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Assessment of Environmental and Health Risks of Urban Flooding

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ABSTRACT

The study assesses the environmental and health risks associated with urban flooding. Investigation revealed that communities where livelihoods depend on small-scale trading or agriculture, urban flooding often erodes the limited resources people have, pushing them further into poverty. The research design used in this report is descriptive design, utilizing questionnaire method to obtain information from the respondents for this project. A total of 100 (one hundred) respondents were selected for this study to represent the entire population of the study. Data was collected using the questionnaire and analyzed using the frequency distribution table to seek answers to the five (5) research questions. The data were presented on a frequency distribution table and analyzed using simple percentage, while two (2) hypotheses was tested using chi-square test. The findings reveal that urban flooding contributes to severe environmental degradation, including contamination of water sources, destruction of ecosystems, and waste accumulation. The health risks are equally alarming, with increased incidences of waterborne diseases, vector-borne infections, and mental health issues due to displacement and loss of property. Vulnerable populations, particularly those in low-income and densely populated areas, are disproportionately affected, amplifying social inequalities. The outcome of this research will inform public health strategies by identifying the health challenges exacerbated by flooding, such as waterborne diseases, and offering evidence-based recommendations to improve community resilience. It will also guide urban planners in designing effective drainage systems and flood management infrastructure to reduce the impact of flooding in urban areas.

Keywords: Environmental Risks, Health Risks, Urban Flooding, and Environmental Impact Assessment, etc.

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1. INTRODUCTION

Urban flooding has emerged as a critical environmental challenge in recent decades, driven by a combination of natural and anthropogenic factors. This phenomenon is particularly prominent in cities experiencing rapid urbanization and population growth, where infrastructure development often lags behind the needs of urban dwellers. Urban flooding refers to the inundation of land and infrastructure in urban areas due to excessive rainfall, poor drainage systems, and rising water levels.

In many urban centers, improper land use practices and insufficient waste management exacerbate the vulnerability to flooding. Paved surfaces in cities reduce soil permeability, increasing surface runoff during heavy rainfall. When combined with clogged or inadequate drainage systems, this runoff contributes to severe flooding incidents. According to United Nations studies, urban flooding has far-reaching consequences, impacting the environment, public health, and socioeconomic stability (UN-Habitat, 2020). Environmentally, urban flooding disrupts ecosystems by eroding soil, damaging vegetation, and contaminating water bodies with hazardous pollutants. Floodwaters often carry solid waste, industrial chemicals, and untreated sewage, leading to long-term environmental degradation.

Urban flooding has become a critical challenge in many cities around the globe, particularly in developing countries. This phenomenon, often driven by rapid urbanization and inadequate infrastructure, poses significant environmental and health risks to urban dwellers. Urban flooding occurs when natural drainage systems fail to accommodate the volume of stormwater, leading to water accumulation in residential, industrial, and public spaces. The increasing frequency and intensity of urban flooding are exacerbated by climate change, poor land use planning, and ineffective waste management practices (Hinkel et al., 2018). The environmental consequences of urban flooding are vast and multifaceted. Floodwaters often carry pollutants, sediments, and waste, resulting in the contamination of water bodies and the degradation of aquatic ecosystems.

From a health perspective, urban flooding contributes to the proliferation of waterborne diseases such as cholera, typhoid, and dysentery. Stagnant water serves as breeding grounds for vectors like mosquitoes, increasing the risk of diseases such as malaria and dengue fever. In Nigeria, cities such as Lagos, Ibadan, and Port Harcourt have experienced recurring urban floods, highlighting the urgent need for comprehensive assessment and intervention strategies (Adeoye et al., 2015). The socioeconomic dimension of urban flooding is also significant, as it disrupts livelihoods, damages properties, and strains public resources. Vulnerable populations, particularly those in informal settlements, are disproportionately affected due to their limited access to essential services and disaster preparedness measures.

Urban flooding refers to the overflow of water in city areas, primarily due to heavy rainfall, inadequate drainage systems, or the alteration of natural watercourses. Unlike rural flooding, which often occurs in more expansive, less densely populated areas, urban flooding happens in areas where the concentration of people, infrastructure, and human activity is high. In cities, impermeable surfaces like concrete and asphalt prevent rainwater from being absorbed into the ground, which leads to runoff that overwhelms drainage systems.

