DEMOGRAPHICAL FACTORSAND THEIRHINDRANCES TOMETROPOLITAN LAND ZONE USEPOLICY ADHERANCES

Abstract

The appropriate application of metropolitan land zone use policies and regulations may help inresolvingmetropolitanland zone use hitches such as undesirable zonal fragmentation, zonal use mix-up and zonal encroachment. This research aimsat contributing to acquaintancerequired to enhance adherence to metropolitan land zone uses in metropolitanland zone use planning. Thispaperfocused on thehindrances to metropolitan land zone use adherence in Nakuru City. Human population in Nakuru cityhas been on upward trajectory over the past thirty years. Just like any other modern metropolitan area in the world, Nakuru city's land use is mainly divided into residential, industrial, commercial and agricultural zone. The size of Nakuru city (municipality) has remained unchanged since 1974. However, there is a proposal to expandits size following its upgradinginto a city. This has pressurized the already limited metropolitan land use zones. The study adopted Hoyt Theory which says that metropolitan land use zones are swayed byfinancial factors. Precisely, the study's main objective was to assess socio-economic aspects of metropolitan demography as hindrances to metropolitan land zone use adherence. This paper employed descriptive survey design. Field data from a sample size of 400 respondents from eleven sample units were collected. All demographical factors (ignorance, political interference, nature of implementation, corruption, availability of capital, and population influx) under study had positively correlated with metropolitan land zone use policy adherences since they had a correlation coefficient of 0.82, 0.90, 1.00, 0.80, 0.92 and 0.98 respectively. The average t-test of all demographical factors under investigation was 0.02. Therefore, the null hypothesis was rejected at p-value of 0.05. Information from Key informants were also incorporated. This research suggested that these hindrances should be minimized through incorporation of all stakeholders, integrity, checked urbanization and proper implementation and adherence to allmetropolitanland zone use policiesthat are in place. This study may be useful to metropolitan land planners, developers andgovernment.

Keywords:metropolitan, Nakuru city, zonal use hindrances, policies adherences, demographical factors, population influx, political influence, inadequate capital

1 Introduction

The study that was done by Kuang *et al*. (2020) in China found that China's urbanization (both metropolitan population and physical metropolitan expansion) stimulatedUrban Land

Consumption Intensity (ULCI). They also found that ULCI is caused by population, economic, spatial and social urbanization. This high intensity of city land uses has a great influence on metropolitan ecosystem. Similar findings were also noted by Calka et al. (2022) There are a lot of metropolitan land use inefficiencies in many cities (Koroso *et al.*, 2021). In many cities, the level of land use surpasses the rate of population progression. On the other hand, they also found that metropolitan infill is low and slow. Their analysis indicated that some cities had had metropolitan land that was not in use within the metropolitan for long. According to them, Metropolitan Land Use Efficiency (ULUE) is what led to metropolitan sprawl, metropolitan land subdivision and casual settlements. The geospatial analysis that was done by Atasoy (2018) showed that upward trajectory of human settlement in Osmaniye city significantly decreased the metropolitan green space. The reduction was due to high levels of metropolitan land subdivision in the city center. This subsequently led to metropolitan land use arrangement change. In Bangladesh, the research revealed that the southern part of this city experienced an escalation zone uses because of metropolitan population influx (Rahaman & Shermin, 2021). This led to metropolitan land use interruptions that were characterized by residential buildings. Maconachie (2016) found that agricultural land was being changed into settlement areas in Benue state of Nigeria.According to Bonye et al. (2020), the economic, institutional, legal and social factors determined the level of urban land use compliance.

In Kenya, a study that was done by (Bonye et al. (2020) in Nairobi city showed that that built-up, commercial, and industrial activities arose commonly at the exterior of the planned areas between 1976 and 2019. The non-compliance was less on commercial land use areas. However, the non-compliance was continuouslysnowballing over the study period in industrial areas.

According to the constitution of Kenya 2010 Article 184, specific regulations and rules are supposed to be formulated to address challenges facing land use in metropolitan areas and cities. In connection to this, the Constitution assigns planning functions to all 47 county governments while the National LandCommission is charged with the responsibilities of monitoring and overseeing (Constitution of Kenya 2010). Adherence to metropolitan land zone use is a measure of the extent to which aftermaths follow thelaid down policies (Chand BJK, 2019).

