Types of Urban Vulnerabilities Affecting Households in Informal Settlements of Kisumu County

Mwangangi Winfred Mumbe[1]
Ruth Simiyu (PhD)[2]
Namenya Daniel Naburi (PhD)[3]

[1]mumbe_mwangangi@yahoo.com
[2]rsimiyu@mmust.ac.kem
[3]namenya08@gmail.com

[1]Graduate Student, [2,3]Lecturer, [2]Department of Peace and Conflict Studies, [1,3]Department of Disaster Management and Sustainable Development, [1,2,3]Masinde Muliro University of Science and Technology, Kenya, P.O. Box 190-50100, Kakamega, Kenya

ABSTRACT

Households residing in informal settlements are often hampered by urban-induced vulnerabilities. Despite more than fifty percent of urban residents in Kisumu County residing in informal settlements, it is unclear to what extent urban vulnerabilities affect these households. To address this problem, the study examined the types of urban vulnerabilities in Kisumu County Informal Settlements. The study utilized a descriptive research design. A multistage random sampling technique was used to select a representative sample of 396 household heads. The data was collected using structured questionnaires, key informant interviews observation guides, and document reviews. Quantitative was analyzed by employing statistical techniques including descriptive statistics while qualitative data was transcribed, coded, and analyzed thematically. The study revealed that there are significant environmental-induced vulnerabilities whereby 86(21.7%) of the residents often experienced water shortages. Further, 312(78.8%), 306 (77%), and 234 (59%) of the households were affected by inadequate sanitation facilities, flash floods water stagnation during rainy periods, and improper waste management respectively. The household heads ranked security concerns as the most significant social economic vulnerability affecting in the households. Further, low economic status and poor housing were acknowledged by 335(84.92%) and 248(63%) of the household heads respectively. The recommendations of the study include the development of an integrated urban development plan for the Kisumu County informal settlements which prioritizes infrastructure upgrades and mechanisms to address both environmental and socio-economic vulnerabilities.

Keywords: Education, Informal Settlements, Urban Vulnerabilities

I. INTRODUCTION

The spread of urbanization in Kenya has presented a complex interplay of challenges and opportunities, significantly influencing the well-being of its population (Ezeh et al., 2017). While urban growth development has created opportunities for improved housing, education, and technological advancements, the increased population has strained existing infrastructure and social services (Sakketa, 2013). The concept of urban vulnerability is rooted in the combination of climate risks with other stressors, including water scarcity and inadequate governance structures, even in the absence of climate change (Mansur et al., 2016). Further, urban areas are characterized by fragmentation concerning environmental and socio-spatial elements, contributing to distinct forms of residential vulnerability, thereby revealing disparities between informal settlements and non-informal settlement regions (Krellenberg et al., 2017).

In many developing countries, a substantial portion 30-50% of the urban population resides in informal settlements, amplifying exposure to urban-induced vulnerabilities (Farell K, 2017). Underlying drivers in these informal settlements, such as poverty, inadequate hazard-reducing infrastructure, limited state support during disasters, and the construction of poorly engineered houses on hazard-prone land, contribute to heightened vulnerabilities (Christopher, 2016). Understanding these dynamics is imperative for effective urban planning and risk mitigation strategies in rapidly urbanizing regions. It is estimated that 46.9% of Kisumu's population lives in slums (Othoo et al., 2020). Kisumu City can be divided into three broad areas: The Central Business District, Informal Settlement, and Peri-Urban areas. The growth of Kisumu has been attributed to factors such as natural growth, the annexation of rural areas located on the outskirts of the city, and migration. Informal settlement areas such as Nyalenda, Manyatta, and Obunga lack access to social services (Obange & Wagah, 2019).

