Challenges facing Wastewater Management in Fast Growing Cities in Tanzania: A Case of Dodoma City Council

Anna I. Wawa
The Open University of Tanzania
anna.wawa@out.ac.tz

ABSTRACT

The main objective of this study was to examine the challenges facing the Urban Water Supply Authorities in fast growing cities on wastewater management, Dodoma City as a case study. The study used field observation and interview methods to collect data. The primary data were complimented by literature search to enrich the findings. Purposive sampling to Dodoma Urban Water supply and Sewerage Authority (DUWASA) and City Council Health officials was adopted to obtain the required information for this study. The findings revealed the major challenge facing DUWASA to include rapid expansion of the city associated with lack of funds for extension and rehabilitation of infrastructure. However, there is a minimal use of the available wastewater systems by the current population due to high cost of installation. The study recommends collaborative efforts by DUWASA and Dodoma City Council on the expansion of sewerage system to match with the current growing speed of the City. The study recommends for The Ministry of Water and Irrigation Tanzania to support DUWASA to execute its planned project of constructing larger waste stabilization ponds away from the residential areas.

Key words: Wastewater, wastewater management, sewerage, waste stabilization ponds

INTRODUCTION

The global sewage generation is increasing at an exponential rate as a result of rapid population growth and urbanization (Bleninger and Jirk, 2008), all of which are exerting pressure on water system infrastructures. There have been concerns that with the current world' rapidly growing population, the trend of shifting from rural areas to urban settlements is likely to continue, and the overall growth of the world's population could add another 2.5 billion people to urban areas by 2050, with close to 90% of this increase taking place in Asia and Africa (Bodo, 2019). In addition to rapid population growth and urbanization, poverty has been a big

challenge facing the third world countries. World Bank and the United Nations Millennium Development Movement define poverty using an income threshold (at purchasing power parity) of US$ 1 a day per person for Africa. Lusambo (2016) in his study in Tanzania found that using selected poverty lines: overall, 29.3% - 98.2% of the households are poor. In rural areas, 24.5% - 96.8% of the households are poor. In peri-urban areas, it was found that 20% to 100% (depending on the poverty line used) were poor, while in urban areas the poverty rate was found to be between 37.1% and 99%. According to Tanzania Human Development Report, Dodoma is among the 5 lower ranked regions in Tanzania based on human development index (UNDP and URT, 2017).

In Tanzania, taking into account the high urbanization rate, the population in the 20 biggest towns will increase to 13.8 million people by 2020 and about 26 million people by 2030. It should be note that currently, 74% of the population lives in Low-Income Areas. In most cases, the unplanned inhabitants of these Low-Income Areas have inadequate access to basic services such as safe water and adequate sanitation (Pauschert *et al.*, 2012). The increase of slums in cities for instance, has been making thousands of people live in appalling housing structures and without facilities like sewerage, electricity, water or paved roads (Hove *et al.*, 2013). Hove further argues that social services like transport, energy, communications and water supply are among the municipal services that are often inadequately provided. This inadequacy has caused dissatisfaction to customers of utilities and they have become reluctant to pay user charges. This erodes the tax base, which in turn, the governments both at the central and local levels find themselves with insufficient funds to maintain or upgrade the existing facilities. Dodoma is among the fast-growing cities in Tanzania; the reason accounting for this speed is the shifting of the capital functions from Dar es Salaam to Dodoma. The establishment of Dodoma as a Capital City was conceived some decades ago, but it came into reality in 2015 when the government of the United Republic of Tanzania, under the leadership of his Excellency Dr. John Pombe Magufuli, deliberately implement this idea. Shifting of capital functions has been in concomitance with shifting of people, capitals/assets and investment opportunities, which have resulted to rapid population growth and expansion of the city that created more demand for land, social services and increase of waste production.