The primary reason for this study was to examine the socio-economic aspects of metropolitan demography as hindrances to metropolitan land zone use adherence in Nakuru City. Demographical factors that were looked at included; population influx, inadequate capital, ignorance, corruption and poor implementation of policy. Annually, the average rate of metropolitanhuman population of Nakuru city is 2.7% (UN, 2020). With a near static land use zones, this rapid influx of metropolitan population in Nakuru city isestimated to have a great effect on metropolitan land zones (Mbuyi, 2019)such as land fragmentation, intra-zonal land use mix-ups (Mogire et al. 2022).In connection to this, available studies that examine hindrances to adherence to metropolitan land zone use plans are scanty. The study's findings may be valuable to metropolitan land use developers for imminent changes and policy making in order to safeguard Nakuru city's land zone use sustainability.

2. Location of the Study

The research was done in Nakuru city, Kenya. It entailed Nakuru East sub-county and westsub-county. The area of Nakuru city is 325km^2. It lies between 0.29'S to 1.03'S and 33.15'E to 36.10'E. Nakuru city consist of eleven administrative wards i.e. Biashara, Kivumbuni, Flamingo, Menengai, Nakuru East, Barut, London, Kaptembwa, Kapkures, Rhoda and Shabab.

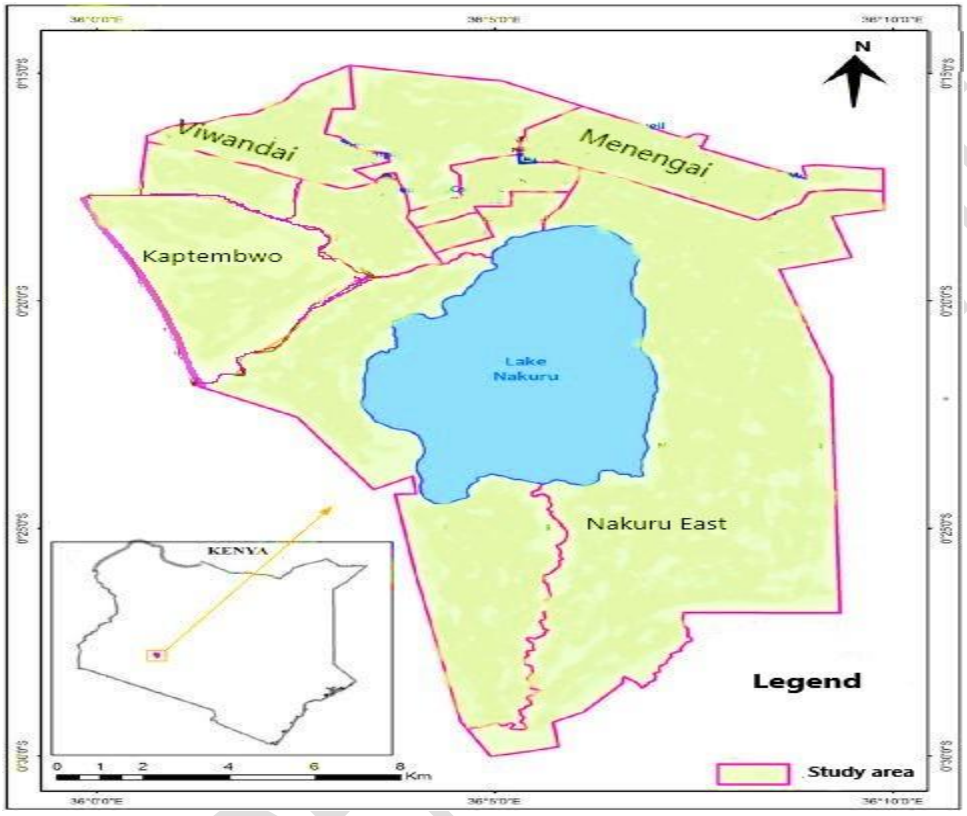

Figure 1 Geographical Location of the Study (Mogire et al, 2022)

4. Methodology

This study employed descriptive survey design. The information was collected between October and December in 2022. Nakuru city was purposively chosen due to tenacity of failure to adhere tometropolitan land zone use. Respondents who were both female and male farmers were drawn randomly selected from the eleven sample units that already existed as Administrative Wards based on their population.

