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CASE 13

The Abokobi Open Dump

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Luca Parente got off the plane in Accra, the capital city of Ghana. His coworker, Charles, picked him up and gave him a tour of the city. Besides the overwhelming heat, Luca was struck by the amount of waste in the street. Accra utilized an open gutter system, meaning that everything from rain water to plastic bags and spoiled food collected in the gutters. Charles explained to Luca that the gutters sometimes clogged during the rainfall season due to the plastics that were dumped in the gutter. This resulted in the flooding of the surrounding area. In the hot sun, the smell of the gutters was unpleasant, and he felt grateful for the sewer systems in Ontario.

THE BURDEN OF WASTE

The World Bank approximates that every year humans produce roughly 1.3 billion tonnes of municipal solid waste (MSW), or roughly 1.2kg per person, per day. MSW includes the everyday garbage that comes from used items that are then thrown away, such as packaging, batteries, paint, paper, etc. However, excrement, air pollution, waste water, and other similar byproducts are not included. The World Bank predicts that each consecutive year we produce more waste than the one before, at a rate where the total amount of global waste production per year will double by 2025 (World Bank, 2012). Such an estimate means that the average amount of waste produced by each person, each day will grow to 1.42kg. These trends are the result of an increasing global population and standard of living.

Generally, waste production is dependent on economic development, degree of industrialization, societal habits, and the local climate of a nation. Some of these factors have more influence than others. Specifically, as a population transitions from low income to middle income to high income, the amount of waste produced is expected to increase. High and upper middle income individuals generate roughly 65% of global waste, while only composing 16% of the global population (Kochhar, 2015; World Bank, 2012). Conversely, low and lower middle income individuals produce 35% of global waste, while composing 84% of the global population (Kochhar, 2015; World Bank, 2012). Therefore, as countries continue to develop and populations move away from rural to urban communities, the amount of waste that is generated is expected to increase.

To respond to the growing amount of waste, countries must employ waste management systems to collect, segregate, dump, and recycle waste. The rate of waste production has outpaced the implementation of waste management systems in many developing countries, leaving roughly 2 billion people worldwide without adequate waste collection services (International Solid Waste Association, 2012).

In 2012, the United Nations estimated that societies who inappropriately manage their waste could expect to spend roughly five to ten times more than if an appropriate waste management system were put in place. Many of these costs come in the form of health care, lost productivity,

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and damages to local businesses. For example, uncollected waste is a significant public health hazard, shown to result in respiratory (e.g. pneumonia) and gastrointestinal infections (e.g. cholera and E.coli), which significantly increases the use of health care services (International Solid Waste Association, 2012). From an environmental perspective, unmanaged waste produces biological toxins resulting in the contamination of land, seawater, groundwater, and freshwater. Many communities in developing countries resort to the open burning of waste to manage the quantity and smell. Such practices contribute to local air pollution, discourage tourism, and hurt local businesses (International Solid Waste Association, 2012).

Many African countries have a linear economy. This means that products are produced, consumed, and then dumped. A circular economy, like those of many countries within the Organization for Economic Co-operation and Development (OECD), ties the ends of production and dumping together with recycling. To move towards a circular economy, significant investments must be made by governments to incentivize the recycling of particular materials, especially scrap metal and plastics.

Ghana's waste management services are unable to keep up with a growing economy, where citizens are transitioning from low income to middle income lifestyles. While the majority of waste produced in Ghana is organic, production of plastic waste is significantly increasing (Yoada, Chirawurah, & Adongo, 2014). In Ghana, large scale recycling remains an uncommon practice, with only a few composting and recycling companies operating in some of the nation's major cities. Much of the recycling in Ghana occurs at a community level by informal waste workers. These waste workers, or scavengers, collect plastics and metals from dumps and then sell it to independent organizations for below market price.

