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# The State of Sachets: Ghana's Private Sector Solution to a Public Infrastructure Problem

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# The State of Sachets:

Ghana's Private Sector Solution to a Public Infrastructure Problem



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In partial fulfillment of a Bachelor of Arts Degree in  
Environmental Analysis at Pitzer College, Claremont, California.

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Readers: Professor Melinda Herrold-Menzies and Professor Paul Faulstich

## Abstract

Known colloquially as “*purewater*”, sachet water has outcompeted all alternatives to Ghana’s unreliable government water infrastructure and serves as the cheap, portable, omnipresent solution for narrowing the safe water access gap. Each single-use sachet holds 500 ml of filtered potable water and is heat-sealed in a high-density polyethylene bag. Insufficient and often skeptical scholarship exists surrounding the state of sachet water in Ghana, and almost no research incorporates qualitative data into analysis and future recommendations. In the face of incomplete and decontextualized research on sachet water, this study aims to use qualitative data concerning Ghanaian viewpoints to showcase the recent positive developments in the lifecycle of sachet water. Data was gathered through semi-structured interviews with dozens of sachet water producers, regulatory parties, consumers from all over the country with diverse backgrounds, and members of the formal and informal waste management sectors over the summer months of 2013 and 2014. Although viewed as a problematic water alternative from a number of health and environmental viewpoints, this thesis demonstrates that sachet water is becoming more potable and better recycled. Results suggest that registered sachet water producers continue to raise water quality, private market waste management solutions are starting to curb the number of inappropriately discarded sachets, and Ghanaians generally are satisfied with sachet water’s role in increasing reliable potable water coverage.

*Pictured on cover: A sachet “picker” outside the Amasaman Market, Greater Accra, Ghana*

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This thesis is dedicated to Ghanaians like my good friend Gbdan "Blessing" Francis, whose intellect, ingenuity, humility, and dedication to bettering the lives of other Ghanaians through education demand recognition.

## *Preface*

My inspiration to study the sachet water waste management in Ghana came four years ago in 2009 during my first visit. As a sophomore in high school, I joined a former Ghana Peace Corps volunteer and a handful of classmates on a month long tour of Ghana. The trip was designed to be a cultural immersion experience for students; we would use local transportation, stay in cheap local hotels, and eat local cuisine. In an attempt to see much of the country in a short period, every two or three days we would move towns. Moving meant long rides on “trotros” (vans), extreme changes in landscape, and abrupt transitions in culture and language.

On our long rides through new neighborhoods, I got a kick out of buying food out of the car window; mangoes, peanuts, even sachets of water – small, sealed plastic bags much like a sandwich “baggie” – could be bought this way most anywhere in the country. During one early, long ride, I sat in the middle seat of a trotro happily eating mango and oranges. Trotro drivers always have a “mate” up front – the mate’s job is to yell out the window and fill the van with passengers. After finishing my fruit, I packed the skins and seeds into a black plastic bag. The mate turned around, and casually asked me, “Is this rubbish?” I told him it was. “Give it here,” he said. In one fluid motion, he reached back, picked up my bag of fruit waste, and slung it out of the passenger side window into roadside brush. We all howled with laughter at the unexpected action; doesn’t every young American want to throw things out of moving cars at high speeds? Yet after our laughter died down, I remained fascinated with the episode. Why was it that I had never seen this kind of action back home? Was this an isolated incident, or was it considered

casual in Ghana? Was there a need to consider what would happen to the black plastic bag?

These questions continued to fascinate me two years later when I returned to Ghana. Yet, instead of answers, I found more questions. I began to become aware of inconsistencies in waste management solutions: some industries created a fascinating juxtaposition between innovative waste management solutions, like the recycled glass bead industry in Koforidua, and ones I had been taught to believe were thoughtless. I watched dozens, if not hundreds of Ghanaians casually toss their empty bags onto the street. I began to imagine tens and hundreds of thousands of these small bags clogging the drainage systems, causing floods, and leading to a lasting series of health and safety issues.

It was clear that I would have to return and dedicate my full attention to studying waste management if I were to understand it from more than a tourist's perspective. It was through my persistent curiosity that the Andrew Mellon Foundation and Pitzer College Internship Fund generously agreed to fund my research, allowing me to return to travel during the summers of 2013 and 2014 to devote localized attention to Ghanaian waste management. Through months of ethnographic research, my ethnocentric assumption that Ghanaians recklessly litter plastic sachets was challenged and refuted; instead, I learned how average citizens are proactively taking waste management into their own hands where government efforts fall short.

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## General Information and Acronyms

This section summarizes some of the terminology and general information required to understand the forthcoming data research. First, the currency used in Ghana is the “Ghana Cedi” abbreviated as “GHC.” The Cedi comes in bills of 1, 2, 5, 10, 20, and 50, and has a coin system called “Pesewas” (“*Pes-wus*”). There are 100 Pesewas to 1 Cedi, analogous to cents and dollars in the US. In 2007, the hyper-inflated Ghana Cedi was redenominated 1,000:1, meaning the cost 20,000 Cedis was now 20 Cedis, or 500 Cedis was now 5 Pesewas (Adowa, 2007). During my first round of field research in 2013, the US Dollar could be exchanged for between 1.9 to 2.05 Ghana Cedis. In 2014, the rate was nearly 3 Cedis to the dollar, and of March 2015, the dollar can be exchanged for nearly 4 Cedis.

I include several excerpts from my interview transcripts in this paper to equip the reader with Ghanaian viewpoints and attitudes. Although a natural inclination may be to quickly skip these blocks of text, and digesting them requires patience, they constitute the basis for this study’s qualitative analysis and should be read with care.

According to the Ghanaian Embassy, over 250 languages are spoken in Ghana, and although the official national language is English, Ghanaians often utilize terms unfamiliar to outsiders. “Sachet water” is the most general term I use to describe the 500-milliliter high-density heat-sealed polythene bags used in Ghana. Many Ghanaians refer to sachet water as “purewater.” Worth noting, “Icewater” is different from sachet water/purewater. Icewater is a term used to describe water filled in a low-density polythene bag, which is hand filled and tied. “Cup water” is a term used to describe the water bought from a mobile water seller that is fetched from a pot in a cup. “Dustbin” is

a term analogous with rubbish bin or trash can, but can also refer to a large “dumpster” container. “Boreholes” are machine-dug wells that often go 200 feet or more down into the earth’s crust, and “Dugouts” are hand or machine dug open pits where rainwater collects. Finally, when I refer to a “bag” of sachet water, I am not referring to an individual sachet; when half-liter sachets are made in the production plants, they are packaged thirty at a time in thick, clear plastic bags. A “bag” of sachet water refers to this plastic bag that holds thirty individual sachets.

All photographs presented in this thesis were taken by the author during the research visits of 2013 and 2014 and should be cited accordingly.

**List of Abbreviations:**

Alum - Aluminum Sulfate

AMA – Accra Metropolitan Assembly

FDA – Food and Drugs Authority

FDB – Food and Drugs Board (now FDA - Food and Drugs Authority)

GWCL – Ghana Water Company Limited

GHC – Ghana Cedis

GPMA – Ghana Plastic Manufacturers Association

GSB – Ghana Standards Board

HDPE – High Density Poly Ethylene

NIH – National Institutes of Health

NASWAP – National Association of Sachet Water Producers

NGO – Non-Government Organization

MDG – Millennium Development Goals

UV – Ultraviolet (light)

WHO – World Health Organization

Zoomlion – Zoomlion Ghana Limited

## Introduction

Through recent countrywide efforts to increase access to safe drinking water, a number of new water treatment and storage systems have drastically altered the way Ghanaians obtain clean drinking water. Rapid urbanization and population growth in the last half century have outpaced municipal efforts to maintain and expand potable water infrastructure in Ghana, and the private sector has responded with an easy – but environmentally threatening – solution (Stoler et al., 2011). “Sachet water” known colloquially as “*purewater*” has outcompeted nearly all alternatives to the unreliable government water infrastructure to become the country’s cheap, mobile, omnipresent answer to the country’s urban water crisis (Stoler et al., 2011). A relatively young and understudied water source, the few scholars who have examined sachet water often declared it an environmental menace and a public health hazard. Ghanaian news media like *The Daily Graphic* and *Ghana Web* often reflect these negative internalized scholarly elite viewpoints (see the flashy articles on Ghana Web, *Plastic waste: a gargantuan environmental problem for Ghana*, 2014, or The Daily Graphic Online, *Poor Sanitation: A Stain on Our Pride*, 2013). Almost no research has examined the production and distribution nexus of the sachet water commodity chain.

One of the contributions of this thesis is that it offers an ethnographic examination of the lifecycle of sachet water, including information on the production of sachet water that the current scholarship lacks. Through my research, I argue that the “pros” of sachet water – it is reliable, portable, potable, inexpensive, and available where piped water is not – outweigh the “cons” – the fluctuations in industry hygienic quality and locally generated waste. By contextualizing the current scholarship with the viewpoints of

sachet water producers and regulatory parties, diverse consumers throughout the country, and members of the formal and informal waste management sectors, I show that sachet water is the most effective potable, reliable, affordable, and increasingly recyclable option for closing a glaring water access gap while more sustainable public water infrastructure improves.

A creative potable water solution barely two decades old, the fact that sachet waste can be found in even the most remote Ghanaian villages could lead an outside observer to believe the sachets have been around since the dawn of plastics. Municipal water infrastructure can be traced back to the introduction of water pipes in 1928, an era when Ghana was still referred to as the Gold Coast (Stoler, 2013). In today's metropolitan capital of Accra, the nationalized *Ghana Water Company Limited (GWCL)* oversees water distribution for over 80% of the city's residents (Van Rooijen, 2008). Piping does not dictate reliable access to potable water, however; increased population growth and strain on water infrastructure has led to scheduled (and unscheduled) GWCL rationing that can vary in duration and predictability (Stoler, 2012). According to Taylor et al. (2002), around half the population lacks a yard or house water lines and nearly 10% lack access to "reliable" water. Stoler (2013) finds that the access to reliable potable piped water is not randomized; in fact, socioeconomic identification is linked to neighborhood rationing patterns, and the two combined can offer predicting factors for sachet water use.

Reliable water infrastructure in the country's largest cities is spotty at best, and in its absence Ghanaians have chosen sachet water. The water source has a number of consumer benefits – its potability, its intermediary sanitation (often water is bought from

GWCL then purified before packaging), its affordability, its portability, and its utter ubiquity. Its use has documented health benefits (Stoler, 2012) and can be linked to greater use as a primary water source in areas with GWCL rationing (Stoler, 2013). However, the use of sachet water has come under fire for its negative long-term environmental consequences, namely the vast increase in un-recycled plastic waste. When one walks around any large metropolitan area in Ghana, the plastic waste that constitutes the majority of litter is unavoidable. Of this plastic waste, used sachet water bags constitute an alarming portion. Through a 21-year study, Fobil and Hogah (2006) documented a sharp increase in plastic waste present in Accra's waterways, shooting from 1.4% of the weight in any given water sample in 1979 to about 4% in 1993, 5% in 1996, and 8% by 1999 (Fobil, 2000). Up to 70% of this plastic waste is polyethylene film, the material used to make plastic shopping bags and water sachets (Fobil, 2000).

There are mounting concerns for the credibility and sustainability of this incredibly successful answer to unreliable water coverage in Ghana. Ackah et al. (2012) estimated that in 2012 in Accra, there were twice as many unregistered (and thereby unregulated) independent sachet water producers as registered producers (600 vs. 300). According to the Daily Graphic, the number of sachet water producers has increased over 10 fold by 2014, making it evermore difficult for regulatory authorities to enforce health standards (Suleiman, 2014). Although among many Ghanaians sachet water has a reputation for overall potability, scholars have critiqued the reliability of sachet water's physiochemical and microbiological quality (Ackah et al., 2012; Yidana et al., 2014; Obiri-Danso et al., 2003.)

Having lived in Ghana during the summer months of 2009, 2011, 2013, and 2014, I saw ample evidence to support the scholarly critiques. Upon exiting the doors of Accra's Kotoko International Airport, the never-ending sight of plastic bags and sachets cluttering the streets and gutters warrants a second glance. In metropolitan cities, pedestrian "hawkers" sell individual sachets as they weave in and out of traffic at busy intersections; sellers and customers risk plastic surface contamination as they exchange a few peswas (Ghanaian currency analog to USD cents) for each sachet, careful to complete the transaction using just their right hand – true Ghanaian custom. When walking the busy streets of Kumasi or the dirt roads of rural Salaga, Ghanaians of all ages seem to enjoy sucking from the glistening corners of chilled sachets. Although I never gathered that littering was encouraged, the universality of discarded roadside sachets fuels the assumption that Ghanaians carelessly toss their sachets once empty. Conflicting reports from a variety of sources routinely endorse and condemn the hydrological and microbiological quality of sachet water, leaving consumers and outside observers skeptical of the industry. However, the story and realities of sachet water in Ghana are incomplete if analysis ends with cursory observations and conclusions encouraged by negative non-Ghanaian conclusions.

A complete picture of sachet water requires a greater breadth of knowledge that published scholarship has not adequately chronicled; contextualizing the water source with a historical perspective and valuing ethnographic research that incorporates the viewpoints of multiple sachet water stakeholders are aspects that help generate a more accurate reality of sachet water. Embracing the saying, "It's better to light a candle than to curse the darkness, I argue for the willingness to entertain sachet water's societal

benefits instead of focusing disproportionate attention on scholarly public health and waste management critiques.

Scholarly concerns have been outlined, peer reviewed, and published, and my research aims to compliment the existing overly technocratic and environmentalist scholarship with the opinions and actual viewpoints of the people who handle the sachets: Ghanaians. It would be foolish to try to invalidate the published science or to argue against waste management concerns for ubiquitous plastic sachet production; however, what scholars to date have lacked is the ethnographic element and Ghanaian perspectives on what needs must be met most quickly. I have found across the country that registered producers are producing water to often higher (and more reliable) physiochemical and microbiological standards than the Ghana Water Company Limited (GWCL) in small, community oriented businesses; I have found that consumers view the resource as a blessing, and that sachet water has improved overall health and access to predictably safe water while still very cognizant of the environmental consequences of irresponsible personal plastic waste management; I have found that forgotten elderly workers and unemployed youth have created a new role in sachet sustainability by collecting improperly discarded sachets and are selling them to recycling companies for cash. Indeed, in the absence of a proper government response to predictable population increases and urbanization, Ghanaians have created innovative, independent, informal economy solutions at almost all life stages of sachet water.



# **CHAPTER 1: Literature Review - Why The Sachet**

## **Way? An overview of potable water in Ghana**

### ***Introduction***

International development goals and scholarly viewpoints present sachet water as a blessing and a curse. Simultaneously, sachet water both has helped Ghana narrow the reliable safe water access gap while raising eyebrows for standardized quality and straining municipal waste management agencies. Whether substituting the problem of water access for waste management is advantageous for Ghana is a central question of this thesis, and is debated within existing scholarship. This chapter outlines what international and Ghanaian scholars have focused on with regard to potable water and sachet water within Ghana. With concerns outlined and summarized, it is clear that the integral voices left out of the discussion are those of Ghanaian sachet water producers, consumers, and waste managers themselves. This ethnographic information will constitute the core data of the following chapters.

### **Hydrology and Water Access in Diverse Environments**

In 2010, five years ahead of schedule, the World Health Organization (WHO) and UNICEF Millennium Development Goals (MDG) had met targets for drinking water accessibility and sanitation (WHO/UNICEF 2012). The objectives and results from the water MDG are impressive – the number of people who lacked sustainable access to drinking water in 1990 was halved, meaning in just two decades over 2 billion people

gained access to “improved drinking water sources” (WHO/UNICEF, 2012). In total, the report *Progress on Drinking Water and Sanitation 2012* delineated that by the end of 2010, 89% of the world’s population used improved drinking water sources – a figure they predict should climb to 93% by the end of this year. An improved water source as defined by WHO is “one that by nature of its construction or through active intervention is protected from outside contamination, and in particular from contamination with fecal matter” (WHO/UNICEF, 2012). This increase in global access to cleaner water, however, has not been realized equitably and may not be an accurate tool to measure reliable access to potable water. In the same 2012 report, several Sub-Saharan African countries own percentages of increased water access far smaller than the global 89% with countries like Sierra Leone and Togo not on target to meet the 2015 MDGs. With many Sub-Saharan countries struggling to meet the MDGs, it is the only region where metropolitan piped water access is actually on a decline, from 68% in 1990 to 55% in 2008 (WHO/UNICEF, 2012). It is clear that the WHO/UNICEF MDG water targets warrant a closer look within Sub-Saharan countries.

There is a greater story to the relatively positive water access numbers in Ghana. William Easterly’s article *How The Millennium Development Goals are Unfair to Africa* raises a number of critical questions, such as whether progress should, “be measured as the increase in a positive indicator or the reduction in a negative indicator?” (Easterly, 2009). Although the percentage of water access in Ghana has increased by over 40% in the last 15 years, nearly 12% of Ghanaian children die before the age of five (compared to 6% in South Africa and 0.6% in the United Kingdom) – a statistic that questions the indicator of access to improved water sources and the underlying goal of actual

improvements in health (Rossiter et al., 2013). Although piped water infrastructure has increased in Ghana's metropolitan cities (thereby increasing the MDG percentage coverage), coverage should not be equated with access, due to unpredictable water rationing. The state-run water company – Ghana Water Company Limited (GWCL) – has been unable to provide constant, reliable piped water to its costumers in a number of metropolitan cities due to the recent rapid increase in urbanization (Nsiah-Gyabaah, 2001; Stoler, 2013; Stoler et al. 2011, 2012; Yeboah, 2006; Van Rooijen, 2008; Machdar, 2013).

