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Effect of Land Use Zoning and Households Disaster Risk Management in Eldoret Town, Kenya

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Abstract

Zoning is a public sector planning tool used to influence the future spatial distribution of people and activities in spaces of various scales in order to improve the built, economic and social environments of communities. This study was done within Eldoret Town in Uasin Gishu County, Kenya. In Eldoret, developers and other human activities have encroached into roads, recreation sites, water overflow passageways, riparian areas and therefore extensive exposes the town households to disaster vulnerabilities/risks. This has interfered with the areas' prepared plans resulting in congestion, insufficient clean water, overcrowding and lack of accessible roads which has led to full destruction of assets as well as deaths when fire occurs. The study was therefore aimed at determining the effect of Land Zoning on Household Disaster Risk Management in Eldoret Town. The study targeted households in Kamukunji, Langas, Kapsoya as well as Kapsaos of Eldoret Town. The study sampled an overall of five hundred and fifty respondents. Descriptive survey and purposive research designs were used. Data were collected using questionnaires, interviews and focus group discussions. Data were analyzed using descriptive statistic, regression and correlation tests. Land use Zoning (LUZ) had a combined influence of 73.0% on Household Disaster Risk Management (HDRM). Test results on the hypothesis indicated that there was a significant 70.9 positive relationship between LUZ and HDRM activity level. The study concluded that Land Use Zoning is useful when proposing and developing urban areas since LUZ has a significant positive influence on HDRM. The study recommended that the use of urban land use zoning as a way of enhancing management of household disaster risks.

Keywords: Urban Land use Zoning (LUZ), Household Disaster Risk Management (HDRM)

INTRODUCTION

Mankind derives his livelihood and survival by exploiting the three physical matters on earth, namely soil (land), water and air. Although those matters appear to be in abundance, they are finite and over exploitation without proper planning might lead to mankind extinction. The rising population has exerted pressure on the little productive land available forcing people to cultivate on steep slopes and riverbanks thus causing soil degradation and erosion. This has resulted in crop failures, food deficiency and poverty thus pushing people out of rural areas to seek the elusive greener pastures in urban centers. Availability of well-paying jobs, business opportunities, electricity, clean water, entertainment, efficient transport and other amenities attract people to urban areas. This has led to rapid

urbanization and industrialization. However, the slow economic growth coupled with demand for urban lifestyles overwhelm supply leading to mushrooming of illegal and uncontrolled development that negates the pull factor.

Zoning is defined as the activity of partitioning land in a metropolis/town to sections where specific land uses are allowed (Lamar, 2015). The land use permitted is determined by the type of zones. Zoning is therefore a method of land use planning for urban planning employed by local governments in many developed countries (George, 2005). More specifically, land zoning is a potent tool both for reducing the overall impact of settlements on the regional environment and for improving conditions within settlements.

Land use zoning is needed to ensure the population is having access to basic incentives including urban services. These populations also require proper human settlements, organized transport, proper infrastructure, economic development, good governance and harmonious living with nature and proper physical planning must be achieved. Physical planning is deciding in advance what to do, where, when, with what and how, in, under and above land. It is a thought process that guides land use thereby has to be guided by a set of rules, regulations and standards. This is a process through which a planning authority prohibits and regulates use, sub-division and development of land and buildings within its area of jurisdiction.

Land-use planning is also useful in case of snow avalanches, as for instance is used in Switzerland, where zoning restricts new building areas at risks. Three zones are established: red where building in strictly prohibited, blue where building is possible but designs have to take impacts into account, and yellow with no restrictions. The use of maps and plans provide information regarding these restrictions and negative impacts are considerably avoided. Some areas are more prone to flooding than others. Africa is currently experiencing significant economic growth and associated demographic changes, including rising urbanization. But without the requisite infrastructure, spatial and settlement planning. In urban areas, the requirements of social, economic, and ecological sustainable development are usually intertwined with the problems of land-use intransigence, fragmentation, and deterioration of quality of natural systems (George, 2013).

The main goal of land use zoning is to divide land uses to meet the economic and social needs of people while safeguarding the future resources. Land use zoning is basically the public policy exercise that designates and regulates the use of land to improve a community's physical, economic, social efficiency, and well-being of the people with considering socioeconomic trends as well as physical and geographical features. Physical planning can be designed as an exercise that uses the land use plan as a framework to propose the ideal physical infrastructure for a settlement or area, including infrastructure for public services, transport, economic activities, recreation, and environmental protection. A physical plan may be prepared for an urban area or a rural area. A physical plan for an urban region can have both rural and urban components, although the latter usually predominates.

Land use zoning at a regional scale can also deal with the provision of specific regional infrastructures, such as a regional road or a bulk water supply system. Both the land use plans and physical plans are not necessarily mutually exclusive. Laws, regulations, plans, and institutional frameworks should form the basis of urban planning. If existing instruments are not realistic or are contributing to informality, use the reconstruction process as an opportunity to improve them; land use zoning should join active collaboration among the reconstruction agencies, the affected community, the private sector, and other

stakeholders, thereby engendering their ownership of the planning process. The planning process should respond to issues of land rights and titling and to discrepancies in the administration of land records, address the needs of informal occupiers of land, and work with them to find viable alternatives. It is common practice in many countries to prepare comprehensive development plans that address both land use zoning and the provision of physical infrastructure.

Land use zoning plans prepare plans and policies that affect the growth and appearance of neighborhoods, cities, and urban regions. Their work affects the siting and sizing of new development at the urban scale as well as the physical design of specific sites. The site planning process itself involves site selection, program development, and site analysis and design, and plan implementation.

Their work may also protect historic buildings and special design districts in the urban core, as well as open spaces and agricultural lands affected by unwanted or premature urban growth in rural areas. Land use zoning have emerged in recent years to promote new concepts, such as: "transit-oriented development," "complete streets," and "safe routes to schools," and to reverse the negative effects of urban sprawl and decay. These planners often use geographic information systems (GIS), population projections, economic base studies, and land suitability analyses based on roadway and infrastructure capacities and environmental factors to determine the quantity and location of new industrial, commercial and residential development in towns and cities. They also forecast the impacts of new urban development on communities, roadway networks, and the environment. They may also prepare plans and strategies to make our use of natural resources in land use and transportation systems more efficient. In general, their work seeks to make our neighborhoods, cities and regions more livable, sustainable and resilient for everyone.