WASTE MANAGEMENT SYSTEM IN ACCRA

Luca, a recent Master of Public Health (MPH) graduate, was looking forward to starting his new job at an environmental advocacy group in Ghana called Treesus. Treesus promotes environmental protection and lobbies governments and organizations to prioritize environmentally conscious projects, while still encouraging local economic development. Particularly, Treesus excels at bringing together multiple stakeholders and developing meaningful relationships with decision-makers and investors. The organization's goals were aligned with Luca's own goals, which involved bettering the environment. Luca had extensive experience working in the Solid Waste Management sector in Southern Ontario and had completed his undergraduate degree in civil engineering at the University of Toronto. Luca took the job in Accra, because he believed it was a good opportunity to make an impact while gaining international experience and an opportunity to travel.

Accra is the capital city of Ghana, a small West African country bordered by Togo and Cote d'Ivoire. Ghana's population totals roughly 27 million people, yet has a landmass of 238,535 square kilometers, making it one of the denser African countries. In 2011, Ghana had a GDP equivalent to \$39.15 billion USD, a third of which comes from agriculture (Quansah et al., 2016). Accra is part of the Greater Accra Region with a population of roughly 4 million and a GDP per capita of about \$1,695 USD, making it one of the most financially successful regions in Ghana (Jones Lang LaSalle, 2016; Ghana Statistical Services, 2012).

Ghana had updated its environmental sanitation policies in 2010, hoping to accelerate its progress towards achieving the Millennium Development Goals (MDGs). Specifically, for MSW, Ghana utilized a 'polluter-pay' principal, meaning those who created waste had to pay for it. While this intended to create an equal playing field, many individuals could not afford to pay for waste collection or simply opted not to. Estimates found that roughly 76% of households in

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Ghana utilized improper waste disposal methods such as open dumping or burning. Only about 5% of homes had their waste collected by a formal waste management organization (Government of Ghana, 2012). Part of the problem was that the 5% of homes, who were generally middle to upper class, set the prices of collection for an entire area, resulting in fees too high for the adjacent, lower income households.

Accra also faced an insufficient number of treatment and disposal sites. This exacerbated the problem of implementing house-to-house collection, as waste management companies had to pay elevated prices at disposal sites. Treatment facilities, such as composting or recycling sites, were scarce and high in demand. The recycling companies that did operate bought recyclable material from waste collection companies. This provided a two-fold benefit to waste management companies, since they received a small profit for providing their recyclables and reduced the fees paid to disposal sites since fewer materials needed to be dumped. However, most recycling is still done informally through scavenging. Scavengers in Accra are self-employed individuals who enter open dumps in search of material that can be resold to private organizations. Most commonly, scavengers gather scrap metal for local smelting companies. They also collect and sell plastics.

Overall, the performance of Accra's waste management system is poor. Most individuals cannot afford proper waste collection and are forced to indiscriminately dispose of their waste. Others use common dumping places or open burning. Waste on roadsides is very common, with plastics accounting for a large proportion. The accumulation of plastics in gutters leads to clogging and consequent flooding, resulting in damage to infrastructure and pools of water for vector-borne diseases (Government of Ghana, 2012).

WASTE MANAGEMENT IN CANADA

Luca was very familiar with the waste management system in Canada, after working as a sanitation engineer for a drainage and sewage company and as an engineer for the municipal government for 3 years before completing his MPH degree. As of 2006, roughly 93% of households in Canada had access to one form of recycling program, and about 97% of these homes used at least one program (Statistics Canada, 2007). Theoretically, this means that household waste is being transported away from the home and is separated from recyclable material. While Luca was aware that Canada performed better than Ghana in this regard, he knew the Canadian waste management system had several flaws.

Canada ranks at the bottom (17th out of 17) when comparing its waste generation to other OECD countries (Exhibit 1). Canada produced approximately 25 million tonnes of waste in 2010, costing about \$2.9 billion to adequately manage it (about 9% of Ghana's GDP in 2010) (Giroux Environmental Consulting, 2014). The fact that only 27% of waste in Canada is diverted from a landfill to either a recycling plant or a compost facility reduces Canada's waste score significantly (Statistics Canada, 2007). Recycling only a quarter of waste is considerably low, especially compared to European states such as Sweden, which recycles 50% of its waste, or Germany, which recycles 65% (OECD, 2015).

