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An Appraisal of Community Initiative in the Provision and Management of Water and Sanitation Facilities in the Kiambiu Slum Settlement in Nairobi.

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Abstract: This paper describes the community initiative undertaken in Kiambiu slum settlement in Nairobi, which like many other slums, has been without proper water and sanitation since its coming into being as early as 1950s. Following a participatory workshop held in 1999, the residents of Kiambiu under community based group "Kiambiu Usafi Group" (KUG) identified and prioritized their immediate needs as Water, Sanitation (Toilets) and Access (Roads). Together with Maji na Ufanisi (Water and Sanitation), a Non-GovernmentOrganization (NGO), they started the Water, Environment and Sanitation (WES) initiative as a collaborative effort between the community and Maji na Ufanisi. The main focus of the collaboration was to support the community initiative of provision of safe water and better sanitation for cleaner environment. The paper explains how the KUG members developed capacity and organized themselves to undertake the management of the water and sanitation facilities that were developed through the support of Maji na Ufanisi. The paper demonstrates in its discussion how water and sanitation initiatives in slum settlements can be undertaken by the government and other development partners to create healthy and live-able environments for the slum dwellers. The information presented in this paper was gathered through, review of technical information from the Maji na Ufanisi, interviews, group discussions and observations.

Keywords: slums, informal settlements, low-income, water, sanitation.

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I. INTRODUCTION

The state of urban housing for the low-income earners in slums/informal settlements in developing countries can simply be summarized as pathetic especially in sub-Saharan Africa where governments have failed to invest in the housing sector while at the same time applying strict controls on developments on both public and private land. The menace and magnitude of slum phenomenon in the developing world has been documented by several authorities including Majale(2008), UN-Habitat (2008), and Toomey ((2010). The 2005 report by the UN estimated that 100 million people are homeless worldwide and 1.6 billion lack adequate housing (Habitat, 2015). This situation has led to poor quality living environments for the vulnerable groups of the society (UN 1992; Hardoy and Satterthwaite, 1982,). Rapid process of urbanization has become notorious for the scale of problems which it seems to entail. The most striking feature of urbanization in developing countries is the vast spread of squatter settlements and shanty towns, ill supplied, if at all, with basic amenities, rapid environmental deterioration, giant traffic jams, violence and crime, urban sprawl eating into countryside, among others (Potter, 1985; Harris, 1992).

Most informal settlements/slums in Nairobi sprout on land owned by individuals, the government, the county government, state corporations, utility companies, riparian land, and on roads and rail reserves. Whilst most of the land occupied by the slum dwellers belongs to the state, hence making the slum dwellers squatters on government land, not much has been done in the near past to regularize ownership. Under these circumstances, no meaningful investment can be done by the slum dwellers. Nearly 60% of Nairobi's population lives in slums while at the same time life in Nairobi present two sides of the same coin. On one side, there is the hip, lavish, modern lifestyle for the middle and upper class people living in posh upmarket estates and suburbs. On the other side are the poverty-stricken neighbourhoods where decent shelter, toilets, running water and proper sanitation are a mirage. Rapid urban growth in Kenya, especially Nairobi being the capital city, has outpaced the capacity of urban authorities to provide and maintain basic services. The result is a lowering of the quality of life, reduced urban productivity, and increased burden of health care and unmitigated environmental pollution. Water and sanitation services are minimal and expensive in these slums leading to lower consumption (Syagga et al, 2001; Syagga, 2011; Lamba, 1994). There are limited sewerage systems in the slum settlements

and communal pit latrines are used which are rarely emptied or drained when full. Open fields are often used as human waste disposal sites both by children and adults. Slums are mostly located in hazardous sites like river banks and quarries which present engineering difficulties and increase the unit cost of providing water and sanitation. For slums that are located next to rivers, the dwellers build pit latrines on the shores so that waste flows into the river while at the same time, down- stream, knowingly or unknowingly, water from the same river/stream is being used for various purposes (washing clothes, bathing, cooking and even drinking) depending on the cost and availability of clean water. Due to the numbers living in the slums the human condition of slums and informal settlements in Nairobi presents one of the greatest challenges to Kenyans of all walks of life. It is estimated that people living and often working in the slums/informal settlements in Nairobi constitute 60% of the city's population of 3.0 million people. With a growth rate of roughly 5% per annum, the city by 2020 is expected to host about 5 million people, of which 3 million will dwell in informal and often precarious settlements. The 60% of the Nairobi population living in the slums occupy a mere 5% of the city's residential area (or 1.5% of the entire city) (GoK and UNCHS, 2001). Amongst the slum dweller communities, the youth, the aged, the orphans, the disabled and people with HIV/AIDS are the most affected by poverty.

This paper is as a result of a user preference design survey of the WES initiative for Kiambiu settlement carried out in 2003 with a number of follow up monitoring visits and having discussion sessions with the officials of KUG. The last monitoring session was carried out in June 2018. The main objective of the survey was to provide insights in the WES initiative and more specifically, (i) to investigate and find out what the residents liked about the new improved water and sanitation facilities; (ii) to find out what the users don't like about the new water and sanitation facilities; (iii) To find out which changes/improvements the users wouldliketobecarriedoutontheir new water and sanitation facilities; and (iv) to make recommendations on appropriate design aspects based on user preference.

II. RESEARCH METHODOLOGY

Multiple research tools to collect the information for this study including quantitative and qualitative were used. In this broad spectrum of research tools lies five basic methods defined as tools for environmental behaviour research that include observing physical traces, observing environmental behaviour, focused interviews and discussions, standardized questionnaires and literature (desk) review. Quantitative method was used to collect quantifiable information which included resident's demographic data that comprised of age/sex composition, while the socio-economic characteristics included relationship among household and community members and residential status. Information on design aspects which respondents like and don't like in their present environment and more so on water and sanitation facilities provided was collected. The main tool used in the quantitative method was an open ended structured questionnaire as opposed to pre-coded questionnaire which would restrict varying perspectives and experiences of people to fit into a limited number of pre-determined response categories to which numbers are assigned. Qualitative method was used to carry out in-depth investigation on the issues the study was investigating in order to generate a wealth of detailed information from a smaller number of people and cases. More emphasis was put on group discussion so as to educe free flowofinformationexchangeinamoreinformalandfriendlyenvironment.