4.1 Sample Size

The entire sample size for the survey was gotten using Yamane formula:

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

According to Yamane, for a 95% confidence level and p=0.05, the size of the sample should be: Where, N =target population=125879 households, n= sample size, e=level of precision of 0.05 precision. Assuming 95% confidence level and p=0.05, the sample size is [125879/ (1+125879×0.05^2) =125879/314.6975=400 households].

4.2 Distribution of the sample size per sample unit

The sample size distribution was done using a formula, $n = \frac{h}{H}(N)$ (Glenn, 1992). Where n= sample size, h= households in the sample unit, H= total households in the target population and N= households sample size.

Table 1 Distribution of the Sample Size

SAMPLING UNIT	HOUSEHOLDS	No. of respondents
CENTRAL/BIASHARA &LION HILL	15382	48
KIVUMBINI/ BONDENI	6770	22
KIRATINA/MENENGAI WARD	5316	16
FREE AREA/EAST WARD	15391	49
LANGALANGA/FLAMINGO	10708	34
VIWANDANI	8908	28
SHABAB	5951	19
RHONDA&MWARIKI A(MANYANI)	25615	82
MWARIKI	8518	27
KAPTEMBWO	153611	50
BARUT	7859	25
TOTAL	**125879**	**400**

Source: Fieldwork, 2022

The questionnaires were given to the respondents from the selected households. They were to determine the level of the predeterminedfactors of metropolitan demography on adherence to metropolitan land zone use policies at the household category.

5. RESULTS& DISCUSSION

5.1Demographical factors and Their Influence onMetropolitan Land ZonalUse policies Adherence

The resultsin Table 2 exposedhow the selected demographical factors affect the adherences of metropolitan land use policies in Nakuru city.

Table 2 responses on demographical factors and their influence on adherences to metropolitan land zone use policies

	Strongly disagree		**disagree**		**Neither agree nor disagree**		**agree**		**Strongly agree**	
	1		2		3		4		5	
	count	%	count	%	count	%	count	%	count	%
Ignorance	4	5.9	7	10.2	6	8.8	29	42.6	22	34.9
Political interference	5	10.2	4	8.2	9	18.4	11	22.4	20	44.9
Nature of implementation	9	11.1	14	17.3	16	19.8	17	20.9	25	30.9
Corruption	7	8.0	9	10.3	14	16.1	34	39.0	23	26.4
Availability of capital	4	3.5	9	7.8	10	8.7	34	29.6	58	50.4
		rage =7.7		**Average =10.8**		**Average =12.6**		**Average =30.9**		**Average =37.5**

Table 2 shows that 68.4% (30.9% those who agreed plus 37.5% those who strongly agreed) agreed that the selected demographical factors affects adherences of metropolitan land zone use policies while 31.6% did not agree. All demographical factors (ignorance, political interference,nature of implementation, corruption, availability of capital, and population influx) under study had positively correlated with metropolitan land zone use policy adherences since they had a correlation coefficient of 0.82, 0.90, 1.00, 0.80, 0.92 and 0.98 respectively.

Table 3 Population influx in relation to metropolitan land zone use policies adherence

Year	Population	Cases of not adhering	
		Counts	%
1991	152289	421	19.4
2001	216690	492	22.8
2011	300473	577	26.7
2021	472126	672	31.1

The result of table 3 shows that tendencies of not adhering to metropolitan land zone use policies increased with increase of metropolitan population. Within the study period, the 1991 which had the lowest population recorded the least tendency of non-adherence while the year 2021 recorded the highest cases of non-adherences and the highest population

5.1.1Testing hypothesis

Table 4 correlation coefficients and T-test results of the demographical factors under investigation

Demographical factors	Relationship with metropolitan land zone use policies adherences		Hypothesis testing	
	Pearson	remarks	T-test	Remarks
Ignorance	0.82	Positively correlate	0.04	Hull hypothesis rejected
Political interference	0.90	Positively correlate	0.01	Hull hypothesis rejected
Nature of implementation	1.00	Perfectly correlate	0.00	Hull hypothesis rejected
Corruption	0.80	Positively correlate	0.02	Hull hypothesis rejected
Availability of capital	0.92	Positively correlate	0.05	Hull hypothesis rejected
Population influx	0.98	Positively correlate	0.01	Hull hypothesis rejected

The null hypothesis (H0) that was saying that there was no significant relationship between demographical factors and adherences to metropolitan land zone use policies was rejected. All demographical factors(ignorance, political interference, nature of implementation, corruption,

availability of capital, and population influx) under investigation had P-value of less than the threshold (0.05). That's 0.04, 0.01, 0.00, 0.02, 0.05 and 0.01 respectively.

