Published by the University of KwaZulu-Natal

<https://journals.ukzn.ac.za/index.php/JICBE>

© Creative Commons With Attribution (CC-BY)

Journal of Inclusive cities and Built environment. Vol. 1 Issue 2

How to cite: Mohammed et al., 2021. Comparative Analysis Of Environmental Justice Among Urban Neighbourhoods. *Journal of Inclusive cities and Built environment*. Vol. 1 Issue 2, Pg 27-40

COMPARATIVE ANALYSIS OF ENVIRONMENTAL JUSTICE AMONG URBAN NEIGHBOURHOODS

By M. Mohammed, S.J.Dukku, Y.Y. Babanyara, I. Muhammad and J.K. Mohammed

Published 25th October 2021

ABSTRACT

This study investigated the level of environmental justice or otherwise in the provision of facilities in selected neighbourhoods of Minna. Qualitative and quantitative data were acquired through physical surveys of facilities of salient features while a checklist was used to guide the research using the Open Data Kit (ODK) tool. With purposive sampling technique, descriptive statistics, spatial data analysis and the Gini coefficient; it was shown that there is lack of justice in the provision of environmental facilities across space. It is worrisome to note that access roads recorded a high level of inequality (0.336 GC) – particularly as Bosso town with 40% of the residents has 20% of access roads, while, Tudun Wada South is having 22% of the road for just 7% of the population. The study, therefore, recommended equity and justice in the provision of facilities to help institute more sustainable development and management in Minna and similar cities.

KEY WORDS Amenities, Environmental Justice, Gini Coefficient, Infrastructure, Services

M. Mohammed - Department of Urban and Regional Planning Federal University of Technology, Minna, Niger State

E-mail: mohammedmaikudi@futminna.edu.ng

S.J.Dukku, Y.Y. Babanyara, I. Muhammad and J.K. Mohammed - Department of Urban and Regional Planning, ATBU, Bauchi, Nigeria

1. INTRODUCTION

The injustice of any nature can cause several problems in any society, especially in a heterogeneous society like Nigeria. Today, Nigeria is faced with various types of socio-economic crisis ranging from economic, social, environmental, religious and political debacles (Abu & Itebiye, 2015). The various tiers of government are struggling to cope with the pace of urbanisation with an ever-increasing demand for infrastructure services that include potable water supply and sanitation, roads, power supply, drainage, schools, and waste collection (Aliyu & Amadu, 2017). In all towns in Nigeria, the demand for services by far outstrips the capacity to supply, and infrastructure deficiencies severely constrained the productivity of investments in most cities in developing countries (Mabogunje, 2015). In many cities in Nigeria, the equitable provision and distribution of urban amenities are often constrained by a lack of adequate funding and technical expertise. However, even where there are attempts to address the situation, most often than not, areas dominated by the low-income earners are left out in the provision of urban amenities (Kawu & Owoyele, 2008). These displays of unequal distribution of urban amenities are in many cases the basis for rising social tension and violent destructions (Dalby, 2016). The urban authorities are often faced with insufficiencies of the resources even at times that little intervention could help arrest avoidable declines capable of worsening the already rising social tension to a full fledge and more consuming wider environmental injustice.

In Minna, the urban poor are isolated in the provision of basic facilities such as electricity supply, potable water provision, green space, and medical services (Mohammed, Jiman, Aliyu & Mohammed, 2019; Ajayi, Kemiki, Mohammed, Adama, & Ayoola, 2015). There is a seeming disparity in the level of attention paid to the distribution of urban amenities in the low-income areas because of perceived lower economic

gains. Hence, the poor environment now consists of locations for social vices such as social maladies, juvenile delinquencies and other societal ills (Abdullahi, 2018). The poor see their environment as what they need, but the policy maker (government especially) sees a poor environment as evil in the city (Tsaboula *et al.*, 2016) thereby creating urban polarisation and inequality.

Environmental justice is defined as “the fair treatment of all people in terms of the distribution of benefits and costs arising from planning projects, programs, and policies” (Oyewole & Komolafe, 2018). The United States Environmental Protection Agency defined environmental justice as: “the fair treatment and meaningful involvement of all people regardless of race, colour, national origin, or income concerning the development, implementation, and enforcement of environmental laws, regulations, and policies. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work” (Schlosberg, 2007). This ‘environmental justice as a series of disadvantage’ school of thought, however, has been challenged in recent literature (Mutz, Gary and Douglas, 2002; Baxter, 2005; Walker and Bulkeley, 2006).