III. KIAMBIU COMMUNITY INITIATIVE - (WES)

Kiambiu Settlement

Kiambiu is one of the informal settlements in Nairobi situated in the Kamukunji constituency of the Pumwani Division, in the Eastern side of Nairobi. The village sits between the Moi air base Eastleigh lower fence on its upper side and the Nairobi river, stretching between Uhuru estate and Buruburu estate on its lower side. The village covers an area of about 0.5 $km^2$and with an approximate population of 50,000 people. Historically, the village is said to have been a farm owned by an Asian before it was acquired by the government after independence. Africans started settling on the farm as squatters from the early 1950s. There are varying opinions on the origins of the name Kiambiu but one of the versions is that the village being an informal settlement next to the air force base, a good part of its history is that of resistance against evictions by government. A story in the village is told of a hide and seek games between the residentsandthegovernmentthatwouldsendtheprovincialadministration and the local authority to pull downthestructures.Theresidents would in defiance put up the demolished structures at night to have them again pulled down during the day. The village falls within the government administrative structure that oversees the administrative and security matters and also issues relating to allocation of Temporary Occupation Licenses (TOL) which are kind of legitimizing the settlements. However, the TOL does not offer security of tenure but just temporary occupation status as is called. The social structure of the village is multi-ethnic with almost every ethnic community in Kenya being represented. In addition there are several religious groups represented here. There are no government schools within the village except for private owned by individuals and those sponsored by Non-Governmental Organizations (NGOs) and religious based. By the time of this study, there was an open

ground that wasused by the youth for recreational activities such as football and children's play area but with time has gradually been developed by individuals who have been allocated the land by the land commission hence denying the youth space for recreation. The residential units developed in this open ground cannot be afforded by the residents of Kiambiu since they are expensively constructed walk up apartments in conventional building materials.

The Housing Status

The housing structures are temporary built out of mud, wattle and iron sheetswalls and Galvanised Corrugated Iron (GCI) roofs. A few of the structures are plastered walls with cement screed floor while most have rammed earth floors. Therooms are small (6-10 m^2) let out as independent units. The basic form of the housing units is rectangular rows tightly packed together with very little circulation space left. Attempts have also been made of building two storey apartments in timber and iron sheets (Figure1) to maximize on the little space available. The resulting high densities require efficient and cheap solid andliquid waste disposal systems. The rent varies according to the construction materials used on the structure. Structures with plasteredwalls and cement screed floors currently attract rent in the range of Kshs.1500 to 2000 per unit (room), while thosestructures with mud and wattle or iron sheets walls and rammed earth floors attract rent of Kenya Shillings.500 per month per room.In December 2001, there was a rent crisis within the informal settlements where tenants wanted to pay only 50 percent of the rent they were paying by then due to the water and sanitation problems they were experiencing. This crisis affected Kiambiu in terms of tenant and landlord relationships. Through consultative meetings between the two parties with the government as an arbitrator, calm returned to this settlement. The issue of rent disagreements between tenants and landlords/structure owners is a fragile one not only in Kiambiu but in most of the slum settlements in Nairobi.However, about 70% of the Kiambiu Usafi Group members live in their own structures though without any form of security, except the TOL. This structure ownership factor has contributed to the group remaining stable and cohesive and supporting each other for over 18 years.

Figure 1: Shows Structures in Kiambiu Settlement.

Infrastructure Services

In most of the informal settlements in Nairobi, like Kiambiu, there is no existing public basic infrastructure services provision and yet disposal of human waste is a major environmental issue considering the high population densities being experienced. Water and sanitation are the two main services that must be in place for any human settlement to remain clean and function normally. In low-income communities, domestic water consumption is generally below 30litres per capita per day because of cost and availability. Kiambiu like many other informal settlements in Nairobi does not enjoy the provision of basic infrastructure services and social institutions/structures including adequate water supply and sanitation services, education, health, recreational facilities, etc. Collaborative efforts between residents, NGOs and private entrepreneurs have attempted to address some of these problems. The water system before the WES initiative did not meet the residents' needs in terms of distribution, quantity, quality and reliability. It comprised of a 2" supply pipe water system installed by St. John's community center and four (4) private water stand points operated on commercial basis. With the provision of more water points and storage tanks through the Kiambiu community project, there has been a marked improvement in the reliability and accessibility to water by the residents in general. In addition, the price of water per 20litre container stabilized to two (2/=) Kenya Shillings. In the last four years, other water suppliers have come into Kiambiu including CBOs/NGOs that have increased the supply of water to the residents. Private water suppliers have also set up water kiosks within the neighbourhood increasing the

distribution points.

Land Tenure

The issue of secure tenure for the residents of Kiambiu and most of the informal settlements in Nairobi, remain a thorny one. Attempts by the residents to be given some form of security of tenure has not succeeded so far although the government has put a moratorium on demolition of informal settlements. The Temporary Occupation Licence given by the local administration does not translate into a form of security of tenure document. It does not mean secure tenure since there is no legal agreement between the residents and the government; thus the residents feel they are squatters on government land. While the poor are denied security of tenure, there are allocations of land in these informal settlements to influential people through political patronage. In Kiambiu, most portions of open spaces left for recreation and public facilities have been allocated to individuals who are currently putting up residential cum commercial storeyed buildings that cannot be afforded by the slum dwellers.

KiambiuUsafi Group

This is a community based organization whose evolution/formation focused on the issue of water, waste disposal and the environment in general. The group currently has a membership of 181 spread over the settlement. Membership is free except all members are required to participate in community activities like cleaning of the environment and other projects. The settlement is divided into four zones for ease of management with an administrative structure offour levels consisting of four committees as shown in Table 1. This structure which is a decentralized model of management has been in operation since KUG came into being and has served the group well up to now.