Piped water coverage in Ghana's capital city Accra is touted at 80%, yet this statistic does not indicate a reliable house connection; in reality, only 45% of the population has a piped water connection to their house and a meager 10% have a constant water supply from GWCL (Taylor et al., 2002; Van Rooijen, 2008). Aside from overlooked problems like the GWCL charging consumers for water even when pipes aren't flowing, the greater issue of piped water unpredictability calls into question just how much of the country has access to *reliable* improved water sources in practice (Nsiah-Gyabaah, 2001).

Access to improved, reliable water in Ghana's metropolitan cities is not distributed equally. Building on Van Rooijen's 2006 assertion that reliable piped home connections are linked to higher income, Stoler et al. (2013) finds that because GWCL piped water rationing is more common for residents who are of lower socioeconomic status, these people are more likely to find alternative primary drinking water sources, sachet water being an increasingly popular one.

Ghana's more rural and arid northern residents are less likely to depend or be offered piped GWCL connections. A tradition that has existed for centuries, small rural communities in the northern region depend on dugouts, shallow hand-dug wells, for drinking water (Berry, 1995; Cobbina et al., 2009). Although many dugouts meet WHO acceptable physiochemical measures (aside from color, turbidity, iron and manganese), dugouts are susceptible to a myriad of microbial contaminations and waterborne diseases (Cobbina et al., 2009). In an area where around 70% of the population subsists on agriculture, the northern region's dependency on potentially hazardous surface water offers a good example of the perhaps misleading MDG global and countrywide percentages (Cobbina et al., 2009).

### ***Enter Sachet Water***

Between a lack of reliable potable water infrastructure, apparently questionable rationing based on the socioeconomic status of residents in a given neighborhood, and general water insecurity based on region, the introduction of sachet water has revolutionized the primary drinking source for many Ghanaians nationwide. Within sachet water scholarship, Justin Stoler and partnering researchers offer the most comprehensive overview of the history, current uses, and future of this water source. With a number of articles published between 2011-2015, Stoler outlines how sachet water has quickly become the primary source of drinking water for Ghanaians who cannot depend on other, less reliable sources (Stoler, 2012, 2013; Stoler et al. 2011, 2012, 2013, 2014). Stoler (2012, 2013) is keen to outline both the benefits and shortcomings of this water source; he outlines in *Improved but unsustainable: accounting for sachet water*

*in post-2015 goals for global safe water and in The Sachet Water Phenomenon in Accra: Socioeconomic, Environmental, and Public Health Implications for Water Security* that the emergence of sachet water in Ghana is a “double edged sword,” for it fills an integral water security gap while creating vast amounts of plastic waste. Remaining largely nonjudgmental, Stoler simply outlines that by fixing one shortfall in public infrastructure, the plastic sachets create a new waste management problem.

There are tradeoffs between accessibility, reliability, and portability between sachet water’s predecessors. Most common and traditional, Ghanaians can fill their own personal containers at stationary water “kiosks” (Stoler, 2013). More expensive than a personal tap, water from the kiosk can risk contamination through lack of filtration or between improper transport and storage (Stoler, 2013; Mintz et al., 1995; Wright, 2004). Aside from fetching water from a fixed location, water delivery from water “tanker trucks” or hand pushed carts offers distribution convenience but does not eliminate the aforementioned improper storage and use contamination (Stoler, 2013). A number of non-governmental organizations (NGO) and social enterprises have offered “point of use” solutions to combat insufficient water filtration or in-home contamination. In Northern Ghana, the social enterprise “Pure Home Water” sells locally made clay water filters and safe storage containers to small households, enabling residents to take water of questionable quality and filter it at home (Johnson, 2007). Where the primary source of drinking water comes from untreated dugouts, the NGO “Saha Global” helps set up locally operated water purification businesses that use aluminum sulfate (“alum”) and chlorine tablets to reduce turbidity and microbiological contamination (K. Clopeck,

personal communication, 2014). Sachet water, then, emerges as the water source that is most reliably potable and subject to the least amount of user contamination.

Aside from filling water to bring back to the home, street vendors selling water in cups or hand tied bags offered other avenues for potable water. Street vendors would bring water from a source (GWCL, private well, water pit, river, or other) to a central location in town and distribute water to customers with a single cup (Ackah et al., 2012). Customers would drink from a single cup, and then give it back to the vendor to refill for the next customer. Another more recent source of water in urban environments is water sold in hand-filled, hand-tied polythene bags (Obiri-Danso et al., 2003). In order to conveniently open the closed polythene bags, sellers often place the polythene bags on their mouth and blow into them (Obiri-Danso et al., 2003). The obvious concern for these two sources of water was the potential for introducing bacteria by sharing a single cup, blowing into the polythene bags, and sealing the bags with a hand-tied knot (Obiri-Danso et al., 2003; Ackah et al., 2012).

Sachet water outcompeted such previous sources due in part to a straightforward, reliable, and easily replicable automated production process. Sachet water production can be understood in two distinct processes: filtering and pumping water into a sachet packaging machine, then filling a heat-sealed sleeve with water. Despite widespread critiques of GWCL's failure to reliably distribute water, the initial source for many sachet producers is piped GWCL water – sachet water producers, in effect, fill the company's water distribution gap (Yeboah, 2005). Producers are not immune to unpredictable rationing, and it is commonplace for sachet water producers, businesses, hotels, and individual residents to first divert GWCL piped water into a reserve tank outside. From

the large reserve tanks, many sachet water producers filter the water through a combination of clay, carbon, yarn, and Ultraviolet (UV) filters. Large rolls of pre-printed high-density polyethylene (HDPE) are sterilized using UV light as they pass through the sachet machine and normally feature the company name, contact information and Ghana Standards Board (GSB) and or Ghana Food and Drugs Authority (FDA) (Formerly FDB - Ghana Food and Drugs Board) regulatory information (Stoler, et al. 2012). Filtered water is pumped into the plastic tube and is heat-sealed to create each individual sachet.

### **Scholarly Concern: A Plastic Public Menace**

Although the sachet filling process is largely automated and incorporates a number of important sanitation procedures, scholars have raised concern that water quality can be sub-standard. Similar studies in Ghana's most populous cities like Accra, Kumasi, Tamale, and Cape Coast find that mineral levels are often within WHO guidelines for potable water among randomly selected sachets, but exceed acceptable levels of fecal bacteria (Obiri-Danso et al., 2003; Dodoo et al., 2006; Ackah et al., 2012; Osei et al., 2013; Okioga, 2007). Registered producers are subject to sanitation training and providing lab-verified water samples among other obligations, yet the Ghana Food and Drugs Authority estimates that there are over twice as many unregistered sachet water producers in Accra than registered ones (Ackah et al., 2012; Stoler et al., 2013). Substandard sachet production is most certainly higher because of the large number of unregistered sachet water producers (Stoler et al., 2012; Yidana et al., 2014; Tagoe et al., 2011; Stoler et al., 2013). However, sachet water quality has improved incrementally in

the last few years, thereby outdating the scholarly elite narrative that sachet water quality is uncertain and bottled water is the only safe packaged water source (Yeboah, 2005).

Sachet water may be considered Ghana's analog to bottled water in the global north. A wider discussion of bottled water is beyond the scope of this paper for comprehensive analyses of the multifaceted controversies surrounding the medium (see Soloman, 2011; Soechtig, 2009; Bozzo, 2009). Bottled water, which only 1% of Ghanaians consider their primary water source, often passes WHO potability standards, but is 30 times per unit more expensive than sachet water and (Stoler 2013; Stoler et al., 2012; Addo et al., 2009; Yeboah, 2005).

Both scholarly environmentalist and Ghanaian municipal agencies are concerned with the rising quantity of solid waste generated from discarded empty sachets. The growing body of literature on Ghanaian waste management focuses on metropolitan waste management, most often in Accra, Kumasi, and Tamale. Themes of this recent work include the discrepancy between the waste generated and its insufficient collection, increasing waste management public-private partnerships (PPP) like the *Zoomlion Ghana Limited*, and scholarly recommendations on how to value discarded sachets and implement recycling programs (Oteng-Ababio et al., 2012; Stoler, et al., 2012; Akaateba & Yakubu, 2013; Post, 1999; Obeng-Odoom, 2013). In popular newspapers like *The Daily Graphic* and *Ghana Web*, considerable ink is devoted to the plastic-clogged municipal water systems and subsequent flooding (Frank, 2014; Yahaya, 2014). Daily, 250 tons of plastic waste is generated in Ghana, a substantial increase since the advent of sachet water (Obeng-Odoom, 2013). Remedies to the plastic waste problem range from



regulating the industry to reduce waste generation and increase recovery, to expanding waste collection, to implementation of recycling incentive.

Scholarly outlooks on the future of sachet waste split between optimists hopeful of incorporating sachets into recycling polity and pessimists upset with the hitherto lack of sachet sustainability. Justin Stoler argues that the pace of waste management infrastructure is too slow to keep up with the rise of sachet water; although sachet water is able to “temporarily bail out local governance failures in basic services provision,” the waste generated is ultimately greater cause for public health and municipal management concern (Stoler, 2012, p. 1508). Because empty sachets have been considered not only worthless but also a nuisance, Fobil and his colleagues have documented the compounding increase of plastic waste in Accra waterways over 20 years, and argue that the future of sachet water lies in making sachets valuable (Fobil et al., 2010). At the core of public-private partnerships (PPP) is the idea that goods should reflect social costs, and Fobil sees a market solution by taxing the chain of plastic manufacturers, sachet water producers, distributors, and ultimately customers (Fobil et al., 2010; Fobil & Hogarth, 2006).

Alternatively, Obeng-Odoom argues that, “the solution does not lie with state intervention, for it was through that medium that the privatization of water and waste management came about”; rather, valuing plastic waste for its private market recycling potential may create a natural shift away from carelessly discarding the bags (Obeng-Odoom, 2013, p 471). The recent research of Oteng-Ababio et al. (2013) may supplement this non-governmental solution through outlining the success of the informal waste “pickers” called *Kaya Bola*. As one of the only sources legitimizing the activities of the *Kaya Bola*, Oteng-Ababio and his team argue that these informal waste pickers help

efficiently recycle post consumer plastics and sell it to a profit to buyers in the industrial sector. Supporting this perspective, Ebenezer et al. (2013) interviewed pickers and found that the transition to scavenging for sachets instead of harder and less malleable plastics offers hope for reclaiming discarded sachets, and with investment could cut down on machine oil imports by recycling the sachets into machine oil.

### ***Conclusion***

Despite an examination of the literature concerning Ghana's potable water landscape with a focus on how sachet water has drastically altered way Ghanaians secure clean drinking water, readers are left with an incomplete story. While much scholarship is quick to applaud sachet water's role in narrowing the water access gap countrywide, the renewed scrutiny on sachet water quality and environmental sustainability ultimately problematizes the water source. Many parties, however, do not consider the water source as problematic as some scholars discussed above; largely absent from the literature are the opinions and practices of Ghanaians who use sachet water.

My ethnographic research presented in the following chapters helps contextualize the scholarly research within the on-the-ground lives of the people using sachet water. My work, as it has unfolded, supports many of the viewpoints explicated above, but it also has illuminated perspectives hitherto unexamined. I incorporate ethnographic perspectives with scholarly works to provide a more comprehensive overview of the role of sachet water in modern Ghana.

## CHAPTER 2 –

### **Feet on The Red Ground: Ethnographic Research Structure**

The original framing of my research proposal in 2013 reflected broader global-north perspectives on developing countries and the gaps within popular media and scholarly literature concerning Ghana. Hailing from Marin County, CA – where school classrooms feature separate recycling containers and compost containers – I was raised thinking the choice to *not* properly dispose of waste is irresponsible. Incorporating this perspective to my research design, I formulated my questionnaire with a bias; I expected to find that Ghanaians did not share the same waste management awareness as I did. On my first day of ethnographic research months after my funding was approved, I quickly discovered how problematic my expectations were. Instead of indifference about sachet water waste, many Ghanaians – including producers, consumers, and waste pickers – spend a great deal of time planning where to dispose of their empty sachets, and often plan several days in advance for what will ultimately become of their waste. In retrospect, I can see how I spent nearly two months of pre-research time in Ghana actually *solidifying* my questionable perceptions of Ghanaian sachet water waste management. Given that the realities of sachet water waste management can be so easily ignored without soliciting Ghanaian viewpoints, the lack of ethnographic information in the sachet water literature is both understandable and concerning.

## Methodology

This research uses data collected from in-country observations, tours, and interviews conducted between May – July 2013 and May – July 2014. Funding for these research stints came from the Andrew W. Mellon Foundation Environmental Analysis Summer Research Fellowship, and the Pitzer Internship Fund. I conducted 40 semi-structured interviews, 30 of which were audio recorded and fully transcribed. Of these 40 interviews, 17 were Ghanaian citizens unaffiliated with the production, regulation, or waste management of water sachets – just “normal people” who live in Ghana. Three key government officials were interviewed: a head sachet water regulatory official, a district waste management official, and a head municipal water quality official. Ten interviews featured sachet water production plant owners. Several of these interviews included tours of facilities, which I was given permission to photograph. Of the 40 interviewees, 11 were female and 29 were male.

Interviews were conducted in both rural and urban communities: Accra, Amasaman, Sogakope, Ho, Kumasi, Tamale, Salaga, Damongo, Mole, Cape Coast, Bolgatonga, Elmina, and Koforidua. The data was gathered through convenience sampling within each research site, and participants were informally recruited – I would often begin asking store owners where they purchased their sachet water or if they knew anyone connected to the sachet water



*An interview in Tamale, Northern Region*

industry, and then followed leads and tracked down companies for interviews. All interviews were conducted in English, Ghana's national language – this limited the scope of possible interviewees, for many Ghanaians who do not have the privilege of a good education often do not speak English. Interviewees were given a consent sheet, and had the nature of the study explained to them orally. All of them had the option to participate in a full or partial interview or to decline to be interviewed at all. Interviews typically lasted between 10 and 30 minutes. All interview materials and methodologies were designed to follow National Institutes of Health (NIH) human research protocol and U.S. law regarding human subjects research. The Pitzer Institutional Review Board evaluated and approved materials and methodologies on April 15<sup>th</sup>, 2013 and again on April 14<sup>th</sup>, 2014. All interviewees included in this thesis have had their names and personally identifiable information changed.

# CHAPTER 3 – Results and Discussion: Ghanaian Perspectives and Patterns

## *Introduction*

Alongside fundamental health and waste management analysis of sachet water, the ethnographic data concerning sachet water producers, consumers, and waste managers must be incorporated into the analysis of water and waste systems in Ghana. Previously underrepresented in analyses of sachet water, the ethnographic research and presented in this chapter contextualizes the scholarly discussion within the lived experience of sachet users and illuminates unheard perspectives from overlooked parties. While many scholars have expressed concern over the quality of, and waste generated from sachet water, their information has been derived almost exclusively through quantitative research. Few sachet water consumer perspectives have been integrated into the sachet water discourse, fewer *kaya bola* sachet water pickers been consulted, and no studies have chronicled the narratives of, and practices employed in, sachet water production facilities. This chapter incorporates ethnographic data covering these three sectors, and provides viewpoints for future policy recommendations that reflect public perceptions and industry realities.

## **Part 1: Historical Overview and Contextualization**

To fully understand the reasons behind the rapid expansion of the sachet water industry in Ghana, one must view the current phenomenon as a “snapshot” in the longer history of Ghanaian water infrastructure. First appearing in country in the late 1990s, sachet water differentiated itself from previous water sources most prominently because of its portability and potability. Before sachet water, Ghanaians regularly chose between a variety of water sources daily, with different sources chosen based on local climate and water source attributes. Home water options could include piped water, water delivered to the house, or water stored in a container fetched from a water kiosk, borehole, dugout, rainwater (Kjellén & McGranahan, 2006; Stoler, 2013). However, once out of the home, Ghanaians depended water vendors who sold their product a variety of ways.

### ***“Cup Water”***

According to multiple interviewees, the oldest form of portable water was simply known as “from the cup” or “cup water” as translated in English. With public water infrastructure insufficient for providing water to all homes on a reliable basis, the only way to find water was to fetch it from a water source outside the home, whether it be a kiosk, well, stream, or the occasional rain collection. This meant that in order to move about freely and thirst-less, Ghanaians would have to fetch water from the community water source, or find a way to bring some water with them for the day. An entrepreneurial venture, “water carriers” brought water to drink, bathe, and cook with to homeowners. Additionally, water carriers began to sell water to Ghanaians outside the home too. This trend developed into a steady business for Ghanaian women: to fetch

water and sell it around town (in interviews with both males and females, I only heard of this position being held by women). Women would carry around large pots of water, and customers would purchase a cup of water. The cups were reused, and once plastic arrived in Ghana, were inevitably plastic. After quenching one's thirst, the customer would continue on their day and maybe find another seller if needed before returning home where they could choose to fetch the water from a centralized location themselves or be sold some water in the home. Below are a few excerpts from interviewees (all presumably over the age of thirty) explaining the process of buying "cup water" on the go. Here is Emmanuel, currently a banker in Accra, and his barber, Ernest:

Robert: What about before? You use a cup?

Emmanuel: Yes. *"We used to share cups," the barber Ernest chimed in.*

Robert: And then you would bring the jugs home? Or...

