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Comparative Analysis of Hypertension Prevalence and its Complications among Adult Populations in Kisumu City and Rural Areas of Kisumu County, Kenya

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ABSTRACT

Background: Hypertension is a significant public health concern worldwide, contributing to severe health complications if not properly managed. This study aimed to compare the prevalence of hypertension and its complications among adults in urban and rural areas of Kisumu County, Kenya, and to examine the socio-economic, lifestyle, and healthcare access factors influencing these outcomes.

Methods: A cross-sectional study was conducted with a sample size of 246 adults from both urban and rural areas of Kisumu County. Data were collected using structured questionnaires, which included demographic information, socio-economic status, lifestyle factors, and healthcare access. Hypertension was diagnosed based on self-reported medical history and measurement of blood pressure. Complications of hypertension, such as stroke, heart disease, kidney disease, and eye problems, were also documented. The data were analysed using descriptive statistics

Results: The prevalence of hypertension was significantly higher in urban areas (33.33%) compared to rural areas (17.07%). Among hypertensive individuals, 31.71% in urban areas reported complications, primarily stroke, heart disease, and kidney disease, while 76.19% in rural areas reported complications, including stroke, heart disease, kidney disease, and eye problems. Socio-economic factors, such as income and education levels, differed markedly between urban and rural areas, influencing health outcomes. Urban residents generally had higher incomes and education levels, better healthcare access, and higher health literacy, facilitating more effective hypertension management. Conversely, rural residents faced lower income levels, less education, and limited healthcare access, leading to poorer management and higher rates of complications.

Conclusions: The study reveals substantial disparities in hypertension prevalence and complications between urban and rural areas of Kisumu County, driven by socio-economic, lifestyle, and healthcare access factors. Urban areas experience higher hypertension prevalence but benefit from better healthcare access, resulting in fewer complications. Rural areas show a lower prevalence but higher complication rates due to limited healthcare access and lower socio-economic status. These findings highlight the need for tailored public health interventions to address the specific challenges faced by urban and rural populations in managing hypertension.

Recommendations: For urban areas, health education programs focusing on stress management, physical activity, and healthy dietary choices are essential, along with promoting regular health screenings. For rural areas, improving healthcare access through mobile clinics, telemedicine services, and community health workers, coupled with health literacy campaigns and economic and educational support, is crucial. Investing in healthcare infrastructure in rural areas is also recommended to provide essential diagnostic tools and medications, facilitating better hypertension management.

Keywords: Hypertension, complications, urban, rural, Kisumu County, socio-economic factors, lifestyle, healthcare access, Kenya

1. Introduction

1.1 Background of the Study

Hypertension, commonly referred to as high blood pressure, is a chronic medical condition characterized by elevated levels of blood pressure in the arteries. This condition is a major risk factor for cardiovascular diseases (CVDs), including heart attacks, strokes, and heart failure, as well as chronic kidney disease and retinopathy (WHO, 2019). Globally, hypertension is responsible for an estimated 7.5 million deaths annually, accounting for about 12.8% of all deaths (World Health Organization, 2021).

The global prevalence of hypertension has seen a significant rise, affecting both developed and developing nations. According to the Global Burden of Disease Study 2017, approximately 1.13 billion people worldwide suffer from hypertension, with the majority residing in low- and middle-income

countries (NCD Risk Factor Collaboration [NCD-RisC], 2017). This rise is attributed to various factors, including urbanization, aging populations, unhealthy diets, lack of physical activity, and increased alcohol and tobacco use.

In Africa, the prevalence of hypertension is particularly high, with an estimated 46% of adults aged 25 and above being affected (Adeloye et al., 2015). The region faces unique challenges such as limited healthcare infrastructure, shortage of healthcare professionals, and insufficient health education, which contribute to the burden of hypertension.

Kenya, a lower-middle-income country in East Africa, is not immune to this growing public health issue. Recent data indicates that the prevalence of hypertension among Kenyan adults ranges from 20% to 30%, with higher rates observed in urban areas compared to rural areas (Ministry of Health Kenya, 2019). The urban-rural disparity in hypertension prevalence is influenced by several factors, including lifestyle differences, access to healthcare services, and socio-economic conditions.

