

## **Mapping the Realities of Waste Crime in Urban Ghana**

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### **Abstract**

The management of solid waste in Ghana is daunting. Despite the introduction of new technologies including waste-to-energy projects, poor solid waste management (SWM) and its signifiers still dominate the daily lives of the people. This article uses the concept 'waste crime' to discuss the negative practices associated with SWM in Kumasi, Ghana. Specifically, it presents the nature of waste crime and how it can be minimized using empirical field data obtained from household heads and institutions involved with SWM through the mixed method design. The results revealed that waste crime was pervasive, existed in many forms and occurred along the entire SWM chain. Poor implementation of policies, insufficient enforcement of environmental regulations and lack of punishment on infractions for illegal SWM were identified as contributing to the phenomenon. The paper argues that if the negative practices associated with SWM are not discussed in the context of crime, policy suggestions on the phenomenon in Ghana might be incomplete.

### **Keywords:**

crime script, Ghana, Kumasi, solid waste, waste crime.

## Introduction

A common characteristic that defines cities in developing countries in the 21st century is growing urban population and increasing production and consumption pattern (World Bank, 2018). Estimates by the United Nations (2014) indicate that about 53% of the world's population live in cities and that this figure is expected to reach 68% by 2050, with a greater percentage of this figure living in developing countries. This projection means that systems must be put in place to accommodate the corresponding increase in solid waste generation from the growing population. Good systems are needed because as Pellow (2002) puts it, solid waste is part and parcel of life and is an unavoidable function of population growth and consumption. For instance, statistics from the World Bank indicate that approximately 1.3 billion tonnes of waste are generated per year, and that without any structural changes in population growth and consumption patterns, waste generation is expected to increase to approximately 13.1 billion tonnes per year by 2050 (World Bank, 2018). Significantly, the expected increase means that the per capita waste generation rates will also increase from 1.2 to 1.42 kg per person per day.

Since the monumental Environment and Development Conference brought the issue of environmental degradation on the platform of international political agenda (World Bank, 2018), the search for sustainable solid waste management (SWM) has become a popular story of hope but without a happy ending in sight, of incremental development against an ever more crucial call for swift decision making among city authorities in developing countries (Gyimah, 2018; Alhassan *et al*, 2018). So far, the Integrated Sustainable Waste Management (ISWM) model is the popular model that countries have adopted to guide SWM in their cities. The model helps in understanding the multi-dimensional systems of SWM in an integrated manner (Ali, 2010). Even with the popularity ISWM, countries in sub-Saharan Africa are still struggling to provide effective SWM services (Ali, 2010). Kumasi, the second largest city in Ghana, is not insulated from the SWM challenges (Oteng-Ababio *et al*. 2017; Owusu-Sekyere, 2019). Effective SWM in the city is challenged by inadequate infrastructure, inaccessible and narrow road networks, chronic under financing and inadequate human resources (Amoah *et al*, 2018; Owusu-Sekyere, 2019). These challenges also hamper city authorities' ability to enforce SWM laws, a situation that has compelled city dwellers to adopt 'dump - it - anywhere' attitude. These negative practices violate existing SWM legislations in Ghana. Such violations are described in environmental management literature as waste crime (WC) (Global Times, 2014; European Commission, 2015). Put differently, WC involves managing waste in a manner that contravenes existing local, national and global waste management legislations.

A deep search through the literature revealed that a number of studies have been conducted in the area of poor SWM in Ghana. The available studies cover a range of issues including

irregular waste collection; street littering; lack of adequate landfilling facilities and limited source separation among others (see Amfo-Otu et al., 2013; Oteng-Ababio et al. 2017; Gyimah 2018; Alhassan *et al*, 2018; Amoah et a., 2018; Owusu-Sekyere, 2019). This paper adds to the growing literature on the phenomenon. It tilts the negative practices associated with SWM and reframes it in the context of crime. Specifically, it discusses the nature of WC; the perpetrators and how it can be minimized. The paper argues that if the negative practices associated with SWM are not criminalized, policy suggestions on the phenomenon in Ghana might be incomplete. The article is divided into six sections. The introduction section is followed by section two which presents literature on WC. Section three delves into the institutional and legal framework governing waste management in Ghana while section four outlines the research methodology. In section five, the results of the study are presented while the final section presents the conclusion and recommendations.

### **Waste and Crime: conceptual perspective**

As a precursor to understanding the WC concept, it is important to contextualize the two terms – waste and crime. Waste as a concept has been a subject of several interpretations (Oteng-Ababio, 2014). Depending on the material type or location, waste, also called garbage or junk and so on, invokes a complex, subjective and conceivably controversial understanding (World Bank, 2018). Irrespective of the controversy surrounding its conceptualization, waste can generally be described as an unwanted or out-of-use material which if not properly disposed of can impact human health negatively (Adarkwa, 2012). The complexity and controversies of what constitute waste is seen in the multiplicity of descriptions ascribed to it. For instance, Gandy (1994) discusses waste from the environmental politics perspective. On his part Manton (2013) believes waste connotes a series of social and technical practices converging on the circulation and management of human activities. For Bickerstaff and Simmons (2009), waste is risk; to Moore (2009), waste is part of the modern development processes and the list is endless. Table 1 presents some useful definitions.

