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Short Communication

Rapid urbanization Vis a Vis meeting target of access to improved sanitation

Elizabeth Wangui Muoria[1]*, Wilkister Nyaora Moturi[1] and George Were Eshiamwata[2]
[1]Department of Environmental Science, Egerton University. P.O. Box 536 Egerton Njoro, Kenya
[2]Natural Sciences, Kenya National Commission for UNESCO, P.O. Box 72017-00200, Nairobi, Kenya
muorializ07@gmail.com

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Abstract

The quality of life of members of a household is affected directly by the sanitation and hygiene of household. Nakuru town was noted to have been the fastest growing urban area East and Central Africa. Hence the need to assess the spatial-temporal variation in household access to sanitation facilities as the urban area grows. A cross sectional survey was undertaken. Data was collected through remote sensing and an interview administered to key informants to elicit information on the sanitation facilities used in different areas on a time series in Nakuru Municipality and surrounding peri-urban area. A structured questionnaire was also administered to 400 respondents drawn from households that were randomly selected from the study area. Descriptive statistics was used in the analysis of data collected. The results of the study showed that over the years the rate of expansion of sewerage systems was very low serving areas surrounding the urban core. The results also showed that a total of 5[1].5% of the respondents used a pit latrine that could be a potential source of contamination of underground water sources. This may impede realization of SDG 6 target 6.1 of universal and equitable access to safe and affordable drinking water for all. The study recommends improvement of the pit latrines by use of lining to protect underground water from horizontal contaminants.

Keywords: Basic sanitation, pit latrine, spatial variation, sanitation access, improved sanitation.

Introduction

A centralized system for urban waste water management was generally used in the past. However, with increased population densities and limited land coupled with increased urbanization, this system cannot suffice[1]. Many fast-growing Cities that are growing very fast have experienced problems in waste water management especially where more often than not the wastewater infrastructure is non-existent, inadequate or outdated[2].

Increasing waste water generation in urban often strains the existing wastewater management systems with dire consequences to human and environmental health. Local authorities in the urban area of developing countries area thus resort to using unsound ways of disposing the waste water which sometimes is partially treated or not into nearby water bodies due to financial, technical and institutional constraints[3,4]. Studies done in Kenya have shown that out of 230 urban centres less than 25% of households in 220 were connected to main sewer systems[11].

Nakuru Municipality has been expanding since independence as evidenced by population census data from 1962 to 2009. The population growth and urbanization trend of Nakuru municipality was recorded as being the highest among other municipalities in Kenya[5]. Nakuru town has also been ranked as Africa's fastest growing town and the fourth in the world[6]. The Joint Monitoring Programme (JMP) estimates revealed that there exists inequalities in in providing improved sanitation services globally hence need for segregated data to show where these inequalities exist[7].

Several infectious diseases are spread through human excreta that are not properly disposed affecting may people in the world[8]. Inadequate supply of improved water and sanitation facilities has been shown to be the cause of a major part of all illnesses in developing countries[9].

Many deaths in children fewer than five years in developing countries are due to diarrhea mostly associated with inadequate supply of improved water and sanitation facilities[7]. Hence the necessity of providing better mechanisms for the disposal of wastewater to protect human and environmental health.

WHO & UNICEF findings revealed that globally the world was on course towards the achievement of the MDG targets for water and sanitation[10]. However there exist some areas that were still lagging behind notably Sub-Saharan Africa. It was thought that the framing of the MDGs could have been the impediment to the realization of these targets for individual states[11]. Hence the need for developing SDGs notably SDG6 targets on water and sanitation[11]. Hence the need to identify the areas that lack improved sanitation and recommend actions to enable the residents meet this goal.

Materials and methods

Description of the study site: The area exhibits both semi-arid and normal characteristic vegetation and it lays in different climatic zones. The soils in the area are volcanic and generally well drained with fine texture and of high agricultural potential in some parts and in others it is mainly sandy and is very easily eroded. Nakuru Municipality has been ranked as Africa's fastest growing town and the fourth in the world with a population of 309424 and characteristic urban sprawl into the peri-urban area[6,12]. The main economic activities include agriculture, industries and service provision. Figure-1 shows the location of the study area.

Research design and sampling procedure: The research design for that was appropriate was cross section. All households in the study area as per the 2009 national population and housing census were taken as the target population[12]. A list of households taken from the 2009 national census was used to select 400 households using stratified sampling procedure with Nakuru Municipality (urban setup) and the peri-urban areas as strata and the households selected randomly from each stratum.

