DEMOGRAPHIC AND SOCIO-ECONOMIC FACTORS AS DETERMINANTS OF ENVIRONMENTAL ATTITUDE IN MAVOKO PERI-URBAN SETTLEMENTS OF NAIROBI METROPOLIS, KENYA

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ABSTRACT

Mavoko peri-urnan settlement is experiencing rapid demographic and socio-economic change as an integral element of the growth and operation of the growing Nairobi city. The transformation has come with environmental challenges related to the emergence and growth of urban activities in rural areas. The objective of this study was to analyse the effect of demographic and socio-economic characteristics on the homeowners' environmental attitude in Mavoko peri-urban settlement. The study targeted heads of household; the general public; officials of government and quasi-government institutions as well as professional and residents associations. The study took a survey design and used multistage random, purposive and quota sampling techniques to identify participants. The study used mixed methods to collect quantitative and qualitative data through questionnaire, interview guide, document analysis, focus group discussions and direct observation. Data were analysed through descriptive analysis, Nomothetic evaluation and Chi-square analysis at $\alpha = 0.05$. The study revealed that demographic and socio-economic characteristics had a significant effect on the homeowners' environmental attitude in Mavoko peri-urban settlement.

Keywords: Demographics, Socio-Economics, Environmental Attitude.

INTRODUCTION

Large cities like New York and Washington in the US; London and Birmingham in the UK; as well as Accra, Cairo, Johannesburg, Maputo and Nairobi in Africa have expanded their municipal boundaries to larger metropolitan regions (*Amnesty International*, 2009). Part of the populations acquire land and settle in the peripheral areas, many a time on floodplains and hillsides as the case is for Soweto-on-Sea near Port Elizabeth and Alexandra in Johannesburg, South Africa; Bujumbura in Burundi, but still feel they are within the city (Douglas et al., 2008; Jha et al., 2012). In Kenya, people settle in peripheral areas of Kiambu, Limuru and Kikuyu to the North; Ngong, Ongata Rongai and Kiserian to the West; Kitengela, Athi River and Machakos to the South; and Thika, Ruiru, Kangundo and Tala to the East but still feel they are within Nairobi (GoK, 2008). Mavoko peri-urnan settlement, within Machakos County, is an integral element of urban systems because it and its environment are integral to the growth and operation of the growing Nairobi city as it experiences rapid demographic and socio-economic transformation (Eakin et al, 2010). This change has come with environmental challenges such as flooding which is related to the emergence and growing of urban activities in rural areas (UN-HABITAT, 2006; Jha et al., 2011).

This study aimed at determining the effect of demographic and socio-economic characteristics on the homeowners' environmental attitude in Mavoko peri-urban settlement. It analysed the effect of the respondents' demographic and socio-economic characteristics on their tendency to engage in behaviour considered indicators of their environmental attitude. The behaviour was classified into two: behaviour in the physical environment as indicators of

their attitude towards the physical environment; and social behaviour as indicators of their attitude towards the social environment. Guided by the work of Teo et al. (2000), the study used Ajzen's Theory of Planned Behaviour which suggests that human behaviour can be explained by understanding their attitudes as human beings will always tend to engage in activities that they are familiar with.

METHODODOLOGY

Study Site

The research was carried out in the geographical region defined as Mavoko settlement, which covers Mavoko constituency of Machakos County within Nairobi Metropolis. Mavoko settlement was identified for this study because it was considered as forming a special geographical space for academic and practical scrutiny for three reasons. First, the area is a transitional zone between the truly urban Nairobi city and a clearly rural area of Machakos County, hence experiencing rapid socio-economic transformation and environmental challenges (UN-HABITAT, 2006). Secondly, the study site poses new institutional challenges for socio-ecological planning and vulnerability assessment arising from the intertwined nature of the rural/urban characteristics; the residents' heavy dependence on and exploitation of the natural resources (Eakin et al, 2010). Lastly, being at the formative stages of development, the area is a place with the potential for positive change due to the livelihood diversification plus access to services and information that could shape the residents' environmental adaptation (Ricci, 2011).

Study Population and Sampling

The study targeted heads of household; community and religious leaders as well as officials of the local residents' associations. Designed as a survey, the study generated data for the purposes describing the demographic characteristics (gender, age, marital status and length of stay in the study area); and socio-economic characteristics (education level, sources of livelihood, range of monthly income and form of residence ownership). This design also enabled the collection of data for describing the respondents' environmental attitude; and to analyse the relationship between the demographic and socio-economic characteristics and the respondents' environmental attitude. Because of the rapidly changing human population of the study area, the study employed John Eng (2003)'s formula for calculating representative multistage random sample size of unknown population size as follows.

$$n = \frac{4z^2_{\alpha/2}p(1-p)}{d^2}$$

Where:

n = the sample size
z = the standard normal deviate relating to the 95% degree of confidence set at 1.96
p = an estimate of the proportion of people falling into the group in which we are interested in the population
d = the proportion of error we are prepared to accept

In this study p = 0.5. (Choosing 50% provided the most conservative estimate of the random sample size). The confidence interval of 95% was estimated to be within 10% of the true value. The multistage random sample size was then given by:

$$n = \frac{4 * 1.96^2 * 0.5(1-0.5)}{0.1^2}$$

$$n = 384.16$$
$$n \cong 385$$

This formula gives a number that is an estimate of the absolute minimum, making it necessary to have more respondents to compensate for loss during follow-up or other causes of attrition. John Eng (2003) and Botsch (2011) recommends an addition of 10% of sample size to compensate for persons that the researcher is unable to contact; and further 30% to compensate for non-response. Thus, the sample size for this study was 600 distributed across all county wards in proportion to their population density as illustrated in Table 1.

Table 1: Sample size distribution in Mavoko, Nairobi, Kenya

County Ward	Pop. Density (No. of people/Km^2)	No. of respondents per sub-location		Totals
Athi River	659	Athi River North	101	202
		Athi River Township	101	
Kinanie	43	Kinanie	7	14
		Muthatani	7	
Muthwani	90	Muthwani	10	30
		Katani	10	
		Ngelani	10	
Syokimau/ Mulolongo	1130	Syokimau	177	354
		Mulolongo	177	
TOTAL				**600**

The sampling of the households who participated in this study was done using the multistage random sampling methods in three stages. First, the study used the lottery technique where the settlements were divided into nine (9) administrative sub-locations in the four county wards as shown in Table 1. In the second phase of sampling, the lottery technique was used to sub-divide the sub-location into small clusters. The urbane sub-locations of Athi River North and Athi River Township in Athi River ward; and Syokimau and Mulolongo in Syokimau/ Mulolongo ward with high population density were clustered into courts. The rural-like sub-locations of Kinanie and Mathatani of Kinanie ward; and Muthwani, Katani and Ngalani of Muthwani ward were clustered based on villages. A list of all the clusters (courts and villages) was drawn with the help of the local leaders. The names and/or identification numbers of all the clusters were written on pieces of paper; and the desired clusters were randomly selected by picking the required number of papers.

