

## Prevalence of chronic kidney disease among people living with diabetes mellitus and hypertension at Manhyia District Hospital

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### Abstract

**Background:** Chronic kidney disease (CKD) is a significant health concern, particularly among patients with comorbid conditions such as hypertension and diabetes. This study aims to assess the prevalence of CKD, medication adherence, health behaviors, and patient knowledge in a population with these chronic conditions. By analyzing data from a hospital database, this research identifies key areas for intervention to improve patient outcomes and manage the progression of CKD.

**Methods:** A cross-sectional study was conducted at Manhyia District Hospital among a conveniently sampled 200 patients living with diabetes, hypertension, and both conditions. A checklist was used to assess the number of cases, and semi-structured questionnaires were used to collect data on sociodemographics, knowledge level, and the risk factors of CKD. The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 27.0 and Microsoft Excel 2013.

**Results:** The prevalence of CKD was highest among patients with both hypertension and diabetes (31.34%), compared to those with only diabetes (15.31%) or hypertension (11.91%). The study showed that 60% were living with low-risk factors of CKD, 30% were living with mild risk factors, and 10% were living with high-risk factors of CKD. The two main risk factors were obesity and non-compliance with medications. The knowledge level about CKD was generally poor, with about 11% who had not even heard about CKD and as high as 50% having poor knowledge about the functions of the kidneys.

**Conclusions:** The prevalence of CKD among patients living with hypertension and diabetes mellitus comorbid was high due to non-adherence to hypertensive and diabetic medications, knowledge regarding CKD was poor, and there were low-risk factors contributing to CKD.

**Keywords:** Chronic kidney disease; Hypertension; Diabetes; CKD

### 1. Introduction

A major public health problem is CKD, especially for those who also have diabetes and high blood pressure. Since these disorders are major causes of CKD, their presence is very harmful to renal function. Diabetes, the main cause of CKD, damages blood vessels in the kidneys, making it harder for them to properly filter waste. Similarly, the second most common cause of CKD, hypertension, exacerbates kidney damage by placing an excessive amount of pressure on the kidneys' blood arteries (Centers for Disease Control and Prevention [CDC], 2022).

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Diabetes is a long-term metabolic disease marked by high blood glucose (blood sugar) levels. Serious damage to the heart, blood vessels, eyes, kidneys, nerves, and heart can result from diabetes over time. The disorder develops when the body is unable to use the insulin that is produced by the pancreas or when the pancreas produces insufficient amounts of the hormone that controls blood sugar (World Health Organization [WHO], 2023). Type 1 diabetes, Type 2 diabetes, and gestational diabetes are the three main forms of the disease. Out of all of these, Type 2 diabetes is the most prevalent, making up between 90 and 95 percent of diabetes cases globally (Centers for Disease Control and Prevention [CDC], 2022). Over the past several decades, there has been a dramatic increase in the prevalence of diabetes, making it a major public health concern worldwide. The International Diabetes Federation (IDF) estimates that 537 million individuals between the ages of 20 and 79 have diabetes in 2021. If present trends continue, this number is projected to increase to 643 million by 2030 and 783 million by 2045 (International Diabetes Federation [IDF], 2021). Numerous causes, including aging populations, urbanization, poor diets, and an increase in sedentary lifestyles, are contributing to this concerning growth.

High blood pressure, sometimes referred to as hypertension, is still a major global health concern, affecting an estimated 1.28 billion individuals between the ages of 30 and 79 globally, of whom about two-thirds reside in low- and middle-income nations (World Health Organization [WHO], 2021). Recent statistics show that only around 42% of individuals with hypertension are identified and receiving medication and that approximately 46% of adults with the ailment are uninformed that they have it. What is perhaps more alarming is that only around 21% of people with hypertension can control their illness (WHO, 2021). These figures demonstrate the persistent global prevalence of hypertension as well as the shortcomings in diagnosis, care, and therapy.

Primary (essential) hypertension and secondary hypertension are the two main categories into which hypertension can be divided. About 90–95% of instances of hypertension are primary, meaning they have no known cause. A combination of genetic and lifestyle variables, such as eating a diet heavy in fat, salt, and cholesterol, being inactive, being obese, and experiencing stress, are responsible (Lackland & Weber, 2015). Conversely, secondary hypertension is less frequent and is brought on by an underlying illness such as renal disease, hormone imbalances, or the usage of certain drugs (Carretero & Oparil, 2000). Due to its tendency to go undiagnosed until serious harm to the body occurs, hypertension is sometimes referred to as the "silent killer" (Kearney et al., 2005). Before suffering a major cardiovascular event, such as a heart attack or stroke, many people with hypertension might not even be aware that they have the illness. Due to its asymptomatic nature, early identification and routine blood pressure monitoring are crucial.

Diabetes and hypertension have a complicated, bidirectional connection in which the development of one illness may contribute to the other's development. It is well recognized that diabetes, especially Type 2, can trigger the development of hypertension through several pathways, including insulin resistance. Insulin resistance can raise blood pressure by inducing endothelial dysfunction, stimulating the sympathetic nervous system, and encouraging sodium retention (Cheung & Li, 2012). Blood vessels can be harmed by high blood glucose levels, which can result in arteriosclerosis and hypertension (American Diabetes Association [ADA], 2022).

On the other hand, high blood pressure can accelerate the development of diabetes. According to Lastra et al. (2014), persistently elevated blood pressure can cause insulin resistance, which is a prelude to Type 2 diabetes, by impairing blood vessel function and decreasing the muscle's ability to absorb glucose. Furthermore, damage to blood vessels caused by hypertension can hinder pancreatic function, making it harder for the body to manage blood glucose levels properly. This raises the risk of diabetes (Ferrannini & Cushman, 2012).

