Research Article

Influence of Knowledge and Skills among Residents in Kibra Integrated Water, Sanitation and Waste Management Project on the Wellbeing of Soweto East Residents, Nairobi County, Kenya

¹Gatua Faith and ²Prof. Maurice M. Sakwa, Ph.D.

^{1&2}Jomo Kenyatta University of Agriculture and Technology, Kenya *Corresponding Author Email: faithgitau@gmail.com

Received: January 22, 2023 Accepted: February 08, 2023 Published: February 16, 2023

Abstract: The study sought out to determine the influence of knowledge and skills among residents in integrated water management influenced on the wellbeing of Soweto East residents in Kibra, Nairobi County. Apart from intense overcrowding, lack of proper and adequate infrastructure, housing and poor sanitation worsened by open sewages and lack of drainage systems have characterized Kibra slums for years. The study employed descriptive survey research design since it's most suited when conducting research study to a large population. The sample frame for this study comprised of 980 households from 6400 beneficiaries from Soweto East. The study sample size was 90 respondents distributed randomly among beneficiaries' households. Data collection was done using questionnaires and was thereafter analyzed quantitatively using SPSS version 20 as a tool and presented in form of Tables. The study found out that knowledge and skills had a positive effect on the wellbeing of Soweto East residents in Kibra, Nairobi County. The study thus concludes that having proper knowledge and skills of water and waste management will translate to improved wellbeing of the slum dwellers. This is because, improvement of all aspects of the environment including sanitation and hygiene requires that the community has proper education and awareness, and these cannot be reached without the proper co-operation from the slum dwellers. The study recommends the need to facilitate stakeholder interaction by encouraging community-based institutions such as women groups, youth groups, Community Development Associations, traditional councils, Water and Sanitation Committees (WASHCOMs) and other identified interest groups. There is also need to educate the residents to enhance awareness on the effects of poor waste and sanitation practices and benefits of KWATSAN. The study further recommends successful enforcement procedures to safeguard efficient waste gathering and dumping.

Keywords: Knowledge and skill, Kibra Integrated Water, Sanitation and Waste Management Project.

Introduction

Close to half of the population of the world lives in urban areas and this proportion is increasing with a projection of almost 5 billion in 2030. Over 300 million urban poor live in informal settlements; this population is made of over 200 million in Asia, 50 million in Latin America and over 60 million in other African cities which are experiencing high population growth (UN Habitat, 2018). Recent statistics show that Africa is urbanizing at a very high rate with an annual urbanization growth rate of 3.31% and a projected increase in population from 373.4 million people in 2017 to 759.4 million in 2030. It is estimated that close to a million people live in Kibra slums: an area measuring approximately 2.5 square kilometres. This intense overcrowding, lack of proper and adequate infrastructure, housing and poor sanitation worsened by open sewages and lack of drainage systems have characterized Kibra slums for years. In addition, a series of factors including very low incomes,

International Journal of Recent Innovations in Academic Research

irregular employment, lack of secure land tenure or collateral, and lack of property and informational records prevent Kibra households from accessing loans to finance construction projects, housing improvements or home purchases (Mulcahy and Chu, 2007). Pit latrines are common in the area, more often than not, in poor conditions, inadequate and overused. As such, the main coping mechanism is the infamous flying toilets that aggravate the health concerns and well-being. Such rapid growth has serious repercussions for a population's access to basic needs that ensure health and human rights are possible, such as access to safe water and affordable housing.

According (Freeman, 2019) to inadequate access to clean water consumes time, increase prevalence rates of waterborne diseases, and increase costs of accessing healthcare. This ultimately impacts the economy of an area. A household is considered to have access to improved water supply if it has sufficient quality and quantity of water for family use at affordable price, available to household members and livestock. Slums lack durable housing, sufficient living area, access to improved water, access to sanitation and secure tenure. In other words, informal settlements are characterized by lack of basic services (sanitation facilities, water, waste collection system, roads, drainage, lighting among others); substandard and inadequate housing conditions; overcrowding and high densities; unhealthy living conditions; and poverty and social exclusion. As such the prevailing conditions in the informal settlements undermine the well-being of the inhabitants.

