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ENVIRONMENTAL CHEMISTRY, POLLUTION & WASTE MANAGEMENT | RESEARCH ARTICLE

Effectiveness of sanitation policy instruments in Mavoko Municipality of Machakos County, Kenya

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Abstract: Improved sanitation leads to better environmental quality however threatened environments, population densities and inadequate finances are some of the challenges facing proper sanitation management. This paper sought to establish the effectiveness of policy, legal and institutional frameworks on promotion of sanitation management in Mavoko Municipality. Resident's awareness and compliance with policy instruments, role and responsibilities of Mavoko Municipality Residents and Service Providers and Political Champions were used to gauge the effectiveness of these policy instruments. Mavoko Municipality has low sewer network coverage with a deficit of 86% in sewerage treatment capacity as its existing sewerage treatment capacity stands at 192,000 m³ against a required capacity of 1,407,000 m³. The study site covered the urbanizing areas within the Municipality. A cross-sectional study design was chosen and both primary and secondary data were collected. 385 house hold respondents were interviewed. Simple random and purposive sampling methods were used to administer questionnaires to stand-alone houses and comprehensive housing schemes. Key informant interviews with County and National Officials mandated with sanitation management related services were conducted using structured forms and interview guides. Findings

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PUBLIC INTEREST STATEMENT

Human waste disposal if not properly managed results in diseases from the household level and beyond and may lead to irreparable damage to the environment. Sanitation policy instruments are Government measures to prevent this state but only if they are implemented effectively. The research was conducted to address the rising urban population densities in Mavoko Municipality which are bound to exert pressure on the existing sewer network which covers less than 1% of the Municipality. The research seeks attention of the Residents, Service Providers and Political Leaders to prioritize the sector. It established that Residents' awareness and compliance levels were very low whilst performance of National and County Governments were poor. Political championing was minimal. However, the Syokimau Residential Neighbourhood Association emerged as a vigilant body which could be supported to work in partnership with Government to facilitate effective implementation of policies and promote community led total sanitation approaches.

indicate that existing policies and legal frameworks are not effective as they play little role in influencing policy for the promotion of appropriate sanitation management approaches. Political championing was negligible whilst County Government performed poorly in sanitation management. Commitment to providing sanitation services and building capacities and strengths of Service Providers and emerging Residential Neighbourhood Association is recommended to promote good practices in sanitation and environmental management.

Subjects: Area Studies; Development Studies, Environment, Social Work, Urban Studies; Urban Studies; Built Environment; Development Studies

Keywords: compliance; Mavoko; policy, legal and institutional frameworks; political champion; sanitation management

1. Introduction

The importance of sanitation management cannot be underestimated because apart from the risk of disease transmission being reduced at the household level and its environs, improved sanitation leads to better environmental quality and where it is integrated with sanitation systems combined with integrated treatment promotes resource recycling through their use of water and recovery of nutrients and energy contained in waste water. Walther, Luthi, and Parkinson (2014). It enhances the attractiveness of cities for investment making them livable. It has been illustrated too by the World Health Organization (2013) that investing in improved sanitation gives back as the economic return on every dollar is US\$5.5 benefit.

However, there are many challenges facing sanitation management approaches especially in the developing world. Challenges range from lack of finances Caincross (2003); poor performance of sanitation management approaches used Anand (2006), Nam, Visuanathan, and Jegathesan (2006), Gunawardana, Galagedara, and Silva (2011) increasing population densities Krishnan (2011), threatened environments due to industrial effluent Srinivasamoorthy, Vijayaraghavan, Vasanthavigar, Rajivgandhi, and Sarma (2011) implementation of failed policies amongst others. Cohen (2013). Mavoko Municipality being one of the fastest growing urban areas with a population of 244,259 projected to grow to 593,182 by 2030 National Population Census (2009a) faces a deficit of 86% in sewerage treatment capacity as its existing sewerage treatment capacity stands at 192,000 m³ against a required treatment sewerage capacity of 1,407,000 m³ National Water Master Plan (2012b). Its sewer network is over 25 years old and comprises only 31.07 km long sewer network which covers a negligible 0.045% of its 963 km² of its total jurisdiction. This state calls for interventions in sanitation management sector.

2. Objective

Governments' participation at the national and local levels ensures the effectiveness of community approaches to total sanitation Olukanni, Azuh, George, Ajayi, and Emenike (2014). Policies and legal frameworks are some of the instruments that Governments use as interventions in promoting sanitation management and environmental sustainability. The objective of the paper is to ascertain whether policy instruments used in the study area are effective in promoting sustainable sanitation management approaches by examining the Resident's awareness and compliance with policy instruments relevant to sanitation management, the role and responsibilities of both the Residents of Mavoko Municipality and the Institutions employed in the management of sanitation matters and the existence of political will in championing sanitation management matters, as a gauge for the effectiveness of these policy instruments.

3. Literature review

Literature in the area suggests on the contrary that most policies have not contributed to proper management of the sanitation sector. They have decentralized the burden to the lower levels of

government which do not have the capacity to support the added responsibilities; denied their population's water and sanitation services at affordable rates due to unfavourable tariffs Organization for Economic Cooperation and Development (2009); failed to harness the synergies of community health workers and health clinics as seen in Peru, Edwards, Davis, and Bellido (2004) and failed to facilitate the interventions of the Non-Governmental Organizations (NGO's) involved in low cost technology, operation and maintenance of the infrastructure.

They have instead pressured the application of these policies resulting in systemic constraints like the weakening of a public service ethic, long-term debt on the poorest countries and continuous pursuit of the same failing policies under uncritical approaches. Cohen (2013)

Literature from the southern African Countries of South Africa, Namibia and Zimbabwe are indicative of a shift in policy with these Countries adopting a holistic approach in addressing sanitation management. Namibia's National Sanitation Strategy of 2009 is informed by a selection criteria made of environment, income generation, affordability, technical appropriateness and cultural aspects. It is built on the foundation of a coordinated water sanitation sector layered with institutional capacity building, community education, construction, operation and maintenance, performance management and enforcement capped by social-economic improvements. It provides a check list of elements to be addressed in change management Namibia (2009). This offers a more integrated approach as opposed to earlier policies.

Zimbabwe's strategy to accelerate access to sanitation and hygiene focuses on resuscitating institutional frameworks, building capacity at all levels and providing appropriate, affordable land sustainable sanitation technologies. It shifts away from construction subsidies to service sustainability and development of a holistic update of water sector policies which are inclusive of sanitation in rural and urban contexts, research and development, monitoring evaluation, knowledge management and advocacy, gender, equity and inclusion, climate change and behaviour change, health and hygiene education Zimbabwe (2011).

South Africa's National Sanitation Policy though prepared in 1996 (Republic of South Africa) has a holistic nature as it embodies 10 principles of demand-driven and community-based approach, basic services and human right, "some for all other than all for some", equitable regional allocation of development resources, water with an economic value, the user pays, integrated development, environmental integrity, sanitation as health and sanitation as a community responsibility. It has further strengthened the policy with the sludge management guidelines which further the selection of appropriate sludge management options based on characteristics and classification of the sludge and the requirements of agricultural use, onsite and offsite disposal, beneficial use of sludge and high loading rated use in agricultural practices, thermal sludge management practices and for commercial products containing sludge.