Mutz et al. (2002) have identified the links between environmental justice and issues of deprivation, while Sze (2006) have explored the spatial dimensions of environmental justice. Sze (2006) noted that environmental injustice is identified in terms of fairness in the distribution of communal infrastructure and services; usually displayed by the just provision of and access to services on the one hand, and participation in the provision of communal services on the other (Zavestoski, Shulman & Schlosberg, 2006). Hafner (2018) reported that environmental justice focuses on addressing the stigmatisation, misrecognition and devaluing of society in comparison to others in the process of decision-making and development. As

Walker (2009) observed, misrecognition is one of the underlying factors determining the selection/choice of a particular location/community over others in the process of development. Following the constructions of Anguelovski and Martínez-Alier (2014), fair distribution of resources, facilities and services occupy the topmost position in the environmental justice argument. This is the aspect of environmental justice that suits this paper.

Environmental justice is a reflection of the promotion of equity and fairness for everyone (Mohammed *et al.*, 2019). Therefore, it has been defined by Khosravaninezhad and Akbari (2014) as the application of the doctrines of equity and fairness in the distributive process of planning policies, programmes and projects. Technically, the foremost argument of the environmental justice advocates is that the benefits and burdens of policies, programmes and projects should be equitably distributed across interest groups without bias. The denial of a decent environment is highly debilitating and creates socio-spatial disempowerment (Scandrett, 2010). Specifically, Kuehn (2000) that identified the synonymity and mutual inclusivity of the concepts of environmental justice and the earlier conception of distributive justice; as both concepts refer to the same situation. That is, the right to a fair share of infrastructure, equal treatment of persons and equitable distribution of opportunities and public goods without regard to race, religion, political affiliation or socio-economic class (Kuehn, 2000; Mohammed *et al.* 2019). In recognition of this, Klein (2007) suggested that environmental justice should be considered in every development project from the initiation to the completion stages, as well as in the operation and maintenance stages. This follows the argument by Scandrett (2010) that environmental justice focuses on both distributive and redistributive equity. Mohammed *et al.* (2019) also emphasized the [re]distributive equity dimension of the environmental justice debate. In the opinion of the United States Environmental Protection

Agency, environmental justice issues arise: "Residents must be a minority and/or low-income group; excluded from the environmental policy setting and/or decision-making process; subject to a disproportionate impact from one or more environmental hazards; and experience a disparate implementation of environmental regulations, requirements, practices and activities in their communities" (United States Environmental Protection Agency, 2000).

Originally, environmental justice was conceptualised as the racialisation of harm (Taylor, 2000; Shrader-Frechette, 2002; Bullard *et al.*, 2007; Nelson and Grubestic, 2018), and the transfer of harm to economically weaker groups (Boyd, 2012). The perception of environmental justice as a classist issue engendered early mobilisations for environmental justice against racism and classism. Hence, Scandrett (2010) addressed the issue of environmental justice from the perspective of oppression; which leads to the introduction of the concept of liberation theology into environmental justice analysis.

Studies are known to dwell on unequal distribution of environmental burdens (Colsa *et al.*, 2014), the inequitable distribution of environmental health and social outcomes (Downey and Hawkins 2008), air pollution and low socioeconomic status (Hajat *et al.*, 2015), racial discrepancies in environmental quality (Hughey *et al.*, (2016), environmental hazards and disadvantaged socioeconomic status (Smith, 2009). Others assessed neighbourhood education levels and pollution exposure race and income (Smith 2009; Bullard *et al.*, 2008), human and environment subsystems (Turner, 2010; Zahran *et al.*, 2008), environmental and social interconnectedness and environmental justice and governance (Chantrill, 2015). Little research has been carried out on infrastructural facilities and basic amenities in analysing environmental justice.

Although, Maantay (2002) and Sadd *et al.*, (2011) employed Geographic Information Systems (GIS) to map out and analyse environmental justice issues, less emphasis was made to capture infrastructural facilities and basic amenities in terms of their equitable distributions or not and particularly the consequences of such action. Empirically, environmental inequality research has focused heavily on exploring disproportionate burdens on low-income and minority groups by residential proximity and exposure to environmental hazards, and less on spatial inequalities of underexposure to "environmental amenities," such as parks and green spaces (Mohammed *et al.*, 2019). Some other authors focus on individual and social recognition as key elements of attaining justice (Middleton *et al.*, 2015), without attention to the inequalities in the distribution of infrastructure and facilities which resulted to polarisation in the urban space.

It is therefore imperative to fill the gap by attempting a comparative analysis of socio-economic correlates of the spatial distribution of environmental facilities among the six residential neighbourhood densities of Minna. With more emphasis on environmental justice problems relating to the provision, distribution, and management of urban infrastructure and facilities as a way of alleviating rising environmental justice problems in the study area.