**Table1:** Multiple definitions and meanings ascribed to waste

Organization	Definition	Source
Eionet	Waste includes things or items that are no longer needed by the owner and for which the owner intends to or has already disposed of.	<a href="http://scp.eionet.europa.eu/themes/waste">http://scp.eionet.europa.eu/themes/waste</a>
Full cycle	It is any unwanted material or substance from factory processes or household activities	<a href="http://www.fullcycle.co.za/index.php/what-iswaste">http://www.fullcycle.co.za/index.php/what-iswaste</a>
Basel convention	Any object or substance which is discarded or is intended to be discarded in line with national laws.	<a href="http://www.basel.int">http://www.basel.int</a>
UN Statistics Division	It is a material for which the owner has no further use	<a href="http://unstats.un.org">http://unstats.un.org</a>
EU	Waste is any material for which the owner is required to discard	<a href="http://ec.europa.eu/environment/waste/">http://ec.europa.eu/environment/waste/</a>
OECD	Waste is a material other than radioactive materials intended to be discarded	<a href="http://www.oecd.org">http://www.oecd.org</a>
UNEP	Any object or substance which is discarded or is intended to be discarded guided by the provisions of national law	<a href="http://www.unep.org/greeneconomy">http://www.unep.org/greeneconomy</a>
European EPA	Any substance which may be described as scrap materials or any effluent or unwanted surplus substance which requires to be disposed of.	<a href="http://www.nwcpo.ie">http://www.nwcpo.ie</a>

What is common among all the definitions is that waste is unwanted or unusable materials that come from sources such as households, industry and agriculture.

Conceptually, crime may be defined from different perspectives by different societies. Crime or “crimen”, a Latin word, literally means an offence or wrong-doing and considered as an anti-social behaviour (Europol, 2011). It refers to a specific act committed in violation of the law or put differently, an act or omission which constitutes a misdemeanor and is punishable by law (EC, 2007). In general terms acts such as murder, robbery, burglary, rape, drunken driving, child neglect and failure to pay taxes are considered as dangerous crimes and are frowned upon and punished by societal laws. There is another form of crime that has often not attracted attention of criminal systems of nation states but that can have a long term retardation of social progress - that is WC (Europol, 2011; Baird et al., 2014; EPA, 2014). It refers to the illegal management of waste (Baird et al., 2014). It may also involve the prohibited ejection and transport of or trade in hazardous and non-hazardous waste (Grant and Oteng-Ababio, 2012). Europol (2011) for example, describes WC as the deliberate refusal of people to deal with waste in accordance with set regulations. It is committed when people pass on their waste to people who they know will not deal with it properly (ibid). In this case, the waste generator and the collector are both committing the crime.

The European Commission, in 2015, defined WC to include crime committed intentionally, out of negligence and involving large scale harm (EC, 2007). It is an offence committed deliberately, which causes or is likely to cause substantial damage to the environment. It may consist of unlicensed waste operations including storage, treatment and unlawful ejections, unauthorised abstractions and illegitimate emissions to air (SEPA 2013). It is a ‘sister’ offence to illicit pollution and incorporates dumping of waste. It may also include unapproved landfill sites; unlicensed skip hire operators; unlawful breaking of scrap and unauthorised export of waste electrical and electronic equipment (EPA 2014). INTERPOL (2016) observes that WC comprises the trafficking of electronic equipment, ozone depleting substances, end of life vehicles and used tires among others. As indicated by Huisman and van Erp (2013), WC can refer to administrative/regulatory violations as well as breaches of criminal laws. Walters (1990) argues that the concept is often used synonymously with “green crime” or “environmental crime”. Situ and Emmons (2000) believe that WC can be situated within domestic and international legal frameworks, arguing that it is an act that violates the law and is therefore subject to criminal prosecution and criminal sanction.

Rucevska et al. (2015) explain that the effects of WC on people and the environment are enormous. It blights communities and causes pollution. According to Interpol (2016), WC has serious and adverse effects on the planet, biodiversity and human life and needs to receive higher attention on the political agenda nationally, regionally and globally.

But even in the face of the associated negative effects, Daele et al. (2007) describe it as a victimless crime and that victims may be unaware of how it can negatively affect unborn generations. The literature posits that committers of WC seek to benefit from their criminal behaviour not because there is absence of law but because the gains far outweigh the consequences (EC, 2007; Rucevska et al. 2015). Put differently, waste criminals commit the crime not by chance but by choice (Nagin 2007). This perspective assumes that all forms of WC activities are based on individual choice that is the result of personality decision-making processes. This means that in thinking about committing WC, the offender considers the related costs and benefits (McCarthy 2002). In that regard, one can then assume that WC is committed because the criminals believe and appreciate the fact that the benefits of indiscriminate dumping of solid waste far outweigh the consequences (punishment) associated with committing the crime. In other words, WC is committed wilfully.

## **Waste Management in Ghana: Legislations and Policies**

Ordinarily, waste generation in itself should not be a problem if it is managed sustainably. Sustainable SWM includes the many processes that are involved in handling solid waste at every chain from generation, re-use and to final disposal. At the generation point, emphasis is often laid on waste minimization or source reduction (Alhassan et al, 2018; World Bank, 2018). Minimization includes an attempt to reduce the quantity of waste that is generated at source (Binyaruka, 2015). The aim is also to reduce the volumes of waste that are sent to final disposal sites. Waste minimization processes should therefore take place at every stage of consumption from design, manufacture, purchase, or use of materials to reduce the amount or toxicity of waste generated (Sama and Mbwangye, 2017). Recycling is another principle underpinning sound SWM. The principle recognizes the resource potential inherent in waste and suggests that if proper source separation and recycling systems are put in place, a significant quantity of waste can be diverted from landfills and converted into resource (Oteng-Ababio, 2014). Final disposal is the last on the SWM chain and it is regarded as the oldest form of SWM (World Bank, 2018). Final disposal sites are usually constructed facilities or open spaces specifically set aside for waste disposal and must conform to international best practice. The overall objectives of the key principles underlying proper SWM are to improve the urban built environment, ensure public health benefits, make scarce resources available and increase economic productivity (Priestley & Bennett 2015).

To be able to understand the nature and extent of WC, it is important to gain insight into the laws governing SWM in Ghana. The policies and legal frameworks are embodied in a lot of scattered legislations and policies. They include Public Health Act, 2012; the revised Sanitation Policy of 2010; Local Government Act 462 and, Act 490 of the

Environmental Protection Agency (EPA) among others (Owusu-Sekyere et al., 2015). These regulations stipulate, among other things that the disposal of solid waste must be in accordance with the standards and procedures that do not compromise public health. SWM is the responsibility of the Ministry of Sanitation and Water Resources while the EPA plays regulatory functions by setting the general principles for which waste could be managed. With constitutional mandate to oversee the development of the various Metropolitan, Municipal and District Assemblies, the Ministry of Local Government, through the waste management departments of the various Assemblies oversee the collection and final disposal of solid waste (Oteng-Ababio et al., 2017).