THE ABOKOBI OPEN DUMP

The focal point of Luca's work in Accra is the Abokobi open dump (Exhibit 2) and its environs, which began operation in 2003. As it was described to him, the Abokobi dump site is a large open dump roughly one kilometer in diameter. Open dumping is very primitive and unscientific, although it is easy and economical in the short term. The dump resides in the Abokobi community, which is on the border between the Ga East Region and the Accra Metropolis (Exhibit 3) and receives over 8,150 tonnes of waste per month. As with many of the open

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dumps in Accra, they are not properly engineered to prevent contamination and leachate runoff. Leachate runoff is dangerous to the surrounding environment, often polluting the surrounding land and making its way into adjacent aquifers (Majumdar et al., 2014). While Luca was not aware of the full extent of the dump's pollution, he knew that people in the surrounding area gathered water from nearby wells or bore holes. He wondered how he could estimate this data and determine if, or how many of, the local water sources were polluted.

To exacerbate the problem, the dump was intended to be temporary and was not initially projected to handle so much waste. Luca learned from talking with workers that the dump site was initially a large hole, despite it being over 60m tall now. To ensure there is adequate room, condensers run day and night compacting waste. Waste is burned to help eliminate many of the odours, but burning creates toxic fumes that blow into the surrounding community for several weeks at a time.

As Luca walked around the dump, he could feel his lungs get heavy as he breathed in. He noticed many of the workers only had a thin cloth over their mouths to filter the smoke. Many of the workers did not look like they were wearing any protective equipment besides gloves or overalls. He also noticed scavengers who wore almost no protective equipment and displayed cuts around their legs and wrists; some even wore open-toed shoes and shorts. The material they collect and sell to private companies is often sharp or jagged, such as tin cans, scrap metal, and broken plastic containers.

HEALTH HAZARDS OF LIVING BESIDE AN OPEN DUMP

Luca wondered what the health effects were of living beside the Abokobi open dump. He began a literature scan and found that the evidence of the public health consequences of living adjacent to an open dump site was limited; the main reason was a lack of consistency concerning what constitutes an open dump, regarding its size and the type of waste dumped there (WHO, 2000). Despite this fact, there are negative health outcomes, especially in children, such as increased respiratory stress and chronic diarrhea, that have been observed and replicated in scientific literature. Many of these effects are amplified due to dumps being placed in poor or marginalized communities (Palmiotto et al., 2014). Often these communities have lower levels of access to medical services as well as decreased education and health literacy (Wilson, Velis, & Cheeseman, 2006).

Many of the chemicals found in the air surrounding a dump or released during open burning are hazardous to an extent. Volatile Organic Compounds (VOCs) are present in fumes, and many are carcinogens or capable of producing other serious health effects. While no study showed a definitive causal link between living beside an open dump and increased cancer rates, the levels of VOCs in the air were often above an accepted threshold (Majumdar et al., 2014). Other chemicals found in dumps result in the formation of a tropospheric ozone that when inhaled, even in low amounts, can cause chest pains or respiratory stress (Majumdar et al., 2014). Heavy metals are also present in most MSW, often in the form of plastics. Determining the levels of cadmium in fumes is important, especially considering its role as an immunosuppressant (Schoeters et al., 2006).

Luca was very worried about the impact of such a cocktail of chemicals on children. He found evidence of congenital abnormalities, low birthweights, and chromosomal abnormalities in communities living close to dump sites (Porta, Milani, Lazzarino, Perucci, & Forastiere, 2009). Children living close to high concentrations of waste had almost three times the incidence of diarrhea – one of the major killers of children under five (Shibata et al., 2015). Chronic exposure

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to odors, especially beginning at a young age, is also associated with anxiety, dermatological problems, and increased rates of asthma (Palmiotto et al., 2014; Porta et al., 2009).