Diabetes and hypertension together have a particularly harmful effect because they can exacerbate one another, starting a vicious cycle that hastens the deterioration of kidney function. The risk of CKD is significantly higher in people with both diabetes and hypertension than in people with either illness alone. This emphasizes the necessity of aggressively managing both disorders to either prevent or reduce the course of CKD (National Kidney Foundation, 2022). Comprehending the complex relationship between diabetes, hypertension, and CKD is imperative in formulating all-encompassing treatment plans that maintain renal function and enhance patient results.

CKD, also called kidney failure, describes the gradual loss of kidney function. The kidney filters waste and excess fluid from the blood, which is then excreted in the urine. CKD is an emerging global public health problem (Hill NR, 2016). The disease is a component of the new epidemic of chronic conditions that have replaced malnutrition and infection as the leading causes of mortality in our world today (Hill NR, 2016). Several studies have shed light on the prevalence of CKD in Ghana, highlighting that the prevalence of CKD is increasing, with hypertension and diabetes being the leading causes (Badro, 2023). This underscores the importance of understanding the intersection of CKD with other chronic illnesses, as the coexistence of these conditions can exacerbate the burden on patients and the healthcare system (Saeed et al., 2023; Sarfo et al., 2018). CKD is manifested by albuminuria and a glomerular filtration rate of less than

60ml/min/1.7m<sup>5</sup> For at least 3 months, regardless of clinical diagnosis (Chen *et al.*, 2019). The incidence of CKD is usually exacerbated in Ghana due to the co-occurrence of infectious causes that predispose one to CKD, like glomerulonephritis and human immunodeficiency virus (HIV), and consumption of nephrotoxic traditional medicinal plants also amplifies the problem in Ghana (Adu *et al.*, 2019; Animaw *et al.*, 2022). The increasing pattern of chronic kidney disease has also doubled in Africans, although old age populations are at a higher risk of developing CKD, reports are stating young adults are at higher risk of mortality and long-term disabilities when compared with counterpart nations (Abd ElHafeez *et al.*, 2018). This further complicates the situation of economic constraints expended to tackle CKD, which demands very expensive interventions, including dialysis and kidney transplants. Since the treatment cost is unbearably high, preventive measures and early detection were highly suggested mechanisms to mitigate the situation (Sarfo *et al.*, 2018).

### 1.1. Study Objectives

These are the objectives of the study are to determine the prevalence of chronic kidney disease among people living with diabetes Mellitus and hypertension from 2022 to 2024, to assess the knowledge level of people with diabetes mellitus and hypertension living with chronic kidney disease, to identify the proportion of individuals with Diabetes Mellitus and Hypertension who lived with the risk factors of chronic kidney disease.

### 1.2. Epidemiological study

Non-communicable diseases are on the rise in low and middle-income countries (Abegunde *et al.*, 2007). This epidemiological transition is due to the adoption of Western lifestyles, which changes in nutrition, rapid urbanization, and an aging population as a result of relatively improved healthcare systems (Fedacko *et al.*, 2019). This has culminated in the burgeoning epidemics of various chronic diseases such as hypertension, diabetes mellitus, and others.

Chronic kidney disease is increasing in incidence and prevalence worldwide and is estimated to be between 10% and 13% globally (Seck *et al.*, 2014). CKD has now emerged as a public health challenge in sub-Saharan Africa, with a reported prevalence of 13.9% in a meta-analysis (Stanifer, 2014). The prevalence of CKD in Ghana is 13.3% in a recent study (Adjei *et al.*, 2018). There is, therefore, a need to identify the common causes of CKD in patients with hypertension and diabetes, which is a major risk factor for the development of CKD.

### 1.3. Prevalence of CKD among Hypertensive and Diabetic Patients From 2020 To 2024

A significant risk factor for CKD is hypertension, and research regularly demonstrates that CKD is more prevalent in those with hypertension. Global estimates of people with hypertension with CKD range from 30 to 40 percent; this number illustrates the significant correlation between increasing blood pressure and progressive kidney damage (Mills *et al.*, 2020). Hypertension damages the kidneys by putting more pressure on their blood arteries, which causes glomerular sclerosis and a slow loss of renal function (Bikbov *et al.*, 2020). An estimated 1.28 billion individuals globally suffer from hypertension, which contributes to the high incidence of CKD in this group (World Health Organization [WHO], 2021).

Diabetes is the primary cause of CKD, and one of the most prevalent and dangerous side effects of diabetes is diabetic nephropathy. Approximately 30–40% of diabetics worldwide experience CKD; however, there are notable geographical differences based on variables such as genetic predispositions, diabetes treatment strategies, and healthcare accessibility (Afkarian *et al.*, 2016). The prevalence of CKD among diabetic patients is especially high in locations with higher rates of diabetes, such as portions of Asia, the Middle East, and North America (Chen *et al.*, 2020). Chronic hyperglycemia, which causes glomerular hypertension, an increase in glomerular filtration rate, and ultimately, kidney damage, is a pathogenesis of diabetic nephropathy (Zhang *et al.*, 2021).

The chance of developing CKD is greatly elevated when diabetes and hypertension coexist in one person. When these two disorders are present together, kidney damage is accelerated, and the prevalence of chronic renal disease is larger than it would be with either condition alone. According to Thomas *et al.* (2016), the prevalence of CKD among people who have both diabetes and hypertension is frighteningly high worldwide, frequently surpassing 50%. Due to its high incidence, CKD can be prevented by implementing integrated management techniques that target blood pressure and blood glucose control (Tuttle *et al.*, 2014).

The high global incidence of CKD among hypertensive and diabetic individuals is caused by several variables. In these groups, poor management of blood pressure and blood glucose is the main cause of the development of CKD. Furthermore, poor diets, obesity, and physical inactivity all increase the risk of CKD in those with hypertension and

diabetes (Tuttle et al., 2014). The burden of CKD worldwide is also significantly influenced by socioeconomic variables, such as unequal healthcare delivery, lack of awareness, and restricted access to care (Stanifer *et al.*, 2016).