II. LITERATURE REVIEW

Urban-induced vulnerabilities can be viewed from a contextual lens whereby as climate change impacts may trigger it, it is a part of a broader process of social development and political and institutional change (Mansur et al., 2016). Households residing in informal settlements are disproportionately affected by climate change impacts because of their exposure to hazards by living in unsafe conditions, and lack of hazard-reducing infrastructure and adaptive capacity (Sterzel et al., 2020). While urban areas are not prone to disasters by nature, the socio-economic processes around urbanization increase disaster vulnerability (United Nations Environment Programme [UNEP], 2014). Urban-induced vulnerabilities are conceptualized as a function of interconnected dimensions which include environmental vulnerabilities such as flood hazards and air pollution, social demographic characteristics such as poor housing, low economic status, and insecurity which determine the adequate capacity for household adaptation and resilience within the urban space (Mansur et al, 2016).

Social economic vulnerabilities such as low income and unemployment affect households in residing in informal settlements (Ezeh et al., 2017: Farrell, 2017). These factors create instances of economic instability which affects access to basic needs. Further, Okello (2016) pointed out that inadequate housing is synonymous with informal settlements, which increases their vulnerabilities such as lack of water and sanitation. Households within informal settlements are affected by insecurity affecting their mobility which is facilitated by limited police presence and illicit activities (Lebas, 2013). Environmental vulnerabilities such as floods are caused by a lack of resilient infrastructure and geographic vulnerability (Simiyu et al., 2019; Kamau et al., 2021). Further, water shortages are commonly experienced in informal settlements which have effects on health and sanitation(Simiyu et al. 2019:Ezeh et al., 2019). Inadequate sanitation and lack of proper waste management in informal settlements contribute to the spread of diseases, pollution, and overall environmental degradation. While these studies indicate the prevalence of urban vulnerabilities in informal settlements, there are gaps in how these vulnerabilities uniquely impact Kisumu County's informal settlements.

III. METHODOLOGY

2.1 The Study Area

Kisumu county in Kenya which lies between Latitude: 0° 14' 60.00" N and Longitude: 34° 54' 59.99" E. Within its boundaries, numerous informal settlements, including Obunga, Manyatta, and Nyalenda, house a collective population of approximately 461,000 individuals, reflecting a high population density of 6,886 per square kilometer (Simiyu et al., 2019). Further, these settlements are affected by substandard living conditions, with 75% of dwellings classified as temporary or semi-permanent structures (Obange & Wagah, 2019). The Kisumu County Integrated County Development Plan (2023-2027) identifies challenges faced by residents of informal settlements such as inadequate and unstable income, payment of high prices for commodities, inadequate infrastructure, and few or no savings and health burdens from the undernutrition and use of poor quality food, fuel and water. These challenges underscore the prevalence of urban vulnerability and its adverse on the livelihoods of Kisumu County informal settlements.

2.2 Research Design

The study adopted a descriptive research design combined with both qualitative and quantitative methods. According to Serem et al., (2013), survey studies are used to obtain information about existing phenomena. Therefore, this design was found useful in gathering, summarizing, presenting, and interpreting data from Kisumu County Informal Settlements.

2.3 Sampling Methods

A three-level multi-stage sampling method was used. First, two sub-counties in Kisumu County with urban informal settlements were selected by purposive sampling, covering 50% of the sub-counties. These settlements are in Kisumu East and Kisumu Central Sub counties. At the second level, at least 10% of the locations within these sub-counties that have informal settlements were selected by purposive sampling. This resulted in the selection of Kolwa East and Kondele locations. At the third level, 10% of the sub-locations within these locations that have informal settlements were selected by purposive sampling. This resulted in the selection of Manyatta A, Manyatta B, Nyalenda A, and Nyalenda B. This approach is consistent with Mugenda and Mugenda (2003), who suggest that a sample size of 10-50% is acceptable. The number of households in each sub-location was obtained from the Kenya National Bureau of Statistics (KNBS) 2019 National Census report. Proportionate sampling was used to allocate the samples in each

sub-location based on their population sizes. A simple random technique was used to select the household heads who participated in the data collection process. A sample size of 396 was obtained using Yamane (1967) formula for small populations.