Kisumu County, located in Western Kenya, provides a compelling setting for investigating these disparities. The county has a population of approximately 1.15 million people, with about 60% residing in rural areas and 40% in urban areas, according to the Kenya National Bureau of Statistics (KNBS, 2019). This demographic distribution presents a unique opportunity to explore how urbanization impacts health outcomes, particularly concerning non-communicable diseases like hypertension.

Urban residents in Kisumu County are more likely to adopt sedentary lifestyles, consume unhealthy diets high in salt and processed foods, and have higher stress levels due to economic and social pressures. These factors contribute significantly to the higher prevalence of hypertension in urban areas (Munyasia et al., 2018). Conversely, rural residents, although more physically active due to agricultural activities, often face barriers to accessing quality healthcare services and hypertension management, such as medication and regular blood pressure monitoring (Munyasia et al., 2018).

Complications arising from hypertension, such as stroke, heart disease, and kidney failure, are also prevalent in Kisumu County. However, the extent and nature of these complications can vary significantly between urban and rural populations. Understanding these differences is critical for developing tailored interventions to address the specific needs of these communities.

Therefore, the background of this study highlights the global and regional significance of hypertension, with a focus on the disparities between urban and rural populations in Kisumu County, Kenya. By examining the prevalence and complications of hypertension in these distinct settings, this research aims to provide valuable insights that can inform public health strategies and improve health outcomes in Kisumu County and similar contexts worldwide.

1.2 Problem Statement

Hypertension is a critical public health challenge globally, with significant implications for morbidity, mortality, and healthcare costs. In Kenya, the rising prevalence of hypertension has become a pressing concern, particularly as it disproportionately affects urban and rural populations differently. Despite the general awareness of hypertension as a major health issue, there is a significant gap in comparative data on its prevalence and complications between urban and rural areas within specific regions like Kisumu County.

Kisumu County, with its unique demographic and socio-economic landscape, exemplifies the broader challenges faced by Kenya in managing hypertension. Urban areas in Kisumu are characterized by rapid urbanization, lifestyle changes, and increased stress levels, which are known risk factors for hypertension (Munyasia et al., 2018). Conversely, rural areas, while potentially benefiting from more active lifestyles, often suffer from poor access to healthcare services, lack of awareness, and inadequate management of chronic conditions (Ministry of Health Kenya, 2019).

The disparity in hypertension prevalence and its associated complications between urban and rural areas poses significant challenges for public health planning and intervention. Urban residents may experience higher rates of hypertension due to lifestyle factors such as poor diet, physical inactivity, and higher levels of psychological stress. In contrast, rural residents, though possibly at lower risk due to more active lifestyles, may face significant barriers in accessing timely and effective healthcare, leading to poorer management of hypertension and higher rates of complications such as stroke, heart disease, and kidney failure (Adeloye et al., 2015).

Existing studies have highlighted the general prevalence of hypertension in Kenya but often lack a detailed comparative analysis between urban and rural settings, especially within specific counties like Kisumu. This lack of detailed, localized data hampers the ability of health authorities to design and implement effective, targeted interventions that address the unique needs of these populations. Moreover, without this comparative analysis, it is challenging to understand the underlying factors contributing to these disparities and to develop strategies to mitigate them.

Furthermore, the complications arising from unmanaged or poorly managed hypertension can be severe and include cardiovascular diseases, kidney damage, and cerebrovascular events. These complications not only increase the burden on healthcare systems but also significantly impact the quality of life and economic productivity of affected individuals and communities. Understanding how these complications manifest differently in urban and rural areas is crucial for tailoring healthcare responses and improving outcomes.

Therefore, there is an urgent need for a comprehensive comparative analysis of hypertension prevalence and its complications among adults in urban versus rural areas of Kisumu County. Therefore study provided the necessary evidence to inform public health strategies, improve resource allocation, and ultimately enhance the management and prevention of hypertension and its complications in diverse settings. Addressing this gap in knowledge is critical for reducing health disparities and improving the overall health and well-being of the population in Kisumu County.

1.3 Rationale of the Study

The increasing burden of hypertension poses a significant public health challenge, particularly in low- and middle-income countries like Kenya. Kisumu County, with its diverse urban and rural populations, offers a unique context to explore the disparities in hypertension prevalence and its complications. Understanding these disparities is crucial for several reasons.