Urban flooding is a growing concern in many parts of the world, particularly in developing countries where rapid urbanization outpaces the development of proper infrastructure (Smith, 2020). As cities expand and climate change leads to unpredictable weather patterns, the frequency and intensity of urban flooding are expected to rise. The consequences of such flooding are far-reaching, as they affect not only the physical environment but also the social, economic, and health conditions of urban populations.

In essence, urban flooding is a multi-dimensional issue that goes beyond just water accumulation; it encompasses the challenges of managing urban spaces in ways that can withstand and adapt to these environmental stressors. The concept involves both immediate impacts, such as property damage and loss of life, and long-term effects, including disruptions to public health and the environment. As urban areas continue to face these challenges, there is a growing need for integrated flood management systems that include improved infrastructure, environmental policies, and community preparedness. The concept of urban flooding thus requires a comprehensive understanding of its causes, effects, and potential solutions to minimize risks and improve the resilience of cities to future flooding events (Brown & Williams, 2019).

The aim of this study is to assess the environmental and health risks associated with urban flooding. The objectives of the study are as follows:

To examine the environmental consequences of urban flooding, including soil erosion, water contamination, and ecosystem disruption.

To investigate the health risks associated with urban flooding, such as the prevalence of waterborne and vector-borne diseases.

To identify the key factors contributing to urban flooding, including urbanization, poor drainage infrastructure, and waste management challenges.

To evaluate the socioeconomic impacts of urban flooding on affected communities, including displacement and economic losses.

To recommend sustainable urban planning and flood management strategies to mitigate the effects of urban flooding.

In order to pursue the objective of this study, the following generalized statements have been designed to guide and aids in obtaining the result for the experiment to be conducted. For this work, the null hypothesis will be represented with H0 while the alternative hypothesis will be represented with hypothesis H1.

$H_0$1: Urban flooding significantly impacts environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity.

$H_0$2: Urban flooding has a direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases.

$H_0$3: Poor urban planning, inadequate drainage systems, and climate change are significant factors contributing to urban flooding.

2. RESEARCH METHODOLOGY

The variables were analyzed by means of percentages and simple table method. This technique permits inferences about observation and are useful for testing the research propositions for generalization the propositions were tested by descriptive statistical terms, and detailed percentage was adopted for clear interpretation and presentation.

2.1. Population of Study

Population of a study is a group of persons or aggregate items, things the researcher is interested in getting information to assess the environmental and health risks of urban flooding. A total of four hundred (400) respondents formed the population of the study.

Sample is the set people or items which constitute part of a given population sampling. Due to large size of the target population, the researcher used the Taro Yamani formula to arrive at the sample population of the study.

$$n = \frac{N}{1+N(e)^2}$$

n: describes the sample size.
N: describes total number of populations of the area.
e: describes maximum variability or margin of error = 0.05.
1: describes the probability of the event occurring.

$$n = \frac{400}{1+400(0.05)^2}$$

$$n = \frac{400}{1+400(0.0025)}$$

n= 400 / (1+1) = 400 / 2 = 200.

2.2 Method of Data Collection

Data were collected from two main sources, namely:

Primary source and Secondary source

Primary source: These are materials of statistical investigation which were collected by the research for a particular purpose. They can be obtained through a survey, observation, questionnaire, or as experiment; the researcher has adopted the questionnaire method for this study.

Secondary source: These are data from textbook Journal handset etc. they arise as byproducts of the same other purposes. Example administration, various other unpublished works, and write ups were also used.

2.3. Method of Data Analysis

Concerning the method of analysis, summary statistics was used to answer the research questions, while Chi-Square (χ^2) test of independence and Pearson product moment correlation coefficient as well as t-test for significance (r) were used to verify the claims of the null hypotheses. All tests were carried out at 0.05 level of significance, the probability level at which we were willing to risk type I error.

The data collected was not an end in itself but it served as a means to an end. The end being the use of the required data to understand the various situations it is with a view to making valuable recommendations and contributions. To this end, the data collected has to be analyzed for any meaningful interpretation to come out with some results. It is for this reason that the following methods were adopted in the research project for the analysis of the data collected.

For a comprehensive analysis of data collected, emphasis was laid on the use of absolute number frequencies of responses and percentages. Answers to the research questions were provided through the comparison of the percentage of workers' responses to each statement in the questionnaire related to any specified question being considered.