Table 1

Calculated study proportionate sample size distribution

Sub County	Location	Sub-location	HH per KNBS	Proportionate Sample Size
Kisumu Central	Kondele	Manyatta A	13,862	124
		Nyalenda B	10,443	94
Kisumu East	Kolwa West	Nyalenda A	9,392	85
		Manyatta B	10,375	93
Total	2	4	44,072	396

2.4 Data collection

The study employed a mixed-methods approach to collect quantitative and qualitative data from various sources. The main instrument for quantitative data collection was a questionnaire with semi-structured, open-ended, and closed-ended questions. Different questionnaires were administered to household heads, headteachers, county government officers, and NGO representatives who were selected as key informants. The primary data was gathered from March to June 2022, while the secondary data was retrieved from existing documents within the same timeframe. A pilot study was conducted in Obunga sub-location with 39 households (10% of the calculated sample size of 396) to validate the data collection tools.

2.5 Data Analysis

In this study, qualitative and quantitative approaches were used to provide quantifiable results that established urban-induced vulnerabilities and access to education. SPSS was utilized to analyze quantitative data. The data was summarized and presented in tables, charts, graphs, and figures. Qualitative data were analyzed according to the themes to address various objectives of the study and triangulate the quantitative data. Frequency distribution was used to organize categorical variables for quantitative data and further calculated using central tendency and variation measures.

IV. FINDINGS AND DISCUSSION

3.1 Households Socio-demographic Characteristics

The household questionnaires were administered to 396 households within four informal settlements in Kisumu County informal settlements. The study sought to reveal the background information of the household heads including their gender, age, education level, occupation, and household income.

Table 2

Households Socio-Demographic Characteristics

Characteristics	Categories	Frequencies (N=394)	Percent
Household Gender	Male	298	75.13
	Female	98	24.87
Household Head Age Group	Below 18 years	4	1.02
	18 – 30 years	175	44.16
	30 – 60 years	206	52.03
	Above 60 years	11	2.7
Household Size	Less or equal to 4	157	39.64
	Between 5 to 9	222	56.06
	More than 9	15	4.3
Household Head Education Level	None	15	4
	Primary	62	15
	Secondary	233	58
	Tertiary	94	23
Household Average Monthly Income	>3000	72	18.27
	3000-10000	170	43.91
	10001-20000	70	17.77
	20001-30000	27	6.85
	<30000		

A descriptive analysis of the study respondents' demographics indicate that 396 households were targeted, of which 298 (75.13%) had male heads and 98 (24.87%) had female heads. The household heads' mean age was 34.6 years, with a standard deviation of 9.8 years. The number of household members ranged from 1 to 15, with 157 (39.84%) households having less than or equal to 4 members, 222 (56.34%) having between 5 and 9 members, and 15 (3.8%) having more than 10 members. The household heads' education level varied from no formal education 15 (4%), to tertiary education 94(23%), with the majority having secondary education 233 (58%) and a minority having primary education (15%, 62). The level of household income per month ranged from less than Ksh. 3,000 72(18.27%) to above Ksh. 30,000 52(13.2%), with the majority earning between Ksh. 3,000 and Ksh. 10,000 170(43.91%), and a minority earning between Ksh. 10,000 and Ksh. 20,000 70(17.77%) or between Ksh. 20,000 and Ksh. 30,000 27(6.85%).

3.2 Types of Urban Vulnerabilities affecting Households in Informal Settlements of Kisumu County

This section reports and analyzes the results of the study on the different types of urban-induced vulnerabilities affecting access to education in Kisumu County Informal Settlements. The section aims to determine the extent to which the study area is exposed to environmental and socio-economic vulnerabilities that affect access to education among households in the informal settlements. The findings are presented and discussed according to the following sub-sections.

3.2.1 Environmental Vulnerabilities affecting Households in Kisumu County Informal Settlements

The research employed a Likert-scale questionnaire to elicit the perceptions of the household respondents regarding various aspects of environmental vulnerabilities that affected the study area (N=396). Table 3 presents the descriptive statistics obtained from the data analysis on the types of environmental vulnerabilities that influenced educational outcomes in the study area. The respondents were asked to rate their agreement with each statement on a scale of 1 to 5, where 1=Always, 2=Often, 3=Sometimes, 4=Occasionally and 5=Never.