First, hypertension is a major risk factor for numerous chronic diseases, including cardiovascular diseases, stroke, and kidney failure. These conditions contribute significantly to morbidity and mortality, placing a heavy burden on individuals, families, and the healthcare system (World Health Organization, 2019). Addressing hypertension effectively requires targeted interventions based on a deep understanding of its prevalence and associated risk factors in different settings.

Second, urban and rural areas often present distinct risk profiles for hypertension due to differences in lifestyle, socio-economic status, and access to healthcare services. Urban areas, characterized by rapid urbanization and modernization, tend to exhibit higher rates of hypertension due to factors such as unhealthy diets, physical inactivity, and increased stress levels (Munyasia et al., 2018). Conversely, rural areas, although potentially benefiting from more active lifestyles, often face challenges such as limited access to healthcare services, lower health literacy, and delayed diagnosis and treatment (Ministry of Health Kenya, 2019). By comparing these two settings within Kisumu County, this study aims to identify specific risk factors and barriers to effective hypertension management unique to each environment.

Third, previous research has indicated a significant gap in the comparative data on hypertension between urban and rural areas within specific regions like Kisumu County. Most studies have either focused broadly on national trends or on urban or rural populations in isolation. This lack of comparative data impedes the development of nuanced, location-specific health policies and interventions (Adeloye et al., 2015). A detailed comparative analysis will provide valuable insights into the unique challenges and needs of urban and rural populations, facilitating more effective public health planning and resource allocation.

Fourth, the complications arising from poorly managed hypertension, such as heart disease, stroke, and kidney failure, not only lead to significant health deterioration and premature death but also increase healthcare costs and economic burdens on families and communities (World Health Organization, 2019). Understanding the prevalence and nature of these complications in urban and rural settings is essential for designing targeted strategies to mitigate these adverse outcomes.

Finally, this study aligns with national and global health priorities aimed at reducing the burden of non-communicable diseases (NCDs). The Kenyan government, through its Ministry of Health, has committed to tackling NCDs, including hypertension, as part of its national health strategy (Ministry of Health Kenya, 2019). This study's findings support these efforts by providing evidence-based recommendations for improving hypertension management and prevention at the community level.

The rationale for this study is grounded in the need to address the significant public health issue of hypertension in Kisumu County by understanding the disparities between urban and rural populations. This research provided critical insights that inform public health policies, improve healthcare delivery, and ultimately enhance the health outcomes of adults living in both urban and rural areas of Kisumu County.

1.4 Significance of the Study

This findings of this study have significant implications for public health policy and practice in Kisumu County and beyond. By identifying the disparities in hypertension prevalence and complications, health authorities can design more effective, location-specific strategies to manage and prevent hypertension. Additionally, this research contributed to the existing body of knowledge, aiding future studies on hypertension in similar contexts.

1.5 Objectives of the Study

- To determine the prevalence of hypertension among adults in urban and rural areas of Kisumu County.
- To compare the complications associated with hypertension in urban versus rural populations in the study areas.
- To identify socio-economic factors influencing hypertension prevalence and its complications in the study area areas.

2. Literature Review

2.1 Prevalence of Hypertension among Adults in Urban and Rural Areas of Kisumu County

2.1.1 Global and Regional Hypertension Prevalence

The Global Burden of Disease Study (NCD-RisC, 2017) provides a comprehensive analysis of hypertension prevalence worldwide. It highlights the dramatic increase in hypertension cases, particularly in low- and middle-income countries. The study emphasizes that the prevalence of hypertension has nearly doubled in many African countries over the past few decades, driven by factors such as urbanization, dietary changes, and reduced physical activity. Adeloye et al. (2015) conducted a systematic review and meta-analysis on hypertension prevalence in Sub-Saharan Africa, estimating a prevalence rate

of 46%. The review points to inadequate healthcare infrastructure and limited public health interventions as significant contributors to the high prevalence in the region. The study underscores the need for targeted health policies to address these gaps. The WHO (2019) report on hypertension provides global statistics and highlights the regional variations in prevalence. It identifies lifestyle changes, aging populations, and health system challenges as key factors influencing the rise in hypertension, particularly in developing countries. The report calls for integrated health strategies to manage and prevent hypertension effectively.

