THE EFFECT OF POOR ACCESS TO WATER, SANITATION AND HYGIENE ON HEALTH: A STUDY OF AGBOBLOSHIE (SODOM AND GOMORRAH) A SUBURB OF ACCRA, GHANA AND OTHER SLUMS

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ABSTRACT:

AIM: The aim of the study seeks to investigate the effect of poor accessibility to water, sanitation and hygiene on health of the people living in Agbogbloshie (Sodom and Gomorrah) a suburb of Accra, Ghana and other slums in the world at large.

BACKGROUND: The rapid increase in rural-urban migration has contributed immensely to the rise of slum dwellers in most cities and towns. These slums lack social amenities such as good source of water, sanitation and proper hygiene and this is having significant effects on health in many countries.

METHODS: The method is a descriptive literature review with inductive content analysis. Database searches in EBSCO Academic Search Premier and Elite, PubMed, Google Scholar and Science Direct. Finally fifteen articles were chosen and analyzed. The analysis resulted in five key components that were discussed.

FINDINGS: Poor access to water, sanitation and hygiene among the slum dwellers are cause by the factors such as uneducated, unemployment, poverty, improper sewage system management and poor housing policies. These bring about associated health risks such as diarrhea and cholera. The interventions such as implementation of MDG – Goals, IBM-WASH were proposed by agencies as a way of reducing these health risks and also eradicating the formation of slums.

CONCLUSIONS: Although poor access to water, sanitation and hygiene has significant effect on health in slum dwelling areas, governments all over the world are doing their best through the interventions provided by the United Nations to prevent the health effects of the slums.
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FOREWORD

The research was conducted to investigate on effect of poor accessibility to water, sanitation and hygiene as a huge challenge to the health of people living in Agbogbloshie (Sodom and Gomorrah) a suburb of Accra, Ghana and other slums in the world at large.

I would like to use this opportunity to express my appreciation to the Almighty God for seeing me successfully through this study. The jo study was not easy however the hope and strength of God kept me focus to over come all the challenges.

I am thankful to my supervisor Gun-Britt Lejonquist of Arcada and Marketta Fredriksson of Diak for their time, excellent guidance and support during this process. It is your exceptional cooperation that enables me to conduct this thesis work and I appreciate it.

I acknowledge the support and encouragement from my lovely husband Peter Borketey, my cousins, Alex Asiedu Okyere, Daniel Sasu Ameyaw, Godwin and Victoria Gyan, Frank Nyarko, Florence Atuah, Children: Jeremiah, Joshua John and other family members which I cannot mention their names one after the other. Your wise counsel and kind words really push me during these difficult periods. I am very grateful and proud of you all. May God bless you!

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Helsinki, December 2017.

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1: INTRODUCTION AND BACKGROUND

Ghana has enormous success delivering access to improved water sources to eighty percent of the population there by eliminating diseases such as Guinea worm which has affected many people as a result of poor water facilities from the country. However, notwithstanding these successes, an estimation of around four thousand Ghanaian children die each year from diarrhea, similarly more die also from pneumonia and about twenty three percent of Ghanaian children are affected from stunting growth which is a chronic malnutrition accredited to poor water, sanitation and hygiene (Grant 2006).

In Ghana, about five million people still use water from unsafe sources that makes them contract the diseases mentioned above. This predominantly occurs in dwellings where people are poor and cannot afford good and safe drinking water - such as slum areas (Grant 2006).

Though about eighty percent of Ghanaians have accessibility to drinking water, only thirteen percent is reflected in improved sanitation and hygiene. A highest number of the people in the rural areas depend on unsafe water sources thus resulting in diseases as a consequence of the contaminated water. Diarrhea being one of the highest recorded diseases causes twenty five percent infant mortality (Water Org 2016). Accessibility to good water, sanitation and hygiene is an essential tool for reducing infant mortality rate and promoting effectual healthy children and community (Mafuta et al. 2011).

Communicable diseases most regularly affect communities with unsafe drinking-water supplies, poor sanitation and hygiene. It is anticipated that there are between one to four million cases of cholera, furthermore twenty eight thousand to one hundred and forty two thousand deaths each year (Unicef 2014).

Due to this situation, the World Health Organization (WHO) supports technical risk assessments and solutions to improve water quality and its related risks as well as sanitation and hygiene practices in cholera hot spot communities during outbreaks (WHO 2010).

Good access to water, sanitation and hygiene has a straight bearing to the common health status of people in a country. Also access to water progresses the sanitary and
The hygienic condition of a community as well as the entire populaces living in the country. Provision of adequate accessibility to safe or clean drinking water, sanitation and hygiene infrastructures is still a challenge to global health in both developed and developing countries (Appadurai 2001).

The earlier study conducted by (Awuah et al. 2008) shows that Ghana faces severe challenges in delivering adequate water, sanitation and hygiene for its citizens especially those in the rural areas. The Ghana Water Company and other institutions in charge of water, sanitation and hygiene are not able to solve these challenges due to finance and logistics.

The speedy increase in rural-urban migration has contributed enormously to the growth of slum dwellers in most cities and towns, pursuing for greener pastures. As a slum area, lack of social amenities, deprived health facilities, economic and social difficulties are its characteristics. The inhabitants have ineffective quality life and are prone to numerous health hazards (Braimah 2002).

From a United Nation Agency in charge of habitat, a slum is outlined as a neglected portion of a city where a lot of people live; however, the place is deprived of decent housing and important social infrastructures. The people leaving in slums are predominantly poor and lack behind in virtually all aspects of life. The living standard in either form whether education, health, access to good drinking water and food, good employment and regular income are extremely poor and immeasurable (UN-Habitat 2003).

Figure 1: A graph showing urbanization trends and estimates in major regions of the world (in % from 1950 to 2050)

Source: UN-DESA (2010;2011)- Water, Sanitation and Urbanization
According to UN-Habitat (2011), a whooping of about thirty eighty percent of the population in Accra which is the capital city of Ghana, live in slums. A further research conducted by UN-Habitat in 2011 which aim at slum improvement and prevention finished in October the same year brought out the fact that seventy eight slums settlement exist in the greater Accra Metropolitan area of which Agbogbloshie (Sodom and Gomorrah) is known as the biggest with every kind of dilapidated health and social challenges. The population is close to eighty thousand people (Housing the Masses 2010).

Figure 2: A picture showing Agbogbloshie (Sodom and Gomorrah) a suburb of Accra, Ghana


The prevailing water, sanitation and hygiene status of the Ghanaian environment has not been the best. Although there has been formulation of policies by the government and other supporting organizations regarding water, sanitation and hygiene – implementing the policies have proven very difficult (Aboh et al. 2013).

Again, a study conducted by (Owusu et al. 2016) on “Access to health in city slum dwellers: The case of Sodom and Gomorrah in Accra, Ghana” describes the condition of the inhabitants living in slum area who are mostly from diverse ethnic background, economically handicapped, mostly uneducated and by estimate are usually unemployed or undertaking very menial jobs with little income. Like all other slum settlement, Sodom and Gomorrah is over populated, lack good and safe drinking water, sanitation and hygiene condition and also there is no proper infrastructure.
Agbogbloshie (Sodom and Gomorrah) is a recognized dumping site for digital products exported from foreign countries. As a result there are millions of waste electronic parts dumped at the area. Several of these products are also processed in a crude way causing pollution and degradation of the settlement making the place insecure to live in terms of health (Parkinson 2003). The place is bereaved of power, effective sewage system and good running water making it exposed to diseases like diarrhea and other infectious diseases. Fire out break and flooding are common human disasters that can be experienced in the area (Braimah 2002).

Many slums are illegal settlement (squatter settlements or shanty towns), which came into existence as a consequence of different economic and social factors with the central one being rapid urbanization. There is no proper planning causing indiscriminate building of houses, poor layout for movement and other future projects. This creates difficulty for future expansion of infrastructure and other developmental projects (Corcoran et al. 2010).

This setback is a factor of challenges confronting the provision of water, sanitation and hygiene services. Sometimes, due to legal reasons, there is a ban on the provision of water and other utilities to these areas since it is regarded as illegal settlement. In some cases, institutions providing utilities are not allowed to expand their services to illegal settlements with the intention of making the settlers to vacate (Sheuya 2008).

The slow pace of development in the rural areas causes rapid rural-urban migration in developing countries. These lead to rise in slums settlement by migrants from the rural areas to the urban cities in searching for greener pastures and better way of leaving only to end up living in slums and deprived conditions (Chocat 2002).

The lower standard of living among the settlers in slums is as a result of not being able to acquire the basic needs of life. This is caused by lack of money to access these basic needs or non-existing in the settlement thus not able to afford the cost of food, water, good housing, and other amenities because money is involved. These people are con-
stantly neglected and vulnerable to all sorts of vices and evil in the society (Birch et al. 2012).

Although slums are close to the City and may be even nearer to a hospital or health system, due to the level of poverty, the dwellers are not able to get all the necessary health aids and support. The overcrowding, poor housing, dirt and poor sanitation and other unhygienic practices, cause high rate of spreading infectious diseases consequently increasing infant mortality rate and maternal complication (Kimani and Ngindu 2007). The lack of good access to water, poor sanitation and unhygienic way of living is a typical characteristic of living in slums areas. The government often abandoned the place; as such there are no plans of developmental projects for the area. Epidemic diseases such as cholera and diarrhea are therefore rampant in these areas (Dagdeviren and Robertson 2011).
2. AGBOGBLOSHE (SODOM AND GOMORRAH)

Agbogbloshie is one of the oldest places in ethnic Accra. The real name is ‘Agbloshie’ which translates as “under Agblo”. Agblo is the name of a river deity that runs through the railway community in Agbogbloshie into the Odor River and flows to the Korle Lagoon. It is a wetland and mushy area due to its network of rivers running into the Korle Lagoon. The place was not a settlement, and was never intended to be since it was a shrine of the river deity, ‘Agblo’. Before colonialism, warriors from the Ga traditional area in Accra were fortified at the river, and seek the support of Agblo in the wars they were embarking on (Safo 2011).