Land use planning mechanism allows for resource management and the reconciliation of diverging interests for example, creation of areas with specific development goals and restriction to expansion and reserve areas. It therefore supports countries to reduce and manage the risks of natural and manmade disasters. It is theorized that good administration and management of land is crucial to poverty reduction, conflict transformation, improvement in the quality of local governance and ultimately sustainable economic growth. But lacking is the approaches integrated into land use planning for disaster risk management. According to Hailu (2013), most towns lack mitigation awareness, forecasting preparedness, and make respond to disaster recovery process difficult. In fact, majority of urban households depend on relief support without which their coping strategies are weak and inadequate. Moreover, most of them fail to improve on infrastructural rebuilding; they end up reconstructing same structures as the ones destroyed. Their vulnerability and exposure to hazard risks that lead to disasters are high. This group is excluded from participating in the economic social, political and cultural spheres in urban areas all of which create and nurture capabilities (Barrett, 2002).

Household disaster risk management (HDRM) is complex, and few administrators have experience in HDRM implementation. It takes time, effort, tools, and training to assimilate HDRM in city functions and ongoing operations. Significant deficiencies remain throughout cities and megacities in terms of inter-institutional coordination, warning systems, incident command and control, resources for response, relief, recovery, and rehabilitation practice following urban disasters. An additional weakness relates to the project planning processes of government. While concepts are often

understood and policies are in place, carrying these policies and concepts to practice is a major hurdle for governments at all level (Christian Aid, 2014; Corbyn, 2010). The process of project planning and execution needs to be recognized as a major weakness if progress in DRM has to be achieved. Even among cities which have shown competency in establishing planning processes to control their physical development, carrying these planning processes into project planning and execution remains a challenging step.

In Eldoret Urban Area, developers have encroached into roads, recreation sites, water overflow passageways, riparian areas amid others are extensive. Kapsoya which is a formal settlement for instance was prepared to have particular kinds of housing formations but has failed to uphold the plan and nowadays, the developers have established their individual models. This has resulted in congestion, insufficient clean water, overcrowding, and lack of accessible roads which has led to full destruction of assets as well as deaths when fire occurs. This is evidenced by scattered waste products and filled drainage systems in the estate. Therefore, this study sort to determine the effect of Urban Land Zoning on Household Disaster Risk Management in Eldoret Urban Area. Its hypothesis was: 'there is no significant relationship between urban land zoning and household disaster risk management in (EUA)'.

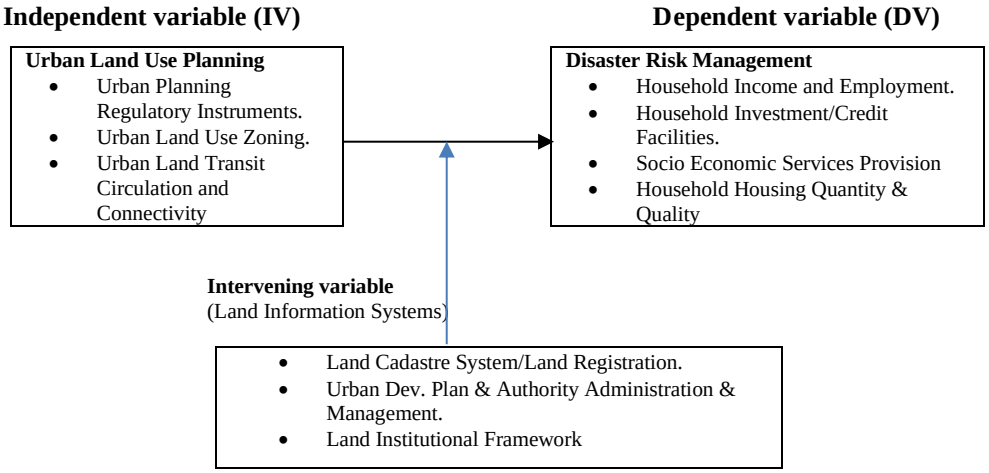

Figure 1: The Research Study Concept.

RESEARCH METHODOLOGY

The Study Area

Eldoret Urban Area was selected for the study. Eldoret is situated in Uasin Gishu County, Rift Valley. Its altitude is 2,085 m above sea level in average and its average temperature is 24ºC. It receives average rainfall of 1,149.9 mm yearly (Uasin Gishu County Integrated Development Plan, 2008 – 2022).

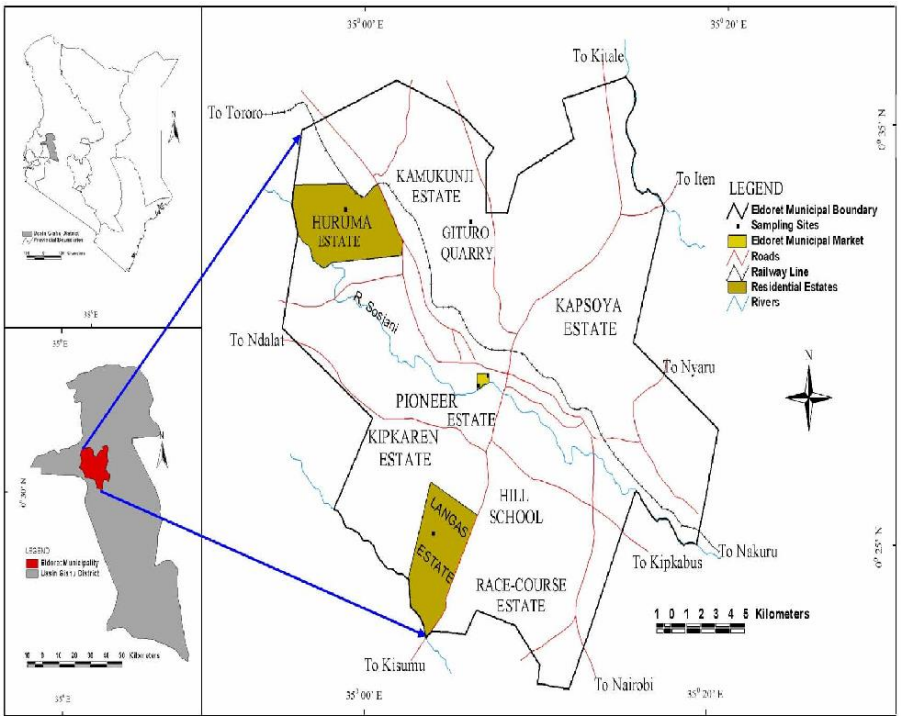

Figure 2: Study Area Map.

