Leaching of E-Waste Pollutants in African Environments

The pollution of soils and air by toxins and heavy metals through the dumping of electronic waste, the resulting effects on those in the surrounding environment, and raising awareness through social media and political paths

Tag Words: E-waste; Electronic waste; dumping; electronic pollution; electronic recycling

Authors: Liljana Kushi, Remy Koch, Kevin McDonough with Julie M. Fagan, Ph.D

Summary:

The dumping of E-waste can be directly attributed to the developed world not correcting recycling their antiquated electronic devices like computers, cell phones, and fax machines, etc. This results in heavy pollution and severe adverse health effects on those living in the surrounding areas. In order to help reduce the amount of e-waste dumping, the proper recycling protocols need to be taken in the developed world. To accomplish this, we want to spread awareness of the issue to raise recycling through forces such as change.org by starting a petition, contacting Senator Sherrod Brown and other senators with a policy brief, and writing to the World Health Organization (WHO) to further light to the situation. When we contacted WHO, they were able to provide us with decent amount of information regarding e-waste in Africa, but unfortunately, according to their laws and regulations within the organization we cannot disclose any of the information at this time.

Video:

http://www.youtube.com/watch?v=srXyzl1EhSY

E-waste and its Effects on the Environment (RK)

The United States is currently lodged in an era of new technology, an era where the general public is obsessed with always having the newest phone, iPad, laptop etc. Technology companies certainly supply the demand, as it feels like Apple and other companies release new phones every month. An estimated 20-25 million tons of electronic waste (e-waste) is generated worldwide but the consequences of this aren’t thought of very often. Despite international treaties such as the Basel Convention, the illegal exportation of e-waste, mainly from more developed countries to less developed countries, has become a prevalent problem in the environmental world. The improper recycling of e-waste does not only pose a problem for the earth it seeps into, but also for the people within a large radius of where it is improperly handled.
For this project we will talk about the health risks associated with the leaching of e-waste, and try to come up with a solution to reduce e-waste in the Rutgers community.

**E-waste Laws and its Illegal Transboundary Movement**

The main international laws for the transboundary (across borders) movement and disposal of hazardous waste, specifically, are set forth in the Basel Convention, in which 178 countries take part. The treaty says that countries have the right to refuse the importation of e-waste. It states that countries are allowed to prohibit the import of hazardous waste, and if they do, other countries must prohibit the export of hazardous waste to that country (1). In other words, all lesser developed countries have the right to ban the import of e-waste, and as such, any African country can say no to the import of e-waste.

The convention delves into what is considered illegal e-waste dumping. Any transboundary export of waste that could be deemed hazardous without permission from members of the Basal Convention, or without obtaining permission from the Basal Convention, and attempting to falsify any documents through fraud, or misrepresentation should be considered illegal. Further, if illegal trade is caught, all the members involved are to ensure that the hazardous waste is disposed of appropriately. As you can see, the international laws and regulations regarding e-waste are pretty loose, and they allow countries to regulate themselves for the most part. This leads to the problems that will be talked about next.

Much e-waste is brought illegally to Africa; that is the major problem. Merchants with only money on their mind illegally dump millions of tons of hazardous waste in developing countries, disguising it as electronics to be exported for use in schools and hospitals. Although more than half a million computers arrive in Nigerian ports every month, only one in four works while the rest is sold as scrap and broken down in massive dumps to extract only minor amounts of metal (2). The health effects of this will be talked about later. One of the biggest illegal e-waste dumping occurred in the Ivory Coast in 2006 by a Dutch company named Trafigura. A ship registered to the company coming from Brownsville, Texas entered the port in Amsterdam to unload several hundred tons of toxic e-waste, but the company that was contracted to process the e-waste raised their price by 20x after determining it was more toxic than they were told. Trafigura decided to have the ship leave Amsterdam with the waste and try to have it processed at different ports, all of which refused to take it until they reached Abidjan in the Ivory Coast. There, the e-waste was given to a new dumping company that illegally dumped the waste instead of processing it, resulting in over 100,000 people seeking medical assistance due to exposure to the e-waste. The transboundary movement was illegal because the waste was first shipped to the Netherlands, but Trafigura decided to reject the waste instead of treat the waste appropriately due to the high cost. Even though the waste was still contaminated, the Netherlands allowed it to depart from their port which violates their obligations under international and Dutch law. Trafigura paid the Ivory Coast 152 million Euros. (3)