Table 3

Household Head Responses on Environmental Vulnerabilities affecting households in Informal Settlements of Kisumu County

Statement	1	2	3	4	5	Rank
This area experiences water shortages	86	134	115	61	0	5
This area does not have adequate sanitation facilities	312	60	24	0	0	1
This area experiences flash floods and water stagnation during rainy seasons	306	72	18	0	0	2
Waste in this area is not properly managed	234	62	0	0	0	3

The results presented in Table 3 demonstrate the prevalence of water scarcity in the area under investigation. Out of 396 respondents, 86 (21.7%) reported to have always faced water shortages, 134 (33.8%) said revealed that they faced this issue frequently, 115 (34%) reported that they faced it sometimes, and 61 (15%) reported that they faced it rarely. In terms of access to adequate sanitation facilities, the results showed that the majority of the respondents, 312(78.8%) always faced problems with the sanitation facilities, while 60 (15.2%) often faced problems, and 24(6%) sometimes faced problems. Further, 306(77%) reported experiencing flash floods and water stagnation on a regular basis during the rainy seasons. In regards to waste collection, 62 (21%) and 234 (79%) of the respondents reported that waste collection services in their residential area were sporadic and infrequent, respectively. Cross-tabulation results of socio-demographic characteristics and environmental vulnerabilities revealed that sanitation was evenly distributed among female and male-headed households. Additionally, challenges around the management of waste in the study area were more cited by household heads with secondary and tertiary education. Further, inadequate sanitation was reported more by households with a monthly income lower than 10,000 Kenya Shillings, pointing out that urban vulnerabilities decrease as monthly income increases.

3.2.1.1 Water Shortage in Kisumu County Informal Settlements

Key informant interviews revealed that the study area experienced water shortages. An NGO representative added that:

> "Here (referring to Manyatta A informal settlement), the average distance to the nearest water source is far, and the households spend more than 30 minutes per day fetching water.

> Moreover, these water sources are often contaminated with fecal matter, chemicals, and pathogens, leading to frequent outbreaks of diarrhea, typhoid, cholera, and other water-related illnesses." (Field Data, 2022)

Secondary data point out that water shortages affect children who have to spend a lot of time and energy collecting water for their families may miss school or be too tired to learn. Additionally, households who do not have access to safe water may suffer from waterborne diseases, such as diarrhea, cholera, or typhoid, which can impair their health and livelihoods(Unger, 2013).

3.2.1.2 Inadequate Sanitation in Kisumu County Informal Settlements

The researcher observed that few households had access to a toilet within their premises, while most had to share communal toilets or practice open defecation. Key informant interviews showed that the communal toilets were often dirty, overcrowded, and poorly maintained, exposing the children to infections and parasites. The lack of proper waste disposal also created a foul smell and attracted flies and rodents, which further spread diseases. A head teacher added that:

> "Children in informal settlements lack access to soap, clean water, and sanitary pads, making it difficult for them to practice good hygiene and personal care. These factors contribute to poor health outcomes and low self-esteem among the children, affecting their attendance and performance at school." (Field Data, 2022)

The findings corroborate a study by Kwiringira et al. (2014) that examined the sanitation situation and hygiene practices among households in two slums in Kampala, Uganda. The study found that most children lacked access to safe and convenient sanitation facilities, and resorted to open defecation or using shared latrines that were often dirty, overcrowded, and insecure.

3.2.1.3 Flash Floods in Kisumu County Informal Settlements

The researcher also found that the study area was prone to flash floods due to its low-lying topography, poor drainage system, and high rainfall intensity. The flash floods in Kisumu County informal settlements caused damage to houses, roads, bridges, and other infrastructure and increased the risk of water contamination, vector-borne diseases, and injuries among children(Othoo et al., 2020: Ahenda et al., 2018). Furthermore, the floods often affected the livelihoods of household members such as children whereby floods forced the schools to close temporarily or permanently due to damage or lack of resources resulting in frequent interruptions and discontinuation of education for many children in the study area. Further, floods also cause households to lose their sources of livelihood, affecting the access to education in these households (Obange & Wagah, 2019).