Source: Nthenya *et al*., 2010

Target Population

The target population for this study included all the households in urban, sub-urban as well as pre-urban areas of Eldoret town. The study occupied majorly Eldoret Urban Area and specifically the four main sections from four spatial structure of urban areas including the slum areas, pre-urban areas, informal settlements areas as well as formal areas. As a result, the study population included the overall population of Eldoret Urban Area approximated to be 497,446 (Kenya population census, 2009). The study focused on Kapsoya, Kamukunji, Langas as well as Kapsaos.

In Kapsoya which had a target population of 8446, the sample size selected was 84; Langas with a target population of 25,021 people, sample size was 253; Kamukunji having a target population of 9188, a sample size of 91 was taken; Kapsaos with a target population of 7345, sample size of 72 was taken.

Study Population

Eldoret Urban Area had a population of 497,446 in the year 2009 (Eldoret Municipal Strategic Plan, 2012). The sections sampled within Eldoret urban area included Kamukunji settlement with a population of 9188 (1,104 households); Langas settlement which is within Langas ward situated 5 km South of Eldoret (CBD) with a population of 25021 as reported by 2009 population census; Kapsaos, a pre-urban area situated in Kapyamit location of Huruma ward in Turbo constituency having a population of 7345 people; Kapsoya estate found in Kapsoya location of Kapsoya ward in Anaibikoi constituency with a population of 8446 people (Kenya Population Census, 2009).

Research Design Framework

Descriptive and purposive survey research design was applied in this study. The purposive survey research design was applied to select the four spatial structure or form of settlements found in Eldoret Urban Areas in the study. Their inclusion in the study was predetermined by the selection of their features that characteristically predict hazardous state that cause disaster risks. In using this technique to select the sample, the researcher believed that the respondents would be able to provide the required data for the study.

The purposive sampling technique was also used to select all the types of structural forms of settlements found in Eldoret urban areas. Four settlement structures of population patterns were therefore included in this study. The researcher hoped that these four settlement patterns would provide the desired target population from which a sample size would be drawn as a true representative of the population.

While a systematic research design was critical in deciding on the size of the respondents that gave the information (Bajpai, 2010). This survey research design was applied when selecting he sample size from the target population. It was selected from a random starting point and a fixed, periodic sampling interval. The desired sample size was determined using the formula (Rahi, 2017; Bajpai, 2010).

$$Sampling\ fraction = \frac{\text{Actual Sample Size}}{\text{Total Population}}$$

In Kapsoya, a formal urban area, where a sample size of 84 was desired from a population of 8446 using the systematic survey research design, all the potential participants were placed in the list of households starting from Limo House going towards the west.

The next step identified every 100th person (8446÷84=100.547619) from count 1 on the list starting from Limo House and chosen as a participant. A person chosen represented a singly family unit (household) this was followed by 200th, ……, 84 times to arrive at the sample size westwards, going round until we are back at the Limo House.

In Langas, an informal settlement with a population of 25021 persons and a sample size of 253 decided. Systematically, all potential individual members of Langas households were included in the list. Corner Mbaya Stage was identified to mark the starting point. This helped in moving around to cover the entire Langas without reaching everyone.

The next step identified every 99th person (25021÷253=98.8972332) from count 1 on the list starting from Corner Mbaya Stage moving on the right side of the road. This side was maintained until all the household individual members were exhausted. The left side of the road was covered afterwards. A person chosen represented a single family unit (household) this was followed by 198th,……, 253 times to achieve the desired sample size westwards.

The next was Kamukunji, a slum area with 9188 total population. A sample size of 91 persons was decided. Included in the sampling list was all the potential participant members of the Kamukunj households starting from St. Peters Kamukunji Primary School moving southwards to cycle the area. This was followed by identifying every 100th person (9188÷91=100.967033) from count 1 on the list starting from St. Peters Kamukunji Primary School and chosen person considered as a participant. Each participant chosen represented a singly family unit (household) this was followed by 200th, ……, 91 times to arrive at the sample size westwards, going round until we are back at the St. Peters Kamukunji Primary School.

Lastly, in Kapsaos, a peri-urban area with 7345 total population, where a sample size of 72 was decided. The potential participants were placed in the list of households starting from Kapsaos Secondary School going towards the west. The next step identified every 102nd person

(7345÷72=102.013889) from count 1 on the list starting from Kapsaos Secondary School going around the estate. A person chosen represented a singly family unit (household) this was followed by 102th, ……, 72 times to arrive at the sample size westwards, going round until we are back at the Limo House.

The Sample Size

This study employed the Fishers model developed in 1930 and later revised by Kothari (2004). The model is specified as follows: -

$$n = \frac{Z^2 Pq}{d^2}$$

From which *n* denote the sample size;

Z, denote the *z*-score associating to 95% confidence interval which is 1.96;

d, denotes the amount of inconsistency allowed = 0.014953;

p denoting frequency of land use planning = 0.97;

q = 0.03.

$[(1.96)^2(0.97)\ (0.03)]/\ (0.014953)^2$=499.975 similar to 500 aspired sample size. The sample size was then distributed rationally with the use of the following formula:

Section I = Langas ($n_{1)}$= [(25,021 ÷ **50,000**)]*(500) =253

Section II = Kapsoya ($n_{2)}$ = [(8446÷ **50,000**)]*(500) =84

Section III = Kamukunji ($n_{3)}$ = [(9188÷ **50,000**)]*(500) =91

Section IV = Kapsaos ($n_{4)}$ = [(7345÷ **50,000**)]*(500) =72

Therefore, $n = n_1 + n_2 + n_3$ = 500: 254+84+91+72=500

Sampling Procedure

An overall of 500 households were selected for the study from the 4 urban arrangements in form of informal settlements, slum areas, formal area and pre-urban areas (Langas, Kamukunji, Kapsoya and Kapsaos). Stratified Proportional random sampling was employed to achieve the study sample size while systematic sample frame of one out of a hundred respondents was employed. On every settlement area, a systematic sampling approach was applied whereby a fixed point was chosen for instance in Kapsoya, Limo House was selected as the starting point counting each 99 people after which the 100th one was identified for data collection using the developed questionnaire. This was replicated until the required sample size (84) was achieved. The same was done in Kamukunji but a different starting point was selected until a sample size of 91 was achieved. Corner Mbaya juncture was chosen as the beginning point in Langas. At this point, 98 persons were tallied and the 99th person was selected to partake in data collection. For Kapsaos, each one hundred and one person was tallied and the 102ndth was selected for data collection.