Agbogbloshie is situated on the banks of the Korle Lagoon, northwest of Accra's Central Business District. Roughly 200,000 Ghanaians who inhabit the area are mostly migrants from rural areas. Due to its harsh living conditions and rampant crime, the area is nicknamed "Sodom and Gomorrah"(Afenah 2011).

Figure 3. Area map of Agbogbloshie (Sodom and Gomorrah), Accra

Source: Aerial outlook of Agbogbloshie (Sodom and Gomorrah) designated as “Slum” (Schluep 2011)

In the 1960s, the slum area of Agbogbloshie was a wetland. As the city of Accra urbanized, a ghetto grew referred to as Fadama, which means Agbogbloshie in Hausa Language. People started settling in the area during the colonial era, with the Hausa traders being the first settlers in the Fadama (Agbogbloshie), This was followed by the Railway community, which predominantly homed the rail line workers (Hugo 2011).
Currently, the place is home to about 200,000 people in three neighborhoods, the biggest foodstuffs and vegetables market, electronic waste scraps market, and a part of the south industrial area. It serves as a very strategic economic hub for Ghana, with all the yams exported to Europe coming from there. The steel industry in Ghana also depends on Agbogbloshie scrap electronic waste market for their raw materials. (Hugo 2011). The geographical location of Agbogbloshie (Sodom and Gomorrah) is shown in the map below.

2.1 ESTABLISHMENT FACTORS OF SODOM AND GOMORAH

There are many factors that had lead to the establishment of Agbobloshie popularly known as Sodom and Gomorrah and these had been categorized as political, economical, technological and environmental factors among others:

Political Factors: The primary cause of the inter-ethnic warfare among a number of Northern societies is over important resources, such as land (Pul 2003). While the period from pre-colonial through colonial to 1980 was relatively peaceful, there was definitely dissatisfaction at various points due largely to controversial colonial land policies which did not take into consideration ethnic diversities (Assefa 2001).

According to Jönsson (2007), efforts to resolve the controversies however created their own as the Alhassan Committee was perceived by the Konkomba to have failed to deliver justice to all parties. The Konkomba were inclined to fight because, perhaps they had been rendered a people without land in the Northern Region a few years ago by the Alhassan Committee.

They had been regarded as such in the past, which accounted for their payment of tribute anywhere they lived in any of the centralized states of Dagbon, Mamprugu, Nanun and Gonja in the northern region of Ghana (Kirby 2003). Land became an important fact for its direct links to Konkomba identity and sovereignty. The denial of such as perceived by the Konkomba of the Alhassan report propelled the bitterness that led to the outburst of 1981 (Bacho 2005).

This clash between the two fashions extended to the capital city of Ghana. A clash of Kokomba and Nanumba traders at the Yam market in Accra in 1980 made the Limann
administration the then president of Ghana decided to temporary settle the Kokomba faction at Old Fadama (present day Sodom and Gomorrah) to pave way for government to look into the issues which brought about the war and resettle them. This lead to the development of a ghetto in Agbogbloshie (Sodom and Gomorrah) in Accra (Skalník 1986)

**Economic Factors:** Approximately 50,000 low-income inhabitants have settled into Sodom and Gomorrah, from across Ghana (Greenpeace International 2008). Many of the villagers find themselves trapped in the vicious cycle of poverty, where the old and young toil side by side. Many barely make enough money from a day's work to cover a basic meal (Dogbevi 2010).

The local economy of Agbogbloshie is based on an onion market-serving immigrants to Accra from the greater Tamale Region (Dagbani) in the north. Unemployed immigrants turned to scrap metal collection, including auto scrap, to supplement incomes (Monbiot 2009). Electronic scrap processing is a fairly small activity at the market. The claim that "hundreds of millions of tons of electronic waste are imported to the area each year" (Darko 2010)

Often the choice facing them is between paying for accommodation or food. Women and children cook circuit boards to salvage the computer chips, which have trace amounts of gold. Mostly the women, who cook motherboards and other circuitry each day, breathe in the poisonous fumes (Nuvor 2012).

**Technological Factors:** Sodom and Gomorrah has also become known as one of the world's digital dumping grounds, where millions of electronic waste products from the west are legally and illegally processed each year (Doctorow 2009). When old computers first began arriving in West Africa, Ghanaians thought they were sent to help bridge the digital divide, as exporters exploited loopholes by labeling junk computers 'donations'. But slowly tons of e-waste piled up on this once green area, and transformed it into a global graveyard for electronic equipment (Claiborne 2009).

Each day, workers clear the area through intense heat radiating from burning computers, iPods, radios and televisions. Acrid, black smoke drifts over the huts of the slum wasteland (Aboh et al. 2013). The nearby Korle-Bu River is now black and thick like used
oil, as it carries empty computer cases toward the ocean. Fires blaze consume the plastic material from cables, plugs and motherboards, leaving only metal behind. This is then collected and sold by the locals (Karikari et al. 2009).

The UN estimates that up to 50m tones of e-waste is thrown away globally each year. It costs a lot more to properly dispose of an old computer monitor in Germany than it does to send it on a container ship to Ghana (Caravanos et al. 2011). An international treaty called the Basel convention came into effect in 1989, forbidding developed nations from carrying out unauthorized dumping of e-waste in less developed countries. However, each month cargo containers still arrive in Agbogbloshie, often illegally, from countries all over the world (Caravanos et al. 2013).

**Environmental Factors (Locality):** The slum is located in the heart of the city, to the northwest of the Central Business District, and hosts a mix of informal residential and commercial structures, with many hawker and niche food markets and small businesses (Boadi and Kuutunen 2002). An estimated ten thousand local residents earn their living from business activities within the slum. The settlement grew significantly throughout the 1990s when it became a popular area for housing and work activities for many Ghanaians due to its low-cost rent, close proximity to the city center and central markets that provide ample income-generating opportunities (Appadurai 2001).

According to Ogbamey (2002), there are no permanent structures in Sodom and Gomorr- rah, and no planning permission is required to put up temporary structures, often made of wood or paper. There are no water or sewerage systems in the area. Present day Old Fadama is a high-density area primarily made up of self-built wooden kiosks and shacks that lack adequate water and sanitation facilities. Flooding is a frequent problem due to the area’s location between the Korle Lagoon and the Odaw River (Grant 2006).

Although the Accra Metropolitan Authorities (AMA) implicitly recognized the settlement by providing basic infrastructure and services in the 1990s, residents live in precarious living conditions and have been facing the threat of illegal forced eviction since 2002 when the AMA served them with eviction notices without providing alternative land or housing (Du 2005).
3 LITERATURE REVIEW OF OTHER SLUMS

A slum is a densely populated urban informal settlement characterized by inferior housing and squalor (UN-Habitat 2007), which vary in dimension and other characteristics (Lawrence 2007). Most slums lack consistent supply of clean water, sanitation services, safe hygiene, law enforcement, electricity and other basic services (UN-Habitat 2007). In the 18th to early 20th centuries, establishment of slums were common in the United States of America and Europe (Ashton 2006) and currently mostly found in urban regions of developing and undeveloped countries of the world (UN-Habitat 2007).

FIGURE 4: slum

According to UN-Habitat (2013), approximately 33% of the urban population in the developing world in 2012 lived in slums. The percentage of urban population living in slums was utmost in Sub-Saharan Africa (61.7%), next is South Asia (35%), Southeast Asia (31%), East Asia (28.2%), West Asia (24.6%), Oceania (24.1%), Latin America and the Caribbean (23.5%), and North Africa (13.3%) (UN-Habitat 2013).

Republic of Central African has the highest percentage of 95.9% residents living in slums as at the year 2009 in the world. However, between 1990 and 2010 the proportion of individuals living in slums declined, although the total urban population increased (UN-Habitat 2013). Neza-Chalco-Ixtapaluca is the world’s largest slum found in the State of Mexico (Davis 2006) and Kibera slum in Nairobi, Kenya, the second largest slum in Africa as well as the third largest in the world.
3.1 ESTABLISHMENT FACTORS OF OTHER SLUMS

Slums are established and developed in different parts of the world due to many diverse reasons (UN-Habitat 2007). Some causes include rapid rural-to-urban migration, urbanization, poor housing planning, colonialism and segregation, poor infrastructure, social exclusion and economic stagnation, politics, and others (Patton 1988).

**Rural–urban migration:** Rural–urban migration is one of the reasons attributed to the development and expansion of slums (UN-Habitat 2007). The world population has expanded at a greater rate since 1950. Many people migrated to urban areas mainly for better jobs, education and various income opportunities than subsistence farming in rural areas (Baker 2008). Migrants to Surabaya in Indonesia narrated that jobs were their main reason for moving to the city (Tjipoherijanto and Hasmi 2005). However, some rural migrants may not access jobs instantly due to lack of skills or the increasingly competitive job markets (Todaro 1969).

Many cities do not provide enough low-cost housing for migrant workers from rural areas. Therefore migrant from the rural areas cannot afford the price of renting in cities and finally settle down in only inexpensive slums (Craster 1944). Additionally, rural migrants primarily enticed by higher incomes continue to flood into capital towns thus increase the existing urban slums (Todaro 1969).

Social networks might also be used to explain rural–urban migration and migrants’ ultimate settlement in slums. Apart from migrants flooding the cities for jobs, a percentage of individuals migrate to cities because of their relationship with relatives or families. When their family support in urban areas lives in slums, those rural migrants intend also to live in slums (Ali and Kavita 2004).

**Urbanization:** The creation of slums is narrowly linked to urbanization (Firdaus 2012). The UN-Habitat mentioned that 43% of urban population in developing countries as well as 78% of people living in the least developed countries are slum dwellers (Bolay 2006). Rapid urbanization initiates economic growth that causes people to seek work and investment opportunities in urban localities (Patel and Burke 2009). When local governments are unable to manage urbanization, migrant workers end up dwelling in slum areas (Hammel1964: Clonts (1970). Some African governments neglected rapid
developing slums and demarcated the slum area as undeveloped lands (UN-Habitat 2003).

Another kind of urbanization does not include economic growth but rather economic stagnation, predominantly contributing to slum development in Sub-Saharan Africa and portions of Asia (Wekwete 2001). This kind of urbanization encompasses an excessive rate of unemployment, inconsistent urban planning policy and insufficient financial resources (Cheru 2005).