2. MATERIALS AND METHODS

2.1 The study area

Minna, the administrative capital of Niger State and a famous railway town, has a population of about 371,570 people in 2019. Minna is referred to as the largest producer of yam which is a staple food for most Nigerians, and, is made up of two (2) Local Government Areas of Chanchaga and Bosso, and twenty-nine (29) neighbourhoods of different densities. Some of the neighbourhoods include Tudun-Fulani, Shango, Tunga, Tudunwada North, Tudunwada South (Figure 1 and 2). Three centrally located neighbourhoods, each from northern and southern parts of the town, were selected for the study (Table 1).

Table 1: Population and Locations of the Sample Neighbourhoods of Minna

S/ No.	Zone	Neighbourhood	2019 Population	% of Population
1	Northern Neighbourhoods	Bosso Town	69,455	40
		Bosso Low-cost	10,459	6
		Bosso Estate	15,969	9
2	Southern Neighbourhoods	Barikin Saleh	40,958	24
		Sauka Kahuta	24,190	14
		Tudun wada South	13,010	7
Total			174,041	100.00

Source: NIGIS, Minna (2019)

Figure 1: Location of Minna Local Government Areas in Niger State

Source: NIGIS Minna, 2019

Figure 2: Map of Minna Showing the Twenty-Nine Neighbourhoods

Source: NIGIS Minna, 2019

2.2 Data sampling and analysis

Qualitative and quantitative data were gathered through direct observation of the features under study. Amenities and infrastructures were accessed using geographical coordinates in the identification of their features and conditions. The checklist tool was converted to a digital tool using the open data kit tool (ODK) platform which is known to provide a reliable way of gathering data with adequate spatial reference (Owoyele, 2014). ODK platform relies on geographical coordinates of the location, image, and qualitative data using android device.

The sampling technique adopted for this study is the purposive sampling technique, based on the type of data for this study and in line with Adefila (2014). Hence, all infrastructure and amenities under any of the five categories selected for this study were sampled. The statistical tools employed for the study included descriptive statistical tool (tables, frequency, and percentage), spatial analysis (nearest neighbourhood analysis) and the Gini coefficient. The results are presented in Tables, Figures and maps for easy interpretation and understanding.

The environmental facilities considered for this study included infrastructures such as public-school facility, potable water supply and road networks. The amenities include public waste disposal facilities and playing ground. Gini Coefficient (GC) approach was employed for the analysis of the levels of inequality in environmental justice in the selected neighbourhoods. The GC for each of the infrastructure and amenities available in the selected neighbourhoods was also determined. Then an aggregating score was employed to determine the overall environmental justice level for the selected neighbourhoods. The Gini coefficient or Gini index is a statistical measure of distribution developed by an Italian statistician Corrado Gini in 1912. It is often used as a gauge of economic inequality, measuring income distribution. However, in recent term the method has been extended to the measurement of inequality of various public social and economic goods (Sanusi, 2006; Mohammed et al., 2018). The coefficient ranges from 0-1; where 0 represent perfect equality and 1 representing perfect inequality.

3. RESULTS

3.1 Level of environmental justice of public Infrastructures and amenities in Minna

Environmental justice level on public schools in the neighbourhoods shows that 6% of the populations which reside in Bosso lowcost do not have any public school, while 24% (Barkin Saleh) and 40% (Bosso Town) of the population had 1 number of public schools respectively. Bosso Estate (9%) and Sauka Kahuta (14%) of the population had 2 number of public schools each, while T/Wada South which had only 7% of the population had 3 number of public schools in the study area (Table 2). The estimated population of these six neighbourhoods was 174,041 people.

The environmental justice level of public boreholes distribution in the study area is presented in Table 21. The study revealed that 6% of the population (Bosso lowcost) had 2 number of public boreholes. Bosso Estate which had 9% of the population with 3 number of the public borehole, Bosso town had 40% of the population with 5 number of the public boreholes, while Barkin Saleh (24%) and Sauka Kahuta (14%) had 9 number of the public boreholes respectively. T/Wada South had 7% of the population, yet enjoy only 12 number of the public boreholes in the study area (Table 2).