Furthermore, the EPA is responsible for regulating the type; substances to be released into the environment, and substances deemed as hazardous to the environment. The EPA has developed basic SWM policies indicating that solid waste should be managed in line with the agreed standards and procedures as enshrined in the EPA Act 490. Secondly, waste generated by industrial outlets should be disposed at approved disposal sites and the management of hazardous wastes should be guided by the stringent procedures prescribed by the appropriate regulatory agencies. As an attempt to ensure that solid waste is disposed in line with international best practice, the EPA has developed the Ghana Landfill Guidelines which provides the procedures for how landfill should be managed including criteria for landfill site selection, waste spreading, compaction and other general management procedures (EPA, 2002). As a complement to the EPA laws, the Criminal Code (Act 29) of Ghana has outlined the punishment and prosecution regimes for individuals and institutions who deliberately and indiscriminately dispose waste at unapproved sites.

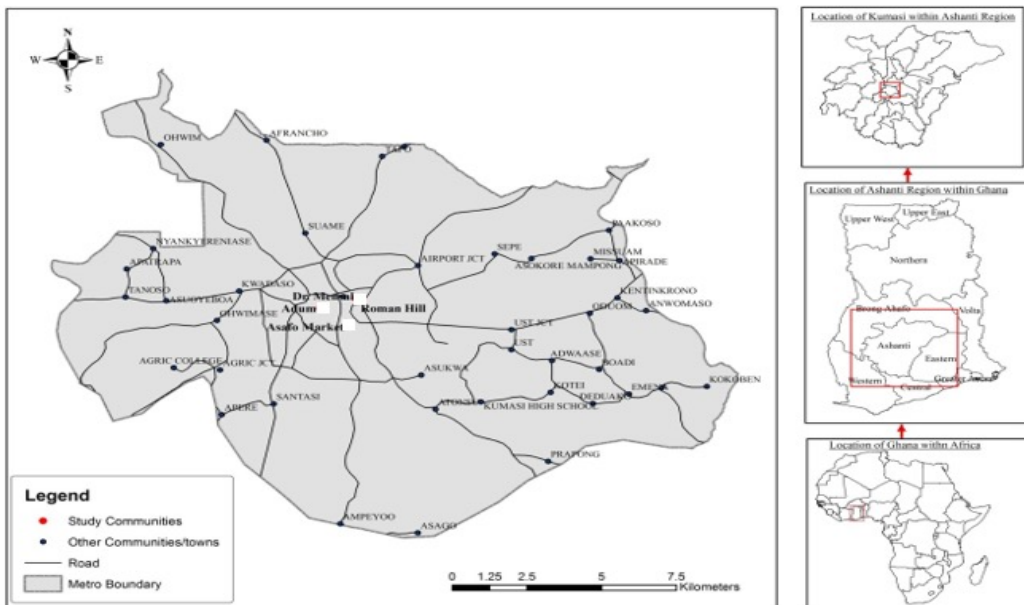
Additionally, the National Building Regulation of 1996 (LI 1630) and Ghana Building Code of 2018 have laws regulating SWM in Ghana. For instance, the National Building Regulation specifies that a landed property for residential or commercial purposes as well as facilities for civic or cultural use must have a designated site reserved for waste disposal. The Regulation further enjoins all houses and commercial facilities to have acceptable dustbins that are commensurate with the number of users of the facilities for waste generated to be stored temporarily before final disposal. The National Building Regulation mandates local authorities responsible for waste management to designate sites as transfer stations within communities where communal waste can be dumped before final disposal. It indicates that characteristically, transfer stations should not be located far from the reach of community members and such sites should be protected from the harsh weather conditions. In addition to the general national laws that have been outlined, local Assemblies in Ghana have developed by-laws, regulatory and legislative instruments for SWM. Some of the by-laws among other things state that where the Assembly has demarcated a specific site for waste disposal, it is illegal for any person

or institution to dispose waste or any offensive or objectionable matter on the street, in a yard, in homes or any open space. The by-laws further prescribe the punishment for offenders, namely fines, imprisonment or both. Even though this paper could not capture all the laws and policies guiding solid waste management in Ghana, it has provided ample evidence that there are commitments on the part of officialdom to nip in the bud the issue of poor SWM.

## Methodology

### Study area

The study was conducted in Kumasi, the regional capital of the Ashanti Region of Ghana (Figure 1). Significantly, the city links Ghana to several countries in the West African sub-region such as Burkina Faso, Mali, Chad, Niger and many others due to its central location. It has therefore become an important centre of trade not only for Ghanaians but for other international jurisdictions (Adarkwa, 2012).



As of the year 2000, the official statistics from the Ghana Statistical Service put the population at 1 million. By 2010, the population had increased to 2.1 million and current estimates put the population between 2.5 - 3 million (GSS, 2012). This phenomenal increase in population coupled with increase in production has directly impacted on solid waste generation. The quantity of solid waste generated in Kumasi on daily basis is between 2000-2500 tonnes (Owusu-Sekyere, 2019). Much of the waste generated is left



uncollected while the collected waste is deposited at unapproved disposal sites. Not even the huge investment in the Dompase engineering landfill and the involvement of the private sector have been able to nip the problem.