**Poor housing planning:** Lack of inexpensive low cost housing and poor planning pushes people to settle in slums. The Millennium Development Goals recommends that member countries should make a "significant improvement in the lives of at least 100 million slum dwellers" before 2020 (United Nations 2000). A sizeable number of slum dwellers indicate a deficiency in housing policy. When there is a significant gap on increasing demand for housing and also scarce supply of affordable housing, this gap is characteristically encountered in part by slums (Choguill 2007).

According to Walther (2015), insufficient financial resources and lack of coordination in government bureaucracy are the two leading causes of poor housing planning. Financial insufficiency in some government policies may clarify lack of affordable public housing for the poor, because any improvement of slums area and expansion of public housing programs increases government expenditure. Due to failure in coordination among different government bureaucracy in charge of economic development, urban planning, and land allocation leads to problems in poor housing planning (Walther 2015).

**Colonialism and segregation:** Urbanization brought by colonialism lead to the establishment of slums. Europeans arrival in Kenya in the nineteenth century created urban centers such as Nairobi primarily to serve their financial interests. Africans were considered as temporary migrants needed for supply of labor purposed (Obudho and Aduwo 1989)

Colonialists’ imposition of segregation policies also created slums like Dharavi slum of Mumbai – currently the largest slum in India (Sharma 2000). During apartheid period of South Africa, racial and ethnic group segregation was practiced where people of color
were relocated to the suburbs of the city (Beinart and Dubow 2013). Griffin and Ford (1980) explained that large slums commenced at the suburbs of segregation-awareness colonial city centers of Latin America. Also in United States ghettos was built and maintained by segregationist policies (Marcuse 2001: Bauman 1987).

**Poor infrastructure, social exclusion and economic stagnation:** According to Arimah (2010), cites poor infrastructure, social exclusion and economic stagnation as a cause for several slums in African cities. Poor infrastructure, social exclusion and economic stagnation force the poor to adapt to situations of living in slums (Silva and Wheelwright 2011).

Poor infrastructure, social exclusion and economic stagnation in a nation with an increasing population decrease per capita disposal income thus increasing urban and rural poverty. The growing poverty in rural areas also encourages movement to urban areas. An inadequately performing economy increases poverty and rural-urban migration, thus increasing slums (Kuiper and Van der Ree 2006).

**Politics:** National governments with political interests undermined efforts to eliminate or degrade as well as upgrade slums into improve housing options for the poor (Suttles 1970). Elimination and substitution of slum creates a conflict of interest, and politics is used as a means of preventing better housing projects in slum areas (Karanja and Makau 2010). Suttles (1970) asserts politics determines rural-urban migration and consequent settlement patterns.
4. THEORETICAL FRAMEWORK

This chapter of the research work deals with the two theoretical model chosen for the research. The Causality Model (Process Theory) and the WASH-Model. The Causality Model looks at the cause and effects of people moving from one place to the other which create problems in that area of geographical location whiles the WASH Theory – focuses on the health hazards that the people go through as they lived in filthy environment due to their behavior.

The two theories are elaborated below as the researcher also tries to find the relationship between them with the research work. Cause and effect most times transpires in the health sector and if caution is not taken it generates a whole lot of problems for the people living in the locality.

4.1 THE CAUSALITY MODEL (PROCESS THEORY)

Causality also denoted as causation, cause and effect is the agency that links one process (the cause) with another process (the effect). The first is comprehended to be partly responsible for the second, whiles the second is dependent on the first (Stock and Trebbi 2003). In general, a process has countless causes, which are thought to be causal factors and all depend on its past. An effect could be another cause of many other effects. Causality in general accepted to be temporally bound - causes always precede their dependent effects (Heckman 2008).

According to Heckman J. (2008), causality is an abstraction that signifies how the world progresses. The concept is more than a basic therefore it is appropriate to explain as the concepts of progression. The concept is like those of agency and efficacy. For this purpose, a leap of perception may be required to grasp it. Hence, causality is developed into the conceptual structure of ordinary language (Copley 2015).

There are some theorists who are interested in differentiating between causal processes and non-causal processes (Salmon 1984). These theorists frequently want to distinguish between a process and a pseudo-process. An example, a ball moving through the air (a process) is compared with the movement of a shadow (a pseudo-process). The former (process) is causal in nature while the latter (a pseudo-process) is not (Salmon 1984).
In another illustration by Salmon (1984), causal processes can be classified by their ability to transfer an alteration throughout space and time. For an example, an alteration of the ball mark by a pen is transported with it as the ball shots through the air. However, an alteration of the shadow will not be transferred by the shadow as it moves along.

These theorists claim that, the essential concept for understanding causality is not causal relationships, but rather recognizing causal processes. The previous philosophies can then be defined in terms of causal processes (Woodward 2003).

**FIGURE 5. The process theory**

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>CAUSE</th>
<th>EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political, urbanization, etc.</td>
<td>Slums</td>
<td>Access to poor water, sanitation and hygiene</td>
</tr>
</tbody>
</table>

*Source: Adapted from an Ishikawa diagram: [www.wikipedia.org/wiki/Ishikawa_diagram](http://www.wikipedia.org/wiki/Ishikawa_diagram)*

### 4.2 THE IBM- WASH THEORY

The Integrated Behavioral Model for Water, Sanitation, and Hygiene (IBM-WASH) is a synthesis which occurs as evidence base that takes the method of a matrix with three dimensions (columns) and five levels (rows), coherent with the matrices of ecological frameworks (Bandura 1989).
Table 1: The Integrated Behavioral Model for Water, Sanitation, and Hygiene (IBM-WASH)

<table>
<thead>
<tr>
<th>Levels</th>
<th>Contextual factors</th>
<th>Psychosocial factors</th>
<th>Technology factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Societal/Structural</strong></td>
<td>Policy and regulations, climate and geography</td>
<td>Leadership/advocacy, cultural identity</td>
<td>Manufacturing, financing, and distribution of the product; current and past national policies and promotion of products</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Access to markets, access to resources, built and physical environment</td>
<td>Shared values, collective efficacy, social integration, stigma</td>
<td>Location, access, availability, individual vs. collective ownership/access, and maintenance of the product</td>
</tr>
<tr>
<td><strong>Interpersonal/Household</strong></td>
<td>Roles and responsibilities, household structure, division of labour, available space</td>
<td>Injunctive norms, descriptive norms, aspirations, shame, nurture</td>
<td>Sharing of access to product, modelling/demonstration of use of product</td>
</tr>
<tr>
<td><strong>Individual</strong></td>
<td>Wealth, age, education, gender, livelihoods/employment</td>
<td>Self-efficacy, knowledge, disgust, perceived threat</td>
<td>Perceived cost, value, convenience, and other strengths and weaknesses of the product</td>
</tr>
<tr>
<td><strong>Habitual</strong></td>
<td>Favorable environment for habit formation, opportunity for and barriers to repetition of behavior</td>
<td>Existing water and sanitation habits, outcome expectations</td>
<td>Ease/Effectiveness of routine use of product</td>
</tr>
</tbody>
</table>

Source: https://www.researchgate.net/figure/

The framework has three interconnecting dimensions that effect WASH-behaviors: the contextual dimension, psychosocial dimension, and the technological dimension (Bandura 1989).

The Contextual Dimension includes determinants related to the individual environment that can influence behaviour change and adoption of new technologies. The Psychosocial Dimension comprises the behavioral and psychological determinants that influence behavioral outcomes and technology adoption. The Technological Dimension comprises the specific attributes of the adoption and sustainability of its product usefulness. The three interacting dimensions includes factors such as laws and policies; climate, geogra-
4.3 THEORETICAL RELATIONSHIP WITH RESEARCH

The causality of access to poor water, sanitation and hygiene on health among slum dwellers did not come overnight but started as a result of a process. The researcher through the Causality Model using the process theory explained the processes of cause and effect. The Process Theory describes how things happened as a result of movement of people from one place to the other which leads to problems in that new locality, for instance the factors attributed to establishment of both Sodom and Gomorrah and other slum areas confirmed these problems the migrants of rural-urban create in their new geographical locations.

On the other hand, the IBM-WASH Theory focuses on the health hazards that the people experienced as they lived in filthy environment of the new locality. This theory looked at some determinants that when implemented will helped the inhabitants to limit the problems that cause the health effect.

In relating the two theoretical frameworks with the thesis topic, shows how human processes and behaviors had caused access to poor water, sanitation and hygiene on health in Agbogbloshie a slum in Ghana in relation to other slums of the world.
5. AIM, OBJECTIVES AND RESEARCH QUESTIONS

The aim of the study seeks to investigate the effect of poor accessibility to water, sanitation and hygiene on health of the people living in Agbogbloshie (Sodom and Gomorrah) a suburb of Accra, Ghana and other slums in the world at large. The paper attempts to provide suggestions on how the impact of poor access to water, sanitation and hygiene can be control in slums to eliminate health hazards affecting the people.

The following objectives were considered:

The thesis tries to explore and obtain deeper understanding of the measures to improve better accessibilities to water, sanitation and hygiene on the people living in Agbogbloshie (Sodom and Gomorrah) and other slum settlements.

To investigate how the emergence of slum affect water, sanitation and hygiene on health of inhabitants in an urban area of Accra as well as other sums.

It further seeks to create the understanding and awareness of the implementation of interventions and strategies in order to reduce preventable deaths (mortality and morbidity), which work against achieving good health and wellbeing.

The research question to be focused on:

What are the effect of poor accessibility to water, sanitation and hygiene on the health of the people of Agbogbloshie (Sodom and Gomorrah) a suburb in Accra in Ghana and other slums in the world?

What are the necessary interventions required to mitigate the effect of poor access to water, sanitation and hygiene on health of inhabitants in Agbogbloshie of Accra as well as other sums?
6. METHODOLOGY

This chapter introduces the type of methodology that is used by the researcher for this thesis work. The researcher accepted a qualitative method with a descriptive literature review, under which literatures will be reviewed systematically. This type of research uses the evidence-based method for the data (Kangasniemi et al. 2013).