2.1.2 Hypertension Prevalence in Kenya

The KNHDS (Ministry of Health Kenya, 2019) offers detailed data on the prevalence of hypertension across different regions in Kenya. The survey shows that urban areas report higher hypertension rates compared to rural areas, attributing this disparity to lifestyle differences and better detection rates in urban centers. A study by Nyaga et al. (2018) explores the impact of urbanization on hypertension in Kenya. It finds that rapid urbanization is closely linked with increased hypertension prevalence due to changes in diet, increased stress, and sedentary lifestyles. The study calls for urban health policies to mitigate these risk factors. Oyando et al. (2019) investigate the prevalence of hypertension in rural Kenya, identifying key factors such as limited access to healthcare, low awareness, and poor health-seeking behaviors. The study recommends improving healthcare infrastructure and community-based health education programs to address these challenges.

2.1.3 Hypertension in Kisumu County

A study by Munyasia et al. (2018) focuses on Kisumu County, comparing hypertension prevalence between urban and rural areas. It finds that urban residents have a higher prevalence of hypertension, attributed to lifestyle factors such as diet and physical inactivity. The study emphasizes the need for tailored public health interventions in urban areas. Odhiambo et al. (2017) explore health challenges in rural Kisumu, highlighting hypertension as a significant issue. The study identifies barriers such as poor healthcare access, inadequate health education, and economic constraints. It calls for comprehensive rural health programs to improve hypertension management. A research by Obure et al. (2016) examines the socio-economic factors influencing hypertension in Kisumu County. The study finds that higher socio-economic status in urban areas correlates with increased hypertension prevalence due to stress and lifestyle changes. It suggests integrating socio-economic considerations into health policy planning.

2.2 Complications Associated with Hypertension in Urban vs. Rural Populations

2.2.1 Cardiovascular Diseases

A study by Wang et al. (2019) examines the disparities in cardiovascular disease (CVD) prevalence between urban and rural populations. It finds that urban residents have higher CVD rates due to higher hypertension prevalence and lifestyle factors. The study suggests targeted interventions to address these disparities. Otieno et al. (2018) explore the impact of hypertension on cardiovascular health in Kenya, highlighting significant urban-rural differences. The study shows that urban residents are more likely to suffer from CVD due to higher hypertension rates and better diagnosis, while rural residents face worse outcomes due to delayed treatment. A research by Mungai et al. (2017) investigates cardiovascular risk factors in urban and rural Kenya, finding that urban areas have higher prevalence rates of risk factors such as hypertension, obesity, and smoking. The study recommends urban-specific health strategies to manage these risks.

2.2.2 Stroke

A study by Owolabi et al. (2015) investigates the relationship between hypertension and stroke incidence in Sub-Saharan Africa. It finds that hypertension is a leading cause of stroke, with urban residents at higher risk due to higher hypertension prevalence. The study calls for improved hypertension management to reduce stroke rates. Kimani et al. (2018) compare stroke incidence and outcomes in urban and rural Kenya, finding higher incidence in urban areas due to higher hypertension prevalence. The study highlights the need for comprehensive stroke prevention programs in both settings, with a focus on hypertension management. A research by Gathara et al. (2016) explores stroke outcomes in urban and rural settings in Kenya, showing that rural residents experience worse outcomes due to delayed treatment and lack of specialized care. The study recommends improving healthcare access and stroke awareness in rural areas.

2.2.3 Kidney Disease

A study by Stanifer et al. (2016) examines the prevalence of chronic kidney disease (CKD) related to hypertension in urban and rural Tanzania. It finds higher CKD rates in urban areas due to higher hypertension prevalence and suggests targeted interventions for hypertension management in urban settings. A research by Kilonzo et al. (2018) investigates the link between hypertension and kidney disease in Kenya, highlighting significant urban-rural differences. The study shows higher CKD prevalence in urban areas and calls for integrated healthcare strategies to manage both conditions effectively. A study by Maina et al. (2017) explores access to nephrology services in Kenya, finding significant disparities between urban and rural areas. The study recommends improving healthcare infrastructure and training healthcare providers in rural areas to better manage hypertension and its complications.