Purposive sampling technique was employed in selecting respondents for key informant interviews and focus group discussion within the study area. Overall, the activities led to a sample size 550.

Table 1: Sample Size (Based on Stratified Proportional Random Sampling Technique)

Urban Spatial Structure of EUA	**Study Area**	**Measure of Study Area**	**Population target of Stratum**	**Sample Size P=500(N/i) (Proportionate)**
Formal Area	Kapsoya	12.1 ha	8446	84
Informal Settlement	Langas	42.5 ha	25021	253
Slum Area	Kamukunji	13.7 ha	9188	91
Per-urban Area	Kapsaos	34.5 ha	7345	72
		102.8 ha		
	Key Informant Interview (KII)			10
	Focus Group Discussion (FGD)			40

Data Collection

Data was collected using both Primary and secondary sources. Primary data collection tools applied were questionnaires with both closed and open-ended questions, unstructured Focus Group Discussion and structured interview guides. Secondary data was obtained from already collected data to supplement the primary data in answering the research problem.

Data Analysis

Questionnaires were categorized and coded and data entered into IBM SPSS version 21 was done for analysis. Descriptive as well as inferential statistical tests were employed in the analysis. Descriptive statistics were then used to illustrate and summarize the data in terms of mean and frequencies. Regressing Land Use Zoning and Household Disaster Risk Management guided by the equation $\gamma = \beta_0 + \beta_1 LUZ$ Where LUZ represented Land Use Zoning and γ denoted Household Disaster Risk Management measures was used to test the effect of LUZ (Land Use Zoning) on Household Disaster Risk Management components hypotheses.

RESULTS AND DISCUSSION

Households Characteristics

In this study, household's characteristics comprised of marital status, gender, age group, education level, household head as well as family size. This information on household characteristics was important in enabling the researcher to make conclusions as well as references to precise characteristics definitely collected. The results of demographic profile are as shown in Table 2.

Table 2: Distribution of Respondents Demographic Characteristics in Study Area

Sub-Urban Areas		**Langas (n=253**	**Kapsoya (n=84)**	**Kamkunji (n=91)**	**Kapsaos (n=72)**	**Subtotal (n=481)**
Gender		Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
	Male	118 (24.5%)	40 (8.3%)	39 (8.1%)	27 (5.7%)	224 (46.4%)
	Female	136 (28.3%)	46 (9.6%)	45 (9.4%)	30 (6.2%)	257 (53.6%)
Marital	Single	30 (6.2%)	11 (2.3%)	10 (2.1%)	7 (1.5%)	58 (12.1%)
Status	Married	208 (43.3%)	70 (14.6%)	69 (14.4%)	46 (9.6%)	393 (81.7%)
	Widow	8 (1.7%)	3 (0.6%)	3 (0.6%)	2 (0.4%)	16 (3.3%)
	Divorced	4 (0.8%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	7 (1.5%)
	Separated	4 (0.8%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	7 (1.5%)
Age	Below 30 yrs.	51 (10.6%)	17 (3.5%)	17 (3.5%)	12 (2.5%)	97 (20.2%)
Bracket	31-40 yrs.	122 (25.4%)	41 (8.5%)	40 (8.3%)	27 (5.6%)	230 (47.8%)
	41-50 yrs.	67 (13.9%)	23 (4.8%)	22 (4.6%)	15 (3.1%)	127 (26.4%)
	51-60 yrs.	10 (2.1%)	3 (0.6%)	3 (0.6%)	2 (0.4%)	18 (3.7%)
	61-Above yrs.	4 (0.8%)	2 (0.4%)	2 (0.4%)	1 (0.2%)	9 (1.9%)
Education	Primary	49 (10.2%)		16 (3.3%)		16 (3.3%)
Level	Secondary	102 (21.2%)		35 (7.3%)		34 (7.1%)
	Diploma	49 (10.2%)		16 (3.3%)		16 (3.3%)
	Univ. Degree	35 (7.3%)	12 (2.5%)	12 (2.5%)	8 (1.7%)	67 (13.9%)
	None	19 (4.0%)	7 (1.5%)	6 (1.3%)	4 (0.8%)	36 (7.5%)
No of Children	1-4	116 (24.1%)	39 (8.1%)	38 (7.9%)	26 (5.4%)	219 (45.5%)
	5-7	106 (22.0%)	36 (7.3%)	35 (7.3%)	24 (5.0%)	201 (41.8%)
	8-10	16 (3.3%)	6 (1.2%)	5 (1.0%)	3 (0.6%)	30 (6.2%)
	11-14	7 (1.5%)	2 (0.4%)	2 (0.4%)	2 (0.4%)	13 (2.7%)
	15-Above	4 (0.8%)	1 (0.2%)	2 (0.4%)	1 (0.2%)	8 (1.7%)
	None	5 (1.0%)	2 (0.4%)	2 (0.4%)	1 (0.2%)	10 (2.1%)
Household head	Father	216 (44.9%)	73 (15.2%)	71 (14.8%)	49 (10.2%)	409 (85.0%)
	Mother	37 (7.7%)	12 (2.5%)	12 (2.5%)	8 (1.7%)	69 (14.3%)
	Child	1 (0.2%)	1 (0.2%)	1 (0.2%)	0 (0.0%)	3 (0.6%)
Alternative	Yes	84(33.0%)	16(19.0%)	13(16.0%)	10(18.0%)	123(26.0%)
Sources of Livelihood	No	170(67.0%)	70(81.0%)	71(84.0%)	47(82.0%)	358(74.0%)
Total		**254 (52.8%)**	**86 (17.9%)**	**84 (17.5%)**	**57 (11.9%)**	**481 (100%)**

Household Disaster Risk Management

This study pursued the three main dimensions of disaster risk management that are mortality, socioeconomic losses and livelihood losses, assessed as disaster-induced impoverishment. This study was designed and developed on the understanding that hazards and disaster risks are not the same and that if a household or mankind does not trigger hazards to its eventual occurrence, then disaster risks and actual disaster would be eliminated. Therefore, this study notes that there are no natural disasters but there are natural hazards that if properly managed, would not lead to disasters. Apart from that socioeconomic aspect of disasters risk management were found to have been ignored in literature hence lacking solutions. Finally, it is high time countries need to move from being dependent on foreign aid, relief supply, and emergencies. Therefore, this study is built on the framework that risk and disasters occurs as a result of interaction between man and nature, hence are preventable.