A qualitative research method conveys by identifying the arrangements of different ideas and opinions, thus exposing the core of the problem out (Wyse 2011). This method suggests information based on the literatures accepted for study by gathering collective knowledge of the phenomenon (Northhouse 2010). It further offers understanding within empiric findings ((Krippendorff 2004; Patton 2002).

According to Comerasamy H. (2012), qualitative literature review based methodology is described as the preparation of a research work where literatures of different authors in the field of the study are completely used. In this respect, the sampling, data collection, data analysis and ethical consideration in the study are centered on the literatures gathered. Qualitative research methodology also includes systematic, explicit and reproducible method for labeling, evaluating and synthesizing the existing body of completed record work produced by other researchers, scholars and professionals (Fink 2005).

This study employs the methodology that is descriptive literature review principles in data collection from electronic database with restriction as well as comprehensive description of research process (Flinkman and Salanterä 2015). The systematic literature review inclusion criteria clarify the articles relevancy whereas the descriptive nature clarifies the chosen article’s values and roles as reflecting on the research questions available (Flinkman and Salanterä 2015).

The procedure of the descriptive method consents for modification and various settings of search words that are significance for the research questions (Kangasniemi et al. 2013). The underlying reason of choosing qualitative method by using a descriptive literature review is to discover components from the empirical data, that have a systematical approach, sampling of data into professional context and terminology. This method assists to develop understanding of the ideas, point of views and motivations in the use of a particular theory (Northhouse 2010).
6.1 CONTENT ANALYSIS

One of the relevant methods widely used in health care research studies is content literature analysis. This offers empiric analysis from literatures and documents through describing, organizing and quantifying of phenomenon in the form of information (Flinkman and Salanteri 2015). This information will be gathered by qualitative data-driven and inductive content analysis (Patton 2002).

Elo et al. (2014) proposed that the outcome of the analysis describing the information collected should be produced in a form of mind-mapping. These mind-maps should be prearranged into main categories and sub-categories permitting the reader to conclude on the findings gained from the literatures of poor access to water, sanitation and hygiene on health in slum areas (Long and Johnson 2000).

The inductive content analysis findings will be presented in a structure where access to poor water, sanitation and hygiene on health would be separated to see how each of them would affect heath care in slum areas. The findings would be supported by relevant information from the data collected, which will be included in the research work.

6.2 DESCRIPTIVE LITERATURE REVIEW PROCESS

This section of the research provides evident approach of the descriptive literature review process, which is done systematically in the thesis work. The objective of using this research method is to accumulate the latest empirical information regarding how poor water, sanitation and hygiene affects health in slum areas of the world through inductive content analysis (Petticrew and Roberts 2006). It critically analyzes multiple research studies, formulating the research questions, analyzing studies that relate to and answer the formulated questions in a structured methodology (Bilotta et al. 2014), which are designed to provide a complete, exhaustive summary of current literature (Herman et al. 2008).

In all research, it is fundamental to commence by clarifying what the researcher wants to find out. The purpose of this research is descriptive in nature centered on inductive reasoning. Inductive reasoning is the procedure of developing conclusions from collected data by merging together new information into theories (Berg 2001). The researcher
examines the text with an open mind in order to recognize significant subjects in answering the research question (Catanzaro 1988).

According to Polit and Beck (2004), when a study has been commenced, the study plan has to be established. Additionally, five central issues must be reflected in the planning process: the aim, the sample and unit of analysis, the selection of data collection method, the choice of analysis method and the applied implications. The researcher has to reflect on these five issues repeatedly before commencing the data collection (Polit and Beck 2006). To guarantee credibility, there must be a sequence of logic between the decisions made and how the research will be conducted (Morse and Richards 2002).

Furthermore, the research review process was as a consequence of reading through peer-reviewed research articles, which becomes a scientific instrument that can be used to summarize, appraise and communicate results (Green 2005). This follows the ensuing process: Examining the research problem, Finding of research question(s) and reviewing the study through searching of data (Taylor 2014).

Descriptive literature review process principally reanalyze results and findings as well as delivering the context for the research, within investigating and usage of the other people’s work which gives the author position through the field of study. The descriptive literature review data collection research process is illustrated in figure 6. This information on various articles concerning access to poor water, sanitation and hygiene will be analyzed by means of qualitative inductive content analysis (Comerasamy 2012).

6.3 DATA COLLECTION

The data search process was wide-ranging, thorough and assisted by information specialist from Arcada as well as Diak University Libraries. In collecting data of literatures, search items like slums, sanitation, water and hygiene were used to make it simpler in finding important articles for the study. During data collection process, emphasizes is employed more on descriptive elements than just a systematic approach (Flinkman and Salanterä 2015).
An inclusion and exclusion criterion was placed in order to get authentic articles for the study. Inclusion criteria comprised of current articles from 2007 up to date on the access to water, sanitation and hygiene in Sodom and Gomorrah as well as other slums in developing countries.

Searching for the literature articles started in the beginning of 2017. The articles for the literature review were all academic articles. Academic databases like EBSCO Search Premier and Elite, PubMed, Science Direct and Google Scholar were used through the Finna database from Arcada and Diak University of Applied science. The similarities and differences of the search words during the data collection method should be priority from each database (Kansgasniemi et al. 2013) and this is presented in Table 3.

The database used had detailed features for searching articles. That of EBSCO Academic Search Premier as well as Elite and PubMed had identical features of textbox to write the search word and an extra sign (+) to increase more empty boxes if multiple search words are used. While in Science Direct it is just one or two empty boxes which makes the author utilized the conjunctions AND meaning (+) and OR as well as the comma sign (,) to represent synonyms. More explanation can be seen in appendix 4.

### 6.3.1 Data collection criteria

Prior to searching for the article, inclusion and exclusion criteria were looked at to facilitate the author in finding the best articles to answer the research question. The year collection from 2007-2017 was set to enable the author get current articles. All the articles were drawn from academic search engines specifically EBSCO, PubMed, Science Direct and Google Scholar to obtained academically peer reviewed articles.

The articles were all transcribed in English for easy clarification, understanding and they were articles with links. The articles were read through and understood well before being used for the literature review of the thesis work. The inclusion and exclusion criteria can be seen in Table 2 below.
Table 2. Inclusion and Exclusion criteria

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
<th>Exclusion criteria</th>
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</thead>
<tbody>
<tr>
<td>Academic journals published between 2007 to 2017</td>
<td>Published before year 2007 and after 2017</td>
</tr>
<tr>
<td>In English language</td>
<td>Other languages</td>
</tr>
<tr>
<td>Research from academic peer reviewed articles</td>
<td>Other types of articles</td>
</tr>
<tr>
<td>Research on the following: Water, sanitation and hygiene</td>
<td>Research based on one aspect alone: Water, Sanitation, Hygiene</td>
</tr>
<tr>
<td>Water and sanitation</td>
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<td>Water and hygiene</td>
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<td>Sanitation and hygiene</td>
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</tbody>
</table>

6.3.2 Data collection searching process

The data searching process as illustrated below in FIG. 6, which commenced with the idea of looking for data search engines.

These search engines were found in the Arcada and Diak Library search engines. Several of the search engines such as EBSCO, PubMed, Science Direct and Google Scholar were used.

It further moved ahead to look for the search words to use in search of the articles making sure that the entirely search engines used the same key words.

In addition, the use of inclusion and exclusion criteria was used to limit the number of articles, which will be generated by the key words. This assisted in eliminating irrelevant articles, which would have emerged in the searching process of the research work.

With all these limitations put in place, yet more than necessary articles appeared which are EBSCO=40, PubMed=3, Science Direct=5 and Google Scholar=24. Given a total of 72 articles from the various search engines.

The researcher had to first select 25 articles, which can be seen in Appendix 1 through abstract reading. After reading through the whole text and quality evaluation (Appendix 2), a final 15 articles were selected for the literature review.
6.4. RELEVANT ARTICLES FOR RESEARCH STUDY

Searching through the search engines of EBSCO, PubMed, Science Direct and Google Scholar with the inclusion and exclusion criteria as illustrated in Table 3 above, the 25 selected articles were recorded in Appendix 1. After careful scrutiny of all the articles, the author narrowed to 15 articles and these articles chosen was guided in answering the research question.

Although, some of the texts contributed to the entire research, by giving ideas and suggestions which assisted in the overall conclusion of the research but they were not beneficial in answering the research question and were thus exempted. Out of these articles, 15 of the articles were chosen for the research work. These articles were used in the findings of the thesis work that is presented in chapter 6 and the discussions in chapter 7. The summary of the 15 articles can be seen in Appendix 3.
6.5 INDUCTIVE CONTENT ANALYSIS

According to Hsieh and Shannon (2005), qualitative inductive content analysis is described as a research method, which has a subjective interpretation to the text data through a systematic classification process of coding and identifying themes or patterns. This research method that falls in descriptive literature review using a qualitative inductive content analysis involves procedures to process raw data collected and classified into categories, subcategories and themes centered on effective interpretation (Zhang and Wildemuth 2009). Qualitative inductive content analysis includes selection of text and phrase, which direct in formulating the research questions under assessment (Patton 2002).

In the process of analyses, each selected literature structure desired to be created. To create the structure needed for the inductive content analysis findings, the found characters in the selected articles were collected as a result of the expression like poor access to water, sanitation, hygiene and developing countries. The literatures provided information, which were categorized into similar categories and sub-categories under water, sanitation, hygiene, common diseases and interventions (Thorne 2000).

Mayring (2000), inductive content analysis is an approach to empirical, methodological controlled analysis of texts within the context of communication as it follows the content analytic rules and step-by-step models without hasty quantification. In data analysis, in order to attain findings that transform raw data into new knowledge, the researcher must have an effective analytic approach throughout the phases of the research (Thorne 2000).

6.5.1 Inductive Content Analysis Process

In qualitative descriptive literature review using an inductive content analysis, the author strives for a balance concerning the description and interpretation of the data. The description of the inductive content analysis gives readers background and therefore the readers get more knowledge about the subject matter under investigation (Denzin 1989).
It start by preparation of data; define units of analysis; development of categories and coding scheme; testing coding scheme on sample of text; code all text; coding consistency assessment; conclusions drawn from the coded data; reporting of methods and findings and drawing of conclusion - to the research work. The inductive content analysis process can be seen above in figure 7.