These policies notwithstanding, Richards and Doering (2008), notes that Kenya, Tanzania, Uganda and Zambia have all formulated policies but they are weak on sanitation and biased to water supply. Sanitation is only regarded as part of the water supply and sanitation when it relates to waterborne sewerage systems. Further, reform activities have preempted the logical progression of policy-strategy and legislation. Tanzania introduced the private sector before strategy and legislative framework; Zambia set-up the institutional framework before the legislation whilst Uganda passed the legislation before policy. Kenya adopted legislation before development of subsector strategies. Still with all these reforms sanitation remains the weak part of these reform processes in all four countries. Sector reforms have not managed in an integrated manner.

Conversely in the recent past Kenya has formulated policies to address environmental sustainability. Kenya Health Policy 2012–2030 acknowledges, the need to create an enabling environment for increased private sector and community involvement in health services provision and finance. It outlines its strategy to actualize minimization of exposure to health risk factors as strengthening

mechanisms for screening and managing conditions arising from health risk factors at all levels but omits the aspects of sanitation management which are critical in managing environments which may contribute to health challenges.

National Environmental Sanitation and Health Policy (NESHP) (2016–2030) has as one of its key purposes the need to enhance the existing legal and institutional framework to encourage active private sector, civil society and community participation in the planning, implementation and ownership of environmental sanitation health services. It targets property owners and developers to invest in and construct suitable sanitation facilities for tenants and home buyers. National Environment Policy (2013a) states its goal as provision of better quality of life for present and future generations through sustainable management and use of the environment and natural resources.

Environment Management and Coordination Act (EMCA) provides for assessment of environmental impacts and audits of developments on land through licensing and issuance of restoration orders. It recognizes international treaties, conventions and agreements geared towards managing the environment sustainably.

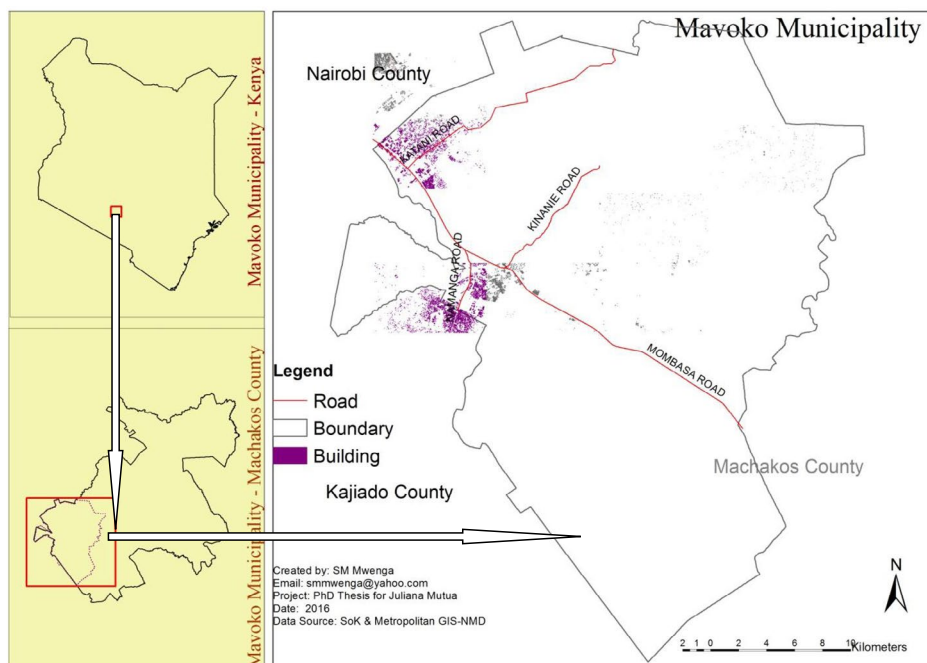
4. Study area

Mavoko Municipality in Machakos County in Kenya (Figure 1) is situated in Eastern, Kenya, about 28 km from the Nairobi. Its geographical coordinates are 1° 27' 0" South, 36° 59' 0" East and its original name is Athi River. This is the area under the administrative boundary of Mavoko Municipality also known as Mavoko Sub County and covers an area of 963 km² according to the spatial planning concept for the Nairobi Metropolitan Region (2013b). It falls under the Mavoko Constituency area which comprises four wards made up of Athi River, Kinanie, Muthwani and Syokimau/Mlolongu, Independent Electoral Boundaries Commission (2015).

Settlements within the study area comprise both standalone houses (SAs) and comprehensive housing schemes (CHSs). SAs are individual housing units occupying a distinct parcel of land with own or private entrance whilst the CHSs are many housing units with similar design, on a common parcel of land and constructed by a common developer. They share a secured common entrance and are confined within a gated community. CHSs are unique as they concentrate populations of over 300 households on land parcels ranging from 1 acre to 5 acres of land.

Figure 1. Mavoko Municipality study area.

Source: Nairobi Metropolitan Department (2015).



Whereas the SAs rely mostly on septic tanks and pit latrines, the CHSs wholly rely on septic tanks. These two housing types were differentiated to identify sanitation management problems and challenges unique to them and their various contributions to environmental and sustainable development.

5. Sampling procedure

A cross-sectional design was found most appropriate as it was best suited in establishing an overall picture of the existing situation of the study at the time Kumar (2005). It involved collection of primary data from respondents from a select sample from the study population which had already been identified as Mavoko municipality. A total of 385 questionnaires were administered to standalone and comprehensive housing scheme households having rounded off the calculated 384 required sample size to a multiple of 5. This sample size was arrived at, assuming a 95% confidence level with a Z^* -score value of 1.96, standard deviation of 0.5 and a margin of error of 0.05 hence the formula:

$$n_0 = \frac{Z^2 pq}{e^2}$$

where n_0 is the sample size; Z^2 is 1.96²; e^2 is 0.05²; p is 0.5 and q is 0.5.

The same 384 was also arrived at using guidelines samples provided by Krejcie and Morgan (1970). 289 and 96 questionnaires were administered to standalone and comprehensive households. Random sampling was used to administer questionnaires to SAs which were homogenous in characteristic and because the design afforded an opportunity to each of the samples to be interviewed. Kothari (2004). Purposive sampling method was used to identify CHSs developed earlier as they were bound to have Tenants/Owners who had occupied the houses for longer periods and therefore likely to have had more exposure to sanitation management study concerns.

To ensure that bias was minimized and that each part of the study area had an equal probability of being sampled, the area populations for each of the Wards which make up Mavoko Municipality were used to come up with ratios which guided the apportioning of questionnaires into the stand alone and comprehensive housing schemes. A proportion of the questionnaires were shared amongst CHSs and SAs on a ratio of 1:4 on the observation and assumption that the population sizes of the standalones far outnumber the CHSs which are a new phenomenon. Once more the ratios were allocated to each of the wards and final figures calculated.

6. Data collection and analysis

Primary data in the form of household questionnaire administration and interview of key informants were conducted with the county officials mandated by the various ministries such as environment and natural resource, water resources management, agriculture, livestock and fisheries, land and physical planning. Ministry of health, agriculture and transport, infrastructure, housing and urban development were interviewed too.

Quantitative data such as records of sunk boreholes, water permits, building plans were collected from the Institutions mandated to implement policy and legal frameworks that regulate sanitation management in the Country. Secondary data comprised a review of the existing policies, legal and institutional frameworks to analyse their implementation and enforcement levels.