From the area, the study identified 34 courts each from Athi River North and Athi River Township Sub-locations; 54 courts each from Syokimau and Mulolongo sub-locations; and three villages each from the five sub-locations in Kinanie and Muthwani county wards. The lottery technique was then used to select three (3) households chosen from each of the identified courts and villages. In order to take a random sample, a sample frame in the form of lists of all the household heads in each of the courts and/or villages were drawn with the help of local leaders who acted like gate-keepers. The identification numbers of all household heads were written on ballot papers; whereupon the desired sample was selected by picking the required ballots. This approach was guided by Broer and Titherdge (2010), who used the sampling strategy to reach the dispersed eco-self-built community projects in the UK to evaluate whether Eco-Self-Built Communities lead to feasible, sustainable and low carbon lifestyles. Similarly, in her study, 'public understanding of and response to climate change in the South of England', Whitmarsh (2005) used this strategy to cover different socio-

economic groups within flood-prone and non-flood-prone areas; and different groups within areas with differing levels of exposure to air pollution. The sample sizes and sampling techniques of other units of measurement and observation in the study population were as shown in Table 2.

Table 2: Study population units, sampling method and sample size in Mavoko, Nairobi, Kenya

Study population unit	Sampling method	Size (N)
Household in Mavoko	Multistage random, Cluster, Lottery	600
Residents Association officials	Purposive	4
Religious leaders	Purposive	4
Focus Group Discussion	Quota	10 per FGD
Document analysis	Saturated	10
Observation checklist	Saturated	10

This study used non-probability sampling methods to identify interviewees and participants in the FGDs. Purposive sampling was used to select Religious leaders and Residents Association officials that were to participate in the study.

Data Collection

The study used both quantitative and qualitative approaches to collect primary and secondary data. The secondary data collection and review preceded the collection of primary data. A review of existing documents provided background information about, and more insights into, the demographic and socio-economic characteristics of the population in urban and peri-urban areas as well as their environmental attitude (Mogalakwe, 2006). The collection of secondary information was conducted through exploring official and non-official resources. Official sources included publications and policy documents of the KNBS, UN-HABITAT and IFRC among others. The researcher first identified the types of documents available and relevant to the study area, before securing authority for their access. Guided by the *Evaluation Review* (2009), relevant documents were compiled and summarised, indicating the type of document reviewed and the way to reference each document.

Primary data were collected through questionnaire, key informant interviews, FGDs and direct observations. A total of 600 self administered questionnaires were hand delivered to the sampled households; 463 (77.16%) of them were returned and upon scrutinising, 55 questionnaires were discarded because they had not been filled in properly. Appointment letters and interview guides for face-to-face interviews were hand-delivered to eight (8) key informants; and the proceedings audio-recorded and written responses from the interviewees in form of handouts obtained. The researcher also convened two (2) FGD sessions of ten (10) participants composed of two (2) homeowners who participated in the household survey, (two) 2 representative from the church, two (2) elders, two (2) youth and two (2) woman from within the Mavoko community. The FGD guide enabled participants to give information on how homeowners' demographic and socio-economic factors contributed to their environmental attitude. In addition, the study used the direct observation checklist to make observations to enrich understanding of the homeowners' environmental tendencies. The observation included noting and recording of events, behaviours and activities related to how community members relate to and care for the environment.

Data Analysis

The data collected were in both qualitative and quantitative form and were analysed using descriptive statistics, Chi-square, Correlation analysis and Nomothetic evaluation. Qualitative data involved tape recorded and written responses to interviews, proceedings at the FGDs, field notes and summary of document content analysis. After reviewing the works of different qualitative research specialists, the researcher used the nomothetic evaluation method to analyse the data from the FGDs; and transcribed and analysed qualitative data from the other sources using the hierarchical coding procedure as illustrated by Whitmarsh (2005). The responses were ordered and grouped through cross-case analysis before it was transcribed and analysed using the constant comparative method to develop relationships and interrelationships from which themes and patterns about flood disaster interventions (Occhio, 2003). The issue of validity was addressed by asking a number of interviewees to comment on the analysis. Quantitative data were mainly from closed ended questions in the questionnaires. To determine the association between the homeowners' environmental attitude and the onset of flooding, data were collected on the causes and incidences of flooding in the study area through questionnaires. The study used descriptive statistics to measure demographic characteristics before using the Chi-square to analyse the relationship through the application of the SPSS.

RESULTS

Demographic and Socio-Economic Characteristics of the Household Heads in Mavoko

Gender Distribution among Household Heads

The household heads were asked to state their gender and their responses were processed and presented as shown in Figure 1 from which it was observed that 277 (68%) of the respondents were male, while 131 (32%) were female.

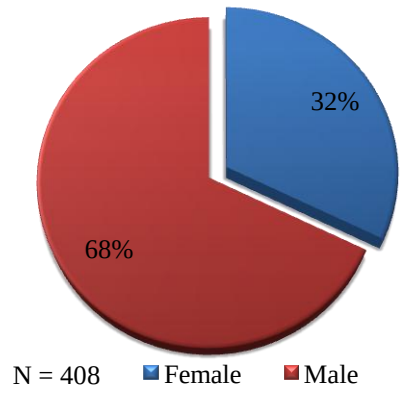


Figure 1: Gender distribution among the household heads in Mavoko, Nairobi, Kenya

The study attributed this variation in gender of respondents to the reason that the study area is a patriarchal society where the head of the family is the man who, as the head of the house hold, is considered the bread winners and ultimate decision maker, including communication with the outer world. Thus, chances of men responding to the questionnaire as the household head were high. However, as shown in the works of Ashiembi (2013) and Banga (2013) the gender proportion of the respondents would have been different if the questionnaire was to be filled in and returned immediately, because it is female members of the households who would be found at home at the time of the survey.

This study analysed the gender composition of the study sample because earlier studies reported contradicting results regarding the relationship between gender and some environmental parameters. For instance, while Teo et al. (2000) reported that there was no significant influence of gender on wastewater management and reuse, Ekere et al. (2009) reported that gender was significantly related to the separation of crop waste in Uganda. Banga (2013) also found that gender had a significant effect on the way households handled waste water from their households.

Age Distribution among Household Heads

Responses regarding the respondents' gender were processed and presented as shown in Table3 from which it was observed that 249 (61.0%) of the respondents were in the age bracket of 41 – 60 years. It was also observed that 90 (22.1%) of the respondents were in the age bracket of 21 – 40 years, while 69 (16.9%) of them were of age above 60 years.

Table 3: Age distribution among the household heads in Mavoko, Nairobi, Kenya

Age	Frequency	Percentage
21- 40	90	22.1
41 – 60	249	61.0
Over 60	69	16.9
Total	**408**	**100.0**

Further analyses of the age distribution of the household heads against their gender were done and the outcome shown in Figure 2, from which, it was observed that among the 22.1% of the respondents within the 21 – 40 years age bracket, 14.2% of the household heads were male compared to 7.8% who were females. It was also observed that among the 61.0% of the household heads in the age bracket of 40 – 60 years, 42.0% were males compared to 18.6% who were female; while out of the 16.9% of respondents at the age more than 60 years, 9.3% were females and 7.6% were males. The analysis also revealed that there were more female than male household heads at over 60 years of age and most of them were widowed.