Hypertension is one of the main causes of CKD in Ghana, where high blood pressure is particularly common. According to research by Sarfo et al. (2018), CKD was present in 28.3% of hypertension patients in Ghana. According to Addo et al. (2018), this prevalence reflects the substantial burden of CKD among people with high blood pressure, which affects almost 33% of the adult population in the nation.

In Ghana, diabetes is a significant cause of CKD, and diabetic nephropathy is a prevalent consequence among those with diabetes. Studies have shown a significant prevalence of CKD among diabetes patients in Ghana. According to research by Osafo *et al.* (2011), diabetes significantly affects kidney function since 46% of diabetic patients at a Ghanaian tertiary hospital had CKD. Different research conducted in 2005 by Amoah and Schuster discovered that 36% of Ghanaian diabetes individuals had CKD.

#### **1.4. Knowledge Assessment of Chronic Kidney Disease Among Hypertensive and Diabetic Patients.**

A major worldwide health concern is CKD, which is more common in those with diabetes and hypertension, the two main risk factors for the condition. Even among at-risk populations, awareness and knowledge of CKD are still low despite the condition's increasing prevalence. Effective disease treatment and prevention require an understanding of the degree of awareness about CKD among individuals with hypertension and diabetes.

Global research repeatedly demonstrates that people with diabetes and hypertension often have little understanding of CKD. According to a systematic study conducted by Gheewala *et al.* (2018), there is a notable knowledge gap on CKD among high-risk groups, such as those with diabetes and hypertension, with awareness ranging from 10% to 28%. Comparably, research conducted in the United States by Tuot *et al.* (2013) found that just 24 percent of patients with diabetes and hypertension knew they had CKD, and even fewer knew how their illnesses related to their chance of getting the disease.

Research from several African nations regularly demonstrates that individuals with diabetes and hypertension typically have little understanding of CKD. For example, Oluyombo *et al.* (2016) discovered that just 17.2% of patients with diabetes and hypertension in Nigeria knew enough about chronic kidney disease. The study identified significant knowledge gaps on CKD risk factors, symptoms, and the significance of early diagnosis. Despite being diagnosed with diseases that are major risk factors for CKD, many patients were not aware of the necessity of routine kidney function tests.

Studies performed in Ghana show that individuals with diabetes and hypertension often know very little about CKD. In the Ho Municipality, just 22.5% of diabetes patients were found to know enough about CKD, according to research by Ephraim *et al.* (2015). According to the study, only a small percentage of patients realized that frequent kidney function tests were necessary to maintain their health and that many patients were ignorant of the connection between diabetes and renal illness.

Research conducted in 2011 at a tertiary hospital in Ghana by Osafo *et al.* discovered that the majority of hypertension patients knew very little about CKD. Mate-Sowah *et al.* (2017) evaluated individuals with both diabetes and hypertension in another research to determine their understanding of CKD. Just 18% of patients, according to the study, had a thorough awareness of CKD, its risk factors, and the need for early identification. Given the high incidence of diabetes and hypertension in Ghanaian society, two conditions that greatly raise the risk of CKD, this lack of awareness was especially troubling.

#### **1.5. Proportion of Individuals Who Lived with the Contributing Factors of Chronic Kidney Disease.**

One of the main risk factors for CKD is hypertension. An estimated 1.13 billion individuals worldwide suffer from hypertension, a disorder that has grown progressively more common worldwide (World Health Organization [WHO], 2019). The high incidence of hypertension is especially worrisome since it has a direct role in the onset and advancement of chronic kidney disease. According to research by Mills *et al.* (2020), 32% of individuals globally have hypertension, with greater rates seen in low- and middle-income nations with inadequate access to healthcare.

According to studies, 20% to 40% of those with diabetes will eventually get CKD (Chronic Kidney Disease Prognosis Consortium, 2019). The increased burden of the disease in these regions is partly due to the rising incidence of diabetes, especially in low- and middle-income nations. It is also necessary to treat both diabetes and hypertension to control renal health since they raise the risk of CKD.

Being obese is a known risk factor for hypertension and diabetes, and it also plays a separate role in the onset of CKD. Over 650 million people worldwide were considered obese in 2016 (WHO, 2021), marking a threefold increase in the prevalence of obesity since 1975. According to Eckel et al. (2011), obesity causes CKD by promoting insulin resistance, inflammation, and an elevated glomerular filtration rate, all of which can eventually cause kidney damage. According to a study by Wang *et al.* (2016), people who are obese have a 1.5–2.5 times higher chance of having CKD than people who have a normal body mass index (BMI). Therefore, the worldwide obesity pandemic presents a serious threat to attempts to avoid CKD, especially as obesity-related conditions like diabetes and hypertension grow increasingly common.

The development of CKD is also significantly influenced by lifestyle factors, including smoking, poor nutrition, and inactivity. Unhealthy diets, which are defined by excessive intake of processed foods, sugar, and salt, as well as physical inactivity, have been linked to the increased incidence of CKD worldwide, according to a global study conducted by the Global Burden of Disease Study (Murray *et al.*, 2020). The development of obesity, diabetes, and hypertension is strongly associated with these lifestyle variables, which increases the risk of CKD. Over 1.4 billion persons worldwide do not participate in adequate physical exercise to sustain good health, according to a 2018 WHO assessment, making insufficient physical activity a global issue. The risk of developing CKD and its associated variables is greatly increased by this sedentary lifestyle and bad eating habits.

To address the rising prevalence of CKD in Africa, especially in Ghana, preventive interventions to lower the risk of CKD in hypertensive and diabetic individuals are essential. Reducing the risk of CKD requires early identification, lifestyle changes, efficient medical therapy, and system improvements in the healthcare system. To lessen the effect of this chronic illness on the continent, ongoing efforts are required to improve CKD prevention and care, especially in low-resource environments.