**Preparation of data:**

This is the first stage of the content analysis process and it involved gathering of all relevant information and articles based on the knowledge of the researcher on the articles that answers the research question after analyzing its relation with the study.

**Define unit of analysis:**

This is point of grouping texts into units before coding them however De Wever et al. (2006), explains that the differences of the various texts could affect the coding decisions and so also are the similarities with other studies. Here a code is assigned to a text and that means taking note of the relevant points in the article.

**Development of categories and coding scheme:**

Deriving the categories or grouping and coding can be obtained from the data, theories and previous related studies of which the coding manual evolves throughout the process of data analysis. The study was conducted on two theories connected to the topic. A manual code for guidance as suggested by Weber (1990) to ensuring consistency in the
entire process of coding was put in place and that took the form of names of category, definition of the categories and the reasons for assigning them

Testing coding scheme on sample of text:
At this stage, the definition is analyzed and tested through the coding of a sample of the data. Again, coherency and consistency are checked for further clarity as well as analyzing if the categories did answer the research question. Schilling (2006), put it that any other challenge with regard to definition to categories, rules to coding, or categorizing special cases are to be resolved.

Code all text:
After being successful with the initial coding, the whole text was coded as well whiles following the patterns of the coding so as to avoid drifting due to the likelihood of new data collection emerging (Schilling 2006).

Coding consistency assessment:
This stage is to check if the coding has been consistent and authentic in the entire data after finishing the coding.

Conclusions drawn from the coded data:
This is a very important stage of the process and demands critical reasoning for a successful conclusion. Here, meaning is drawn from the various categories and the properties form the data, after which relationship between the categories are identified and a test is conducted against the entire data (Bradley 1993).

Report your methods and findings:
The final stage is reporting a summary of the methods used and the findings after following the process. This implies explaining or reporting the means by which the researcher arrived at the coding process as well as how he or she measured the authenticity.
6.6 ETHICAL CONSIDERATION

Ethical consideration is extremely essential part to be considered throughout the whole process of the research work. This prevents violation of any rules relating to the writing of research. Reliability of research work is very significant and any kind of infringement can lead to punishment or disapproval of the study. Continues scrutiny of researcher’s ethical behavior will help to avoid fabrication, falsification and plagiarism from other research works (Best and Kahn 2006). Any misconduct during the research processes can negatively influence the societies attitudes regarding science (Mauthner et al. 2003).

The author is a student of Arcada University of Applied Science as such obeyed the whole guideline and scope of the outlined thesis guide. Any journals, reports, articles, and books cited by the researcher in this research work was not directly written as the former to avoid plagiarism. The articles used for the literature review were collected from academic databases which the author had legal access to by being a registered member of the Arcada University of Applied Science.

The researcher considered relevant available articles and English Language was chosen was to prevent wrong translation. For easier clarification, the researcher did some of the tables and figures, but those taken from previous studies were accordingly cited. The texts were avoided of any form of fabrication to exaggerate the data.
7. FINDINGS

This chapter of the thesis work introduces us to the main findings after using the inductive content analysis in scanning through the articles chosen for the research work. The researcher read fifteen different articles in an effort of looking for the effects of poor water, sanitation and hygiene on health and health issues in Sodom and Gomorrah as well as that of the other slums.

7.1 WATER SOURCES AND CONDITIONS

Water situation generally around the world, is quite enhanced as compared to that of sanitation and hygiene; however, about 3.6 billion of the world’s population acquires water from unprotected sources and about 884 million people journey over a long distance to get water (Bartram and Caincross 2010). In developing countries, not only is the origin of water problematic but studies have revealed that the average water quality level is lacking behind and are common in Asian countries as the cities water supplies fail to meet the world health organization water quality standards (Bartram and Caincross 2010).

Unpredictability: Sodom and Gomorrah depends on unimproved source of water due to irregular flow of pipe-borne water from the Ghana Water Company Limited (Owusu et al. 2016). Vendors typically store water in concrete tanks. The pipe borne water by estimation flows for about four hours a day and are very unpredictable (Awuah et al. 2013). Occasionally the water does not flow for approximately three weeks and under such conditions, residents depend mostly on water tanker operators and sachet water for their domestic activities (Owusu et al. 2016).

The guarantee of continuous supply of water is also very important area to look at. The suppliers from the public network have systems in place to guarantee water flowing continually. Those in the private sector are characterized by long queuing, carrying water in containers for long distances (Dagdeviren and Robertson 2011).
**Costs:** Due to the higher cost of the water from these vendors, residents in the slum are not able to buy enough for their everyday activities and water from the vendors is almost eleven times higher than the water utility rate provided by GWCL (Awuah et al, 2013).

The private small-scale suppliers of water such as street vendors, kiosks, water resellers and water tankers charge high prices for their services which makes it difficult for middle level income earners to afford while the public water network prices are standardized. The government have regulatory and control bodies checking the pricing of social services (Dagdeviren and Robertson 2011).

**Quality:** Not only is the water from individual vendors costly, it has been observed that growth of Algae occurs in the tanks where the water is being stored and moreover the tanks are hardly cleaned regularly. Again some pipelines connected to the tanks for the flow of water are exposed and at a point in time thus, running through earth drains containing wastewater. This means that both the clean water and the wastewater can mix as they pass through the same tunnel or pipelines. In some cases the pipelines are of poor quality so they leak, and instead of them to replaced or properly fixed, the leaking pipelines are tied with plastics bags which affect the quality of water in this slum area (Awuah et al. 2013). There is also presence of higher levels of faecal coliforms in the water due to the channels that the water pipe passes, entry of wastewater into the pipes.

The chemical elements present in the sources of water available to slum users also poses health threats. The concentrations of these elements like copper in drinking water cause health challenge. The corrosion of the pipelines which is common in slums also release higher concentration of copper into the water (Awuah et al. 2013)

According to (Bartram and Cain 2010: Dagdeviren and Robertson 2011), statistics in 2011 indicated that by an estimation of 11% of the world’s population resort to the usage of unimproved source of drinking water. Consequently in the form of unprotected wells, surface water, shallow dug wells, as well as water stored in tanks and this is clear in some slums in developing counties (Bartram and Cain cross 2011). In the cities of Nairobi and Abidjan where slums existed, about 80% of the population depend on non-
formal means of receiving water in the form of kiosks, water resellers and small-scale providers (Dagdeviren and Robertson 2011). Lagos in Nigeria is the same with 5% of individual households in the city are connected to the public water system. The rest of the people sources of water are wells, water tankers, boreholes and various illegal connections from the public water system (Dagdeviren and Robertson 2011: Wolf et al, 2014)

The quality levels of the water supplied by these private people are from the underground, which is directly dependent on the sanitation and hygiene practices that exist within the locality. For instance, Côte d’Ivoire and in Dar Es Salaam where there is an evidence of cholera and other water-borne disease outbreak in slum settlements with poor sanitation and hygiene practice. Due to this the residents sometimes use inappropriate homemade treatments to acquire some level of quality (Dagdeviren and Robertson 2011).

**7.2 SANITATION CONDITIONS**

Sanitation is the channel of promoting hygiene by the prevention of human contact with hazards of wastes particularly faeces (Wolf et al, 2014: Bartram and Caincross 2010). These hazards might be physical, microbiological and chemical agents of disease that can cause health problems includes human as well as animal excreta, solid wastes, domestic wastewater, agricultural and industrial wastes (Wolf et al. 2014).

**Poor and inadequate toilet facilities:** Accessibility to basic sanitation is a huge challenge to residents in the slum. Not only the available facilities inadequate but also they are not in good shape and unimproved. The problem of the lack of household toilets in the slum puts pressure on the few public toilets although they are very poor. Those who cannot get access resort to open defecation in bushes and drains (Owusu et al. 2016).

In 2011, the world’s population has about 36% of unimproved sanitation which is described as flush toilets not attached to a septic system, pit latrines without slab, bucket latrines and open defecation (Wolf et al. 2014). Globally, most of the communicable diseases are caused by lack of WASH implementation. Nearly 1.1 billion individuals
still defecates in the open, which means many households and communities depend on dirty and hazardous latrines (Bartram and Caincross 2010).

The absence of proper planning in the community resulting from high population density prevents residents from constructing household toilets. The two types of toilet systems available in the community are Kumasi Ventilated Improved Pits (KVIPs) and Pan latrines. According to Jenkins and Curtis (2005), access to these unimproved sanitation facilities results not only in fecal contamination of the environment and transmission of gastroenteric infections but also loss of dignity and quality of life. As at the time of this study, there were 635 squat holes for the public toilets of which approximately 80,000 had to use. In proportion, it means that an estimate of 126 users could use a squat hole as compared to the standard of 1 to 50 people, this also brings about open defecation.

**Improper solid waste management:** Sanitary conditions in the slum is also in a deplorable state due to indiscriminate dumping of waste and choked drains with stagnant water serving as breeding grounds for mosquitoes. Piles of waste are scattered at the vicinity haphazardly, generating foul smell especially when it rains. Despite all these, there are people who sell close to the waste paving way for flies from the waste to carry pathogens unto the food.

Recent development show that there are waste collectors placed in front of the residents of the city dwellers and people pay for the conveying of the waste to the central waste center depending on the quantity of refuse. Sometimes, people do not get the collectors because of the lack of money to pay for the service of daily collection. This has become a major sanitation problem for the slum dwellers.

**7.3 HYGIENE PRACTICES**

Bartram and Caincross (2010) define hygiene as a set of practices performed for the preservation of health. According to World Health Organization (WHO), hygiene is conditions and practices that help to maintain health and prevent the spread of diseases (Boadi and Kuitunen 2002). The concept of hygiene is in relation with cleanliness, health and medicine, as well as personal and professional care needed to implement the practices of hygiene (UN-Habitat 2011). Bartram and Caincross (2010) and then again
Freeman et al. (2013) describe the practices of hygiene as a preventive measures to reduce the incidence and spreading of disease in medicines and in homes and everyday life settings.