### **Data collection**

Data collection was done in three stages. In the first stage of data collection, a multistage sampling technique was adopted to select five research localities based on population density, extent of physical planning and challenges with waste management provided by the Metropolitan Assembly. Based on the stated criteria, five locations namely Aboabo, Asewaase, Kwadaso, Awhiaa and Abrepo were selected. Taking a cue from a similar study conducted in Kumasi on environmental management (see Amoah et al., 2018) the systematic random sampling method was then used to select 25 housing units equally from each research site. In all 125 housing units from the 5 research localities were selected for the questionnaire survey. This was done by dividing a quota assigned to a community by the total number of housing units in each community. The result of that was the Kth value which was used for the systematic random sampling exercise. For every Kth house, a single household head was selected for the questionnaire survey until a quota to a community was exhausted. The questionnaire sought views on where study participants dispose waste, why they dispose waste where they do, their knowledge about the waste management laws and their knowledge on whether or not disposing waste as prescribed by the laws constitutes crime. This was done over a period of five months (November, 2018 to March, 2019). The questionnaires were administered using the face-to-face method, usually on Saturdays and Sundays, and also between 0500GMT and 0630GMT. This is the period where most of the household heads who were earlier contacted via telephone calls had agreed to participate.

The second stage of our data collection involved six in-depth interviews with experts from the waste management sector in the Metropolis and a legal advisor from the Legal Aide Board. While the waste management experts provided information on challenges to service delivery and some operational activities, the legal advisor gave insights on available legislations and their interpretation and proffered remediation on combating WC. As a way of fertilizing the responses from the survey, five household heads who were willing to throw more light on the phenomenon were interviewed. During the interviews, audio recording and notes were taken in order to reduce biases and to ensure the validity of the information gathered. The third stage of data collection involved extensive visits and observations at the various illegal dumping sites, waste management operations of the statutory mandated institutions and other individuals. The pictures that were taken during the direct observations helped in verifying and nullifying some of the data that was obtained in the face-to-face encounters.

### Data analysis

Data analysis was done in two different phases; the qualitative data were transcribed, cleaned, familiarized and summarized into categories and sub-categories. Codes ranging from 1- 5 were assigned to heads of household who participated in the interviews. The codes helped in concealing respondents' identity for confidentiality and ethical reasons. The responses from the interviews were later reduced through identified patterns and interpreted. For quantitative analysis, the Chi-square test was used to examine the factors that encourage people to commit WC. This method is appropriate because the dependent variable, WC is a binary variable (i.e. 1= if a respondent commits WC and 0 = otherwise) and the independent variables are nominal (Stigler, 1999). The Pearson Chi-square test model is expressed in equation 1 as:

$$\chi^2 = \sum_{i=1}^w \sum_{j=1}^v \frac{(OB_{ij} - EX_{ij})^2}{E_{ij}} \quad (1)$$

$\chi^2$  represents the Chi-square test of independence,  $OB_{ij}$  is the value of the two nominal variables that are observed and  $EX_{ij}$  is expected value of two nominal variables. The degree of freedom is presented as  $df = (w-1)(v-1)$ , where  $w$  is the total number of rows and  $v$  the total number of columns.

Hence,  $EX_{ij}$  is computed as:

$$EX_{i,j} = \frac{\sum_{k=1}^v OB_{i,j} \sum_{k=1}^w OB_{k,j}}{N} \quad (2)$$

Where  $EX_{i,j}$  represents the expected value,  $\sum_{k=1}^v OB_{i,j}$  sum of the  $i_{th}$  column,  $\sum_{k=1}^w OB_{k,j}$  sum of the  $k_{th}$  row and  $N$  total number. The null hypothesis for the Chi-square test is: there is no association between the dependent and independent variables. Thus, the null hypothesis is rejected and the alternative accepted if the critical Chi-square value is less than the calculated Chi-square at a pre-determined probability level, preferably 10%. The variables adopted for the analysis were based on previous empirical research (Keller and Cernerud, 2002; Almaiah & Man, 2016; Alhabeeb & Rowley, 2017). Table 2 presents the definition and measurement of the variables used in the analysis.

**Table 2:** Definition and measurement of variables

Variable	Description	Measurement
<i>Dependent variable</i>		
WC	Dispose waste illegally	Dummy; 1= WC; 0 = otherwise
<i>Independent variables</i>		

HHage	Age of respondent	Number of years
Sex	Male respondent	Categorical; 1 = if yes; 0 = otherwise
Occupation	Occupation of respondent	Categorical; 1=Trader; 2=farmer; 3=government sector employee; 4=private sector employee and 5=unemployed
Education	Level of educational of respondent	Categorical; 1 = no formal education; 2=Primary; 3 = JHS/Middle school; 4= Senior High School; 5= Vocational/Technical school and 6 = Tertiary
Residential	Housing type of respondent	Categorical; 1= Rent apartment ;2= Own house; 3= Lives in compound house

## Results And Discussion

### Identifying the Nature of WC and the Criminals involved

The study revealed that solid WC was committed along the entire solid waste management chain– from generation to the final disposal sites. It mostly occurred in the form of fly-tipping, illegal disposal by households, and poor management practices by waste management institutions. The study showed that households committed WCs by blatantly dumping solid waste in spaces with fatal flaws including water bodies and gutters (Figure 2).



**Figure 2:** A common scene at most illegal solid waste dumpsite at Asewase

Apart from the household level, another perspective of individual involvement in WC were passengers on board commercial vehicles (commonly known as 'trotro'). The results revealed that passengers throw out waste materials (such as polythene bags) onto the streets while in vehicles, whether stationary or in motion. One key informant from the KMA in an interview revealed why passengers engaged in this act:

*The driver will not allow the passengers to leave the waste in their vehicles. Passengers are also reluctant to move around looking for dustbins and therefore they feel the only option will be drop it on the street, after all it will be swept the following day.*

Meanwhile, our engagement with city authorities revealed that commercial drivers are required by law to have refuse containers on-board all commercial vehicles, a requirement both state-owned and private commercial drivers breached with impunity. The key informant further revealed that the Assembly lacks resources to enforce the laws regarding fly-tipping. When asked what was preventing the Assembly from sending personnel to the streets to apprehend fly-tippers and other waste criminals, the lack of funds syndrome was cited as the major reason:

*There are not enough workers to make sure waste is not disposed indiscriminately. The lack of enough workers has given people the opportunity to dispose waste anywhere they want. (An officer at the waste department of the Municipal Assembly)*

Fly-tipping does not only litter the street, but it also poses a health risk to people. It was observed that anytime it rained, these fly-tipped materials block gutters, produce bad odour and contaminate surrounding water bodies.