**Health Effects of Illegal Dumping of E-waste**

There are safe and effective methods for the recycling of the hazardous materials in e-waste. Unfortunately, these methods are more expensive to start up and require more money to operate,
and in this world of capitalism, no one has time for that. In a perfect system for the recycling of e-waste, all the hazardous waste would be separated from the rest of the recyclable waste without harming the environment or other humans. E-waste recycling plants that function properly are able to both save more beneficial resources from the waste but also reduce the amount of pollution emitted when e-waste is recycled by refining, concentrating, mining, or smelting. The problem is that these processes that are environmentally sound have a higher cost of investment in regards to older technology that is much cheaper to operate. Newer processes also require extremely large amounts of waste in order to make any money, and the training is more arduous for employees. Because doing the environmentally-sound method involves both cooperating with stringier laws and spending more money, many companies often choose to dispose of their e-waste in developing countries where laws are more relaxed (4). As always, corporations go for the cheaper method instead of the environmentally safe one. It is no surprise that companies would rather make more money rather than support a safe Earth.

Another cost saver of illegally exporting e-waste is a result of the “no to low” pay of the workers, all of who are exposed to many hazardous toxins and materials. Often, poor workers are hired to break up and attempt to recycle old and obsolete e-waste that is mostly imported from North America. Usually workers are employed where unregulated, unsafe, and primitive techniques are used to recycle the e-waste, such as exposing phosphor by using hammers to open cathode ray tubes, producing toxic odors by melting circuit boards over open fires, and dumping acids and metals into nearby lakes and rivers. In developing countries around the world, poor children and adults are exposed to hazardous chemicals in order to recycle the e-waste from developing countries. The effects of e-waste are therefore not only seen in the countries where electronics are heavily used, they are also seen in the form of environmental contamination in the underdeveloped countries where the e-waste is recycled (4).

In Ghana, the main e-waste recovery site, located in the capital Accra, is named Agbogbloshie market, though there are smaller sites running similar operations around the country. The main functions at this location is to manually recycle the old and obsolete electronic pieces of equipment in order to retrieve some expensive metals such as aluminum and copper. Another function is to burn certain plastics such as wire in order to retrieve copper from the cables inside. A lot of this work is carried out by children who are using obsolete tools themselves and have no equipment to protect themselves. While this seems particularly bad on its own, it gets worse once you consider where it is located. The Agbogbloshie market has its general disposal areas located right next to two shallow lagoons. The lagoons are next to areas used for open burning of e-waste. During thunderstorms and other rain storms, a lot of the market gets flooded and the metal dusts that are in the soil get taken up and disposed in the aforementioned lagoons and the Odaw River, which subsequently flows into the ocean. Thus metals from this improper e-waste recycling market end up getting deposited into the Atlantic Ocean. Samples were taken from inside the market, from the lagoons, and from the river, and were subjected to chemical tests to determine the metal concentrations in them. The results were absolutely staggering. It was found that a number of metals were found at concentrations that were much more than typically seen in uncontaminated soils. Among those metals seen at over one hundred times the levels typically seen were zinc, tin, copper, and lead. Fifty times the amount of antimony and five times the amount of cadmium were also found at levels that were above standard levels of contamination. In fact, cadmium is rarely found in the environment. There was also more barium than should be
expected, and all of these metals can be highly toxic to human (5). As proven by these tests, these poor disposal techniques lead to the seeping of many toxic and unnatural metals into the soil and into the environment, affecting not only people in the market but also people within a large radius from the river contamination.

Conclusions and Solutions

Many countries have legislation that requires electronic producers to finance and set up collection systems for the proper recycling and treatment of e-waste. Even though the legislation exists, only 25% of e-waste generated in Europe is collected and recycled properly, whereas in the US it is only 20% (5). This certainly does not bode well, because according to a 2011 Pike report, the total amount of e-waste will more than double by weight over the next 15 years. That report also anticipates that the amount of recycling and reuse driven by international environmental legislation and leading electronics manufacturers will also rise, and eventually that amount would be more than the amount of e-waste produced (6). The fact is laws and regulations regarding e-waste should get stricter over the coming years.