Sanitation and waste management are two of the basic services that have been a part of the global debate on sustainable human development. To provide for decent, not decadent, places to live, the housing itself cannot be considered alone. Developing and promoting a healthy neighbourhood is equally important. For this reason, provision of basic services like water sanitation and solid waste management is a priority. The UN-Habitat (2019) described sanitation and hygiene challenges in slums in terms of poor basic services results in lack of access to sanitation facilities or safe water sources. The main aim of K-WATSAN (Kibra Integrated Water, Sanitation and Waste Management) Project implemented by UN-Habitat in conjunction with the Kenyan government in 2017 was to contribute to improving the livelihoods of the urban poor in Soweto East by supporting small-scale community-based initiatives in water, sanitation, and waste management. The initiative was intended to demonstrate that crucial improvements in life, quality and dignity are possible in such large informal settlements and was designed to promote an in-built sense of project ownership in the targeted community for long term sustainability.

The specific objectives of the project was to improve water, sanitation and waste management conditions through the provision of storm water drains, communal water and sanitation facilities and small-scale door-to-door waste collection and recycling services; Support the community to identify and venture into new income generating and business opportunities; enhance information and technology skills among the population through the establishment of a Community Information and Communication Technology Centre and; Strengthen the institutional and technical capacities of selected key target groups by conducting training courses. This program recognizes the fact that past attempts to improve water and sanitation in Kibra slum have failed because they did not integrate water, solid waste, sanitation, and drainage, which need to be addressed simultaneously in settlements like Kibra if there is to be a perceivable improvement in the living environment. The WATSAN initiative is facilitating the construction of ablution blocks, which are communal water and sanitation facilities. These sanitation facilities are all-in-one complexes with ventilated improved pit latrines, shower cubicles and water booths. Community members are building the structures, which are strategically placed to provide access to all residents.

Literature Review

Theoretical Review

This study was guided by the capability approach is a broad normative framework for the evaluation of individual wellbeing and social arrangements, the design of policies and proposals about social change in society. Capability approach to well-being and development evaluates policies according

International Journal of Recent Innovations in Academic Research

to their impact on people's capabilities. It asks whether people are being healthy, and whether the resources necessary for this capability, such as clean water, access to medical doctors, protection from infections and diseases, and basic knowledge on health issues, are present. Sen's claim is that well-being achievements should be measured in functioning, whereas well-being freedom is reflected by a person's capability set. A focus on agency will always transcend an analysis in terms of functioning and capabilities and take agency goals into account. Sen (2019) opines that in developing Capability approach there is the need to develop people's capabilities (not just making them recipients but masters of their own destiny) so that they can achieve their full potentials. Capability approach focuses on what people can do and be, as opposed to what they have, or how they feel.

The functionings are the various things a person may value doing or being, such as being adequately nourished, being healthy and being able to take part in the life of a community. Capabilities on the other hand refer to a person's real or substantive freedom to achieve such functionings; for example, the ability to take part in the life of society. Of crucial importance is the emphasis on real or substantive–as opposed to formal–freedom, since capabilities are opportunities that one could exercise if so desired (Gay, *et al.*, 2019). The capability approach places particular emphasis on the capabilities a person has, irrespective of whether they choose to exercise these or not. The distinction between achieved functionings and capabilities is between the realized and the effectively possible, that is, between achievements and freedoms. To put it succinctly a functioning is an achievement, whereas a capability is the ability to achieve. Functionings are, in a sense, more directly related to living conditions, since they are different aspects of living conditions.

The capability approach holds that this is unlikely to be the case: people have varying needs and will thus require different levels of resources to achieve the same standard of living (Sen, 2019). The strength of capability approach is that it shows how capabilities can be achieved through empowerment and generation of enough income, where wellbeing must be the result. The weakness of this approach is that it doesn't well clarify the factors which contribute to failure of capabilities and how to overcome them. The reason why social capital theory will be used in this study to fill that gap manifested in capability theory. Therefore, this study is in line with the capability approach based to its contents; where the wellbeing of human being is in centre influenced by different factors including accessibility to clean water, sanitation facilities and adequate waste management as it is in our case study of evaluating the socio-economic impacts of integrated water, sanitation, and waste management on wellbeing of Soweto East residents in Kibra, Nairobi County.