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## 2. Methodology

A descriptive cross-sectional study was employed in the study. This design can identify trends in the study area. It is particularly useful for identifying individuals who developed the disease and new individuals who recently had the disease. This design was chosen again because the study was carried out at a short point in time to determine the prevalence of CKD among people living with diabetes mellitus and hypertension at Manhyia District Hospital.

### 2.1. Study Population

The target population for this study comprises patients with hypertension only (HPT), hypertension with diabetes mellitus (HPT+ DM), and diabetes mellitus only (DM) at Manhyia District Hospital who have developed or been diagnosed with chronic kidney disease.

### 2.2. Inclusion Criteria

Patients 18 years and above living with either Hypertension, diabetes mellitus, or both conditions that have been diagnosed with chronic kidney disease.

Hypertension was defined as the presence of a persistently elevated systolic blood pressure of  $\geq 140$  mm Hg and or a diastolic pressure of  $\geq 90$  mm Hg (WHO) who are 18 years and above and were on hypertensive drugs at the enrollment visit.

Diabetes mellitus was defined as fasting blood glucose  $\geq 7$  mmol/L on two or more occasions, random blood glucose  $\geq 11.1$  mmol/L with symptoms,  $HbA_{1c}$  Of  $> 6.5\%$  (WHO), and on medications for the treatment of type 2 diabetes mellitus.

### 2.3. Exclusion Criteria

- Patients who had pre-existing medical conditions may affect the outcome of the study, such as lupus nephritis, type one diabetes, and hypertensive emergencies/urgencies.
- Patients who were unable to provide informal consent or who did not wish to participate in the study.

### 2.4. Sampling Technique

A systematic sampling technique was used to ensure that patients with CKD among patients with diabetes mellitus and hypertension in Manhyia District Hospital were fairly represented in the study. The technique ensures that the findings we get from the study are close to what we could have gotten if the researcher had measured a complete population (Shadish *et al.*, 2022).

## 2.5. Sample Size

The sample size was calculated using the Daniels formula to get the desired degree of accuracy, the desired level of confidence, and the anticipated fraction of the characteristics existing in the population. Daniel's formula is thought to be particularly useful in large-population settings and unknown populations.

$$n = \frac{Z^2 x P(1-p)}{d^2} \text{ Daniel WW (1999).}$$

n= sample size

z = value at reliability level (z value for a 95% confidence interval and alpha of 0.05 is 1.96)

P= prevalence from the literature review is 13.3% (*Elliot K Tannor, et al 2019*)

d= margin error (amount of random sampling error in a survey is 0.05 at 95% confidence level)

So, our sample size will be determined by the formula

$$n = \frac{(1.96)^2 \times 0.133(1-0.133)}{0.05^2} = 177=200.$$

The sample size was 177 patients, but there were enough patients for the study, so we decided to increase it to 200.

## 2.6. Data Collection Instrument

The data for the study was collected using semi-structured questionnaires and a checklist. Bearing in mind the analysis mission, information was obtained from previous data and patients themselves. A semi-structured questionnaire was used as a key data collection tool for the study. The questionnaire consists of mostly closed-ended questions and a few open-ended questions. The questionnaire was therefore translated into the local language of the respondent for them to understand. The checklist was used to determine the population who had been diagnosed and lived with hypertension, diabetes mellitus, or both conditions and who developed chronic kidney disease from 2022 to the first quarter of 2024.

## 2.7. Data Analysis

The collected data from the participants was organized using descriptive statistics such as tables and charts according to the study, and the data was analyzed using a Statistical Package for Social Science (SPSS) version 27.0 and Microsoft Excel 2013. The data was thoroughly scrutinized to ensure that it was free from errors before the analysis was done.

## 3. Results

### 3.1. Socio-demographic characteristics of participants

The table below contains the proportions of the genders that were involved in the study.

**Table 1** Gender

Gender	Frequency	Percentage
Female	108	54.0
Male	92	46.0
Total	200	100.0

Source: Field Data, 2024

From Table 1, 54% of the participants were females, while 46% were males.

The table below focuses on the age ranges that were employed in the study.

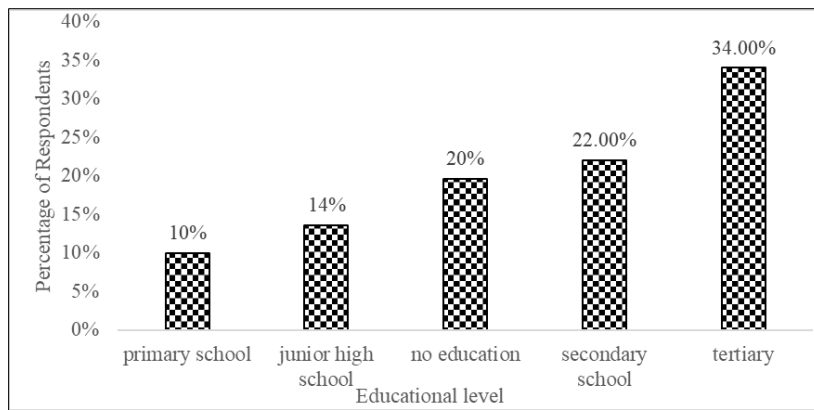
**Table 2** Age

Age	frequency	Percentage
18-20	18	9.0
21-30	59	29.5
31-40	51	25.5
41-50	47	23.5
50 +	25	12.5
total	200	100.0

**3.2. Source: Field Data, 2024**

From Table 2, the highest proportion of the age range that was involved in the study is 21 – 30, at 29.5%, and the lowest age range is 18 – 20, with 9%.

The figure below shows the level of education of participants in the study. Most of them had completed tertiary.