Table no 1: Management of Structure of Kiambiu Usafi Group

S/N	COMMITTEE	FUNCTIONS
1	Executive	Overall administration of the group 's activities
2	Implementation	Oversees and coordinates all projects of the group
3	Project	Management of Financial and Administrative matters
4	Zonal	Coordinates community activities at zonal level

In December 1999, a Participatory Urban Appraisal (PUA) workshop was held in the settlement in which the residents identified and prioritized water and sanitation (disposal of waste), Roads and drainageissues as the main problems they would like to address at the community level. In order to deal with these problems, KUG identified Maji na Ufanisi as the mainpartnertosupport its efforts. Out of the over 1000 members registered at the formation of the group, only 181 have remained active up to date and are unevenly spread in the 11cluster/cell groups. These cell groups do not fall within any clear pattern and are allowed to form spontaneously making them fairly loose. The group has an executive committee constituted from the cells whose responsibility is to organize community activitiesand manage any development programmes.

MajinaUfanisi

MajinaUfanisi works with partners to implement projects in the Arid and Semi-arid Areas (ASALs) and the Nairobi slums. In the ASALs, Maji na Ufanisi works with partner organizations in Marsabit, Garissa, Taita Taveta and West Pokot districts to introduce technologies that include hand-dug wells, sub-surface dams, sand dams, underground surface catchment tanks, rock catchment usage and gravity water systems. In Nairobi slums,the organization works with Community Based Organizations (CBOs) in Kibera (LainiSabaand Soweto) and Kiambiu in Eastlands to improve community water systems, urbandrainage systems, public toilets and garbage and storm water management. In addition,MNUhasalso introduced entrepreneurship programmes meant to assist the communitiesinpoverty alleviation.

IV. THE W.E.S INITIATIVE: USER REACTION TO THE TECHNICAL SOLUTION

This part provides information on the conception, planning, design and implementation of the project and user reaction to the technical solution (water, toilets and showers) provided.This information is based on the socio-economic characteristics of the residents (sex,maritalstatus,ageandmembershiptoKiambiuUsafiGroup); actual use of the facilities (water, toilet and shower);what residents like/don't like about the services (in terms of planning,design,choiceof materials, etc.);reasons why they don't like these services; and proposals for improvement of these services. In keeping with the main objective of the WES initiative which was to improve the living conditions of the residents of Kiambiu by upgrading the settlement through provision of water and sanitation facilities, it was expected to have far reaching positive effects on the health of the community

considering the constant outbreaks of diseases like cholera, dirhoea and others related to lack of water and sanitation facilities. In addition, there were expected ripple effects from this initiative which included equipping residents in the various skills through on-job training during the construction stage thus skills empowerment so that they get into the job market, both formal and informal. Water, Environment and Sanitation was identified by the residents of Kiambiu and given priority attention through the Kiambiu usafi group, a community based organizationinthesettlement. MNU was identified as a partner to support the implementation of this initiative. This project was funded by MNU up to four water and sanitation units to be built inthe settlement. By 2003 three units were already completed and in use while the fourth unit was completed in 2007 together with a temporary social hall built out of iron sheets for walling and roof cover. MNU supported this initiativethrough provision of technical advice, building materials and labour. The communitycontributed unskilled labour at the initial stage of excavating the foundations after whichunskilled and skilled labour was hired from the community through interviewsorganizedbyMNU. Skilled labour that was not found in the settlement was hired from outside Kiambiu.

Planning and building of the facilities

The planning and design of the project was carried out in full consultationandparticipationof the Kiambiu community members under the Kiambiu Usafigroup.Thecommunityrepresentatives who were elected by the community visited communitysanitationfacilitiesinMathare and Ziwani to conceptualize the kind of facilities thatwouldbeappropriatetotheirneeds. Planning meetings were held and were not restricted otheprojectcommittee.Allmembers of the community wereinvited and welcome toparticipatefully.MNUofficerswere at hand during these meetings to guide the community ontechnicalissuesthattheywerenot competent to resolve. Planning meetings were held at the design stage, selection of sites, procurement of materials and implementation stagesforthecommunityto becomepartandparcel of the process and own the project. However, it became apparent that the community did not have alltherequired skilled manpower in terms of artisans (masons and carpenters) for implementation of the project. Thus, most of the artisans used were hired from outside Kiambiu. Unskilled labour washired from the Kiambiu community. But, this approach, according to the MNU project team had a number of challenges that had an effect on the cost of the project including:(i) In order to equip members of the community who were working on the project, on-jobtraining was undertaken with the team from MNU and the skilled labour during the construction period. This slowed down the pace at which implementation of the project moved.