The disaster risk management variable was a dependent variable that consisted of household income, household employment, household investment and financial credits, quality and quantity housing, and housing mobility. These were some critical areas of concern forsocioeconomic disaster risk management.

Disaster Risk Management Dimensions

There were five Disaster Risk Management dimensions, which are household income, household employment, household investment and financial credits, quality and quantity housing, and housing mobility. The household participants were asked to state their level of agreement or disagreement with the statement that the urban land use planning has influenced each dimension in their respective locations. The results are as shown in Table 3.

Table 3: Responses to Disaster Risk Management Dimensions

Item	Disagree Strongly	Disagree moderately	Disagree slightly	Agree slightly	Agree moderately	Agree Strongly
Disaster Risk Management(DRM)						
Household Income (HI)	0%(0)	0%(0)	1%(5)	55%(264)	34%(163)	7%(34)
Household Employment (HE)	5%(24)	0%(0)	10%(48)	35%(168)	25%(120)	25%(120)
Household Investment and Financial Credit (HIFC)	0%(0)	4%(19)	3%(14)	19%(91)	34%(163)	40%(192)
Housing Quality and Quantity (HQQ)	0%(0)	0%(0)	0%(0)	10%(48)	47%(256)	40%(192)
Household Mobility (HM)	0%(0)	4%(19)	3%(14)	19%(91)	34%(163)	40%(192)
Overall DRM	**3%(14)**	**2%(10)**	**14%(28)**	**28%(56)**	**40%(192)**	**13%(62)**

The results in Table 3 show that Household Income (HI) scored 55% on agree slightly, agree moderately accounted for 34% while agree strongly scored only 7%. This was an indication that majority of the sampled participants were of the opinion that there is slight presence of Household Income (HI) activities in the sampled households sampled of Eldoret urban areas. The results for Household Employment (HE) show that slightly agree accounted for 35%, agree moderately accounted for 25% while agree strongly scored only 25%. This was an indication that majority of the sampled participants were of the opinion that there is slight prevalence of Household Employment (HE) of Disaster Risk Management activities in the urban areas. This implies that there are some low levels of employment and income generating activities from among the household sampled. However, some level here implies that majority of respondents were of the opinion that this level is not significantly convincing, it may be unstable if not unsustainable. These findings concur with the findings of Hailu (2013).

The results for Household Investment and Financial Credit (HIFC) indicate that that slightly agree accounted for 19%, agree

moderately accounted for 34% while agree strongly scored only 40%. This was an indication that majority of the sampled participants were of the opinion that they agree very much that Disaster Risk Management activities of Household Investment and Financial Credit (HIFC) is highly prevalent in this. Finally, the results also indicate that Housing Quality and Quantity (HQQ) accounted for 10% on slightly agree, 47% on moderately agree and 40% on very much agree that there is prevalence of Housing Quality and Quantity (HQQ) activities among the sampled households.

This implies that the majority of the sampled participants were of the opinion that Housing Quality and Quantity (HQQ) activities are moderately low and poorly practiced from among the urban area household sampled. This may be influenced by the desire to have all better living standard and well-being as the alternatively pursued by urban migrants globally. This infers that many of the households from different study locations have strong concern to their Housing Quality and Quantity (HQQ); these findings are in agreement with the findings of Putman (2010) who also found out that Housing Quality and Quantity (HQQ) is an important element of Disaster Risk Management and therefore county governments with their disaster risk management tools should ensure that urban areas are safe and secure for all inhabitants and disasters risk prevalence is minimized or totally eliminated.

To further analyze the results in Table 3 show that Household Income (HI) is the strongest dimension of disaster risk management, it scored 45% (216), it was followed by Housing Quality and Quantity (HQQ) that scored 44% (211), Household Investment and Financial Credit (HIFC) scored 37% (178) while Household Employment (HE) scored 30% (144), when all the highest frequencies are added together and divided by two, multifactor analysis of Likert scale scores. This infers that sampled participants agreed that Household Income (HI) and Housing Quality and Quantity (HQQ) are critical to their urban areas under study disaster risk management intensities. These findings agree with the results of Coulombel, (2010) who also found out that Household Income (HI) is needed for households to steer socioeconomic development activities and be active in environmental management and regenerate new opportunities for Household Income (HI) and employment activities leading to sustainability.

The Mean Scores on Disaster Risk Management Dimensions

There are three indicators used to measure Disaster Risk Management in terms of Household Income and Employment (HIE), Household Investment and Financial Credit (HIFC) and Housing Quality and Quantity (HQQ) that determines the sampled urban household strong desire to minimize their disaster risk vulnerability to improve on disaster risk management. The higher the mean and low standard deviation indicates a moderately high and stable disaster risk management level in the sampled household respondents while the small mean and large standard deviation implies low level of disaster risk management activities in the sampled listed Eldoret urban areas. The results are as shown in Table 4.

Table 4: Overall Mean Scores on Household Disaster Risk Management Indicators

	N	Mean	Std. Dev
DRM Dimensions	481	5.3946	.70385
Household Income (HI)	481	3.9696	.23201
Household Employment (HE)	481	3.6123	.32159
Household Investment and Financial Credit (HIFC)	481	3.8976	.25482
Housing Quality and Quantity (HQQ)	481	3.5678	.25154
Housing Mobility (HM)	481	3.6996	.62182

Results in Table 4 show the descriptive statistics of the indicators of disaster risk management level as determined by the five components of dependent variable. The mean scores for each indicator ranged from 2.0123 (SD = .23201) to 5.3946 (SD = .70385). Household Income (HI) of the urban areas had the highest mean and least deviation, followed by Housing Quality and Quantity (HQQ) of the households, next was Household Investment and Financial Credit (HIFC) activities of the households with a mean of 3.8976 and standard deviation of .25482, likewise Household Employment (HE) of the households had a mean of 3.6123 and a standard deviation of .32159 and lastly was Housing Mobility with a mean of 3.6996 and standard deviation of .62182. Overall, the item mean for disaster risk management was 5.3946 (SD = .70385), which was slightly above average. This implies that there is high low level of concentration on Household Income (HI) and Housing Quality and Quantity (HQQ) activities in the sampled household respondents as reported by the participants. Moreover, this is an indication that households are highly vulnerable as they are exposed to high risks since all the dimensions of dependent variables point at unstable level of each dimension. These results disagree with the findings of a study that concur with that of Twigg (2015) who found out that the overall mean (2.461) of all items indicate low level of competence by the two groups of respondents indicating that household participation in disaster risk management is significantly high.