The consequences of e-waste are vast, yet it is a rarely talked about subject. Spreading knowledge about this topic is immensely important because the craze to always have the newest piece of technology is having a profound effect upon the health of people throughout the world, as well as on Earth. Therefore, our plan is to raise awareness into how detrimental e-waste is. We can do this through social media such as Facebook, Twitter, and YouTube. The Rutgers community is a big one and it is going to continue to grow. If we can make sure Rutgers students are aware of how to properly dispose of old electronics, that would be a good start. Maybe this can be done by putting the locations of phone collecting bins on bulletin boards throughout Rutgers with some catchy slogan written on it. On a larger scale, we can find out what Rutgers does to dispose their old electronics, and check to make sure whatever company collects it is disposing of it legally to recycling sites that are much more technologically advanced and environment-friendly. These are a few ways that we can reduce e-waste.

The major problem with the illegal dumping of e-waste is the resulting contamination that comes along with it. With regard only to human health, there are more than one thousand chemical compounds known to exist in e-waste, including some that are labeled as toxic (7). Some such toxic heavy metals that can be found in e-waste that has been dumped without properly recycling protocols include beryllium, barium, antimony, cadmium, halogenated flame retardants (specifically those using bromides), copper, lead, tin, as well as mercury. These heavy metals are used for a variety of reasons. For instance, beryllium is used in clips and motherboards as a well to increase strength while still maintaining electrical conductivity. In most cases, the e-waste can easily be traced back to being the source of major quantities of pollution. For example, the amount of mercury used in electronics can account for roughly twenty-two percent of annual consumption worldwide. These heavy metals can have devastating effects on human health.
Ground Pollution

The immediate human health concerns of the pollutants associated with e-waste can be immediately associated with the ground pollution occurring through the leaching of these heavy metals into the soil. In a study conducted by the non-government associated environmental group Greenpeace, six different dumping grounds around the Agbogbloshie Market in Ghana were studied. In this study, the researchers took samples of soil and ash (from the burning of the e-waste as a way to reveal the metals inside for possible extraction and recycling for money). They then tested these soil samples and compared them to the average soil sample of the area. In all of the dumping areas tested, the soil/ash showed much higher levels of the heavy metals that are known to be found in e-waste materials. Alongside the heavy metals, many organic compounds (which are also pollutants) were discovered that were also found in e-waste or known to form through the combustion of such e-waste. Some of the metals were measured at rates exceeding one hundred times the normal concentration of uncontaminated soil. These metals found at the top two polluted sites in the market include copper with measurements of 7290 and 9730 mg/kg of soil/ash, lead with 4160 and 5510 mg/kg of soil/ash, tin with 1290 and 1175 mg/kg of soil/ash, and zinc with 6920 and 18900 mg/kg of soil/ash. Antimony levels were measured at a fifty times higher levels than typical background soil with measurements of 286 and 592 mg/kg of soil/ash. Cadmium levels were also found to have risen, but only at five times the typical background soil with measurements of 10 mg/kg of soil/ash (8).

Along with the heavy metals, organic compounds such as (poly)-chlorinated benzenes, brominated compounds, and phthalates were shown in the dump sites. The first and third sites tested positive for DEHP, a phthalate ester. The first also tested positive for three other phthalates: DiBP, DBP, and DiNP. These phthalates are formed from the burning of plastics from the e-waste, and are known to be toxic to inhale as well as carcinogenic (8).

Water Pollution

Another contamination occurring due to the e-waste is water pollution. In fact, the last sample in the study is actually from the smaller of two lagoons in the area. This water sample was slightly less polluted than sites one and two but still very polluted compared to surrounding samples. There is also pollution in the second, larger lagoon due to cross contamination likely from flooding. The larger bodies of water around Agbogbloshie such as the Korle Lagoon are also showing signs of serious contamination. The groundwater is also becoming contaminated as the metals and organic compounds trickle their way through the soil. If the groundwater becomes too contaminated, the pollution will be able to spread further and affect more people. Without stopping the dumping, the land will continue to become more contaminated with these e-waste byproducts and the water pollution will only continue to worsen (8). Along with the chemical factors involved with pollution, there is a physical factor as well. The water in this suburb has become unusable because of the amount of e-waste simply sitting in the water. This water is no longer safe to play in or use (9).
Air Pollution

Much of the problem with these heavy metals and toxins is that they can be inhaled and then cause health effects. Unfortunately, in Agbogbloshie, the primary practice of people, usually young children, trying to make money off of scrap metal is to burn the e-waste and collect the now exposed copper wiring. By doing this, many organic toxins are released into the surrounding air and can easily be inhaled. Phthalates are created by doing this, as are chlorinated benzenes and polychlorinated dibenzo-p-dioxins and furans, all of which are toxic (8).