Emmanuel: No. The person, the water carrier, carried the cups around. She has one cup to fetch [the water from the jug]. She carried around the cups, but it was not safe, because, people considered it unhygienic. What we [did] was, we normally tried to drink water at home, then we just try to maintain yourself until you get back. Yeah, that's what they used to do in the past, and now, sachet water is everywhere.

Francis, a forty-year-old construction supplies salesman, remembers cup water as a nuisance:

Francis: You know, previously, when we were young, sachet water was not there. We used to buy water in plastic cups, okay? From the fridge, they fetch it into a bucket, then they sell it in cups. Sachet water wasn't there.

Francis's younger male employee, Kwabena, also recalls the pleasures of cup water

Kwabena: ...they also had a very nice pot, nice, chilled. And when you are walking, you buy it, from the cup, and drink.



Unpacking these three quick statements, we find historically important information. First, looking at Kwabena's and Francis' comments, they use the words "fridge" and "chilled." Talking to them and others, I learned that the advent of refrigeration was not only a huge step forward for sanitation, but also for consumer choice. Before refrigeration, Ghanaians would have no choice but to drink water at whatever temperature they found it. With refrigeration, Ghanaians could now choose to have a refreshing cup of cool water rather than a warm one – a welcomed choice when the average temperature in the country is often above 75°F. It is also worth noting that with the number of "hot" days a year has increased substantially over the last half century (McSweeney & Lizcano, 2008).

Storeowners were the first to secure refrigeration units in town. I talked to a refurbished refrigerator salesman in Kumasi who had worked in the same business for twenty years, and he helped explain that homeowners with enough disposable income would often buy a used refrigerator and chill water (from any source – bottled, tap, well, river). However, the great majority of Ghanaians could not enjoy the benefits of refrigeration except in the capacity of the "cup water" sellers. These entrepreneurs would secure a refrigerator, and chill a pot of water overnight. Come morning or midday, they would walk to town with cold water to sell by the cup to roaming customers. The normal price for a cup of water averaged 500 Cidis (5 pesewas in today's redenominated Cedi currency or 2 cents USD).

Ernest's comment is interesting in that he remarks on sanitary concerns. There are at least two sanitary concerns with "cup water." First and most obvious, the water itself was unregulated, unlabeled, and of questionable quality. Mobile consumers would

purchase this water, with its quality unknown. Second, the fact that the water seller would use the same plastic cups for dozens of customers raises additional sanitary concerns. Transmutable illnesses and bacteria could be spread simply from using a cup from a previous customer, and the water itself may not be clean enough to drink. It was apparent in my interviews that instead of drinking several cups of water, Ghanaians would choose to drink the more inexpensive and predictably safer water at their homes from the centralized communal source in the mornings and evenings, and drink “cup water” from mobile sellers only sparingly. Of course, this behavior was not of universal concern; several interviewees voiced no qualms with this form of portable water.

The “cupwater” saleswomen were limited in how much water they were able to sell a number of ways. Aside from the sanitary concerns regarding the water itself, the reusable cups both required cleaning on a regular basis and could only satisfy one customer at a time. In addition, that customer would have to stay put until they had finished the water, and returned the cup to the saleswomen, limiting the customer base. In Ghana, it's very common to sell goods to customers in transit; while driving, any stop the vehicle makes is an opportunity for a transaction to take place. One can buy almost anything out of a car or bus window at a stop sign or traffic light, from small snacks to household cleaning items. “Cup water,” if it was sold in this manner, was limited to one customer at a time. *Icewater* offered a leap forward in water portability.

### ***“Icewater”***

“Cup water” had a number of practical and sanitation drawbacks – it was of questionable source, unlabeled, featured an unsanitary communal cup, and had to be

consumed on site. The emergence of “Icewater” eliminated the problem of having to consume water at the seller’s location. Although bottled water emerged in Ghana around the same time as plastic bags and bottles, bottled water was a luxury item, with a starting price that was 30 times more expensive than cup water (Stoler, 2013). A growing, mobile population needed a more mobile water source, and that source was known as “Icewater.”

Icewater (also known as water “in the rubber,” rubber being a colloquial reference for plastic bags, and sometimes “Purewater”) is simply water poured into a thin polythene bag, and tied up at the top. Imagine the bag used to transport a goldfish home from the pet store – without the fish! According to the Stockholm Environment Institute, the Icewater nomenclature originates from how many sellers added blocks of ice to the water bags and stored them in iceboxes or chilled pots (Songsore, et al., 1993). Use is relatively straightforward - customers bite a hole at the bottom of the bag, and squeeze out the water, most often sucking on the bag until the water was finished. Once opened, the bag was hard to store for later consumption (unless one consumed enough to make another tie in the bag).

Like the advent of other technological innovations in Ghana, it is difficult to determine when Icewater first arrived in Ghana and spread to major cities, towns, and villages. In fact, no interviewee could give me a good estimate of when plastic bags and bottles arrived. I first traveled to Ghana in 2009, and although far less prevalent than sachet water by then, I witnessed the Icewater industry still in action. But in 2013, the Icewater industry had nearly disappeared. Due to outbreaks in waterborne diseases like Cholera, certain municipalities, like the Tema Metropolitan Authority, have chosen to

ban Icewater for human consumption (see Ghana Web, *Cholera Cases Rise; Home-Tied Iced Water Ban*, 2005).

Icewater, like “cup water,” could be served warm or chilled, for the same price of 5 Pesewas (500 *old Cedis*), but had the added benefit of being far more portable. Customers could now buy a half-liter of water and carry it *away* from the saleswoman. This was of course preferable to all parties; saleswomen could now abandon the hassle of cleaning and reusing plastic cups, sell more, more easily, to more to mobile customers. Indeed, customers could now choose *when* and *where* they wanted to consume their water, as well as buy some extra water if they were making a longer journey. Another convenience factor was that there was no *immediate* cleanup factor for the saleswomen; the disposable nature of Icewater meant the cleanup from this water source was someone else’s problem. This clean up issue was effectively transferred from seller to buyer.

The single-use nature of Icewater also decreased the risk of spreading germs from sharing cups as seen in the cup water market, yet created a new opportunity to contaminate water. In order to conveniently open the polythene bags, sellers often placed the polythene bags on their mouth and blew into them (Obiri-Danso, K., A. Okore-Hanson, and K. Jones, 2003). Sanitary concerns over water quality still remained due to the fact that bags were filled from a variety of sources. With Icewater, both bacterial and mineral content were unknown and varied from seller to seller.

Whereas “cup water” was prevalent during a period of Ghanaian history where public water infrastructure was nearly nonexistent in many cities, the period in which Icewater developed also saw a rapid increase in community water infrastructure. Many Icewater sellers filled the bags with piped water, well reservoirs, and boreholes, both

filtered and unfiltered. Ghanaians I interviewed had a much more favorable view of Icewater compared to “cup water” due to the single-use capability of Icewater bags, coupled with increased measures of sanitation and added portability factors. Below are a few excerpts from my interviews that highlighted interesting perspectives on the advent of Icewater over the last few decades.

Here is Kweku, the head officer for a regional sachet water regulatory organization.

Robert – So sachet water didn’t come much longer than ten years ago. First it was water in the cup, then Icewater. Is Icewater legal anymore, can you do that?

Kweku– It’s still legal. It depends on the individual. You are seeing what you are buying. You see the law is specific on packaging and labeling it. Because if you are carrying the water in the cup, you have seen it, and you want to take that water. That is left up to you. If someone is selling that Icewater, you have seen that. It’s just that, you see, there’s no law that bars them from doing it. But technology has kept [Icewater saleswomen] out of business.

Robert: I see, people don’t want to take?

Kweku: Exactly, people don’t want to take. It’s better to take sachet water. People prefer that, but there’s no law preventing Icewater.

This excerpt illustrates an interesting part of Ghanaian law that dictates what products are under the scope of Ghanaian regulatory offices such as the Food and Drug Authority, Ghana Standards Board, Municipal Assembly etc. Kweku was a unique consultant in that he was well educated and knew the regulatory procedures that now dictate sachet water standards. Having worked in this office for ten years, his department was in a transition period from overseeing Icewater to regulating sachet water. In essence, Kweku understands that “cup water” and sanitary concerns were “known unknowns;” everyone knew that the water source was *unpredictable*, sanitation measures

*varied*, and it was a “*drink at your own risk*” situation. Unlabeled Icewater offer similar concerns; the sanitation is a “known unknown.” However, earlier in our interview he explained that Icewater producers began to accumulate so much capital that they could afford to put ink text and label their bags. Once a product is labeled, it is considered a good to be regulated under the Food and Drug Association, and is subject to regulation (sachet water is under the direct regulation of the GSB and FDA). Now, the “known unknown” of Icewater had a name, and the producers could be held accountable for sanitary conditions, mineral content, and human consumption.

However, the law that was designed to get packaged water producers to properly label and thereby properly filter and produce water in sanitary conditions had the opposite effect: it drove producers to *not* label their product in order to remain anonymous and continue unsafe production. This is how the Icewater industry remained until the advent of the sachet water industry and the technological advancements that made it possible, such as inexpensive filtration, automated bagging, and cheap lab access.

Further, business owner Francis provided valuable information on the history of water infrastructure in Ghana.

Robert: So tell me a little bit about before Icewater?

Francis: Icewater has always been there, like, whenever electricity gets to *any* town, and then they are using fridge, they like to just chill the water, and then sell to others. Originally, like in the villages, there is nothing like chilled water, you just put the water in a pot, and its very cool, and then they drink (as in the clay pots are naturally cool and chill the water). Only the rich guys in the cities, they are able to drink water out of the fridge, already chilled (like the fridges with water dispensaries). We saw the government working very hard to take electricity to everywhere, and then people, poor people can even buy used fridges and so they were becoming popular and popular. And once you have a refrigerator, its not like everybody who has it can chill the water. So, but that was basically when Icewater started. But then the purewater (sachet water) came. I think purewater is bagged nicely! Icewater, you can't carry it around too much, because it can

pop. The bags are very, very thin. But this one, the sachet water, now you can transport around pretty nicely. [The bags are thicker.]

Francis's conversation illustrates two points well. First, refrigeration made Icewater a more attractive, exotic product while providing entrepreneurial opportunities for Ghanaians. Second, the packages are thin and susceptible to leaking. Francis exposes this limitation of Icewater that was not appreciated until sachet water came to Ghana. The bags used for Icewater were exceptionally thin, and could accidentally pop, tear, or rip easily. The thin plastic density made transporting and selling thousands of empty bags at a time easy, but filled bags proved somewhat troublesome for sellers and consumers. Both had to be careful handling the water-balloon like Icewater bags; once a hole had been made, by accident or on purpose, the bag would have to be emptied in a controlled manner. In addition, one could only carry a few Icewater bags at a time, for too much pressure on the bags would pop them. This is different from the higher-density polythene bags used for sachet water that are much more difficult to tear. Sachet water bags can also be emptied halfway and stand upright unattended.

Although I had not seen much Icewater on my 2011 visit (and hardly any in 2009), Francis's employee, Paul, assured me that it still had a place in the sachet water economy and had not disappeared.

*Colleague Kwabena hands me an Icewater bag and says, "Here is a sample. They still sell it."*

Paul: But it's for the bread sellers. They use it to put down the dust.

Robert: So it's not a drink?

Paul: It's not a drink. They think it is still more economical to use.

*Kwabena: “People, they still kind of like this one. If you want to, you just say, “I want to buy Icewater. This one is five Pesewas. It’s cheaper,” implying that he buys it to drink.*

It is clear that compared to its impractical and questionable predecessors, sachet water offered convenience and peace of mind. Besides the fact that the GSB and FDA regulated labeled sachet water quality, the HDPE plastic bags were less likely to break, could stand on their own once half empty, and could be bought in bulk and taken anywhere. Combined with increased electrification and the rise in everyday refrigeration accessibility, the sachet water industry capitalized by selling a new, portable, safe, and regulated means of drinking water.

### ***Piped Water***

Like all infrastructure in a country as large and diverse as Ghana, it is difficult to make accurate generalizations about the history of piped water in urban and rural areas. National pipe-borne water services have existed in Ghana since the 1920s (Stoler, 2013). But, based on my interviews and personal experience in the country, nationalized running water services are quite spotty in terms of coverage, quality, availability, and affordability. Running water has existed in parts of heavily urbanized areas – like Cape Coast and Kumasi – for decades, but many rural and even suburban areas still rely on other water sources like community wells and now sachet water.

The national water company, *Ghana Water Company Limited* (“Ghana Water” or GWCL) succeeded the former Ghana Water and Sewerage Corporation (GWSC) in 1999 (Nyarko, 2006). Ghana Water provides piped water in major cities and some smaller towns to businesses, water plants, and homes, yet predictably falls short of demand and



covers 60% of its potential customers (Nyarko, 2006). This may be influenced by piped coverage as well as reliable access to the coverage. Even among the interviewees that had a piped water connection, Ghanaians often preferred and trusted sachet water over the GWCL water. Noble, a waste management official, underscored the enthusiasm and trust Ghanaians often expressed for sachet water over GWCL.

Noble: But now you go to homes, they give you sachet water, on a tray! So people are now moving from taking water from the tap in glasses to sachets. Even the remote villages, you get sachet water.

Robert: Is it a cleanliness issue or is it just preference?

Noble: Well...it is an issue of clean...See, the perception of [sachet water] is that it's *pure*. That is one. They don't care to look or know what is inside it once it's filtered – they think it is clean. Some of the villages, apart from the town, that are not connected to the main water supply from Ghana Water, so you go there and maybe you see boreholes. The boreholes are salty. So, they wouldn't like to drink from those boreholes. So that one is not about preference. But preference? Maybe town here, it could be preference. As well as it could be status. I mean, you don't go to home now and they fetch water from a plastic container into a cup for you. Because here, we have clean water. In Ho here, from Ghana Water – you fetch it from tap, it's very clean. Especially those of us who draw from the Volta Lake. But there are some that get [water] from the other lakes. Those ones are not so clean, so for them, they can see it's about cleanliness, not preference.

Noble illuminates a few key points. For one, piped water has existed for decades in some areas, yet the water quality may vary depending on location and water source. Despite the fact that water quality has improved significantly in recent decades, Ghanaians who grew up with inconsistent tap water do not trust it. Additionally, because sachet water has a reputation among Ghanaians for being *pure*, it is the drink of choice even when piped water is available. Of course, a remaining perception is that GWCL's sources are different – some from boreholes, some from lakes and rivers *other than* the Lake Volta – so although all branches supposedly meet the benchmark for human

sanitation set by one Municipal Assembly, some branches may vary in water quality. According to Noble and some other interviewees, tap water that GWCL has harnessed from boreholes or other sources may be potable, but not great tasting, smelling, or looking; however, tap water from the same national company a few towns over may be of higher quality. The variable quality is unsettling; sachet water eliminates that variable, providing consistent, thoroughly treated water that is overseen by a different government agencies (Ghana Food and Drug Authority and Ghana Standards Board). All that said, water provided by GWCL has a reputation for being at least *potable*; sachet water may taste better, be better filtered, and is individually packaged. For a small price, Ghanaians prefer sachet water for safety, consistency, taste, and status.

### ***Bottled Water***

Readers may now ask, “I have never heard of sachet water...but if Ghana needs cheap portable water, what about *bottled water*?” There are many interesting parallels between the American bottled water industry and the framing of bottled water with the Ghanaian sachet industry in terms of marketing “purity,” “taste,” and “portability.” However, one great difference between the two nations is purchasing power. One can buy a chilled 500ml *bottle* for about one Cedi (about 35 cents USD) in a corner store in Ghana, and a large 1500ml bottle for as cheap as two Cedis (about 70 cents USD). But one can buy seven or more 500ml sachets for the same price as one 500ml bottle of water when purchased individually, even more when purchased by the bag (30 sachets).

Nana, a filtration salesman in Kumasi, explained the decision-making process Ghanaians use when purchasing water:

The [sachet water]: It is easier to carry along. It is all over the place. Everybody uses it. You know, it is hygienic somehow, so if you are thirsty and you are in your car, it's easy to see the kids are selling it, and when you get to grocery shop, it is easy to buy, and it is very cheap. It is a good solution. Provided the manufacturing price is less so that everybody can use it. Some of them cannot buy the bottled ones. It is very *expensive*. The same treatment, but the plastic. If you don't have that money you can buy the sachet pack. And one cost of a bottle, can buy sachet water for the whole family of three or four. You spend money to buy one bottle for you only, for that you buy one big bag [of sachet water], and the family of three can use it, maybe two or three days. But if you buy the bottled ones, you may not even last even a day. Maybe hours. So I hope the [sachet water companies] will continue doing it, the factories, so that people can buy it. They are doing a good job.

Indeed, just as in the United States, bottled water is easy to find in Ghana – but compared to sachet water, Ghanaians see it as an outrageous luxury, a waste of money even. Nana illustrates the view that the water does indeed go through the same treatment (I confirmed this when visiting a combination bottled water and sachet water factory), so there should be no difference in water quality. In reality, there are far more sachet water producers than bottled water producers in Ghana, and researchers like Addo et al., 2009 show that bottled water is predictably safer to drink than sachet water. Nana has a favorable view of sachet water companies not just because he sells them disposable filters, but because they provide safe, quality water to Ghanaians at a more *affordable* price. Ghanaians might switch to bottled water were it as cheap as sachet water, but for now it is an unnecessary and often prohibitively expensive luxury.