Hygiene practices differ widely and what is accepted in one society might not be acceptable in another culture. International Scientific Forum on Home Hygiene has established a risk-based method known as Hazard Analysis Critical Control Point (HACCP), with "targeted hygiene" (UN-Habitat 2011). The idea of Targeted hygiene is to identify the routes of transmitting pathogens in homes and how to apply hygiene procedures at critical points with appropriate times to discontinue the chain of infection (Johnston et al. 2015)

**Lack of resources:** As a result of the inadequate and inefficient supply of good water for domestic purposes, the hygiene conditions of the residents are very poor. Water is needed for good hygienic practices like hand washing, bathing, and good toilet facilities both in the household and the community. Although there have been much advocacy for proper hand washing after toilets, residents in the slum cannot meet this need because of the lack of water and even in case there is availability, there is little or no income to be able to access this service.

**Poor waste management system:** The waste management system in the city of Accra as a whole has not been effective resulting in poor hygiene for many residents particularly those who live in the slums. About 95 percent of wastewater, including raw sewage in the city is emptied into open gutters and drains which go straight into the Korle Lagoon. Also many households resort to the use of pits, pans and bucket latrines. Only few numbers of households who are considered rich use flush toilets in Accra (Boadi and Kuitunen 2002)

### 7.4 COMMON DISEASES

Slums throughout the world are associated with certain common diseases especially in situations where there is poor access to water, sanitation and hygiene conditions (Bartram and Cairncross, 2010; Caincross et al. 2010). The effect of these diseases in the
global health is dreadful. It is beyond control as cholera and diarrhea are major cause of infant mortality with the ratio of one is to ten (Obrist et al, 2006).

**Effects of unsafe drinking water:** The faecal matter in the water causes infectious diseases such as cholera and diarrhea. Waterborne diseases are usually caused by lack of sanitation and hygiene through contaminated drinking water (Bartram and Caincross 2010). These are very prevalent in these places. The chemical elements in the water, predominantly copper, lead and cadmium in higher concentrations poses serious health complications among the residents. Lead causes problems in the stomach and small intestines like abdominal pain and diarrhea (Awuah et al 2013).

According to Holm et al (2002) a longer exposure to lead can cause serious complication in enzyme production and can lead to death. It also causes weak immune systems in the residents. There is also hormone mutation and other renal health challenges. The nervous system is also not spared as various other diseases emerge due to the infections, among which cognitive and neurobehavioral deficits are high in dren WHO (2004a) asserts that, there is electrophysiological evidence of effects on the nervous system. The health challenge by lead according to OECD (2007) is irreversible making it extremely dangerous.

Johnston, Teague and Graham (2015) research work on children's health in slums report that cholera and diarrhea are common illnesses among young children. After the earthquake of Haiti in 2010 where majority of the populace were living in poverty, an outbreak of Cholera took the lives of about 8321 people in the country (Accra Metropolitan Assembly, 2017: UN Habitat 2011). Similarly children's vulnerability to HIV/AIDS prevalence is high and gender inequality increases women's risk of acquiring HIV/AIDS in slums S (Accra Metropolitan Assembly, 2017: UN Habitat 2011)

**Effects of Poor sanitation:** The dirty and unsafe latrines also cause intestinal helminthiases, giardiasis, schistosomiasis and trachoma (Bartram and Cairncross 2010). The fecal-oral route transmits intestinal helminths through worms. About two billion people are infested with soil-transmitted helminths worldwide through the eggs present in human faeces that in turn contaminate soil in regions where sanitation is poor (Bartram and Cairncross: Obrist et al. 2006), (Bartram and Cairncross 2010). Other diseases that
could be prevented through proper access to sanitation and hygiene practices are Cholera, malaria and Ringworm or Tinea (AMA and UN-Habitat 2011).

A study conducted by (Holm et al. 2002; WHO 2007b) show that the extreme health effect of cadmium, is kidney damage both in the general population and in occupational exposed workers. The problem is caused by a long-term accumulation of the element in the blood stream that impedes the reabsorption of proteins, glucose and amino acid. Other effects of Cadmium exposure are disturbances in calcium metabolism, hypercalciuria and formation of renal stones.

The nearness of the slum to an electronic waste-processing site exposes the residents to numerous toxic chemicals. The fumes released from the burnt metals and plastics are in the form of lead, cadmium, dioxins, furans, phthalates and brominated flame retardant which when inhaled, affect the reproductive system, the nervous system and the brain of the people with children being the most vulnerable (Caravanos et al 2013). Another disease prevalent in this area is Malaria. The choked gutters and wastes scattered around provide a breeding ground for mosquitoes, which cause malaria.

**Poor hygiene practices**

Another mode of transmitting Staphylococcus aureus like MRSA and PVL-producing MRSA strains are through clothing and household linens, that efficiency of laundry processes can be a key factor in outlining the rate of community spread of these strains (Caincross et al. 2010; Johnston et al. 2015). Bartram and Caincross (2010) have understood that these strains are contagious within families, community settings such as prisons, schools and sport teams. Skin-to-skin and indirect contacts with contaminated objects such as towels, sheets and sports equipment are also factors to spread the diseases (Owusu and Kuitunen 2002: UN-Habitat 2013).

**7.5 INTERVENTIONS**

The implementation of health interventions varies from country to country. There are core health concerns that can be dealt with in order to ensure good water supply, sanitation, hygiene and health in cities.
Delivering sanitation to people demands a systems approach, rather than simply focusing on the toilet or wastewater treatment plants (Obrist et al. 2006). The main purpose of sanitation system is about protecting and promoting human health through provision of a clean environment and ending the cycle of disease (Obrist et al. 2006). Lack of improved sanitation has serious health impact on human being (Owusu and Kuutunen 2002). Improving access to safe sanitation and changing hygiene behaviours can reduce death rate (Obrist et al. 2006). Lack of sanitation is a serious issue that is affecting most developing countries and countries in transition (Wolf et al. 2014).

**Proper liquid waste management system**: A recent intervention introduced to curb open defecation in low income areas in Accra is assisting residents to construct modern household toilets of which the government will pay half the cost and the half will be born by the residents. The World Bank through the Ministry of Local Government and Rural Development in Ghana are sponsoring this project (Ghana business news 2017). The amount involved is $150 million grant of which 1000 modern toilets have been constructed already in 2014. Proper latrines assist to control the spread of Musca sorbens flies that transfer the Chlamydia pathogen between children's faeces (Boadi and Kuutunen 2002). In slum location, the use of high quality piped water and the connection of sewer waste to an appropriate management site is vital to improving sanitation and health of the people, which leads to greater reduction in diarrhea (Wolf et al. 2014).

**Proper solid waste management**: In an attempt to deal with waste in the city of Accra specifically in the slums, the Accra Metropolitan Assembly has adopted a strategy of providing waste bins to all households and this is to effectively manage waste. There is division of the city into six collection zones where the collection companies who are normally private companies charge the fees. There is however a central container system used in the slums where individuals can get rid of their waste at a central container without any fee charged. This has brought a significant improvement in the waste collection system in the slum (Owusu et al. 2016).

**Health policy**: The National health Insurance scheme has been one of the interventions adopted to help all classes of people to access health including those living in slums and other deprived areas. However, this has not been effective and has been replaced by
charitable organizations and NGO’S who organize screening exercise once a while for the residents. The use of health medication like oral rehydration therapy helps to prevent death caused by diarrhea (Bartram and Cairncross 2010).

**IBM-WASH Implementation:** There has been the establishment of wash facilities in most public schools by the AMA. The aim is to ensure that all children can get proper sanitation and health at school even if they lack those facilities at home. The AMA has selected thirty schools for the implementation of sanitation facilities project this year (Accra Metropolitan Assembly 2017).

Promoting behavioral change as an ideal intervention through education and training programs (Johnston et al. 2015). Studies show that Ascaris and other intestinal worms, which are caused by poor sanitation and also diarrhea among children could be prevented from transmission through washing of the hands with soap (Bartram and Cairncross 2010; Obrist et al. 2006).

Integration of WASH into the development policy of the country, allocation of budget and resources for effective implementation of health programs is very necessary (Hulland et al. 2013). Ministry of Health at the national level in the various countries should make IBM-WASH policy an integral part of their health policy especially that of children (Bartram and Cairncross 2010). This must be accompanied by effective and strategic planning (Boadi and Kuitunen 2002). IBM-WASH should be included as a key performance indicator of management in the health sector and health laws must be implemented in every home (Bartram and Cairncross 2010).

**MDG – GOALS:** Social housing projects have proven to benefit countries like United Kingdom, United States of America and other European Nations in preventing slum growth. Cities in Singapore have been successfully managed by the urban development sector to deal with the commencement of slums and this has been beneficial to the country (Dagderviren and Robertson 2011). In view of this, governments, private and other international stakeholders have some responsibilities to play in guaranteeing proper hygiene, good sanitation, water and health (Hulland et al. 2013).
8. DISCUSSIONS

In recent years, a lot have been done by countries that have experienced the consequence of the development of slums in the urban areas (UNCHS Habitat 2001). Majority of which are provision of infrastructure as interventions. Living conditions in slums vary from country to country (Dagdeviren and Robertson 2011), and the results of slums lead to poverty and disease (Payne 2005).

There have been many discussions and arguments about the onset of slums for many decades and in 1970s, paramount of this discussion is the concept of slums of despair” versus “slum of hope” (Lloyd 1979). The view point of outsiders on a slum like Sodom and Gomorrah is a slum of despair but the dwellers see it as a place of hope where they can fight for their survival (Owusu et al. 2016). The negative attributes given to slums as a place deprived of the basic amenities for living and a hob of violence, social disorder and all kinds of social vices are the opinion of outside people whereas the inhabitants of slums see it as a home where they can fend for themselves and live a good life (Sanjek 1990; Low 1996).

The main water available to slum dwellers are shallow wells and springs which are unsafe for drinking and not only that, the distance by which the people travel to get this water is very long and this explains how limited access to water is in slums (Auwah et al. 2013). Pipe born water is limited in these areas and the few ones in existence do not flow very well. The higher cost of water from private vendors also prevents the residents from accessing enough quality water (Collignon et al. 2002).