2.3 Socio-economic, Lifestyle, and Healthcare Access Factors Influencing Hypertension

2.3.1 Socio-economic Factors

A study by Hajat et al. (2017) investigates socio-economic determinants of hypertension in low- and middle-income countries, finding that higher socio-economic status is associated with higher hypertension prevalence due to lifestyle factors. The study suggests addressing socio-economic disparities in health interventions. A research by Ataklte et al. (2015) explores the economic burden of hypertension in Sub-Saharan Africa, showing that lower socio-economic status is linked with poorer health outcomes due to limited access to healthcare. The study calls for policies to improve healthcare affordability and access. A study by Bovet et al. (2017) examines socio-economic inequalities in hypertension management, finding that lower socio-economic groups are less likely to receive adequate hypertension care. The study recommends targeted health policies to reduce these inequalities.

2.3.2 Lifestyle Factors

A study by Appel et al. (2015) explores the relationship between dietary patterns and hypertension, finding that diets high in salt, fat, and processed foods are significant risk factors for hypertension. The study emphasizes the need for dietary interventions to manage hypertension. A research by Lee et al. (2017) investigates the impact of physical activity on hypertension risk, showing that regular physical activity significantly reduces hypertension prevalence. The study suggests promoting physical activity as a key strategy in hypertension prevention. A study by WHO (2019) examines the impact of smoking and alcohol consumption on hypertension, finding that both behaviors significantly increase hypertension risk. The study calls for public health campaigns to reduce smoking and alcohol consumption as part of hypertension management.

2.3.3 Healthcare Access

A study by Peck et al. (2016) explores barriers to hypertension care in low-resource settings, finding that distance to healthcare facilities, cost of care, and lack of healthcare providers are major challenges. The study recommends improving healthcare infrastructure and affordability. A research by Beaglehole et al. (2018) investigates the impact of healthcare access on hypertension management, showing that better access to healthcare services leads to improved hypertension outcomes. The study suggests integrating hypertension care into primary healthcare services. A study by Dorsey et al. (2017) explores the potential of telemedicine for hypertension management in rural areas, finding that telemedicine can improve access to care and hypertension management. The study recommends adopting telemedicine in rural healthcare strategies.

3. Methodology

3.1 Study Design

This study utilized a cross-sectional comparative design to assess the prevalence of hypertension and its complications among adults in urban and rural areas of Kisumu County, Kenya. Data was collected at a single point in time to compare health outcomes between these two populations, providing insights into the disparities in hypertension prevalence and related complications.

3.2 Study Population

The study population comprised adults aged 18 years and above residing in both urban and rural areas of Kisumu County. Participants were selected from diverse socio-economic backgrounds to capture a comprehensive understanding of the factors influencing hypertension prevalence and complications.

3.3 Sample Size Determination

The sample size was calculated using Cochran's formula for cross-sectional studies, assuming a 20% prevalence of hypertension, a 95% confidence level ($Z = 1.96$), and a 5% margin of error. The estimated sample size was **246 participants** to ensure statistical reliability.

3.4 Sampling Techniques

A multi-stage sampling approach was employed. First, Kisumu County was stratified into urban and rural areas. Random sampling was then used to select households from each stratum, and within each household, one eligible adult was randomly chosen to participate. This technique ensured a representative sample from both urban and rural settings.

3.5 Data Collection

A structured questionnaire was used to collect data on demographic characteristics, hypertension status, prevalence, complications, and socio-economic factors. Participants' blood pressure measurements were recorded, and additional relevant health information was gathered to assess hypertension-related complications.

3.6 Data Analysis

Descriptive statistics, including frequencies and percentages, were used to summarize demographic characteristics, hypertension prevalence, and associated complications. Comparative analysis was conducted to examine differences between urban and rural populations, highlighting variations in hypertension risk factors and health outcomes.

4. Result and Discussion

4.1 Prevalence of hypertension

Table 1: Study Sample

Area	**No.**	**%**
Rural	123	50%
Urban	123	50%
Total	**246**	**100%**

Table 2: Hypertension Status

Status	Rural n= 123		Urban n=123	
	No.	%	No.	%
Hypertensive	21	17.07	41	33.33
Non-Hypertensive	102	82.93	82	66.67
Total	**123**	**100**	**123**	**100**

The sample consisted of 246 participants, evenly divided between urban (123 participants) and rural (123 participants) areas. According to the data, the prevalence of hypertension was notably higher in urban areas, with 33.33% of the participants being hypertensive, compared to only 17.07% in rural areas.