The common perception among Ghanaians is that while bottled water may be better tasting, sachet water is just as safe (among foreign tourists like myself, the perception is that the bottled water is more hygienically produced). Of course, an added benefit of bottled water is it is reusable packaging – the resalable bottles are often used to

store other goods like palm oil, and its even more portable than sachet water. In Ghana, bottled water is a status symbol according to business owner Francis:

But, a lot of these things, they're just a matter of taste and preference. And it's also a matter of convenience. So from a taste preference standpoint...the number one bottled water is *Voltic*. But I have met people, business managers, who say, "Oh, Voltic is crap!" Ok? And they say they like *Bel Aqua*. But all this is just the brand, right? I mean, there isn't that much of a difference between "Crest" and "Colgate!" I really, really just feel that it is just a taste and preference. Because, the bottled water, it's at the high end. It's expensive! But what is actually being sold is the bottle. What makes it expensive is the bottle, the packaging. And then sachet water is the next expensive, ok, and this sachet water – it's just the sachet! And the next expensive, it's called "Icewater." That's like, you know, really, really thin, the plastic that they put it in and then they hand tie it. So it's on this scale of water from the tap, Icewater, sachet water - which other people call purewater - to bottled water. And then when we get to the bottled water range, we're looking at *which brand we're talking about*. But, when you look at the sachet water, I don't think folks look too much at the brand, whether it is *Akpe* or *Ever Klin* or "Little!" [A joke about my last name]. Whatever it is, folks just drink it!

For Francis, the price of each water source depends not on filtration or treatment, but on packaging costs and possibly status. He addresses an interesting sociological point when talking about recognizing differing quality standards within a certain medium. For Icewater or tap water, there is no product discrimination; it is impossible – the product is unlabeled, and the only way to make a judgment is to try the water out or have it chemically analyzed. Within the sachet water bracket, he asserts that people do not really care what brand it is; Ghanaians have faith in the regulatory oversight of the FDA and GSB and believe that if the water is in a labeled sachet, it must be *pure*, so the brand does not matter.

Throughout almost all of my interviews, Ghanaians did not have a particular sachet brand that stood out as a cut above the rest. Indeed, observing how Ghanaians purchased the water demonstrated a disinterest in branding; a seller shouted "Ice Pure!"

or “Purewater!” and a customer would buy the sachet, with no concern for the brand. The same occurred with sellers in stores – often customers would come up to a stoop with money in hand ready to buy whatever sachet water the store had to offer. Only once did I hear that brand mattered: from Kingsley, a refrigerator salesman in Kumasi. He said that the biggest companies who sell bottled water as well as sachet water advertise heavily, and their water costs a little more and has a higher demand. This was the exception to the rule, however, as there are almost no sachet water companies that have a national presence.

Examining Francis’s comment about bottled water discrimination may sound familiar to a reader who has been confronted with buying one brand of bottled water over another. Among the wealthiest Ghanaians, there may be discrimination not only among what medium of water one buys and drinks, but *what brand* one buys and drinks. I suppose it may be a common practice among the most wealthy people in a society to distinguish one’s power by demonstrating “sophisticated taste buds” and disposable income, even when it comes to essentially indistinguishably basic products like bottled water.

There is also an important distinction to be made here between “still water” and “mineral water” in Ghana. Although I was unable to verify his claims, Kweku, introduced previously as the head officer for a regional sachet water regulatory organization, indicates that if a company wants to produce mineral water, they are under higher scrutiny:

Robert: And then bottled water it is the same process? If I want to bottle I have to get it approved by you?

Kweku: Yes you see, the bottle has much more requirements. You see, the sachet, they just filter the water, pass it through the UV system, and package it. Bottling, like Voltic, they claim to have added some minerals; they have to come up with the natural mineral content. They have to indicate the exact content of the minerals in the water. But sachet water, they don't have that requirement. The bottled [mineral] water uses much more sophisticated equipment than the sachet water.

It is important to note that not all bottled water is mineral water; however, if a company claims to produce “mineral water,” they must prove it. Like sachet water companies, mineral water companies have to submit the required water samples for sanitation testing, but they also must submit *additional* samples to certified laboratories for mineral analysis.

## **Part Two: The Life Cycle of Sachet Water – Ghanaian Perspectives**

With sachet water's predecessors and alternatives outlined utilizing scholarly information reinforced through Ghanaian narratives, this section illuminates an overlooked and exceptionally important actor for the sachet water phenomenon in Ghana – the producers. Although my original research was focused solely on consumption and waste management, I was thrilled and surprised to be welcomed into 10 sachet water production plants and given personal tours of the facilities. Although understudied within sachet water scholarship, sachet water producers are portrayed as questionably hygienic, quick to avoid regulation and oversight, and dangerous to public health in the few instances they are examined. However, through my studies, I find that many producers work against these stereotypes. With increased regulation by the GSB and FDA in recent years coupled with community and consumer feedback, many sachet water companies showcase hygienic processes, the use of a diverse set of filtration methods,

compliance with regulatory measures, and an overwhelming desire to respond positively to increased consumer demands for potability.

### ***Ghana Water Company Limited (GWCL), Producers, and Source Water Quality***

Although the initial source of water varies for independent sachet water producers, the great majority of producers utilize GWCL as their primary source for “crude” water (Stoler, 2013). Ghana Water Company Limited water is harvested from a complex network of surface water sources to provide running water to urban and some rural areas. The largest source of above ground water is Lake Volta and its tributaries. Lake Volta was created in 1964 through the completion of the Akosombo Dam at the southern most point of the Volta River (van de Giesen et al., 2001). Although the environmental consequences of this massive ecological engineering project are controversial, Lake Volta and the Akosombo Dam today provide hydroelectric power for Ghana and surrounding nations in addition to providing GWCL with clean, reliable water requiring relatively minimal filtration. One of my key informants named Dennis was a chemist connected to government water regulation – he helped explain that the baseline water quality derived from Lake Volta was so high that it constitutes grounds for proximal sachet water plant siting:

Dennis: Most of the sachet water producers are in [the Eastern Volta Region]. Even if you go to Accra, most of the producers in Accra, if you look you will see that most of them come and produce the water here. Because, we take from the Volta Lake, and the Volta lake water is quite good. So we don’t need so much purifying, so most of [the sachet water companies] they prefer to produce their sachet water here than in Accra.

According to Dennis, water companies prefer to site in proximity to Lake Volta due to its high water quality. Through my interviews in the Eastern Volta Region, however, I found

that despite the initially higher water quality, many still prefer sachet water over the GWCL Volta Region piped water. A stigma that is difficult to overcome, in a region where piped water quality is higher than many of Ghana's other regions, people still believe that sachet water is far purer and tap water is unsafe. Dennis believes that water from GWCL that reaches a town or village is safe; but instead the point of use behaviors are to blame for water contamination.

Dennis: Those that have access to Ghana Water Company's supply, they have no problem. The only problem is that, the villages, sometimes their process of handling the water that is fetched from the tap, how it is stored, it's their problem.

Robert: Because you have to clean the storage tanks?

Dennis: Right, those who are fetching [water from the tap], you shouldn't allow kids. So sometimes if you think that, *the kind of personnel that is fetching* or drinking water in their house, they are not...grown enough to take care of certain precautions. So instead, you see people buying this purewater, [or] sachet water. But if you are able to fetch Ghana Water, handle it well, store it well, there's no difference what they are producing. You see, their perception – they are using a bag, using polythene so it's not exposed to the environment. But when you fetch it down in the container, you see sometimes someone come fetch, another come fetch...In the process of fetching, someone can do something that another doesn't like.

Dennis believed that GWCL meets hygienic standards set by the local Municipal Assembly; if unhygienic tap water is consumed in a village it was the village's unhygienic water-fetching protocol that is to blame. The variety of polluting sources is diverse, from communal taps to improper storage and handling. Although Dennis was aligned with the GWCL and has formal training as a chemist, he was the only interviewee who explicitly advocated for the GWCL quality and procedures. However, his comment about unhygienic point of use practices deserves consideration and further research beyond the scope of this thesis.



When conducting research, I did not focus in detail on GWCL practices for pumps water from underground sources. I did gather from interviews of officials and sachet water companies that aboveground water is almost always preferred between the sourcing costs, potability, and physiochemical makeup. Water from underground sources (boreholes or wells) is often infused with certain undesirable dissolved minerals, which need to be filtered out. In both the arid north and rainy south, Ghanaian topsoil shines with a rich red-rust color. This strong red coloration in the soil is indicative of laterite – soil saturated with metals like aluminum and iron often found in hot and wet tropical areas (Helgren and Butzer, 1977, web). Laterite is used to make bricks for buildings countrywide; often combined with other soil strengtheners it is one of the cheapest and most ubiquitous build materials in the country (Adinkrah-Appiah, 2001, web). The consequence of such a laterite-saturated soil for water quality is that iron and aluminum come to saturate both ground and surface water. Although not inherently harmful in drinking water according to WHO standards, the iron and aluminum can impart an undesirable poor taste or stain skin and clothing color. Laterite rich soil is most likely to blame for Ghana’s high concentration of iron and aluminum in almost all water sources (Partey et al., 2009). Several interviewees like Dennis used the terms “like dirt” or “salty” to describe water pumped from mineral-rich boreholes.

### ***Registration and Regulation***

With the near exponential rate of growth of the sachet water industry in the mid 1990s through 2014, the role of industry regulation and water quality standards in Ghana is integral. Within the published literature, concerns center on the facts that regulatory

oversight is insufficient to keep pace with the growing industry, and that producers can evade regulatory officials relatively easily (Suleiman, 2014; Ackah et al., 2012; Yidana et al., 2014; Obiri-Danso et al., 2003.) Adding to this body of research, I find that the Ghana Standards Board (GSB) and Food and Drugs Authority (FDA; formerly Food and Drugs Board) have recently increased regulatory efforts and empowered consumers with hotlines for reporting concerns. Additionally, within the reputable sachet water producing companies, management officials have increased efforts to work with regulatory officials, some recognizing the marketing benefit of working with the regulatory agencies and consistently producing cleaner water.

Outlined in greater detail by Okioga (2007), the sachet water industry is overseen, with some overlap in duties, by the Ghana Standards Board and the Ghana Food and Drugs Authority. While all sachet water producers must register and meet standards of the FDA, it is optional to partner with the GSB. The advantage of registering both with the FDA and GSB is the brand recognition and security that accompanies the GSB endorsement icon. The certification process with each agency is lengthy, comprehensive, and costly in the eyes of some small sachet water production companies. Before production and sales can begin, each sachet water plant must complete an "...application form and submit...it together with supporting documents that include a business registration certificate, certificate of analysis, a site master plan of the factory, and health certificates for all workers in the product line showing test results for tuberculosis, hepatitis A and E, typhoid and other communicable diseases" (Okioga, 2007, p. 35). Once the paperwork is in order, the sachet producers still must maintain regulatory

standards concerning worker health status, equipment and site hygiene, water quality, record keeping, and laboratory licensing.

I interviewed a key member of the FDA responsible for assuring proper sachet producer registration and labeling who highlighted some of the most important regulatory processes:

Robert: How does that application work?

Consultant: Yes, the application, you just apply, you write the name of your company, your location of the factory, then we come to look at it – is it ideal? Is it closer to a public place of convenience, or is it closer to a refuse dump? Before we can agree for you to do it in the first place. If not, then we disagree.

Robert: And then you have to stop?

Consultant: Yes, then you have to stop. Then, after we have agreed on the location, then we ask that you purchase a set of application forms from the office. Then you complete that process, the brand name, the location. Then you attach the medical certificates of your staff. You also attach the laboratory analysis of the water. The finished product, you attach it.

Robert: What does the medical form say, what do they have to prove?

Consultant: The medical form, you are looking for whether the person has any communicable diseases. Otherwise you are not qualified to be in the business. If you have typhoid, we don't want you to work on the food or water. That's what we are looking for. So, when we have screened the staff and seen that they are okay, we have inspected your water analysis of the water, then the final approval is given *after* we have taken the final sample to our laboratory to confirm what you have given us. If it is okay, then we give you the approval. Plus, we keep monitoring, ensuring that you change your filters regularly.

There are a number of important processes to note from my conversation with the FDA employee. First, the FDA takes the *siting* of each sachet plant into consideration – an important concern I have not encountered in the literature. The FDA is concerned with proximal pollution; making sure the plant is located away from harmful sites like city dumps or brownfield sites is of integral importance. Additionally, registration of the

company helps create accountability for the sachet plant owners, both holding owners responsible for the quality of their water and making it easier for the FDA to track companies.

Once a company has a properly registered and sited plant, it must provide medical reports that certify their workers' health conditions won't possibly compromise the water conditions. One of the final steps is to produce a water sample, which has to come from a fully operational plant, often meaning GWCL is pumping water in or the company is pumping from a private borehole, the holding tanks are filled, and the water passes through the filtration system into the bagging machine. Any independent certified laboratory can analyze the sample for winterbourne bacteria and mineral content, and some GWCL head offices have fully capable laboratories to analyze independent water samples. Once an independent or GWCL laboratory gives a positive report, the final step before production is a sample analysis by the Ghana Food and Drug Authority themselves.

There are additional regulatory steps that a company has to take if it wants to earn both the FDA and GSB approvals. A Koforidua sachet water producer helped me understand the regulatory process from the small independent producer's standpoint – Here is a portion of an interview with Dabbi, the owner of a one-machine water plant who just recently opened for business:

Robert: So brand new! Wow. So, talk to me about how you did the lab work and registration process – all that.

Dabbi: These are the certificates there – *he points to a wall of certification documents, including the Food and Drugs Authority lab tests and microbiology / personal hygiene training* – And Ghana standards board.

Robert: Was it easy then? It wasn't hard?

Dabbi: No. Very easy. If you follow the directions, there is no problem.

Robert: And then did you have to do the laboratory work too?

Dabbi: Yes! Here in Koforidua. We have all the copies...the water companies, they came and they tested everything. And training – you have to be trained by Food and Drug Board.

Robert: Where was it? Was it in Accra?

Dabbi: No, here, in Koforidua.

Robert: Wow, so it's Ghana Standards Board, its Food and Drug Authority, and then, these two too – Laboratory report one, laboratory report two. How long did that take?

Dabbi: Yes, we started somewhere last year. [It was now early July]. Then by October, everything had gone through. Because you can't start without it going through?

Robert: So how many months? Two, four, six?

Dabbi: Eight months.

Dabbi seemed confident that he was producing the healthiest water that met all of the



*Microbiology and Personal Hygiene training completion certificate presented by the FDA to a sachet water company in Koforidua proudly framed and hung on in the production plant*

regulatory guidelines in all of Koforidua. A Highlight of the certification process for Dabbi was the daylong training on “microbiology and personal hygiene.” In addition, he noted that the entire process took *eight*

*months* to complete, from registration to production. Because the registration process is so arduous, one might surmise that the

sachet plant owners (like all small business owners) are emotionally as well as financially invested in their business.

Thus far I have covered the route that most sachet water producers take before they can begin production. However, I have not addressed the process a sachet water producer goes through if they have a private borehole instead of using Ghana Water's supply. Sachet water companies, like GWCL, try to avoid fetching water from a borehole for a host of reasons: it is expensive to drill a borehole (up to \$5,000 USD), it is costly run a gasoline-powered to pump (and the pump is subject to mechanical complications), and it requires extra monitoring and filtering. Much of the registration and production processes are similar, except the Ghana Standards Board requires that water from a borehole go through more stringent testing for various dissolved minerals. In addition, water from a borehole requires extra treatment and filtration before it can be packaged. For these reasons, sachet water companies tend to avoid using water from a borehole.

There are also a few advantages to harvesting water from a borehole. For one, water flow is more predictable; many of my interviewees had multiple holding tanks to store extra water, because the GWCL schedules "dry days" where they do not pump water to the sachet water companies, as well as days where water is unexpectedly shut off. With water from a borehole, the company can harvest as much as their capability allows. Most importantly, the borehole water is *free*; once the costs of drilling and pumping machines have been met, the company does not have to pay a supplier for water. In general, though, the costs outweigh the benefits for sachet water producers, and water purchased from Ghana Water is the common choice.

### ***Filtration and Sachet Water Production***

The most important aspect of sachet water – for regulators, producers, outside scholars, and consumer alike – is water quality. Although studies during the past decade have indicated some sachet water producers do not meet potability standards, the trends for over-purification and multiple filtration steps for the ten sachet water producers I visited suggest that regulated sachet water producers are working hard to end the scholarly concerns with sachet water quality. Although each factory is set up differently in terms of target output, number of machines, hours of operation, number of rooms, hygienic precautions, filtration systems, and storage facilities, all were quick to showcase the numerous hygienic precautions that ensure a high standard of potable water.

Many plants share common layouts and production practices. Most are located in what looked like small single-level concrete homes, indiscernible from neighboring architecture, aside from the water storage tanks often elevated outside the plant. These storage tanks house the unfiltered water reserve, both in plants that receive water from GWCL and from boreholes. The tanks are formed from a high-density hard plastic, although some interviewees reported that underground concrete storage tanks are also used. Of the factories I visited, the smallest holding tank is 500 liters and the largest held 1,500 liters. Across the country, I saw just two holding tank brands, the dominant being “Polytank” and the seemingly less popular “Syntex.” Tanks could simply serve as the intermediate holding zone for unfiltered water or provide the preliminary stage for filtration. About half of the plants I visited had one or more yarn filters mounted on the

piping feeding into the holding tank. This initial filter would be replaced more often than others and was easy to access from outside the facility. Tanks require cleaning on a regular basis, and are scrubbed inside with soap and an antiseptic, according to one plant owner in Sogakope.