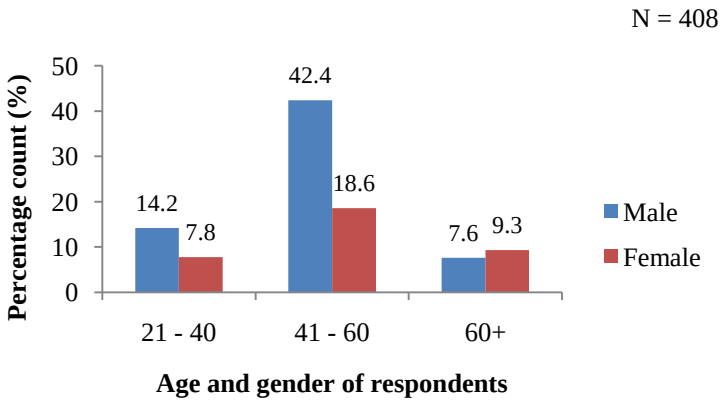


Figure 2: Respondents Distribution by Age and Gender

Multiple data sources reveal that there is a significant variation in the distribution of age and gender among household heads in Mavoko. Direct observation revealed that parts of the study area, such as Athi River, Mlolongo/Syokimau and Katani, were previously ranches where majority of the elderly people were former workers in the ranches. While FGDs proceedings and key informant interviews revealed that it was youthful persons who were actively purchasing land and settling in the area, data from reviewed literature revealed that active settlement in Mavoko started after the year 2000 with a large population of youthful men and women coming to seek livelihood opportunities in the Nairobi and surrounding areas (UN-HABITAT, 2010). In addition, previous studies reported that the average age of respondents in similar studies were between 25 and 50 years (Ashiembi, 2013; Banga (2013). This meant that peri-urban populations are made of energetic people who could actively engage in productive activities aimed at environmental attitude change.

Education Level Distribution among Household Heads

Concerning the respondents' level of education, the responses were processed and presented as shown in Figure 4 from which it was observed that 266 (65.2%) of the respondents were of tertiary education level, 97 (23.8%) had secondary school level of education while the 45 (11.0%) had primary level of education.

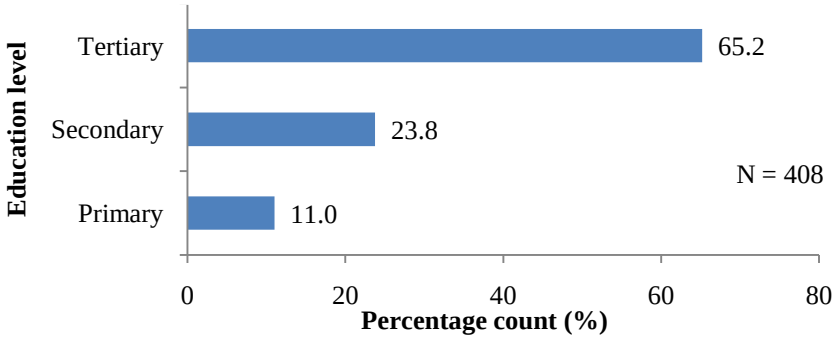


Figure 4: Distribution of Education Level of the Respondents

Further analysis of the household heads' education level against their gender distribution was done and the results presented in Figure 5 showed that more males than females were educated at all levels.

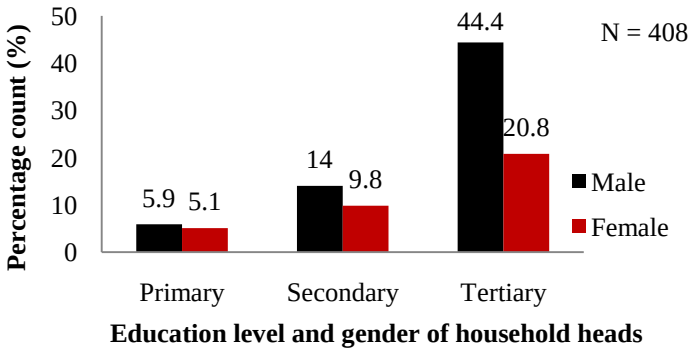
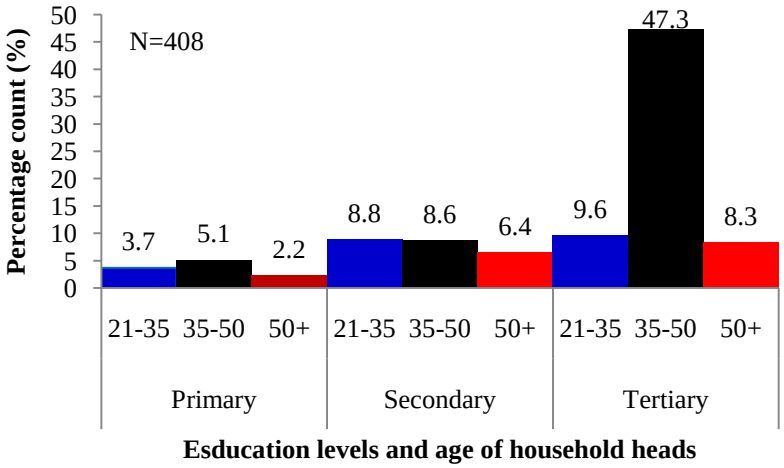


Figure 5: Distribution of Respondents' Education Level of By Gender

Among the 11.0% of the respondents with primary education level, while 5.9% were male compared to 5.1% who were females. Similarly, of the 23.8% of the respondents with

secondary level of education, 14.0% were males compared to 9.8% who were female. Further, of the 65.2% of the respondents with tertiary education level, 44.4% were males, while 20.8% were females. The study attributed this variation in the distribution of education levels among the respondents to the perceived many employment and business opportunities which attract potential employees and business persons to settle in the area. These are people who have completed college or secondary level education and seek livelihood opportunities. Further analyses of the education level of the respondents against their age distribution gave the outcome as presented Figure 6 from which it was observed that out of the 65.2% of the respondents with tertiary level of education, 47.3% were in the age bracket of 41 – 60 years, 9.6% in the 21- 40 years age bracket and 8.3% over 60 years of age. Out of the 23.8% of the household heads with secondary level of education, 8.8% were in the 21- 40 years age bracket, 8.6% in the 41 – 60 years age bracket, while 6.4% were over 60 years old. Among the11% of household heads with primary level of education, 5.1% were in the 41 – 60 years age bracket, 3.7% in the 21- 40 years age bracket while 2.2% were over 60 years old. It was further observed that nine (9) out of the eleven (11) respondents with primary level of education were at over 60 years of age; and 5 of them were widows.



