INOSR APPLIED SCIENCES 12(2):15-23, 2024 ISSN: 2705-165X
©INOSR PUBLICATIONS INOSR12.2.1523
International Network Organization for Scientific Research
https://doi.org/10.59298/INOSRAS/2024/12.2.152300

The Challenges and Way Forward of Pollution: A Case Study of Makindye Division, Kampala Capital City

Waiswa Abel and Womuzumbu Moses

School of Natural and Applied Sciences, Kampala International University, Uganda

ABSTRACT

The goal of the research was to examine the problems with pollution and provide a case study of Kampala, the capital city, specifically in the Makindye division. Air, water, land, and noise pollution were the types of contamination that were examined. When pollutants are introduced into a natural environment, they can cause instability, disorder, harm, or discomfort to living things or physical systems that make up the ecosystem. This is known as pollution. Many human activities, including those in industries, transportation networks, and crowded constrictions, harm the environment in the Makindye Division. This procedure generates a significant number of pollutants. Many regions of Makindye, including Nsambya, Kibuye, Buziga, and many more, were selected as sample places for the study. The research design, data types and sources, data collection techniques, data processing procedures, data presentation and analysis, and constraints were all included in the methodology. Data for the research project was gathered over many weeks using a cross-sectional approach. The study included two primary methodologies: questionnaire surveys and participatory techniques. in every zone that has been chosen. Information access was one of the study's limitations. The largest obstacle, according to many respondents, is ignorance and a lack of environmental consciousness. Environmental education and awareness campaigns are effective ways to prevent pollution in metropolitan areas, however, the major harm that pollution does is to human health. The public ought to be informed and involved in the assessment of the effects substances and activities have on health and the environment. However, some respondents pointed out that the KCCA frequently fails to involve the public in important issues that affect them, such as construction projects, where buildings are frequently raised without the approval of the public.

Keywords: Pollution; Challenges; Way Forward; Makindye Division; Kampala Capital City

INTRODUCTION

When dangerous materials or toxins are released into the environment, it disrupts the ecosystem. This is known as pollution.[1]. It affects the four spheres that make up the earth that is to say: the hydrosphere (the water), the atmosphere (the space above the earth which is made up of air), the biosphere (where life takes place), and the lithosphere (the rocks and minerals. Each sphere is affected by a different form of pollution where the atmosphere is mainly affected by air pollution because it is mainly concerned with the air, the hydrosphere is affected by water pollution because this deals with water specifically, and many others[2]. The harmful substances that cause pollution are called pollutants. Pollutants can be natural such as volcanic ash which is caused during volcanic eruption and they can also be created by human activities such as trash or runoff caused by factories, agricultural activities, and many others[3, 4]. The challenges of pollution are the outcomes of pollution to the environment that are negative or positive but mainly the negative part takes the largest position according to the definition of pollution. And the challenges come in depending on how one has been utilizing the environment and at the moment he/ she cannot get what he has been getting from that practically part of the environment[5, 6]. Then the way forward these are the possible solutions towards the challenges of pollution and how best they can be minimized so that the natural environment can be restored and sustainable development also can be attained at the same time[7–9]. Pollution prevention refers to actions that decrease the quantity of pollution produced by various processes, such as consumer consumption, transportation, industrial production, and farming operations. Pollution control aims to mitigate the environmental effects of pollutants