Frequency in this study refers to the arrangement of responses in order of magnitude or occurrence, while percentage refers to the arrangements of the responses in order of their proportion. The simple percentage method is believed to be straight forward easy to interpret, and understand method. The researcher, therefore chooses the simple percentage as the method to use.

The formula for percentage is shown as:

% = f/N x 100/1

Where f = frequency of respondent’s response

N = Total number of responses of the sample, 100 = Consistency in the percentage of respondents for each item contained in questions.

2.4. Statistical Analysis

Demographic study of the assessment of environmental and health risks of urban flooding was described using descriptive statistics, including percentages and frequencies. All analysis was conducted using SPSS version 11 software.

3. DATA ANALYSIS, RESULT AND DISCUSSION

This presentation is based on the responses from the completed questionnaires. The result of this exercise is summarized in a tabular form for easy references and analysis. It also shows answers to questions relating to the research questions. Simple percentage in the analysis was employed.

3.1. Presentation and Analysis of Data

The data collected from the respondents were analyzed in tabular form with simple percentage for easy understanding.

A total of 200 (two hundred) questionnaires were distributed, and 200 questionnaires were returned.

3.2. The Socio-demographic Characteristics of the Respondents

This section deals with the description of the characteristics of all the respondents (200) involved in the study by randomly selection of respondents from the study area. The characteristics of respondents include age, gender, and educational state.

Table 1. Demographic Profile of Respondents.

Demographic Variables	Categories	Frequency	Percentage (%)	Cumulative Percentage (%)
Gender	Male	110	55.0	55.0
	Female	90	45.0	100.0
Age (Years)	18 – 25	40	20.0	20.0
	26 – 35	70	35.0	55.0
	36 – 45	55	27.5	82.5
	46 and above	35	17.5	100.0
Marital Status	Single	80	40.0	40.0
	Married	105	52.5	92.5
	Divorced/Widowed	15	7.5	100.0
Educational Level	Primary Education	20	10.0	10.0
	Secondary Education	60	30.0	40.0
	Tertiary Education	95	47.5	87.5
	Postgraduate	25	12.5	100.0
Occupation	Civil Servant	60	30.0	30.0
	Trader/Businessperson	50	25.0	55.0
	Student	40	20.0	75.0
	Artisan/Technician	30	15.0	90.0
	Unemployed	20	10.0	100.0
Years of Residence	Below 5 Years	35	17.5	17.5
	5 – 10 Years	80	40.0	57.5
	Above 10 Years	85	42.5	100.0

The demographic profile reveals that out of 200 respondents, males constitute a slight majority (55%) compared to females (45%). Most respondents (35%) fall within the 26–35 years age bracket, indicating a youthful and economically active population. In terms of marital status, 52.5% are married, while 40% are single, reflecting a balanced adult demographic. The educational distribution shows that nearly half of the respondents (47.5%) possess tertiary education, suggesting a fairly literate population capable of understanding environmental and health-related issues. Regarding occupation, civil servants (30%) and businesspersons (25%) dominate, followed by students (20%) and artisans (15%), while 10% are unemployed.

Furthermore, 42.5% of respondents have resided in the area for over 10 years, implying substantial community experience with urban flooding occurrences. This demographic distribution provides a reliable foundation for analyzing public awareness, perceptions, and adaptive responses to environmental and health risks associated with urban flooding.

3.2. Re-statement of Research Questions

RQ1: What are the primary environmental consequences of urban flooding, including its effects on soil erosion, water quality, and local ecosystems?

Environmental Consequences	Categories / Indicators	Frequency	Percentage (%)	Cumulative Percentage (%)
Soil Erosion	Severe erosion and loss of topsoil	80	40.0	40.0
	Moderate erosion in affected areas	75	37.5	77.5
	Minimal or no erosion	45	22.5	100.0
Water Quality Degradation	High contamination (pollution from sewage/waste)	95	47.5	47.5
	Moderate contamination	70	35.0	82.5
	Low or no contamination	35	17.5	100.0
Impact on Local Ecosystems	Severe disruption of aquatic/terrestrial life	85	42.5	42.5
	Moderate ecosystem disturbance	80	40.0	82.5
	Little or no effect on ecosystems	35	17.5	100.0
Waste Accumulation and Pollution	High level of waste deposition after flooding	100	50.0	50.0
	Moderate waste accumulation	65	32.5	82.5
	Minimal waste accumulation	35	17.5	100.0
Vegetation and Land Degradation	Significant destruction of vegetation cover	90	45.0	45.0
	Partial destruction of vegetation	75	37.5	82.5
	No significant vegetation loss	35	17.5	100.0