Primary and secondary data gathered were analysed using the social statistical package for social sciences (SPSS) and descriptive statistics presented by way of tables, graphs, frequencies and percentages. A content analysis was used to develop thematic issues discussed in the paper (see Table 1).

Table 1. Apportioned questionnaires for administration

| Ward | Assumed ratio of standalone houses to comprehensive housing schemes is 1:4 based on observation of the study area | Final questionnaires for administration to stand alone (SA) and comprehensive housing scheme (CHS) | |
|--------------------|---|--|-----|
| | | SA | CHS |
| Athi River | $(1/4) = 0.25 \times 219$ | 165 | 55 |
| Kinanie | $(1/4) = 0.25 \times 12$ | 9 | 3 |
| Syokimau/Mulolongo | $(1/4) = 0.25 \times 66$ | 50 | 16 |
| Muthwani | $(1/4) = 0.25 \times 88$ | 66 | 22 |
| Sub-total | | 290 | 96 |
| Grand total | | 386 | |

Source: Mutua (2017).

7. Results

This section illustrates the factors considered indicative of an effective policy. These were Residents' awareness of sanitation policy, role and responsibilities of both the Residents and the Institutions involved in sanitation management and political will present in championing the sanitation sector. The study found that 58% of respondents were aware of the environment policy whilst 35 and 27% were aware of environment sanitation and health and health policies, respectively. Awareness on housing and land policies were recorded both at 13%. Urban development was the least known with 13% of the respondents indicating awareness (see Figure 2).

40% of the respondents raised their awareness of policy through own reading, County Government (CG) sensitization meetings came second at 13% whilst sensitization by House Developers came third at 11%. Others sources of policy sensitization were through political statements by Leaders and Residential Neighbourhood Associations (RNAs) at 74 and 6%, respectively. Table 2 Sensitization on Sanitation Management shows this.

Compliance with the Environment Sanitation and Health Policy were at 24% with respondents reporting compliance with maintenance of clean and safe environment, proper waste management and disposal was second with 12% whilst conservation of the environment was third at 11%. The rest of the areas of compliance recorded low values below 2%. These were proper maintenance of latrines, protection of forested areas, health checkups and recycling and reusing of resources. Figure 3 illustrates these results.

Figure 4 depicts very low compliance rates with respondents indicating the highest being 5% compliance with building codes and regulations.

Figure 2. Respondents awareness of policy in (%).

Source: Field Survey (2016).

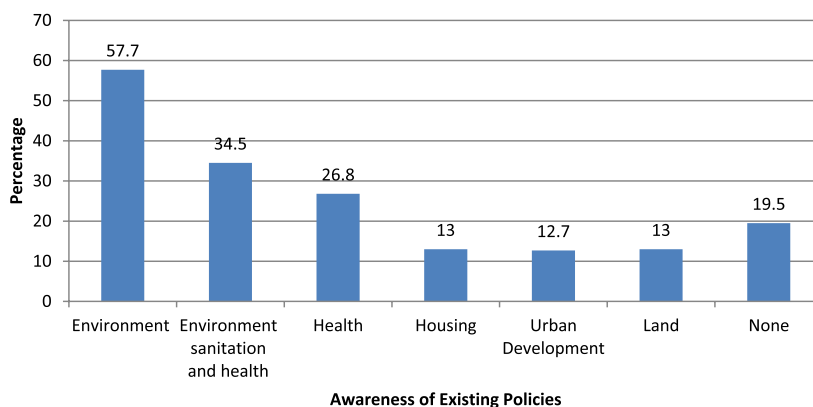


Table 2. Sensitization on sanitation management

| Source of policy sensitization | % |
|---|------|
| County government sensitization meetings | 12.7 |
| Political statements attributed to the leadership | 7.3 |
| Neighbourhood associations | 6.2 |
| Community based organizations | 2.6 |
| House developers | 11.2 |
| Own study | 40 |
| National environment management authority (NEMA) | 0.5 |
| Mass media/social | 2.6 |
| Professionals in the construction industry | 0.3 |
| Total | 100% |

Source: Field Survey (2016).

Figure 3. Respondents compliance levels with environment, sanitation & health policy (%).

Source: Field Survey (2016).

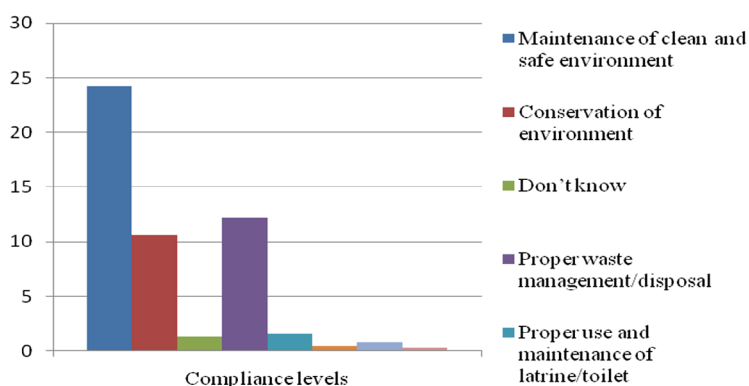
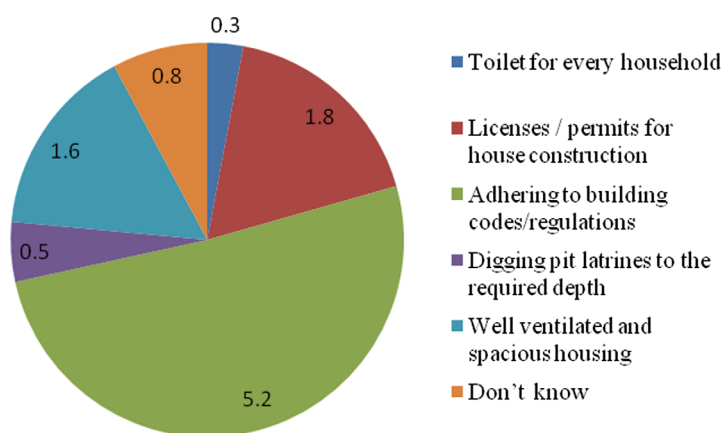


Figure 4. Respondents compliance levels with housing policy in (%).

Source: Field Survey (2016).



Compliance with Urban Development and Land Policies were very low with the bulk of 93% of the population indicating non-compliance since they did not give any response. All the compliance areas mentioned by the respondents such as controlled and approved development by various Authorities, legal ownership of property through titling, payment of land rates and protection of public and private land by not encroaching recorded below 3% compliance rates (see Figure 5).

Figure 6 illustrates that the Public Health Act was the most known Law with 32% of the respondents indicating their awareness about it. Environment and Management Act was second with 28%

Figure 5. Respondents compliance levels with urban development and land policies in (%).

Source: Field Survey (2016).