As revealed by the United Nations Human Settlements Programme (UN-Habitat) more than 924 million of people were living in slums in the world and that figure will rise 1.5 billion by 2020 (Payne, 2005). Such quick growth of population has negative effects on accessibility to basic needs that safeguard the good health and rights for safe water accessibility and housing affordability. Social pressures and lack of job opportunities in Africa influence urban migration and because of inadequate income people search the cheapest shelter in different slums including where there are poor services which are not compatible with public health, environmental sustainability, civic administration norms and social equity due to high density of population in those slums. Many efforts were provided to alleviate that social issue but there is no progress. The big number of urban populations in Africa is a generator of many challenges and issues relating to bad health status due to constraints and poor planning in financial and capabilities of different institutions, the competition pressure for resources and development to improve the livelihoods which makes the life in African cities and towns to be hard and complex.

Das *et al.*, (2021) claim that the process of integrated housing is not suitable for India. But for development of the area, they suggested in favour of raising the awareness about proper education, family planning, health care etc. and they contended that these cannot be reached without the proper co-operation from the slum dwellers. A study by Hamid *et al.*, (2020) advance the evidence

International Journal of Recent Innovations in Academic Research

suggesting that it would be worthwhile for vocational or livelihood education policy makers to develop policies that offered livelihood training to non-literate, very poor adults, especially women, who are unable to access knowledge and skills that might relieve their poverty. The first recommendation then is that vocational education policy should assess what would be needed localities to ensure an environment that would enable training in particular livelihoods actually to result in higher productivity, incomes, and wellbeing. Secondly, vocational education policy should pursue a strategy of decentralization and capacity-nurturing that will permit resourceful responses to local actual and potential patterns of livelihood. Madhusoodhanan (2006) had conducted a study in Trivandrum city to examine the problems of slum dwellers and various governmental measures implemented for their rehabilitation. The study showed that both the pull and push factors were influenced for the growth of slums. The push factors are family specific, and the pull factors consist of employment linked migration, political support, and hope of access to better social infrastructure. There has been a phenomenal increase in the total area of slums and the number of households. For example, Nairobi gives the example of different conditions manifested in many African cities where more than 60 percent of the population in urban areas live in extreme bad conditions due to big number of populations. For example, in Kibra which occupies around 250 hectares within the boundary's city, the population has been reported to more than a million where the report census of 2019 identified over 170,000 inhabitants in that locality. In 2004, the government of Kenya in collaboration with UN-Habitat started a slum upgrading programme (KENSUP) in Kibra especially in Soweto East one of the 12 villages of Kibra, to address the issue relating to lack of clean water where the operations of Kibra Water and Sanitation Project (K-WATSAN) were the part of KENSUP.

That initiative was proposed as the intervention in order to address the key concerns pinpointed during the assessment of health status through participatory community, where the key targets were waste collection and management, water and sanitation, transport access, capacity building, social and physical infrastructure, drainage, provision of security of tenure, and opportunities for housing improvement and income generation in order to improve the livelihoods of urban poor residents of Soweto East. Now the programme is still ongoing in the following four cities which are Nairobi, Mombasa, Kisumu and Mavoko. In summary the programme was intended to show how crucial improvement together with dignity and quality are possible even in informal settlement. The failure in providing for housing needs, effective implementation of land policy and involvement of community members in collective decision making especially during delivery of urban services intensified the issue of accessing the good health status. In our view, there is a need of new approach to address the problems faced by the dwellers in informal settlement of Kibra slum to help them to improve their livelihoods through income generation, housing improvement, security provision for tenure for social and physical infrastructures. Consultation and partnership among stakeholders are also in need which will foster the build of human resources and institutional capabilities from local to national level to strengthen and sustain the slum upgrading interventions.