Beyond individual perspectives, it was also observed that local government agencies and their collaborators (private sector partners) committed the most serious levels of WC in the Metropolis through non-compliance with existing legislations, high non-collection rate and the use of poorly managed sites for solid waste disposal. The city of Kumasi produces 2000 tonnes of solid waste on daily basis but a little over 45% of it is collected (Kumasi Metropolitan Assembly 2012). As a national requirement, the Kumasi Metropolitan Authority is authorised to provide SWM services to residents with private solid waste management companies. The Kumasi Metropolitan Assembly, with support from development partners, has constructed waste disposal sites in communities such as Kwadaso, Aboabo, Asewase, Awhiaa and Abrepo to enhance the delivery of proper SWM. Our observations at these sites revealed they do not conform to all the standards prescribed by the EPA. Table 3 provides the basic requirements for construction and maintenance of landfills and their violations during the field study.

**Table 3:** Observed violations at final disposal sites

Variable	Preferred requirement	Observed violations
Neighbourhood	<ul style="list-style-type: none"> <li>▪ Disposal sites should not be located in the immediate proximity of occupied dwellings, waterways and water bodies.</li> <li>▪ A minimum distance of at least 500m should be provided.</li> <li>▪ A need for a buffer zone (cultivated area – bush vegetation) for segregating the landfill from residential areas.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Disposal sites are located in the immediate proximity to residential facilities.</li> <li>▪ Minimum distance not observed.</li> <li>▪ No buffer zones available</li> </ul>
Geological and hydrogeological conditions	<ul style="list-style-type: none"> <li>▪ Necessary to determine the potential risk of emissions from the landfill for the underlying soil and groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>▪ No available facility for the observation of geological risk</li> </ul>
Risk of flooding, subsidence and landslides	<ul style="list-style-type: none"> <li>▪ Sites endangered by landslides, flooding and subsidence are unsuitable and such information can be gained through interviews with community leaders or city authorities.</li> </ul>	<ul style="list-style-type: none"> <li>▪ No such interviews with communities were conducted on the past flooding history of disposal sites</li> </ul>
Access control and signposting	<ul style="list-style-type: none"> <li>▪ To keep people and animals out for safety reasons</li> <li>▪ To help monitor types and volumes of waste dumped</li> <li>▪ To provide information of the type of waste acceptable</li> </ul>	<ul style="list-style-type: none"> <li>▪ Disposal sites have no restricted access</li> <li>▪ No observed monitoring controls</li> <li>▪ All types of waste are deposited</li> </ul>
Daily compaction and cover	<ul style="list-style-type: none"> <li>▪ To prevent wind-blown litter and fly breeding.</li> <li>▪ Compactions use airspace more efficiently</li> </ul>	<ul style="list-style-type: none"> <li>▪ Continuous wind-blown materials and high presence of insects</li> <li>▪ Not regularly compacted</li> </ul>
Record Keeping	<ul style="list-style-type: none"> <li>▪ Record keeping of incoming waste types and quantities</li> </ul>	<ul style="list-style-type: none"> <li>▪ No records on incoming waste</li> </ul>
Fire must be avoided	<ul style="list-style-type: none"> <li>▪ Though difficult due to the presence of landfill gas, must be avoided to prevent the release of harmful substances</li> </ul>	<ul style="list-style-type: none"> <li>▪ Disposal sites are continuously burning</li> </ul>

**Source:** EPA 2002

The violation of the requirements also exposed the neighbouring communities to the ravages of the nuisance from the sites. The effect of poor SWM in Kumasi is spontaneous – unacceptable littering; foul-smell; gutters choked with waste and heaps of uncollected waste. It is no surprise that figures from Ghana’s Ministry of Health in 2018 show that about 70% of all diseases related to the environment in the Metropolis are often reported from communities that host final disposal sites (Amoah et al., 2018). Residents of such communities including Kwadaso and Dompooase have on several times demonstrated against the poor management of the facilities. They often argue that the waste disposal facilities have led to the rise of environmental risks, risks that have led to the escalation of health problems in the communities.

The second form of WC committed by state institutions was their inability to regularly collect refuse bins from designated homes and public places as required by law. This was evidenced from the in-depth interviews with household heads:

*My dustbin has not been emptied for the past three weeks. I cannot understand this because this is not the kind of contract we agreed on. He promised to empty my dustbin twice a week because of the family size but look at what is happening ... It is criminal to collect money from a person and not deliver as promised. It is even more criminal to allow the person to suffer this environmental mess through no fault of his. (Interviewee 1)*

This narration is in contrast with the prescribed standards in the literature that in hot and humid tropical climatic conditions such as the case in Ghana, solid wastes should be collected not less than two times in one week. This helps reduce the extent of decomposition as refusal to regularly dispose of waste can produce bad odor while leachate may also seep out to create unhygienic scenes (UN-HABITAT, 2010). The direct observation revealed that the overflowing waste containers created further problems for the nearby environment (see figure 3).



**Figure 3:** An Overflowing Waste Container at Aboabo

The last form of institutional WC was mode of transportation (fly-tipping of waste) which remained a major and widespread problem in solid waste transportation in Kumasi. This happens because the buckets containing the waste were mostly not covered as mandated by the laws guiding proper SWM in Ghana.