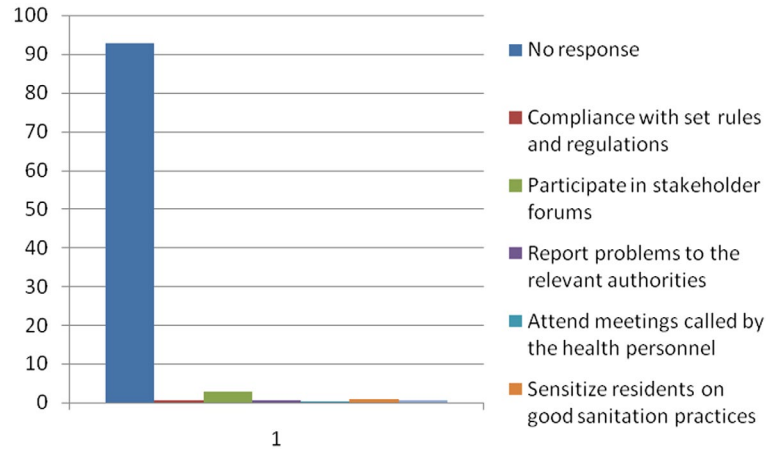
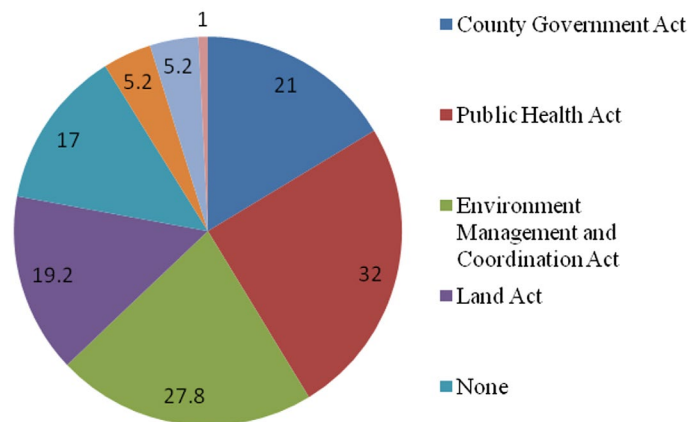


Figure 6. Respondents awareness of existing laws in (%).

Source: Field Survey (2016).



of the respondents registering their awareness on it. County Government Act and the Land Act came third and fourth at 21 and 19%, respectively. Agriculture Act was the least known at 1% most likely because the study area comprised an urban population. Physical Planning Act (PPA) and Urban Areas and Cities Act (UACA) tallied with 5% of the respondents indicating their awareness.

The County Government was rated as the most active in relation to sanitation management activities at 44% as shown in Figure 7. Other Institutions in the form of Developers, Donor Agencies, and Non Governmental Organizations were rated at less than 15%. However, there were respondents who indicated that none of the mentioned Institutions were active in the study area and made up for 24% whilst those who did not give any response were 16%.

Table 3 on involvement of Institutions in sanitation matters shows that 54% of the respondents did not respond to this question. Only 29% of the respondents indicated involvement of Institutions mentioned as active, in providing drainage and sewerage services. Maintenance of the sewer line and provision of water services were other activities undertaken by the Institutions but with only 5 and 4% of the respondents acknowledging this. Sensitization and awareness creation in sanitation matters, enforcement of sanitary laws and provision of exhauster services were below 3%.

Most of the Citizens did not play any role in influencing the formulation and amendment of Laws and Regulations. Figure 8 shows that 90% of the respondents reported not influencing Laws formulation whilst only 6% indicated influencing the same of the 6% of the respondents who indicated

Figure 7. Institutions active in sanitation management in (%).

Source: Field Survey (2016).

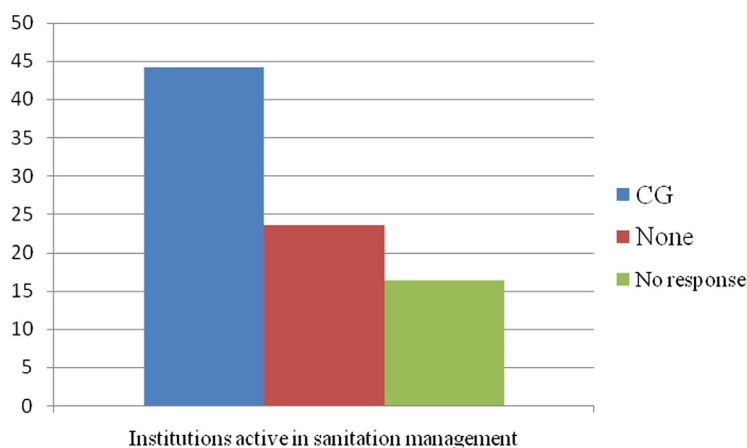


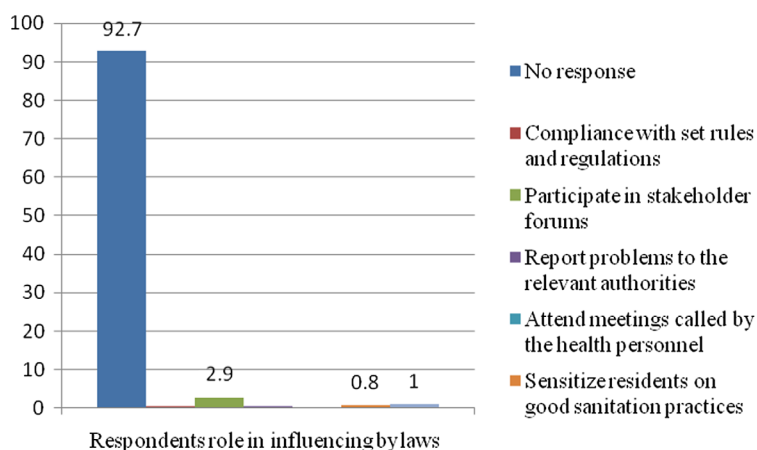
Table 3. Involvement of institutions in sanitation management

| Areas of involvement by institutions | % |
|--|------|
| Provide drainage and sewerage services | 29.1 |
| Maintenance and repair of sewer system | 4.9 |
| Ensures sanitary laws are implemented | 1.3 |
| Sensitizing and educating public on sanitation matters | 2.3 |
| Provision of water services | 3.9 |
| Provision of public toilets | 0.3 |
| Provision of exhauster vehicles | 1.3 |
| Clean up exercises by NGOs | 0.5 |
| Garbage collection | 1.6 |
| Sensitize on agriculture matters | 0.3 |
| None | 0.5 |
| No response | 54.0 |
| Total | 100% |

Source: Field Survey (2016).

Figure 8. Respondents role in influencing formulation and amendment of laws and regulations in (%).

Source: Field Survey (2016).



influencing Laws and Regulations, 3% said that they did this through participation in stakeholder forums. Less than 1% was sensitizing fellow residents on good sanitation practices. Other methods of involvement included compliance with the set rules and regulations, voting and reporting problems to the relevant Authorities which were similarly less than 1%.

Figure 9 illustrates that 49% of the respondents were aware of public statements made by political leadership in the study area relative to sanitation management. However 31% were not aware of any political statements made with regard to the same whilst 20% did not respond to the question.

There were 5 out of 8 political statements attributed to the Governor with regard to sanitation management. Table 4 shows the leading statement was the provision of water and sewerage services with 25% of the respondents highlighting it. Other statements were to the effect that more toilets be build, ensuring that waste disposals do not become a hazard to residents, inspection of toilet waste disposals, free of charge waste disposal, every household to have a toilet and more boreholes for water reliability. These other statements attributed to the Governor had less than 2% of the respondents reporting them.

Figure 9. Public statements attributed to political leaders with regard to sanitation management.

Source: Field Survey (2016).