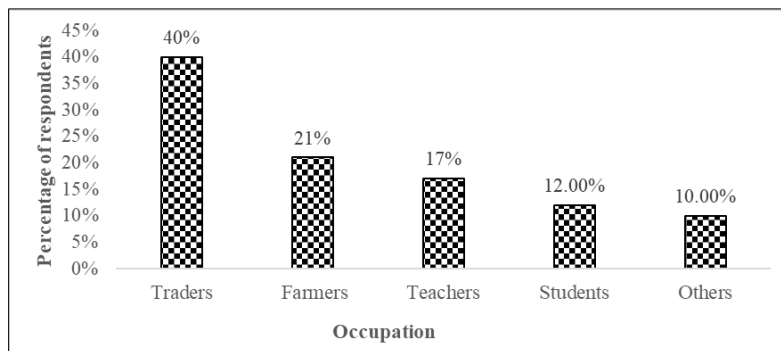


Source: Field Data, 2024

**Figure 1** Educational level of participants.

Figure 1 shows that 34% of respondents had tertiary education, the highest percentage, while 10% had only primary education.

The figure below shows data on the occupations of the participants that were involved in the study.



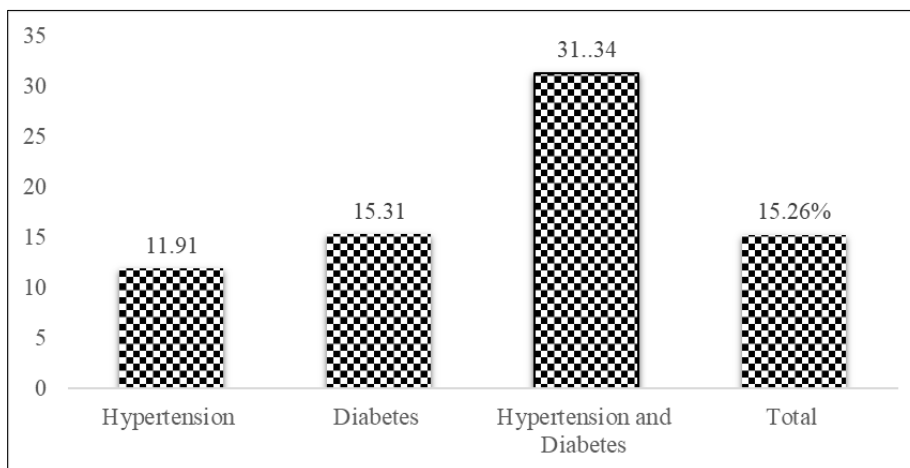
Source: Field Data, 2024

**Figure 2** Occupations of participants

From Figure 2, the majority (40%) of the respondents were traders, and 10% were others, that is, occupations that were not listed.

### 3.3. Prevalence of Chronic Kidney Disease Among People living with Hypertension and Diabetes from 2022 – 2024

Data was collected from 200 patients with hypertension, diabetes, and hypertension and diabetes, that is, from 2022 to the first quarter of 2024. Within this period, there were (61.53%) cases of hypertension, (25.74%) cases of diabetes, and (12.74%) cases of both hypertension and diabetes. The prevalence of chronic kidney disease among patients living with hypertension recorded the lowest (11.91%), followed by those living with diabetes (15.31), with the highest (31.34%) recorded in those living with both hypertension and diabetes. The total prevalence of chronic kidney disease across all the conditions is 15.26%, as shown in Fig.4.2



Source: Fieldwork, 2024

Figure 3 The prevalence of chronic kidney disease.

From Figure 3: 31.4% of participants living with both HPT and DM had CKD, while 11.91% of those living with only HPT had CKD.

### 3.4. General Knowledge about kidney health.

The table below contains the percentage of participants who have heard of CKD. A large proportion had at least heard about it.

**Table 3** Have you ever heard of kidney disease?

	Frequency	Percentage
No	22	11.0
Yes	178	89.0
Total	200	100.0

Source: Field Data, 2024

Table 3. shows that 89% of the participants had heard of CKD, while 11% had never heard of it.

The table below assesses the source of the participant's information about CKD. A higher proportion heard it from the hospital.



**Table 4** Source of information about kidney disease

Source	Frequency	Percentage
Radio	32	17.78
Television	50	28.08
Hospital	90	50.56
School	6	3.00

Source: Field Data, 2024

Table 4. shows that 50.56% of the participants heard about CKD in the hospital, while 3% heard it from school.

The table below shows data on participants' knowledge of how frequently blood sugar and blood pressure were to be checked.

**Table 5** Frequency of blood pressure and blood glucose level

	Frequency	Percentage
Daily	91	45.5
Monthly	66	33.0
Weekly	43	21.5
Total	200	100.0

Source: Field Data, 2024

From Table 5, 45.5% of the participants reported that blood pressure and sugar are to be checked daily, while 21.5% said they are to be checked weekly.

The table below shows the various stages of those participants who were informed that they have CKD.

**Table 6** Stage of CKD

	Frequency	Percentage
Stage 1	4	12.5
Stage 2	16	51
Stage3	3	10.0
Stage 4	5	18.0
Stage 5	3	8.0
Total	31	100.0

Source: Field Data, 2024

From Table 6, 51% of those who were informed they had CKD were in stage 2, and 8% were in stage 5.

The table below shows information on whether the participants know the treatment options for CKD or not.

**Table 7** Treatment options for CKD

	Frequency	Percent
No	32	16
Yes	168	84.0
Total	200	100.0

Source: Field Data, 2024

Table 7 shows that 84% of the participants knew about the treatment options available for CKD, but 16% did not.

The table below shows participants' knowledge of the cost of dialysis

**Table 8** cost of dialysis

	Frequency	Percentage
Above 500 cedis	115	57.5
Around 200 cedis per cycle	14	7.0
Around 500 cedis per cycle	71	35.5
Total	200	100.0

Source: Field Data, 2024

From Table 8, 57.5% of the participants reported that the cost of dialysis is above 500 cedis, while 7% said it is around 200 cedis.