Containment

With all of this contamination due to the excess of e-waste, nothing is really being done to intervene. Nothing is being done to stop the dumping of the e-waste on the land. As you can see in the video titled “Ghana: Digital Dumping Ground”, there is nothing being done to contain the pollution and contamination in any way. The e-waste is just piled up together with other trash with nothing separating it from people, the surrounding area, or water. The only project being attempted to help the water pollution is the Korle Lagoon Ecological Restoration Project. According to their website, their plan was to “restore the Korle lagoon to its former ecologically and financially valuable state” (10). In this plan, they planned on “capping areas of dumping” as a way to prevent pollution from entering the water (10). The project has run into construction problems due to the amount of pollution in the lagoon and has yet to meet its goals. This leaves the lagoons heavily polluted with high concentrations of toxic materials. Not much can be done without major support and money from the government as far as containment is concerned. There are no set laws as to where to dump, and so containing an unknown area is rather impossible.

The Health effects of improper disposal of E-waste (LK):

The improper disposal of electronic wastes in African soils has become a tremendous health concern throughout Africa, and around the world. Although many people might not be aware of what is currently happening in Africa, many are suffering from e-waste toxins entering their bodies. Everyday citizens in Africa are being poisoned by these harmful toxins entering their bodies because powerful countries like ourselves are dumping these toxic chemicals that electronics wastes contain into the soils and compensating them with a very small amount of money.

The long term effects these citizens are facing are cruel starting from respiratory problems to neurological problems, reproductive problems and death. The different health effects from the contact with dangerous wastes may affect different organs in the body, mostly depending on what the person came in contact with. In addition, other diseases can arise from coming in contact with these harmful chemicals found in the electronics. A large percentage of heavy metals is found in landfills every day ranging from 40% in lead to 75% of other toxic metals. Lead for example, which is one of the most harmful elements to be found in e-waste is known to damage parts of the brain from the central to the peripheral nervous system. Studies have been conducted in many parts of the world, and one in particular was done in Nigeria. Results were very alarming because the waste that is disposed in the soil are disposed with no precaution, the
resources that are left are being used in landfills and used as waste. All these have detrimental affects not only to the environment, but to the people who are living in that environment.

The risks that E-waste has on countries like Ghana:

Ghana has become a big concern throughout as it is found to be one of the biggest dumping sites for e-waste without having any regulation for proper e-waste disposal. Cities in Ghana are experiencing large piles of e-waste found before their eyes everyday (www.PBS.org). The citizens there do not know why they are developing severe health diseases such as cardiovascular or neurological diseases as they are unaware that the lead and cadmium inside the electronics have poisonous effects on their bodies. There should be a program that controls the amount of waste that is dumped into sites and properties of people, and how it affects people. Along with this program, the country itself should enforce regulations of what enters the port, and what does not. If they were to stop e-waste from entering the port then that would be one less thing that country has to worry about. Countries like Ghana for example, are used for this disposal and recycling. Because of the poor disposal and poor recycling process, a lot of these pollutants that include heavy metals are being released into the air.

These pollutants can easily enter the lungs of many people, and not only cause upper respiratory problems, but they can lead to more serious issues, such as cancer and reproductive problems. Toxins that are found in the electronic itself can lead to severe brain damage as well. If these toxins are filling up our lands here with all the laws that we have for recycling and disposal, for those that live in Africa, these problems are doubled as they are not covered by any laws to help protect them from having landfill full of e-waste. A study done at the University of Cincinnati found a correlation between pregnant women and their fetuses that nearly all mothers in third world countries have an increased risk for neurotoxicity, which is the poisoning of nerves and nerve cells. Since the brain is rapidly developing in children neurotoxic chemicals like heavy metals can lead to developmental damage. Regulations for stricter rules need to be enforced in these countries because everyday children and adults are dying from these diseases that are caused by dumping of electronics. Each day people are hurting, but no one seems to care. The problem is there, and what should we who are aware of this do? We need to have a strong awareness program, and have strong will power to help save as many people as we can from these horrific consequences. They cannot help themselves, so it is up to us, to help those who are in need.