This requires efficient wastewater treatment techniques to manage liquid wastes emitted from residential, industrial and commercial areas. Dodoma urban, is the jurisdiction operational area for Dodoma Urban Water Supply and Sanitation (DUWASA). DUWASA was established on 1st July 1998 as per Act No. 8 of 1997. It is full autonomous entity with the legal mandate to provide clean and safe water and sewerage services to the urban area of the Dodoma City council. The authority was subsided by an Urban Water Department which also took over from the Capital Water Engineer in 1996. However, the sewerage system remained under Capital Development Authority (CDA) until in the year 2002, when it was handed over to DUWASA. The Authority is in category "A" which therefore is obliged to meet all operations and maintenance cost plus some capital investment. This implies that construction and maintenance of sewerage systems are the obligations of the Authority (DUWASA Annual Report, 2018).

Wastewater treatment and management is the overall process that involves the improvement of the quality of wastewater between points of production and points of discharge. This process is aimed at improving the physical, biological and chemical properties of wastewater to eliminate both the known and emerging contaminants from the wastewater eventually available for release into the environment (Bruce *et al*., 2015). Donde (2017) asserts that, biological treatment has gained much ground over other methods since it has become an important and integral part of any wastewater treatment plant that treats wastewater from different sources having soluble organic impurities or a mix of different wastewater sources. Biological treatment using aerobic activated sludge process has been in practice for well over a century and is undergoing more and more modification and improvements.

According to Pauschert *et al.* (2012), only 10 out of the 20 public service providers operate a rudimentary sewer system. The respective coverage is presented in brackets behind the name: Mwanza (3.1 %), Moshi (5.8%), Arusha (7.0 %), Dodoma (11.6 %), Iringa (11.9%), Mbeya (0.6 %), Morogoro (1.6 %), Songea (3.7 %), Tabora (1.3 %), Tanga (9.3 %) and Dar es Salaam (4.8 %). Pauschert *et al*. further observe that, only 30% of households with on-site sanitation facilities empty their facility relying on contractors or cess pit-emptier. Many households simply shift the facility to another place as long as space is available. Often people refrain from using emptying services, because of the high cost for those services.

However, wastewater management is crucial in protecting public health by preventing diseases as well as environmental pollution from sewage contaminants. A large volume of untreated wastewater has been dumped directly into the water streams threatening human health and ecosystem biodiversity resources (United Nations World Development Report II, 2006).

Early in the 19th century, the English scholar Reverend Thomas Malthus published "An Essay on the Principle of Population." According to Malthus, while resources tended to grow arithmetically, populations exhibited exponential growth. Thus, if left unrestricted, human populations would continue to grow until they would become too large to be supported by the available resources. Humans would outpace their local carrying capacity, the capacity of ecosystems or societies to support the local population. Malthus proposed alternative to moral restraint that, if allowed to grow unchecked, population would outstrip available resources, resulting in what came to be known as Malthusian catastrophes naturally occurring checks on population growth such as famine, disease, or war.

Malthusians would cite epidemics and starvation in overpopulated urban slums, as natural checks on growing populations that have exceeded the carrying capacities of their local environments. Proponents of this theory, Neo-Malthusians, state that these natural checks such as famines were examples of Malthusian catastrophes. On a global scale, however, food production has grown faster than population due to transformational advances in agricultural technology. It has often been argued that future pressures on food production, combined with threats to other aspects of the earth's habitat such as global warming, make overpopulation to be still a more serious threat in the future (https://socialsci.libretexts.org.). This theory is relevant to this study as it relates the population growth and utilization of resources. As stated before, the exponential growth of Dodoma city exerts pressure on available social services including water infrastructure. Urbanization theories also apply to this study. According to Bodo (2019), urbanization is the steady increase in the number of people living in cities or urban centres. The urban growth results from the continuous mass movement of people from rural settlements to urban areas or the movements between urban areas. It can also result from natural increase through high fertility rates accompanied with low mortality rates. Bodo further argues that, when people move in their numbers to a particular location, there will be pressure on the available

resources. In the case of this study, the influx of people from other towns to Dodoma is expected to exert pressure on the existing infrastructures.