Table 2: Level of Environmental Justice on Public Infrastructures in Minna

Zones	Neighbourhoods	Population	Infrastructures					
			Schools		Public Water Boreholes		Access Roads	
			Number	Ratio	Number	Ratio	Percentage	Ratio
North	Bosso Town	0.40	1	2.51	5	12.53	0.2	0.50
	Bosso Low-cost	0.06	1	4.25	9	38.24	0.13	0.55
	Bosso Estate	0.09	0	0.00	2	33.28	0.14	2.33
South	Barkin Saleh	0.24	2	14.39	9	64.75	0.21	1.51
	Sauka Kahuta	0.14	2	21.80	3	32.70	0.1	1.09
	Tudun Wada South	0.07	3	40.13	12	160.53	0.22	2.94
Total			9		40		1.00	

Source: Authors, 2020

The environmental justice in the distribution of access road as shown in (Figure 3) revealed that 9% of the population (Bosso Estate) had 10% of the access roads, 24% (Barkin Saleh) had 13% of the roads, 6% (Bosso lowcost) had 14% of the roads, while 40% (Bosso town) had 20% of the roads. Sauka Kahuta which had 14% of the population enjoy 21% of the roads, while T/Wada South enjoy 22% of the roads with 7% population (Table 2).

Figure 3: Distribution of public infrastructures in Neighbourhoods of Minna

Source: Authors, 2020

The Lorenz curve for the public schools is presented in Figure 4 where 0.543 GC was obtained. This implies that environmental injustice in the study area for public school is at 54%. This implies that the level of inequality in the distribution of public schools in the study area was high and evident in the number of schools enjoyed by T/Wada South against her population.

Figure 4: Lorenz curve for public schools in the study area

The Lorenz curve for the public boreholes is presented in Figure 5 where 0.410 GC was obtained. This implies that environmental injustice in the study area for public borehole is at 41%. This implies that the level of environmental injustice in the distribution of public borehole was high even though there was variation in the level of distribution across the neighbourhoods as presented in (Table 2).

Figure 5: Lorenz curve for public boreholes in the study area

The Lorenz curve for the access roads is presented in Figure 6 where 0.336 GC was obtained. This implies that the environmental injustice level in the distribution of access roads in the study area is at 34%. That is, there is less inequality in the distribution of access roads in the study area compared with public schools and public boreholes.

Figure 6: Lorenz curve for access roads in the study area

3.2 Level of environmental justice for public amenities in Minna

The study also appraised the environmental justice level of waste dumpsites in the study area and showed that Bosso Low-cost and Bosso Estate which had 6% and 9% of the population enjoy 1 and 2 number of waste dumpsites respectively. Barkin Saleh and Bosso town had 24% and 40% of the population, yet they only enjoy 4 and 5 number of waste dumpsites respectively. However, T/Wada south and Sauka Kahuta which had 7% and 14% of the population enjoy 6 and 8 number of waste amenities respectively (Figure 7 and Table 3).

Table 3: Environmental Justice Level of Public Amenities in Minna

Zones	Neighbourhoods	Population	Amenities			
			Waste Dumpsites		Open Playing Ground	
			Number	Ratio	Number	Ratio
North	Bosso Town	0.40	5	12.53	2	5.01
	Bosso Low-cost	0.06	4	17.00	3	12.75
	Bosso Estate	0.09	1	16.64	1	16.64
South	Barkin Saleh	0.24	8	57.56	1	7.19
	Sauka Kahuta	0.14	2	21.80	3	32.70
	Tudun Wada South	0.07	6	80.26	1	13.38
Total			26		11	

Source: Authors, 2020

Field result shows that Bosso Estate with 9% and Barkin Saleh 24% of the total population had 3 number of recreational amenity each, while Bosso town with 40% of the population enjoy 2 number of recreational amenities respectively. However, Bosso lowcost, T/Wada South and Sauka Kahuta accounted for 6%, 7% and 14% of the population, yet, they enjoy 1 number of the amenities respectively (Table 3).

Figure 7. Distribution of public amenities in Neighbourhoods of Minna

Source: Authors, 2020

The Lorenz curve for the waste dumpsites is presented in Figure 8 where 0.378 GC was obtained. This shows that the environmental injustice level in the distribution of waste dumpsite in the study area was at 38%. Although, some neighbourhoods enjoy more proportion of amenities than required as presented in Table 3.

Figure 8: Lorenz curve for public waste dump sites in the study area

The Lorenz curve for the open playing ground is presented in Figure 9 where 0.318 GC was obtained. This implies that the environmental injustice of recreational amenities in the study area is as at 32%. This implies that reasonable numbers of the inhabitants of the study area were deprived from enjoying recreational amenities.