Improper handling of e-waste:

1. A study conducted at The University of Cincinnati found that improper handling of e-waste such as burning it or improperly disposing it, will eventually end up in landfills (http://healthnews.uc.edu).
Table 1: Elements found in E-waste and their harm on human organs:

<table>
<thead>
<tr>
<th>Element</th>
<th>Harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>Has toxic effects on the nervous system (peripheral) and the reproductive system for both males and females.</td>
</tr>
<tr>
<td>Mercury</td>
<td>Causes damage to the central and peripheral nervous systems as well as the fetus.</td>
</tr>
<tr>
<td>Cadmium</td>
<td>Long term poison to the human body especially the kidneys.</td>
</tr>
</tbody>
</table>

All credit for the table above is given to: (http://www.ncbi.nlm.gov)

Part Two: Service Projects

Raising Community Awareness:

In order to make the largest impact on the problem at hand, the general public needs to be informed on the matter so they can be involved in its solution. As such, we decided to establish a petition on Petition.org as a means to expose others to the hazards of E-waste dumping. This page briefly describes the current problem revolving around electronic waste and allows for people to show their support by signing the petition electronically.

Currently, the petition page has only a few members who are a part of the group. However, it is growing and more people are being exposed to the idea of recycling their electronic equipment. This will hopefully lead to the proper recycling of the group members’ e-waste, which in turn, will lead government officials to enact a mandatory recycling law. Unfortunately, it is too early to tell the actual impact this page is having on the problem, but at least people are being exposed to the fact that there is a problem at all.


“This petition is important and everyone should sign it because Electronic Waste is becoming such a huge problem in Ghana where e-waste is being dumped without limit. People there are developing all types of illnesses such as respiratory, development issues, reproductive issues, including death. Everyday they are breathing in toxins that are found in the electronics. All the electronics contain numerous amounts of lead and cadmium, which are highly toxic to the human body. So I ask you to please take a moment to read this and while reading this keep in mind the people that are suffering everyday from the excessive dumping of electronics on their land.”

Contacting the WHO:

We thought the most appropriate approach to the problem on an international scale would be to contact a major organization to see what was being done to help prevent and ultimately stop the dumping of electronic waste in developing nations. This being the case, we determined that the
World Health Organization (WHO) would be the best contact seeing as how they are responsible for determining if a scenario is deemed to be hazardous to the health of those involved and e-waste is more than responsible for its fair share of health concerns with the releasing of toxic chemicals and heavy metals into the environment.

We received emails back from the WHO regarding the situation, however due to their in-house terms and policies we are unable to share this information at the moment since it would be in direct violation of said policies and legal troubles would arise for the group.

**Contacting a Political Power:**

The last approach we decided to take was to contact a U.S. congressman to try and motivate them to support a bill that would make e-waste dumping illegal for the United States to take part in. We decided to contact Senator Sherrod Brown of Ohio because in 2011 he had proposed the “Responsible Electronics Recycling Act of 2011.” This bill would have made it illegal for the U.S. to ship their unwanted electronic waste to developing nations as well as specifically determine which materials would be marked as “hazardous” or “toxic” e-waste. Unfortunately this bill failed to pass the committee to which it was sent. However, with the growing amount of e-waste year by year legislation needs to be passed to enforce the proper recycling protocols. The following amendment is also to be added to the bill as well.

**Amendment:** The federal government is responsible for the development and funding of proper electronic recycling plants which are to be located in every state by 2015, and every county by 2020 so as to guarantee to the public access to such facilities.

**Letter to Senator Brown:**

To Senator Sherrod Brown:

Good day Senator Brown. My name is Kevin McDonough and I am writing you to discuss the very real issue of pollution. However, I am not just talking about any pollution but rather a very specific kind of pollution. I am talking about electronic waste, which consists of all old and outdated electronic technology that has been thrown in the garbage to sit in landfills as I am sure you are aware. These items include televisions, cell phones, video game consoles, faxing machines, printers, copiers, as well as other items. Since technology is increasing at an amazing rate, these items are becoming obsolete much more quickly than in previous years leading to much higher levels of electronic waste which needs to be disposed. This only helps to increase the problem at hand.