Findings from the 200 respondents indicate that urban flooding has considerable environmental impacts across several domains. A significant portion (40%) of respondents reported severe soil erosion leading to the loss of fertile topsoil, while 37.5% observed moderate erosion. In terms of water quality, 47.5% indicated high contamination levels, mainly from sewage, oil spills, and waste runoff. Ecosystem disruption was also prominent, with 42.5% of participants reporting severe disturbances to aquatic and terrestrial habitats.

Additionally, half of the respondents (50%) identified high levels of waste accumulation and pollution post-flooding, which exacerbates urban environmental degradation. Lastly, vegetation loss was highlighted by 45% of respondents as a major effect, contributing to further land degradation and loss of biodiversity. Overall, the results underscore that urban flooding poses a substantial threat to soil stability, water quality, and ecological balance in urban environments.

RQ2: How does urban flooding impact public health, particularly in relation to the spread of waterborne and vector-borne diseases?

Public Health Impact Areas	Categories / Indicators	Frequency	Percentage (%)	Cumulative Percentage (%)
Waterborne Diseases	High increase in cholera, typhoid, and diarrhea cases	90	45.0	45.0
	Moderate increase in reported cases	75	37.5	82.5
	Minimal or no increase	35	17.5	100.0
Vector-borne Diseases (e.g., Malaria, Dengue)	High mosquito breeding and disease spread	100	50.0	50.0
	Moderate increase in vector activity	70	35.0	85.0
	Low or no vector-related impact	30	15.0	100.0
Contamination of Drinking Water	High contamination due to sewage and waste infiltration	95	47.5	47.5
	Moderate contamination	65	32.5	80.0
	Low or no contamination	40	20.0	100.0
Respiratory and Skin Infections	High prevalence of infections after flooding	80	40.0	40.0
	Moderate prevalence	75	37.5	77.5
	Minimal or no prevalence	45	22.5	100.0
Psychological and Mental Health Effects	High stress, trauma, and anxiety levels among residents	85	42.5	42.5
	Moderate psychological impact	70	35.0	77.5
	Minimal or no impact	45	22.5	100.0

The survey findings reveal that urban flooding significantly affects public health in various ways. Nearly half of the respondents (45%) observed a high rise in waterborne diseases such as cholera, typhoid, and diarrhea following flooding events, while 37.5% reported moderate increases. Similarly, 50% indicated a sharp rise in vector-borne diseases, particularly malaria and dengue, due to stagnant water serving as mosquito breeding sites.

About 47.5% highlighted severe contamination of drinking water sources from sewage and waste infiltration, heightening the risk of infection. Furthermore, 40% of respondents noted a high prevalence of respiratory and skin infections, often resulting from contact with polluted floodwater. In addition, 42.5% reported psychological effects such as stress and trauma caused by property loss and displacement. Collectively, the data underscore that urban flooding not only degrades environmental quality but also poses critical health risks, amplifying disease outbreaks and undermining community well-being.

RQ3: What are the key factors contributing to the occurrence and severity of urban flooding in affected areas?

Contributing Factors	Categories / Indicators	Frequency	Percentage (%)	Cumulative Percentage (%)
Poor Drainage System	Major cause of flooding	95	47.5	47.5
	Moderate contribution	70	35.0	82.5
	Minor or no contribution	35	17.5	100.0
Blocked Water Channels / Improper Waste Disposal	Major cause of flooding	100	50.0	50.0
	Moderate contribution	65	32.5	82.5
	Minor or no contribution	35	17.5	100.0
Unplanned Urbanization and Building on Floodplains	Major cause of flooding	90	45.0	45.0
	Moderate contribution	75	37.5	82.5
	Minor or no contribution	35	17.5	100.0
Inadequate Urban Planning and Infrastructure	Major cause of flooding	85	42.5	42.5
	Moderate contribution	80	40.0	82.5
	Minor or no contribution	35	17.5	100.0
Heavy Rainfall and Climate Change Effects	Major cause of flooding	105	52.5	52.5
	Moderate contribution	60	30.0	82.5
	Minor or no contribution	35	17.5	100.0