Luca wondered what to make of this data. While much of it was inadequate to make definitive scientific conclusions, he felt that there was enough evidence to support the fact that the Abokobi dump may affect the community's health. He also wondered whether the lack of data was because of a lack of research. He noted that many of the communities living beside open dumps were in lower income areas with few research institutions.

THE GA EAST MUNICIPAL ASSEMBLY

Luca knew that the decisions pertaining to the dump, and future matters involving waste, were determined by the local municipal assembly in the Ga East district of the Greater Accra Area. Like municipal governments in Canada, divisions of the municipal assembly manage water, sanitation, and other environmental concerns (Government of Ghana, 2012). The municipal assembly is also responsible for responding to public inquiries and complaints.

The municipal assembly responsible for the Abokobi dump was much more disorganized than what Luca encountered back in Toronto. Luca had planned a meeting with members of the local government, but waited several hours before discussing the dump with any official. Most of his time was spent shaking hands and introducing himself. Once Luca began describing the work he was trying to do, he was quickly referred to another office in the government building. Eventually Luca ran into Mr. Spong, an assistant to the Assemblyman of Environmental Health in the Ga East district. Mr. Spong was first introduced to Luca by Charles, who was a longtime friend. A frustrated Luca asked why no one cared to listen to his story.

Mr. Spong explained to Luca that no one in the municipal assembly trusted Luca and his intentions. "You can't just come in here and start asking difficult questions that can get people fired. No one and everyone is to blame for the dump. We all let it happen, but no one wants to take responsibility. Once someone starts answering your questions and explaining the process to you, they start taking responsibility, and no one wants that. No one is going to risk a good government job for someone they don't know, especially a foreigner."

Luca tried to explain to Mr. Spong that the longer this problem went on the worse it was going to get. He explained the literature he found and the negative health consequences that come from living beside an open dump. Despite his sincere petitions, Mr. Spong revealed another layer of complexity. "You think we don't know that? We get calls every day from people complaining, but even if someone was willing to help, you couldn't just change it. Half the people here are making money from the dump, either because they get to make big contracts with waste management companies, or they are paid by those companies to let things slide. The waste management companies always pay on time, and treat everyone here very well. You don't get that treatment every day."

Luca left the municipal assembly less optimistic than when he entered. It seemed that the local government was very much at the behest of the large waste management companies.

THE ABOKOBI COMMUNITY

The surrounding Abokobi community is a heterogeneous population. Luca noticed that most of the homes were small wooden structures with only a few brick houses with power lines running to them. It was difficult for Luca to make any further assertions about the community without talking to some of the members.

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Mr. Quacoe, one of the local community leaders, explained that many of the citizens were employed but had limited access to electricity. Moreover, while most children were in school, many of the parents and grandparents had little education past elementary school. There was a general feeling in the community that they were being taken advantage of by the waste management companies using the dumpsite. Mr. Quacoe recalled one of the discussions he had with a nearby resident: “It’s making us sick, we have to live every day beside the dump breathing in the toxic air, meanwhile the people who own the dump get rich. They get everything, and we get nothing.” Individuals felt that waste management was also the responsibility of local governments, and that Assembly Members (the legislative officials in Ghana) were not doing their best to put the interests of the community first. Mr. Quacoe explained how this opinion was not uncommon, but it was not the only perception of the dump either.

Father Solomon, a pastor at the local Presbyterian church, was an influential member of the community and had his finger on the pulse of the community. “Many people are angry, but many people are happy too. The dump has employed many people and has brought business to the surrounding shops. The government has even started repairing nearby roads so that the dump trucks break down less frequently.” Father Solomon explained that individuals wanted support to make sure that they would be healthy and that their children would grow to live long lives.

WASTE MANAGEMENT COMPANIES

Various organizations operate in Accra’s lucrative waste management sector. Waste management companies often fill a large gap in services, since municipal assemblies lack the capacity to manage waste on their own. However, upon entering the waste management market, many new companies face significant taxation and require large amounts of capital investment. To operate in a municipality, waste management companies must also pay monthly fees. These conditions require companies to prioritize profit, rather than quality service, from the outset if they wish to operate. As a result, it is common for waste companies to ignore poor neighbourhoods, since most individuals cannot afford the price of collection. Waste managers provide high income neighbourhoods with higher quality services, but these neighbourhoods still suffer from inconsistent collection due to problems such as a shortage of garbage trucks.