Most of this electronic waste does not sit in landfills in developed nations however. Instead, companies will sell the garbage to developing nations whom simply dump the waste in uncontrolled landfills. This electronic waste is then burned and scavenged through to obtain the small amounts of metals inside the equipment which can then be recycled for a small nominal reward. Unfortunately, the process through which these people attempt to obtain the recyclable material releases large amounts of toxic chemicals as well as heavy metals into the surrounding environment. This does lasting damage to the soil seeing as the large quantities of pollutants
alter the composition and fertility of the ground. Over time, humans also suffer from the pollutants, complaining of respiratory problems, neurological problems, and similarly to the soil, infertility.

The only way to prevent these events from occurring is to establish a law in developed nations such as the United States that would require the citizens of this nation to follow recycling protocols regarding electronic waste. This is specifically done by taking it to a facility that will properly dispose of the electronic equipment instead of merely shipping it to other countries. This legislation would strongly resemble “The Responsible Electronic Recycling Act” that you were involved with in 2011. With the presence of this law, the recycling of electronics would become mandatory and so the necessity to dump the unwanted electronic waste in developing nations would disappear. This would help to both create jobs in the United States by hiring people to work the facilities which are deemed capable to handling the recycling process as well as stop the severely detrimental effects that the accepting developing nations are experiencing. We have also started a petition on change.org regarding the need for legislation for the recycling of e-waste material.

Since we live in a world that is only growing technologically, the problem of e-waste must be handled as soon as possible before this new wave of technology becomes obsolete and the problem doubles or even triples in just a few short years. It is up to people like you Senator Brown to get a bill passed and enforced requiring that electronics be recycled otherwise it won’t be long before our own landfills will be swimming with toxic electronic waste.

Sincerely,
Kevin McDonough, Rutgers University

The letter below was sent to:
Sen. Frank Lautenberg, NJ; Sen. Robert Menendez, NJ; Rep. Gene Green, TX; Rep. Mike Thompson, CA; Rep. Chris Ross, PA

In today’s advanced world, everyday people are buying electronic equipment to meet their needs. More and more computers, televisions, video game consoles, and cell phones are being distributed throughout the general public of developed nations. With the purchase of new electronics, most people stop using their old devices and simply toss them in the trash. This leads to massive amounts of e-waste being produced, over 25 million units, with only less than 20% of that being recycled (1). This means that at least 20 million units are trashed. These units are usually illegally exported to developing nations under the false impression that they are for educational and medical use but instead are dumped in the surrounding areas. It is here that people attempt to remove recyclable material such as copper and gold in order to sell them for money. This is accomplished by burning the equipment’s plastic frames and wiring to expose the precious metal (2).

While this process allows for the successful removal of the desired metals, it is an incredibly detrimental process. The burning of the outer shells of the electronics produces a number of toxic organic chemicals that enter into the soil and the atmosphere leading to high levels of
pollution. They also enter the bodies through the inhalation of the smoke produced from the fires. In addition to organic toxic chemicals being introduced into the environment, a number of heavy metals also find their way into the immediate vicinity by leaching out of the equipment and filtering into the soil. In some illegal dumping areas, such as the Agbogbloshie Market found in Ghana, the soil was contaminated so much so that the levels of heavy metals in the soil exceeded 100 times the normal levels found in uncontaminated soils. These heavy metals include copper, zinc, tin, and lead. Other metals, such as antimony, were found to be as elevated rates as high as fifty times normal concentrations. Other metals were found to be present in samples at roughly five times or less the normal soil concentrations, such as cadmium (3).

These pollutants exist at exceedingly high levels in the dumping grounds. Due to the constant exposure to these pollutants, the people in the general area suffer some serious health effects. These health effects vary but include issues involving the respiratory system, neurological symptoms and development, as well as reproduction (infertility). Sometimes the exposure is so severe that it can even result in death. Secondly, the ground and water also suffer from the massive amounts of toxins and metals present. The populations of plants, animals, and microorganisms all suffer due to their inability to exist in such polluted conditions. The groundwater becomes undrinkable as well as generally unusable (for living reasons) because of the negative health impacts that would occur if one were to consume the contaminated waters (4).

One would think that with these major detrimental effects related to the disposal of electronic waste that more legislation would have been passed to regulate it. The current regulations that exist are due to the passage of the Basel Convention Treaty. This treaty makes it so that any of the signing 187 member nations can declare it illegal to import any electronic waste into their country. By doing so, this makes it illegal for the other 186 nations to export electronic waste to said country or move the waste under false claims of use. The punishment of such an action is stated as only that the two parties involved become jointly responsible for the appropriate disposal of the electronic waste (5). With such minor repercussions for their actions as well as low regulation of the treaty to begin with, it is easy to see why illegal dumping has become such a major issue.