KEY: 21 – 40 years 41 – 60 years Over 60 years

Figure 6: Distribution of Education Level of the Respondents by Age

The UN-HABITAT (2010) presented this disproportionate presentation of education levels between men and women across all age groups when they reported that Illiteracy rates in Nairobi for the 15 – 54 age groups are 7.8% and 5.8% for women and men respectively. In Nairobi, illiteracy levels were reported to be lower compared to the rest of the country as reflected in the CBS (2003) where 56.4% of women and 67.3% of men were reported to have attended secondary school and above. In addition, direct information revealed that the participants had good command of English and Kiswahili languages, an indicator of their high literacy/ education levels. Findings from reviewed literature revealed contradictory results from earlier studies regarding education level amongst the populations in peri-urban settlements. Ashiembi (2013) reported that less than 43% of the residents of Ongata Rongai had at least completed secondary education, a factor that was noted to limit their exposure to available options for environmental conservation like solid waste disposal and recycling of wastewater. However, Banga (2013) found that 43.8% of the respondents of Urban Kampala had attained secondary level education and 17.5% had attained tertiary level education making them aware of, but they had not participated in solid waste separation and recycling practices. Further, Frederiks et al (2015) acknowledged that education was associated with environmental issues, but also reported that higher levels of education generally do not

certainly and directly lead to pro-environmental behaviour. The study, therefore, concluded that education level among household heads in Mavoko was high and that most of them were conscious of their acts; hence responsible for their decisions.

Source of Livelihood for Household Heads in Mavoko

About the main sources of livelihood amongst the respondents, their responses processed and presented in Figure 7 showed that 48.3% of the respondents were self employment; 35.8% were in formal employment, while 15.9% had casual labour as their source of livelihood. Further analysis revealed that more males than females were in formal employment, while the reverse was true where more females than males were in self employment.

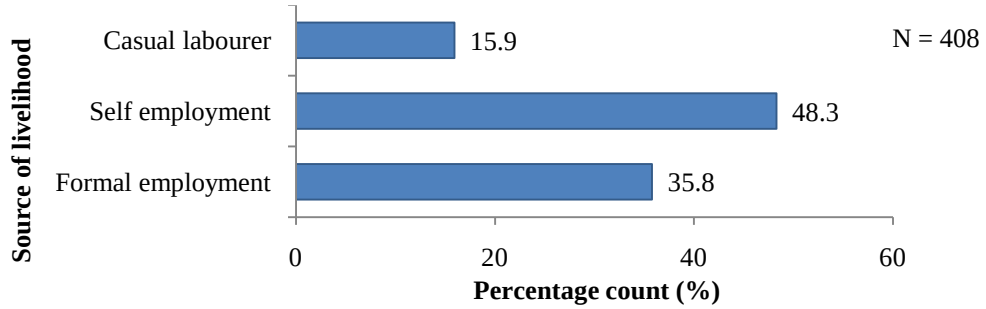


Figure 7: Source of Livelihood for the Respondents

Multiple data sources revealed that residents of peri-urban settlements had different sources of livelihoods. Data from direct observation and FGD proceedings revealed that some households had more than one source of income where they engage in some businesses to supplement income from formal employment. It also revealed that majority of the businesses were owned by persons in formal employment who ran them through proxies. Data from reviewed literature also revealed that most the households in peri-urban settlements depended on non-farm based businesses and formal employment and services (Ricci, 2011). NEMA (2012) reported that between 2004 and 2011, 56.6% of women and 68.6% of men in Nairobi were aged between 15 and 50 years of whom, 42% were unemployed, 22% self-employed, 22% in casual labour and 14% were students. The necessity to analyse the sources of livelihood for households in this study arose from the works of earlier scholars who found that there could be a relationship between sources of livelihoods and how people related to the environment. Ashiembi (2013) reported that source of income for residents of the peri-urban areas of Ongata Rongai influenced their wastewater management and re-use. Similarly, Acheampong and Anokye (2013) reported that household employment influenced the commuting patterns and costs in Kumasi's peri-urban settlements. However, Frederiks et al (2015) found limited and inconsistent evidence that employment status influenced energy consumption.

Income Level for Households in Mavoko

Regarding the range of monthly income for the household heads, the responses were processed and presented as shown in Figure 8 which showed that 52% of the respondent earned less than Ksh. 30,000/= per month, 32% earned between Ksh. 30,000/= and 50,000/=, while 16% earned more than Ksh. 50,000/= per month.

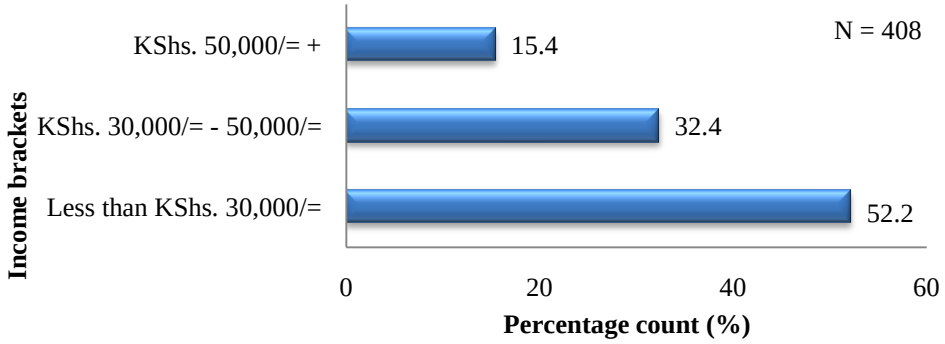


Figure 8: Income Bracket for the Household Heads In Mavoko, Nairobi, Kenya

Multiple data sources revealed that peri-urban areas are resident to a mix of households of different socio-economic status. Data from key informant interviews and FGD proceedings revealed that for different reasons, some respondents under-declared their levels of income. Some respondents expected financial aid following the study; others gave net salaries as opposed to gross earnings; some people did not keep record of their daily business operations; and some only declared income from their formal employment leaving out what they got from the businesses for fear of taxation. Thus, it was not easy to ascertain the true income of the households of Mavoko. However, data from the literature reviewed revealed that low-income residents of larger cities like Nairobi acquired land in peripheral areas where the development is not controlled and infrastructure are lacking (*Amnesty International*, 2009; Jha et al., 2012; UN-HABITAT, 2010). Thus, it was necessary to analyse the distribution of income levels amongst the study sample with respect environmental attitude.

Type of Residence Ownership by Households

Responses with regard to type of residences occupied by households, the responses were processed and presented Figure 9 showed that 78% of the respondents owned the residences in which they live, while 22% of them lived in rental houses.