Varon and Mara (2004) acknowledge the wastewater stabilization ponds (WSPs) as the most appropriate method of domestic and municipal wastewater treatment in developing countries, where the climate is most favourable for their operation. According to Varon and Mara, WSPs are least-cost, low-maintenance, highly efficient, entirely natural and highly sustainable. The only energy they use is direct solar energy, so they do not need any electromechanical equipment, saving expenditure on electricity and more skilled operation. WSPs are particularly suited to tropical and subtropical countries since sunlight and ambient temperature are key factors in their process performance. Dodoma region being a tropical region its climate favours the optimal operations of WSP. Varon and Mara, describe WSP are man-made earthen basins, comprising of the series of anaerobic, facultative and, depending on the effluent quality required, maturation ponds (Figure 1). Basically, primary treatment is carried out in anaerobic ponds, secondary treatment in facultative ponds, and tertiary treatment in maturation ponds. Anaerobic and facultative ponds are for the removal of organic matter (normally expressed as "biochemical oxygen demand" or BOD), Vibrio cholerae and helminth eggs; and maturation ponds for the removal of faecal viruses, faecal bacteria like Salmonella spp, Shigella spp. and pathogenic strains of Escherichia coli, and nutrients (nitrogen and phosphorus). Due to their high removal of excreted pathogens, WSPs produce effluents that are very suitable for reuse in agriculture and aquaculture (Varon and Mara, 2004).

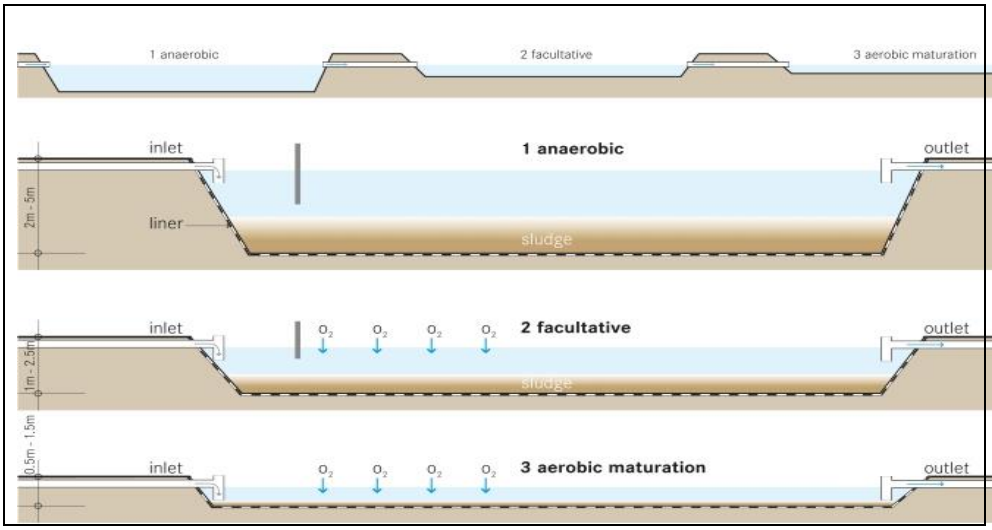

Figure 1: Structure of Waste Stabilization Ponds
Source: https://en.wikipedia.org/, accessed March (2019)

The use of aerobic wastewater treatment as a reductive medium has been receiving increased interest due to its low operation and maintenance costs. WSP performs well in pathogen and nutrient removal thus leaving the effluent being nutrient-rich for farming purposes. Mkude and Saria (2014) comment that wastewater effluent if efficiently treated, contributes to water resource conservation and expansion of irrigated land. It also reduces the disposal problem hence protecting the environment and improves public health. However, WSP system comprising only anaerobic and facultative ponds produces an effluent suitable for restricted irrigation only (for all crops except salads and vegetables eaten uncooked and for discharge to a stream, river or lake). Maturation ponds are needed if the effluent is to be used for unrestricted irrigation. However, in all cases, the appropriate design calculations must be done to determine whether or not suitable effluents will be produced (Varon and Mara, 2004).