Insufficient Government Regulation and Response	Major cause of flooding	80	40.0	40.0
	Moderate contribution	85	42.5	82.5
	Minor or no contribution	35	17.5	100.0

The results from the 200 respondents reveal that urban flooding is primarily driven by both natural and human-induced factors. The leading contributors identified include heavy rainfall and climate change (52.5%) and blocked water channels caused by poor waste management (50%). A significant number (47.5%) attributed flooding to poor drainage systems, while 45% pointed to unplanned urbanization and construction on floodplains as critical issues. Additionally, 42.5% emphasized inadequate urban infrastructure as a major factor that worsens flood severity, while 40% linked the problem to inefficient government regulation and response mechanisms. Overall, the findings suggest that the severity of urban flooding arises from a combination of environmental pressures, infrastructural inadequacies, and weak policy enforcement, highlighting the need for integrated urban planning, effective waste management, and proactive climate adaptation measures.

RQ4: What are the socioeconomic impacts of urban flooding on communities, including displacement and financial losses?

Socioeconomic Impact Areas	Categories / Indicators	Frequency	Percentage (%)	Cumulative Percentage (%)
Displacement of Residents	High level of displacement and loss of homes	85	42.5	42.5
	Moderate displacement	75	37.5	80.0
	Minimal or no displacement	40	20.0	100.0
Damage to Property and Infrastructure	Severe property and infrastructure destruction	100	50.0	50.0
	Moderate damage	70	35.0	85.0
	Minor or no damage	30	15.0	100.0
Loss of Livelihood and Income	Significant loss of jobs and business opportunities	90	45.0	45.0
	Moderate income disruption	75	37.5	82.5
	Little or no income impact	35	17.5	100.0
Increased Cost of Living and Repairs	High cost of living and rebuilding expenses	95	47.5	47.5
	Moderate increase in expenses	70	35.0	82.5
	Little or no change in cost	35	17.5	100.0
Interruption of social and economic activities	High disruption to transportation, education, and business	90	45.0	45.0
	Moderate disruption	80	40.0	85.0
	Minimal or no disruption	30	15.0	100.0

Community Relocation and Rehabilitation Cost	High financial burden on affected households and government	85	42.5	42.5
	Moderate rehabilitation cost	80	40.0	82.5
	Low or no financial burden	35	17.5	100.0

The responses from 200 participants reveal that urban flooding imposes severe socioeconomic challenges on affected communities. Nearly half of the respondents (50%) reported serious damage to properties and public infrastructure, while 47.5% emphasized the increased cost of living and repairs following flood events. About 45% identified loss of livelihood and income, as businesses and daily activities were disrupted, while another 45% highlighted major interruptions in social and economic activities such as schooling, transportation, and trade. Furthermore, 42.5% observed high displacement rates, with many families forced to relocate temporarily or permanently. An equal proportion (42.5%) noted that rehabilitation and relocation costs place a substantial financial burden on both households and local authorities. Overall, the findings indicate that urban flooding extends beyond environmental damage; it deeply affects the socioeconomic stability of communities, increasing poverty risks, financial stress, and social dislocation.

RQ5: What sustainable urban planning and flood management strategies can be implemented to mitigate the effects of urban flooding?

Sustainable Strategies	Categories / Indicators	Frequency	Percentage (%)	Cumulative Percentage (%)
Improvement of Drainage Systems	Highly effective strategy	100	50.0	50.0
	Moderately effective strategy	70	35.0	85.0
	Least or not effective	30	15.0	100.0
Proper Waste Management and Channel Maintenance	Highly effective strategy	95	47.5	47.5
	Moderately effective strategy	75	37.5	85.0
	Least or not effective	30	15.0	100.0
Enforcement of Urban Planning and Building Regulations	Highly effective strategy	90	45.0	45.0
	Moderately effective strategy	80	40.0	85.0
	Least or not effective	30	15.0	100.0

Adoption of Green Infrastructure (e.g., Green Roofs, Permeable Pavements)	Highly effective strategy	85	42.5	42.5
	Moderately effective strategy	80	40.0	82.5
	Least or not effective	35	17.5	100.0
Early Warning Systems and Community Awareness	Highly effective strategy	90	45.0	45.0
	Moderately effective strategy	75	37.5	82.5
	Least or not effective	35	17.5	100.0
Reforestation and Wetland Restoration	Highly effective strategy	80	40.0	40.0
	Moderately effective strategy	85	42.5	82.5
	Least or not effective	35	17.5	100.0