rather than simply managing their presence. The pollution prevention strategy aims to enhance the efficacy of a process, therefore decreasing the quantity of pollution produced at its origin. While there is a consensus that source reduction is the most desirable approach, some experts also use the term pollution prevention to encompass recycling or reuse [10–12]. Regrettably, public agents and metropolitan authorities lack sufficient capacity to effectively address pollution control mostly owing to insufficient public finances. Global debate persists on the two essential aspects concerning the environment: human needs and the future of the ecosystem. Waste and rubbish are significant sources of pollution in the Makindye division. However, the disposal rate is high and the collection process is inadequate. Only a small number of households can afford to pay for garbage disposal. Large quantities of waste are indiscriminately disposed of in many suitable locations, such as backyards, roadsides, water bodies including swamps and lakes (e.g., Lake Victoria in Ggaba), trenches, and open fields. Several unidentified areas in the Makindye division progressively transform into dumping sites. There are several locations with poor road conditions across the streets, with the most problematic areas being Nabutiti, Kansanga market, Buziga Street, Kisugu Road, and several others in the Makindye division. The contamination of urban water sources in the Makindye division is most severe during rainy seasons since uncontrolled surface runoffs flow via water channels and ultimately land up in water trenches, such as in Nabutiti. The Nabutiti water trench in the Makindye division serves as a collection site for both non-point source pollution and point source pollution. This leads to the pollution being directed to Lake Victoria, hence contributing to the increased rates of air pollution in the Makindye division. The gathered content comprises of surface runoff, industry discharges, and residential discharges in the form of both liquid and solid waste. The untreated combination flows directly into Lake Victoria. Atmospheric pollution mostly manifests as air pollution; however, noise pollution is also a significant issue. In the Makindye division, the primary sources of outdoor noise (undesirable sound) are bars, construction sites, and transportation systems. Noise is primarily caused by inadequate urban planning and corruption among some authorities. The central business centre is crowded with several retail malls, small and twisted roadways, a large number of street hawkers, and heavy traffic. Not only do these make excessive noise, but they also emit air pollutants. Makindye Division is home to several food processing industries, as well as a prominent manufacturing industry located near public facilities like as schools, hospitals, and residential areas. This manufacturing process is a significant emitter of hazardous gases. Additional sources of air pollution include the presence of sandy roads across the majority of the city and the unpleasant smell emitted by decaying rubbish.

METHODOLOGY

Research Design

The research study was carried out over several weeks and it used two major approaches that is to say participatory and questionnaire. The area of analysis was the challenges and way forward to pollution a case study of Makindye division and the information was obtained from the people in the selected places of Makindye division. The sampling design selected three parishes that participated in the study and included Kansanga, Makindye, and Ggaba out of the five parishes that make up Makindye division. Due to restricted resources and the high expense of accessing the whole Makindye division, just three parishes were chosen for the study. This decision was made because of the scarcity of both time and money. For the study, one local leader (LCI) and a small number of community members were chosen from each of these parishes. The observation design involved the chosen participants engaging in meticulous observation of their surroundings and actively participating in the debate and analysis of the community situation. The study included a statistical design in which participants were asked to rate various forms of pollution, identify the issues associated with pollution, and provide potential solutions for addressing pollution in the Makindye division.

Study Area and Population

Makindye division is one of the five administrative divisions within Kampala capital city of Uganda and it was formed as a division in 2006 before that it was part of the larger Makindye Ssabagabo Municipal Council. It is located in the southern part of Kampala and it is known for its mix of residential, commercial, and industrial areas. The division is situated to the southwest of Kampala's center business district. Other divisions of Kampala border Makindye division. To the north, it is bordered by Lubaga division, to the east by the central division, and to the west by the Rubaga division. The division extends southwards to the shores of Lake Victoria, providing some scenic views of the lake. The division encompasses a variety of neighborhoods, including Kibuye, Nsambya, parts of Buziga, and

others. It is well connected to the rest of Kampala through a network of roads and public transportation, making it accessible for residents and visitors. The total land area of Makindye division is approximately 48 square kilometers. This area includes both urban and suburban regions within the division. The latitude of Makindye division is approximately 0.2914 degrees south of the equator and longitude32.5915 degrees east. Being in the south hemisphere, the Makindye division is situated near the equator, which means experiences a tropical climate. Makindye division like the rest of Kampala and much of Uganda, experiences a tropical climate. The climate can be described as follows. Temperatures are generally warm and stable throughout the year with an average temperature range of 20°C (68°F) to 27°C (81°F). Rainfall: the region has distinct wet and dry seasonsGenerally speaking, the dry season runs from December to February while the wet season is from March to May and October to November. Particularly during the rainy season, the region has a somewhat high humidity level. The division experiences variable cloud cover and a good quantity of sunlight all year round.