*The solid waste containers are not handled well by the drivers. When they come to pick the container and it is full with solid waste they do not cover it, so as the vehicle speeds off, the waste materials also drop off from the bucket. (Interviewee 3)*

Meanwhile, available legal requirement (Local Government Act 462 and EPA Act 490) indicates solid waste collection and transportation should be done with trucks that can completely cover the waste while in motion in order to avoid the spillage. The law further stipulates that due to the long distance between disposal sites and collection points, trucks with capacities of 10-15m<sup>3</sup> should be the ideal. Preferably, compaction vehicles with superior capacity to reduce fly-tip-over is the acceptable practice (Read et al., 1998). The study shows that criminality was involved, whether inadvertently or not, in solid waste management activities in Kumasi, a situation that is also common across all the other cities in Ghana (Oteng-Ababio et al, 2017; Owusu-Sekyere, 2016) and that WC was common, exists in many forms and is committed by both individuals and institutions (both public and private) (Eunomia, 2014). From the results, WC in

Kumasi could be categorised by the act of doing the harm itself and/or related to a breach of conditions associated with a mandatory licence or permit, just as indicated in Ghana's Criminal Code, 1960 (ACT 29) Sections 18 and 19.

### Reasons for committing waste crime

The reasons for dumping waste illegally varied across research participants. Table 4 summarizes the responses from the household survey.

**Table 4:** Chi-square analysis of the determinants of WC

Age	Frequency (N=125)	Percent	Test / Interpretation
20-30	15	12.0	$\chi^2 = 0.037$ df=2 Pr=0.982 Not significant
31-40	27	21.6	
41-50	53	42.4	
51-60	30	24.0	
Total	125	100.0	
Sex	Frequency	Percent	
Male	73	58.4	$\chi^2 = 2.485$ df=1 Pr=0.115 Not significant
Female	52	41.6	
Total	125	100.0	
Occupation	Frequency	Percent	
Trader	16	13.0	$\chi^2 = 11.286^{**}$ df=5 Pr=0.646 Not Significant
Farmer	78	62.0	
Government sector employee	16	13.0	
Private sector employee	9	7.2	
Unemployed	6	4.8	
Total	125	100	
Residential	Frequency	Percent	



Rent apartment	10	8.0	$\chi^2 = 0.928$ df=2 Pr =0.629 Not significant
Own house	36	28.8	
Compound house	79	63.2	
Total	125	100	
Education	Frequency	Percent	
Certificate	14	11.2	$\chi^2 = 4.268$ df=5 Pr =0.512 Not Significant
Diploma	26	20.8	
First Degree	63	50.4	
Master's Degree	22	17.6	
Total	125	100	

## Attitude

Items	Disagree No (%)	Agree No (%)	Test / Interpretation
I have nowhere to dump	5 (4%)	120 (96%)	$\chi^2 = 15.351^{***}$ df=4 Pr =0.001 (Significant)
I cannot pay to dump	21 (17%)	104 (83%)	$\chi^2 = 8.585^*$ df=4 Pr =0.002 (Significant)
I do not know it is illegal to dispose waste anywhere	34 (27%)	91 (73%)	$\chi^2 = 4.098$ df=4 Pr =0.001 (Significant)
The refuse container is far	29 (23%)	96 (77%)	$\chi^2 = 18.791^{***}$ df=4 Pr =0.001 (Significant)

NB: \*\*\*, \*\* and \* means it is statistically significant at 1%, 5% and 10% respectively

Insightfully, some household heads who participated in the research did not know it was illegal to dispose of waste at unapproved spaces. In-depth interviews with the household heads on whether they were aware that their solid waste disposal practices constitute a crime, the responses were varied. The following are some of the responses from the interviews with some of the household heads:

*I do not know it is criminal to dump waste in the bush because am not aware of the law that says we should not do that (interviewee Sat Asewase,).*

*In another interaction, Interviewee 4 of Kwadaso indicated:*

*If it was illegal then they would have arrested everybody in the community because anytime it is about to rain, all of us in the community dump the waste in the gutter so that it can be flushed away by the rain .*

*We have created this open dumpsite in this community because there is no option. If it was a crime to do that city authorities would have come to cover it long ago. We have not been arrested because they - city authorities - have not provided us with a place to dump the waste (interviewee 1 at Aboabo).*

*I know it is not good but it is also not an offense that is why I asked my daughter to do it at dawn where nobody will see her. We have no choice because I have no money to pay for the services of the Company (interviewee 3 at Awhyiaa).*

It was further observed that some opinion leaders and other stakeholders (normally elected representatives of the people) were also ignorant on some of the bye-laws on proper SWM in the city. An Assembly member (representative of the people) indicated in an interview:

*I did not know it is an offense to dump waste at places where the KMA has not authorised people to do so.*

He continued: *"If as a member of the Assembly I don't know, how do you expect me to educate the people"*.

The findings of the study show that the reasons why people committed WC centered on issues of how waste is governed and the responsibilities of actors and institutions in the governing practices. It was observed that those responsible for enforcing waste management laws in terms of guiding, directing and steering of societal or individual responsibility have failed to do so. Even though there exist a plethora of waste management legislations as indicated by the results, these legislations tend to focus more on formal practices of government, especially in the area of infrastructure investment. Meanwhile it is increasingly clear, both empirically and theoretically that waste management laws

without enforcement where responsibility is placed on the individual and societal actors will not yield the needed results. Generally, the lack of enforcement of SWM legislations and policies engenders absence of fear for the law. It also encourages illegal SWM practices including indiscriminate littering and unacceptable landfill practices (Oteng-Ababio, et al., 2017).

### Closing the loop on solid waste crime

Admittedly, the authors reckon with the fact that even though there have been efforts by the State on ensuring good sanitation in general including the re-activation of sanitary inspectors and the national sanitation day among others, WC is still being committed. From this perspective, the study identified some strategies which are geared towards reducing the phenomenon in Kumasi in particular, and Ghana in general, from the perspective of study participants (see Table 6).