WSP technology has been adopted by Dodoma Urban Water Authority in treating wastewater. The trunk sewer has the capacity of serving 423,000 people. However, the system had served about 40,000 people by 2018, which is only 10% of Dodoma City population. Only few areas have been completely covered by lateral sewers of 23 km length. Wastewater from this system is finally treated by waste stabilization ponds [WSP] which are located at Swaswa area (DUWASA Report, 2018). Interview with DUWASA sewerage and environmental engineer revealed that WSP in Dodoma were designed 30 years ago considering the number of people at that time. WSP are located at Swaswa area about 7 km from the city centre, in north eastern part of Dodoma town, the area which is now surrounded by residential houses. It is a place where wastewater is transported from different parts of the city through sewerage system and on-site sewage facilities. Sewerage engineers furthermore revealed that the available ponds were constructed for temporary use before the permanent WSP was constructed at a distant area from the city. Unfortunately, the temporary ponds are still used to-date regardless of the increase in the population. Additionally, the constructed ponds are not fully utilized due to incomplete construction hence not allowing the completion of treatment process. The structure of WSP consists of two anaerobic and two facultative ponds working in series only, no maturation

ponds at all.

Lack of maturation ponds makes the wastewater effluent not suitable for unrestricted agriculture due to a risk of contamination of crops. However, the surrounding community is tempted to use the partially treated wastewater for irrigation purposes which threatens the health aspect of the surrounding society. Dodoma region being semi-arid area experiences severe shortage of water, and farming activities are competing for the scarce water sources with industrial and municipal users. Alternatively, farmers use wastewater directly to their farms and for construction purposes. This study therefore intended to investigate the challenges facing the DUWASA in managing wastewater and to identify the associated impacts. Specifically, the study intended to: examine the extent to which the existing sewerage system in Dodoma city is utilized. Secondly the study examined the challenges facing DUWASA in managing wastewater in Dodoma city, and finally, the impact of sewage disposal in relation to health aspects of people in Dodoma city. The findings emanating from this study provide feedback to the responsible authority aiming at exposing the challenges hence recommendations for improvement of wastewater management. This information is also vital for policy makers at ministerial level to make them facilitate establishment of a comprehensive and sustainable wastewater infrastructure and conservation measures.

METHODOLOGY

The Study Area

The study was conducted in Dodoma City Council. Dodoma City is the new national capital of The United Republic of Tanzania and the capital of Dodoma Region. According to 2012 census, Dodoma had a population of 410,956 (NBS 2012). However, the discussion with the responsible officer at National Bureau of Statistics indicated the difficulty of projecting Dodoma city population due to the currently high influx of people in Dodoma following the shifting of Capital city from Dar es Salam to Dodoma. Dodoma town was founded in 1907 by German colonists during construction of the Tanzanian central railway. The literal meaning of Dodoma originally '*Idodomya*' in a native (Gogo) language is translated as 'it has sunk'. The natives give a history of an elephant which sunk in a wetland. The city is seen as lowland sunk in-between hills. It is in a semi-arid region with relative warm temperature throughout the year

(Dodoma City Council Profile, 2016). Dodoma city is located at 6.17 latitude and 35.74 longitudes and it is situated at an elevation of 1,125 metres above sea level. The city lies in the heart of Tanzania in the central part of the country, 450 km west of Dar es Salaam. Dodoma city lies on a strategic cross road including The great North road with access to Arusha and Kenya in the north; Morogoro to Dar es Salaam in the east; Iringa and Mbeya to Zambia in the south and Singida to Kigoma and Mwanza, in the West (Figure 2) .