Primary data was collected using a questionnaire administered to the household head either male or female. The questionnaire was designed to generate information on the sanitation facility the household used. The questionnaire was administered to all sampled participants (n=400) from the study area. An interview was conducted with ten (10) key informants taken from the publically owned water service providers that were selected purposively from the study area to collect more information to corroborate the qualitative data collected. Through interviews, information on sewage system coverage on a time series was sought.

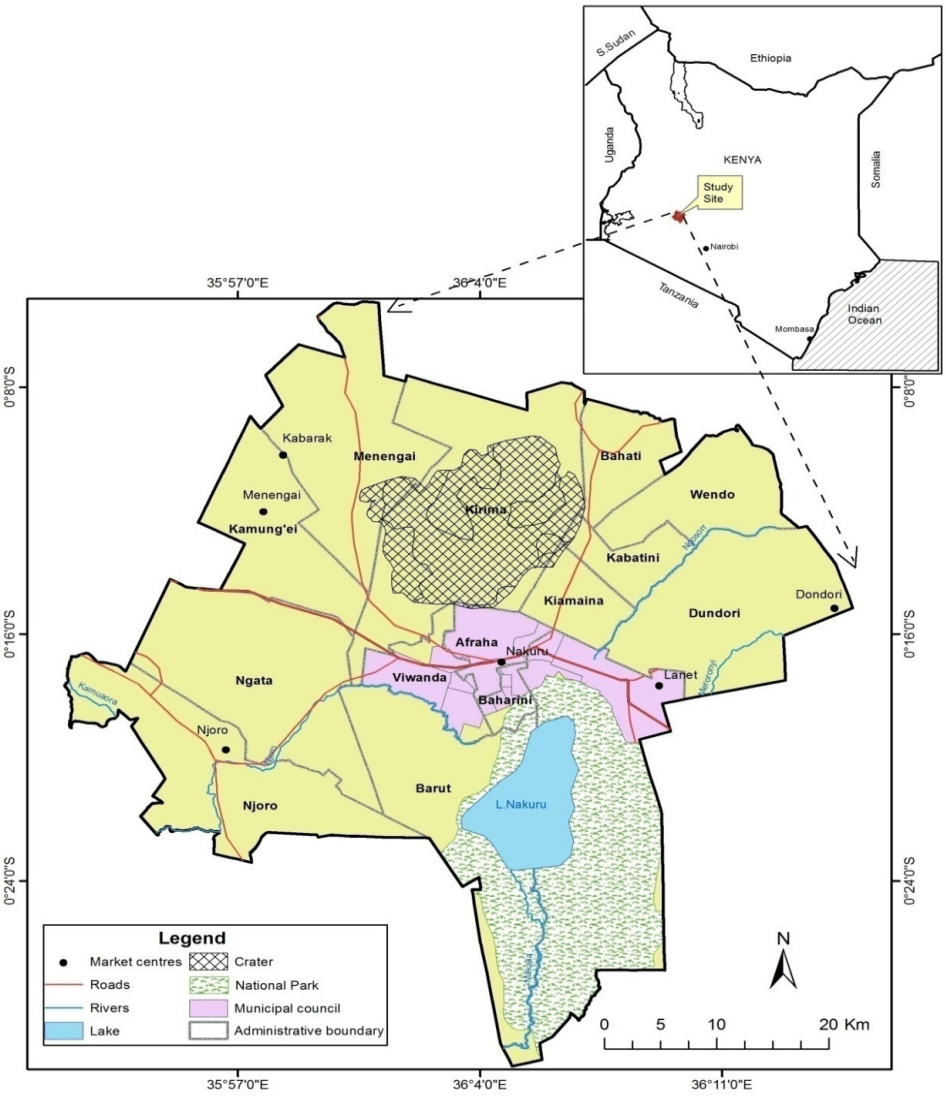

Figure-1: A map of the study area.

Results and discussion

The study documented the options available for use as sanitation facility by the households. The results show that overall; 41.9% of the households in study area used a water closet (WC), 57.6% a pit latrine which were either basic or improved and 0.5% did not respond. Spatial variations in the type of sanitation facilities was observed and indicated that a total of 83.7% of households in the peri-urban and 71.8% in the low income urban areas predominantly used pit latrines (Figure-2). WHO & UNICEF defines five service levels of monitoring SDG6 target 6.2.1a. These levels are "Safely Managed; Basic; limited; Unimproved and Open Defecation"[13]. From this definition, it can be concluded that most of the responds are using unimproved sanitation facilities. This finding concurs with that of JMP findings that showed that only 28% of sub-Saharan countries used a basic sanitation facility with the majority using unimproved facilities and practicing open defecation[13].