The metropolitan population influx callsfor more metropolitan land space. Due to inadequatemetropolitan land, urban dwellers are unlikely to adhere to consignedmetropolitan land zone uses. Rich dwellershave substantive capital which they employ developing their metropolitan land space in accordance to metropolitan land zone use plans/policies. On the ugly side, high Income also givesmetropolitan dwellers power to sway decision in their favor through carrots and access to metropolitanland in zones not designated for certain activity which they want to execute. This finding is similar to the study of Wu et al. (2021) who found that population density, and capital asset confidently led to the expansion of urban land use.

Inadequate funding from the government resulted in poor implementation of metropolitan land zone use policy and regulations at all the stages of the metropolitan land zone use planning. In developing countries such as Kenya, metropolitan land use planning is majorly funded by donors. Bearing in mind that donors have their main concern depending on their own goals, therefore, the planning process is not sustainable and considerate to local metropolitan land use demands.

The ignorance due to inadequate knowledge on metropolitan land zone use policies significantly influenced the implementation of metropolitan land zone use plan. Significant number of metropolitan dwellers was using metropolitan land anyhow provided they make a living. Metropolitan land use was influenced by political class especially those who are in power at that moment. This entailed setting land aside for a public project. Political influence was also used in metropolitan land grabbing. For instance, metropolitan land that was set aside for public used was being diverted into personal use/property.

Poor adherence to metropolitan land zone use led to land fragmentation and zonal use mix-ups. Generally zonal use mix-ups were cited by 62% of the respondents while land fragmentation was cited by 38% of the respondents. This finding was similar to those of Menakanit et al. (2022) who found that urbanization (metropolitan dwellers increase) led to clearance of vegetation and finally fragmentation of metropolitan land in Bangkok city that was initially under vegetation. The responses also revealed that Rhoda and Free Area/East Ward witnessed high rate of land fragmentation and zonal use mix-ups at 39.9% and 31.6% respectively. Interestingly responses cited the least disruptions in metropolitan land zonal disruptions in Central/Biashara &Lion Hill and Kivumbini/ Bondeni area with a percentage of 5% and 4.6% respectively.

An average of 45.1% of the respondents said that Nakuru Citymetropolitan land zones were not used according to Metropolitan Land Zone Use Policy. Different sample units recorded different degree ofnon-adherence to metropolitan land zone use policy.The observation made from 290 points within the study area revealed different degree of non-adherence as shown in the following table

These results are in harmony with study findings of Güneralp et al., (2017) who carried a study to determine challenges caused by the growing cities in Africa. They found that metropolitanland use zoning polies are facing societal, institutional and environmental challenges among others.

Conclusions

Demographical factors such as ignorance, political interference, nature of implementation, corruption, availability of capital, and population influx have significant effects on metropolitan land zone use policies adherences. They have an average positive correlation coefficient of 0.9 with metropolitan land zone use policies adherences. The hypothesis testing revealed that the demographic factors that were under investigation had an average probability value of 0.02 below the threshold of p-value of 0.05. This led to the rejection of the null hypothesis (no correlation between demographical factors and metropolitan land zone use policies adherences).

Recommendations

The study exposed that population influx was the chief challenge facing the implementation of metropolitan land zone use policies. This research recommends the provision financial resources. This can be done by the relevant bodies like governments and financial institutions. They should step in to provide technical and financial resources either through giving loans or grants to facilitate favorable land zone use.

Political interferences should be minimized by ensuring independence of Urban Planning bodies and other land regulatory bodies. To reduce ignorance,the national and county governments should increase public awareness.

The government should advocate for family control measures. These include availing birth control methods such as condoms. The government should make these birth control measures available and affordable to all citizens.