Although the private sector has contributed much in rendering water service to these areas, Lobina (2006) suggest ineffectiveness especially on the long run. The technical and scattered nature of informal settlements require a lot of structuring and planning in other to deliver very effective and sound services of any kind including the provision of good quality (Kirkpatrick et al. 2006).

Dagdeviren H. and Robertson S. A. (2011), explain that a holistic approach is needed if the problem of providing quality slums is to be solved. By this, policies and interventions that address the problem of land tenure, urban planning, relocations and housing finance are essential.
Due to the proximity of water vendors to informal settlements, they have very good knowledge as to the best way to render services to the slum dwellers therefore it is necessary to infuse small-scale water providers into the formal water sectors through education and training and encourage them to improve their services to the poor in slums. Ideas of doing this include giving a legal backing to the informal providers; building a strong cooperation between utilities, informal providers and government authorities; strengthening regulatory measures to check the quality and pricing of services; retaining effective and efficient suppliers and resorting to microfinance as an alternative to financing their project.

The sanitation facilities available to households and the community in slums are mostly dirty, unsafe latrines, shared toilet facilities with no proper waste disposal system exposes them to diseases. The improper management of on-site sanitation such as latrines overflows can lead to major contamination leading to disease outbreak (Baker and Ensink 2012). According to Owusu (2010), due to the poor background of people who live in slums, most of them cannot queue and pay for the limited poor sanitation services, thus resorting to packaging their liquid and solid waste in plastic bags and rubber containers and throwing them into gutters and drains. Rainfall is also seen as an opportunity to dump their waste by throwing them in the rains for them to be carried away (Wolf et al. 2014)

Institutional ineffectiveness has also contributed to the problems in slums. The weak local government structures and inadequate infrastructures is a main challenge in dealing with the sanitation problems facing informal settlements. Community sanitation projects like sewage treatment, surface runoff management, solid waste management, contribute to a healthy living community and society (Chaplin 1999; Hardoy et al. 2005). When effective sanitation and hygienic practices are implemented, it prevents endemic diarrhoea, giardiasis, intestinal helminthiases, trachoma, schistosomiasis, and numerous other global infections that affect people living in slums. Hygiene practices such as hand hygiene, food and water hygiene, respiratory hygiene, general home hygiene creates comfort and assist in preventing the spread of diseases (Cairncross et al. 2010).

A substantial disease burden is connected with deficient access to good water, good sanitation and good hygiene practices and is generally preventable with sustained cost ef-
fective interventions (Bartram and Cairncross 2010). Common diseases discovered in slum areas as a result of poor access to water, sanitation and hygiene are classified into epidemic and endemic diseases. The disease burden weighs seriously on both household and health systems. Health cost in these slum areas is enormous running into billions of money to be used. The World Bank and WHO Disease Control Priorities Project considered most interventions in poor access to water, sanitation and hygiene in developing countries to be cost-effective (Bartram and Cairncross 2010).

Diseases intervention has been on the heart of every government and for this reason, many governments where urbanization is the principal cause of slums are putting mechanism to assist eradicate various diseases that affects the inhabitants living in slum areas with poor access to water, sanitation and hygiene (Bartram and Cairncross 2010). Diseases interventions that commenced in developed countries in the past played an essential role like the social housing projects in preventing the growth of slum in USA and Europe (Stone et al. 2003; Whitehead and Scanlon 2007). Urban development in Singapore has similarly been successful as a result of force savings regarding housing and this has prevented the establishment of informal settlements (UN-Habitat 2003).

Additional intervention is the London Declaration, that is a global commitment to collaborative disease eradication, which focuses on guaranteeing access to clean water, basic sanitation, hygiene and health education (Johnson et al. 2015). The millennium development goals as one of the utmost intervention by the United Nations is concern about the percentage of people deprived of sustainable access to safe drinking water and basic sanitation as well as good hygiene practices (Lenton et al. 2008).

Global targets to the development of access to water and sanitation as well as hygiene need a universal intervention more especially to the slum areas. The entire benefits of these interventions exceed the health benefits and this can be valued at more than the costs of the interventions. Hygiene, sanitation, and water supply are development priorities. However, the objective of international policy on drinking water and sanitation is inadequate. The active involvement of health profession in water supplies, sanitation and hygiene is vital to accelerate and consolidate progress of global health care (Johnson et al. 2015).
9. CONCLUSIONS, CRITICAL REVIEW AND RECOMMENDATIONS

Building a strong social, vibrant economy and society depends on a number of factors including the general wellbeing and health of the people. This is based on proper sanitation, good hygiene practices and safe water. The lack of these important elements brings about a lot of diseases and death, which impedes the development of the society.

Slum is a secluded place in urban cities characterized by the lack of these important elements mentioned earlier therefore there is poor health and low living standards for the inhabitants. Sodom and Gomorrah, which is the biggest slum in Ghana, like other slums in developing countries, lack the basic necessities for good living in the form of poor access to good drinking water, sanitation, hygiene condition, housing quality, overcrowding and lack of health care, making living condition in slums very difficult for human settlements.

The developments of slums in general have been attributed to the movement of people from the villages and towns to seek for greener pastures in the cities. Combating the development of slums coupled with the poor living conditions of the inhabitants needs a holistic approach. As efforts are being made by government and other agencies to provide facilities for sanitation and good drinkable water in households and the community level, there should be a rigorous education in these slums on proper sanitation and hygienic practices. Behavioral change is imperative in the quest to mitigate this challenge and as such, requires the needed attention.

Strong political wills is needed in implementing interventions and policies that will reduce the poor access to water, poor sanitation and hygiene. In Ghana, the objective and process of achieving access to safe water, clean sanitation and good hygiene is enshrined in the Ghana Poverty Reduction Strategy, which is in line with achieving the Millennium Development Goals initiated by the United Nations with the aim of increasing the pace towards the provision of safe water, adequate sanitation and improve hygienic conditions that will lead to good health for both rural folks and urban dwellers (Awuah et al. 2008).
Critical Review

The articles analyzed ranged from discussions, expert opinions and policy forum documents, which were based on empirical studies. Conducting systematic research implies the use of systematic article with much evidence base findings. This authenticates the result obtained and provides a basis for conducting similar studies whose outcome will be similar if the same method is employed as the first one (Elo et al. 2014).

The researcher based her search for articles on five main databases because of the ease of accessing those databases and getting relevant articles from them. Other databases were not used because they did not give the required information needed after entering the search words. Some also directed the researcher to other sites where the information was difficult to be found. This would have strengthened the level of evidence in the study as a result of giving the researcher the possibility of wider range in selecting the articles for the research work. Using articles from other languages would also have been important but that would have required translation, as the required language for the thesis is English (Elo and Kyngäs 2008).

In some cases, the researcher found important articles but then, due to financial constraints she could not access them because those articles were for sale and moreover there some web sites that demanded subscription before one could get the information. All these are considered as a limitation to the study as researcher could not access all relevant materials (Elo et al. 2014).

Recommendations

The factors causing slums in Ghana and other developing countries need to be addressed due to the impact of the development of slums in urban cities some of which are: poor access to water, sanitation and hygiene that have adverse effect on the health of the inhabitants living in the slum. High rate of mortality and morbidity is very obvious in these areas. In other to mitigate these challenges,
1. Public housing programs that make provision for water systems and other infrastructural facilities for everyday living should be factored into the whole housing project in order to prevent unplanned urban settlement.

2. There should be integration between the sectors saddled with the task of providing safe drinking water, good sanitation and good hygiene practices and in the formulation of national policies and its implementation. (Owusu and Kuitunen 2002)

3. IBM-WASH, which is a basic method for promoting the accessibility of quality drinking water at affordable price, proper sanitation and hygiene facilities at the individual, household and the community level should be given due consideration. This approach is very significant to the prevention of diseases such as diarrhea.
10. REFERENCES


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Wyse E. S. (2011). What is the Difference between Qualitative Research and Quantitative Research? Snap Survey

INTERNET REFERENCES:


http://nataliaojewska.com/pictures-of-ghanas-old-fadama-slum

https://www.slideshare.net/jigsdbest/slums
## Appendix 1. Articles selected for the literature review

<table>
<thead>
<tr>
<th>Number and search engine</th>
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<th>Authors and year</th>
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<th>Quality evaluation</th>
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<td>10. EBSCO</td>
<td>Poor water and slum and Ghana</td>
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<td>Interconnected slums, water, sanitation and health in Abidjan, Cotedivoire</td>
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<td>Global challenges in water, sanitation and health</td>
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<td>14. Google Scholar</td>
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<td>(Boadi and Kaitunen</td>
<td>Urban waste pollution in the Korle la-</td>
<td>+</td>
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<td>Abstract</td>
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<td>15. Google Scholar</td>
<td>Water and sanitation and slum and Ghana</td>
<td>The challenges of improving water and sanitation services in less developed countries</td>
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<td></td>
</tr>
<tr>
<td>19. PubMed</td>
<td>Slums and Ghana</td>
<td>A systematic approach to behavior change interventions for the water and sanitation sector in developing countries: a conceptual model, a review and a guideline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Science direct</td>
<td>Water and sanitation and slum and Ghana</td>
<td>Hygiene, Sanitation and Water: What needs to be done?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Science direct</td>
<td>Water and sanitation and slum and Ghana</td>
<td>Designing a handwashing station for infrastructure-restricted communities in Bangladesh using the integrated behavioural model for water, sanitation and hygiene interventions (IBM-WASH)</td>
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## Appendix 2: Quality evaluation on articles used