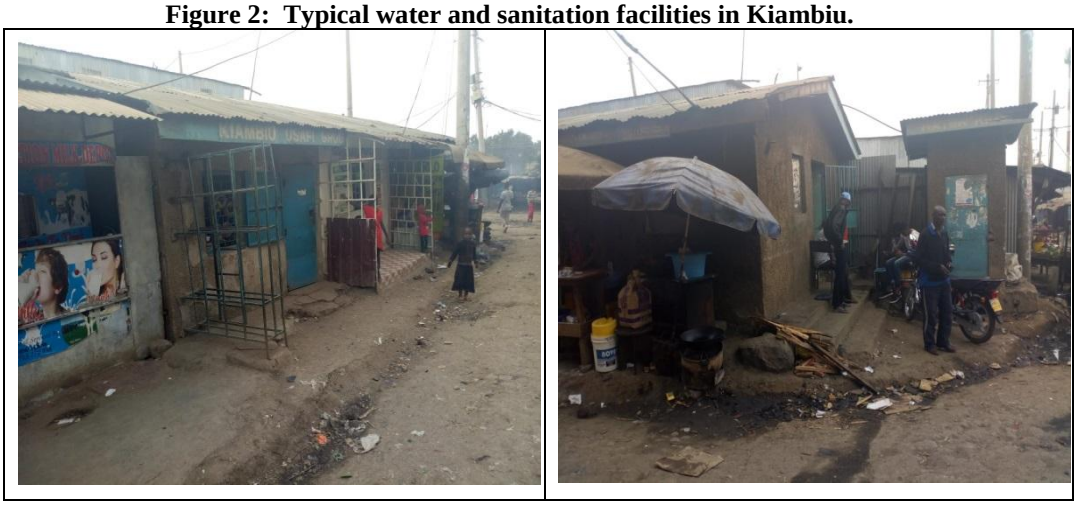
The on-job training model came along with other challenges including the quality of work being produced and the amount of wastage of materials as a result of repeat works. In addition, productivity levels per day per person were very low, hence costly; (ii) Community members hired and had little knowledge in construction tended to be rigid in their ways of doing things on site. Even the qualified artisans had the same problem of being rigid. Such rigidity did not work well with the training of community workers who needed flexible and easy methods of construction.The background of the hired community workers had its own effects on the project. Some of the workers were women who had been abused by their husbands. They needed to be counseled than to be pushed to work to the expected levels of productivity.Another challenge that the MNU project team also faced with the selection of workers from the community to be hired was in relation to the conflict of interest from community leaders who wanted their relatives/friends to be hired without undergoing interviews like all others.In addition, the project committee members from the community gave voluntary services while at the same time hired labour from the community was being paid. There was thus a conflict in the sense that the committee members were supervisors without any payment/allowance.Discussions held with the community workers who participated in the construction of the facilities provided some insights in the problems the project faced. Since there was no proper training, the on-job training was inadequate to the extent that the KUG officials were finding it difficult to maintain these facilities using the available labour from its members. In addition, the hired artisans (masons and carpenters) did not have the relevant qualifications and experience expected for this job which led many mistakes made during construction resulting in repeat works, breaking, re-building, etc. It was also noted by the KUG officials that the turn-over of artisans was too high to haveproduced consistent quality of work. Thus, the on-job training was poorly co-ordinated with very little benefit to the trainees and the community in general.

The structure: materials and systems

The basic principle for the design of the water and sanitation facilities was efficiency and cost effectiveness. Efficiency in terms of use of water and disposal of liquid waste while cost effectiveness was seen in terms of cost of materials and systems used and subsequent cost of maintenance. Therefore, this called for systems (materials, construction methods, operational, etc.) that are durable, simple to operate and maintain using local skills. The systems used were to accommodate a large number of people per day, thus durability was of essence in order to avoid rapid wear and tear and constant breakages that would result in high maintenance

costs. The materials used which were sourced locally to reduce on the cost element in the construction included concrete foundation, natural stone walling and timber roof structure covered with galvanized corrugated iron sheets. Water pipes are steel and the storage tanks are plastic with carrying capacity of 10,000 litres each. Two water tanks were provided for each facility, one to serve the toilet and shower while the second tank is for emergency water for household consumption in case there is a shortage of supply from the city council mains. The toilets and the bathrooms are connected to the Nairobi city county sewer line that passes through the settlement. This is an advantage that Kiambiu settlement enjoys since connection of sewer systems is usually expensive if it is not near settlement.The illustrations in figure 2 show facility number one which is one of the most active and busy. It shows the predominant materials used on the toilets which are conventional permanent materials. For security purposes, steel doors and windows are used.

Figure 2: Typical water and sanitation facilities in Kiambiu.



Project Cost and Management of the Facilities

The cost of these facilities consisted of building materials, labour and transport of which with thehighest elemental cost was building materials. The Maji naUfanisi (MNU) project team faced challenges of making sure materials are not stolen from the site. Materials were supplied by two companies from outsidethe community after the local community suppliers who at the beginning of the project were given the tender failed to deliver the building materials on time. Other factorsthatcontributed to the cost of the project included the on-job training of communitymembers.According to MNU project team there was slow pace in construction while at thesametime the trainees were being paid. The cost of each facility was Kshs. 1.2 million. Discussions with the community workers on the project revealedthatthecostoftheprojectwas also affected by the amount of materials wasted during construction.Duetothehighrateof turn-over of hired artisans, building and breaking and rebuildingof thework during construction greatly increased the cost of the facilities. This observation directly relatedtothe management of the project during construction, to which questions arose as to whether properprojectmanagement practice were observed. The facilities are managed by a committee that has the responsibility of ensuring proper running of all the four facilities and a levyis charged on the services rendered.From the time these facilities became operation in 2003 to 2014, waterwassold at Kshs.2/= per 20 litre container, taking a shower per visit cost Kshs. 4/=; using a toilet cost Kshs. 2/= per visit while children under 11 years old are not charged for use of these facilities. There are also monthly subscription cards of Kshs. 50/= per family for toilet use for active members only which is a discounted rate as compared to paying per visit.The money realised is used to cater for repair of any damages/breakdownofthefacilities; buying of all cleaning detergents and chemicals and cleaning tools; pay for water bills from the Nairobi water company and the rest of the money which is over and above the expenses is saved. The management committee hires and manages workers who run the project on a daily basis and audits daily collections and hands over to the implementation committee to bank the money. Theimplementationcommittee ensures that there is harmony between the project committee and the employeesof the project. However, during the last session held with the management committee, it was noted that due to the increase in the number of water provision by more NGOs and private entrepreneurs coming in Kiambiu settlement, KUG has since withdrawn from selling water to the community in order to concentrate on the provision of sanitation which is still inadequatein the settlement.