3.2.1.4 Poor Waste Management in Kisumu County Informal Settlements

The researcher observed that some residents of informal settlements including children were engaged in waste picking as a source of income or survival for themselves or their families. The waste picking involved collecting plastics and other materials from dumpsites, landfills, or streets, and selling them to recyclers or middlemen. The waste picking exposed the children to health hazards such as cuts, infections, toxic substances, and violence. Moreover, the waste picking consumed a lot of the children's time and energy, preventing them from attending school regularly or completing their assignments. During the key informant interviews, head teachers reported that some learners stayed home to look for money to cover minor school expenses and one of the sources of money was selling recyclable waste. Further, one of the head teachers stated:

> "The challenges faced by the learners in this region are pervasive and affect all aspects of their lives, including their educational attainment. Even within the school setting, many learners are compelled to forego their classes in order to engage in income-generating activities, such as casual labor or waste collection." (Field Data, 2022)

The findings corroborated with secondary data which pointed out that households residing in informal settlements are exposed to multiple health risks (Satterthwaite et al., 2020; Oketch & Ngware, 2012). The improper disposal of waste creates a favorable environment for the breeding of vectors such as mosquitos, rats, and flies, which can transmit diseases such as malaria, leptospirosis, and dengue fever. These diseases deplete the resources that could otherwise support other needs within the households (Okello, 2016).

3.2.2 Socio-Economic Vulnerabilities Affecting Households in Informal Settlements of Kisumu County

The study further examined the different forms of socio-economic vulnerabilities that affected the livelihoods of Kisumu County informal settlement residents. The respondents were presented with a series of statements and

asked to indicate their level of agreement on a Likert scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). Table 4 summarizes the statements and the corresponding responses. The results are analyzed in Table 3.2.

Table 4

Household Responses on Socio-Economic Vulnerabilities in Urban Informal Settlement of Kisumu County

Statement	1	2	3	4	5	Rank
Majority of the houses in our area are in poor condition and are congested	248	100	48	0	0	3
There are security concerns in our community	352	44	0	0	0	1
Low economic status and unemployment	335	41	20	0	0	2

The data presented in Table 3.3 indicated that 352(88.8%) of the HH respondents ranked security as the highest socio-economic concern in their areas. 335 (84.92%) household heads strongly agreed with the statement of the presence of low economic status and unemployment in informal settlements. Additionally, 248 (63%) strongly agreed that the majority of the houses in the areas were in poor condition and congested. Additionally, a cross-tabulation between socio-demographic characteristics and socio-economic vulnerabilities revealed that 248 (83.22%) of male-headed households were concerned about poor housing and congestion compared to female-headed households. Further, more household heads with age ranges of 18-30 175(70%) and monthly income of below 10,000 shillings 155(63.89%) a month perceived that their houses were in poor condition while smaller households with less than four members reported poor housing conditions.218 (90%) households earning below 10,000 Kenya shillings strongly agreed with the presence of low income and unemployment in informal settlements.

3.2.2.1 Poor Housing Conditions in Kisumu County Informal Settlements

The researcher observed that most of the houses in the area were roofed with iron sheets but made of clay walls or corrugated iron sheets. However, the iron sheets were rusty, and the walls had dents some of which would allow an individual to see inside the house. The researcher also noted that at least 1 out of 3 houses was made of bricks but in a generally poor state from their outlook. During an interview, one of the NGO officials stated:

> "Many houses in this area are usually congested with people sharing minimal areas. As you can see when you take a walk around, you realize there is no space separating my structure and my neighbor's structures in some of the clustered houses. The houses are built to make long rows and are separated by narrow paths. Many families, even ones with more than seven people, live in one room." (Field Data, 2022)

The primary data corroborates with secondary data which indicates that the majority of the urban population in Kisumu lives in informal settlements that lack adequate housing and basic services (Obange & Wagah, 2019). Further, the report indicated that the housing stock in Kisumu is generally poor, with 60% of the dwellings having mud walls, 34% having iron sheet roofs and 63% having earth floors. Additionally, most of the houses have no natural lighting and poor ventilation. The residents also experience overcrowding with the average household size in Kisumu being 4.8 persons per room, which is higher than the national average of 3.4 persons per room (Simiyu et al., 2020).