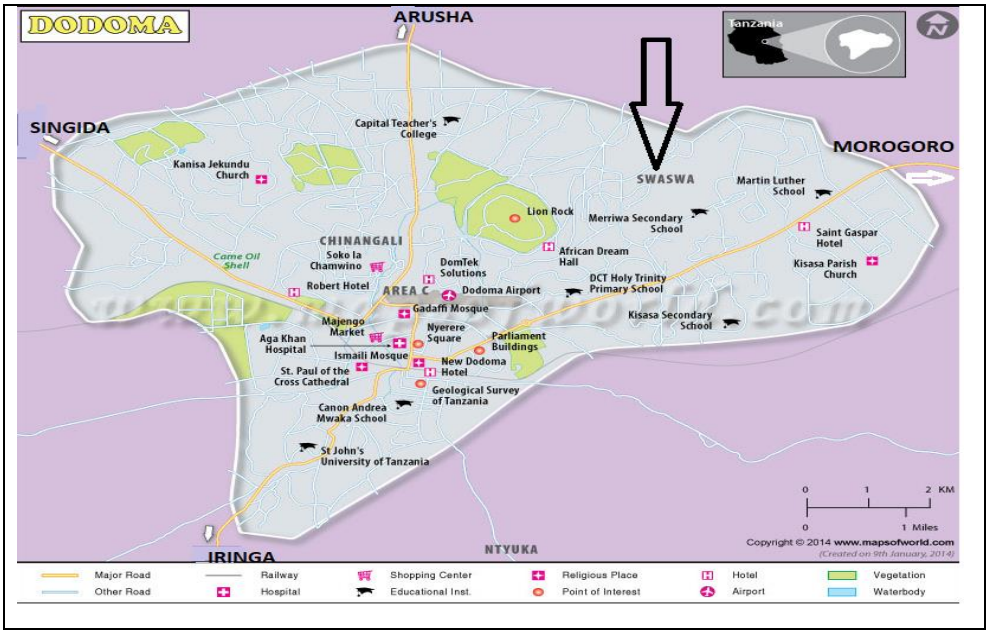

Figure 2: Dodoma City Council showing its location and bordering regions https://www.google.com/search

According to Dodoma City Profile, about 75% of the people's income in the Municipality is from agriculture and animal husbandry. 25% of the population is engaged in petty businesses such as retail shops, carpentry and food vendors. Other activities include small and medium industries, consultancy and construction work. The main industrial products are wine, mattresses, furniture and mineral water. Others include honey, wax and herbs from the forests. Per capita income is estimated to be Tshs 407,486. Dodoma was selected to represent the fast-growing cities in Tanzania which have been experiencing challenges of wastewater management. The study involved three officials from Dodoma Urban Water Supply and Sanitation Authority including: Sewerage and Environmental engineer, WSP attendant; and head of Municipal Health

Department. These officials are dealing with wastewater management and were purposively selected to provide information related to the study objectives.

Methods

The study adopted a case study approach to allow the in-depth investigation of challenges facing DUWASA in managing wastewater in a fast-growing city of Dodoma. Two sources of data were collected: primary data were obtained from field survey and secondary data from documentary reviews. For primary data, the study used interview and field observation to collect data to substantiate various issues pertinent to wastewater management in the study area. An interview schedule was used for face-to-face discussion with DUWASA and City council officials while observation activity was guided by a list of issues to be observed in the field. Interviews enabled the researcher to have detailed in-depth discussions with responsible officials to meet the main objective of the study. Pictures were taken during the field visit to illustrate the real situation of sewerage system management and waste water stabilization ponds at Swaswa area. The collected data were primarily qualitative in nature hence necessitated the use of content analysis. Qualitative data analysis involved ideas and opinions which are categorized into themes, this kind of data use verbal statements or explanations. Documentary review involved secondary data derived from second hand information; information that is already documented elsewhere. Secondary data collection is cost effective and provides data that are permanent as well as available in a form that can be checked by others (Kothari, 2004). In this regard, the researcher used a number of documents including organizational profiles, annual reports and literatures including books, journal articles, published and unpublished materials available online relevant to the topic. This helped the researcher to get wider understanding of the topic, be able to analyze data and make conclusion and give recommendations.

FINDING AND DISCUSSION

The Extent of Use of the Available Sewerage System

DUWASA reports show that only 10% of the Dodoma city population is connected to sewerage system while the remaining 90 % use other means of disposing waste water. Sewerage coverage network by the year 2018

was 89.4 km (Figure 3). The number of households connected to sewer was 5,760 houses including commercial areas and institutions.

