Wilson, D. C., and Webster, M. (2018). Building capacity for community waste management in low-and middle-income countries. *Waste Management and Research*, 36(1), 1-2.

World Bank. From Waste to Resource-Shifting Paradigms for Smarter Wastewater Interventions in Latin America and the Caribbean*: Background Paper II. Showcasing the River Basin Planning Process through a Concrete Example-The Río Bogotá Cleanup Project*. World Bank, 2019.

World Health Organization. *Mental health and psychosocial considerations during the COVID-19 outbreak, 18 March 2020* (No.WHO/2019-nCoV/Mental Health/2020.1), 2020.

Appendix: Questionnaire Survey of waste management workers in Ghana

This survey is to better understand how your work environment can be related to waste management efficiency. I want to find out how your work environment can be improved in the future and, at the same time, your productivity can be improved. Results from this survey will be part of my doctoral dissertation and academic research only. Your personal information, if any, will not be shared with third party individual or organization. If you kindly agree to help me on this survey, please proceed with answering the following questions. Thank you very much in advance.

ASSESSMENT OF WORKING CONDITIONS OF WASTE MANAGEMENT WORKERS

Date…….

I. Socio-Demographic Characteristics

1. Gender ☐ Male ☐ Female
2. Age: Less than 30 yrs ☐ 30-50 yrs ☐ 51-60 yrs ☐ Above 60 y ☐
3. Marital status: Married ☐ Single ☐
4. Education completed

   ☐ Junior High School Certificate ☐ Senior High School Certificate

   ☐ Bachelor's degree/HND

   ☐ Other (Please specify)

   ……
5. How many years have you worked as waste management personnel?

   ☐ Less than 2 years ☐ 2-5 years ☐ 6-10 years ☐ Above 10 years
6. Kindly indicate your current position in your workplace.

   …….

II. WORK CONDITIONS RELATED MATTERS

7. Do you receive the following benefits in your organization?

Benefit	Yes	No	Not Sure
a. Social Security Benefits			

Benefit	Yes	No	Not Sure
b. Health/Medical Insurance			
c. Other Insurance Benefits (e.g. Life, Child education etc.)			
d. Transport Allowance			
e. Risk Allowance			
f. Food Allowance			
g. Rent/Housing Allowance			
h. Clothing Allowance			
Other benefits/bonuses, please specify:			

8. Do you have access to the following tools/equipment provided by your organization?

Tool/Equipment	Yes	No	Not sure
a. Personal Protective Equipment (PPE) e.g. Coveralls, vests, gloves, goggles, boot etc.			
b. Vehicles (Trucks, tricycles etc.)			
c. Waste Collection Tools e.g. Rakes, wheel barrows, shovels, brooms etc.			
d. Waste Collection Bins			

9. Your working conditions directly influence your work output

☐ Strongly Disagree Disagree ☐ Neutral Agree ☐ Strongly ☐ Agree

10. Kindly indicate how your working conditions influence your work output

Highly motivate me to do more ☐ Discourages me not to do more ☐

Motivate me to do more ☐ Highly discourages me not to do more ☐

It does not affect my output ☐

11. How many hours a day do you work? _____

12. How much are you paid? GHS _____

13. Are you satisfied with the payment you receive? ☐ Yes ☐ No Not Sure ☐

14. Have you been injured in the past during your work? ☐ Yes ☐ No ☐ Not Sure

15. If so, did you receive any health insurance benefit? ☐ Yes ☐ No

16. Can you be compensated if your injury makes you incapable to work?

Yes ☐ No ☐ Not Sure ☐

17. How would you rate your overall satisfaction with your current working conditions on a scale of 1 (minimum) to 10 (maximum)?

1	2	3	4	5	6	7	8	9	10

18. What challenges do you encounter in your work?

☐ Lack of protective devices ☐ Lack of company regulations ☐ Long hours of work

☐ Poor medical care ☐ Frequent burns ☐ Poor remuneration

☐ Social Stigmatization ☐ Cuts to hands and feet ☐ Heavy workloads

☐ Other_____

COVID-19 RELATED ISSUES

19. Are you aware of Covid-19 ☐ Yes ☐ No ☐ Not sure

20. If yes, how do you get information about Covid-19

Radio ☐ ☐ Friends

Television ☐ ☐ News papers

Social Media ☐ ☐ Other

21. Are you aware of the Covid-19 safety protocols? ☐ Yes ☐ No ☐ Not sure

22. Which of the following safety protocols are available in your organization?

Veronica buckets ☐ Disinfectants ☐ ☐ Other _____

Hand sanitizers ☐ Hand gloves ☐

Nose masks ☐ Soap ☐

23. How do you protect yourselves against Covid-19 while working?

We wear face masks ☐ ☐ We use hand sanitizers on site

We wash our hands frequently ☐ ☐ We keep social distance on site

We wear hand gloves ☐ ☐ Other_____

24. How often do you wash your hands or apply hand sanitizers on site?

☐ After every single collection ☐ None

☐ Three times a day ☐ Other_____

☐ After a day's work

25. In case of sickness like fever, do you know where to contact?

Yes ☐ No ☐ Not Sure ☐

26. How often do you have days off from work due to the Covid-19 infection?

☐ Once a week ☐ Once in two weeks

☐ More than once a week ☐ Other_____

27. Are you worried about covid-19 at your work place? ☐ Yes ☐ No

28. If yes, why are you worried?

We might get infected ☐ ☐ We might get more stigmatized as waste workers

We might lose the job ☐ ☐ Other_____

Our remuneration may be reduced ☐

29. Kindly indicate the extent to which you agree with each of the following statements with a tick (√) where 1 is Strongly Disagree and 5 is Strongly Agree

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
The government reasonably protect employees from being infected?					
I feel safe enough to work in this season.					
It is important to carry disinfectants during my work.					
My uniforms need to be cleaned properly.					

III. WORK CONDITIONS AND WASTE MANAGEMENT EFFICIENCY

30. Kindly indicate the extent to which you agree with the following statement where 1 is strongly disagree and 5 is strongly agree.

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5
More investment should be made to improve waste collection safety.					
Every employee in garbage collection needs proper PPEs (e.g. Coveralls, vests, gloves, goggles etc).					
Vehicles and trucks must be designed to reduce my actual contact with garbage handling.					

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Waste collection tools like lakes, wheelbarrows, shovels, brooms can improve garbage collection efficiency.					
Training on garbage collection and handling under threat like COVID-19 can better protect me at work.					

31. Do you have your own methods to protect yourself from COVID-19 at work? If so, please share your ideas.

    _____

    _____

    __

32. How do you think sanitation can be improved in this Municipality?

    _____

    _

IV. EMPLOYMENT AND EMPLOYEE RELATIONS

33. Please tick (√) your answer in the box provided based on the scale of 1 to 5 in terms of employment relations where 1 is Strongly Disagree and 5 is Strongly

Statement	Strongly Di	Disagree	Neutral	Agree	Strongly A
	1	2	3	4	5
I am fairly satisfied with the level of salary I receive.					
I receive recognition when I perform above expectations.					
My company value my view when making a					

decision.					
The working relationship between my union and company is cordial, which is comfortable for me.					
I receive periodic training on waste collection from experts.					
I receive adequate feedback and guidance from my supervisor.					
I am treated fairly by my supervisor.					

Thank you for your cooperation.