Findings from the 200 respondents reveal that effective flood mitigation depends largely on integrating sustainable planning and management approaches. Half of the participants (50%) identified improvement of drainage systems as the most effective strategy for reducing flood severity, while 47.5% emphasized the importance of proper waste management and regular channel maintenance to prevent blockages. About 45% considered enforcing urban planning and building regulations, such as restricting construction on floodplains, crucial to reducing vulnerability. In addition, 42.5% supported the adoption of green infrastructure, including green roofs, permeable pavements, and urban parks, as eco-friendly solutions for water absorption and runoff control. Moreover, 45% of respondents highlighted the role of early warning systems and community awareness programs in improving preparedness and response to flood events.

3.3. Test of Hypotheses

3.3.1. Hypothesis One

H0; Urban flooding do not significantly impacts environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity

H1; Urban flooding significantly impacts environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity

Table 2. Urban flooding do not significantly impacts environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity

Response	**Observed N**	**Expected N**	**Residual**
Agreed	56	50	6
strongly agreed	60	50	10
Disagreed	44	50	-6
Strongly disagreed	40	50	-10
Total	**200**		

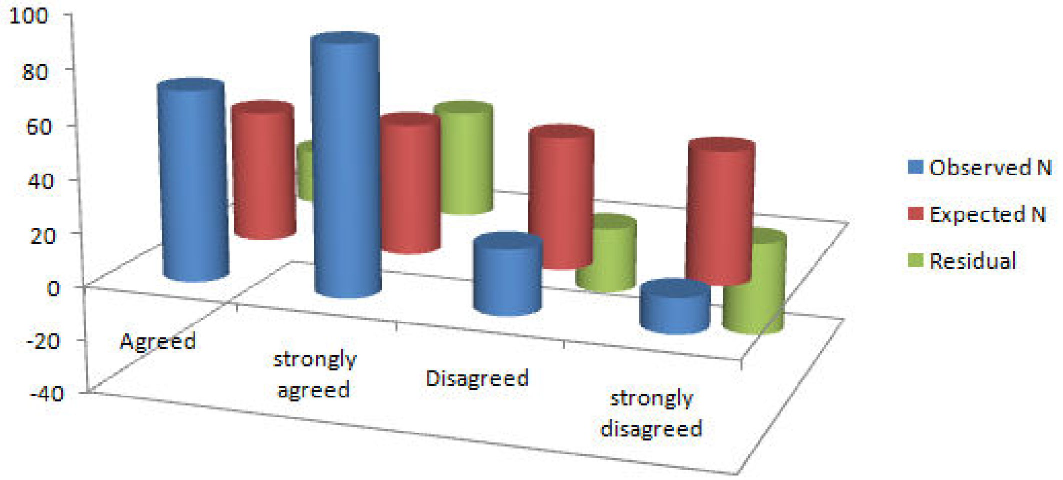

Figure 1. Urban flooding does not significantly impact environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity.

Table 3. Test Statistics.

	Urban flooding do not significantly impacts environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity
Chi-Square	19.331[a]
Df	3
Asymp. Sig.	.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 50. This accepts the null hypothesis, which states that urban flooding does not significantly impacts environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity, as the calculated value of 5.44 is lesser than the critical value of 7.82.

Therefore, the alternate hypothesis is rejected, which states that urban flooding significantly impacts environmental stability by contributing to soil degradation, water pollution, and the loss of biodiversity.

3.4. Hypothesis Two

H0; Urban flooding has no direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases.

H1; Urban flooding has a direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases.