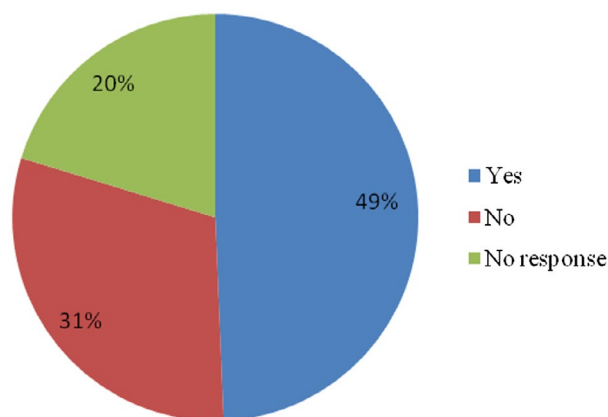


Table 4. Political statements attributed to the governor

| Governors statements | % |
|---|------|
| Provide good waste disposal services | 1.8 |
| Provision of water and sewerage services | 25.2 |
| Build more toilets in the county | 2.6 |
| Ensure that waste disposals don't become a health hazard to residents | 1.6 |
| All toilet waste disposals should be inspected | 0.8 |
| Waste disposal should be free of charge | 0.3 |
| Cannot recall | 0.5 |
| Drill more boreholes to increase water reliability | 0.3 |
| Every household should have a toilet | 1.0 |
| No response | 66 |
| Total | 100% |

Source: Field Survey (2016).

All respondents or 100% reported not being aware of any political statements by the Senator relative to sanitation management. Less than 1% reported being aware of the statements to the effect of “provision and maintenance of sewer system and better toilets to improve standards of living”. Table 5 illustrates the responses.

The area member of Parliament had five statements attributed to him regarding sanitation management. 94% of the respondents reported not being aware of any statement made by the Member of Parliament (MP). However, 2% of the respondents were both aware of statements on provision of adequate water and sewerage services. Table 6 illustrates these results.

“Clean environment starting with the woman” and “rehabilitation of the Kinanie health centre” emerged as the Women Representative’s statements with regard to sanitation management. However, these were rated below 1% with the majority 99% not being aware of any statements made as indicated in Table 7.

Table 5. Political statements attributed to the senator

| Senators statements | % |
|---|----------|
| Provision and maintenance of sewer system | 0.3 |
| Better toilets will improve standards of living | 0.3 |
| No response | 99.5 |
| Total | 100% |

Source: Field Survey (2016).

Table 6. Political statements attributed to the area member of parliament (MP)

| Statements | % |
|--|----------|
| Provision of adequate water | 2.1 |
| Build public toilets | 0.8 |
| Use water effectively | 0.3 |
| Provision of water and sewerage services | 2.3 |
| Drill more boreholes | 0.3 |
| No response | 94.3 |
| Total | 100% |

Source: Field Survey (2016).

Table 7. Political statements attributed to the women representative

| Statements | % |
|---|----------|
| Clean environment starts with the woman at home | 0.5 |
| Rehabilitation of Kinanie health centre into a maternity hospital | 0.3 |
| No response | 99.2 |
| Total | 100% |

Source: Field Survey (2016).

The Member of County Assembly (MCA) Mlolongo had statements attributed to her with regard to sanitation management but they were not known by many as only less than 10% indicated awareness of the statements. Table 8 depicts these as the provision of improved sanitation services, provision of piped water, construction of proper drainage and sewer system, public toilet construction for the “Bodaboda” transport providers, provision of reliable exhauster services and disbursement of more funds for toilet construction. Majority 91% were not aware of any statements made by the MCA.

There were no active discussions on sanitation management as 81% respondents reported not having them as is indicated in Figure 10. Only 13% were involved in the discussions. Those who reported having discussions were less than 10% and they said that they were involved in matters dealing with management of communal waste disposal, provision of sewer connection to all houses, effective and reliable sewer systems, channelling and repair of overflowing and burst sewer lines and Residents education by Mavoko Water and Sewerage Company (MAVWASCO). However, majority 91% still indicated non engagement in the discussions on sanitation management.

The few respondents in Figure 11 who made up 13% (Figure 10) and were involved in toilet waste management activities mentioned being involved in committees within the residential area, in “Barazas” and churches. These made up for 9, 2 and 1%, respectively. Figure 12 shows other areas in which toilet waste management discussions took place as the women groups and home visits where each made up for less than 1% of the total respondents whilst market place and social media especially the “WatsApp” groups accounted for below 1% each.

Table 8 Political statements attributed to the MCA

| Statements | % |
|--|------|
| Provision of piped water | 1.8 |
| Construction of proper drainage and sewer system | 1.8 |
| Build public toilets for ‘bodaboda’ operators | 1.0 |
| Provision of improved sanitation services | 3.4 |
| More funds to be disbursed to construct toilets | 0.3 |
| Provision of reliable exhauster services | 0.5 |
| Construction of tarmac roads | 0.3 |
| No response | 90.9 |
| Total | 100 |

Source: Field Survey (2016).

Figure 10. Involvements in active discussion of sanitation management in the residential area.

Source: Field Survey (2016).

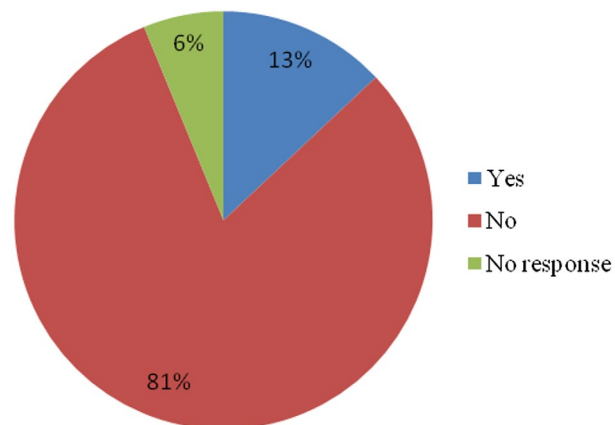


Figure 11. Discussions about sanitation management in (%).

Source: Field Survey (2016).

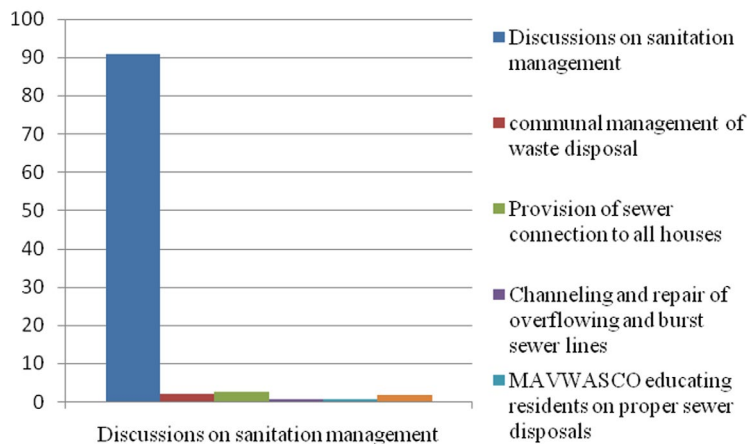


Figure 12. Places of sanitation management discussions.

Source: Field Survey (2016).