Study Population

The total number of members of a certain species, group, or community that reside in a given geographic location or within a defined territory is referred to as the population. Additionally, it refers to the overall population of a certain region, such as a city, county, division, or the entire planet, when discussing human populations. Population is a basic term in demography and the social sciences, and it may be assessed in a variety of ways. Out of all the parishes in the Makindye division, I considered three parishes for my study. and a participation model, in which the LC chairperson served as the head of each parish and was assisted by a small group of chosen members 15 in each parish, for a total of 45 in all three parishes. Forty-five local inhabitants, chosen at random, were questioned at their places of employment and housing for the questionnaire survey conducted among the population in the three parishes. Participants in the seminars included municipal offices, commercial waste collection companies, and street sellers.

Sampling Techniques and Sample Size

Sampling Techniques

A simple random sampling strategy was used during the study and research process. In this form of sampling, the researcher selects a sample at random and uses it for more studies and research and this is mainly due to the limited resources and information for the study area. The respondent was selected from the three parishes that were selected at first Kansanga, Ggaba, and Makindye. In each parish, 15 respondents were randomly selected who had some information about the challenges and way forward of pollution in Makindye division. And purposive sampling was also used on a special group of respondents.

Sample Size

This refers to the number of individual observations, data points or participants included in a research study, survey, experiment, or statistical analysis. It is a critical aspect of the study's design and is important for drawing meaningful conclusions and making statistical inferences about a larger population. The sample size is typically determined based on factors such as the research objectives, desired level of statistical confidence, and available resources. A large sample size generally provides more representative and reliable results, while a smaller sample size may lead to increased uncertainty and reduced generalizability of findings. Researchers often use various statistical techniques to calculate an appropriate sample size to meet their research goals

Data Collection Materials

The study used participatory approaches and different materials were used to collect data as detailed below;

Note Books and Question Papers

These were employed to gather data on the many forms of pollution, obstacles, and future directions related to pollution in the Makindye Division. It was asked of each participant to record the precise details as stated on the card. Here are a few details that were listed on the cards: obstacles to preventing pollution, individual environmental concerns, the consequences of environmental contamination, and several other issues.

Focus Group Discussion (FGD).

Focus groups were utilized to talk with the locals about ways to reduce pollution and the best ways to repurpose waste items to make a livelihood, such as recycling discarded bottles for other uses.

Questionnaire

This is one of the tools that were used to collect data during the study and here several questions were set by the researcher to the respondent for deeper and clearer information about the causes of pollution, challenges of pollution, challenges faced when controlling pollution, and the way forward to pollution in Makindye division.

Photography

Photographs in this data collection tool, digital cameras are used to take photos and even record videos during the course of the study and these photos and videos can be used to back up the information obtained during the study.

Methods for Data Processing and Analysis

Since this is a participatory study, a sizable portion of the data was created and examined on the spot by the participants. The researchers' primary task was to arrange the data. Data was added, subtracted, categorized, and ordered. The calculations to ascertain percentages were then carried out.

Research Limitations

Depending on the study topic being studied, many researchers encounter both comparable and unique limits in their investigations. Any study's results or the validity of any theory might always be questioned by more research. Most study studies using interactive displays in public spaces are focused solely on exploratory exploration; there are only empirical investigations. The majority of studies take a fairly general approach to analysing the proliferation of large-scale displays in public areas; they pose broad, non-systematic queries and provide purely theoretical responses. The introduction of interactive apps into public areas is part of a larger trend in which the use of computers has become more commonplace and is no longer limited to work-related tasks. Task-oriented theories address just the "how" of an action, not the "why," hence they don't address issues with underlying motives. There is currently a great need to deepen our understanding of the reasons driving user behaviour. The process of interaction is largely unknown, especially when it comes to how interactive displays stimulate onlookers' interest and promote intense user participation. To fully comprehend public interaction processes, real-world studies are necessary; interactive large-scale displays have only just begun to make their way into public spaces following a protracted phase of prototype experimentation. The majority of studies conducted thus far have been in secure sections like labs or educational facilities. Lab-based user research are no longer adequate to completely understand public interaction processes since interaction with public displays happens in both the digital and physical worlds. Instead, real-world setting design is the only way to fully comprehend public interaction processes. Thirdly, because developing a prototype is expensive, the majority of research has focused on single-display applications. Research using multi-display prototypes is quite uncommon as of right now. Access to resources, information, time management, editing, proofreading, and direction and assistance from the organisation and participants are further limiting variables.