Table 4. Urban flooding has no direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases

Response	**Observed N**	**Expected N**	**Residual**
Yes	96	66.6666667	29.33333333
No	64	66.6666667	-2.66666667
Undecided	40	66.6666667	-26.6666667
Total	200		

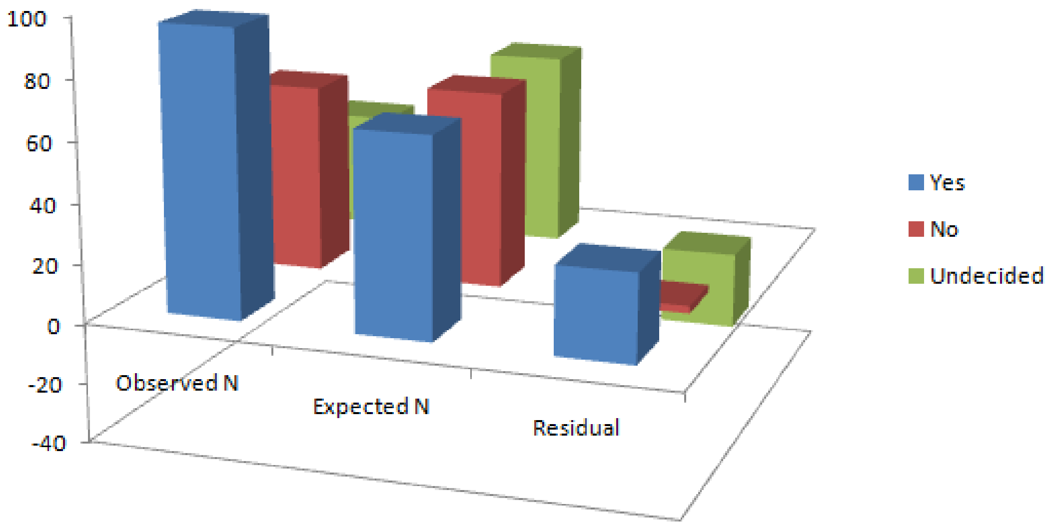

Figure 2. Urban flooding has no direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases.

Table 5. Test Statistics.

	Urban flooding has no direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases
Chi-Square	28.211[a]
Df	2
Asymp. Sig.	0.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 23.68. This rejects the null hypothesis, which states that urban flooding has no direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases, as the calculated value of 23.68 is greater than the critical value of 5.99.

Therefore, the alternate hypothesis is accepted, which states that urban flooding has a direct and measurable effect on public health, increasing the prevalence of waterborne and vector-borne diseases.

4. DISCUSSION OF FINDINGS

The findings of the study on the environmental and health risks associated with urban flooding provide significant insights into the extent to which flooding affects urban populations and ecosystems. From an environmental perspective, this study revealed that urban flooding exacerbates issues related to water contamination, air quality deterioration, and destruction of biodiversity. The increased volume of floodwaters often overwhelms the drainage systems, leading to the spread of contaminants such as untreated sewage, hazardous chemicals, and pollutants. This was particularly evident in cities with poorly maintained infrastructure, where urban floodwaters contributed to soil erosion and the contamination of water bodies, which negatively impacted ecosystems and local agriculture (Akinyemi et al., 2016). Furthermore, flooding leads to the destruction of green spaces and habitats, thereby reducing the overall biodiversity in flood-prone areas, as demonstrated by the case study in Lagos (Rojas et al., 2017).

Additionally, this study revealed the socioeconomic implications of urban flooding, particularly its impact on livelihoods and economic stability. In flood-prone areas, the loss of homes and businesses disrupts local economies and livelihoods, particularly in informal settlements where a significant portion of the population resides (Reinhard & Klijn, 2019). Many individuals in these communities depend on daily wages or small businesses that are often destroyed during flooding events, leading to a cycle of poverty that is difficult to break. This finding aligns with studies conducted in other urban centers, where floods have been shown to disproportionately affect low-income communities and individuals living in poorly planned and unregulated areas (Rojas et al., 2017). The role of sustainable urban planning, such as the incorporation of green infrastructure and floodplain management, was emphasized as a critical measure in reducing flood risks in the long term (Reinhard & Klijn, 2019).

5. CONCLUSION

Urban flooding presents a significant challenge with far-reaching environmental, health, and socioeconomic consequences. This study underscores the urgency of addressing the underlying causes of flooding, including poor urban planning, inadequate infrastructure, and the intensifying effects of climate change. The environmental degradation caused by flooding, such as water contamination and habitat destruction, highlights the need for sustainable urban management. The associated health risks, particularly the spread of waterborne diseases and mental health issues, further emphasize the critical need for proactive measures to protect vulnerable populations. A comprehensive approach that integrates effective urban planning, robust infrastructure development, public health initiatives, and climate adaptation strategies is essential. By prioritizing these measures, urban areas can reduce the risks of flooding and promote resilient and sustainable communities for the future.

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