**Table 6:** Respondents' strategies for reducing solid waste management

S/N	Items	Disagree No (%)	Agree No (%)	Mean	SD
1.	Offenders of waste crime should be imprisoned	5 (4%)	120(96%)	1.45	0.66
2.	Offenders of waste crime should be made to pay fines	31(25%)	94 (75%)	2.19	1.04
3.	Offenders of waste crime should be made to clean the areas they have dumped waste illegally	36 (29%)	89 (71%)	2.42	1.11
4.	Offenders of waste crime should be made to do community work for some months	25 (20%)	100 (80%)	1.55	0.74
5.	There should be Public Education on the negative effects of WC	20 (16%)	105(84%)	1.81	0.92

6.	There should be enforcement of legislations on waste management	12 (10%)	113(90%)	1.65	0.83
7.	The current laws on waste management should be amended to make it more punitive	15 (12%)	110 (88%)	2.07	0.98
8.	Waste crime should be added to the criminal laws of Ghana and punishable as such	25 (20%)	100 (80%)	2.8	1.1

The research participants shared their views on what could be the best strategy in reducing WC. For instance, about 89 percent of the participants indicated that there was the need to enforce laws on waste management and for 64 percent, imposing fines will help in curbing the phenomenon. Sharing his views on how WC can be minimized, a key informant indicated that:

*For me, I think WC should be treated as part of organized crime in the country. When this is done, it will attract the attention of policy makers and it will be fought from all angles and with every resource available.*

The key informant further indicated that since WC is committed along the entire waste management chain from production to final disposal, it will be important to have multi-agency cooperation at both national and sub-national level. He intimated:

*There will be the need to reinforce national regulation frameworks and enforcement capacities of legally mandated institutions as the foundation for excellently and efficiently fighting solid WC. The government, as a matter of urgency, must improve the needed skills and increase resources of the responsible institutions to perform their duties. In this case, the role of sanitary inspectors becomes very crucial. This, I believe, will make it more difficult for people to commit WC.*

Another key informant (legal expert from the Legal Aide Board) proposed adoption of the crime script concept (CSC) postulated by Cornish (Cornish, 1994) as a way of reducing waste crime in Ghana. He explained:

*The crime script is a concept that is used in finding out the offenders' behaviour and the reasons for their decisions. WC can be minimized only if the factors that stimulate people's intentions to commit crime are understood. The concept describes series of probable activities, places, and roles that constitute crime actions.*

The research revealed that the CSC details the components regarding the series of decision points that an individual offender goes through in committing the crime (Tompson & Chainey, 2011). The significance of CSC as an investigation procedure is believed to lie in its ability to assist law makers to design measures aimed at crime prevention. The understanding is that it can provide a means of provoking offender's subjective account of why a particular crime is committed. In doing so, the CSC can provide a framework for developing more comprehensive and objective account of crime-commission synthesis from offender account, a view shared by Cornish (1994) and Borrión (2013).

The key informant noted that the CSC can be applied as an objective evaluation and appreciation of WC. This is because it can break up WC into six acts and these are creation/generation; on-site storage; collection; transfer and transport; treatment and final disposal. He further noted that each of these acts can further be sub categorized into scenes where the illegal activity might take place, a view shared by Baird et al. (2014). He further explained:

*Each scene or stage will have a planning, pre-activity, activity and post activity stage, with the primary offender being the principal actor in the scene. In this case crime script analysis can enable waste managers to unearth the relationship between the illegal activity and the structures that helped the crime to exist.*

The analysis of the key informant is in sync with the works of Tompson and Chainey (2011). They observed in their research that after identifying the conditions that facilitate WC, waste managers need to make sense of the information collated by interpreting the content of the script. Boba (2005) also adds to the discourse by arguing that CSC can achieve its purpose by asking and finding answers to questions of 'who', 'what', 'where', 'when', 'why' and 'how' the illegal activity occurred. After this, the waste manager should then identify how to deal with the problem by exploring the specifics of the crime (Tompson & Chainey, 2011). Even though the CSC may have its flaws, notable among them is information fragmentation (Leclerc, 2013; Guilmour, 2014) and may not be able to give a clear difference between the offender, a victim as well as anyone capable of intervening during the crime scene. The key informant suggested that it can offer a way of teasing out the essential details needed to help understand and tackle the WC problem in the city of Kumasi in particular, and in Ghana, generally.

## Conclusion

From all indications, rising population and consumption activities in Ghana will persist for many years to come. Accompanying the increasing population and production activities will be rising solid waste generation. In contemporary times of sustainable development where clean and livable city concepts are being espoused, it is important that authorities take steps to institute measures and where such measures are already in place, they can be enforced to nip the problem of illegal waste disposal in the bud. This is because poor waste management does not only make cities unsightly but also makes cities economically unattractive. The study has shown that efforts have been made from several fronts to encourage proper solid waste management in Ghanaian cities in general, and Kumasi in particular, but the problem persists. It is the view of the researchers that poor solid waste management practices should be criminalized and criminal punishments that are punitive enough be instituted. The paper has exhumed the multiple dimensions of the subject and has clearly shown that the causes of WC are diverse and involves multiple actors. The key dimensions are deeply located within the field of poor waste governance systems in the country. The study concludes by suggesting that reducing waste crime will require a multi-level strategy owing to the diverse backgrounds of the perpetrators. Mass public education, clear communication strategies and cooperation and coordination among waste management agencies (whether private or public) should be the key. It is the firm belief of the researchers that proper implementation of these suggested strategies can help reduce the opportunities for ‘criminals’ to engage alongside legitimate waste businesses.

## References

- Adarkwa, K. K. (2012). The changing face of Ghanaian towns. *African Review of Economics and Finance*, (4) 1-29.
- Ali, A. (2010). Wasting time on solid waste in developing countries. *Waste Management*, Vol 30, pp.1437-1438.
- Alhassan, H., Asante, F.A., Oteng-Ababio, M.& Bawakyillenuo, S. (2018). Application of theory of planned behaviour to households’ source separation behaviour in Ghana. *Manage. Environ. Qual.* 29, 704–721.
- Amoah, S.T., Owusu-Sekyere, E. & Narteh, E.A. (2018). Urban space renaissance of a developing country city. *Urban Research & Practice*, doi.org/10.1080/17535069
- Baird, J., Curry, R. & Cruz, P. (2014). An Overview of WC, its Characteristics and the Vulnerability of the EU Waste Sector. *Waste Management and Research*, Vol 32, pp.97-105.