Conceptual Framework



Figure 1. Conceptual framework for the study

Methodology

This study adopted the mixed methods research approach where both quantitative descriptive survey and qualitative exploratory research designs were used to examine the impacts of Kibra integrated water, sanitation, and waste management project on the wellbeing of Soweto east residents, Nairobi County, Kenya. The study used quantitative approach in evaluating the socio-economic impact of K-WATSAN project on the wellbeing of Soweto East residents. This design is most preferred when conducting research study to a large population since it allows generalization of results of the research sample to the larger target population. The study was carried out in Soweto East village, Kibra Constituency as the study site because it has several localities affected by inadequate sanitation, lack of clean water and poor waste management. In Nairobi County, Kibra Constituency was purposively selected as the study location due to negative impacts of inadequate sanitation facilities manifested in that locality. The sample frame for this study comprised of 980 households from 6400 beneficiaries from Soweto East (UN-Habitat, 2010). Silverman (2015) notes that, sample frame should be large to allow the researcher to make inferences of the entire population. Soweto East is divided in four zones A, B, C and D. Questionnaires were used for community leaders and some community members with secondary and university level of education from different household. Focused group discussion was conducted for the remaining community members with a small level of education in order to collect data concerning the impacts of Kibra integrated water, sanitation and waste management project, and the suggestions for better improvements in order to achieve a sustainable wellbeing in their communities. Quantitative data analysis was done using SPSS Version 20 and the findings was presented in form of tables.

Findings and Discussion

Descriptive Analysis

The study sought to investigate on how knowledge and skills among residents in integrated water management influenced the wellbeing of Soweto East residents in Kibra, Nairobi County. The research findings also sought to find the mean frequency and standard deviation. Table 1 shows the results obtained.

Tuble 1. Tubulation of Indicators of Iknowledge and Skins.						
Statements on knowledge and skills	Mean	Std. Deviation				
KWATSAN taught you on how to dispose wastewater	4.39	1.080				
KWATSAN taught you on proper methods of disposing waste	4.33	1.207				
As taught in KWATSAN you use proper waste disposal techniques (solid and liquid waste)	4.18	.840				
KWATSAN taught you on how to purify water	4.12	.329				
Do you purify drinking water using KWATAN water purification techniques	3.86	1.051				
KWATSAN explained on the importance of purifying water	4.15	.827				
KWATSAN taught you on the need to clean water storage containers	3.91	1.173				
KWATSAN taught you on how to store drinking water	3.92	1.114				
KWATSAN taught you on how water contamination can occur during storage	4.05	1.143				
N = 66						
Key: 1.00-1.79 strongly disagree, 1.80-2.59 disagree, 2.60-3.39 neither disagree nor agree, 3.40-4.19 agree, 4.20-5.00 strongly agree						

Table 1. Tabulation of Indicators of Knowledge and skills.

As shown, the respondents strongly agreed on KWATSAN teachings on how to dispose wastewater, proper methods of disposing waste, purification of water, use proper waste disposal techniques (solid and liquid waste), importance of purifying water and how water contamination can occur during storage. As per the descriptive statistics results, regarding knowledge and skills the respondents

agreed that the project was instrumental in them getting the knowhow on dealing with sanitation and waste management. The need for this knowhow is important in slums as the greatest burdens of diseases are related to sanitation and waste management inadequacies.

This compares to Otaki *et al.*, (2020) in their study of domestic water demand analysis by household activities in developed countries found out that the factors that influence water use were water resources, knowledge, skills, water price, climate, dietary culture, and household size in that order of magnitude. The extent to which the findings are related to the conceptual framework indicators of knowledge and skills factor analysis carried out. In the conceptual framework knowledge and skills was conceptualized as constituting waste disposal, water purification and water storage. The tables below summarize the results.

	Initial			Extraction Sums of Squared			Rotation Sums of Squared		
	Eigenvalues			Loadings			Loadings		
	Total	% of	Cumulative	Total	% of	Cumulative	Total	% of	Cumulative
		Variance	%		Variance	%		Variance	%
1	1.579	39.464	39.464	1.579	39.464	39.464	1.458	36.448	36.448
2	1.300	32.491	71.955	1.300	32.491	71.955	1.420	35.507	71.955
3	.590	14.749	86.705						
4	.532	13.295	100.000						
Extraction Method: Principal Component Analysis.									

Table 2. Knowledge and Skills Total Variance Explained.