*Holding tanks and external primary yarn filter situated outside a sachet water factory in Sogakope.*

From the holding tank, water enters the filtration site, and the level and systems of filtration are the greatest variations I noticed among the various plants. The minimum level of filtration I found consists of a series of two yarn filters, two carbon filters, and a UV light filter, whereas the most complex consisted of some fifteen mixed-medium filters and two UV filters. According to FDA regulatory standards, minimum filtration for operation standards requires 4 filters along with a UV filter (Okioga, 2007). The most



common filter used in sachet water plants is a yarn filter, followed by carbon filters, UV light filters, and even ceramic or clay filters in a few plants. Most often, the size of the yarn and carbon filters is approximately a ten-inch tube with a two-inch radius and half-an-inch diameter hole in the center. These filters are situated in clear holding pods, most often strung together on the pipe leading from the poly tank on the way to the filtration machine.



*Three yarn and two carbon filters leading to sachet filling machines.*



*Below the set of yarn and carbon filters, this sachet plant employed the use of a clay filter*

In terms of filtration quality, the yarn filters come in three levels of filtration thickness – 5 microns, 1 micron, and 0.5 micron, and they are often installed in the plants in that order. Yarn filters are placed before the carbon filters, and are designed to filter out physical impurities like sand, silt, or rust. The carbon filters further aided in capturing unwanted compounds, including ones that would give the water a “bad taste” according to one company owner. The UV water filter and UV sachet bag light kills harmful bacteria on and within the plastic water sachets. Each plant I visited had some combination of these three basic filters. The additional or “optional” filters included ceramic and clay, which company owners claimed to not only further filter water, but also give it a natural, “earthy” taste.

Although most filters come in the standard ten-inch size, a few plants opted to use larger filters that they could replace less frequently. The “medium” sized filters look and function just like the small ones I have described, but they were around twice as thick and three times as long. They still sit in long clear pods along the water line, and came in different microns of yarn as well as carbon. The largest disposable filters stand about five feet tall, and are self-contained. These filters were seldom replaced, and often are used in combination with the smaller filter sizes.



*Exhausted carbon filter (left) and yarn filter (right)*

Although the GWCL water that most plants used to fill sachets should meet FDA industry standards, sachet company owners all expressed that the GWCL filtration was not enough to produce healthy, tasty water. Here’s Bright, the first company owner I interviewed in 2013, explaining some of his filtration philosophy:

Bright: ...because sometimes, the water that comes from Ghana Water Co. is *dirty*. Sometimes it's odd. If it is three days before we change it, the color [of the yarn filter] is changed, so you have to change it immediately.

Robert: So which one's better? *I hold up a 1, .5 micron yarn and carbon filter.*

Bright: We use all. We have four types.

Robert: Lets see.

Bright: This one is 0.5 microbes (yarn)...this one is carbon, this is the last filter. *He shows me the line of filters that lead to the filtration machines.*

Robert: So this one takes out...it says, "Sand, silt, dirt, rust," (yarn) so, the particles. And this [carbon] one is more for like bacteria?

Bright: Yes. Then we have a light called "oov" light.

Robert: Oh wow! And a UV light! So you have really good, clean water!

Bright: The best, I would say the best.

Bright's production plant is situated in Sogakope, a river town at the edge of the Volta region. Despite being situated in water district with surface water access from the GWCL, water quality is unreliable and demanded great filtration costs. The FDA maximum lifespan for a yarn filter is three months, and with the water Bright received from the GWCL, the lifespan of his filters is less than 1/20 of this.

Replacing filters is a reliable fixed operational cost; the frequency of replacing filters varies based on the volume and quality of water that passes through them. For the larger plants, with several machines operating daily, filters are replaced sometimes on a *daily* basis. For smaller plants or plants who had slowed production (I visited in the rainy season, and production had slowed nationwide), the company owners replace their filters when they "looked dirty" or the taste of the water began to change. The price of each filter varies from region to region – in urban areas, like Kumasi, one can buy filters for

three Cedis and fifty Pesewas (about \$1.75), whereas more rural areas must buy filters with special transport cost factored in at five Cedis (\$2.50) each. When asking Kweku if he ever encounters health concerns in the sachet plants, he pointed to the reluctance to change filters as the main problem:

Kweku: There are occasionally problems because they fail to change the filters at the right time. So as the filters get dirty, they want to make more profit, so they don't change the filters regularly. So when the filter threads are weak, the filtration becomes weak and as a result you see some particles in the water.

Robert: You can see them?

Kweku Yeah, you can see them. It's no good.

Sachet company owners, however, are cognizant that they have to change their filters regularly, because the penalty for producing poor quality water is harsh – immediate closure of the factory. Here's Kweku again:

Kweku: Yes; You see the food and drug authority people are very good. They are monitoring [sachet companies] good. That's why they are doing a good job. They are monitoring the site, they are checking the water, to laboratory, checking them. The staff working at the water. So they are doing a good job for the water. They won't allow you to produce water just like that. When they come to the factory, and they find out that the factory is not clean, they will just close the factory.

Robert: So Ghana has the cleanest water.

Kweku: Oh yeah! For me, that is what I've seen. You see "EverPure," "Voltic," they are doing it very well. Small factories also. They won't allow you to produce dirty water, they will just close the factories – just like that. They will inspect the filters that you are using, they will inspect the drains, and sometimes they will ask all the staffs to go for a medical checkup.

Once water has passed from its source into the holding tanks and through a series of filters, purified water enters the sachet water production machine. Each machine, which in 2013 could be purchased for approximately 3,000 Cedis (\$1,500 USD), stands around seven feet tall. The front face is about three feet wide, and the sides are about two feet. Water enters the machine through the base of the machine to enter the sachets near the base of the machine. By and large the most common brand of sachet machine



*A typical “Koyo” brand sachet production machine*

is *Koyo*, although by 2014 I found that an Accra-based firm had begun to sell machines manufactured in Ghana. Large high-density polythene rolls sit in the exposed back of the machine. Each roll ranges in weight between 15-20 kilograms (33-44 pounds) and is purchased with a company’s information already printed on the long rolled sheet. The number of sachets that can be produced per kilo varies, as Bright explains.

Bright: The machine moves these rolls, feeds them the water, and cuts it itself.

Robert: Oh ok, it does everything! How many bags per roll?

Bright: It depends. Rolls are sold by kilo. So you have some who are nineteen kilo, ten kilo, depends...Twenty kilo can produce about 400 bags. If there’s not any problem...waste.



*The back of a sachet machine – the roll feeds through the front of the machine, first passing under a UV light*

Often, the company's name, logo, address, and phone number are printed on each sachet along with regulatory seals and information.

The large roll feeds under another UV light to kill any bacteria on the plastic before

feeding through to the front of the machine. Once at the front of

the machine, the roll is fed through a heat press, wrapping the roll into a tube shape sealed at the bottom. It is here that the filtered water meets the plastic, and is poured into the tube in 500ml increments. The water doesn't fall straight through the tube; instead, it is trapped at the sealed top of the bag that preceded it. At the base of this now water-filled tube, a second heat press seals the bottom of each sachet before sealing the top. The heat from this second press is just enough to seal each bag and melt through the plastic, severing the sachet from the rest of the tubular plastic above it. The result is an individual water sachet, which falls into a bin at the front of the machine.



*The collection bin for newly made sachet water*

Once water enters the machine, the process is completely automated; the machine feeds the roll onto the heated pads that form the sachets, moves the plastic down one sachet length at a time,

and feeds water into each sachet with

the predetermined amount of water. Machines normally produce a bit faster than one sachet per second: 72 sachets per minute. However, newer machines can produce up to 90 or 100 bags per minute and have adjustable dials for speed and heat panel temperature.

Each machine requires one “operator” who, despite his/her title, pays little attention to the machine and is primarily responsible for “bagging” the sachets into large transport bags. The operator sits on a stool to the side of the machine, grabs one sachet a



*A sachet machine operator monitoring production and bagging newly made sachets*

time, and carefully but quickly counts them and stacks them to a large clear plastic bag, thirty per bag. Aside from bagging, the operator is responsible for judging if each sachet is properly sealed. There is an occasional “bad seal” or “bad cut” for an individual sachet, meaning that the sachet was not properly sealed and will leak. The operator makes a quick assessment for each sachet – for sometimes these holes are



miniscule – and if the sachet is deemed poorly sealed it is tossed into a separate bin. Many sachet companies actually save their “bad cut” sachets, drain them, bag them, and sell them to recycling companies (this phenomenon will be visited later). Filtering out “bad cut” sachets is an important job for the sale of complete thirty-count bags, because a broken sachet means the bag won’t sell. Bright explains the idea behind removing “bad cut” sachets:

Yes, and you can see here, there’s water around it. When the people take the water, they complain that it leaks inside, they say, “It’s supposed to be thirty!” If it’s not up to thirty sachets, they are losing money, you understand? So we have to put them down and re-bag it so they are dry and there is no water around.



*A large quantity of “bad cut” sachets leftover as a byproduct of production. The company will likely sell the sachets to a recycling company all at once*

The operators, like many workers in Ghana, are paid by the job or by the day, not by the hour. In many cases, workers are paid a set (undisclosed) amount a day, and are expected to fill a pre-determined number of bags. Of course, this means the number of hours worked can range depending on the speed at which the machines produce sachets, the quota the worker is expected to fill, and if the worker has to refill the machine. The average productivity appears to be around 400 large plastic bags per worker per machine per day.

Each factory is required by the Food and Drug Authority to minimize potential contamination of water by way of filters, and contamination of sachets through hygienic facilities. For all factories, this means dedicating an area where employees can change into work robes or smocks, change their footwear for clean sandals or “cros,” and properly wash their hands, before entering the production room. Indeed, I was also required to don such borrowed footwear during



*Footwear adorned inside production facilities*

my visits inside the production rooms. Hygienic precautions benefit the companies as well as the consumers; hygienic conditions means more hygienic water and a decreased possibility that employees will track in materials that could puncture bags.



*Hundreds of sachet bags carrying thousands of sachets in a company storage room*

The above outlined procedure is nearly identical at every sachet factory I visited. The biggest variation I found is the number of bags produced. In peak seasons, an independent sachet company can produce several thousand (3-4,000) bags a day (and each bag contains thirty sachets). Smaller companies (and those producing less during the “rainy season”) can produce as few as 100 bags a day, or even stop producing for a day or two. Every company has at least one sachet water machine, but of the independent companies I visited, the maximum number was six. Larger factories could have dozens of machines; an FDA employee informed me that in Ghana’s third largest city, Tamale, the largest sachet water plant had fifty machines producing in a line at once! Indeed, just because a company had several machines did not mean they were all in production; for

wealthier plant owners, it was a common practice to keep one machine off, not producing, and only use it when one of the main ones broke or required cleaning / maintenance.

Completed bags of sachets are stored in various ways depending on what each company has space for. Some larger companies have separate storage rooms where bags are stacked four feet high. Others stack bags outside their factories and sell right from their place of storage. In all cases, bags of sachets are required to be elevated off the ground to avoid materials that could puncture the plastic. In addition, bags are not supposed to be exposed to direct sunlight, which could speed up the deterioration of the bag and pollute the water inside.

### ***Distribution and Sales***

The sales and distribution system of sachet water in Ghana that is a double-edged sword wherein a solution to a water access problem results in high levels of plastic pollution. The distribution system is best separated into two groups – stationary sellers and mobile sellers – which help increase potable water penetration within urban and rural areas alike. Companies only sell sachet water in bags of 30, via truck deliveries to stores and homes or on-site pickups. Customers range from wholesale stores, convenience stores, hotels, businesses, purewater sellers, to individual homeowners.

### **Section A: Sales From the Production Facility**

Before sales take place, companies decide on their price for each bag. There are a number of variables that factor into the decision of where to draw the price line, such as costs of filtration, fluctuating prices of oil and gasoline for transportation, and Ghana

Water, competitor prices, and demand based on the weather. Groups like the Association of Ghana Industries, Accra Ice & Pure Water Association, the Ghana Plastic Manufacturers Association, and the National Association of Sachet Water Producers (NASWAP) in particular have worked together in an attempt for inter-industry economic preservation, some of which work to make sure there are price floors for sachets (Stoler et al., 2012). Although there is no maximum price that companies can sell bags for, the NASWAP does mandate a minimum price. During my research in July 2013, the price floor was set at 1 Cedi twenty Pesewas (1.20 GHC, or ~60 cents USD) per bag of thirty sachets. By 2014, the price had increased to 1.8 GHC. Anywhere I traveled in the country in 2013, I saw the price for a bag of sachet water range from 1.20 GHC to 2 GHC, with the mean price being 1.5 GHC. Several company owners who sold their product for over the minimum price told me they would often lower the price should a distributor buy bags in large quantities.

When a sachet company is located in an urban area, like most of the companies I visited in Sogakope, it is customary to sell bags immediately outside the production site. Companies will hire a clerk to sell bags to homeowners and small business owners, usually selling no more than one or two bags (60 sachets) at a time. These outdoor sales operations use a stilted and roofed stand, complete with shade protection, thick, square fencing or chicken wire walls, and a locking gate to close when unattended.



*Sachets in a locked enclosure outside a “corner store” (bottom left of photo)*

More often, though, sachet water companies were sited far away from the heart of town and used large trucks to deliver bags of sachet water straight to the customer. Most companies employ an open air, four walled truck to carry the bags of water. The largest factories I visited owned four trucks. Most companies have one or two trucks, and some factories opt out of delivery service all together. Susan, the only female manager I met, ran the largest operation in Sogakope, and specialized in delivery:

Robert: Has the cost been going up a lot?

Susan: It depends on the season. Now we are in rainy season, so the bill changes. Maybe we have one car once a week? But if there is water, they can go three

times a day, two trucks a day. It depends on the demands and depends on the driver also.

Robert: How many bags does the car carry?

Susan: Four hundred and fifty. The big one takes seven hundred and twenty.

Susan's smaller truck is typical, and carries 450 bags throughout the town and as far as *Aflao*, over 80 kilometers (50 miles) away.

### Section B: Sales From Stores and Distributors

Because companies are often located on the outskirts of town and do not sell sachets individually, many Ghanaians buy individual sachets in small retailers colloquially known as "corner stores." Corner stores in Ghana range in size from a 4'x4'x7' lockable metal enclosure, to a spacious room with space for customers to walk inside and browse the products. Other common venues for sachet sales include bus stops,



*Bags of sachet water stored in protected and elevated metal enclosure outside a small kiosk*

gas stations, and supermarkets. I spent considerable time observing customer behavior in the corner shops, and several of my interviews took place in them, providing me a chance to observe typical sale patterns. Quite frequently, customers

will come up to a corner store with correct change in hand, ask for a sachet or fetch one themselves, pay, then leave – all in a matter of seconds. In 2013, individual sachets were sold for ten pesewas apiece everywhere in the country, 15 pesewas in 2014. In 2011 when I visited, the price was one-third of the 2014 price, at five pesewas. As

expected, there is a discount for purchasing a larger quantity at once. Rarely, a customer would approach the counter and ask to buy an entire bag of thirty sachets. If they did, the minimum price was almost always two Cedis in 2013, and was rarely more than 2.5 GHC.

### Section C: “Purewater Sellers” and “Small Girls”

Information in this section is derived from interviewees who translated conversations with sachet water foot sellers, or from third parties such as storeowners or sales clerks. Although I approached over a dozen foot sellers for interviews, I could not find one who spoke enough English, or who was patient enough with my insufficient language ability, to answer my questions. Thus far, my reporting of distribution and sales might mirror the way many consumables are sold in the US. It is the “foot sellers” that distinguish the way sachets can be found across the country. The way that many individual sachets make it to customers in Ghana is from sachet water foot-salespeople. First, let me define some terms – as the reader will recall, “purewater” is a less formal and more common term for sachet water. “Hawkers” is a term for salespeople who yell out their product name and sell on-foot; and because selling purewater on foot is nearly exclusively a female role, many Ghanaians refer to the saleswomen as some variation of the phrase “purewater small girls.” My interviewees and I use these terms interchangeably with ones I have used thus far in this thesis.





*A young “purewater small girl” with chilled sachet water in Cape Coast*

Sachet water foot sellers always acquire complete bags of sachet water, either buying straight from a factory or from a distributor. As discussed earlier, refrigeration has changed the way sachet water salespeople operate. In order to make their sachet water most desirable, nearly all salespeople refrigerate their product and sell cold sachets. Once chilled, salespeople open the bag of sachets and place them in a large plastic or metal bowl, often 20 or more inches in diameter. Once in the bowl, sellers will hoist it up and place it either on a cloth or directly on their heads, and when selling they will often reach into the bowl and removing sachets without taking the bowl down. With cold, mobile sachets, sellers move about the streets, selling sachet water in a manner similar to the way Icewater was sold in the past and how many small snacks are still sold today.

Selling the product requires different skills, depending on where the product is sold. The most common locations are the street markets, at the centers of town (main roads), bus stations / lorry parks, and large traffic hubs. In all cases, salespeople yell a catch phrase and repeat it over and over, much like a vendor selling peanuts and hot dogs at a baseball game. The normal call is a shrill, high-pitched “Ice-pure,” “Yes-pure,” or “Purewater.” When the target customers are in cars, salespeople often walk through traffic, selling to individual customers through car windows. Inside a car or bus, it is customary to help one another out when purchasing; if someone isn’t next to the window and asks for a sachet, the person sitting at the window is expected to hail down the salesperson and complete the transaction. If a salesperson is in the middle of a transaction when traffic begins to move, they will most often run after the vehicle to complete the transaction if possible (drivers generally do not linger). Similarly, sellers will chase cars as they approach and slow down before a stop, to maximize sales time and

opportunity. Selling to persons on foot in town or at the marketplace is considerably less hectic.