In order to regain control over the problems associated with e-waste, additional national legislation needs to be passed in the United States. This bill should resemble the previously proposed “Responsible Electronic Recycling Act” that was proposed in 2011 but failed to pass committee. Similar to the original bill, this bill needs to establish the illegality of shipping toxic and hazardous electronic waste to developing nations that are unable to properly recycle and dispose of the material. Also like the original, the legislation should require the EPA to create a list of certified materials that must be properly recycled in order to prevent their toxic compounds and metals from being released into the environment. Again as the original plan put forth, there must be some kind of punishment for those that do not follow the correct protocol when it comes to recycling the hazardous material. This must be harsher than the current one listed in the Basel Convention. Lastly, as an amendment to the previous bill proposed, mandatory facilities should be established in every state, preferably every county, so that the general public also has the ability to the correctly recycling their individual electronic waste (6). This will ensure that the out-of-date technology is being handled and dismantled
appropriately while still in the United States, preventing electronic waste from accruing and needing to be shipped elsewhere for disposal. With this approach, the developing nations will not have tons upon tons of harmful materials to handle, and the pollution associated with the electronic waste will not be able to enter into the environment to begin with. This will save lives, improve living conditions, as well as prevent further environmental degradation. The vast majority of electronic waste comes from first-world developed nations such as the United States. It is only right and fair to be responsible for ourselves and our own waste instead of simply dumping it in a place we cannot see and harming others while doing so.

References cited in letter

Generic Letter To the Rest of the Senate: http://www.senate.gov/senators/contact/

To Senator ______,

Good day Senator ______. My name is Kevin McDonough and I am writing you to discuss the very real issue of pollution. However, I am not just talking about any pollution but rather a very specific kind of pollution. I am talking about electronic waste, more commonly referred to E-waste, which consists of all old and outdated electronic technology that has been throw in the garbage to sit in landfills. These items include televisions, cell phones, video game consoles, faxing machines, printers, copiers, as well as other items. Since technology is increasing at an amazing rate, these items are becoming obsolete much more quickly than in previous years leading to much higher levels of electronic waste which needs to be disposed. This only helps to increase the problem at hand.

Most of this electronic waste does not sit in landfills in developed nations however. Instead, companies will sell the garbage to developing nations whom simply dump the waste in uncontrolled landfills. This electronic waste is then burned and scavenged through to obtain the small amounts of metals inside the equipment which can then be recycled for a small nominal reward. Unfortunately, the process through which these people attempt to obtain the recyclable material releases large amounts of toxic chemicals as well as heavy metals into the surrounding environment. This does lasting damage to the soil seeing as the large quantities of pollutants
alter the composition and fertility of the ground. Over time, humans also suffer from the pollutants, complaining of respiratory problems, neurological problems, and similarly to the soil, infertility.

The only way to prevent these events from occurring is to establish a law in developed nations such as the United States that would require the citizens of this nation to follow recycling protocols regarding electronic waste. This is specifically done by taking it to a facility that will properly dispose of the electronic equipment instead of merely shipping it to other countries. This legislation would strongly resemble “The Responsible Electronic Recycling Act” that was proposed in 2011. With the presence of this law, the recycling of electronics would become mandatory and so the necessity to dump the unwanted electronic waste in developing nations would disappear. This would help to both create jobs in the United States by hiring people to work the facilities which are deemed capable to handling the recycling process as well as stop the severely detrimental effects that the accepting developing nations are experiencing. We have also started a petition on change.org regarding the need for legislation for the recycling of e-waste material.

Since we live in a world that is only growing technologically, the problem of e-waste must be handled as soon as possible before this new wave of technology becomes obsolete and the problem doubles or even triples in just a few short years. It is up to people like you Senator _____ to get a bill passed and enforced requiring that electronics be recycled otherwise it won’t be long before our own landfills will be swimming with toxic electronic waste.