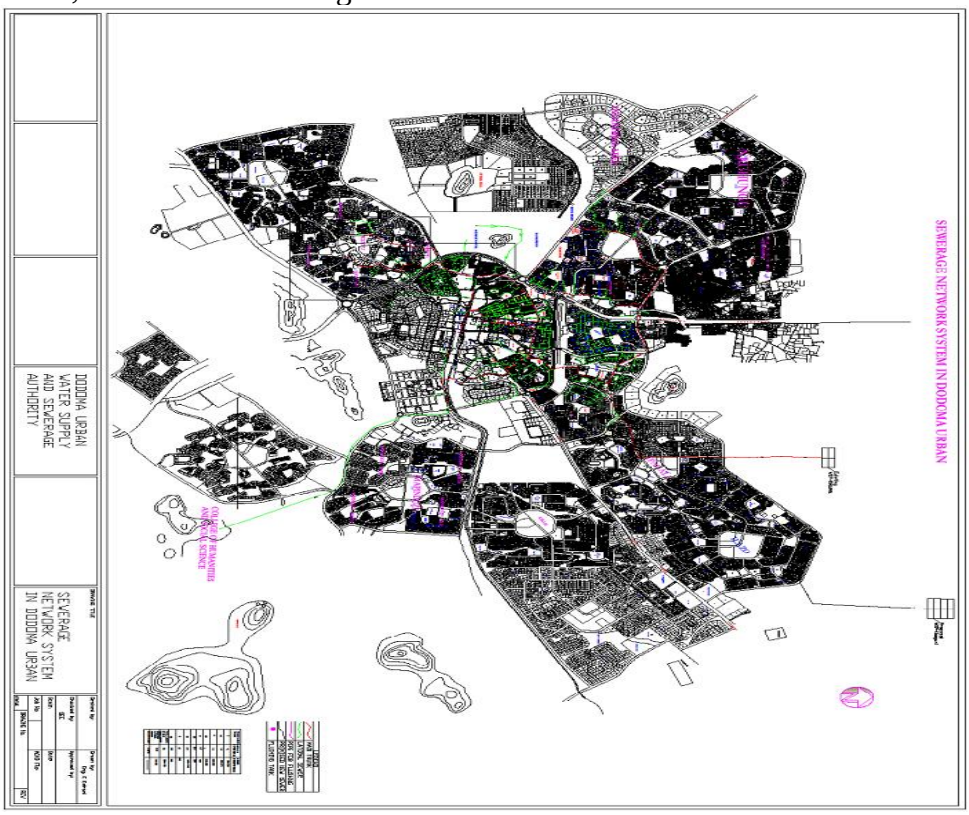

Figure 3: Sewerage network within Dodoma city (indicated by green lines)

Source: DUWASA (2018).

This study found that those houses which were very close to the sewerage system were connected to it. However, only few houses and commercial centres were connected to the sewerage system. Discussion with DUWASA sewerage engineer revealed the reasons for the small percent use to be unwillingness of residents due to high costs. This is due to high connection fees and maintenance as the users are supposed to pay in their monthly water bills. These findings tally with Pauschert *et al.* (2012), who found that the sewer network for Dodoma was 11.6% at that time, and the reason for this was high connection fees that discouraged the potential customers. The current coverage seems to be lower as a result of the expansion of the city which has increased the area to be covered. Connection to sewer network, according to sewerage engineer is safe for

human health and environment since the sewage is carried into pipes to the waste stabilization ponds (Figure 4).

Figure 4: Sewerage pipes in Makole street transporting wastewater to Swaswa WSP

Source: Field survey (2018).

DUWASA uses WSP to treat wastewater naturally. During the site visit at Swaswa area, four ponds were observed where only two of them were in use and the remaining two were under construction. The frequency of empties visiting the ponds was observed to be high with the average of 5 trunks per hour. One of the ponds maintenance challenges observed was emptying of sewage outside the ponds particularly during rainy season when the roads towards the ponds are not easily passable. This contaminates the environment causing bad smell and unattractive surroundings thus greatly posing a health risk to the nearby community. Interview with sewerage engineer revealed that the small percentage of sewerage system users was caused by high connection fees that kept at bay the potential customers. The estimated costs were that, only 10 metres length of the system, would cost about Tshs. 100,000 equivalents to USD 43, that means a person whose house was one kilometre from the system would be required to pay about Tshs 1,000,000 equivalent to (USD 435) to be connected to the system. As revealed in the literature, Dodoma is among the 5 regions categorised as lower human development level, characterized with low-income residents. The connection fee is relatively high to the majority of citizens who live below poverty lines as asserted by Lusambo (2016). In addition to connection fee is monthly charges hence unaffordable to a normal low-income earner.