Figure 9: Lorenz curve for open playing ground in the study area

3.3 Aggregate environmental justice of infrastructures and amenities in Minna

Summary of the aggregate Environmental Justice Index (EJI) for the infrastructure and amenities studied (Table 4) shows that public schools had the highest environmental justice index of 0.543 which shows that the distribution of public schools is with a high level of inequality. Public borehole recorded EJI of 0.410, implying that the distribution of public borehole amenities is above 40%. This is in line with the work of Ajibola et al. (2013). Waste dumpsites ranked 3rd with EJI of 0.378, access roads rank 4th with 0.336 while open playing ground rank 5th with 0.318, thus exhibiting environmental injustice above 30% which is significantly high. This is similar to the work of Sanusi (2006) on the assessment of the spatial relationship between poverty and environmental quality in Minna Metropolis, Niger State, Nigeria. The overall EJI of infrastructure and amenities in the study area is 0.397 which implies that there is a high level of environmental injustice in the distribution of infrastructure and amenities in the study area (Table 4).

Table 4: Aggregate environmental justice of infrastructure and amenities Minna

Amenities	EJI	Rank
Public Schools	0.543	1
Public Borehole	0.410	2
Waste Dumpsites	0.378	3
Access roads	0.336	4
Open Playing Ground	0.318	5
Average	0.397	

Source: Authors, 2020

4. DISCUSSION

Findings of this study shows high level of inequality of public schools' distribution where neighbourhoods with high population has low number of public-school provision. This is in negation of the standards for schools' provision according to Obateru (2005) and Guise et al., (2010) which should be between 5,000 and 8,000 population there should be a school. These results also corroborated with the findings of Morenikeji (2017), which shows that the provision of public schools in Ondo state were not equitably distributed and has farthered the communities away from the centre of administration. In terms of water facilities, it was found out that the high density neighbourhoods (Bosso Town and Barking Saleh), with a population of 34,649, has the lower extent of water boreholes. This implies that, the standard of WHO (2015) that individual should have between 40 and 60 litres of water could not be achieved through boreholes alone. The findings by Abd'Razack (2014) indicated that people of Minna has access to only 15 litre/capita/day. This might be due to dependency on borehole that has a limited yield per day. High density neighbourhoods suffer a lot because of the breakdown of some of these water boreholes. This is in line with Adewale et al., (2015); Bidandi (2018), that the age of residents and satisfaction with the neighbourhood in the Ibadan core area is influenced by access to water and basic amenities. The access roads in the sampled neighbourhoods revealed that low densities areas had more adequate accessible roads than high densities. Dung-Gwom (2007) observed that the availability of access roads in low density areas in Jos enhance the rental value of buildings compared to the high-density neighbourhoods. This is also supported by the findings of this study that high density neighbourhoods do not have adequate accessibility and most of the roads are untarred and not motorable. Broad and Cavanagh (2015) in their studies concluded that neighbourhood accessibility depends

on the extent of road network in the neighbourhood. This study also agreed with this assertion that road construction and opening up of new sites in the high-density neighbourhood were not given adequate attention compared with the low-density neighbourhoods. To buttress this, Ogunbajo et al., (2016) opined that urban renewal is a process that enables accessibility to be possible in organic city.

The public waste dumpsites in medium density areas were located in close proximity to houses and a similar pattern was also observed in high density areas, this indicated the nearness of the dumpsites with the households in the neighbourhoods. Public wastes dumpsite is a menace in the city and this was proved by Abd'Razack et al. (2013) that high income households generates higher solid waste whereas high density neighbourhood generates the highest volume of solid waste. Hence, this result is in line with current findings concerning the number of waste dumpsites in the neighbourhoods. Uba et al., (2008) opined that an average household in Northern Nigeria generates 0.56 Kg/day. Therefore, this informed the researcher about the gravity of the need for adequate waste management in the neighbourhood. The number and the expanse of solid waste determined the extent of its management. Distribution of open playground in the selected neighbourhoods indicated the availability of recreational centers in the areas. Weak integration of neighbourhoods does not encourage share utilisation of available playground by different neighbourhoods as observed by Brown and Chikagbum (2017) Neighbourhoods used for this research do not have a direct link with each other. The only links that exist are majorly poor however serving the low-income earners or the economically disadvantaged people working for or serving the rich people living in the low-density neighbourhoods. High density neighbourhoods suffer from a high lack of amenities, poorly serviced and inadequately connected other parts of the urban areas.

This research proved that there is spatial inequality in the distribution and location of infrastructures and amenities in the neighbourhoods of Minna. It implies that Environmental Injustice is always melted on the residents of the high density neighbourhoods in Minna and similar cities. This is a common phenomenon in the developing countries (Mabogunje, 2015), and further agreed with the work of Hummel et al., (2013) that Environmental justice research became a growing body of evidence and has been considered in the political debate, dealing with situations of society deprived groups regarding their access to environmental resources.