In urban areas, the prevalence of hypertension can be attributed to several factors. Urban lifestyles are often associated with higher levels of stress due to job pressures, financial challenges, and a fast-paced environment. These stressors are significant risk factors for hypertension. Additionally, dietary habits in urban settings tend to include higher consumption of processed foods that are rich in sodium, fats, and sugars, which contribute to elevated blood pressure levels. Furthermore, urban residents generally have better access to healthcare services, leading to more frequent diagnoses of hypertension. This accessibility to healthcare could partly explain the higher prevalence rate observed in urban areas compared to rural areas.

Conversely, rural areas exhibited a lower prevalence of hypertension, with only 17.07% of participants being hypertensive. Rural lifestyles often involve more physical labour and activity, which can help maintain healthier blood pressure levels. The diet in rural areas is likely to consist of more fresh produce and less processed food, contributing to lower rates of hypertension. However, the lower prevalence rate in rural areas might also be due to underdiagnoses. Limited access to healthcare services in rural areas can lead to fewer cases being identified and reported, which could artificially deflate the observed prevalence rate.

The significant difference in hypertension prevalence between urban and rural areas highlights the impact of lifestyle and environmental factors on health. Urban areas, with their higher stress levels and dietary risks, exhibit a higher prevalence of hypertension. On the other hand, rural areas, despite potentially healthier lifestyles, face challenges related to healthcare access, which might lead to underreporting of hypertension cases.

These findings have important public health implications. The higher prevalence of hypertension in urban areas necessitates targeted public health interventions focusing on lifestyle modifications. Programs that promote physical activity, healthy eating, and stress management are crucial for addressing hypertension in urban settings. In rural areas, improving healthcare access is vital. Implementing mobile clinics, telemedicine, and community health workers can help bridge the gap, ensuring timely diagnosis and management of hypertension. Educational campaigns should be tailored to both urban and rural contexts, addressing specific risk factors prevalent in each setting.

In conclusion, the study reveals a stark contrast in hypertension prevalence between urban and rural areas of Kisumu County. Urban areas report a higher prevalence, likely due to lifestyle factors, while rural areas show a lower prevalence, potentially influenced by limited healthcare access. Addressing these disparities through targeted interventions and improved healthcare infrastructure is essential for managing and reducing the burden of hypertension across Kisumu County.

4.2 Complications Associated with Hypertension

Table 3: Complication status

Status	Rural n= 21		Urban n = 41	
	No.	%	No.	%
Complication	16	76.19	13	31.71
No complication	5	23.81	28	68.29
Total	**21**	**100**	**41**	**100**

Table 4: Associated Complications

Complications	Rural n= 16		Urban n= 13	
	No.	%	No.	%
Stroke	8	50	6	46.15
Heart disease	5	31.25	4	30.77
Kidney disease	2	12.5	3	23.08
Eye Problem	1	6.25	0	0
	16	**100**	**13**	**100**

The study also aimed to identify the complications associated with hypertension among adults in urban and rural areas of Kisumu County (as shown in table 3 and 4). The complications considered included stroke, heart disease, kidney disease, and eye problems. The data showed marked differences in the frequency and type of complications between hypertensive individuals in urban and rural settings.

The prevalence of complications among hypertensive participants differed significantly between the two areas. In urban areas, 31.71% of hypertensive participants reported complications, whereas in rural areas, a much higher percentage of 76.19% reported complications. This discrepancy underscores the disparity in health outcomes between urban and rural populations.

In urban areas, the reported complications among hypertensive individuals included stroke (46.15%), heart disease (30.77%), and kidney disease (23.08%). Notably, no urban participants reported eye problems as a complication. The relatively lower complication rates in urban areas, despite higher hypertension prevalence, could be attributed to better access to healthcare services, which facilitates timely management and treatment of hypertension, thereby preventing or mitigating complications. Additionally, urban residents may have greater awareness and knowledge of hypertension management due to higher education levels and better health literacy.

In contrast, rural areas exhibited a significantly higher rate of complications among hypertensive individuals, with 76.19% reporting at least one complication. The complications included stroke (50%), heart disease (31.25%), kidney disease (12.5%), and eye problems (6.25%). The higher complication rate in rural areas highlights the challenges faced by these communities in managing hypertension effectively. Limited access to healthcare services in rural areas likely results in delayed diagnosis and treatment, contributing to the higher incidence of severe complications. Moreover, lower health literacy and awareness about hypertension management in rural areas may exacerbate the situation.