Interview with the City Council Health department officer revealed other methods of disposing waste water in Dodoma city were septic tanks, sewerage ponds, and storm water drainage. Use of septic tanks is the main method of disposing waste water in Dodoma city. During site visits, septic tanks were observed in many houses in the study area. Septic tanks are large air-tight holes in the ground lined with bricks or concrete with an inlet pipe for incoming sewage and outlet pipe for treated sewage. The tank has a removable concrete cover with air vents for gases to escape. In emphasizing this, the municipal health officer had these to say;

> *Septic tanks were ascertained as more hygienic because sewage does not come out to the ground surface and does not occupy floor area on the roadsides or impair the beauty of the surroundings*

Sewer trunks come to suck sewage in households, transport and dump it into sewage reservoir pond at Swaswa WSP (Figure 5).

Figure 5: Trunk emptying collected wastewater to WSP at Swaswa in Dodoma

Source: Field survey (2018)

However, carefulness is required in handling sewage in septic tanks. This is substantiated by a study by Marshall (2005) in Jakarta. The author found that in Jakarta, there were more than one million septic tanks in the city, but they were poorly maintained and had contaminated the ground water with faecal coli form bacteria. The contents in tanks (untreated) were often emptied illegally into water ways. During interviews with DUWASA officials, it was revealed that during rainy season septic tanks do overflow hence their users opt to empty their contents in seasonal rivers and water channels thus posing health risks to city dwellers. Storm water drainage is another method used to dispose sewage in the study area. In this method, people construct small outlets at the ground level that discharge wastewater into storm water drainage constructed by the city council. This was mainly observed along market places and the houses located close to the storm drainage system, the sewage flows directly to the drainage and is carried to natural rivers. Since the water in storm drainage system mixes with wastewater, it is exposed to the environment. Again, posing health risk as some people are tempted to use it for irrigation of rice farms and children sometimes play with it.

The Challenges facing DUWASA in Wastewater Management

The study revealed challenges facing wastewater disposal in Dodoma city including financial constraints, incomplete construction of WSP, and use of partly treated water for agriculture, and the low use of the existing sewer network by the customers.

Financial Constraints

Interview with the sewerage engineer revealed that DUWASA was facing financial problems which were hindering the required department from connecting all the houses to the sewage network and maintaining the existing sewer system. With a particular focus on this, the engineer narrated that,

> *Financial problems hinder the reconstruction of the lines which are frequently affected by salinity and gases. There have been frequent collapses of concrete pipes which require frequent maintenance but suffer from lack of funds. Lack of funds also hinders the expansion of the network to new customers. Additionally, our customers fail to connect to sewer system due to high installation costs. As a result, DUWASA provides services to only 10% of the total population of Dodoma city.*

The Use of Temporarily Constructed WSP in Dodoma City

According to sewerage and environmental engineer, WSP at Swaswa lack maturation pond which is an important stage in the biological waste water treatment. Again, the current WSP are confined; surrounded by residential areas in such a way that there is no room for extension and for that they pose potential risk of health to the surrounding community. Generally, the current waste water treatment units do not meet the Tanzanian standards to the effluent and how to reduce the environmental impacts to the surrounding. Functioning of WSP is also affected by shortages of unblocking tools and equipment to disludge the ponds as revealed by WSP attendant. This causes a high concentration of dirtiness (Biological Oxygen Demand (BOD) that affects the functioning microorganisms to decompose the wastes.

Blockage of Sewerage System and Use of Partially treated Wastewater

The interview with Sewerage engineer revealed the problem of frequent blockage of sewerage system caused by solid waste entering into the system,

> *Overflowing of sewage in the city is a common problem. This is often caused by blockage of chambers. This has been reported to be caused by residents who illegally use the sewerage system to dispose solid wastes into sewers. Furthermore, the scattered solid wastes particularly plastic bags also enter the open chambers. Blockage of sewerage system discourages other users to continue using the sewerage system and therefore opt to use other methods.*

Bodo (2019) argues that high rates of urbanization affect land, water, and air because of the large number of people, the number of buildings and the increased demands on the available resources in the cities. The lack of sanitation and sewerage systems has been leading to the blockage of the drainage system thus causing flooding in cities. Topographical structure of Dodoma city, being a low land is prone to flooding particularly during heavy rains. This has caused a mixing up of wastewater from septic tanks and blocked chambers to environment natural streams which are health risky to surrounding community. The use of partly treated wastewater was also revealed by the study. During field visit at Swaswa WSP, the

researcher observed people using the waste water in the first pond that is, the one not partially treated for irrigation activities.