RESULTS

Demographic Characteristics of the Respondents

Gender Respondent

The table below shows the gender composition of the respondent in which the percentage of the female respondents was higher than that of the male where 65% were female and 35% were male summing up to the total percentage of 100% of the respondents.

Table 1: Gender composition of the respondents

Gender	Percentage
Male	35%
Female	65%
Total	**100%**

Age of the Respondents

The respondents were asked to show their age bracket and the following data was obtained concerning their age, the findings indicate that 30% of the respondents were between the age of 25-30,22% between the age of 30-40 and 48% were 40 and above.

Table 2: Age of respondents

Age group	Percentage
25-30	30%
30-40	22%
40 and above	48%

Table 3: The harmful effects of pollution in Makindye division

The harmful effects of pollution	Frequency	Percentage
Human Health	30	37.5%
Natural Environment	20	20%
Economy Development	18	22.5%
Social Development	12	20%
Total	**80**	**100%**

Source: Primary data

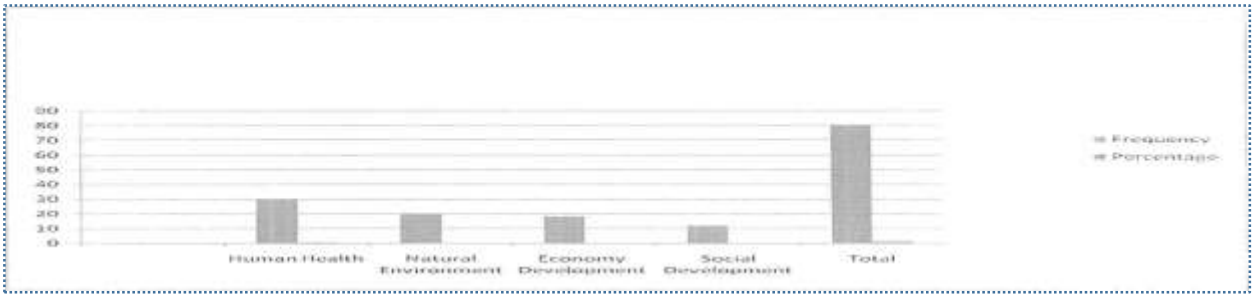

Figure 1: The Harmful Effects in Urban Environment

The results shown in Table 1 above indicate that 37.5% of respondents believed that pollution in urban environments had the greatest impact on human health. While the remaining 25% of respondents claimed that urban pollution mostly damaged the natural environment, another 22.5% claimed that urban pollution primarily affected economic development, with the remaining 15% claiming that it was social development. A graph similar to the one in picture one above may be used to display the data in Table 1. The city's everyday pollution and loudness had a negative impact on people's health; many people complained of persistent headaches, colds, and coughs. Regarding the surrounding environment, many said that Kampala's environment has changed significantly in

a short amount of time and that it is continuously changing. Others expressed concern that there would not be any trees or natural springs in the near future. The locals have lost some of their traditional customs, such as cultivating crops and hunting, as well as an additional pastime known as "Bulungi bwansi," as a result of the contaminated environment and increased human activity.

Challenges of Urban Environmental

The respondents were asked questions on these objectives and the responses are shown in table 4.

Table 4: The Challenges of Preventing Urban Environmental Pollution

The challenges of preventing urban environment pollution	**Frequency**	**Percentage**
Ignorance and lack of environmental awareness	30	37.5%
Citizen apathy	20	20%
Corruption	18	22.5%
Poor quality of local leaders	12	20%
Total	**80**	**100%**