More established, financially stable waste management companies, such as those operating the Abokobi dump, find themselves in a different predicament. Some have adopted a strong sense of corporate social responsibility, since it buys them significant favour with the local municipal assemblies. Established organizations will fund think tanks or provide significant financial aid to support community health interventions. While this practice is uncommon, bribery is common. Other larger waste management companies in Accra often pay politicians or municipal assemblies sizeable amounts of money to operate in wealthier neighborhoods or avoid penalties for not adhering to their contracts. Either case makes it difficult to adequately regulate and enforce policies. Luca wondered how he could work with organizations that generally did as they pleased.

IMPORTANT MEETING

At the end of the week, Treesus will hold a workshop in the Accra Metropolis district and invite the Municipal Assemblymen who are responsible for environmental health and sanitation in Accra. Treesus also invited several of the major solid waste management companies. Three of the waste management companies – Waste Giant, Meko, and Speedy Waste – all use the Abokobi open dump and had confirmed their attendance. Luca will give a presentation at the workshop to describe some of the strategies Canada and other countries use to manage and reduce the amount of solid waste they produced. Luca knows this is a good opportunity to

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describe the economic and health benefits of implementing an effective waste management system, such as transitioning Accra from a linear to closed-loop economy.

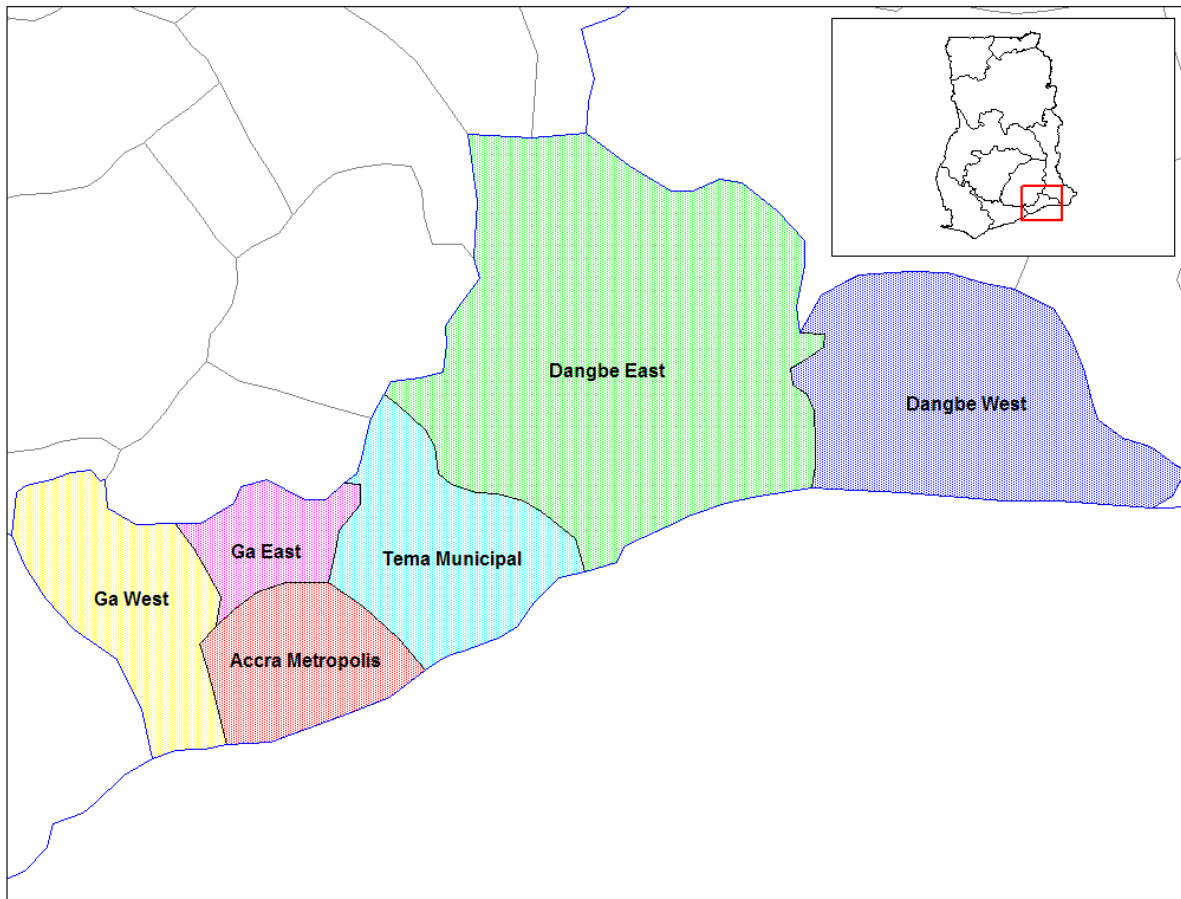
Luca debates what is a more productive presentation. He wonders how much stakeholders know about other waste management systems in other parts of the world? He even wonders if Treesus knew how poorly Canada's waste management systems ranks compared to other countries in the OECD. Luca has a couple of days to prepare his presentation but is unsure how much knowledge or what biases his audience will have.