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<tr>
<th>Criteria / Questions</th>
<th>Explanation</th>
<th>Y /N</th>
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<tr>
<td>Was the research question clear and understandable?</td>
<td>Very clear question for the study gives an overview of what the study seeks to do and therefore leading to the aim and objectives</td>
<td>+</td>
</tr>
<tr>
<td>Was the search for relevant primary studies very detailed and exhaustive?</td>
<td>The totality of the evidence used by the authors for the study and that includes published and unpublished. Searching from a variety of sources including databases, books, abstracts from meetings and conferences, insights from donors, other thesis or reviews</td>
<td>+</td>
</tr>
<tr>
<td>Were the criteria used to select studies for the inclusion in the study relevant?</td>
<td>The element of no bias in sample chosen and used for the study</td>
<td>+</td>
</tr>
<tr>
<td>Was the methodology used for generating the primary data of high quality in the study?</td>
<td>The right statistical tool or test applied to generate the kind of information</td>
<td>+</td>
</tr>
<tr>
<td>Were the assessments of the studies reproducible?</td>
<td>Criteria that other people could use to do the same systematic review</td>
<td>+</td>
</tr>
<tr>
<td>Does the study bring about a conclusion based on the findings?</td>
<td>A general conclusion that is based upon the findings</td>
<td>+</td>
</tr>
</tbody>
</table>
### Appendix 3. Relevant articles selected

<table>
<thead>
<tr>
<th>Number</th>
<th>Source</th>
<th>Title &amp; Authors</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>EBSCO</td>
<td>Access to health in city slum dwellers. The case of Sodom and Gomorrah in Accra, Owusu-Ansah F., Tagbor H. &amp; Togbe Afi M. (2016)</td>
<td>Rural Urban migration has increased slum dwelling in the city specifically Sodom and Gomorrah in Accra - Ghana. Health and sanitation has been affected due to factors such as overcrowding, poor-quality housing, inadequate sanitation facilities, poor drinking water and inadequate health care. Therefore epidemic diseases like diarrhea and cholera are common in the area, affecting mostly women and children. High mortality rate is therefore the result.</td>
</tr>
<tr>
<td>2.</td>
<td>Google scholar</td>
<td>Evaluating access to potable water and basic sanitation in Ghana’s largest urban slum community: OldFadama Accra, Monney, I., Buamah, R., Odai, S. N., Aswah, E., &amp; Nyenje, P. M. (2013).</td>
<td>Sanitation and water quality in the biggest slum in Ghana, Sodom and Gomorrah show no proper toilets in the residents of the people so they resort to KVIP toilets and pit latrines which are not hygienic. Water pipes and bore holes exist in some parts of the slum, but flow for a maximum of 4 hours a day, pipelines leaks and this makes fecal matters and other chemical components that pose health threats to be seen in the water supplied.</td>
</tr>
<tr>
<td>3.</td>
<td>EBSCO</td>
<td>Access to Water in the Slums of Sub-Saharan Africa. Dagdeviren, H., &amp; Robertson, S. A. 2011</td>
<td>Private sector interventions such as water tankers, sellers of sachet water, street vendors, kiosks and others have contributed in some way, it has not materialized significantly over the years, looking at the cost of the service which is highly priced for slum dwellers and also of low quality. They argue that provision of good quality water is a very wide scope, which involves policies and regulations and huge capital investment that is beyond the individual private entities. As such the public sector should take a leading role by addressing a variety of issues relating to urban planning, housing, relocation, housing finance and backed by policies and regulations.</td>
</tr>
<tr>
<td>4.</td>
<td>EBSCO</td>
<td>Assessing the impact of drinking water and sanitation on diarrhoeal disease in low and middle income settings: systematic review and meta-regression; Wolf J, Prüss-Ustün A, Cumming O, Bartram J, Bonjour S. et al 2014.</td>
<td>Assessing the impact of drinking water and sanitation on diarrhea in low and middle – income settings, a major disease that causes high death of children in the world particularly those living in deplorable conditions like slums, is linked with poor sanitation and inadequate quality drinking water is diarrhea. Water from unprotected springs and wells, rivers are not entirely healthy for drinking. Poor sanitation practices such as pit latrines without cover, bucket latrines and open defecation account for a major cause of diarrhea.</td>
</tr>
<tr>
<td>5.</td>
<td>EBSCO</td>
<td>Hygiene, Sanitation, Water: Forgotten Foundations of health; Bartram J., Cairncross S., 2010</td>
<td>The global health care community and public health seems to concentrate much resources and attention on three main diseases, which are threat to the health of people around the world. These are HIV/AIDS, tuberculosis and malaria forgetting poor hygiene, sanitation and water that cause death of many children than the three diseases combined. It is very obvious that the impact of poor hygiene, sanitation and water has enormous negative effects on people. Much ill-health in the global world today has been attributed to the lack of HSW (hygiene, sanitation and water).</td>
</tr>
<tr>
<td>6.</td>
<td>Google scholar</td>
<td>Social effects of poor sanitation and waste management on poor Urban communities: a neighborhood – specific study of Sabon-Zongo, Accra Owusu, 2010</td>
<td>Poor sanitary environments especially affect children and adolescent who are highly affected by environmental concerns. Defecating in bushes and other open areas as well as walking for a long distance brings a challenge to people living in an environment. Such children may not know the essence of keeping the wider community clean after living with this bad behavior for a long time. This is the reason why people litter around places despite the availability of trash bins and other waste management facilities.</td>
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</table>
7. **Google Scholar**
Interconnected slums, water, sanitation and health in Abidjan, Cotedivore

According to Obrist et al (2006), the view that slums are secluded from the urban cities in which it is situated are not enough especially in the provision of water, sanitation and health. Therefore the concept of interconnectedness should be critically looked into. The study reveals that in reality, development of slums and the rest of African cities cannot be separated. The main issues of liquid and solid waste removal, provision of good quality water and health are interrelated. The networks of pipes that sewage passes through as well as water pipes are an outstanding indication of interconnectedness between the individuals and the service providers.

8. **SCIENCE DIRECT**
Hygiene, Sanitation and water: What needs to be done? Cairncross S., Bartram J., Cumming O., & Brocklehurst C. 2010

According to Cairncross et al (2010), although hygiene, water and sanitation have been proven by other studies to reduce diarrhea and other infectious diseases and the high mortality rate, little progress has been made in many developing countries.

Needed interventions, political neglect and lack of the will to undertake these interventions by governments is a challenge in situations where there are policies and plans. In addressing this, governments should partner local institutions to champion this course. Also donors should increase the budget allocation to these sectors. National health ministries should include targets and plans and work towards it.

9. **SCIENCE DIRECT**
Designing a hand washing station for infrastructure-restricted communities in Bangladesh using the integrated behavioural model for water, sanitation and hygiene interventions (IBM-WASH)

The issue of diarrheal disease and other respiratory infection are high in percentage in terms of the morbidity and mortality. In intervening this situation, the application of the WASH approach (washing the hand with soap and water) in a selected station where the materials are readily available reduced the infection and the spread of the disease significantly.

However, not all locations in Bangladesh have the infrastructure to undertake this intervention. The study through formative research and interview came up with the best hand washing station design in these low infrastructural areas.

10. **Google Scholar**

Generally, Ghana faces a challenge of providing enough quality water as well as sanitation for its people. The public institution (Ghana water company limited) saddled with the task of providing quality water has not performed well due to many challenges it has on its own with the main one being financial limitations.

In the area of sanitation, only structural interventions have been put in place, with the others yet to be dealt with. Equal attention should be given to the sanitation sector.

11. **Google Scholar**
Urban waste pollution in the Korle lagoon, Accra, Ghana; Owusu and Ku tunen, 2002

The problem of pollution in the Korle Lagoon has a tremendous effect on the country in health, economic and physical wise. The activities of slum dwellers cannot be overlooked as much waste matter lands in the lagoon.

The high consumption by inhabitants in Accra coupled with the low sanitation facilities result in large untreated matter landing in the lagoon. Sometimes, the matters are large to the extent that they get choked in the lagoon and in times of heavy rain, flood is the outcome, destroying homes, properties and lives.

12. **PUBMED**
A systematic approach to behavior change interventions for the water and sanitation sector in developing countries: conceptual model, a review and a guideline; Hans-Joachim Mosler, 2011

According to Mosler (2012), although it is very pertinent to provide water and sanitation facilities to people, that alone do not solve the problem if there is no attitudinal change. Sanitation problems are caused by a higher percentage of wrong sanitation attitudes, which calls for change. There has been huge investment in the provision of water and sanitation facilities by government and other state agencies as well as donations and charity work by religious groups and NGO's to that effect. However, complaints such as misuse of toilets, poor hygiene practices have been coming up daily and this brings attention to the fact that without proper attitude and change of behavior regarding these facilities, they will be useless. Therefore behavioral approach to water, sanitation and health is pertinent, taking into consideration five new measurable varia-
bles that should have a positive outlook when intervening for a change. These are: risk factors, attitudinal factors, normative factors, ability factors and self-regulation factors.

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<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>Good water and sanitation play a key role in addressing core challenges of developing countries, which include poverty and hunger, adequate human health facilities, reduction in child mortality, and protection of natural resources. Provision of easy access to domestic water and also effective sanitation facilities are crucial in improving the lives of people making these two elements very important in the achievement of the millennium development goals which aims at helping developing countries to mitigate the challenges mentioned above (Lenton, Lewis &amp; M. Wright, 2008)</td>
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<tbody>
<tr>
<td><strong>Abstract</strong></td>
<td>Johnston, Teague and Graham (2015) examined the challenges of Neglected tropical disease and water, sanitation and hygiene integration programs. The study reveals that the integration play major role in controlling and eradicating a lot of tropical diseases. However, there are some factors that impede the effective integration and thus performance of the program. These challenges are: the different objectives of the two sectors, difference in the scale of funding, lack of coordination and sharing of information among the two areas, more focus on mass drug administration as compared to the other sector.</td>
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<tr>
<td><strong>Abstract</strong></td>
<td>The intervention in the improvements of water, sanitation and hygiene infrastructure, coupled with the promotion of behavioral activities will aid the achievement of controlling and eradicating many neglected tropical diseases. The next procedure is to combine the wash programs with the other disease control programs, therefore integration of the two. The outcome of a joint meeting among stakeholders of WASH, NTD’s (Neglected Tropical diseases) and child health, with an objective to build upon their collaboration.</td>
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## Appendix 4. Data search words and search process in numbers

<table>
<thead>
<tr>
<th>Data Base</th>
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