Sincerely,
Kevin McDonough, Rutgers University

Resources:

1. http://ban.org/about_basel_conv/treaty_text.html
2. http://www.guardian.co.uk/environment/2008/may/06/waste.pollution

Letter to Editor:
Sent to World WHO ORGANIZATION:

WHO Regional Office for the Americas
Washington D.C., USA
Donna Eberwine-Villagran
E-mail: eberwind@paho.org
Sonia Mey-Schmidt
E-mail: maysonia@paho.org

April 08, 2013

To whom it may concern,

Electronics are important in today’s society as everyone uses them. The problem with them is the improper disposal. Many have an idea that electronics are sent to a place where they are properly disposed and recycled and some are, but what they do not know is that many of these electronics are dumped in countries like Ghana and throughout Africa. Tons and tons of electronics are dumped in these dumping sites causing people to develop all types of illnesses from respiratory problems, neurological problems, cancer, and even death. What I ask is to please help spread the word and make people aware that just because we do not see electronics dumped in front of our eyes does not mean that it is like that throughout the world. Citizens in Africa are struggling every day to survive because every day they are breathing these harmful toxins from electronics that are released in the air. We can all help spread the word to stop the dumping of electronics in countries that do not have the power to fight back. I ask that awareness is spread to help make people aware that this is a problem. Having people aware of the disastrous effects that E-waste materials bring into our atmosphere we can help reduce them and the potential risks they bring to humans.

The laws concerning e-waste come forth from the Basal Convention, an agreement of which 178 countries take part. The treaty says that countries have the right to refuse the importation of e-waste. It states “Parties exercising their right to prohibit the import of hazardous wastes or other wastes for disposal shall inform the other Parties of their decision” and “Parties shall prohibit the export of hazardous wastes and other wastes to the Parties which have prohibited the import of such wastes.” In other words, all lesser developed countries have the right to ban the import of e-waste, and as such, any African country can say no to the import of e-waste. We need to understand why certain countries are willing to take e-waste that is recyclable.

Thank you,
Liljana Kushi, Rem Koch, and Kevin McDonough

Letter to the Editor (KM): Targum Newspaper

To Whom It May Concern,

In today’s modern world, technology surrounds us every second of every day. We are constantly having interactions with all sorts of electronic devices that make our days more productive and
more enjoyable. These devices include televisions, cell phones, computers, video games, etc. In the U.S. alone, there are over 300 million people. Now consider how many of these people own cell phones, televisions, computers. The number of electronic devices is staggering.

Now consider how every new piece of technology makes the former versions obsolete. Newer, faster computers replace older, slower ones. High definition, flat-screens, and plasma televisions are replacing their older boxier predecessors. New video game systems with better graphics and games replace the less impressive older consoles. With each of the newer technologies ultimately comes the electronic waste of the older technologies. Tons upon tons of e-waste is produced annually with signs on showing increases in the amount of electronics being produced and thus waste being produced.

The problem that arises is the removal and disposal of these older, old-of-date devices. A majority of the general public just tosses them in the trash to be taken to landfills and dumps instead of being properly recycled. This e-waste is then collected and shipped to developing nations where it is dumped without regard to the environment or the people living there. These people are exposed to a number of hazardous chemicals and heavy metals from this electronic waste. This exposure to high levels of pollutants has adverse health effects on these unsuspecting victims. With incredibly high levels of mercury, cadmium, lead, as well as organic chemicals, the organs of these people have a major toll taken on them leading to general health problems from respiratory difficulties, neurological impairments, and infertility.

How can we as humans allow for this injustice to occur? The people that are being exposed to these terrible health conditions and electronic waste aren’t even the ones who are using the technology. Instead it is the developed world merely throwing their unwanted trash and remains on top of undeveloped nations for a small nominal fee. We think “Out of Sight, Out of Mind” but we can no longer allow for this to be our mindset. Instead we have to take responsibility for our actions and our waste.

It isn’t hard to do a quick Google search to find the nearest facility that would happily recycle your old and undesired electronics. It isn’t hard to take a few minutes to drive to said facility to have your old computers and cell phones taken care of properly. It isn’t hard to be aware of the damage caused to others by disregarding the dangers of just throwing out one’s old devices. But it is hard to clean up massive landfills piled with e-waste and return it to its original condition. It is hard to return someone’s health to normal after being exposed to dangerously high levels of toxins. It is hard to deal with pollutants once they are already in the environment.

Just be smart. Be responsible. Be aware. Recycle your old electronics. Otherwise, the movie Wall-E may be a little more accurate of a future than we would hope.

Sincerely,
Kevin McDonough
SEBS senior, Biological Sciences