Luca considers presenting the waste management system in Canada while also presenting its shortcomings. Providing the whole picture will allow Accra to learn from some of Canada's mistakes. Transitioning to a more advanced waste management system is also appealing, especially considering that he knew Ghana's desire to achieve the Millennium Development Goals. However, Luca wonders if a waste management system that relies heavily on landfills is an attractive option in Accra. Would he convince the government and corporate officials that more landfills, despite their costs, are still a better option compared to open dumping? How aware of this are they already? Furthermore, much of Canada's recycling stream relies heavily on households segregating their waste from recyclable materials, a non-existent practice in Accra. Would officials interpret the presentation as an achievable ideal or would they find it unrealistic in a resource restrained country?

Alternatively, Luca thinks about giving a strengths-based presentation. While households in Accra do not separate their recyclable materials, there is a large population of informal waste workers who do. By augmenting or formalizing the existing forms of waste separation, Accra could utilize existing methods to close the ends of its linear economy. Would officials consider this strategy as moving away from the Millennium Development Goals? Would waste management companies feel comfortable with a formalized waste scavenger system operating in their dumps? Could Luca create a convincing strengths-based presentation, while still promoting some of the beneficial waste practices Canada performs? Would Treesus be comfortable with a presentation that strays from its original purpose? Should Luca just present what is expected of him? What are the pros and cons of each of his presentations, and what option should Luca present at the workshop?