V. SOCIO-ECONOMIC CHARACTERISTICSOF RESPONDENTS

The sample size for this research was 125 respondents representing 8.5 percent of the users as computed from records. The respondents were mainly heads of households or their spouses; but any member

ofahousehold who was over 18 years of age could also be interviewed in the absence of the head or spouse. Gender balance was necessary and the ratio was 51 percent male to 49 percent females of the respondents. The data on sex, age and marital status of the respondentsis presented in the Table 2 below. This data provides insights in the socio-economic characteristics of the residents hence a basis for understanding the interpretation ofthe information collected and presented from the survey. It can be observed that with suchpredominantly young population living in this settlement, they will demand for modern public facilities and utilities. In addition, their perception of the type of environment they would prefer to live in will be seen in the context of modern/new housing environments thatare around them including Uhuru estate,Buruburu, Kimathi, amongst others. Information collected was from members and non-members of Kiambiu Usafi Group of which 70 percent of the respondents were not members of this group. The answers given by the non-members could be said to be more critical and constructive criticism of the facilities as opposedtomembers who would be tempted to portray a good image by praising the facilitieseven wherethere could be conspicuous problems that need to be addressed.

Table no 2: Respondents by Sex, Age and Marital Status.

Variable Category	As % of Sample (125)	Remarks
Sex:		
Male	51.0	Both men and women were available for
Female	49.0	interviews during day time when interviews
Total	**100.0**	were being conducted.
Age		
Below 20	19.0	On average, the residents were found to be
years	54.0	young, 88% being 40 years and below. This
21-30	15.0	could be attributed to the fact that these are
31-40	7.0	young families in search of livelihoods who
41-50	5.0	don't have regular income.
Over 50	**100.0**	
Total		
Marital		
Status	75.0	Those over the age of 21 years accounted for
Married	25.0	81% of the total residents interviewed. The
Single	0.0	marital status shows that this is a settlement
Other	**100.0**	with very young productive families.
Total		

Respondents were asked questions that intended tofind out what they liked or didn't like about their new facilities, reasons for their answers and proposals for necessary improvements/changes. The focus was mainly on the technical aspects including planning, design and choice of materials. The respondents were further segregated into maleandfemale and how they responded to these questions. By segregating male and female responses, it ispossibleto see in terms of gender, which one of them critically analysed their environment. Inaddition,the responses would then provide thebasis for improving the facilities taking into consideration specific needs peculiar to each group and coming up with a more balanced solution.

Water: What users like about the water facility.

Of the respondents interviewed, 89 percent were users of water from the new facility. The remaining 11 percent got their water from the private water vendors in the settlement. Table 3 shows the responses to the question on what the users liked about the water facility. The responses showed that an overwhelming number of users (82%) werehappy with the cleanliness of water from this facility. The other factor is the availability and reliabilitywhere 40.8% overall were satisfied. This is because theprivatewatervendorsdonothavestorage facilities hence when there is shortage of water from the city council mains, their taps run dry instantaneously. Across the gender divide, there is balanced view on reasons I, 2 and 6 while the male respondents had stronger views on reasons 3, 4 and 5. Reasons 3 and 4 areaddressing technical issues while 5 addresses affordability issue showing that male userswere more comfortable with the charges than female users. From the discussions withthevarious groups, the same sentiments came out whereby there was generally a high levelofsatisfaction with the water supply. The choice of materials, especially steel pipes asopposed to plastic pipes was highly appreciated by the users because of the expected long life-span of steel pipes.

Table no 3: What Users Like about the Water Facility

S/N	Reasons	% Male	% Female	% All	Remarks
1	The water is clean and safe	82.8	82.0	82.4	Reliable source of water
2	Water is available and reliable	40.6	41.0	40.8	Proper planning; storage tanks
3	Metals pipes used are more durable than plastic pipes	28.1	18.0	23.2	Appropriate choice of materials
4	The facility is well designed	9.4	6.6	8.0	Community involvement
5	The service is affordable	9.4	3.3	6.4	Management consideration
6	Others: Near to house; good service; water naturally cold.	14.1	14.8	14.4	Management and source of water.

Water: What users do not like about the water facility

Users were also asked to state attributes they don't like about the water facility. Table 4 below gives a summary of the users' response to this question. The first observation is that the satisfaction levels having been high as seen earlier, 67.2% of the respondents did not have attributes they did not like on this facility. However, there were a number of issues raised by a smaller fraction of users that need attention. Issues raised were not confined to planning and design, but included management of the facility as well. Two issues on planning raised that need to be addressedarethedistributionofthefacilities within the settlement in order to cut down on the walkingdistancesandtoincreasethenumber of water taps as a stop gap measure to reduce on queuingduringpeakhours.The views of the responses from the male and female respondents on the twoissueswerebalanced. However, more male respondents raised other issues as seen in attribute number six. In the discussion groups, the issue of distribution of facilities in the settlement came upstrongly. The main area of contention was the distances one has to carry a 20 litres (equivalent to 20 kgs) jerry can full of water.

Table no 4: What Users Don't Like about the Water Facility

S/N	Reasons	% Male	% Female	% All	Remarks
1	Nothing Satisfied with the facility)	65.6	67.9	67.2	Highly satisfied
2	Cost of water too high	6.3	4.9	5.6	Management issue
3	Water dirty at times	1.6	3.3	2.4	Normally after shortage
4	Water kiosk far from residence	4.7	4.9	4.8	Planning issue
5	Water taps are inadequate for users	3.1	4.9	4.0	Planning/management
6	Others: too much spillage of water; attendants are dirty; space for jerry cans small; low pressure; operating hours restrictive.	17.2	6.5	12.0	management issues to deal with: - space design - lift up storage tanks

Water: Users' proposals for improvements of the water facility

Having raised the issues they are dissatisfied with, the respondents made proposals on how the facilities could be improved and the reasons why such improvements should be made. Table 5 is a summary of the respondents' proposals and the reasons for those proposals. Slightly less than half of the respondents across the gender divide did not have any proposals to make since they were satisfied with the facilities. The responses on the rest oftheproposalswere balanced from both the male and female respondents. In the discussionsaswellthere were very strong sentiments on the distribution of water kiosks withinthe settlement.Thegeneral feeling and recommendation was that more kiosks should be distributedtoreduceon the walking distance of the residence in fetching water. It was also notedthroughinterviewsand discussions that there was need to provide washing areas at thewaterkiosksandre-cycleused water into the toilet channel to help maintain cleanliness. Inaddition,theissueofmore storage tanks to take care of the constant shortage of water fromcitycouncilsupplywas raised and is a concern that needed to be addressed along with others.