Source: Primary data

In addition, when asked about the difficulties associated with pollution in metropolitan areas, the respondents provided the following responses: 37.5% of respondents cited ignorance and a lack of environmental knowledge. While 25% of respondents claimed that corruption at all levels of environmental management accounted for 22.5% of the problem, citizen apathy, or the lack of interest in public engagement, was cited by 25% of respondents. The remaining 15% stated that one of the biggest obstacles to reducing urban pollution was the calibre of local officials. Because people are uninformed, pollution in the city continues, as the phrase goes. Ignorance is not a defence. The majority were unaware of the damaging consequences that utilising improperly maintained cars may have on the environment, as well as the effects that improper waste management could have on the air, water, and land. The results, however, indicated that a large number of people have no worry whatsoever about the actions of the general population. A good example would be choosing leaders or even participating in nation-building projects, presuming that these are political or that those who stand to gain from the governing party should be concerned. Their indifference then has an impact on the general population and the environment.

The Way Forward to Pollution.

Table 5: The Way Forward to Pollution

The prevention measures of the pollution in urban environment	**Frequency**	**Percentage**
Awareness and environmental education	30	37.5%
Behavioral change	20	25%
Strict government policies	18	22.5%
Involvement of private sectors	12	15%
Total	80	100%

Source: Primary data

The data in Table 2 can be illustrated on graph as shown in figure2 shown below;

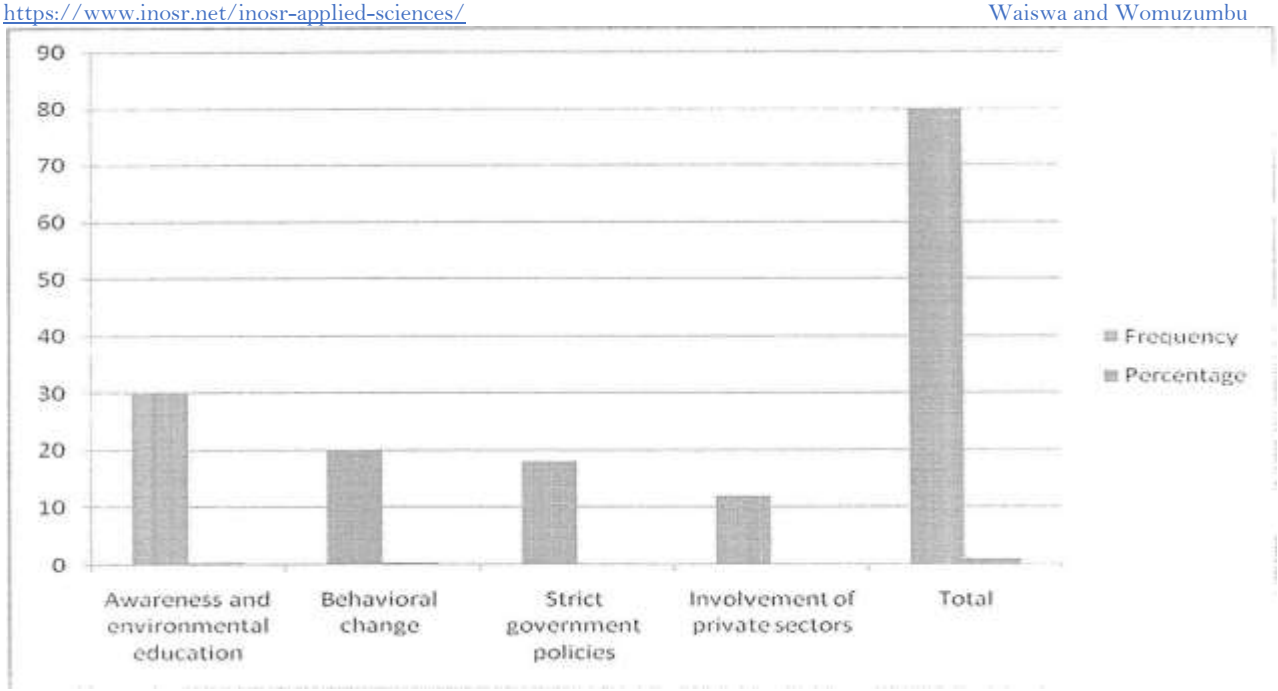

Figure 1 Prevention Measures

A total of 37.5% of respondents stated that environmental education and awareness. However, 25% of respondents claimed that pollution in metropolitan areas may be reduced by adopting positive behavioural changes. Tight government regulations accounted for 22.5% of the total. 15% of respondents said that pollution in metropolitan areas can be controlled by the private sector. The main strategy for combating pollution in all human environments was thought to be environmental education and awareness raising, but many people accused their local leaders of being dishonest and unconcerned with the interests of the community. They further stated that local leaders should plan such events in the event of any schooling. They went on to say that these officials will exploit the policies in a corrupt manner to serve their own interests once they are established.