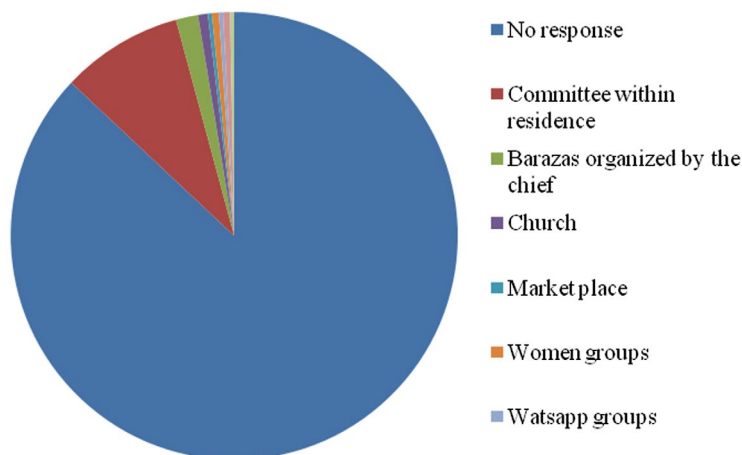


Figure 13. County and national government support to sanitation management.

Source: Field Survey (2016).

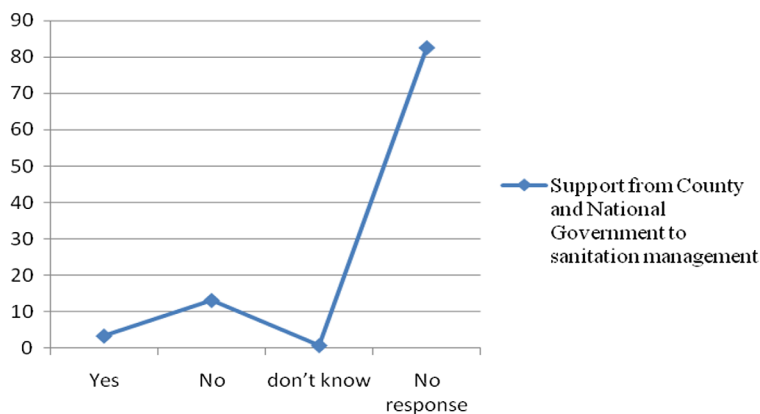


Figure 13 illustrates the levels of support from both County and National Government to the toilet waste management activities which were at 3%. 13% registered lack of it. Majority 83% did not give any response.

Table 9 shows that of the 4% County and National Government support to the toilet waste management activities, organization of meetings led at 2%, provision of funds to MAVWASCO follows at 1% whilst regular visits by county representatives and presence of County Health Officer at less than 1%.

Table 9. County and National Government Support to Sanitation Management

| Support methods by the government | % |
|--|------|
| Provision of funds to MAVWASCO | 1.3 |
| Organize for meetings | 1.6 |
| Presence of County Health Officer | 0.5 |
| Regular visits by the County Representatives | 0.8 |
| No response | 95.8 |
| Total | 100 |

Source: Field Survey (2016).

Three areas that the County and National Government needed to consider in providing support to sanitation management activities emerged as funding of proposed projects and enforcement of the law which tallied at 40%. Passage of law to support the Resident’s activities came third at 15%. Storm water drainage was recommended by 8% of the respondents whilst 6% urged MAVWASCO to supply more water and regularly (see Table 10).

7.1. Residents awareness and compliance with policies and laws in sanitation management

Relevant policy instruments were analysed by highlighting specific provisions of the respective policy instruments which were compared against the awareness of the Residents, role and responsibilities of Institutions present and political champions of the policies to establish their effectiveness. These were the Building Code (1968), National Housing Policy (2004), National Land Policy (2009b), Kenya Health Policy (2012a), Environment, Sanitation and Health Policy 2016–2030 (2007), Public Health Act (2012), Physical Planning Act 1996 (2012), Environment Management and Coordination Act (1999), County Government Act 2011 (2012), Land Act (2012); Agriculture Act (2012) and Urban Areas and Cities Act 2013 (2011).

It was ascertained that objectives of some of the relevant policies in sanitation management suggest a need to reengineer the dissemination of policy for actualization in implementation. The County Government of Machakos relies on individual stakeholder’s initiative to familiarize with Laws and Regulations for compliance. This has left Government policies to be disseminated and implemented by the private sector resulting to minimal impact.

Table 10. Recommended support from county or national government to sanitation management

| Support required from government | % |
|---|------|
| Passage of a law to support the resolutions made | 15.3 |
| Funding of proposed projects | 40.3 |
| Enforcement of relevant law | 40.0 |
| Follow up and implementation of proposed projects | 2.9 |
| MAVWASCO to provide regular and more water supply | 6.0 |
| Provision of storm water drainage system | 8.1 |
| Community participation in decision-making | 2.6 |
| Fund the EPZA water company to accommodate many | 0.3 |
| Employ outreach public officer | 0.5 |
| Public awareness and sensitization | 1.0 |
| Maintenance and repair of blocked sewer lines | 0.3 |
| Provide public toilets | 1.0 |
| Total | 100% |

Source: Field Survey (2016).

It alludes to Mjoli's (2010) findings that for effective compliance, community participation must be enforced and adequate budgets allocated to promote community "buy in" whilst GLAAS (2014) established that political support alone without implementation of sanitation plans was inadequate in ensuring actualization of the said plans. Clear sensitization policies have to be put in place whilst strengthening those in place to get stakeholder support and compliance.

National Land Policy recognizes the need to resolve land degradation due to population pressure and notes solid and liquid waste as challenges facing urbanization. The policy puts in place mechanisms of managing environment such as environmental impact assessment (EIA) and audits (EA). However, there were weaknesses in enforcement of this EIA reports as what was proposed sometimes ended up not being implemented.

It emerged from the study that though some of the Comprehensive Housing Schemes had EIA reports which indicated the use of bio digesters to manage sewage, some of the House Developers had instead installed septic tanks which were not performing well. This emerged as a challenge to sanitation management where the County Environment Officer had EIA reports which made reference to mitigation measures not implemented on the ground.

This situation was reinforced by the low compliance rates with urban development and land policies which recorded at below 3 with 93% with the bulk of the population not giving any response. This is an indicator of non-compliance as one would only comply with what they are conversant or familiar with. Still, compliance areas mentioned by the respondents such as controlled and approved development by relevant authorities and protection of public land from encroachment were observed not to have been adhered to as the Syokimau river channel and wetland area have been encroached upon by Housing Developers.

National Housing Policy confirms the globally accepted challenge of inability of Governments in developing countries to match population growth with demand for services. It appreciates that housing demand alone is at 150,000 units per year against an estimated production of between 20,000 and 30,000 units annually. In line with this policy the State Department of Housing and Urban Development (SDHUD) has as one its mandates, the promotion of low cost building materials for housing.

However, respondents in the Study area reported very low compliance rates with the highest being 5% complying with building codes and regulations. The policy is evasive on sanitation management and only mentions the need for trunk infrastructure provision by the Local Authorities now turned County Governments. This reinforces Osumanu, Rahim, Songsore, Braimah, and Mulenga (2010) observations that responsibilities for sanitation and wastewater management have been shifted to Local Governments even after it has been shown by Organization for Economic Development and Cooperation (OECD) Countries that such policies have failed.

The Building Code (1968) which is closely related to the mandates of the SDHUD provides in 191 and 202 for latrine accommodation in building plans, disposal of sewage and waste for water closets for domestic and industrial users. However, it never featured amongst the options given by the respondents. This suggests that either the building code is not in use as the revision of the same has been ongoing or respondents did not adhere to the requirements of the same.