Table no 5: Users' Improvement Proposals of Water Facility and Reasons

S/N	Proposals	% Male	% Female	% All	Reasons
1	None	46.9	49.2	48.0	Satisfied with the facility
2	Provide more water kiosks.	14.1	13.1	13.6	To reduce on walking distances

3	Add more storage tanks	7.8	6.6	7.2	To take care of shortage time
4	Increase number of taps	12.5	14.8	13.6	To reduce on queuing
5	Provide washing area	1.6	4.9	3.2	To wash at the facilityand recycle water into the toilet.
6	Others: - provide bench for resting - Fence the facility - Separate water kiosk and toilet - Raise water tanks at high level	9.5	8.2	8.8	 - during queuing - To make it secure - For health reasons - To increase water pressure

In summary, the issues raised by the residents on the water facility cut across planning, design and management aspects. However, issues tabulated in Table 5 are more of technical (planning and design)nature as raisedto be considered for improvement in the water provision facilities which include provision of more water kiosks within the settlement, provide morestoragetankstotakecareofshortages and raise them at high level for optimum water pressure, provide washing area at each facility and cleanthe toilets with used water from the washing activity.

Toilet: User' Reasons for liking the toilet facility

This is the second most important facility after water because it can only function effectively where there is enough water supply. In terms of ranking, the two facilities have equal weighting at 82.4% of the users liking them.Thefilthinmost slum settlementsis brought about by lack of proper sanitation facilities.The toilets were designed such that they could serve many people and use less water than the conventional water closets. They were also designed with the aim of having very lowmaintenance costs. Unit two facilitywhich was the first to be built has two (2) toilet units andsix(6)shower units for men and same number of units for women. There are four (4)toiletsandfour (4) showers for men and the same number for women in each of the other three facilities. Reasons as to why users liked the toilets are tabulated in Table6 below.On the overall, 82.4 percent of the users are happy with the cleanliness of the toilets. Segregated responses from males and females show similar trends. Overall, 20.8 percent of the users were happy with the fact that this facility is available and accessible of which 26.8 percent of women users as opposed to 15. 6 percent of men liked this facility for this reason. In terms of design aspects and planning, users talked of good layout, modernity, permanency of structures and the design of the channel as reasons they liked the toilets. The same reasons were advanced by users during group discussions. One user of unit three made the following statement which summarises the level of satisfaction with cleanliness of the toilet: "Our toilet facility is so clean that one can take tea and bread inside it without being offended by any foul smell". The contrast between what these residents were used to and what they have now is beyond their imagination.

Table no 6: What Users like about the Toilet facility

S/N	Reasons	%	%	%	Remarks
1	Clean	85.9	78.7	82.4	Overwhelming
2	Good layout/design	14.1	18.0	16.0	Planning aspect
3	Available and accessible	15.6	26.2	20.8	Management
4	Modern	15.6	19.7	17.6	User perception
5	Permanent structure'	7.9	4.9	4.8	Technology aspects
6	Others: Affordable - Nearmy residence - Design of channel good	7.9	14.8	11.3	 Planning and aspects

Toilet: Users' reasons for not liking the toilet facility

The overwhelming satisfaction of the toilet facility notwithstanding,users were asked to state what they do not like about the toilet facility. A number of attributes that users do not like about the toilet facility are summerised in Table 7 below.

Table no7: What Users don't like about the toilet facility

S/N	Attributes	%Male	%Female	% All	Remarks
1	Nothing	35.9	37.7	36.8	Satisfied; no complains.
2	Toilets without flush	12.5	14.8	13.6	Design attribute - unhygienic
3	Open channels for defecation	17.2	21.3	19.2	Design attribute- unsightly.
4	Toilets are inadequate	9.4	3.3	6.3	Mainly facility number two
5	Cleanliness not consistent	15.6	18.0	16.8	Management attribute – supervision of workers.
6	Others: - Short operating hours - No proper foot rest - Poor maintenance - Not affordable - Ceramic floor tiles too slippery	23.2	18.0	23.2	The attributes are composite including design, planning, technological and management.

The general observation is that both the male and female respondents had more or less same views on what they do not like about the toilet facility. Apart from attribute 4, on thenumber of toilets not being enough as observed by 9.4% of men as opposed to 3.3%ofwomen,the rest of the reasons had balanced weighting for both gender. The issue of few toilets relatesmoretounitnumber two where there are only two toilets for men and same number forwomen.Theinterpretation here is that in the morning more men than women leave early forworkhencethe attribute being more weighted by men than women. The above reasons were more pronounced in the discussions with the users. The issueoftoilets without flush was raised and was said to contribute to the low levels of cleanliness in the toilets. The design provided one flush unit for two toilets and already some have broken down. Users complained of unsightly human waste not cleared after use. In addition,the open channel for defecation does not provide a good environment in the toilets.Stillonthedesign, the problem of not providing proper foot rest areas was said to resultinpooruseof the toilet by some users missing the channel. The channel was also saidnottobeappropriatefor children who tended to mess the toilet even more. In terms of technology,userscomplained of the floors being slippery and dangerous when wet because of thesmooth ceramic floor tiles finish. Other concerns that were raised through discussion included the use of toiletsbyoldpeopleespecially women. These are squatting type which was said to be inappropriatetotheelderly. However, considering that these are public toilets, it was noted that it would be unhygienictopropose a western type of toilet. The issue of toilets blocking was said to arisefromuseof inappropriate paper like newspaper and carton pieces instead of soft tissue paper.