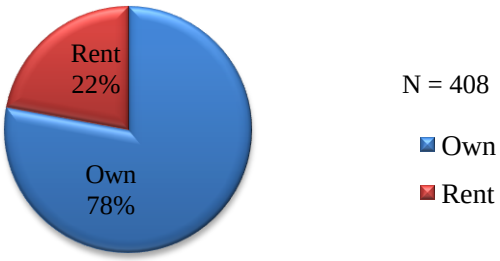


Figure 9: Residence Ownership by Households in Mavoko, Nairobi, Kenya

Data from multiple sources revealed that peri-urbun settlements were resident to a mix of households of different residence ownership types. Proceedings at the FGDs and key informant interviews revealed that residents of peri-urban settlements were there because of the lower cost of housing. It was revealed that most of the youth who moved into the settlement were jobless or in lowly paying occupations, hence rented houses. In addition to rental housing being cheaper, it was noted that most of the homeowners acquired their own

homes so as to cut down on the ever increasing cost of housing in Nairobi. They took loans with which they bought plots and started building houses before the money got exhausted at different stages of construction; and had to move in before proper completion so as to avoid continued paying of rent (Jha et al., 2012). Analysis of the variation in the type of housing among the respondents was based on findings of previous studies which showed that it was of importance when dealing with the subject of environmental attitude. Frederiks et al. (2015) reported that type of residence appeared to be positively related to household energy consumption where residents of detached dwellings tended to consume more energy than those in multi-unit rental dwellings. Similarly, Banga (2013) found that households staying in houses with backyards had alternative ways of disposing waste such as dumping it in pits and burning it.

Households' Attitude towards the Physical Environment in Mavoko

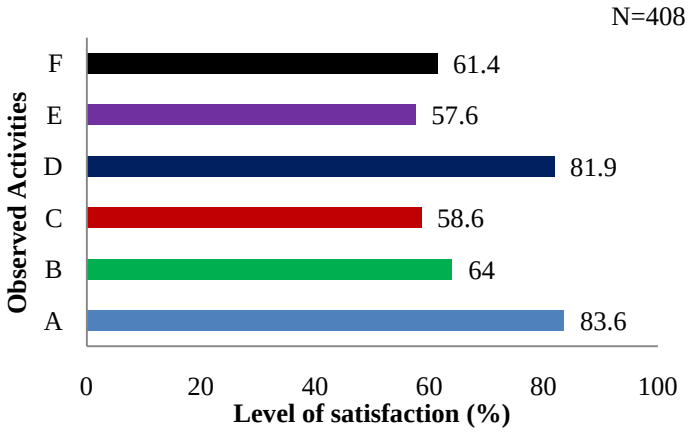
The respondents indicated how commonly they observed their neighbours engage in a set of practices considered as indicators of their attitude towards the phsical environment such as: Use of masonry perimeter wall; Use of concrete paved compound; Dumping of wastes from construction in valleys; Levelising ground at people's gates; Dumping of garbage in open fields; Settling in valleys/wetlands/ reparian areas; and Releasing waste water from households into the open. The results presented in Table 4 showed that 391 (95.4%) of the respondent "commonly" observed people damp wastes from construction sites in valleys and open fields; 381 (94.3%) "commonly" observed people acquire plots and settle in valleys/wetlands/ reparian areas; while 376 (92.1%) of them "commonly" observed people level off the ground at their gates for easy access into the compounds. It also showed that 342 (83.8%) of the respondents "commonly" observed compounds enclosed with masonry perimeter walls; 316 (77.4%) "commonly" observed people damp garbage in open fields; while 307 (75.2%) of them "commonly" observed their neighbours release waste water from households into the open. Similarly, it was noted that 298 (72.9%) of the respondents "commonly" observed compounds with concrete pavements.

Table 4: Obsrvation Rate 0f Practices in Mavoko, Nairobi, Kenya

Practice	1	2	3	4	5	T/C (%)
Use of masonry perimeter wall	218 (53.4%)	124 (30.4%)	19 (6.3%)	30 (7.4%)	17 (4.2%)	**69.1**
Use of concrete paved compound	166 (40.6%)	132 (32.3%)	29 (7.1%)	50 (12.3%)	31 (7.6%)	**72.9**
Dumping of wastes from construction in valleys	284 (69.6%)	107 (26.2%)	5 (1.2%)	9 (2.2%)	3 (0.7%)	**95.4**
Levelising ground at people's gates	140 (34.3%)	236 (57.8%)	11 (2.7%)	12 (2.9%)	9 (2.2%)	**92.1**
Dumping of garbage in open fields	145 (35.5%)	171 (41.9%)	27 (6.6%)	44 (10.8%)	21 (5.1%)	**77.4**
Settling in valleys/ wetlands/ reparian areas	189 (46.3%)	192 (47.1%)	9 (2.2%)	5 (1.2%)	13 (3.2%)	**93.4**
Releasing waste water from households into the open	142 (34.8%)	165 (40.4%)	18 (4.4%)	46 (11.3%)	37 (9.1%)	**75.2**

KEY: 1 = Very Commonly; 2 = Commonly; 3= Not Sure; 4 = Not Commonly; 5 = Not Very Commonly; T/C = Total Commonly (%)

Data from direct obsrvation revealed three issues about the environmental tendancies amonst the households in Mavoko. Some households in areas with low population density like Kinanie and Muthwani packed waste from their houses into polythene bags and damped them into the open fields. In townships, there were established garbage colletion points, but these seemed un attended and overflowing. The other observation was that developers simply deposited solid waste from construction sites into dry valleys and open fields. Similarly, data from key informant interviews and FGD proceedings revealed that garbage and solid waste disposal was a big challenge with the potetial for disease outbreak when it rained. It was also revealed that some households damped the waste at night to avoid being seen by other neighbours. Having observed that there was a high tendency of households in Mavoko to engage in practices that were negative to their physical environment, the study asked the respondents to indicate how satisfied they were with the way people: used masonry perimeter walls; used concrete paved compound; acquire and develop plots; disposed off solid waste and garbage from their households and construction sites; handled waste water from households; and managed surface water drains near their compounds. The responses analysed and presented in Figure 10 showed that 341 (83.6%) of the respondents were "satisfied" with a compound with masonry perimeter wall; 334 (81.9%) were "satisfied" with the way people dispose of solid waste and garbage from households and construction sites; while 261 (64.0%) of them were "satisfied" with having a concrete paved compound.



KEY:
A: Use of masonry perimeter walls
B: Use of concrete paved compounds
C: Acquisition and development of plots
D: Disposal of solid waste/garbage
E: Handling of waste water from households
F: Management of drains near their compounds

Figure 10: A satisfaction rate of activities in the physical environment in Mavoko, Nairobi, Kenya

It also showed that 251 (61.4%) of the respondents were "satisfied" with the way people manage drains near their compounds; 239 (58.6%) were "satisfied" with the way people acquire and develop plots; while 235 (57.6%) of them were "satisfied" with the way people handle waste water from their households. The investigated set of practices were indicators of negative attitude towards the physical environment. Thus, the high tendency as well as the high satisfaction level of the respondents to engage in practices that were negative to the physical environment showed that their environmental attitude was negative.

Demographic Factors and Attitude towards the Physical Environment in Mavoko

The researcher did Chi-square tests to determine the effect of the respondents' gender, age, level of education, level of income and type of residence ownership on: the use of masonry perimeter walls, use of concrete pavements, acquisition and development of plots, disposal of solid waste and garbage from households and construction sites, handling of waste water from households and management of drains near their compounds. The results were as shown in Table 5.