### ***Sachet Water Consumption***

Because of the diversity, easiness, affordability, and ubiquity of sachet water, nearly all Ghanaians who can afford it use it. Sachet water was the main source of drinking water for every Ghanaian I interviewed, whether in small towns or the capital Accra. Women and men of all ages and social status drink several sachets daily. Consumption of sachets is higher in Ghana's hotter dry seasons, and lower during the rainy seasons. Interestingly, consumption patterns proved gendered my male respondents would often admit to drinking more sachets daily than women, regardless of the season. The average number of sachets used daily by men and women ranged from three or four in the rainy season, as many as around ten during the dry season. But no matter the season, location, gender, or age, sachet water consumption is an inescapable part of daily life.

Sachets are consumed in a style dissimilar to any other water source. Normally, the consumer tears a hole in one of the bag's four corners, and has to drink between  $\frac{1}{4}$  - to  $\frac{1}{2}$  of the total volume at once. It's important to drink enough of the sachet straight away for practical reasons; once some of the volume is gone, the sachet can sit upright without spilling. The malleable plastic can enable customers to drink some of the sachet, then set it down on a variety of surfaces, from flat tables to cup holders or car dashboards.

Children use sachet water like adults do, however, it is common for children to purchase a sachet, drink some, and leave it unfinished. Frank, a storeowner in Accra who

sells sachet water in a residential area thinks that children may use more sachets than adults, as he shared with me early in my visit:

Frank: But for the kids, the kids like to drink a lot of water. Sometimes, they take one, they cannot finish it; they throw it away. So they use *even more*.

Robert: More than ten?

Frank: Yes! (*laughs*)

Indeed, I took note of what Frank said and observed the consumption behavior of children throughout my research. Children varying in age from around 4 years to 10 would often buy a sachet – either with a group of friends or by themselves – drink some, and toss the rest. As a result, I would see half-empty sachets littering most cities.

Because of its reputation for purity and in comparison to the inconsistency of GWCL, Ghanaians use sachet water in a variety of ways in addition to drinking. The most common alternate use is washing hands on the go. Ghanaians often drink half of one sachet, and use the rest to wash their hands, the corner hole working well to create a movable stream. Other common uses for sachet water include a portable wash for fruit and other foods, washing dishes, and even bathing. Especially when tap water is unavailable, those who can afford it use sachet water for all their water needs.

Of course, if one has to rely on sachet water as their only source of water, consumption increases dramatically. Hotel employee Phillip – an Accra native – explains how he has come to rely on sachet water over other sources:

Robert: So, when you are home then, how many sachets a day?

Phillip: Well, at home, it depends. Sometimes when the tap is not flowing, that is the time we use the most sachet water. You could use it for bathing, for cooking, for washing dishes.

Robert: So, tell me, when the tap is running, how many?

Phillip: When the tap is running, you just drink sachet water. I drink about, let's say, ten or fifteen a day.

Robert: Fifteen a day! Ok, so when the tap is not running, how many?

Phillip: when the tap is not running at all, I could use about two bags.

Robert: Two? 60 sachets? Wow!

Phillip: Because I have to bathe, I have to wash dishes, I have to drink...

Although Philip uses more sachet water than any of my other interviewees, his motivation to use sachet water again stems from the inconsistency of the GWCL water supply. Employed in a high post in the service industry, Phillip's comments might be indicative of his class status. Regardless, Phillip's candor struck me – the fact that it is acceptable and sometimes necessary to rely on sachet water for *all* water needs raises alarm from a plastic waste management perspective.

### ***Consumer Sachet Disposal***

No part of Ghana has been left untouched by the sachet water industry. Although the industry has relieved the GWCL's task of providing affordable, potable water, it has simultaneously left the country littered with millions of discarded sachets and outpaced waste management efforts. Proper waste management begins with consumer practices, and the introduction of the non-biodegradable waste disposal is a relatively new issue for Ghana. In the capital city of Accra, rainstorms now bring the streets to a standstill with massive flooding, greatly exacerbated by empty plastic sachets clogging the drainage system (Yahaya, 2014). In remote parts of the country, like *Asiafo Amanfro* where the

community of less than a thousand speaks their own language, the roads and pathways are peppered with empty sachets.



*Hundreds of discarded sachets on a popular hiking route several miles from Koforidua*

The tendency to of dispose of sachets on the ground has increased along with the expanding industry, prompting city governments and waste management companies to try creative solutions in an attempt to curb empty sachet waste. Although the problem is created and faced at a community level, often each individual has a system, a personal pattern of disposal and reasoning behind it. I now turn my attention to different patterns of disposal in different communities of Ghana.

## Section A: Minimal Waste Management Philosophies

Simply littering empty sachets once finished is an all too common practice countrywide. Whether one has just finished drinking on the street, in the car, or at the market, it's very common to see evidence of Ghanaians simply dropping their empty sachets. Although admittedly problematic, the target of my original research grant proposal and interviews was to unearth *why* it is an acceptable practice to litter empty (and sometimes half-filled) sachets. I had hoped to discover some degree of intentionality behind the action; maybe Ghanaians think it is the government's job to clean and take care of the waste, or they believe that their individual disposal patterns do not create a waste problem. In many cases, I discovered a lack of awareness or concern of the problem: For many Ghanaians, who are accustomed to an inadequate waste management system, disposing of empty sachets on the street does not warrant a second thought.

I was raised with the privilege of a waste management system that efficiently removed trash from sight. In Ghana, I quickly discovered that I had not given much prior thought to what it would be like growing up without such waste management infrastructure. Additionally, I lacked a historical perspective on plastic in Ghana, and the pace of waste management infrastructure in relation to the rise of non-biodegradable materials. Paul, a private investor fresh out of school living in Sogakope, whom we heard from before, commented on the history of waste disposal in Ghana that helps explain sachet disposal philosophy:

Paul: And before we used to pack our things in brown (paper) bags, or in leaves. These tree leaves. But when the rubber (plastic bags, sachets) came, we don't use that one again. So everyone is using the rubber, and production is increasing. It costs a lot to clean it.

Robert: So that used to be ok then, when you are finished with the banana leaves, you can just toss it.

Paul: The leaves, those are biodegradable. The leaves, they can decay. Maybe four...one week, you will see decay. But you see this one – forever! So even now when they dispose it, it takes lifetimes to decay. So this one, it is a threat in terms of keeping the environment clean. This one is a problem. Seriously!

Robert: And people realize that it's a threat, right?

Paul: Yes!

Robert: But it's still ok and accepted to toss on the ground?

Paul: People are doing it. The government is trying to put like bins around so when you are using they put inside. But our culture is so stubborn that we cannot change.

From what I gathered, food and drink packaging in Ghana has undergone a *rapid* change in the last forty years. In less than one generation, Ghana went from using organic packaging that could be tossed and biodegrade in weeks to plastic packaging that will take hundreds of years to biodegrade. Non-biodegradable material has so quickly replaced the former biodegradable one that Ghanaian society has not matched the quick change in disposal patterns. Thus, a radical nationwide educational campaign integrated into public media and schools may be required to change century old disposal patterns.

This theory may be valid when littering sachets has no impact on city infrastructure like in Sogakope. But in larger cities, such as Accra, one might think that the pressures to stop littering would begin to change individual behavior. With constant newspaper articles of the impact of flooding in Accra (and witnessing floods firsthand), Accra residents would seem like the population most likely to look for alternative disposal means. Yet from my personal observation and interviews, Accra residents are



the most predictable population to improperly dispose of empty sachets. Here's Prince, an Accra native who lives just outside of the city.

Prince: When it rains, that one, it is too bad. Because, you just even go and look into the gutters. When it rains, it will all go and then choke.

Robert: Does it flood?

Prince: Yeah...

Robert: Does somebody go and take it out? Is there a worker to do that?

Prince: You see, In Ghana here, we are not serious. Seriously, we are not serious.

Robert: So, how does it get un-choked?

Prince: It depends. Because over here, some times we do it our self! Because if we don't do it...*(motions from the gutters to his stoop, I imagine a gesture of flooding)* we have to do it ourselves!

In several communities like Prince's, the consequences of improper disposal of water sachets is tangible, and requires citizen help to remedy problems such as clogged gutters and flooding. Yet, Prince's community has yet to show improvement in terms of waste management - he actually indicated that it is getting worse.

Francis expressed to me that he believes people have the potential to dispose of sachets properly and will do so when it's convenient – but that the lack of dustbins is the real problem. People just don't want to carry their trash for long periods of time to eventually dispose of it properly.

People drink it then they just throw it around. We don't have a good culture of like, tucking away trash. I think we're going to get there. So we don't have that culture, so people drink the sachet water and they just throw it around.

The chemist Dennis believed that increased business and “being too busy” is to blame for improper disposal.

Robert: So people here just hold their waste until they see a dustbin?

Dennis: Yeah! Its one thing. The other thing is that here, we don't have an influx of business people like from Accra. Sometimes, the fact that you are too busy with your work can even influence the environment. Just drink, and instead of taking a minute and looking for a dustbin, you think that to locate a dustbin is a problem just because it's the nature of what you are doing. Sometimes traffic – to move from one place to another place is a problem for you. So you prefer to just throw it away and go on your way. You do that; mister A does that; mister B does that...before you realize it, everyone is doing it. But here [in the Volta Region], there is no traffic, you move freely. If you drink and you don't spot a dustbin, you can even hold it. In some few meters, you see one, you drop it inside. The population is not so much, they are conscious about the environment.

Robert: So people realize what happens when they throw away their trash.

Dennis: Exactly, they know.

As this commentary suggests, Dennis's community – the city of Ho – is an anomaly in my study. Ho is the capital of the Eastern / Volta Region in Ghana, and is a fairly large city (estimated 200,000+ population) – yet it has far cleaner streets and gutters than any other city I visited, including communities 10 or 100 times smaller. Dennis believes that a “slower” pace of life, combined with ready access to dustbins and community consciousness, has fostered a cleaner environment in Ho.

For some, it seems, discarding empty sachets is simply an outdated cultural practice that will change for the better with increased education and public dustbin placement. Within one generation, Ghana witnessed a change in packaging from biodegradables that would decompose within weeks to plastics that take hundreds of years to deteriorate. This extreme shift in the type of waste generated was not met with a proportionate strategy to deal with it. Left with inadequate state funded waste disposal support, the burden of proper waste management is left for Ghanaians to decide for themselves. Many cities lack public dustbins, the consequence of which is often point of

use discarding. Without adequate or frequent options for proper individual waste management, many Ghanaians devote little attention to sachet disposal.

### Section B: Mindful Disposal

Despite the dominant practice of littering empty sachets, some Ghanaians are conscious of their sachet waste disposal. Other disposal options include holding onto empty sachets and disposing of them in dustbins, burning the sachets, or to keeping their empty sachets for recycle pickups. Some plastic and recycle companies are beginning to pay cash for large numbers of empty sachets, motivating some households to save their sachets. This also provides collection jobs for unemployed citizens. Overall, the motivation to use these various disposal patterns vary on a case-by-case basis. The discussion of recycling sachets is muted within scholarship and should be given greater attention – this study is limited to the collection to resale of plastic sachets.

In the Eastern and Volta Regions (Sogakope, Ho), I found that it is common to stash empty sachets to burn with household garbage. This practice saved households from having to find dustbins to dispose of their empty sachets and also saved empty sachets from escaping into gutters or the environment. In many cases, however, Ghanaians who burned their sachets do so simply as a tactic to manage space in and around the home. Sarah casually explained that she would throw away sachets when the dustbins are tended to, but otherwise she burns them:

Robert: And the empty bags, do you collect the empty ones?

Sarah: Aw no, we just fire it out.

Robert: Burn it?

Sarah: Burn it.

Robert: I see. So no one comes to collect?

Sarah: Sometimes, if we put it at the dustbin, sometimes before we come someone will pick it. But if we don't we just burn it.

For Prince, he burns empty sachets in the absence of a neighborhood woman who used to come and collect the empty sachets:

Prince: But when it gets full, no matter, we use to burn.

Robert: Have you ever sold it back to the government?

Prince: No.

Robert: But you like to save them to burn?

Prince: No, not really. You see, there is one woman; she has always been coming here to collect them. But when she doesn't come, we use to burn it. At times, she comes around. But we can't just keep it around here for when she doesn't come.

Not all Ghanaians burned sachets for the sake of space management. Eli, a Sogakope native who recently graduated with an engineering degree specializing in building materials, burns his sachets because he hates to see discarded sachets escape into the environment.

Eli: But what I do, mostly in the house, is I separate it from other refuse, and then at the end of the day, I just burn it.

Robert: The sachets or the other refuse or both?

Eli: No, the sachets I burn it differently.

Robert: Why?

Eli: Because, if it goes into the environment, it takes a long time to decay, and then it causes this pollution in the environment. So I decided just to put it together and then burn it.

Although unusual, I did see that one definition environmental concern can be a motivating factor for sachet disposal choices. Interviewees were not concerned with airborne emissions generated from burning sachets and refuse.

Linked to environmental and economic concern, many sachet water company owners across the country save their empty and “bad cut” sachets to sell to recycle companies. A revenue generating recycling practice, Kofi explains that his sachet water company actually collects and brings empty sachets to Accra to sell back to companies.

Robert: So where you live, do people like to save them?

Kofi: They just burn them, throw them away. We don't do it in my house though, we save them. We pack them up and actually take them to the recycling companies ourselves.

Robert: In Accra?

Kofi: Yeah.

Robert: How much do they pay you?

Kofi: I don't know the price, they actually weigh by kilo, then they pay you.

Robert: (He shows me the pile in the back.) How much is this? For how long have you been collecting all this?

Kofi: It should be like a month.



*About a “month’s worth” of “bad cut” sachets outside a production plant in Sogakope*

Alternatively, some homeowners collect empty sachets for “pickers” to take away for free, and some company owners and sell their bad cut sachet waste or for profit. Here’s Paul again, explaining that he treats the free pickup service as a beneficial service.

Robert: So I saw, Eli (another worker here), he took one, then he disposed of it in the bin. Is that what you do too?

Paul: Yes.

Robert: And what happens to the ones in the bin?

Paul: After we drink it, they recycle it. So we will stash it so when they come picking around, we have it.

Robert: How often do they come around?

Paul: Ah, maybe twice a week.

Robert: Ok, and do they pay you?

Paul: It's *free*. So we don't have any use for it, so we give it.

Robert: So most businesses, do they do that?

Paul: Yes. They will come and collect it and send it to wherever they want to send it. I am sure that when they come for it, they will sell it to a company. So there are some benefits for collecting it.

Robert – Do you know the women (collectors) personally?

Paul: No, they just come, and they are passing by, so I say, “ok, we have some” and I will show them to the rubber (plastic bag where they store the empty sachets).

Saving empty sachets – whether at home or in the workplace – relieves consumers of the effort of burning the sachets with their rubbish while providing jobs for “pickers” and recycle companies. The practice of saving empty sachets could be seen as mutually beneficial for the consumers and the collectors, and is worth underscoring. However, Paul says that what he does is out of the ordinary – the prospect of stashing sachets seems silly to some folks in town.

Robert: So no one ever comes to *buy* the bags back? Like its just if you want, you choose to stash it?

Paul: Yes, its free. You know something? When you see me packing, they say, “WOW what is this guy doing?”

Robert: So it's strange to do that? To pack the bags?

Paul: Yes! These old ladies, they go around picking it. It is free, they can pick it. They are making money out of it (implying that - why would someone who is *not* making money packing plastic doing such a thing?)

It is brave and helpful when people like Paul to stash their sachets and set a positive example, even in the face of mild teasing, in order to change the public waste disposal behavior as a whole.

Given dustbin scarcity and a cultural trend to either dispose of waste on the street or by burning, Ghanaians are left with the choice to either hold their empty sachets or discard them after use. For those who choose to hold their sachets, a folkway stigma exists, and at the individual level, no profit comes from holding empty sachets. However, for “pickers” who choose to independently collect littered sachets, or collecting them by going door to door, the “environmental menace” of discarded sachets offers a means to curb pollution while generating profit. An increasing number of companies that create a predictable number of “bad cut” sachets can save them for a free or profitable collection. The recycle value of discarded sachets merits greater scholarly research and institutional investment.

### ***Waste Management***

Plastic waste can be found in all parts of Ghana, from remote villages to the crowded city streets of Accra. Of this plastic waste, used sachet water bags constitute an alarming portion. Several studies previously references document the rise of plastic waste in waterways, like the longitudinal studies by Fobil et al. (1979, 2000, 2006, 2010) and Schweizer & Annoh (1996). These studies show that the plastic waste that is improperly disposed of has increased 5 fold in the last 30 years, seventy percent of which is the LDPE and sachet HDPE film (Fobil, 2000). Tracking the plastic in Accra’s waterways is important because it correlates with increased city flooding. Despite



alarming increase in plastic waste, there are some observable changes in various waste management systems in Ghana that give hope to decreasing plastic waste in the environment. What follows is an exploration of some of the new systems that address the used plastic sachet problem.

### Section A: Pickers and Plastics – The Rise of Recycling

In my four visits to Ghana over the past five years, one of the greatest changes I've witnessed (in terms of waste management) was the advent of the “kaya bola” or “picker.” In years past, empty water sachets were considered worthless rubbish. But with new recycle industries, the empty bags have value. Because recycle companies have begun to buy back empty sachets, the once worthless sachets lining the streets could be gathered and exchanged for Cedis; each empty sachet on the street could translate into money. As a result, street pickers have now begun collecting the empty sachets.