All stakeholders should embrace proper implementation of metropolitan land zone use policies without discrimination or favor of any nature. Ministry of Lands and Physical Planning (Kenya) should be empowered to carry out its mandate. The national government will achieve this if the department of land, physical planning and urban development of Nakuru metropolitan is involved

References

Atasoy, M. (2018). Monitoring the metropolitan green spaces and landscape fragmentation using remote sensing: A case study in Osmaniye, Turkey. Environmental Monitoring and Assessment, 190(12). https://doi.org/10.1007/s10661-018-7109-1

Bonye, S. Z., Yiridomoh, G. Y., & Bebelleh, F. D. (2020). Compliance with land use regulations in Peri-urban areas in Ghana: A study of Bamahu and Danko residential areas in wa municipality,Upper West Region. *GeoJournal*, *86*(6), 2845-2859. https://doi.org/10.1007/s10708-020-10229-w

Calka, B., Orych, A., Bielecka, E., & Mozuriunaite, S. (2022). The ratio of the land consumption rate to the population growth rate: A framework for the achievement of the spatiotemporal pattern in Poland and Lithuania. *Remote Sensing*, *14*(5), 1074. https://doi.org/10.3390/rs14051074

Chand BJK. Land management problems in Nepal: Repercussions of land use policy and implementation gaps in Regional and Metropolitan Planning. ISPRS Ann. Photogramm. Remote Sens. Spat. Inf. Sci. 2019;4(5/W2):17–24. DOI: 10.5194/isprs-annals-IV-5-W2-172019.

Güneralp, B., Lwasa, S., Masundire, H., Parnell, S., & Seto, K. C. (2017). Urbanization in Africa: Challenges and opportunities for conservation. Environmental Research Letters, 13(1), 015002.

Koroso, N. H., Lengoiboni, M., & Zevenbergen, J. A. (2021). Urbanization and metropolitan land use efficiency: Evidence from regional and Addis Ababa satellite cities, Ethiopia. Habitat International, 117, 102437. https://doi.org/10.1016/j.habitatint.2021.102437

Kuang, B., Lu, X., Han, J., Fan, X., & Zuo, J. (2020). How urbanization influence metropolitan land consumption intensity: Evidence from China. Habitat International, 100, 102103. https://doi.org/10.1016/j.habitatint.2019.102103

Mbuyi, K. (2019). Kinshasa: Problems of land management, Infrastucture, and food supply. African Cities in Crisis, 148-175. https://doi.org/10.4324/9780429048227-6

Menakanit, A., Davivongs, V., Naka, P., &Pichakum, N. (2022). Bangkok's metropolitan sprawl: Land fragmentation and changes of Peri-metropolitan vegetable production areas in thawiwatthana district. Journal of Metropolitan and Regional Analysis, 1(1). https://doi.org/10.37043/jura.2022.14.1.4

Rahaman, S. N., & Shermin, N. (2021). Identifying built-up area expansion and comparing two conventional built-up area extraction method from LANDSAT imagery: A case study on Khulna city. Academia Letters. https://doi.org/10.20935/al758

Mogire, D. A., Kagendo, J., &Kweyu, R. (2022). Effects of spatiotemporal dynamics of population in urban centers on land use arrangement: A case of Nakuru town, Kenya. *Cradle of Knowledge: African Journal of Educational and Social Science Research (The)*, *10*(3), 127-144. https://doi.org/10.4314/ajessr.v10i3.4

Mwaura, O. K., & Odera, P. A. (2021). Monitoring spatio-temporal compliance of urban development plans using GIS and remote sensing in Nairobi city County, Kenya. *Ghana Journal of Geography*, *13*(3). https://doi.org/10.4314/gjg.v13i3.4

United Nations. (2017). Drivers of Migration and Urbanization in Africa, New York. United

Nations Department of Economics and Social Affairs. (2019). World Urbanization Prospects.

The 2009 Revision. United Nation Department of Economic and Social Affairs Waters, E. A.,

World Bank. (2017). East Asia and Pacific Cities: Expanding Opportunities for the Metropolitan

Wu, R., Li, Z., & Wang, S. (2021). The varying driving forces of urban land expansion in China: Insights from a spatial-temporal analysis. *Science of The Total Environment*, *766*, 142591. https://doi.org/10.1016/j.scitotenv.2020.142591

Poor.Washington, DC: World Bank. https://openknowledge.world bank.org/handle/10986/27614