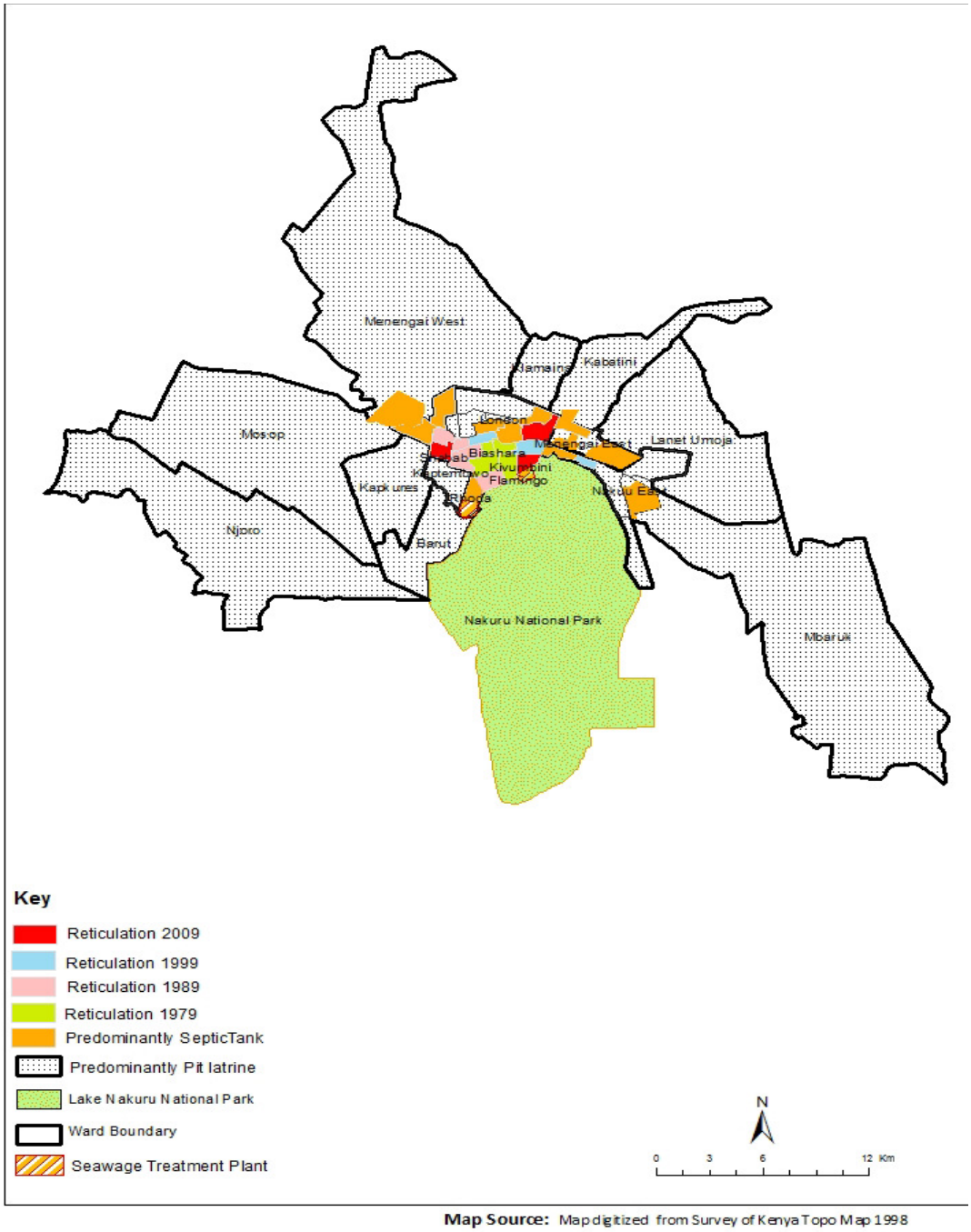

Figure-2: Spatial variation of the distribution of the means of waste water disposal by households in the study area.