Table 5: Cross Tabs Of Chi-Square Tests Between The Demographics And Activities In In The Physical Environment In Mavoko, Nairobi, Kenya

VARIABLES	Gender	Age	Level of Education	Level of income	Residence ownership
Use of masonry perimeter walls	12.378**	15.354**	16.083**	52.144*	73.637*
Use of concrete paved compounds	10.232**	19.680*	17.223**	90.187*	50.213*
Acquisition and development of plots	14.472*	42.045*	43.247**	162.205*	2.472**
Disposal of solid waste and garbage from households and construction sites	9.168**	41.721*	23.468*	42.125**	34.638*
Handling of waste water from households	13.668*	30.638**	54.964*	36.138*	4.247**
Management of drains near their compounds	12.080**	25.203**	32.402*	45.263**	36.426**

KEY:
* = Highly significant at $p < 0.01$; ** = Highly significant at $p < 0.05$

Gender and Attitude towards the Physical Environment in Mavoko

The analysis revealed that the respondents' gender had a significant effect on their attitude towards the physical environment. The value ($X^2_{4,0.01} > 13.28$) revealed that the respondents' gender had a significant effect on their acquisition and development of plots, handling of waste water from their households and their management of drains near their compounds. Similarly, the test value ($X^2_{4,0.01} > 9.488$) also revealed that the respondents' gender had significant effect on their preference for the use of masonry perimeter walls, use of concrete paved compounds and their disposal of solid waste and garbage from households and construction sites. The observed significant effect meant that gender was a strong determinant of the respondents' attitude towards their physical environment.

Multiple data sources also showed that gender was a predictor of homeowners' environmental attitude. Proceedings from FGDs and key informant interview revealed that building design and construction as well as the planning of the homestead are manifestly social and material processes shaped by the broader social changes where there is increasing women participation. Data from direct observation revealed that when it came to choice of a place to settle and develop a home, women were noted to prefer areas with relatively better infrastructure like in the urban centres of Athi River and Mulolongo townships. Data from reviewed literature also revealed that there was a significant effect of gender on the way households handled waste water from their households. Banga (2013) reported that women were more involved in source separation than men in the household. It is women who know

and decide what was useful and what constituted waste; and were more likely to separate and dispose of solid waste from the households than men. Ekere et al. (2009) also reported similar results when they studied the separation of crop waste in Uganda.

Age and Attitude towards the Physical Environment in Mavoko

The analysis revealed contradictory findings regarding the effect of the respondents' age on their attitude towards the physical environment. The value ($X^2_{8,0.01} > 20.09$) showed that the respondents' age had a significant effect on their acquisition and development of plots; and on their disposal of solid waste and garbage from households and construction sites; and the value ($X^2_{8,0.01} > 15.51$) showed that the household head's age had a significant effect on their management of drains near their compounds and handling of waste water from households. However, the value ($X^2_{8,0.01} < 20.09$) revealed that the household heads' age had no significant effect on their use of concrete pavements; and the value ($X^2_{8,0.01} < 15.51$) revealed that the household head's age had no significant effect on their use of masonry perimeter walls. The study attributed this finding to an understanding that older people tend to be more risk averse than younger ones, hence they would cautiously site their homes and dispose of waste in such a way as to minimise disaster risks. Further data analyses revealed that of the 19 households that had engaged the services of private garbage collectors, 12 (63.2%) of them were aged 60 years and above, meaning that older people were more willing to contribute and invest in safe environmental practices.

Data from secondary literature reviewed also revealed contradictory findings from previous studies regarding similar environmental issues. For example, while Frederiks et al. (2015) found a positive association between age and energy consumption, Gatersleben et al. (2002) reported that age was not significantly related to household energy use. Shibia (2010) also found that age significantly influenced attitudes and perceptions of the local communities towards conservation areas.

Level of Education and Attitude towards the Physical Environment in Mavoko

The analysis revealed that the respondents' level of education had a significant effect on their attitude towards the physical environment. The value ($X^2_{8,0.01} > 20.09$) revealed that the respondents' level of education had a significant effect on their handling of waste water from households and management of drains near their compounds. The value ($X^2_{8,0.01} > 15.51$) also revealed that the respondents' level of education had a significant effect on their acquisition and development of plots; use of perimeter walls; use of concrete pavements; and on their disposal of solid waste and garbage from households and construction sites. The study associated high level of education with increased knowledge and awareness which inculcate in people the preferences for a hygienic environment and the need for environmental protection. The choices by the respondents to acquire and develop plots; and use masonry perimeter walls are guided by their awareness of the benefits associated with avoiding settling in swampy and reperian areas as well as using natural hedges as opposed to having a perimeter wall. Multiple data sources revealed that there was a significant effect of education on a wide spectrum of environmental attitudes. Data from key informant interviews and FGD proceedings revealed that positive environmental attitude amongst well informed citizens was due to their knowledge of environmental problems and awareness of the consequences of not properly managing the environment. Further, data from reviewed

literature revealed that education had a significant influence on people's willingness to contribute towards environmental conservation and protection (Frederiks et al., 2015).

Level of Income and Attitude towards the Physical Environment in Mavoko

The analysis revealed that the respondents' level of income had a significant effect on their attitude towards the physical environment. The value ($X^2_{8,0.01} > 20.09$) revealed that the respondents' level of income had a significant effect on their acquisition and development of plots; use of concrete paved compounds; and use of masonry perimeter walls. Similarly, the value ($X^2_{8,0.01} > 15.51$) revealed that the respondents' level of income had a significant effect on their management of drains near their compounds; disposal of solid waste and garbage from households and construction sites; and handling of waste water from households. Multiple data sources confirmed that level of income is a strong socio-demographic predictor of environmental attitude. Data from direct observation revealed that households with higher income had their concrete pavements and enclosed in high masonry perimeter walls as seen in the leafy areas of Nairobi metro-polis in estates such as Karen, Runda and Gigiri. The study also observed that people with higher income had the ability to engage the services of private garbage collectors as well as cleaners to ensure the compound and its surroundings were well kept. Individuals with higher income were also observed to be more willing and able to reduce their standard of living to spend more money on general environmental problems.

Data from reviewed literature also revealed that there was a strong relationship between household income and their environmental attitude. For instance, Frederiks et al. (2015) found positive associations between household income and residential energy consumption, suggesting that higher-income households tend to consume more energy than lower-income households; own and use more electrical appliances than lower-income households; and capable of investing in one-off energy efficiency measures. Similarly, wealthier citizens were reported to have a higher demand for a clean environment and less environmental damages (Franzen 2003).