The disparity in complication rates between urban and rural areas can be attributed to several factors. The accessibility and quality of healthcare services play a crucial role. Urban areas typically have better healthcare infrastructure, more healthcare providers, and easier access to medical facilities. This allows for more effective management of hypertension and early intervention to prevent complications. Conversely, rural areas often suffer from a lack of healthcare resources, including fewer healthcare providers, longer distances to medical facilities, and limited availability of essential medications and diagnostic tools.

Socioeconomic factors such as income and education levels significantly impact health outcomes. Urban residents generally have higher income levels and better educational attainment, which correlate with improved health literacy and access to health information. This enables urban individuals to manage their hypertension more effectively and seek timely medical care. In contrast, rural residents often have lower income levels and educational attainment, limiting their ability to access healthcare services and understand the importance of managing hypertension.

Lifestyle factors also contribute to the disparity in complications. Urban lifestyles may include higher stress levels and less physical activity, but urban residents also have more opportunities for health education and preventive measures. Rural lifestyles, while potentially involving more physical labor,

may lack the resources and infrastructure for comprehensive health management, leading to a higher incidence of complications from untreated or poorly managed hypertension.

These findings highlight the need for targeted interventions to address the high complication rates associated with hypertension in rural areas. Improving healthcare access in rural communities is crucial. This could involve the establishment of more healthcare facilities, mobile clinics, and telemedicine services to reach remote areas. Additionally, health education campaigns tailored to the rural context can raise awareness about hypertension management and the importance of regular health check-ups.

In urban areas, continued emphasis on preventive measures and lifestyle modifications is essential to reduce the prevalence of hypertension and its complications. Programs promoting healthy eating, regular physical activity, and stress management can help mitigate the risk factors associated with hypertension

The study reveals significant disparities in the complications associated with hypertension between urban and rural areas of Kisumu County. Rural areas exhibit a higher rate of complications, likely due to limited healthcare access and lower health literacy. Addressing these disparities through improved healthcare infrastructure, targeted health education, and preventive interventions is essential for reducing the burden of hypertension complications and improving health outcomes in both urban and rural populations of Kisumu County.

4.3 Access Factors Influencing Hypertension Prevalence and its Complications

Table 5: Access to Health Care Services

Access	Rural n=123		Urban n=123	
	No.	%	No.	%
Yes	98	79.6748	123	100
No	25	20.3252	0	0
Total	**123**	**100**	**123**	**100**

Table 6: Monthly Income

Ksh ($)	Rural n=123		Urban n=123	
	No.	%	No	%
<7,000 (<$50)	59	47.97	12	9.76
7,000-14,000 ($50-100)	31	25.20	19	15.45
14,000-70,000 ($100-500)	25	20.33	41	33.33
70,000-140,000 ($500-1000)	8	6.50	29	23.58
>140,000 (>$1000)	0	0	22	17.89
Total	**123**	**100**	**123**	**100**

Table 6: Level of Education

Level	Rural N=123		Urban N=123	
	No.	%	No.	%
No formal education	23	18.70	7	5.69
Primary education	41	33.33	15	12.20
Secondary education	50	40.65	37	30.08
Tertiary education	9	7.32	64	52.03
Total	**123**	**100.00**	**123**	**100.00**

The study also explored how socio-economic factors influence the prevalence of hypertension and its associated complications in urban and rural areas of Kisumu County. The data reveals significant disparities between urban and rural populations, providing insights into the underlying causes of these health outcomes (as shown in table 5, 6 and 7).

Access to healthcare services shows significant disparities between urban and rural areas. The data reveals that all urban participants (100%) reported having access to healthcare services, whereas 20.33% of rural participants reported a lack of access as shown in table 5. This significant difference in healthcare access impacts the ability to diagnose, treat, and manage hypertension effectively.

Urban residents benefit from closer proximity to healthcare facilities, more healthcare providers, and better healthcare infrastructure. This access enables timely diagnosis and management of hypertension, preventing the development of severe complications. Rural residents, on the other hand, often face barriers such as long distances to healthcare facilities, fewer healthcare providers, and limited availability of diagnostic tools and medications. These barriers contribute to delayed diagnosis and treatment, leading to higher rates of complications.