### 3.5. Personal Habits that Predispose to CKD

The table below shows whether the participants are on medications or not.

**Table 9** Medications they are on

	Frequency	Percentage
No	92	46.05
Yes	108	54.0
Total	200	100.0

Source: Field Data, 2024

From Table 9, 46% percent of the participants said they were not on any medication, but 54.0 reported they were on medication.

The table below shows the various types of medications those who said they are on medication are using.

**Table 10** Types of medications

	Frequency	Percentage
CKD medications	4	3.0
DM	34	31.5
DM and HPT	23	19.5
HPT	45	45.0
NSAIDS	1	.5
SUPPLEMENTS	1	.5
TOTAL	108	100.0

From Table 10, 45% of those who were on medication were on hypertensives, and 19.5 were on both anti-diabetes and hypertensive medications.

The table below shows data on whether participants engaged in physical activity or not.

**Table 11** Engagement in regular physical activity

	Frequency	Percentage
No	51	25.5
Yes	149	74.5
Total	200	100.0

From Table 11, 74.5% of the participants engage in physical activity, while 25.5% do not engage in physical activity.

The table below shows the participant's daily water intake.

**Table 12** How is your water intake daily?

	Frequency	Percentage
Eight sachets a day	47	23.5
Four sachets a day	79	39.5
One sachet a day	7	3.5
Three sachets a day	67	33.5
Total	200	100.0

Source: Field Data, 2024

From Table 12, 39.5% of the participants reported that they take in four sachets of water per day, while 3.5% reported one sachet of water daily.

The tables below show whether the participants take in herbal preparations or not.

**Table 13** Intake of herbal preparations

	Frequency	Percentage
No	138	71.0
Yes	58	29.0
Total	200	100.0

Source: Field Data, 2024

From Table 13, 71% of the respondents were not taking herbal preparations, but 29% were taking herbal preparations.

The table below shows the average intake of fruits and vegetables per day by the participants.

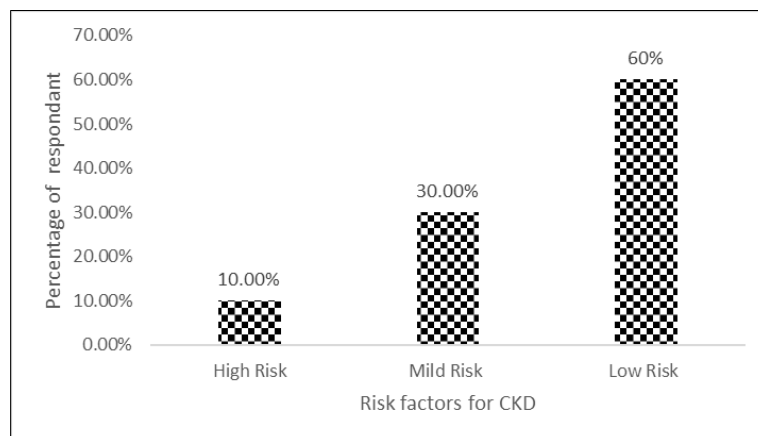
**Table 14** Average servings of fruits and vegetables intake per day

	Frequency	Percentage
None	30	15.0
One	41	20.5
Three	71	35.5
Two	58	29.0
Total	200	100.0

Source: Field Data, 2024

From Table 14, 35.5% of the participants consume three servings of fruits and vegetables daily, while 15% do not consume any servings.

The figure below shows the proportion of participants living with risk factors for CKD. Those with 7 – 10 risk factors were considered “high risk,” those with 3 – 6 risk factors were “considered mild risk,” and those with 2- 1 risk factors were “low risk.”



Source: Field Data, 2024

**Figure 4** Risk factors for CKD

From Figure 4, 60% were living with a low risk of CKD, but 10% of the participants were living with a high risk of CKD.

## 4. Discussion

### 4.1. Prevalence of CKD among people living with diabetes and hypertension

The data collected from the hospital database between 2022 and the first quarter of 2024 provides valuable insights into the prevalence and distribution of hypertension, diabetes, and their co-occurrence among patients, as well as the associated CKD risk. The findings reveal that a significant proportion of the patient population is affected by these conditions, with varying degrees of risk for developing CKD.

Hypertension emerges as the most prevalent condition within the patient population, accounting for 61.53% of the patients. This finding aligns with global trends indicating that hypertension remains a dominant health concern, particularly in aging populations and those with increased exposure to risk factors such as obesity, sedentary lifestyles, and dietary factors (Mills *et al.*, 2020). The prevalence of diabetes alone, at 25.74%, is also substantial. This prevalence is consistent with global estimates, where the number of individuals diagnosed with diabetes, particularly type 2 diabetes, continues to rise, largely driven by lifestyle factors and an aging population (Saeedi *et al.*, 2019).

The co-occurrence of hypertension and diabetes in 12.74% of the population is particularly concerning. This combination is known to exponentially increase the risk of cardiovascular complications, kidney disease, and other severe health outcomes (Gujral *et al.*, 2020). The interaction between hypertension and diabetes creates a vicious cycle that exacerbates the progression of both conditions, complicating treatment and management (Bakris *et al.*, 2020).

The prevalence of CKD among patients with these conditions varies significantly, underscoring the differing impacts of hypertension, diabetes, and their combination on kidney health. Among patients with hypertension, the prevalence of CKD is 11.91%. While lower than the overall prevalence across all conditions, this rate is still significant, reflecting the well-documented impact of hypertension on kidney function over time (Weir *et al.*, 2017). Hypertension is a leading cause of CKD due to its role in damaging the renal vasculature, leading to reduced kidney function and, eventually, kidney failure (Wang *et al.*, 2016).