Residence Ownership and Attitude towards the Physical Environment in Mavoko

The analysis revealed that the type of residence ownership had a significant effect on the respondents' attitude towards the physical environment. The value ($X^2_{8,0.01} > 20.09$) showed that the type of residence ownership had a significant effect on the respondents' use of masonry perimeter walls. The value ($X^2_{8,0.01} > 15.51$) showed that the type of residence ownership had a significant effect on the respondents' use of concrete pavements; management of drains near their compounds; disposal of solid waste and garbage from households and construction sites; and on their handling of waste water from households. However, the value ($X^2_{8,0.01} < 15.51$) showed that the type of residence ownership had no significant effect on the respondents' acquisition and development of plots. Multiple data sources confirmed that the type of residence ownership is one of the strongest socio-economic predictors of environmental attitude. Data from direct observation revealed that respondents who rented houses preferred residences that were well secured with high masonry perimeter wall and good paving as opposed to those who owned their residences. Further analysis of the respondents' demographics revealed that those respondents who owned their residences had higher incomes and higher education levels. In addition, majority of these respondents were observed to possess other characteristics commonly associated

with economic achievement and social stability compared to those who rent their residences hence, they could afford the cost a perimeter wall and concrete paving as well as hiring private garbage disposal services.Data from reviewed literature also revealed that there was a strong relationship between the type of residence ownership and the household's environmental attitude. For example, Kan (2007) reported that occupants of their own houses were more likely to invest in the maintenance and improvement of the property and the surrounding environment to higher standards. Similarly, Banga (2013) reported that households who owned houses with backyards had alternative ways of disposing waste by dumping it in pits and burning it.

Households' Attitude towards the Social Environment in Mavoko

The respondents indicated how commonly they observed their neighbours engage in a set of practices considered as indicators of their attitude towards the social environment such as: greeting/making calls to neighbours; participating in estate meetings; visiting neighbours; supporting the needy; and involvement in communal activities. The responses presented Figure 11 showed that 275 (67.4%) of the respondents "commonly" observed residents greet and/or make calls to their neighbours, while 254 (62.2%) of them "commonly" observed residents participate in estate meetings. It also showed that 159 (39.0%) of the respondents "commonly" observed residents support the needy in their neighbourhoods; 135 (33.1%) of them "commonly" observed residents participate in communal activities; and 120 (29.4%) of them "commonly" observed their neighbours visit each other.

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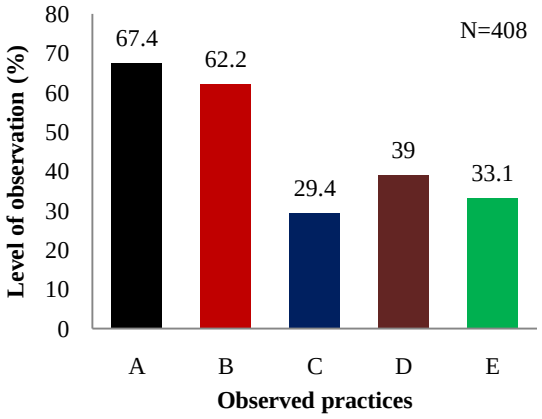

KEY
A: Greeting/ Making calls to neighbours
B: Participating in estate meetings
C: Visiting neighbours
D: Supporting the needy
E: Involvement in communal activities

Figure 11: Observation rate of practices in Mavoko, Nairobi, Kenya

Multiple data sources revealed that just like in other urban and peri-urban settlements, interpersonal activities among households is limited. Data from direct observation revealed that there was fear and mistrust of strangers in the community; and there were weak interpersonal relationships among neighbours. The fear and mistrust is reflected in the stereotypical views that associated urban and peri-urban settlements with crime; and it could be seen in parents' attitudes towards letting children play out unsupervised in more populated areas like Mulolongo and Athi River townships. Data from key informant interviews and

FGD proceedings also revealed that residents of Mavoko seldom interacted with or talked to strangers as one participant said that:

"…if you have a problem and need help, it is better to rely on the people you know well and trust. …you cannot trust them fully."

Another one said:

"---people here live individual lives…they do not involve neighbours in their affairs much; and deal with the problems directly affecting themselves… are self-centred fashion".

Proceedings at the FGDs also revealed that homeowners are increasingly resorting to IT for social interaction, with many of them using mobile telephones, as opposed to physical movement and interaction amongst neighbours. One participant said:

"…mobiles have made communication during emergency quite easy. Recently, my daughter had an attack at night and, thank God, when I called my neighbour, he quickly came and assisted her to get to Martyr hospital."

Another one added:

"…. with mobiles, I am able to enquire of how my people are doing any time I am away. …also very convenient to get household supplies such as cooking gas … I just call the suppliers."

Data from reviewed literature also revealed that residents of gated communities in urban and peri-urban settlements preferred keeping to them and were not free to physically interact with strangers they did not understand, but were increasingly resorting to interacting on social media (Alvarez-Rivadulla, 2007). Having observed that there was a high tendency of households in Mavoko to engage in practices that were negative to their social environment, the study asked the respondents to indicate how satisfied they were with: exchange of information amongst neighbours; concern for each others' welfare in their neighbourhoods; attendance of estate meetings with neighbours; and involvement in social activities in the neighbourhood. The results presented in Table 6.

Table 6: Satisfaction With Social Environment In Mavoko, Nairobi, Kenya

Value statement	**1**	**2**	**3**	**4**	**5**	**T/S (%)**
Exchange of information amongst neighbours	38 (9.3%)	199 (48.8%)	54 (13.2%)	100 (24.5%)	17 (4.2%)	**58.2**
Concern for each others' welfare	95 (23.3%)	202 (49.5%)	38 (9.3%)	50 (12.3%)	22 (5.5%)	**72.9**
Time spent together with neighbours	34 (8.4%)	184 (45.2%)	76 (18.6%)	90 (22.1%)	23 (5.7%)	**53.7**
Involvement in social activities	54 (13.2%)	197 (48.4%)	50 (12.2%)	75 (18.3%)	32 (7.9%)	**61.6**

KEY: 1 = Strongly Satisfied; 2 = Satisfied; 3 = Not sure; 4 = Dissatisfied; 5 = Strongly Dissatisfied; TS = Total Satisfied

Table 6 showed that 297 (72.9%) of the respondents were 'satisfied' with the level of concern for each others' welfare amongst the residents of Mavoko, while 251 (61.6%) of them were 'satisfied' with the level of the residents' involvement in social activities in their neighbourhood. It also showed that 264 (64.6%) of the respondents were 'satisfied' with the time the residents spent together with neighbours; and 237 (58.2%) of them were 'satisfied' with the way information was shared amongst neighbours. The investigated set of practices were indicators of positive attitude towards the social environment. Thus, the high satisfaction level of the respondents with the low tendency of their neighbours to engage in practices that were positive to their social environment showed that their attitude towards the social environment was not very positive.

Demographic Factors and Attitude towards the Social Environment in Mavoko

The researcher did Chi-square tests to determine the effect of the respondents' gender, age, level of education, level of income and type of residence ownership on: exchange of information amongst neighbours; concern for each others' welfare in their neighbourhoods; attendance of estate meetings; and involvement in social activities in the neighbourhood. The results of the analysis were as presented in Table 7.