Types of Land Use Zoning in Eldoret Urban Area

The process of urban land use zoning emerges as a critical factor of providing order and sustainability in land use. Since land use is the object of zonal characterization, each land use zone is subject to a series of regulations depicting what can be built in terms of nature, function and density, giving tools to county governments to influence urban development. There are four major types of land use zoning. These are presented in Table 5.

Table 5: Descriptive Statistics for Types of Urban Lnd Use Zoning (ULUZ)

Variable	N Stat	Range Stat	Min Stat	Max Stat	Mean Stat	Std. Error	S.D. Var	Stat
LUZ	481	80.45	-38.0	73.00	4.46	1.17	10.13	0.240
Functional	481	4.77	4.01	5.26	4.100	0.630	0.624	0.400
Form Based	481	5.96	1.94	2.74	7.965	0.667	1.177	2.330
Intensity	481	6.35	1.83	3.41	4.213	0.624	1.687	0.230
Incentives	481	7.33	3.18	3.57	0.314	0.576	0.264	0.615

The results from Table 5 show that the Urban Land use Zoning has shown a moderate deviation among the sampled urban areas in Eldoret. It shows a mean ability to put town to order of almost 4.46%, the maximum reported influence is around 73% and the minimum is -38.0% with deviation of 10.17 between sampled regions of Eldoret urban Areas. It implies that the need for Urban Land Use Zoning adoption

as an approach in helping in disaster risk management to households living in Eldoret Urban Areas. Therefore, the county government needs to understand the need for building a proper and sustainable zoning as a critical tool in urban sanity design and development. The authority needs to adopt various techniques and tools including urban land use zoning as integral part of land use planning.

The mean of the functional zoning of the Urban Land Use Zoning is 4.100, with the maximum and minimum are 5 and 4 respectively. The functional zoning is capable in organizing the urban land use as commercial, administrative, residential, and industrial and green space. The functional zoning shows an experience of annual frequencies of a maximum of five times the influence in the total degree of influence of Urban Land Use Zoning. The mean of the functional zoning is 63.0%, which is 63.0% of influence of the total influence of Urban Land Use Zoning on disaster risk management leaving the rest 37.0% be influenced by other factors. It implies that county governments such as Uasin Gishu in which Eldoret Urban Authority is housed need to utilize functional zoning to facilitate the application of urban land use zoning to effective disaster risk management to urban households.

The form-based zoning of the Urban Land Use Zoning shows an experience of annual frequencies of a maximum of three times influence with a minimum of two levels of experiences. This implies that form-based zoning registered quite a small level of influences. The mean of form-based zoning influence is only 66.7%, which is 66.7% of the orderly function in urban planning influence on household disaster risk management. The form-based zoning classifies the land use in terms of downtown, uptown, east side, historical zones, and manufacturing areas.

The Intensity zoning indicates an experience of annual frequencies of a maximum of four times and a minimum of three times the level of influence. This implies that the Intensity zoning registered quite a moderate level of influences on the disaster risk management techniques. The mean of Intensity zoning is 58.1%, which implies that 58.1% of the total Urban Land Use Zoning influence on disaster risk management. This infers that urban land planning departments, urban land use zoning influences the designing of high density, average density, low density and no density areas for building infrastructure that are not disaster risk themselves. This may be the reason why most urban areas strategically indicate the kind of housing property to be built in a certain area. In Kenya for example, various residential areas require specific housing in terms of height, space, and type. Although in places like Nakuru commercial or residential properties were not to go beyond certain height, due to the region being near the seismic core prone to volcanicity, yet today there are many skyrocketing in the presence of this regulation.

The incentives zoning indicates an experience of annual frequencies of a maximum of four times and a minimum of three times the level of influence. This implies that the incentive zoning registered quite a moderate level of influences on the disaster risk management process. The mean of Incentive zoning is 57.6%, which implies that 57.6% of the total Urban Land Use Zoning influence disaster risk management. This infers that urban land planning departments, urban land use zoning influences the designing of incentives such as Export processing Zones, Konza City, and Africa Economic Zone in Uasin Gishu, Plateau Business Parks in Uasin Gishu, and Commercial Parks and extra. These results concur with the finding of Gosnell *et al*. (2011) and Enermark, (2012) whose studies identified the same factors to have contributed to challenging strategy implementation in urban planning departments in different countries globally.

Land Use Zoning Influence

The study also sought to find out the level of urban land use zoning influence from the household respondents. There are several types of zoning codes in use today and combinations thereof. It is sometimes difficult to distinguish between the types of codes and their respective formats or techniques. However, this study made use of functional zoning, form-based zoning, intensity zoning and incentive zoning under which there are other sub elements. Urban land use zoning is considered to be useful in the following areas: stabilizing and increasing property values, particularly residential properties; relieving and checking congestion in the streets and neighborhoods; increasing safety and enhancing security and administration of security services in buildings and residential neighborhoods; making business more efficient by ensuring there is order, and making life healthier by increasing the quality and aesthetic values of a locality, neighborhoods, city or town. Ten items were identified and measured on a 4-Likert scale of agree and disagree. The results are as shown in Table 6.