3.2.2.2 Insecurity in Kisumu County Informal Settlements

The key informant interviews reported the presence of hot spots and times of the day when a crime is likely to take place. Additionally, it cited that most places in the informal settlements did not have lights but footpaths behind houses that were deserted and unkempt provided the opportunity for mugging, theft, and robbery, especially at night. Lebas (2013) observed that specific characteristics of hotspots in informal settlements included: a lack of police in the nearby vicinity, infrequent patrols, dark alleys, isolated areas, presence of many bars and illicit alcohol brewing dens, unfinished constructions, presence of idle youths hovering around, and presence of gambling places including pool and bases along the roads and bad roads which make motorists slow down.

The informal settlements tend to have higher crime rates during elections and cultural events such as disco matanga (Mulinge, 2018). A study conducted in Mathare informal settlements showed that the residents of informal settlements experienced cases of physical assault. The study also indicated the gendered effect of insecurity where women were victimized or harassed. During the interview with one government official, the presence of criminal groups within the informal settlements was cited. These criminal groups are associated with extortion, kidnappings, heckling political rallies, and kidnappings.

Reporting of crimes continues to be a challenge to informal settlements. During an interview, a government official stated:

> "Many people do not report to the police. It is a complex relationship whereby the community does not have confidence in the dispensation of justice by the Police Service Commission. Many of them would rather let the issue die down than report it to the police (Field Data, 2022)."

Specifically in Kisumu informal settlements, there has been resentment toward the local authorities. In these areas, a significant segment of youths is likely to resort to violence at the slightest provocation (Lebas, 2013). This has been attributed to the perceived political and historical marginalization. The police are viewed as an extension of the repressive state machinery.

3.2.2.3 Low Economic Status in Kisumu County Informal Settlements

In order to explore the underlying causes of the low economic status of the residents, the study also solicited the HH respondents' opinions on the main factors that contributed to such a state of affairs.