Table 7: Cross Tabs Of Chi-Square Tests Between The Demographics And Activities In In The Social Environment In Mavoko, Nairobi, Kenya

VARIABLES	Gender	Age	Level of Education	Level of income	Residence ownership
Exchange of information amongst neighbours	16.473*	35.467*	38.173**	120.452**	157.105*
Concern for each others' welfare in their neighbourhoods	12.086*	43.546*	32.516**	218.332*	115.992*
Attendance of estate meetings with neighbours	31.433**	98.712*	99.907*	379.463*	36.732*
Involvement in social activities in the neighbourhood	8.318*	94.631*	31.111**	94.875*	80.013*

KEY: * = Highly significant at $p < 0.01$; ** = Highly significant at $p < 0.05$

Gender and Attitude towards Social Environment in Mavoko

The analysis revealed that the respondents' gender had a significant effect on their attitude towards the social environment. The value ($X^2_{4,0.01} > 13.28$) showed that the respondents' gender had a significant effect on their attendance of estate meetings; and on their exchange of information with neighbours. The value ($X^2_{4,0.01} > 9.488$) also showed that the respondents' gender had a significant effect on their concern for each others' welfare; and on their level of participation in social activities in their neighbourhoods. Multiple data sources confirmed that the gender was a demographic predictor of environmental attitude. While, direct observation revealed that more men than women attended estate meetings, data from key informant interviews and FGD proceedings revealed that gender had a significant effect on people's behaviour in society, where women's and men's social location in the home and community created gender-specific roles. In addition, data from reviewed literature also showed that women were more likely to express their displeasure with anti-social behaviour; and suggest on how to improve the situation, much as they are reported to have less factual knowledge about the larger socio-economic problems than men (Andreoni & Vesterlund, 2001). They further argued that the traditional gender socialisation, cultural norms, the

women's roles as care givers and nurturers, encouragements to be cooperative and feel compassion lead to a higher concern for the maintenance of life and a greater likelihood of women to engage in behaviours aimed at preserving the environment. Hunter et al. (2004) also found that the traditional gender roles in most African societies where women worked at home induces a greater likelihood for them to care for others through community groups.

Age and Attitude towards Social Environment in Mavoko

The analysis revealed that the respondent' age had a significant effect on their attitude towards the social environment. The value ($X^2_{8,0.01} > 20.09$) showed that the respondents' age had a significant effect on their attendance of estate meetings; level of involvement in social activities in the neighbourhood; and on their concern for each others' welfare in their neighbourhoods. The value ($X^2_{8,0.01} > 15.51$) also revealed that the respondents' age had a significant effect on their exchange of information. Multiple data sources confirmed that age was a strong demographic predictor of environmental attitude. FGD proceedings revealed that older people attended estate meetings more than the younger ones; and that younger people were involved in social activities in the neighbourhood and exchanged information more than the older residents.

The study attributed this finding to an understanding that older people were more positive about communal unity, hence their enthusiasm to work and to contribute towards improving the life in the neighbourhoods where they hold leadership positions. However, younger people were noted to be more techno-savvy hence their activity on social media such as facebook, instagram, twitter or WatsApp where they exchange information on any emerging issues real time. Data from reviewed documents also revealed that older people tended to be more endowed, hence their willingness and readiness to support their neighbours in need which reflects their concern for each other people's welfare compared to the younger homeowners. Hirsh (2010) reported that older people were more concerned with the way people relate and act in their neighbourhoods than younger people.

Level of Education and Attitude towards Social Environment in Mavoko

The analysis revealed that the respondents' level of education had a significant effect on their attitude towards their social environment. The value ($X^2_{8,0.01} > 20.09$) showed that the respondents' level of education had a significant effect on their attendance of estate meetings with neighbours. The value ($X^2_{8,0.01} > 15.51$) also showed that the respondents' level of schooling had a significant effect on their exchange of information with neighbours, concern for each others' welfare, and their involvement in social activities in the neighbourhood. Multiple data sources revealed that there was a relationship between the homeowners' level of education and their attitude towards the social environment. Data from key informant interviews and FGD proceedings revealed that for salaried people in formal employment, high education level meant high monthly income, hence the observed high rate of willingness to support their neighbours at times of need. Data from reviewed literature also reveal that education had a significant effect on a wide range social attitude. Frederiks et al. (2015) and Klineberg et al. (1998) reported that one's education level had an influence on their readiness and willingness to share information because they were better aware of the consequences of not relating positively as neighbours. Thus, education level is a significant determinant of the homeowners' attitude towards their social environment.

Level of Income and Attitude towards Social Environment in Mavoko

The analysis revealed that the respondents' level of income had a significant effect on their attitude towards their social environment. The value ($X^2_{8,0.01} > 20.09$) showed that the respondents' level of income had a significant effect on their attendance of estate meetings; their concern for each others' welfare in their neighbourhoods. The value ($X^2_{8,0.01} > 15.51$) also showed that the respondents' level of income had a significant effect on their exchange of information; and their involvement in social activities in the neighbourhoods. Data from the reviewed literature also reveal that there is a significant effect of level of income on the respondents' participation in the social activities. For instance, Franzen (2003) observed that while people with lower income were reported to have less time for socialisation, wealthier were more willing to participate in estate meetings and in social activities to improve the welfare in the neighbourhoods. Roskruge, et al. (2011) also reported that individuals with a higher income have less pressing economic problems and are therefore more willing and able to reduce their standard of living to spend more money on charity.

Type of Residence Ownership and Attitude towards Social Environment in Mavoko

The analysis revealed that the type of residence ownership had a significant effect on the respondents' attitude towards their social environment. The value ($X^2_{8,0.01} > 20.09$) revealed that the type of residence ownership had a significant effect on the respondents' exchange of information with neighbours; concern for each others' welfare; involvement in social activities in the neighbourhood; and on their attendance of estate meetings with neighbours. The significant effect of the type of residence on people's attitude towards their social environment can be attributed to the commitment by people who own their residences to remaining in their neighborhood for a longer time compared to those who rent, hence the drive to establish and maintain positive relations with their neighbors. Multiple data sources confirmed that the type of homeownership has a significant effect on people's environmental attitude.

Data from key informant interviews and FGD proceedings revealed people who owned their residences were more likely to improve their attachment to their neighbors where they are able to mitigate neighborhood instability and promote neighborhood cohesion. Owning one's home was also noted to provide a base on which the community builds a common stock of social relationships for social security compared to those who rent their residences. Data from reviewed literature also revealed that when people own the home where they live, they have higher levels of social capital than those who rent because the housing forms the building blocks on which the community builds a common stock of social relationships that homeowners rely on to reach a desired social cohesion (Roskruge, et al., 2011). The homeowners are reported to have higher trust in others, participate more in local activities, and have a more positive sense of community. Further, while people who rent residences feel like they could shift any time, those who own their residences are also committed to remaining in their neighborhood for a long time, hence make personal investment in the local community (Teo et al., 2000).

CONCLUSION

The analyses revealed that demographic and socio-economic factors had a significant effect on the respondents' tendencies towards activities that were considered as indicators of their attitude towards the environment. The study, therefore, concluded that demographics and

socio-economic factors were significant determinants of the household environmental attitude in the Mavoko peri-urban settlements of Nairobi metropolis in Kenya.

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