- Binyaruka, J.P. (2015). Patterns and correlates of solid waste disposal practices in Dar es Salaam city, Tanzania. *Afr. J. Environ. Sci. Technol.* (9) 545–556.
- Boba, R. (2005). *Crime Analysis and Crime Mapping*. Thousand Oaks, CA: Sage Publications Inc.
- Borrion, H. (2013). Quality Assurance in Crime Scripting. *Crime Science*, 2(6)
- Cornish, D. (1994). The procedural analysis of offending and its relevance for situational prevention. In Clarke RV (ed.) *Crime Prevention Studies*, Vol. 3. Monsey, NY: Criminal Justice Press, pp. 151-196.
- Daele, S. V, Beken, T.V & Dorn, N. (2007). Waste Management and Crime – Regulatory, Business and Product Vulnerabilities. *Environmental Policy and Law*, 37(1) 34-38
- Eunomia (2014). WC, Tackling Britain’s Dirty Secret. Online:[http://www.esauk.org/Dirty\\_Secret\\_LIVE.pdf](http://www.esauk.org/Dirty_Secret_LIVE.pdf). Accessed 12/02/2016.
- EC (European Commission). (2015). End-of-life vehicles (ELV) directive: an assessment of the current state of implementation by Member States. Available at: <http://ec.europa.eu>
- Europol. (2011). EU organised crime threat assessment. The Hague: Europol. Available at: [https://www.europol.europa.eu/sites/default/files/publications/octa\\_2011\\_1.pdf](https://www.europol.europa.eu/sites/default/files/publications/octa_2011_1.pdf) (accessed December 2013).
- Global Times (2014). Police bust ‘e-trash’ smugglers, seize 72,000 tons of goods. [Online]. 26/02/2014. Available from: <http://www.globaltimes>.
- GSS (Ghana Statistical Service). (2012). Final report on population and housing census. Accra. Sakoa Press Limited.
- Grant, R. & Oteng-Ababio, M (2012). Mapping the Invisible and Real African Economy: Urban E-Waste Circuitry. *Urban Geography* 33(1):1-21.
- Gyimah, P. (2018). Households’ Solid Waste Separation Practices in Cape Coast Metropolitan Area. Master of Philosophy Thesis submitted to the Department of Geography and Regional Planning of the Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast, Ghana.
- Interpol (2016). [www.interpol.int](http://www.interpol.int) (accessed December, 6 2020).
- McCarthy, B. (2002). New economics of sociological criminology. *Annual Review of Sociology*, 28, pp.417–442.
- Leclerc, B. (2013). New developments in script analysis for situational crime prevention: Moving beyond offender scripts. In B. Leclerc & R. Wortley (eds.), *Cognition and crime: Offender decision-making and script analyses*. Crime Science Series. London: Routledge.

- Nagin, D. S. (2007). Moving choice to center stage in criminological research and theory, *Criminology*, 45, pp.259–272.
- Oteng-Ababio, M (2014). Rethinking waste as a resource: insights from a low-income community in Accra, Ghana. *City, Territory and Architecture* 1:10, doi:10.1186
- Oteng-Ababio, M., Owusu-Sekyere, E. & Amoah Samuel, T. (2017). Landfill externalities and property values dilemma – emerging insights from three Ghanaian cities, *Journal of Contemporary African Studies*, 35:3, 349-369.
- Owusu-Sekyere, E (2016). Re-thinking Landfills as Asset: Empirical Evidence from Urban Ghana, In: *Urban and Rural Developments: Perspectives, Strategies and Challenges* Nova Science Publishers, Inc. 400 Oser Avenue, Suite 1600 Hauppauge, NY 11788 USA.
- Owusu-Sekyere, E. (2019). Creative individuals, “Kaya Bola” exceptionalism and sustainable development in twenty-first century Ghana. *J. Glob. Entrepr. Res.* 9, 2–17.
- Pellow, D.N. (2002). *Garbage Wars: The Struggle for Environmental Justice in Chicago*. The MIT Press, Massachusetts. United States of America.
- Post, J., Broekema, J. & Obirih-Opareh, N. (2003). Trial and error in privatisation: experiences in urban solid waste collection in Accra and Hyderabad. *Urban Studies* 40, pp.837–854.
- Priestley, S. & Bennett, O. (2015). Fly-tipping - the illegal dumping of waste. Briefing Paper Number 05672, 15 September.
- Read, A. D., Philipts, P. & Robinson, G. (1998). Landfill as a Future Waste Management Option in England: the view of landfill operators, *The Geographical Journal*, 164(1), pp. 55-66
- Sama, C.M. & Mbwange, F.E. (2017). Determinants of households’ choice of waste management in the Buea municipality: an econometric analysis. *Int. J. Contemp. Appl. Sci.* (4) 2308-1365.
- SEPA. (2013) SEPA Enforcement Report 2012-2013. Online:[http://www.sepa.org.uk/about\\_us/publications/enforcement\\_reports.aspx](http://www.sepa.org.uk/about_us/publications/enforcement_reports.aspx). Accessed 12/20/2014.
- Situ, Y. & Emmons, D. (2000). *Environmental crime: The criminal justice system’s role in protecting the environment*. Thousand Oaks, CA: Sage
- Tompson, L. & Chainey, S. (2011). Profiling illegal waste activity: using crime scripts as a data collection and analytical strategy. *European Journal on Criminal Policy and Research* 17, pp.179–201.



UN-HABITAT. (2010). *Solid waste management in the world's cities*. Nairobi: UNHABITAT, 2010.

UN (2014). *The road to dignity by 2030: ending poverty, transforming all lives and protecting the planet*. In *Synthesis report of the Secretary-General on the Post-2015 Agenda*, December 2014, Para 48.

Walters, G. D. (1990). *The Criminal Lifestyle: Patterns of Serious Criminal Conduct*. Los Angeles, CA: SAGE.

World Bank (2018). *Annual Report 2018: Management's Discussion and Analysis and Financial Statements (Fiscal 2018)* (English).