Table 2 shows the components extracted through the factor analysis regarding knowledge and skills. The results shows that two components or factors were extracted (with Eigenvalues of above 1) instead of three as had been formulated in the conceptual framework. Table 3 show how the different statements related to knowledge and skills were loaded in the respective components.

Tuble et fille fille ge und Shills Rotated Component fluttik t						
	Component					
Knowledge and Skills Items	Waste water purification	Water storing capacity				
KWATSAN taught you on proper methods of disposing waste	.860	.077				
Do you purify drinking water using KWATAN water purification techniques	.836	165				
KWATSAN taught you on how to store drinking water	130	.823				
KWATSAN taught you on how water contamination can occur during storage	.048	.842				
Extraction Method: Principal Component Analysis.						
Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 3 iterations.						

Table 3. Knowledge and Skills Rotated Component Matrix^a.

Table 3 above shows the statements that congregated on the components of knowledge and skills namely wastewater purification and water storage capacity. These are the two theoretical concepts of knowledge and skills that were confirmed empirically.

Regarding how they agreed or disagreed on the effects of the project towards contributing to the knowledge and skills descriptive statistics was utilized. This is summarized in Table 4 below.

Tuble in Descriptive Statistics of Water Farmeution and Storaget							
	Mean	Std. Deviation	Cronbach's Alpha				
Wastewater purification	4.10	.96165	.616				
Water storing capacity	3.98	.94450	.573				
N = 66							
Key: 1.00-1.79 strongly disagree, 1.80-2.59 disagree, 2.60-3.39 neither disagree nor agree,							
3.40-4.19 agree, 4.20-5.00 strongly agree							

As per Table 4, the respondents agreed on wastewater purification and water storing capacity practices having means of 4.10 and 3.98 respectively. Therefore, the knowledge and skills of water storage and purification techniques were the key aspects that the respondents benefited from the project. This shows the essence of proper knowledge and skills in contributing to better sanitation and waste management. In the slum areas an understanding of the sources of diseases is important to reducing the water borne diseases prevalent in these areas. Tamene (2021) in their study found out that sufficient knowledge and skills in water management helped improve diseases outbreak such as diarrhoea situation in and therefore very important in promoting healthier environments.

The regression analysis results for Knowledge and Skills are shown by Table 5.

	Model 1				Model 2		
	В	Т	Sig.	В	t	Sig.	
(Constant)	5.532	10.207	.000	3.806	7.078	.000	
Wastewater purification	157	-1.298	.199	206	-1.735	.088	
Water storing capacity	273	-2.265	.027	.260	2.188	.032	
Dependent variable	Healthier environment		ment	Improved quality of life			
ANOVA (F)	3.165			4.280			
(Sig.)	(.049)			(.018)			
Adjusted R Square	.062			.092			
Std. Error of the Estimate	.68594			.68068			

Table 5. Regression analysis of Knowledge and Skills.

Water storage capacity building did influence both wellbeing indicators namely healthier environment and improved quality of life as per Table 5 above. As expected, water storage capacity positively influences improved quality of life but unexpectedly negatively influences a healthier environment. A study by Singh, (2016) further postulated that the socio-economic condition of the slum dwellers is generally poor because of the lack of basic social amenities; functional skills, proper education, source of the income, hygiene, and health resources. This shows that the availability of water requires it to be used with care as it is a necessity for life thereby knowledge on how to better utilize the scarce clean and safe water ensures better quality of life.

Conclusions and Recommendations

Conclusions

The study sought out to determine the influence of knowledge and skills among residents in integrated water management influenced on the wellbeing of Soweto East residents in Kibra, Nairobi County. The study found out that knowledge and skills had a positive effect on the wellbeing of Soweto East residents in Kibra, Nairobi County.

The study thus concludes that having proper knowledge and skills of water and waste management will translate to improved wellbeing of the slum dwellers. This is because, improvement of all aspects of the environment including sanitation and hygiene requires that the community has proper education and awareness, and these cannot be reached without the proper co-operation from the slum dwellers (Das *et al.*, 2021).