Further analysis revealed that only 16.9 % of the respondents dispose their liquid waste through piped sewer. The rate of reticulation was also low and serving residents close to the town Centre. The result compares well with records from Water Services Regulatory Board (WASREB) which showed 16% national sewer coverage[14]. Households located within. However, it was evident from the survey that some households within 50 feet of a sewer line are not connected to it as required by law[15]. The reasons as to why residents are not connecting to the sewer lines can be explored in another study. However, lack of capital and inadequate water supply have cited as the major impediments to connecting to a sewer line in their neighbor hoods[16]. The ideal solution for the disposal of waste water by the use of pipes to treatment plants it is expensive for many towns and cities in developing countries hence low access or in some cases absent[17].

The finding from the study showed that 62% of the respondents using a flush toilet in the urban area are connected to a piped sewer and only 3% of the respondents in the peri-urban area. In the areas that are not served by a sewer line residents largely rely on septic tank, soak pits and pit latrines. New housing areas that have been built in the peri-urban areas predominantly use septic tanks. When the tanks are full, they are emptied mostly by private service providers. According to NAWASSCO, these private companies are licensed to empty the liquid waste into the sewerage treatment plants at a cost. In the peri-urban areas that use the septic tanks, there is also inadequate supply of water with most of the areas relying on rainwater harvesting. The households have invested in constructed underground tanks for storage of the water harvested and in some cases these water storage tanks are constructed near the septic tanks.

The constructed water storage tanks are sometimes not well engineered and cracks on the cover were evidence during the survey leaving the water exposed to contamination. Most of the septic tanks do not meet the construction standards and this could compromise not only underground water quality but also the water stored in the underground storage tanks[18]. Contamination could also arise during emptying of the septic tank that could cause spillage of the sewage. Failure and inadequate maintenance and servicing of septic tanks can lead to wastewater overflows with dire consequences to human and environmental health[19]. Many cities is usually have limited services for emptying, transportation and treatment of fecal sludge from improved on-site sanitation facilities thus causing health impacts to human and the environment[17].

Use of suitable sanitation amenities is imperative in ensuring that illnesses such as diarrhoea, intestinal infections and cholera among others are controlled. A lot of work has been done in low income settlements of Nakuru Municipality in provision of pit latrines by Practical Action and Umade Trust since 2012. The project was on realizing "rights to total sanitation in two low income settlements in Nakuru town" by mobilizing landlords as well as tenants resulting in a considerable number of pit latrines that were constructed and a change of behavior on the tenants in ensuring that the latrines were cleaned regularly[20]. This initiative is what could have increased the wide spread use of pit latrines in the low income areas. However, there is a lot of work that needs to be done to ensure that this does not impact negatively on the quality of underground water.

Due to wide use of unlined pit latrines and the kind of geology, i.e., volcanic soils and rocks that have fractures or fissures, the area may pose a risk to the regional groundwater quality. Thus residents should be encouraged to consider improving the materials used in the construction of the pit latrines to avoid contamination of underground water that the area heavily relies on. Research studies carried out in various towns in Kenya show that residents in these towns face a high risk of consuming contaminated water as boreholes and most wells were highly contaminated[21,22].

A similar study carried out in Zimbabwe showed that there is potential for contamination of water in wells and boreholes and recommend lining of the pit latrines with impermeable materials to safe guard water quality[23].

Many households especially the tenants in multi-dwelling house units in the same compound have a major problem of disposing grey water from laundry and cleaning of utensils which they do from a common area. This grey water is directed into open drainage or to the roadside especially in low income areas of both the urban and peri-urban settlements. This grey water could also contain fecal matter from the washings of baby napkins and this creates a health hazard from houseflies and rodents. SDG6 target 6.3 seeks to "improve water quality, waste water treatment and safe reuse". According to UN,

"Treating waste water will protect public health and the environment, mitigate the costly impact of pollution and increase the availability of water resources. The report notes that wastewater is an undervalued source of water, energy, nutrients and other recoverable by-products Recycling, reusing and recovering what is normally seen as waste can alleviate water stress and provide many social, economic and environmental benefits"[24].

Hence the water sector in Nakuru in collaboration with relevant agencies and landlords should seek for innovative ways on how the waste water can be collected and recycled for use instead of releasing it to open drainages and roadsides.

Conclusion

The results from the study reveals that there has been a marked improvement in access to a toilet facility in the study area and that majority of the residents use pit latrines some of which were in a poor state. Furthermore 'basic pit latrines are classified as unimproved sanitation facility'. Hence most of the respondents cannot be said to have access to improved sanitation facilities.

Recommendations: All stakeholders including County Ministry of Health, Environment and NGOs need to come together and seek lasting solutions in provision of improved sanitation facilities. Recycling water can supplement water supplied by the water service providers in the area which can be used to wash cars and water lawns and flower gardens.

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