Table 6: Distribution of the Measure of Land Use Zoning Influence

Statement		SD	D	A	SA	Total
1. Functional zoning is important in dividing land into commercial areas useful in concentrating commercial activities in specific zones giving various support to the operators	F	14	43	168	255	**481**
	%	03.3	09.0	35.0	53.0	**100**
2. Zoning of urban land use can influence creation of administrative areas useful in providing basic administrative services stabilizing security and safety of towns	F	14	34	168	265	**481**
	%	03.0	07.0	35.0	55.0	**100**
3. Establishing specific residential zones is important to urban households in accessing residential services	F	24	43	164	250	**481**
	%	05.0	09.0	34.0	52.0	**100**
4. This is able to create industrial zones that is critical in locating industries in specific areas for purposes of concentrating basic industrial services in one location	F	24	43	154	260	**481**
	%	05.0	09.0	32.0	54.0	**100**
5. Creating a zone for green space is critical for future expansion, recreation	F	29	48	154	250	**481**
	%	06.0	10.0	32.0	52.0	**100**
6. Establishing the downtown considered the CBD for commercial, and administrative functions of the inter and intra-governmental activities	F	19	39	154	269	**481**
	%	04.0	08.0	32.0	56.0	**100**
7. Establishing zones for mixed use development popular with pedestrian friendly, most dense and is home to a diverse set of establishments including office buildings, residential towers, apartment complexes, retail centers, nightlife strips, and hotels	F	14	58	144	265	**481**
	%	03.0	12.0	30.0	55.0	**100**
8. Creation of Estate Zones is useful for urban households to inhabit areas officially marked for human occupation	F	29	34	164	255	**481**
	%	06.0	07.0	34.0	53.0	**100**
9. Establishing Intensity zones is important in determining the high, average, low, or no densities housing development	F	24	19	144	294	**481**
	%	05.0	04.0	30.0	61.0	**100**
10. Setting aside zones for incentives or no incentives attract certain socioeconomic activities and enhanced control of environmental management	F	14	19	144	303	**481**
	%	03.0	04.0	30.0	63.0	**100**

The results in Table 6 show that strongly agree accounted for 255 (53.0%), agree 168 (35.0%) disagree accounted for 43 (09.0%), and strongly disagree 14 (03.0%). This is an indication that majority of the participants approved the statement that functional zoning is important in dividing land into commercial areas useful in concentrating commercial activities in specific zones giving various support to the operators.

In relations to zoning of urban land use can influence creation of administrative areas useful in providing basic administrative services stabilizing security and safety of towns, the results show that strongly agree accounted for 265 (55.0%), agree 168

(35.0%), disagree accounted for 34 (07.0%), and strongly disagree 14 (03.0%). This is an indication that majority of the respondents strongly agreed that zoning of urban land use can influence creation of administrative areas useful in providing basic administrative services stabilizing security and safety of towns.

At the same time, these results show that strongly agree accounted for 250 (52.0%), agree 164 (34.0%), disagree accounted for (09.0%), and strongly disagree 24 (05.0%). This is an indication that majority of the participants also agreed that establishing specific residential zones is important to urban households in accessing residential services.

Moreover, from the results in Table 6, one realizes that strongly agree accounted for 260 (54.0%), agree 154 (32.0%),), disagree accounted for 43 (09.0%), and strongly disagree 24 (05.0%) with the statement that zoning able to create industrial zones that is critical in locating industries in specific areas for purposes of concentrating basic industrial services in one location. This implies that majority of participants approved the statement that zoning sre able to create industrial zones that is critical in locating industries in specific areas for purposes of concentrating basic industrial services in one location.

Also, participants with opinion of strongly agree accounted for 250 (52.7%), agree 154 (32.0%), disagree accounted for 48 (10.0%), and strongly disagree 29 (06.0%) with the statement that zoning enhance creation of zones for green space is critical for future expansion, recreation. This implies that majority of participants agreed with the statement that zoning enhance creation of zones for green space is critical for future expansion, recreation.

Again, these results reveal that strongly agree accounted for 269 (56.0%), agree 154 (32.0%), disagree 39 (08.0%), and strongly disagree 19 (04.0%) on the statement that establishing the downtown considered the CBD for commercial, and administrative functions of inter and intra-governmental activities. This implies that majority of participants agreed with the statement that establishing the downtown considered the CBD for commercial, and administrative functions of inter and intra-governmental activities.

In relation to establishing zones for (uptowns) mixed use development popular with pedestrian friendly, most dense and is home to a diverse set of establishments including office buildings, residential towers, apartment complexes, retail centers, nightlife strips, and hotels, the results in Table 3 show that strongly agree accounted for 265 (55.7%), agree 144 (30.0%), disagree 58 (12.0%), and strongly disagree 14 (03.0%). This implies that majority of participants were strongly of the opinion that establishing zones for mixed use development popular with pedestrian friendly, most dense and is home to a diverse set of establishments including office buildings, residential towers, apartment complexes, retail centers, nightlife strips, and hotels.

Furthermore, the results in Table 6 indicate that strongly agree accounted for 255 (53.0%), agree 164 (34.0%), disagree 34 (07.0%), and strongly disagree 29 (06.0%) on the opinion that creation of estate zones is useful for urban households to inhabit areas officially marked for human occupation. This implies that majority of participants agreed with the statement that creation of estate zones is useful for urban households to inhabit areas officially marked for human occupation.

In addition to that, the results in Table 3 indicate that strongly agree accounted for 294 (61.0%), agree 144 (30.0%), disagree 19 (04.0%), and strongly disagree 24 (05.0%) on the opinion that establishing Intensity zones is important in determining the high, average, low, or no densities housing development. This infers that majority of participants agreed with the statement that establishing Intensity zones is

important in determining the high, average, low, or no densities housing development.

Finally, the results in Table 6 indicate that strongly agree accounted for 303 (63.0%), agree 144 (30.0%), disagree 19 (04.0%), and strongly disagree 14 (03.0%) on the opinion that indicate that setting aside zones for incentives or no incentives attract certain socioeconomic activities and enhanced control of environmental management. This infers that majority of participants agreed with the statement that indicates that setting aside zones for incentives or no incentives attract certain socioeconomic activities and enhanced control of environmental management.

This would enhance the households determining their multiple uses and diversified socioeconomic activities. This would enhance livelihood stability and sustainability hence making the urban households able to minimize their vulnerability to socioeconomic and environmental disaster risks. Zoning would result in restoring residential density associated affecting downtown zones, address a zoning and land use inconsistency that would allow the urban households plan land use density match the higher density allowed in the former zoning since Kenya is modernizing, the pervious colonial planned urban system would not work today, establish an urban household plan implementation overlay zone for the largely residential areas within suburban areas and its neighborhoods that and its neighborhoods' that would trigger discretionary review for development exceeding 30 feet in height.

Thus, urban land use zoning would enhance planning where different users are able to access particular zone for specific activities. These results are in agreement with the findings of Twigg (2015), Gunjal (2016), Freire *et al.* (2014); Gaube & Remesch (2013) that zoning is important in organizing urban land space in multipurpose uses such as sub division and specific area plans, neighborhoods design, heritage preservation, growth and service boundaries and natural hazards zoning enhancing equitable and adequate distributions.