Kenya Health Policy (KHP) 2012–2030 acknowledges, the need to create an enabling environment for increased private sector and community involvement in health services provision and finance. It outlines its strategy to actualize minimization of exposure to health risk factors as strengthening mechanisms for screening and managing conditions arising from health risk factors at all levels but omits the aspects of sanitation management which are critical in managing environments which may contribute to health challenges.

This confirms Richards and Doering (2008) observations that Kenya, Tanzania, Uganda and Zambia have all formulated policies that are weak on sanitation. This policy is already challenged by the weakness seen in the very low involvement of Institutions in matters of sanitation management. The study found that only 29% of Institutions mentioned as active were providing drainage and sewerage services.

The Environment Sanitation and Health Policy (2016–2030) has as one of its key purposes the need to enhance the existing legal and institutional framework to encourage active private sector, civil society and community participation in the planning, implementation and ownership of ESH services. It targets property owners and developers to invest in and construct suitable sanitation facilities for tenants and home buyers. To achieve this stakeholder involvement, it requires an environment conducive to consultations, negotiations and collaboration amongst stakeholders but this is confronted by an environment which is not conducive to bringing desired change.

From the study it was established that there was very little collaboration as 91% of the Residents did not take part in discussions pertaining to sanitation management while less than 3% of the population had awareness in sanitation matters and enforcement of sanitary laws. This already indicates disconnect between the target group and implementing agency which is the County Government plus a missing feedback mechanism to inform all parties involved. It corroborates Olukanni et al. (2014) assertion that lack of connection between Institutional policies and the peoples' sanitation practices challenged efforts made towards the attainment of the millennium development goals which have now been refocused as the sustainable development goals.

Government participation at the local and national levels are fundamental in ensuring effectiveness of community approaches to total sanitation United Nations Children's Fund's (2009). Nevertheless from the study, it was almost non-existent and implies too that any changes or reforms undertaken may only be marginal agreeing with Reut, Saravanan, and Zerah (2002) study in India that reforms made in the water and sanitation sector only brought marginal gains as other interventions by stakeholders like the NGOs were not considered in informing policy.

Public Health Act (PHA) 1921 provides in section 115 for the maintenance of cleanliness and prevention of nuisance which may be injurious to health whilst Environment Management and Coordination Act (EMCA) 1999 provides in section 29 for Provincial and District Environment Committees which are charged with the responsibility to manage the environment in their areas of jurisdiction. Section 31 further provides for Public Complaints Committee in which Citizens grievances may be heard.

PHA, 1921 and EMCA, 1999 were among the laws most known, with 32 and 28% of the respondents indicating their awareness about it. This could be attributed to the fact that the PHA has had a longer period of being enforced having been enacted in 1921 whilst the EMCA seems to have benefited from the global attention that has been given to environment matters which has trickled to the national and local level. Still compliance with its provisions at the Resident level has been low.

County Government Act (2012) and the Land Act (2012) came third and fourth at 21 and 19%, respectively, most likely because these are recent enactments of the law made in 2012. They provide for county planning to guide, harmonize and facilitate development in the County and civic education programmes and evaluation for resource potential and use for land use planning, respectively. Still the compliance levels with these sections of the law from Residents perspective were not evident as they did not mention existence of any County plans or the facilitation of civic education by the enforcing Authorities.

PPA and the UACA were fifth tallying at 5%. This low rate of awareness was revealing as these laws provide for the preparation and implementation of plans and management of the urban areas and yet are least known. It should not therefore be surprising if sanitation management matters are not addressed. However, it is acknowledged that the UACA was enacted in 2013 and likely not to be well

known. For the PPA which is over 20 years since its enactment indicates failure in enforcement of the Law by the former Local Authorities now County Governments.

Agriculture Act was the least known at 1%. It provides for preservation of the soil and its fertility. Though sanitation may enrich the soils Orodi (2005) or even provide nutrients to irrigating Farmers Emi et al. (2010), this has not been factored into the Act. This explains to some extent the Residents poor knowledge of the Act though the urban nature of the study area is also a contributing factor to the prevailing Resident ignorance of the law.

Urban Areas and Cities Act had 5% of the respondents indicating their awareness of the law. This is dismal particularly noting that the Law provides for participation by Residents in their city or urban areas affairs in which sanitation is critical. Table 11 is a summary of the analysis on awareness levels on existing policy and legal instruments.

Table 11. Summary on the analysis on compliance levels with relevant statutes

| Relevant statutes | Relevant provision | Awareness levels in percent (%) |
|---|---|---------------------------------|
| National Land Policy Sessional Paper no. 3 of 2009 | Resolve land degradation through environmental management mechanisms such as environmental impact assessment (EIA) and audits (EA) | 13 |
| National Housing Policy for Kenya Sessional Paper no. 3 of 2004 | Promotion of low cost building materials | 13 |
| | Trunk infrastructure provision by the Local Authorities now turned County Governments | |
| Kenya Health Policy (KHP) 2012–2030 Sessional paper no. 6 of 2012 | The need to create an enabling environment for increased private sector and community involvement in health services provision and finance | 27 |
| The Environment Sanitation and Health Policy (2016–2030) | Enhance the existing legal and institutional framework to encourage active private sector, civil society and community participation in the planning, implementation and ownership of ESH services | 35 |
| Public Health Act (PHA) Cap 242 | Provides in section 115 for the maintenance of cleanliness and prevention of nuisance which may be injurious to health | 32 |
| Environment Management and Coordination Act (EMCA) no. 9 | Provides in part IV and V for environmental planning and protection and conservation of the environment | 28 |
| | Provides in section 29 for Provincial and District Environment Committees which are charged with the responsibility to manage the environment in their areas of jurisdiction. Section 31 further provides for Public Complaints Committee in which Citizens grievances may be heard | |
| | Provides in schedule 2 for the requirement of an EIA for sewage disposal works | |
| National Environment Policy 2013 | Provides in section 6.2.2 (1–3) for the improvement of management and conservation of water supply sources, promotion of technologies in respect to waste water and recycling and incentives for private sector investment and development of appropriate water and sanitation technologies and infrastructure for waste management | 58 |
| County Government Act, no 17 of 2012 | County planning to guide, harmonize and facilitate development in the County | 21 |
| | Facilitate civic education programmes | |
| Land Act 2012 | Provides for sustainable administration and management of land and land based resources and in particular section 8 (b) for evaluation for resource potential and use for land use planning | 19 |
| Urban Areas and Cities Act Cap 275 | Provides in the second schedule 2(1) for participation by Residents in their city or urban areas affairs | 5 |
| Physical Planning Act Cap 286 | Provides in Parts IV and V for preparation and implementation of plans and management of the urban areas | 5 |
| Building Code | Provision in 191 and 202 for latrine accommodation in building plans, disposal of sewage and waste for water closets for domestic and industrial users | 0 |
| Agriculture Act | Part IV provides for preservation of the soil and its fertility | 1 |

Source: Field Survey (2016).

7.2. Role of the residents in influencing policy formulation and amendment of by-laws

Urban Areas and Cities Act, 2013 provides in schedule 2 section 1(1) for Citizens contribution to decision-making processes of the city or urban area by submitting oral or written presentations or complaints to a board or town committee through the city or municipal or town administrator.