5. CONCLUSION

Unequal and disproportionate distribution of environmental infrastructure and amenities is a serious problem facing urban planners and policy makers.

Environmental justice is an approach towards ensuring the socio-spatial and economic sustainability of neighbourhoods, cities, regions and countries through the adoption of the doctrines of equity and fairness. Through the adoption of the environmental justice approach, town planners, urban managers and other policy makers make better decisions towards reducing inequality in the provision and consumption of amenities across space. This study has shown that lack of fairness in the provision of environmental amenities is both a cause and effect of distributive and procedural inequities across space. The findings of the study indicated that there is a high level of environmental injustice ($GC = 0.397$) on the aggregate in the study area, this is not spread across the selected infrastructures and amenities of interest, particularly the high density neighbourhoods (Bosso Town and Barkin Saleh) were deprived from the infrastructures and amenities. The paper therefore recommended equitable construction of more access roads across the neighbourhoods; imbining equity and justice in the provision of more water boreholes and waste dumpsites to help

institute more sustainable development and management in Minna and similar cities.

6. CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

7. REFERENCES

- Abdullahi, U. (2018). *The insight of domestic violence from the perspective of female victims in Ebiraland, Nigeria* (Doctoral dissertation, Universiti Utara Malaysia).
- Abd'razack, N.T.A, Ludin, N.A.M & Umaru, E. (2013) Ecological Footprint, Lifestyle and Consumption Pattern in Nigeria. *American-Eurasian Journal of Agriculture and Environmental Science* 13(4): pp 425–432
- Abd'Razack, N.T.A (2014). Ecological Footprint as an Assessment Tool for Sustainable Urban Development in Minna, Nigeria. An Unpublished PhD Thesis in the Department of Urban and Regional Planning. Fakulti Alam Bina, Universiti Teknologi Malaysia
- Abu, P. O., & Itebiye, B. O. (2015). Economic injustice in Nigeria (Acts 2: 44-45): The Niger Delta experience. *Canadian Social Science*, 11(10), 23-31.
- Adefila, J. O. & Bulus, J. S. (2014). Spatial inequalities in infrastructural development in Plateau State, Nigeria. *American International Journal of Contemporary Research*, 4(4), 89-97.
- Adewale, B. A., Taiwo, A., Izobo-Martins, O., Ekhaese, E. N. et al. (2015). Age of Residents and Satisfaction with the Neighbourhood in Ibadan Core Area: A Case Study of Oke Foko. *Global Journal of Arts, Humanities and Social Sciences*, 3(2), 37-45.
- Ajayi, M. T. A., Kemiki, O. A., Mohammed, J. K., Adama, U. J., & Ayoola, A. B. (2015). A Study on the Application of GIS in the Assessment of the Impact of Infrastructure on Residential Property Value in Minna. In *21st Pacific RIM Real Estate Society (PRRES) Conference, Kuala Lumpur, Malaysia*.
- Ajibola, M. O, Awodiran, O. O & Salu-Kosoko, O. (2013). Effects of Infrastructure on Property Values in Unity Estate, Lagos, Nigeria. *International Journal of Economy, Management and Social Sciences*
- Aliyu, A. A., & Amadu, L. (2017). Urbanization, cities, and health: The challenges to Nigeria - A review. *Annals of African medicine*, 16(4), 149–158. https://doi.org/10.4103/aam.aam_1_17
- Anguelovski, I., & Martínez-Alier, J. (2014). The 'environmentalism of the poor' revisited: Territory and place in disconnected glocal struggles. *Ecological Economics*, 102, 167–176
- Baxter, B. (2005). *A Theory of Ecological Justice*. USA and Canada: Routledge
- Bidandi, F.(2018). The City as an Experimental Space: The Interface between Public Satisfaction and Effects on Urban Planning Resulting from Kampala City's Sprawl. *Urban Agglomeration*, 107.
- Boyd, D. R. (2012). The constitutional right to a healthy environment. *Environment: Science and Policy for Sustainable Development*, 54(4), 3-15.
- Cavanagh, J. & Broad, R. (2015). Poorer countries and the environment: friends or foes? *World Development*, 72, 419-431.
- Chikagbum, W., & Brown, I. (2017). Urban growth: Challenges, management and planning implication in Port Harcourt municipality. *Journal of Global Ecology and Environment*, 6(4), 135-148
- Bullard, R. D., Mohai, P., Saha, R., & Wright, B. (2007). Toxic wastes and race at twenty 1987–2007: Grassroots Struggles to dismantle environmental racism in the United States. Cleveland, OH: United Church of Christ Justice and Witness Ministry.
- Chantrill, C.V. (2015). Grand calumet: The linkages between environmental justice, vulnerability and environmental governance. Unpublished PhD Dissertation.
- Colsa, A., Grafton, B., Hintzen, K., & Orvis, S. (2014). Mapping and analyzing environmental justice in the United States. Master Thesis: University of Michigan.
- Dalby, S. (2016). Environmental (in) security. *International encyclopedia of geography: People, the earth, environment and technology*. Pp.1-10.
- Dung-Gwom, J. Y. (2007). Urban Renewal in Jos – Bukuru Metropolis. Paper Presented at the MCPD Workshops organized by the Nigerian Institution of Estate Surveyors and Valuers, October 25th, Jos, Plateau State, Nigeria.
- Downey, L. & Hawkins, B. (2008). Race, income, and environmental inequality in the United States. *Sociological Perspectives*, 51(4), 759-781.
- Guise, R., Barton, H., & Grant, M. (2010). *Shaping Neighbourhoods: For Local Health and Global Sustainability*. Routledge.
- Hafner, R. (2018). *Environmental justice and soy agribusiness*. London and New York: Routledge
- Hajat, A., Hsia, C., & O'Neill, M. S. (2015). Socioeconomic disparities and air pollution exposure: a global review. *Current environmental health reports*, 2(4), 440-450.