DISCUSSION

The survey reveals a gender disparity in the Makindye division, with a higher percentage of female respondents (65%) than male respondents (35%). The age distribution suggests that older individuals may be more concerned or affected by environmental issues [13, 14] The majority of respondents (37.5%) identified human health as the most affected by urban environmental pollution, with issues such as headaches, coughs, and colds being common. The degradation of the natural environment and economic and social development were also noted as affected by pollution. Challenges in preventing pollution include lack of awareness and ignorance, citizen apathy and corruption, and poor leadership quality[15–17]. Proposed solutions include increasing environmental education and awareness, encouraging positive behavioral change and implementing strict government policies, and involving the private sector in addressing pollution. The findings highlight the importance of community engagement, effective governance, strict policies, and reducing corruption in addressing pollution. A holistic approach involving education, behavioral change, strict policies, and private sector involvement is necessary to tackle the complex issue of urban environmental pollution[18–20].

CONCLUSION

The study reveals that urban pollution has harmful effects on human health, natural environmental problems, and socioeconomic development. 37.5% of respondents believe that human health is the main concern, while 25% believe the natural environment is the main concern. 22.5% believe economic development is the main concern, while 15% believe it is social development. 37.5% of respondents believe awareness and environmental education are the main measures to control urban

pollution. 25% believe behavioral change is the main measure, 22.5% believe strict government policies are the main way to control pollution, and 15% believe private sector involvement is the main strategy. The main challenges in urban pollution prevention are ignorance and lack of environmental awareness, which is attributed to poor institutional backgrounds, inadequate education systems, and local leaders and politicians involving in activities that provide financial rewards, such as campaigning. The majority of respondents believe that awareness and environmental education are the most effective strategies to control urban pollution. Other challenges include citizen apathy, corruption, and poor quality of local leaders.