Toilet: Users' proposals for improvements

Having raised the problematic' areas of the toilet facility, users made suggestions as to how this facility could be improved and reasons for such proposals as presented in Table 8. In these proposals, as in other concerns above, there is consistency in terms of percentages of women and men making contributions. Proposals by the respondents aimed at improving on the weaknesses of the facility as presented in Table 8 and through discussions. Proposal number two on the provision of a flush unit for each toilet is almost triple (36%) of all respondents when compared to the respondents (only 13.6%) who had sighted it as a problem in Table 7. This attribute can be said to be important to the users of the toilet considering the fact that ittouches on the cleanliness of the toilet. However, one has to note that the design concept was to economiseon the use of water. Thus the answer to this problem is not a straight jacketed one. In addition, proposal five addresses the issue of distribution of toilets within the settlement. During discussions, users felt that the catchment population and area for each of these facilities were high and large respectively resulting in queues and long walking distances to get to the facilities, which in turn was discouraging users especially at night. However, due to lack of space for these facilities to be spread in the settlement, users proposed making them double storeyed in order to increase the number of toilets. In addition more space could be created to be used as stores and offices for workers and project officers. Another issue raised in discussion groups was the gap between the doors and the floor which was found to be too large. The problem experienced was that children could crawl under the door and leave it closed making it difficult for use. The proposal was to reduce the gap to avoid suchproblems.

Table no 8: Users proposals for improvements and reasons

S/N	Proposals	% Male	% Female	% All	Reasons
1	Widen the channel	3.1	4.9	4.0	To avoid droppings on sides
2	Provide each toilet with a flush unit	34.4	37.7	36.0	For each user to flush and leave the toilet clean
3	Provide toilets designed specifically for children	3.1	1.6	2.4	Children fear squatting over the channel; mess the toilets.
4	Leave the excreta hole only open and cover the rest of the channel	17.2	14.8	16.0	To avoid unsightly waste left in the open channel.
5	Increase number of toilets in the settlement	15.6	9.8	12.7	To reduce walking distances and for use at night
6	Others: - Use appropriate floor tiles - Provide mirrors - Provide water taps in the toilets				- To avoid accidents - For checkup after the visit - For use by Muslims

Showers

The new shower facility was being used by 73.6 percent of the respondents. The rest of therespondents said they buy water and take a bath in make shift shades near to their residential units. The main reason for some of the residents not using the new facility was that the Kshs.4/=charge per user wasfound to be high in the sense that a 20 litre water container which cost Kshs. 2/= was sufficient for two people to take a bath. The other reason advanced was the long distances of the facilities from someoftheresidences.

Showers: Users' Reasons for liking the shower

Before this facility was built, residents took their bath in small structures made of temporary materials. Secondly, the space provided was too small with privacy not really guaranteed. Users were therefore, asked to state reasons why they like the new facility. A numberofreasons were raised as shown in Table 9.

Table no9: What users like about the shower.

S/N	Reasons	% Male	% Female	% All	Remarks
1	Clean	60.9	29.5	45.2	Management issue
2	Available and accessible	26.6	24.6	25.6	Planning- siting of facilities
3	Modern shower systems	20.3	9.8	15.1	Perception of modernity
4	Convenient to use	15.6	18.0	16.8	Technology -
5	Spacious	1.6	8.2	4.9	Relates to unit 2 mainly
6	Others: - Ensures privacy - Near my residence - Facility is safe	1.6	4.9	3.2	-.Personal dignity and comfort -. Convenience - sense of security

Cleanliness was the overriding reason for users liking this facility especially the male respondents. Of the male users interviewed, 60.9 percentliked the facility as opposed to only 29.3 percent of the female users interviewed. On overall 45.2 percent of the users were happy for this particular reason. Inreason3relating to modernity of the facility, the number of male users who liked the facilityweretwice the number of female users. For the reason of spaciousness (number 5), thefemaleusers who liked the facility were almost five times more than male users. The restofthereasons tended to be more or less balanced for both male and female users. It can beobserved here that all the reasons presented by the users, there was none that had been pickedby overwhelming majority of respondents. This can be interpreted to mean that this facilityisranked lower than toilet and water facilities by all users.

Showers: Users' reasons for not liking the shower facility

Users were asked to state whether there are any attributes they do not like about this facility. A number of issues were raised as tabulated in Table 10. The responses to the questiononwhat the users did not like about the facility showed that the satisfaction level couldberatedas high. On overall, 40.9 percent of the users were satisfied with the facility. Themosthighly rated reason for users not liking the facility is the cost which could be seen asamanagement issue. However, there is another angle of design to the issueofcostaselaborated during discussions. It was argued by the respondents that there is misuse of water since the quantityused by anyone user is not regulated. In addition some users took a very long time inthebathrooms causing long queues especially in the morning leading to high water consumption.

Table no 10: What users don't like about the shower

S/N	Reasons	%	%	%	Remarks
1	Nothing	34.4	47.5	40.9	Satisfied with facility
2	Expensive (unaffordable)	21.9	13.1	17.5	Management/design
3	Bathrooms are few (queuing)	4.7	1.6	3.2	Planning
4	Cleanliness not consistent	7.8	3.3	5.6	Management
5	Floor slippery- floor tiles too	7.8	3.3	5.6	Technological-use
6	Others: - Closing time too early - Poor quality plastic shower - One entrance for both sexes - Showers too small	12.0	8.2	10.1	 Management Technology Social Design

The respondents pointed out that thesmooth floor tiles were slippery especially when they are wet and that this posesdangertothe users.Theissueofbreakages of plastic shower heads was mentioned in linewiththecostofmaintenanceand service rendered. In unit one and three, users pointed out that shower heads were too low and not convenient for use by tall people. On the socio-cultural side, users were not happy with theentrance to the toilet being one for both male and female. Men felt uncomfortable by seeingscantilydressed women going to the shower. However, this issue is alsoclosely related to thesizeofthe shower especially in unit one and three. It was argued that due to the size beingsmall,theclothes hanged inside the shower got wet when showering. Unit two had biggersizeshowersand users did not experience this problem.