In rural areas, improving healthcare access is crucial. Establishing mobile clinics and telemedicine services can reach remote areas, ensuring timely diagnosis and treatment of hypertension. Health literacy campaigns should educate communities on the importance of hypertension management and the availability of healthcare resources. Additionally, policies aimed at improving income levels and educational opportunities can enhance overall health outcomes in rural populations.

Income levels vary considerably between urban and rural areas. In rural areas, 47.97% of participants earn less than 7,000 KSH per month, compared to only 9.76% in urban areas as shown in table 6. Conversely, higher income brackets are more common in urban settings, with 17.89% of urban participants earning more than 140,000 KSH per month, compared to none in rural areas. Higher income levels in urban areas provide better access to quality healthcare, healthier food options, and opportunities for physical activities, all of which can mitigate the risk factors associated with hypertension. On the other hand, lower income in rural areas can limit access to healthcare services and nutritious food, increasing vulnerability to hypertension and its complications.

Education levels also show a stark contrast between urban and rural areas. In urban areas, 52.03% of participants have tertiary education, while only 7.32% of rural participants have reached this level of education. Conversely, 18.70% of rural participants have no formal education, compared to just 5.69% in urban areas as shown in table 7. Higher education levels correlate with better health literacy, enabling individuals to make informed decisions about their health, seek preventive care, and adhere to treatment plans. Lower education levels in rural areas contribute to poorer understanding and management of hypertension, leading to higher rates of complications.

4. Summary, Conclusion and Recommendation

5.1 Summary of Findings

The study aimed to compare hypertension prevalence and its complications among adults in urban versus rural areas of Kisumu County, Kenya, and to examine the socio-economic, factors influencing compare hypertension prevalence and its complications.

The prevalence of hypertension was significantly higher in urban areas, with 33.33% of participants being hypertensive compared to 17.07% in rural areas. The higher prevalence in urban areas can be attributed to lifestyle factors such as higher stress levels, dietary habits, and better access to healthcare, which facilitates more frequent diagnoses.

Complications associated with hypertension were more prevalent among rural hypertensive individuals (76.19%) compared to their urban counterparts (31.71%). Urban hypertensive individuals primarily reported stroke, heart disease, and kidney disease as complications, while rural individuals reported a wider range, including eye problems. The higher rate of complications in rural areas is likely due to limited access to healthcare, resulting in delayed diagnosis and treatment.

Socio-economic factors, such as monthly income, level of education and healthcare access significantly influenced hypertension prevalence and its complications. Urban residents typically had higher income levels and education, better healthcare access, and higher health literacy, which contributed to more effective management of hypertension. Conversely, rural residents faced lower income levels, less education, and limited healthcare access, leading to poorer management and higher rates of complications.

5.2 Conclusion of the Study

The study concludes that there are substantial differences in hypertension prevalence and complications between urban and rural areas of Kisumu County, influenced by socio-economic, lifestyle, and healthcare access factors. Urban areas exhibit higher hypertension prevalence due to lifestyle factors but benefit from better healthcare access, resulting in fewer complications. Rural areas show a lower prevalence but higher complication rates due to limited healthcare access and lower socio-economic status. These findings underscore the need for tailored public health interventions to address the specific challenges faced by urban and rural populations in managing hypertension.

5.3 Recommendations

For Urban Areas:

- Health Education Programs: Implement educational initiatives focusing on the importance of stress management, regular physical activity, and healthy dietary choices to reduce hypertension prevalence.

- Preventive Healthcare: Encourage regular health screenings and check-ups to facilitate early diagnosis and management of hypertension.
- Support Services: Provide counseling and support services to help individuals manage stress and maintain a healthy lifestyle.

For Rural Areas:

- Improving Healthcare Access: Establish mobile clinics, telemedicine services, and community health workers to reach remote areas, ensuring timely diagnosis and treatment of hypertension.
- Health Literacy Campaigns: Develop educational campaigns tailored to rural contexts to raise awareness about hypertension management and the importance of regular health check-ups.
- Economic and Educational Support: Implement policies to improve income levels and educational opportunities, enhancing overall health literacy and access to healthcare services.
- Infrastructure Development: Invest in healthcare infrastructure in rural areas to provide essential diagnostic tools and medications, facilitating better management of hypertension and its complications.

These recommendations aim to address the disparities in hypertension prevalence and complications between urban and rural areas, ultimately improving health outcomes for all residents of Kisumu County.

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