The Environmental Management and Coordination Act (1999) provide in section 29 for Provincial and District Environment Committees which are charged with the responsibility to manage the environment in their areas of jurisdiction. Section 31 further provides for Public Complaints Committee in which Citizens grievances may be heard.

However, most of the Citizens did not play any role in influencing the formulation and amendment of by Laws and Regulations. 90% of the respondents reported not influencing laws formulation whilst only 6% indicated influencing the same. Of the 6% of the respondents who indicated influencing by Laws and Regulations, 3% said that they did this through participation in stakeholder forums. Less than 1% was sensitizing fellow residents on good sanitation practices.

Other methods of involvement included complying with the set rules and regulations, voting and reporting problems to the relevant authorities were each tallied at less than 1%. This is further confirmation that Citizens do not “own” the laws and hence the dismal compliance rates.

7.3. Institutions active in sanitation management

Public Institutions involved in service delivery in the sanitation sector in the study area were established as the Mavoko Water and Sewerage Company (MAVWASCO), Export Processing Zone Authority (EPZA) the County and National Governments. Other Institutions were the Syokimau Residents Association (SRA) which is a Neighbourhood Association and the Paul Mue Foundation. According to the respondents, the County Government was the most active in relation to sanitation management activities at 44%. It was involved in providing drainage and sewerage services. Maintenance of the sewer line and provision of water services were activities undertaken by the Institutions but with only 5 and 4% of the respondents acknowledging this. MAVWASCO was not mentioned amongst the Institutions providing services in the area and this could be explained by the promulgation of the (Constitution of Kenya, 2010) which put the former local Authorities under County Government.

Similarly, Export Processing Zone Authority (EPZA) did not feature amongst the respondents from the households as an active Institution because it deals more directly with the promotion of the industrial sector though it was supplying domestic water to parts of Mavoko Municipality. This overlap in functions could be the reason why they did not feature as active as most respondents are likely to associate service provision with the County Government (former Local Authority).

Other institutions in the form of Developers and Non-Governmental Organizations came second and were rated at 23 and 14%. However, there were respondents who indicated that none of the mentioned Institutions were active in the study area. The County Offices like National Environment Management Authority (NEMA), Physical Planning, Housing, Water and Public Works did not feature at all probably because they were assumed under County Government.

Still the poor rating of Institutions in the study is indicative of the failure by the County Government to harness the potential in effective contractual relationships that have been shown by Water and Sanitation Program (2011) and partnerships between municipalities and providers, Jones, Kathy, and Tyers (2006) to provide flexible entry for the private sector and NGOs in sanitation promotion, investment and delivery. It is similarly in support of Okumu and Oosterveer (2010) argument that Local Authorities are unable to put in place alternative plans and regulations for physical environmental infrastructure development.

On triangulation of the information to establish availability of other Institutions existing in the study area, records available from the Social District Development Office were only reflective of self

help groups concerned with persons living with disability, vulnerable groups' i.e. women, youth and the orphaned and whose agenda was not related to sanitation management.

There was an only self-help group known as the Enterprise Self Help Group (SHG) in Katani which fell under an umbrella body known as the "Paul Mue Foundation". Amongst the fourteen objectives it has, improved latrines and provision of sustainable sanitation was the last indicating the least prioritization being accorded to the sector. A close follow-up on the SHG did not yield additional information as a promise to return a call by the contact person was never fulfilled nor was there any physical address to afford visits to the Organization.

The study established Syokimau Residents Association as the only existing Residential Neighbourhood Association (RNA). As the name suggests it was active in the urbanizing areas of Syokimau and neighbouring Katani area in Mavoko municipality. The RNA has been active in enforcing proper environmental management. It has engaged NEMA and successfully sued Kings Developers whose faulty septic tank had been discharging raw sewage into the Sabaki stream. It obtained a Court order stopping "Joiven" Contractors from further developments until they unblock the Sabaki stream.

7.4. Political will and representation on sanitation management affairs

Political will as one of the components of political factors and the recognition that support from high profile champions can help prioritize and initiate momentum in moving the sanitation agenda forward Cronin, Badloe, Torlesse, and Nandy (2015) made the answer to statements attributed to political leadership pivotal in establishing level of support towards efforts at sanitation management. Respondents attributed five statements with regard to sanitation management to the Governor.

The leading statement was the provision of water and sewerage services with 25% of the respondents highlighting it. Other statements were to the effect that more "toilets be build", "ensuring that waste disposals do not become a hazard to residents", "inspection of toilet waste disposals", "free of charge waste disposal", "every household to have a toilet" and "more boreholes for water reliability". Other statements noted from the Governor had less than 2% of the respondents reporting them.

Observations from the study area indicated the Governor's awareness of the need for sanitation management through the construction of public toilets in Mlolongo and at the Machakos Junction amongst other areas in the larger Machakos County. Out of the four MCA's in the study area, only the Mlolongo MCA had statements attributed to her with regard to sanitation management. They touched on provision of improved sanitation services, provision of piped water, construction of proper drainage and sewer system, public toilet construction for the "Bodaboda" transport providers, provision of reliable exhauster services and disbursement of more funds for toilet construction. The Women Representative had two statement attributed to her which made reference to a clean environment emanating from the woman and rehabilitation of the Kinanie Health Centre. The Senator did not have any sanitation-based management statements attributed to him.

A cross checking of the social media as a communication tool used by the political leadership to sensitize the public on their agenda was established. Only the Governor and MCA-Mlolongo and Muthwani were active with up-to-date postings on their activities. Still sanitation management did not feature per se as an area of concern amongst the political leadership. There is a lot of room for improvement as over 90% of the respondents reported not being aware of any political statements being attributed to the political leadership apart from those of the Governor.

This suggests that either the strategies being used by the Political leadership are not exhaustive, are inadequate or that they are not aware and alive to sanitation management matters. Similar results were obtained from the respondents who indicated non-engagement in discussions on sanitation management. However, respondents recommended areas of engagement with the County and

National Governments as: the funding of proposed projects and enforcement of the law; passage of law to support the Resident's; storm water drainage infrastructure and increased and regular water supply from MAVWASCO.

8. Conclusion and recommendations

Existing policies and legal frameworks are not effective as they are least known with the target population not complying with the laws and playing little or no role at all in influencing policy for the promotion of appropriate sanitation management approaches. Government participation performed poorly due to the low levels of involvement in sanitation by the implementing agencies alluding to weak institutions either as a result of weak institutional structures and capacity, inadequate funding or both.

Political awareness and will are similarly near non-existent amongst the area Senator, Member of Parliament, County Assembly Member and the Women's Representative. Only the Governor appears to have awareness in sanitation management matters albeit at low levels. However, this is insufficient as success of any policies, legal frameworks and institutional capacity building may not be achieved without the input of all the key stakeholders who by design must be well informed to make the desired changes. The Political leadership needs sensitization on sanitation management matters and a change in the way it communicates with the Citizenry.

Just as there is commitment to make policy and laws to govern the sanitation sector, investments towards building capacities of the Regulatory Bodies and Institutions charged with the responsibility of providing sanitation services and enforcement of enacted policies and legal should be made. Sensitization of the various sectors of the population should be undertaken with the view to promoting good practices in sanitation and environmental management for sustainable development. The emergence of the RNA needs to be captured and institutionalized to leverage on its strengths at facilitating effective implementation of sanitation policy instruments on the ground.

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