- Hummel, D., Adamo, S., de Sherbinin, A., Murphy, L., Aggarwal, R., Zulu, L. Knight, K. (2013). Inter-and transdisciplinary approaches to population–environment research for sustainability aims: a review and appraisal. *Population and Environment*, 34(4), 481-509.
- Hughey, S. M., Walsemann, K. M., Child, S., Powers, A., Reed, J. A., Kaczynski, A. T. *et al.* (2016). Using an environmental justice approach to examine the relationships between park availability and quality indicators, neighborhood disadvantage, and racial/ethnic composition. *Landscape and Urban Planning*, 148, 159-169.
- Kawu, A. M., & Owoyele, G. S. (2008). Slums: Hubs of opportunities and sustainable development. *Environ: Journal of Environmental Studies*, 2(9), 51–61.
- Khosravaninezhad, S. & Akbari, R. (2014). Application of environmental justice concept in urban planning, the peri-urban environment of Tehran as the case study. *International Journal of Architectural Engineering & Urban Planning*, 24 (1), 56-64
- Klein, N. (2007). Spatial methodology for assessing distribution of transportation project impacts with environmental justice framework. *Transportation Research Record*, 2013(1), 46-53.
- Kuehn, R., & Robert, R. (2000). A Taxonomy of environmental justice. *Aboriginal Policy Research Consortium International (APRCi)*, 307.
- Leichenko, R., & Solecki, W. (2008). Consumption, inequity, and environmental justice: The making of new metropolitan landscapes in developing countries. *Society and Natural Resources*, 21(7):611–624
- Maantay, J. (2002). Mapping environmental injustices: Pitfalls and potential of geographic information systems in assessing environmental health and equity. *Environmental Health Perspectives Supplements*, 110161.
- Mabogunje, A. (2015). *The development process: A spatial perspective*. London: Routledge.
- Middleton, C., Allouche, J., Gyawali, D., & Allen, S. (2015). The rise and implications of the water-energy-food nexus in Southeast Asia through an environmental justice lens. *Water Alternatives*, 8(1).
- Mohammed, M., Jiman, C., Kawu, A. M., & Mohammed, J. K. (2019). Comparative environmental justice among Dutsen Kura Hausa and Dutsen Kura Gwari neighbourhoods of Minna, Nigeria. *ATBU Journal of Environmental Technology*, 12(1), 1-12.
- Morenikeji, W., Umaru, E., Pai, H., Jiya, S., Idowu, O., Adeleye, B. M. *et al.* (2017). Spatial analysis of housing quality in Nigeria. *International Journal of Sustainable Built Environment*, 6(2), 309-316.
- Mutz, K., Gary, C. B., & Douglas, S. K. (2002). *Justice and natural resources: Concepts, strategies, and applications*. Washington, DC: Island Press
- Nelson, J., & Grubestic, T. (2018). Environmental justice: A panoptic overview using scientometrics. *Sustainability*, 10(4), 1022. 10.3390/su10041022
- NIGIS (2018). Niger State Geographical Information System.
- NSMA & RID (2008). *Niger State Government: Agricultural potentials in Niger State*. Ministry of Agriculture and Rural Infrastructural Development, Minna.
- Obateru, O. I. (2005). *Space Standards for Urban Development*. Penthouse Publications, Ibadan, Nigeria.
- Ogunbajo, R. A., Bello, M. O., & Adebayo, M. A. (2016). Assessment of Urban Infrastructure Quality and User Satisfaction in Low Income Residential Neighbourhoods in Minna, Nigeria. *ATBU Journal of Environmental Technology*, 9(1), 98-115.
- Owoyele, G.S. (2014). Assessment of the relationship between neighbourhood quality and human health in Minna, Niger State. Unpublished PhD (URP) Thesis, Department of Urban and Regional Planning, Federal University of Technology, Minna.
- Oyewole, M. O., & Komolafe, M. O. (2018). Users' preference for green features in office properties. *Property Management*, 36(4), 374-388.
- Pulido, L. (2000). Rethinking environmental racism: White privilege and urban development in Southern California. *Annals of the Association of American Geographers*, 90(1):12–40.
- Sadd, J. L., Pastor, M., Morello-Frosch, R., Scoggins, J., Jesdale, B., *et al.* (2011). Playing it safe: Assessing cumulative impact and social vulnerability through an environmental justice screening method in the south coast air basin, California. *International Journal of Environmental Research and Public Health*, 8(5), 1441-1459.
- Sanusi, Y.A. (2006). An Assessment of the Spatial Relationship between Poverty and Environmental Quality in Minna Metropolis, Niger State, Nigeria. A Dissertation submitted to the Post Graduate School, Federal University of Technology, Minna.
- Scandrett, E. (2010). Knowledge and valuation in environmental justice struggles. In: Pavlich, D. (Ed.). *Managing environmental justice*. Amsterdam: Rodopi B.V. pp.23-38
- Schlosberg, D. (2004) Reconceiving environmental justice: global movements and political theories. *Environmental Politics*, 13 (3): 517-540.
- Schlosberg, D. (2007). *Defining environmental justice: Theories, movements, and nature*. New York: Oxford University Press Inc.
- Shrader-Frechette, K (2002). *Environmental justice: Creating equality and reclaiming democracy*. Oxford: Oxford University Press