Land use zoning will thus ensure that density bonuses allow developers to build more densely than normally permitted in exchange for providing a public good, such as affordable housing. This zoning tool achieves two things: developers can build additional units, increasing potential profit, and loosely populated areas become denser. For example, instead of building a single-family home on a large plot, a developer would be incentivized to build multiple affordable condominiums a project that would not otherwise be legal. Density zoning is similar to incentive zoning because it makes exceptions to density regulations in exchange for some public benefit.

Results of Correlation Analysis

The results from Table 7 are observation that there is a significant positive relationship between Land Use Zoning and Household Disaster Risk Management Activity level (R=.842). This was an indication that Land Use Zoning explained 70.9% (R^2= .709) of Household Disaster Risk Management. The other variables affecting Household Disaster Risk Management explained by the remaining 29.1%. The analysis from the model had the F value of 5.4873 at p-value <0.05, the findings were sufficient to support the relationship between Land Use Zoning and Household Disaster Risk Management, inferring that Land Use Zoning had statistically significant positive effects on Household Disaster Risk Management activity level.

Table 7: Relationship between Land Use Zoning and Household Disaster Risk Management

Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	.842[a]	.709	.677	.53441

Predictors: (Constant), Functional, Form Based, Intensity, Incentives

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	9.123	1	1.384	5.4873	.000[b]
Residual	16.641	481	.287		
Total	26.513	125			

[a]. Dependent Variable: Household Disaster Risk Management

[b]. Predictors: (Constant), Functional, Form Based, Intensity, Incentives

Coefficients[a]

Model	Un-standardized Coefficients		Standardized Coefficients	Significance	
	β	Std Error	Beta	t-value	p-value
(Constant)	.3856	.115		4.030	.051
Land Use Zoning .664	.121		.654	4.564	.000

[a]. Dependent Variable: Household Disaster Risk Management activity level

[b]. Predictors: (Constant), Functional, Form Based, Intensity, Incentives

$\gamma = \beta_0+\beta_1 LUZ = .3856+.664LUZ$

The results indicate that there is a positive significant relationship between LUZ and Household Disaster Risk Management activity level. The functional, form based, intensity, and incentives increases as LUZ increases. Therefore, given the equation $\gamma = \beta_0+\beta_1 LUZ = .3856+$.664LUZ when LUZ is zero γ will be equal to *.3856* and when LUZ is increased to 10 units then γ will be *.3856*+.664 (10), which will be 7.0256 units of HDRM showing an increasing effect of LUZ on HDRM. Therefore, the null hypothesis that there is no relationship between Land Use Zoning and Household Disaster Risk Management is rejected. Although in the literature there are varied results but this finding concurs with the finding of Smolka (2014) who found that urban areas with larger boards that are weak, LUZ tend to have higher desire for improved Household Disaster Risk Management, which could be to help deal with vulnerability and resilience problem of urban households. They found out that Land Use Zoning as a dimension of Land Use Planning which is more entrenched due to socioeconomic values that can be realized from applying land use planning to bring stability and sustainability in urban areas in Eldoret and any other city in the world.

In summary, it infers that household's lives, livelihoods, and wellbeing are at risk either directly or indirectly from the destructive effects of a hazard. Their incomes and livelihoods are at risk because movement, access and utilization of their productive assets are restricted where there is no land use zoning. Each type of hazard puts somehow a different set of elements at risk due to their vulnerability. Therefore, land use zoning could be a useful tool used to reducing such vulnerability. To this end, development planners need to identify elements that are most at risk from the principal hazards, which have been identified (UNDP, 1991). In the Eldoret Town case, elements at risk comprise people's life and wellbeing, employment, housing mobility, environmental concerns, local systems and social structures, coping strategies.

CONCLUSION

Land use zoning was considered useful in the following areas including functional zoning, form-based zoning, intensity zoning and incentives zoning. In the functional zoning, this divides urban land in various uses including commercial, administrative, residential, and industrial and greens pace. The findings indicated that Urban Land use Zoning and all its five-dimensional items combined had an influenced of 73.0%. The findings also indicated that functional and form-based land use zoning had highest level of influence on disaster risk management compared to the other dimensions.

Zoning provide areas specifically allocated suitable for particular activity. It means that zonal mapping will have already taken place and determination of hazard prone areas identified and included in the map when zoning and allocation of specific activities are done. For example, form-based zoning is aimed at dividing land into downtown, uptown, historical zones, and manufacturing areas. While intensity zoning divides and classify urban land into high density, average density, low density and no density. Finally, incentive zoning provides for incentives or no incentives. The finding indicated that zoning would influence disaster risk management by providing specific zones suitable for particular socioeconomic activities that attract similar investment in such areas creating employment opportunities, and providing sustainable income to households. Other business startups would also emerge in supporting those working in these zonal areas.

The benefit of zoning is that it helps to separate different, incompatible property uses and collects together those that are similar. This ensures creation of neighborhoods' that match and useful to each other. This can help influencing neighborhoods whose households are not hard working to adopt a culture of trying and putting more efforts hence they would become self-reliant. Zoning would also provide control mechanisms that would limit the kind of housing construction for example in high density areas, skyrocketing buildings would be allowed to be constructed, this would put a mechanism that ensures no informal structures are established in average density areas.

Test results on $H0_2$ indicate that there was a significant positive relationship between LUZ and Household Disaster Risk Management activity level. The functional, form based, intensity, and incentives increases as LUZ increases. Therefore, given the equation $\gamma = \beta_0 + \beta_1 LUZ = .3856 + .664LUZ$ when LUZ is zero γ will be equal to *.3856* and when LUZ is increased to 10 units then γ will be *.3856*+.664(10), which will be 7.0256 units of HDRM showing an increasing effect of LUZ on HDRM. Therefore, the null hypothesis that there was no relationship between Land Use Zoning and Household Disaster Risk Management was rejected. Although in the literature there were varied results but this finding concurs with the finding of Smolka, (2014) who found that urban areas with larger boards that are weak, LUZ tend to have higher desire for improved Household Disaster Risk Management, which could be to help deal with vulnerability and resilience problem of urban households. They found out that Land Use Zoning as a dimension of Land Use Planning which was more entrenched due to socioeconomic values that could be realized from applying land use planning to bring stability and sustainability in urban areas in Eldoret and any other city in the world.

RECCOMENDATION

The study recommended that the use of urban land use zoning as a way of enhancing management of household disaster risks is necessary given that it was found out that land use zoning has a strong influence on household disaster risk management, thus there should be urban practices that support application of zoning be able to manage urban areas to become

safe and secure for occupancy by the migrants who are increasingly moving to urban areas.

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