*A young sachet picker outside the bus depot in Tamale*

Pickers are independent Ghanaians, often very young boys and girls or unemployed elderly folk who sweep the heavy traffic areas of cities where empty sachets are littered. Most commonly, I found pickers in lorry parks, at busy intersections, and at street junctions where goods were sold to moving vehicles. I confirmed through multiple interviews that Zoomlion (a waste management company) and “Sintex” (a plastic manufacturing company) bought back sachets in Accra, and other recycle

companies could be located in other major cities. Pickers would take large plastic bags and fill them with empty sachets. Filled bags could be sold directly to the recycle plants, or sometimes company cars would come to major towns to buy the full bags directly from the pickers. Prices always varied based on weight, but large bags full of plastic sachets (an estimated 3' diameter and 5' tall) could sell for 10 or more Cedis. Ebenezer et al. (2013) argues that the increased stream of reclaimed sachets could revolutionize the machine oil industry in Ghana, moving from importing oils to recycling sachets and producing it in country. Through other interviews, I heard that future plans for in-country recycling would lead to recycling sachets into higher density plastic dustbins – an effort that would further decrease improperly disposed and forgotten sachets.

In my 2013 and 2014 travels, I met about 5 pickers and approached them for interviews, yet in all cases (and similar to the purewater foot sellers) they didn't speak any English. In Sogakope, I was



*An elderly picker outside the Sogakope market*

lucky enough to have just finished an interview with Paul when I ran into an elderly picker. Paul volunteered to help translate Ewe to English for me; unfortunately, the picker was just beginning business and had yet to sell her first bag of empty sachets.

Robert: I would just like to ask, who she sells to, how much.

Paul: She has just started the business; she has not sold to anybody yet. This is her first time in business. She has been a farmer, but now, she suffers from the arthritis, so she cannot farm nowadays. So in terms of economic of living it is

very, very hard for her. She is forced to go into this business. Like the New York suburban.

Robert: Is she in competition for Zoomlion to pick?

Paul: They picked a lot before she came here.

One point that's worth highlighting here is that Zoomlion, the private waste management company, competes with pickers for empty sachets. I learned that Zoomlion owns their own recycle plant in Accra, and recycles empty sachets, turning a profit on the trash. In a press release on the Zoomlion website (n.d.), the company pledged to create recycling facilities in all operating districts – a move that will hopefully generate profit and create cleaner streets simultaneously. However, the competition between pickers and Zoomlion for empty sachets may have detrimental effects on other forms of trash that Zoomlion is officially responsible for picking up. Because empty sachets have value compared to the other worthless garbage, interviewees suggested that Zoomlion seeks to sweep the streets of empty sachets above all else. In a country where waste management predictably falls short of waste generated, I would argue that the government-paid waste management companies should prioritize waste reclamation that the economy deems valueless in the light of pickers to retrieve plastic sachet waste.

Other interviews confirmed that the pickers who were elderly were often forced into the line of work out of economic insecurity. They divulged that social security system in Ghana is fairly ineffective, and that many elderly people have been forced into difficult manual labor jobs, even in old age. Here's Yali, a recent high school graduate working at a family store in Sogakope.

Robert: How often do they come around?

Yali: They come everyday. Old people too. The elderly people too, they need money, so they go around picking it from the streets. You see the people; they hold a big bag, rubber bag (actually its plastic) and pack it. And there's people who go to the waste dump to pick it.

It's no question that the profession of picking is a difficult one, but with the new value of empty sachets, it is a job that can provide at least some money for food and water.

### Section B: Zoomlion and Government Waste Management

Established in 2006, Zoomlion is a private waste management company headquartered in Accra, that contracts with the government to “Keep Ghana Clean.” Since its conception, the company has spread across all ten regions of Ghana and even expanded to a handful of neighboring countries. Although at least a dozen waste management companies operate under government and private contracts throughout Ghana's ten regions, Zoomlion is the largest. Municipal Assemblies in urban areas –once responsible for all waste management – are now tasked with coordinating with companies like Zoomlion to best determine public and private coverage (Akaateba & Yakubu, 2013). Zoomlion provides a variety of waste management services, ranging from walking and bicycling pickers, home dustbin services, and city dump management. Within the last two years, Zoomlion has increased efforts to dedicate more public dustbins – the company donated 1,000 public dustbins in 2015 in honor of National Sanitation Day, understanding it is in the best interest for their business and for public health to have increased public waste receptacle (Mordy, 2015). With years of experience in Waste management, Noble helped demonstrate the exact nature of large-scale waste management companies in Ghana.

Robert: So, tell me about how business goes.

Noble: [Zoomlion and other waste management companies] are basically responsible for collecting waste. Aside from that, we provide other services. Like in *Hohoe* we clean offices. Yeah, for private business. We also have, we call it a “door to door.” We give out waste bins to private homes and offices, they dump their refuse in, we come to empty it for them, and they pay some management service charge. Then we have a public contract with the government. A partnership. Ok, so one of the programs is that we provide dustbins, big containers, about twelve cubic meters, containers at a public place. Then people dump their refuse in it.

Robert: I see, like homeowners and business owners, small ones.

Noble: Right. Homeowners and small businesses. Like shops. It’s free; the government pays for that. So they dump into it, we have trucks; they empty into the disposal site. It’s not scientific, it’s not well managed, but it’s a dump. We manage the refuse at the dumpsite. So basically, that is what we do here.

In addition to rubbish management, these large waste management companies also recycle various materials (metals, plastics, glass) including plastic sachets:

Noble: But as a company, we also have a recycling plant. In Accra.

Robert: Oh...I heard Zoomlion has its own recycling plant?

Noble: Yes, it is owned by Zoomlion.

Robert: What does it recycle?

Noble: Well, polythene, you know, plastics. It goes through a conveyer belt, we sort, we have sorters that sort the plastics, sort metals, sort glasses, and then the organic waste is converted into an organic fertilizer. Then the plastic into pellets for the manufacturer of plastics. It’s currently ongoing in Accra.

Waste management companies in metropolitan areas commonly provide street cleaning services. For the Zoomlion Company specifically, men ride large, well marked yellow and blue tricycles that



*A Zoomlion mobile collection tricycle*

include a mobile trash bin, which is filled and dumped at local dumps and drop off locations.

Noble: So, about operations here (in Ho), we have workers who tidy up public places –they sweep on the streets, public places. They collect [and bring refuse to] the big containers. We have baskets, we have tricycles.

Robert: I've seen those tricycles in other cities, but do they have them here?

Noble: We have the tricycles here. So we collect into the tricycles, then on to the big container. Then, back to the final dumpsite.

I was curious see if the rumor that waste management companies are in competition with private pickers for empty water sachets has validity. Noble admitted that, of course, both companies and pickers are keen to collect empty sachets when convenient for their resale value and relative ease to carry.

Robert: Do the workers separate when they're picking from the street?

Noble: Previously, we don't separate. We collect everything, into the tricycle, then back into the container. But when this recycling idea came, that was just some few months ago, we are now trying to do the separation, to pick the sachets, we sort them out, put them somewhere, then we process them for recycling. We package them to be transported to Accra. But the company is also trying to bring an aspect of the recycling process here, to almost all the districts. Where we have a small factory that does the recycling into pellets. It means that we will process the sachet rubber into pellets, into plastic pellets here, then send them to Accra for manufacturing. But it has not taken place yet. I'm sure by the cross of the year (by 2014) we should have the machines. Almost all the districts. So the volume that we send to the dumpsites will be reduced, and it will also create value. We make money out of it. Currently, people are buying it (empty sachets).

Noble corrected my assumption that Zoomlion and other waste management companies are simply in competition to pick sachets from the street for profit. Instead, picking sachets from the street not only helps recycle plastic and generate cash on the side, but it also helps reduce landfill waste. Landfills in Ghana are rather rudimentary; they are

often above ground, unlined, and often cover a large area of land. Decreasing landfill is important for reducing the area that is occupied with trash and the environmental problems that arise from them.

Plastic recycling programs in Ghana are surprisingly new; I am unaware if other companies are recycling general materials in Ghana, but for Zoomlion, their plastic recycling capability is just over two years old.

Robert: So right now, you collect it, maybe you do some sorting, you package sachets, and you send it to Accra where there is a Zoomlion recycling plant that actually turns it into the pellets and sells it to companies?

Noble: Yeah. Currently it sells, I know... The dustbins that we use –they want to go into production of the dustbins themselves. Currently we are importing them from somewhere, but now, I think they want to produce them, locally.

Robert: Recycling is maybe 2-3 years old in Accra?

Noble: No, the recycling really just started somewhere last year. But you know it took a longer time for the plants to be built. Three, maybe four months ago, that's when they were building the plants. It's a very big place.

Noble indicated that he had been sent to the recycle plant in Accra in December 2012. I was intrigued to learn that Zoomlion may reuse plastic sachets to make more dustbins.

Although the rising trend for Municipal Assemblies to contract with private waste management companies like Zoomlion has led to an increase in waste management coverage, municipal waste generated still outpaces management agencies (Oteng-Ababio et al., 2012). Although sachet water is nearly two decades old in Ghana, it is until only in the last few years that these discarded sachets have held any recycling value. "Pickers" – waste scavengers ranging from children to the elderly – have responded to the market shift and have begun to seek out publicly discarded sachets or those stashed in homes or factories to sell to recycling companies by the kilo. Although the advent of sachet

pickers may decrease the volume of discarded sachets entering municipal waterways and the environment, the efforts of waste management companies too increased recycling is an important component of the improved sachet lifecycle.

Some Ghanaians find this problematic; while waste management companies still provide insufficient service, I argue that sachet picking should be left to the otherwise unemployed pickers, and waste management companies should increase efforts to reclaim waste that has no economic value and would otherwise be left unattended. In any case, Municipal Assemblies should address the lack of public dustbins (and recycling receptacles as a later goal), for the qualitative data suggests that Ghanaians discard their sachets improperly rather than hold it on their person in the unlikely event that they encounter a waste receptacle.



# **CHAPTER 4 – Independent Sustainability: The Future of Sachet Water**

## Section A: Ghanaian Successes and Recommendations

Through a several decade-long struggle to narrow the potable water access gap, Ghana’s private economic sector has chosen sachet water above other options as the most reliably accessible source of potable water. Having outlined the historical precedents and followed the life cycle of sachet water, the future direction of potable water in Ghana currently remains in sachet water dominance. In his 2012 article: “Improved but Unsustainable: Accounting for Sachet Water in Post-2015 Goals for Global Safe Water”, Justin Stoler remarks that the scholarly elite are quick to question the sustainability of sachet water, yet refrain from endorsing an alternative potable water solution. In this section, I present some of the changes my informants see as positive trends for the sustainability of sachet water. Additionally, I explore some of the long-term solutions Ghanaians believe should take place to provide reliable potable water security.

### ***Changing Perspectives Through Education***

Although this thesis explores the life cycle of sachet water with emphasis on its production, the original focus of my research was on solutions to managing plastic sachet waste throughout Ghana. In the 2013 BBC report *Ghana's 'waste to wealth' initiative*, waste management officials expressed that increased education will be the best tool to

divert recyclable waste from landfills. As affirmed by my interviews, this goal is best accomplished via public radio and television. Dennis shed s light on this educational campaign:

Dennis: We do education here, but it happens all over. There are advertisements on radio, advertisements on TV.

Robert: Even on TV?

Dennis: Oh yeah there are a lot of programs on Tele, on radio, even in town we do a lot of education on that. But it's not like, it's minimal – as compared to those places [which are more polluted].

Robert: So people realize what happens when they throw away their trash.

Dennis: Exactly, they know.

Robert: So everyone is just doing a good job?

Dennis: They are. And they also dedicate education, especially airwaves that goes through the local FM radio stations, telling people what to do, what not to do. So it's helping them.

Robert: What are the ads like?

Dennis: Yeah, oh sometimes you see, when they see that the particular area is not doing well, they will put a spotlight on that area. So the town will not want to have that kind of image, so they will be fighting for a good name for the area. So that next time they are not put on spotlight.

Robert: So it's like a pressure?

Dennis: Yeah. Peer pressure.

Robert: Is there any other kind of ad?

Dennis: Yes like the ad – “Hold your waste until dustbin.”

Public service announcements on Ghana's national station, *Ghana TV (GTV)*, encourage individuals to properly dispose of their waste. Educating sachet water users of the nature of plastic sachets is integral. Although a handful of sources like the *Report to*

*the Accra Metropolitan Assembly on Solid Waste Composition* recommend community and scholastic education on waste separation, no formal campaigns other than the ones referenced by my interviewees appear to have been implemented (Andreini et al., 2000). Public educational announcements about plastic sachets help fill informational gaps. In addition, Dennis pointed to radio ads that put a “spotlight” on communities that do not properly manage waste. Such announcements help pressure these communities to increase efforts to best manage their waste. Education, peer pressure, profit motive, and concern for the environment to constitute healthy and culturally appropriate bases for not littering plastic sachets.

### ***Community Waste Management Pride: The Case of Ho***

I conducted interviews in over a dozen cities and towns from Ghana’s southern capital to the northern border town of Bolgatanga, and found that many cities feature common elements of waste management. However, one city stuck out as the anomaly in terms of cleanliness: Ho. The streets and gutters of Ho, unlike any other city, are nearly empty of plastic waste. The river that crosses town flows with far less visible pollution than rivers in communities one-tenth the size. Yet Ho is home to dozens of sachet water factories, and its sachet consumption patterns are similar to other Ghanaian municipalities. Given my perception that the city is



*Clean streets and gutters in Ho*

cleaner than others, I was driven to find out through my interviewees if the waste management approach is different in Ho, and if the residents observe a difference compared to neighboring communities.

With experience in the contracted waste management industry in Ho, Noble validated my observations:

Robert: So one of the reasons you say it's cleaner here is because Zoomlion is doing a good job. The other reason is the behavior? Explain.

Noble: One – the containers that we have are accessible. You don't need to walk so far to access a container. Unlike some places, container's far away. So somebody who doesn't have money to afford the services to have the containers at the homes [can utilize the public ones]. One aspect could also be, in a metropolis, the life there...people don't care about what goes around. But here? We are in a village here. *People care about the cleanliness of the community.* People care about what goes on around them.

Likewise, Dennis echoed Noble's sentiments:

Robert: So why is Ho so clean?

Dennis: You see, the fact is that here, the local authorities are on top of their jobs. And the people, they know what is right and what is wrong. The individual attitude is positive here. I don't see people throwing things around. If anything, other people come and do it (outsiders).

Robert: So people here just hold their waste until they see a dustbin?

Dennis: Yeah!

Such collective municipal conscience is rare in Ghana, and perhaps throughout the world. Noble attributes the cleanliness in Ho to two main features: the large number of public waste receptacles and the community value of "keeping the town clean." Like interviewees in other cities indicated, like Paul in Sogakope, one main deficit of metropolitan waste management is the lack of public receptacles – with few dustbins, citizens are less likely to properly dispose of their refuse properly. Apparently, the

quantity of dustbins in Ho positively impacts public behavior. As for a philosophy of town cleanliness, Noble may have attributed it to the size of Ho. With a smaller area where social ties are greater and littering becomes a folkway, Noble's argument might hold true – but during my visits to smaller communities like Salaga and Sogakope, this line of logic did not result in an even cleaner city. Through whatever combination of education in schools, radio and TV education, peer pressure, and concern for the environment or beauty of one's communities, the more communities who model their waste management philosophies after Ho, the better.

### ***Sustainable Water Futures***

With no shortage of scholarly critiques of sachet water's health and environmental shortfalls, opinions on what direction Ghana should immediately take to decrease sachet use and increase safe water access are silent. Given this void, I made sure to ask each interviewee about their perspectives on sachet water's future and the future of potable water infrastructure in general. Most fruitful was this question - "*What would you like to change in regards to street rubbish?*" The responses I received were creative, diverse, and thoughtful. The *most* common solution I heard from Ghanaians nationwide was to increase the number of public dustbins. Francis, whose hometown of Sogakope has only two public dustbins, thinks Zoomlion should be diverting funding away from street sweepers and toward more dustbins, which would reduce the need for street sweepers in the first place:

Francis: ...they can do a better job. I mean, they have a lot of people who are working for them. What probably needs to be done is, a lot of that money, need not necessarily be invested in all the people who walk around every morning and sweep. But I'm sure that we can certainly get a lot more trash cans, strategically

located, I'm sure we can do more education, for God's sake, you can just take a couple of steps and throw it away. So I think that is what needs to be done.

Robert: So if the government should move money places, it should be for education and trashcans?

Francis: Yes. Yes, well, not necessarily. At the end of the day, you're going to need some hands. Some people to get the job done. But I think that for the most part, Ghana's trying to get a lot of people to get the job done. You know, if you think about it, the government employment is going; they call it "youth employment." They are trying to create jobs. So I think if you look at the unemployment rates, there is this *incentive* to get a lot of guys. But if you think about it, the long-term strategy, what needs to be done is to make sure that the place is clean. All those people can be employed to do something else for Ghana.

Francis confirmed my opinion that increased education coupled with abundant, regularly attended dustbins would shift the waste management burden away from the companies and place it on each individual consumer.

Meanwhile, others expressed an opposing view. Although he most likely would not oppose more dustbins, Prince would like to see the government provide jobs *specifically to sweep the streets* and pick up used sachets:

Robert: Is there anything that the government can do to help collect?

Prince: Oh yeah, a lot. You see in Ghana here we don't take things serious. You know, the government can even use this (sachets) to provide a job for even youth. Because we see a lot of people walking and they are doing nothing. You see? And look we can even use this; imagine what happens to all this...we can use this to create a job and at the same time to make the country very neat.