Showers: Users Proposals for Improvements

Asummary of users' proposals onhow to improve the identified problems is shown in Table 11. It can be seen that very few users made these proposals. During discussions more emphasis was put on the same proposals for improvements. The issue of cost was more than emphasized and it was recommended that the quantity of water per user beregulated, such that all users pay for equal amount of water.

Table no 11: Proposals for shower improvements and reasons

S/N	Reasons	%	% Female	% All	Reasons
1	No improvements	43.8	54.1	48.9	Satisfied
2	Provide good quality shower heads	1.6	3.3	3.2	To avoid water splashing on walls
3	Provide each shower with water regulator per user	10.9	4.9	7.9	To reduce on misuse and thus lower the cost of shower use
4	Provide more bathrooms	12.5	0.0	6.3	To reduce on queuing
5	Use non-slippery floor materials	6.3	1.6	3.9	To avoid accidents
6	Others: - Provide separate Floors - Reduce gap below the door - Provide bigger size	6.3	0.0	3.1	- Men and women not to meet - Stop children under the door - Stop watersplashing

Environment

In order to assess the effect of the water and sanitation facility to the environment, users wereasked whether there has been any improvement and to enumerate the specific reasons. An overwhelming 97.5percent answered in affirmative and gave at least five reasons as shown in table12below.Two main reasons presented are cleanliness and the issue of very little defecationalloverthesettlement. These two are very closely related factors since water borne toilets require continuous water supply to maintain a hygienic solid and liquid waste disposal.

Table no 12: Reasons why there is improvement on the environment

S/N	Reasons	% Male	% Female	% All	Remarks
1	Cleaner than before	32.8	39.3	36.0	Community awareness
2	Ther is little defecation all over the settlement	50.0	47.5	48.7	Because of free use by children below 11 years
3	There is very limited use of flying toilets	14.1	24.6	15.3	More healthy environment
4	Ther is surety of drinking clean	9.4	6.6	8.0	Treated at source
5	There is reduction in out-breaks of diseases	9.4	9.8	9.6	Some of the diseases are cholera, diarrhea, etc

The impact of this initiative to the Kiambiu settlement residents can be seen through the environment. The reasons stated in Table 12, show that residents of this settlement have woken uptothereality that they can keep their environment clean and habitable. Members of the Kiambiu Usafi Group have set aside one day in a week for cleaning their environment. There is also the Kiambiu Youth Group, an affiliate of KiambiuUsafiGroupwhichfocusesontheenvironment management of the settlement. Due to this improvement, the users were happy and appreciative of the fall in the instances of out breaks of diseases which affected mostly children in large numbers. In addition, the residents were happy with the reduction in the number of pit latrines in their settlement which in most cases were poorly built and provided very little privacy and at the same time emitting foul smell.

Management Aspects

This study focused mainly on technical issues of the WES initiative. However, during the interviews and discussions, a number of issues related to management of the facilities were raised by the respondents and the employees. The issues were collected through interviews and discussions with the various resident groups in Kiambiu. Table 13 summarises management issues raised, concerns expressed and proposals by the employees and users of the new facilities.

Table no 13:Management issues raised by Employees and Users

S/N	Issues	Concerns	Proposals
1	Cost of shower	The price of shower Kshs. 4/= is too high.	Reduce the cost of shower to at least Kshs. 3/=
2	Cleanliness of facilities	The cleanliness of the facilities is not consistent due to laxity by employees.	Employees should be supervised closely to carry out their work expeditiously.
3	Operating time	The facilities close at 9 pm which is too early forcing residents to go back to their old ways of waste disposal.	Open the facility up to 11 pm when most residents retire to bed.
4	Facilities attendants	Attendants are not clean hence the danger of contaminating water when selling is high.	The management should set cleanliness standards to be observed by all employees.
5	Protective clothing	Workers do not have protective clothing; this is a health hazard to the employees.	Provide protective clothing ((gumboots, gloves, nose covers, etc.,) to all workers.
6	Uniform for workers	It is not possible to identify attendants at the facilities.	Provide uniforms to all the attendants.
7	Long working hours	The 16 hours shift is too long and tiring to the workers.	Create a two shift work schedule that would push the closing time to 11pm.
8	Flushing of storage tanks.	Storage tanks could be contaminated if not flushed for a long time.	Flush storage tanks at least two times a year.
9	Cleaning of facilities.	Cleaning of facilities during morninghours forces women and men to use same facilities.	Cleaning should be done at night after closing the facilities.

VI. CONCLUSSION

Arising from the interviews and discussions with the residents of Kiambiu and observations of the environment,it wasnotedthatissues, concerns and proposals advanced by users of the new waterandsanitationfacilitiesprovide a basis for the development of such community initiated projects. Recommendations to these issues as discussed in the paper form an operational framework which could be perfected and documented for other communities and development partners to learn from and adopt them. The shortfallsin this particular initiative givearichunderstandingoftheprosand cons of community based projects. Some of the issues discussedareveryminutedetailsbut should be seen to contribute tothe development of user friendlywaterandsanitation facilities. There are those issues that can be addressed right away in thealreadybuiltfacilities and those that need to be noted and be taken into consideration in subsequent projects.

Water, Environment and Sanitation initiative is a clear demonstration of peoples' desire to live in a healthy environment supplied with the necessary services and facilities. Community initiatives have been and still are the most challenging in terms of implementation and achieving the intended objectives. Through the analysis of the WES initiative in Kiambiu, one can with certainty say that the objective set for this project has to a large extent been met. In the same context, there are lessons learnt from this initiative that could be useful to similar projects being planned by any other community living in similar circumstances. Issues that have been raised by the users are a reflection of the level of involvement in the process of implementing the project. Users who are not members of Kiambiu Usafi Group participated effectively in the discussions and interviews and expressed their opinions as to what should be done to improve these facilities. The information gathering was easy,anindication that the residents of Kiambiu were happy with this initiative and looking forwardto their views being incorporated in the scheme.

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