REFERENCES

1. Manisalidis, I., Stavropoulou, E., Stavropoulos, A., Bezirtzoglou, E.: Environmental and Health Impacts of Air Pollution: A Review. Front Public Health. 8, 14 (2020). https://doi.org/10.3389/fpubh.2020.00014
2. Hejnowicz, A.P., Ritchie-Dunham, J.L.: Foundational guiding principles for a flourishing Earth system. Business and Society Review. n/a,. https://doi.org/10.1111/basr.12349
3. Shetty, S.S., D, D., S, H., Sonkusare, S., Naik, P.B., Kumari N, S., Madhyastha, H.: Environmental pollutants and their effects on human health. Heliyon. 9, e19496 (2023). https://doi.org/10.1016/j.heliyon.2023.e19496
4. National Institute of Environmental Health Sciences: Air Pollution and Your Health, https://www.niehs.nih.gov/health/topics/agents/air-pollution
5. Council (US), N.R., Medicine (US), I. of, Woolf, S.H., Aron, L.: Physical and Social Environmental Factors. In: U.S. Health in International Perspective: Shorter Lives, Poorer Health. National Academies Press (US) (2013)
6. Yang, Z., Gao, W., Li, J.: Can Economic Growth and Environmental Protection Achieve a "Win–Win" Situation? Empirical Evidence from China. Int J Environ Res Public Health. 19, 9851 (2022). https://doi.org/10.3390/ijerph19169851
7. Kibria, Md.G., Masuk, N.I., Safayet, R., Nguyen, H.Q., Mourshed, M.: Plastic Waste: Challenges and Opportunities to Mitigate Pollution and Effective Management. Int J Environ Res. 17, 20 (2023). https://doi.org/10.1007/s41742-023-00507-z
8. Hariram, N.P., Mekha, K.B., Suganthan, V., Sudhakar, K.: Sustainalism: An Integrated Socio-Economic-Environmental Model to Address Sustainable Development and Sustainability. Sustainability. 15, 10682 (2023). https://doi.org/10.3390/su151310682
9. Moallemi, E.A., Malekpour, S., Hadjikakou, M., Raven, R., Szetey, K., Ningrum, D., Dhiaulhaq, A., Bryan, B.A.: Achieving the Sustainable Development Goals Requires Transdisciplinary Innovation at the Local Scale. One Earth. 3, 300–313 (2020). https://doi.org/10.1016/j.oneear.2020.08.006
10. Raiyaan, G.I.D., Arunachalam, K.D.: Pollution Prevention, Sustainability, and Green World. In: Hussain, C.M. (ed.) Handbook of Environmental Materials Management. pp. 1–23. Springer International Publishing, Cham (2019)
11. Chu, E.W., Karr, J.R.: Environmental Impact: Concept, Consequences, Measurement. Reference Module in Life Sciences. B978-0-12-809633-8.02380–3 (2017). https://doi.org/10.1016/B978-0-12-809633-8.02380-3
12. A, I.A., O, A.B., AbimbolaP, O., A, A.-A.T., O, D.A., ToyinA, O., A, I.A., O, A.B., AbimbolaP, O., A, A.-A.T., O, D.A., ToyinA, O.: Water Pollution: Effects, Prevention, and Climatic Impact. In: Water Challenges of an Urbanizing World. IntechOpen (2018)
13. Obaideen, K., Shehata, N., Sayed, E.T., Abdelkareem, M.A., Mahmoud, M.S., Olabi, A.G.: The role of wastewater treatment in achieving sustainable development goals (SDGs) and sustainability guideline. Energy Nexus. 7, 100112 (2022). https://doi.org/10.1016/j.nexus.2022.100112
14. Yang, M., Chen, L., Wang, J., Msigwa, G., Osman, A.I., Fawzy, S., Rooney, D.W., Yap, P.-S.: Circular economy strategies for combating climate change and other environmental issues. Environ Chem Lett. 21, 55–80(2023). https://doi.org/10.1007/s10311-022-01499-6
15. Kumar, R., Verma, A., Shome, A., Sinha, R., Sinha, S., Jha, P.K., Kumar, R., Kumar, P., Shubham, Das, S., Sharma, P., Vara Prasad, P.V.: Impacts of Plastic Pollution on Ecosystem Services, Sustainable

Development Goals, and Need to Focus on Circular Economy and Policy Interventions. Sustainability. 13, 9963 (2021). https://doi.org/10.3390/su13179963
16. Zhao, J., Madni, G.R.: The impact of economic and political reforms on environmental performance in developing countries. PLoS One. 16, e0257631 (2021). https://doi.org/10.1371/journal.pone.0257631
17. Debrah, J.K., Vidal, D.G., Dinis, M.A.P.: Raising Awareness on Solid Waste Management through Formal Education for Sustainability: A Developing Countries Evidence Review. Recycling. 6, 6 (2021). https://doi.org/10.3390/recycling6010006
18. Adabanya, U., Awosika, A., Moon, J.H., Reddy, Y.U., Ugwuja, F.: Changing a Community: A Holistic View of the Fundamental Human Needs and Their Public Health Impacts. Cureus. 15, e44023. https://doi.org/10.7759/cureus.44023
19. Tawiah, V., Zakari, A., Alvarado, R.: Effect of corruption on green growth. Environ Dev Sustain. 26, 10429–10459 (2024). https://doi.org/10.1007/s10668-023-03152-w
20. Ganda, F.: The influence of corruption on environmental sustainability in the developing economies of Southern Africa. Heliyon. 6, e04387 (2020). https://doi.org/10.1016/j.heliyon.2020.e04387

CITE AS: Waiswa Abel and Womuzumbu Moses (2024). The Challenges and Way Forward of Pollution: A Case Study of Makindye Division, Kampala Capital City. INOSR APPLIED SCIENCES 12(2):15-23. https://doi.org/10.59298/INOSRAS/2024/12.2.152300