Eli, with a background in building materials and a degree in engineering, thinks another solution is to switch to biodegradable plastic. Although biodegradable sachets have been in development for years, they have not yet emerged into the sachet water market.

Regardless, this strategy could help solve the problem of waste that takes hundreds of years to decay without putting a burden on citizens or change their disposal patterns.

Robert: So if you had any recommendation to decrease the pollution, what would it be?

Dennis: Um, I would recommend that the government will enforce the production houses to purchase the packaging that has been made out of biodegradable materials. So that even if its left in the environment, after some time it decays. Because the materials that are being used right now, it takes a long time to decay.

Dennis shares the opinion that the fact that GWCL provides theoretically pure water to private sachet businesses is a poor direction for public utilities to take and reinforces a low standard of initial water quality. “We are producing water for public consumption not for business,” he said with distaste. As a company designed to serve the public, Dennis would prefer to see the public utility company to supply clean water straight to the citizens of Ghana. His proposed solution is powerful and is increasingly familiar for readers in the global north.

Robert: Ok, last question – what do you want to see improve?

Dennis: Ok there are so many things – myself I’m doing a project but, its like, I cannot go ahead, cannot continue with it. I wanted to initiate a project, which would advocate for [water] dispensers. If you are able to mount this [public water] dispensers at vantage points, you educate the public to keep a bottle, wherever you are you can just go to the dispenser and open it. So you don’t have to generate waste repeatedly. You just drink and you keep it.

Drinking fountains can be found in many public places in the United States, and private companies are beginning to adapt to the trend by installing filtered water stations in new buildings, most notably on college campuses (Koch, 2011). Such a solution in Ghana, of course, would require an increase in GWCL reliability and infrastructure in addition to city support and citizen endorsement.

### *Alternative Sachet Uses*

Although recycling sachets for manufacturing and mechanical industries has provided economic incentives for sachet collection, alternative uses of altered sachets offer opportunities for more localized and less technocratic reuse. “Trashy Bags” (<http://www.trashybags.org/>) is an internationally famous NGO that works to collect discarded sachets to fashion designer tote, purse, and laptop bags (Tutton, 2010). Bags produced are expensive and require skilled workers to create – although commendable, the NGO cannot be considered a countrywide solution to the sachet waste problem. A much more simple recycling use for discarded sachets can be seen in plant



nurseries. Sachet plant nurseries are an under-

*A small “sachet based” nursery in Kumasi, 2014*

chronicled phenomenon – no published articles and only one Masters of Science thesis explore this tactic for reuse (Bismark, 2011). I unexpectedly came upon a sachet plant nursery during an evening walk in Kumasi and was unable to secure an interview.

However, the principles are simple: sachets are to be cut on one side and filled with soil and seed/seedlings, possibly with drainage holes at the bottom of the sachet. Simple entrepreneurial reuse ideas like this, while unlikely to substantially address the daily volume of sachet waste generated, are able to change the economic value of once worthless sachets and may accompany a change discarding patterns.



## Section B: Informed Recommendations

Lacking extensive training in international water developmental policy, in this section I make short-term and long-term recommendations that incorporate the perspectives of Ghanaians who understand the country's water situation firsthand. The main source of drinking water for all of my interviewees with an average of five sachets consumed daily, only change that is radical, countrywide, and accompanied by education will begin to curb sachet water use in a sustainable way.

### ***Short Term Solutions***

In 2012, Stoler proclaimed, "Sachets may be the latest example of how the free market can temporarily bail out local governance failures in basic services provision", the key word being "temporarily." At its core, the greatest issue with sachet water is not the occasional fluctuations in quality, but rather the inordinate amount of un-recycled waste generated. In the short term, therefore, Ghana should devote more funding and attention to and address inadequate disposal infrastructure before or simultaneously focusing on increasing reliable piped water infrastructure. First, making sure that empty sachets do not make their way into the environment, sewers, and waterways means trying to ensure that they are disposed of in a more centralized manner. For many interviewees, the fact that dustbins are not nearby constitute a large factor in why they stash, burn, or litter their empty sachets. Therefore, I recommend that the government of Ghana provide more public dustbins at a minimum, more recycling bins as a future goal at multiple locations in both urban and rural locations. I concur with Francis's view that Zoomlion should

devote attention and funding to providing more public dustbins, rather than hiring a seemingly endless number of biking street sweepers. Indeed according to a few interviewees, the ubiquity of street sweepers may be an enabling factor for people to litter: knowing someone is there to pick up after himself or herself, littering has fewer implied consequences.

Diverting funding from street sweeping toward providing and maintaining public trash receptacles would accomplish several goals. First, more dustbins would make it easier for Ghanaians to begin regular dustbin disposal of their sachets; more people using dustbins regularly could help shape and change regular Ghanaian behavior and disposal patterns. Second, because street sweepers sometimes retrieve the newly valuable sachets over other waste, more dustbins and less street sweepers could lead to more private pickers retrieving empty sachets for sale to recycle companies. More public dustbins would also make it easier to dispose of sachets (and other waste) in a manner that disables non-biodegradable sachets from entering the environment, public waterways, and streets.

Another simple solution to managing sachet water waste is to change common disposal patterns to deliberately streamline the process by which empty sachets are designated for recycle companies. The recent valuing of empty sachets has increased the likelihood that they will end up recycled – whether collected at home, taken by pickers, or separated at the large waste management level. However, with exception of a handful of trailblazing home collectors, the majority of consumed sachets are not designated for recycling by the consumers themselves. Because empty sachets now have recycle value and companies are paying cash for empty sachets, educating the public consumers (via

television, radio, written advertisement, word of mouth) of the value in stashing their empty sachets would decrease the number of sachets discarded immediately after use. The incentive for stashing sachets could be Cedis or a tax write-off upon surrender of bagged empty sachets. Sachet water recycle companies could then put in more effort to retrieve empty sachets from towns without recycling facilities in condensed shipments. By increasing the number and strategic placements of public trashcans, consumers would be better equipped to dispose of and recycle sachets.

### ***Long Term Solutions***

As the immediate problem of empty sachets entering the environment is addressed in the short term, Ghana should also focus on problems that gave rise to sachet water in the first place: a lack of reliable and potable public water infrastructure. Although the national GWCL has a history of inconsistent service and water quality, through my interviews I have come to understand that the company has improved in recent years. In fact, no interviewee said that the water from GWCL was unsafe to drink – instead, interviewees often indicated that they simply moved from drinking tap water to drinking sachet water, and expressed skepticism with quality over fluctuation taste and color. Aside from continuing to improve general water infrastructure (providing nationwide water coverage, improving water quality, increasing access to disenfranchised and more rural populations), the GWCL future goals should include a campaign among covered populations to change the perceptions that their water is *impure*. Changing a nation's perception of the national water company is easier said than done; it is a battle of attrition that must be waged through advertising, taste testing, and undercutting the

competition pricewise. As it stands now, tap water for individual homes is an expensive luxury – it may be the case that in order to increase reliable home water connections, the government will have to provide economic incentives to GWCL and its customers and/or minimizing the ease at which sachet water companies gain access to GWCL piped water for repackaging.

Of course, sachet water is the most popular water source not just because of its supposed *purity*, but also because of its portable and disposable properties. Moving towards a more sustainable means of water provision like piped GWCL water while also making water more portable with disposable containers like sachet water may be an impossible and overall undesirable goal. Aside from “cup water”, I found no evidence of a popular portable water predecessor that was reusable such as a reusable metal or glass water jug. The manufacture and sale of reusable water bottles that could be filled from the tap demands more research for implementation combined with increased *public* water infrastructure. Indeed, Dennis’ solution of increased use of personal reusable water bottles would only be a practical option should there be an abundance of easy to find filling stations – a long term goal for the government of Ghana and GWCL.

In addition to the portability feature, sachet water is also appealing for its “one time use” convenience and carefree disposal. The one time use aspect also gives some users the perception that sachets are untainted and germ-free. In addition, because sachets are sold chilled, they are often more satisfying in Ghana’s warm climate than environment temperature tap water. In order to satisfy *all* positive features of sachet water without sacrifice or negative environmental / sustainability side effects, I would

support Eli's solution of a biodegradable sachet when and if such a solution enters the marketplace.

Although articles from Ghanaian news sites like *Ghana Business News* and *Modern Ghana* purported that biodegradable sachets would completely alter the problem of sachet water waste, the country has yet to see implementation. Indeed, Okioga (2007) and Stoler (2013) share Eli's viewpoint that biodegradable sachets would be a quick short-term solution while public water infrastructure improves, yet feasibility for all sources remain unclear. Alternatively, the Ghana Plastic Manufacturers Association (GPMA) is advocating adding biodegradable additives to the current polythene sachet matter, yet news of implementation of this recommendation remains unclear. In either case, replacing sachets with biodegradable material could provide a solution that leaves the difficulty of changing consumer behavior out of the equation. What then becomes the question is, how will the biodegradable material effect the environment – will the material be safe to dispose of in waterways and city gutters? These concerns should be addressed and weighed against other options before biodegradable material is used on a large scale.

### Section C: Solution Synthesis

The rise of sachet water to utter ubiquity is predicated on a long history of municipal water shortcomings that have never been properly addressed. In order to change or replace such an integral aspect of Ghanaian life, the government must consider replacements for all of sachet water's benefits and address all of sachet water's negative aspects.

A comprehensive solution will include a combination of many of the items considered above, over a lengthy period of time. Of immediate importance, to prevent sachets from entering the environment and clogging waterways, more public dustbins should be deployed and serviced on a regular basis. If this means diverting funding away from street sweeping units to finance more dustbins, then I believe it is the right choice given the possibility that street sweepers are of increased need due to few options for waste disposal besides littering. In accordance with current systems of stashing, the government should streamline the process whereby those who collect their empty sachets can send them off for recycling and even turn a profit. The government should direct attention to public education of the importance of proper waste disposal through various forms of media, including written, televised, and radio outlets. If biodegradable sachet material or additives exist that could replace the traditional non-biodegradable HDPE plastics, they deserve further research for decomposition efficacy and possible market subsidizing. At present, however, the most promising sustainable option would be to continue to improve on public water infrastructure and make clean water more easily accessible and reliable nationwide. The prospect of increasing and diversifying piped water and public water infrastructure deserves more government attention and scholarly research. With increased investment in providing public water filling stations and drinking fountains, the practice of carrying a reusable water bottle as a portable water source would be more practical of a solution. Such changes, of course, will take years, and can constantly be improved upon.

## **CHAPTER 5 – Summary and Conclusions**

With a public water infrastructure unable to properly satisfy the needs of an increasingly urbanizing population, sachet water has quickly become an affordable, reliable, potable, and portable water ‘solution’ for the people of Ghana. Despite increasing potable water access and security, sachet water has been internationally scrutinized for the increasingly problematic non-biodegradable waste produced and for fluctuations in quality to a lesser extent. With concern over the water source from parties within and outside Ghana, there is little sign of an alternative to sachet water in the near future. Identifying the fact that scholarly concern almost unanimously muted the perspective of actual Ghanaian consumers, producers, and waste management parties, I spent the summer months of 2013 and 2014 in Ghana conducting interviews in over a dozen cities. The research presented in this thesis incorporates the integral qualitative data from these underrepresented parties and sheds new light on the life cycle production and waste management of the sachet water industry.

A review of the literature concerning the sachet water industry in Ghana shows that a select few authors researching almost exclusively in Accra (and to a lesser extent Kumasi and Tamale) has generated a limited scope with large gaps. Concerned with the public health and waste management externalities of sachet water, authors are quick to point out that the sachet water industry is under-regulated and the waste is unmanageable. Quantitative data gathered suggest that consumers should be weary that unregistered sachet water producers are common and water produced is often unsafe for human consumption. Regardless of quality, the improperly discarded plastic sachets have choked municipal water systems, cause large scale flooding, and serving as a public

eyesore. Waste management efforts, although improved by supplementing municipal, assembly efforts with private companies like Zoomlion, still fall short for the inordinate amount of urban waste produced daily, a growing portion of which are discarded sachets. Much of this literature is decontextualized, however, and leaves readers without a historical overview of previous potable water alternatives and a false sense of manufactured disgust with Ghana's water choices. By examining the industry firsthand, this thesis contextualizes the traditionally held strict-environmentalist perspectives with those of Ghanaians who have observed longitudinal change of potable water and live in the sachet water sphere.

Through a combination of 40 formal recorded and transcribed interviews, numerous informal conversations, and my own observations and personal experiences, this report can be used as a tool to understand viewpoints of the sachet water industry from “the inside out” rather from the current “outside in” perspective. Whereas almost all published literature focuses only on the three main research sites, I wanted to provide a more comprehensive view of the country as a whole and incorporate regional differences. Through incorporating qualitative information into an otherwise qualitative discussion, the hidden benefits of sachet water are more pronounced and validated. Additionally, this thesis lends a voice to previously ignored sachet water stakeholders, including sachet water users, production companies, sachet sellers, government employees, and waste pickers. The result of capturing information on an industry through multiple perspectives – from the “inside” as well as through observation – in a historical context should leave readers with a more accurate, comprehensive, and intimate perception of the “real” role of sachet water in Ghana.



Results from qualitative data analysis help illuminate some of the unpublished hopes for the sachet water industry and suggest that independent private sector parties are minimizing the negative externalities of sachet water. The production of sachet water – while seen as questionably hygienic by global north scholarship – is tightening and heightening standards of water quality, observing the correlation between consumer satisfaction and demand with increased water quality and brand recognition. Worth underscoring, the majority of sachet water producers purchase their source water from the GWCL and filter it with no less than a combination of four filters and one UV filter, inferably improving the water quality that would already be safe for consumption by Ghanaian regulatory standards.

Consumers commend sachet water for its reliable quality and availability in light of intermittent GWCL coverage. When finished, there are few options for responsible disposal due to the lack of public dustbins. Sachet water producers and some consumers who save sachets in the home or on the go have found that with a lack of state waste management accountability, they can save their sachets and give or sell them to independent sachet pickers. The “Kaya Bola” or sachet pickers –possibly in competition with large-scale waste management companies like Zoomlion – are quickly changing the perspective that discarded sachets are doomed to cause environmental problems by plucking sachets from streets and homes for profit in the recycling industry. Although this study lacks the comprehensive elements to determine the large-scale impact of waste pickers and rise of sachet water production quality on an industry scale, the results are nonetheless integral for they contradict the decontextualized negative perspective that many sachet water scholars hold.

In arguing a viewpoint that is incongruent with traditional environmentalist discourse –that the sachet water industry is actually not as detrimental and problematic as scholars suggest due to private waste collection, and that in light of alternatives sachet water is an important solution for potable water security – I recognize and can affirm that the industry is nonetheless an unsustainable one, and alternatives must be developed and implemented. Sachet water was borne of public infrastructure shortcomings; investment in and a rise to competency of the state run *Ghana Water Company Limited* should be the aspiration for the Ghanaian government in order to relieve the unsustainable sachet water industry. Ideally, public water infrastructure would provide reliable and potable water at an affordable price for Ghanaian homeowners and communities, and public drinking fountains and filling stations would enable the realistic use of reusable water bottles. In the interim, however, sachet water has answered the needs of Ghanaians, and the combination of rising industry standards and increased recycling efforts have made the demonized water source more reliable and sustainable than the global north has been led to believe.

## *Afterword*

Researching the sachet water phenomenon in Ghana has informed much of my academic studies in college and enabled me to reflect on previously unrecognized internal global north perspectives. When writing my funding proposal in the spring of 2013, I was forced to reflect on my previous two visits to Ghana to reconstruct what I thought might be the role of sachet water in Ghana. I wanted to study why the sachets were simply tossed on the ground after use – how Ghanaians could simply not make the connections between littering sachets and excess street side rubbish or metropolitan flooding. I assumed that many Ghanaians simply did not share the same reverence for the environment, maybe that they *just did not care*. I thought that lack of education was surely to blame, that I was lucky enough to have been taught the importance of recycling and waste separation from a young age, and the same educational campaigns did not exist in Ghanaian schools. In my mind I concluded that the socialized *bad* feeling I experienced when I knowingly threw away my recyclables and refuse together, and the lack of such an observable feeling for Ghanaians was due to the differences in waste management education I have received my whole life. From a young age, I was taught that improper waste management (including recycling) would lead to direct environmental consequences, and assumed that Ghanaians did not receive the same education. Additionally, I concluded that the sachet industry itself was such a desperately needed solution to a lack of adequate potable water infrastructure, that maybe Ghanaians were willing to withstand the environmental costs for the water security and health benefits.

After years of research and months of interviewing and observing in Ghana, much of my initial theorizing proved wrong, oversimplified, and reflected socialized global north perspectives about African and global south countries. In reality, Ghanaians who want to properly manage their waste have to give *more* thought to waste disposal than I do in America, and the industry has made life safer and easier for the average Ghanaian citizen. Through my research, I have not only identified flaws in my assumptions; I have learned that observation without authentic contextualization is a limited tool. It was only through interviewing people all over the country, and entering sachet plants, water companies, and waste management companies, that I was able to gain a more holistic understanding of the role of sachet water and of questions that I had only guessed the answers to. Knowing this, it makes me wonder how much other international researchers interject their own conclusions into their own studies. If I had made false assumptions after months of observation in Ghana, how many other researchers with socialized negative perceptions about the global south have too? In order to receive and produce accurate information, regardless of what kind of foreign research one engages in, one must be willing to look beyond their original scope of interest, challenge their socialized truths and viewpoints, and dare to explore the interconnected nature their topic has in relation to a its home society and historical context.

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