- Smith, C. L. (2009). Economic deprivation and racial segregation: Comparing Superfund Sites in Portland, Oregon and Detroit, Michigan. *Social Science Research* 38:681-692.
- Sze, J. (2006). *Toxic soup redux: Why environmental racism and environmental justice matter after Katrina. Understanding Katrina: Perspectives from the social sciences*. Retrieved from <http://understandingkatrina.ssrc.org> 2nd March 2009
- Taylor, D. E. (2000). The rise of the environmental justice paradigm injustice framing and the social construction of environmental discourses. *American Behavioral Scientist*, 43(4), 508-580
- Tsaboula, A., Papadakis, E. N., Vryzas, Z., Kotopoulou, A., Kintzikoglou, K., Papadopoulou-Mourkidou, E. et al. (2016). Environmental and human risk hierarchy of pesticides: A prioritization method, based on monitoring, hazard assessment and environmental fate. *Environment international*, 91, 78-93.
- Turner, B. L. (2010). Vulnerability and resilience: Coalescing or paralleling approaches for sustainability science? *Global Environmental Change*, 20(4), 570–576.
- Uba, S., Uzairu, A., Harrison, G. F. S., Balarabe, M. L., & Okunola, O. J. (2008). Assessment of heavy metals bioavailability in dumpsites of Zaria Metropolis, Nigeria. *African Journal of Biotechnology*, 7(2).
- United States Environmental Protection Agency (USEPA) (2000). What's new: Environmental justice map. United States Environmental Protection Agency, Protocol Region IV, Environmental Accountability Division. Retrieved on 5th March, 2020 from <http://www.epa.gov/region4/ead/WhatsNew/WhatsNew.html>
- Walker, G. (2009). *Environmental justice: concepts, evidence and politics*. Routledge.
- Walker, G. P. & Bulkeley, H. (2006). Geographies of environmental justice. *Geoforum*, 37(5): 655–669.
- World Health Organization (2015), WHO/UNICEF Joint Water Supply, & Sanitation Monitoring Programme. Progress on sanitation and drinking water: 2015 update and MDG assessment. World Health Organization.
- Zahran, S., Brody, S. D., Peacock, W. G., Vedlitz, Grover, H. et al. (2008). Social vulnerability and the natural and built environment: a model of flood casualties in Texas. *Disasters*, 32(4), 537-560.
- Zavestoski, S., Shulman, S., & Schlosberg, D. (2006). Democracy and the environment on the Internet: Electronic participation in regulatory rulemaking. *Science, Technology and Human Values*, 31(4):383–408