Patients with diabetes exhibit a higher prevalence of CKD at 15.31%. This higher prevalence is consistent with global data showing that diabetes, particularly when poorly managed, is one of the leading causes of CKD worldwide (Zhang *et al.*, 2021). Hyperglycemia in diabetic patients causes damage to the kidneys' microvasculature, leading to diabetic nephropathy, a common precursor to CKD (Tuttle *et al.*, 2014).

The highest prevalence of CKD is observed among patients with both hypertension and diabetes, at 31.34%. This figure is alarmingly high and highlights the synergistic effect of these conditions on kidney health. The co-occurrence of

hypertension and diabetes significantly accelerates the progression of CKD due to the combined effects of hyperglycemia and hypertension-induced vascular damage (kidney disease): Improving Global Outcomes [KDIGO], 2020). This underscores the need for aggressive management strategies in patients with both conditions to prevent the onset and progression of CKD.

The high prevalence of CKD among patients with hypertension, diabetes, and their combination has significant implications for healthcare providers. Early identification and management of these conditions are crucial to prevent the onset and progression of CKD. Regular screening for kidney function in patients with hypertension and diabetes should be a standard practice, as early detection can lead to interventions that slow disease progression and improve patient outcomes (KDIGO, 2020).

Moreover, the data suggests a need for integrated care approaches that address the overlapping risk factors and complications of hypertension, diabetes, and CKD. Multidisciplinary care teams, including primary care physicians, endocrinologists, nephrologists, and dietitians, are essential for providing comprehensive care that addresses all aspects of these complex conditions (Bakris *et al.*, 2020).

#### **4.2. knowledge level of people with diabetes mellitus and hypertension living with chronic kidney disease**

The data extracted from Tables 4.3.1 to 4.3.6 provides a comprehensive understanding of participants' perceptions, awareness, and knowledge about CKD and its contributing factors, management, and associated costs. These insights are vital for developing effective patient education and healthcare strategies.

The data from Table 4.3.3 reveals that 45.5% of participants believe that the contributing factors for CKD, specifically diabetes and hypertension, should be checked regularly. Additionally, 21.5% suggest that these factors should be monitored weekly. Regular monitoring is crucial in managing CKD risk, as it allows for early detection of complications and timely intervention (KDIGO, 2020). The data indicates that a significant portion of the participants are aware of the importance of regular monitoring, which is encouraging. However, there remains a need for standardizing guidelines on monitoring frequency to ensure consistent patient management.

The data from Table 4.3.4 shows that 51% and 8% of participants were at stages 2 and 5 of CKD, respectively. These stages indicate severe kidney damage, with stage 5 being indicative of kidney failure requiring dialysis or transplantation (Levey *et al.*, 2020). The distribution of CKD stages among participants highlights the advanced state of kidney disease in a notable portion of the population, underscoring the need for timely diagnosis and intervention.

A majority of participants (84%) reported being aware of CKD treatment options, as shown in Table 4.3.5. This level of awareness is positive and reflects the effectiveness of patient education efforts. However, 16% of participants who were not aware of treatment options indicate a gap that needs to be addressed. Ensuring that all patients are informed about their treatment options is crucial for empowering them to make informed decisions about their care (Tong *et al.*, 2019).

Finally, Table 4.3.6 reveals that 57.5% of participants believe the cost of dialysis per cycle is above ₺500, with 7% estimating it to be around ₺200. The cost of dialysis is a critical concern for patients with CKD, as it is a long-term, recurrent expense that can place a significant financial burden on patients and their families (Vanholder *et al.*, 2018). Accurate knowledge of dialysis costs is important for patients to plan and manage their treatment, highlighting the need for clear communication from healthcare providers.

The findings from these tables highlight the importance of comprehensive patient education and effective communication in managing CKD. Ensuring that patients are fully informed about the contributing factors, monitoring requirements, treatment options, and associated costs of CKD is crucial for improving outcomes and quality of life. Healthcare providers should focus on closing the knowledge gaps identified in this study, particularly regarding the importance of regular monitoring and the financial aspects of CKD treatment. Additionally, addressing the barriers to communication that leave a significant portion of patients uninformed about their CKD status is essential for optimizing patient care.

#### **4.3. Personal health and habits that predispose to CKD**

The data presented offers a detailed view of the medication adherence, lifestyle habits, and health behaviors of the participants, providing important context for understanding their overall health and management of chronic conditions such as hypertension, diabetes, and CKD.

The data shows that 54% of the participants are on medication, with 19.5% taking both diabetic and hypertensive medications. However, a significant 44.5% reported not being on any medication, which is concerning given the high prevalence of chronic conditions in this population. Medication adherence is a crucial aspect of managing chronic diseases and preventing complications such as CKD (Brown & Bussell, 2011). The finding that only 47% of participants take their medication regularly further emphasizes the need for interventions aimed at improving medication adherence. Poor adherence to prescribed treatments can lead to uncontrolled blood pressure and glucose levels, accelerating the progression of CKD (Krousel-Wood *et al.*, 2015).

A positive finding is that 74.5% of participants engage in regular physical activity, which is beneficial for managing chronic conditions and reducing the risk of CKD progression (Johansen *et al.*, 2020). However, 25.5% of those who do not engage in regular physical activity may be at increased risk for poor health outcomes. Physical inactivity is a known risk factor for both cardiovascular disease and CKD (Zhang *et al.*, 2021).

The data indicates that only 35.5% of participants consume an average of three servings daily of fruit and vegetables, while 15% consume no servings. This suggests a need for dietary interventions to improve the intake of these essential nutrients, which are vital for kidney health.

Water intake among participants varied, with 39.5% consuming 2 liters per day, while a small percentage (3.5%) consumed only 500ml. Adequate hydration is important for kidney function, and insufficient water intake can exacerbate the risk of CKD (Clark *et al.*, 2016). The finding that a large proportion of participants consume sufficient water is positive, but attention should be given to those with low intake to ensure they are adequately hydrated.