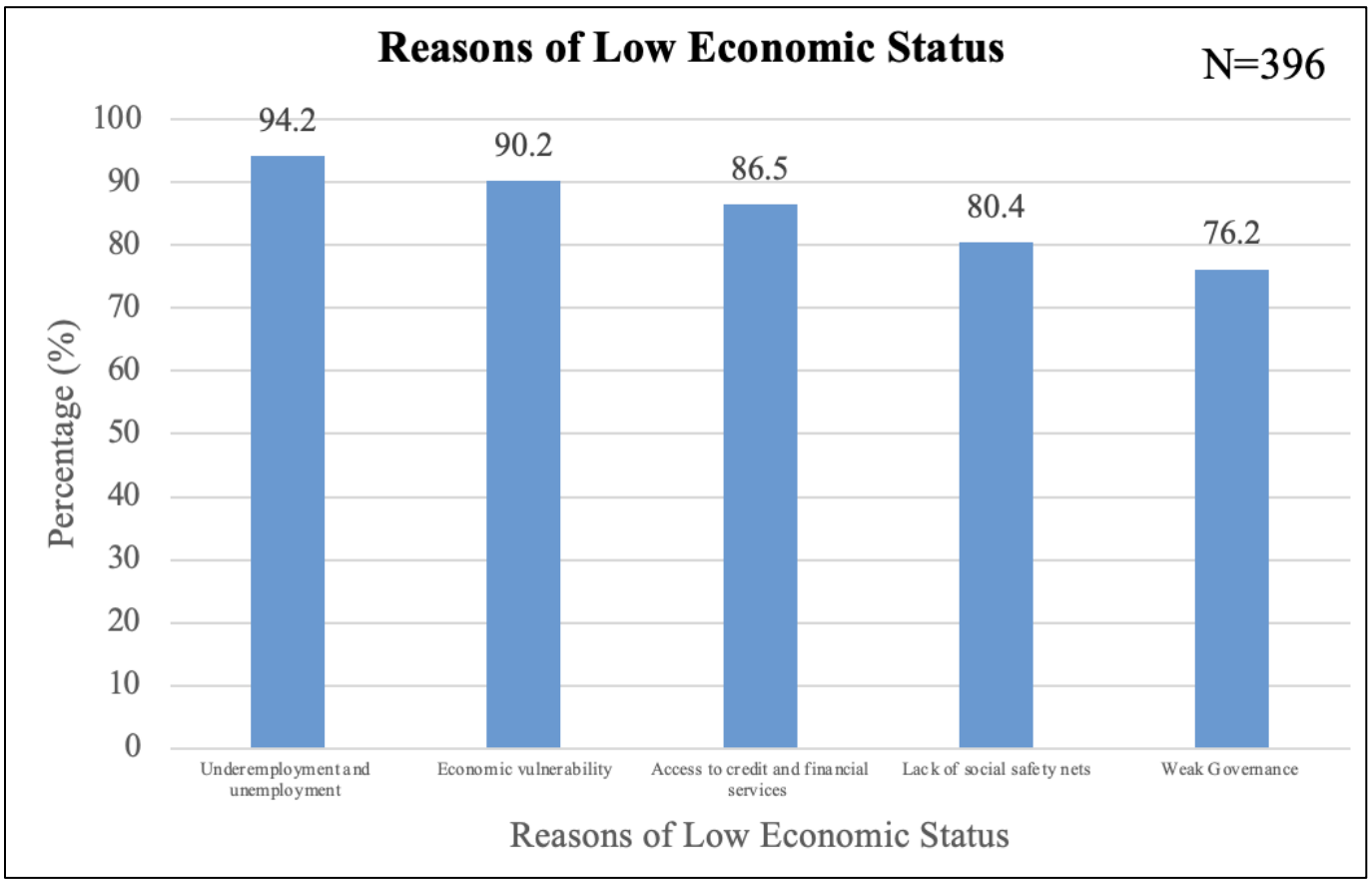

Figure 1

Reasons for Low Economic Status in Kisumu Informal Settlements

Figure 1 shows that underemployment and unemployment were cited by 371 (94.2%) followed by economic vulnerability 355(90.2%), access to credit and financial services 340(86.5%), lack of social safety nets 317(80.4%), and weak governance 300(76.2%) as the reasons for low economic status in informal settlements. An NGO representative respondent who cited underemployment and unemployment as the main factors for low economic status said:

> "There people living in informal settlements have no regular jobs. Sometimes they get some casual work, sometimes they don't. They mostly depend on the mercy of the employers who pay them very little." (Field Data, 2022)

The key informant interviews further pointed out that the informal settlement residents faced difficulties in meeting their basic needs due to factors such as high cost of living and the lack of savings or insurance. The nature of

living from hand to mouth worsens their livelihoods in instances of fire, a flood, or sickness. These findings corroborated secondary data from the World Bank (2021), which showed that 71.9% of the urban population in Kenya lived below the international poverty line of $1.90 per day in 2016, compared to 63.2% of the rural population.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The study investigated the types of urban vulnerabilities affecting households in informal settlements within Kisumu County. The study revealed that there are significant environmental-induced vulnerabilities including water shortages, inadequate sanitation facilities, flash floods, water stagnation during rainy periods, and improper waste management which negatively affects households residing in Kisumu informal settlements. Moreover, Security concerns were ranked highest by household heads as a significant socio-economic vulnerability in Kisumu County informal settlements. Other socio-economic vulnerabilities such as low economic status and poor housing were acknowledged as challenges affecting these households. The findings underscore the influence of socio-economic and environmental vulnerabilities on these informal settlements. The findings in the study recommend the need for comprehensive intervention that addresses both the environmental and socio-economic vulnerabilities affecting residents of Kisumu County informal settlements.

5.2 Recommendations

The recommendations of the study include the development of an integrated urban development plan for the Kisumu County informal settlements which prioritizes infrastructure upgrades and mechanisms to address both environmental and socio-economic vulnerabilities which is implemented by collaboration between local government, community stakeholders, and NGOs for sustainability. This can be complemented by community-led economic empowerment programs that focus on residents with skills needed for sustainable livelihoods.

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