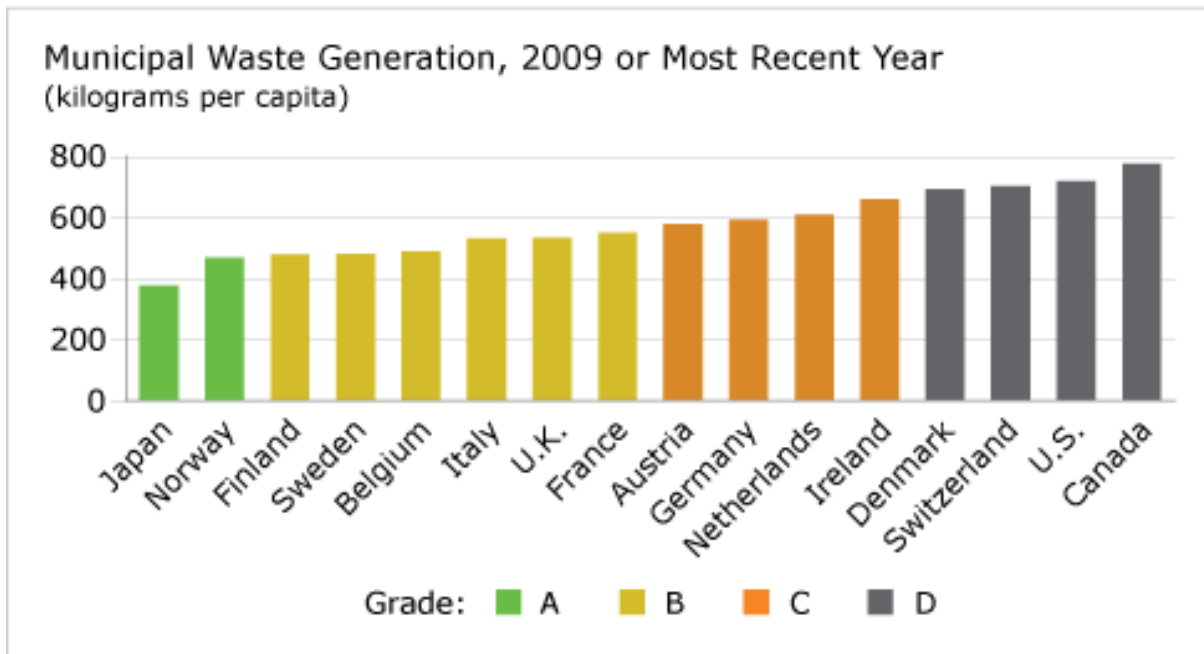
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EXHIBIT 1 Municipal Districts of Accra



Source: Rarelibra, 2006.

EXHIBIT 2
Municipal Waste Generation Rankings Among OECD Countries (2009)



Source: Conference Board of Canada, 2013.

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EXHIBIT 3 The Abokobi Open Dump



Source: Captured by author.

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INSTRUCTOR GUIDANCE

The Abokobi Open Dump

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BACKGROUND

Treesus, an environmental advocacy group in Accra, Ghana, recently hired Luca Parente. Like many West African countries, Ghana has a linear economy, meaning that it dumps rather than recycles most of its municipal solid waste. Luca explores the Abokobi open dump site, a large open dump in the middle of the Abokobi community. Luca recognizes the hazards of living beside an open dump and learns that it may increase the rate of communicable diseases and the exposure to toxic heavy metals. The Abokobi community is divided on their perceptions of the dump. Some see scavenging at the dump as an opportunity to provide income for their families while others view the dump as a significant health hazard. Scavenging is one of the only forms of recycling present in Accra. Luca is expected to present on what he believes to be the best direction for waste management in Accra. Will Luca conclude that Accra should follow the footsteps of countries with more developed waste management systems? Or will Luca find a way to augment existing structures?

OBJECTIVES

1. Understand the magnitude of waste and the challenges that arise when societies transition from low income to middle income countries.
2. Identify the similarities and differences in waste management systems between Canada and a developing country such as Ghana.
3. Apply the HDI and I = PAT to municipal solid waste management and determine how they impact decision making.
4. Perform a SWOT analysis of the waste management system in Accra to guide the decision-making process outlined in the case.
5. Analyze the consequences to the environment, economy, and human health that result from inadequate waste management.
6. Evaluate the evidence surrounding the health effects of living beside an open dump to determine whether or not the evidence is conclusive.

DISCUSSION QUESTIONS

1. What are some innovative ways countries are managing their waste?
2. What steps can Accra take on a household level to promote recycling? What about at a government level?
3. Is scavenging at the Abokobi open dump a practice that should be prohibited because of the health effects to workers or promoted because of the economic and environmental benefits?
4. What are the challenges to implementing a strengths-based approach at a community level? How about at an international level?
5. What consequences could have been avoided had the Abokobi dump been engineered to protect the surrounding environment?

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6. What evidence does Luca need to reach a conclusion regarding the health effects of the Abokobi dump?
7. How will the 'Next 3 Billion' effect the global production of waste?

KEYWORDS

Waste management; municipal solid waste; stakeholder engagement; recycle.