The study by Mkude and Saria (2014) revealed the poor performance of WSP in Dodoma in BOD, Nitrogen and Phosphorus removal, which was associated with poor construction and partial completion of WSP, lacking maturation stage. This stage is essential for polishing wastewater and nutrient as well as pathogen removal. Sewerage engineers further explained the challenges they were experiencing as the Authority when trying to prohibit the use the partially treated water; sometimes they were meeting resistance from the residents surrounding the areas who were using this water for irrigation and construction activities. The WSP attendant claimed to have sometimes been threatened by the users of the wastewater hence hindering him from efficiently discharging the operations of WSP. Furthermore, he disclosed that there were some elements of underground politicians' influences supporting the community to use the wastewater regardless of its danger to their health. He had these to say,

> *Politicians including ward Council members and parliamentary members, particularly during election period, tend to side with community members pretending to deal with their concerns while preventing professionals to perform their duties.*

DUWASA's Future plans for Improving Wastewater Management

During interview with DUWASA officials, the following were revealed as future plans of the Authority to cope with the fast growth of the city; first is to extend the sewer network to about 250km for trunks, sub trunks and lateral sewer. Secondly, is to construct trunk sewers from the existing ponds (Swaswa area) to the new proposed site for waste stabilization ponds (WSP) at Nzuguni area. A third plan is that the Management of sewer disposal trucks (Exhosters) should equalize the cost based on the size and volume relatively to the disposal cost

Impacts of Sewage Disposal to the Public health

Discussion with Dodoma City health officer, revealed the eruption of epidemics like typhoid, malaria and dysentery which are directly associated with poor sewage disposal. It was revealed that vectors for the

disease were being nurtured in the stagnant water that had been created in sewage outlets, drainage, puddles, and ponds. According to Dodoma City Council Profile; the top 6 frequently occurring diseases in Dodoma City included; malaria, urinary tract infection, diarrhoea, skin infections, pneumonia and intestinal infection. Most of these are bacterial diseases associated with the contaminated environment. The stagnant water influences the breeding of mosquitoes and other water born disease vectors. In addition, discussions with the health officer affirmed that these diseases were mostly affecting children because they normally used to play in storm water streams. This scenario is in line with WHO report that; worldwide, 2.2million of people die each year from diarrhoea and over half of the world's hospitals beds are filled with people suffering from water borne disease (UNDP, 2006). The experience of the researcher being a resident of Dodoma City for 28 year agree with WHO report, the most frequently mentioned diseases in Dodoma include typhoid, cholera and Malaria. All these are linked to the contaminated environment.

CONCLUSION AND RECOMMENDATIONS

Urbanization has given rise to several challenges or problems such as, the build-up squatter settlements and spread of diseases, inadequate waste disposal and poor sanitation. Responsible authorities should come up with workable solutions through review and implementation of policies. Managing of sewage is intrinsically linked to management of the entire water chain. Sewage disposal is an everyday activity as it is intertwined with domestic, industrial, commercial, and agricultural activities. Meanwhile, poor sewage disposal influences the spreading of water borne disease, air pollution, and awful environment. The study recommends the following: there should be collaborative efforts by DUWASA and the City Council to facilitate smooth functioning of wastewater treatment in Dodoma to match with the current growing speed of the City. The responsible Ministry should support DUWASA in executing the planned project of constructing larger Waste Stabilization Ponds away from residential areas. DUWASA should also continue to create community awareness on guidelines of reuse of wastewater for agriculture and the associated dangers. The assessment of wastewater quality after WSP treatment should be done to reduce the impacts on the public health and environment at large.

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