Recommendations of the Study

The study concluded that KWATSAN practices affected to a great extent the wellbeing of residents in Soweto East, Kibra, Nairobi County. The study recommends the need to improve the efficacy of these practices through increased stakeholder interaction to improve this by encouraging communitybased institutions such as women groups, youth groups, Community Development Associations, traditional councils, Water, Sanitation and Hygiene Committees (WASHCOMs) and other identified interest groups. This would aid identification of creative and innovative processes at a local level that can support the level of adoption of KWATSAN. There should be raised stakeholder awareness on the linkages between improved and safe water supply, health and the environmental. They could be an impediment to unsustainable services has been the lack of sufficient awareness among users. The awareness strategy should adapt to local cultures and should be delivered in local languages.

The study concluded that the status of wellbeing of the residents in the region is positively associated with the level of adoption of the KWATSAN practices. The study recommends that there is need to educate the residents to enhance awareness on the effects of poor waste and sanitation practices and benefits of KWATSAN. Educating the public will also empower residents resulting in the invention of new ideas on use of waste and the elimination of reckless dumping. There is also need to implement successful enforcement procedures to safeguard these practices.

The study also concluded that KWATSAN implementation has brought a positive effect in improving the livelihood and wellbeing of residents in Soweto East, Kibra, Nairobi County. The study recommends that there should be policy and institutional framework in place with the mandate of ensuring that the owners of any premises whether temporary or permanent, residential or industrial is connected to wastewater collection system to ensure that the wastewater generated is safely channelled to an appropriate disposal site in a sustainable manner. The policy framework must be based on the principles of integrated, sustainable wastewater management and the legislation should be consistent with the spirit and principles contained in the policy.

Conflicts of interest: There is no conflict of interest of any kind.

References

- Das, M., Das, A., Giri, B., Sarkar, R. and Saha, S. 2021. Habitat vulnerability in slum areas of India–What we learnt from COVID-19?. International Journal of Disaster Risk Reduction, 65: 102553.
- 2. Freeman, L.C. 2019. The development of social network analysis: a study in the sociology of science. Empirical Press, Vancouver.
- 3. Gay, L.R., Geoffrey, E.M. and Peter, A. 2019. Educational research: competencies for analysis and application. London: Pearson.
- Hamid, M., Thron, C. and Fageeri, S. 2020. Status and Trends in University Admissions for Women in Sudan: A graphical data analysis. Social Sciences and Humanities Open, 2(1): 100076.
- 5. Madhusoodhanan, V. 2006. Rehabilitation Measures for Slum Dwellers in Thiruvananthapuram City. In: (Ed.), Nair, K.N., Gopikuttan, G., Housing in Kerala, Daanish Books, New Delhi.
- 6. Mulcahy M. and Chu, M. 2007. Kibera Soweto East, a case study in slum upgrading. Nairobi Kenya.
- 7. Otaki, Y., Honda, H. and Ueda, K. 2020. Water demand management: Visualising a public good. PloS One, 15(6): e0234621.
- 8. Payne, G. 2005. Getting ahead of the game: A twin-track approach to improving existing slums and reducing the need for future slums. Environment and Urbanization, 17(1): 135-146.

- 9. Silverman, D. 2015. Interpreting qualitative data. Sage.
- 10. Singh, B.N. 2016. Socio-economic conditions of slums dwellers: a theoretical study. KAAV International Journal of Arts, Humanities and Social Sciences, 3(3): 5-20.
- 11. Tamene, A. 2021. A qualitative analysis of factors influencing household water treatment practices among consumers of self-supplied water in rural Ethiopia. Risk Management and Healthcare Policy, 14: 1129-39.
- 12. UN-Habitat. 2010. Solid Waste Management in the World's Cities. London: Routledge.
- 13. UN-Habitat. 2018. State of African Cities Report, 2018. Nairobi: UN-Habitat.
- 14. UN-Habitat. 2019. Tabuk City Profile: UN-Habitat, UN.

Citation: Gatua Faith and Maurice M. Sakwa. 2023. Influence of Knowledge and Skills among Residents in Kibra Integrated Water, Sanitation and Waste Management Project on the Wellbeing of Soweto East Residents, Nairobi County, Kenya. International Journal of Recent Innovations in Academic Research, 7(2): 7-15.

Copyright: ©2023 Gatua Faith and Maurice M. Sakwa. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.