The data also reveals that 29% of participants use herbal medications for various reasons, such as improving sexual performance and relieving body pains and fever. Herbal medications can have nephrotoxic effects, particularly when used without medical supervision (Tabassum & Ahmad, 2011). The use of herbal medications among a significant portion of participants underscores the need for healthcare providers to inquire about and monitor the use of alternative therapies, especially in patients with or at risk for CKD.

The findings from this data highlight several key areas for intervention to improve the management of chronic conditions and prevent the progression of CKD among participants. Addressing medication adherence through patient education and support, promoting regular medical check-ups, and encouraging healthy lifestyle behaviors, such as physical activity and a balanced diet, are critical steps. Additionally, healthcare providers should be vigilant in monitoring the use of herbal medications and NSAIDs, educating patients on their potential risks, and ensuring adequate hydration among patients.

#### **4.4. Proportion of risk factors of CKD among the participants**

The analysis of the study population reveals that a majority of participants (60%) were classified as having a low risk of developing CKD, while a smaller yet significant portion (10%) were identified as being at high risk. These findings underscore the critical need for targeted interventions and preventative strategies, particularly for those at elevated risk.

The lower-risk group, which comprises the majority of the study population, suggests that many individuals may be effectively managing their health conditions, such as hypertension and diabetes, through medication adherence, regular medical check-ups, and healthy lifestyle choices. Previous studies have shown that effective management of these underlying conditions is key to reducing the risk of CKD progression (Keller *et al.*, 2022). However, the presence of a high-risk subgroup indicates that there are still considerable challenges in managing risk factors, such as obesity and medication non-compliance, which are known contributors to CKD (Wang *et al.*, 2016).

The identification of 10% of participants as high-risk is particularly concerning. This subgroup may be more likely to progress to end-stage renal disease (ESRD) if appropriate interventions are not implemented. The literature supports that patients at high risk of CKD often have multiple comorbidities, poor adherence to treatment regimens, and other lifestyle factors, such as poor diet and lack of physical activity, that exacerbate their condition (Smith & Johnson, 2023). Addressing these issues requires a multifaceted approach that includes patient education, regular monitoring, and potentially more aggressive management of their underlying conditions.

In addition, the role of obesity in increasing CKD risk cannot be understated. Obesity is a well-documented risk factor for CKD, as it contributes to hypertension, diabetes, and other metabolic disorders that can damage the kidneys over

time (Chang et al., 2021). The findings of this study align with existing research that highlights the importance of weight management in reducing the incidence and progression of CKD (Lee et al., 2020).

In conclusion, while the majority of participants are at low risk for CKD, the presence of a high-risk subgroup highlights the need for focused interventions to prevent disease progression in these individuals. Future research should explore the specific barriers faced by high-risk patients in managing their health and investigate the effectiveness of targeted interventions in reducing CKD risk.

#### *List of abbreviations*

- CKD: Chronic Kidney Disease
- HPT: Hypertension
- DM: Diabetes Mellitus
- NSAIDs: Non-steroidal Anti-inflammatory Drugs

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## **5. Conclusion**

The prevalence of CKD among patients living with hypertension and diabetes mellitus comorbid was high, knowledge regarding CKD was poor, and there were low-risk factors contributing to CKD.

#### *Limitation of Study*

Data quality and availability are significant limitations of this study. In Manhya Hospital, there are challenges in obtaining comprehensive data and reliable health records, especially regarding CKD. This could lead to underreporting, recall bias, and tempering with the accuracy of the estimated prevalence and associated factors.

In addition, the use of a semi-structured questionnaire was based on self-reports and responses of respondents. These self-reports tend to be exaggerated and may not represent the main facts.

#### *Recommendation*

To reduce the rate at which people living with diabetes, hypertension, or both conditions develop CKD, the following must be practiced.

- The Ministry of Health should develop and implement educational programs focused on the importance of medication adherence, regular check-ups, and lifestyle modifications for managing hypertension, diabetes, and CKD. These programs should be tailored to address the specific needs and knowledge gaps identified in the patient population.
- Implement strategies such as medication reminders, patient counseling, and support systems to help patients consistently take their prescribed medications. Healthcare providers should regularly monitor adherence and address barriers, such as side effects or cost.
- Encourage patients to attend regular medical check-ups through reminder systems, educational campaigns, and partnerships with community organizations. Early detection and monitoring are crucial for managing chronic conditions and preventing CKD progression.
- Healthcare providers routinely inquire about the use of herbal medications and NSAIDs, educating patients on their potential risks, especially for those with or at risk for CKD. Patients should be encouraged to consult with healthcare professionals before using any alternative therapies.
- Advocate for policies that reduce the financial burden of CKD treatment, including the costs of dialysis and kidney transplantation. This could involve working with insurance providers, government programs, and non-profit organizations to provide financial assistance and support to patients.
- In conclusion, enhancing patient awareness and engagement, coupled with a stronger emphasis on preventive care and early intervention, will be critical in managing CKD and improving outcomes for patients with hypertension and diabetes. This work provides a foundation for future research and intervention strategies aimed at reducing the burden of CKD and improving the quality of life for affected individuals.

#### *Ethical Consideration*

Clearance was sought from the school, and an authorization letter was given to us for the data collection from the facility. Our official letter was submitted to the facility to assist us in our research work and make various information available. Informed consent was sought from all respondents before they were included in the study. Strict confidentiality and

anonymity of the responses were ensured, such as that names would not be recorded. The respondents will be given the free will to partake, continue, or stop being part of the study at any time. No money or incentives were given to motivate participants before participating. Measures were put in place to safeguard each other's privacy, as the data was collected in the presence of others.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

The authors declare no conflict of interest.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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