

Influence of Environmental Factors on Chronic Kidney Disease

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ABSTRACT

Chronic kidney disease (CKD) is one of the health challenges ravaging the world presently with significant morbidity and mortality as well as enormous health cost. Some factors are associated with increased risk of having CKD including age, gender and environmental factors such as certain occupations. This research aims to look at the age, sex and occupational distribution of patients with CKD at a tertiary hospital in Owo, Ondo State, Nigeria. The survey design gathered from the 86-dataset collected from patients with chronic renal disease attending the renal clinic. The results show that the highest age of respondents that have kidney disease is 35years. Also, trading is the most prominent occupation in patients with kidney disease. The major symptom of kidney disease is decreased urine output. The result also revealed that gender is statistically significant $F_{(4,85)} = 5.816$, $P < 0.05$. Also, the result shows that age is significant to kidney disease. $F_{(4,85)} = 8.225$, $P < 0.05$. Likewise, results revealed that occupation is not significant $F_{(3,85)} = 1.068$, $P > 0.05$ for kidney diseases. Further results reveal a linear relationship between the three predictors

(age, gender, and occupation). They significantly predicted the criterion variable $F_{(3,85)} = 7.293$ and accounted for 21.1% observed variance in kidney disease. Age $\beta = .561$, $t_{(86)} = 3.038$, $P < 0.05$ and gender ($\beta = .860$, $t_{(86)} = 4.468$, $P > 0.05$). It has made a significant contribution to the model where gender was the most potent predictor. Based on the findings, it was concluded that age and gender have an effect on kidney disease.

Keywords: Chronic Kidney Disease (CKD), Environmental factors, Risk factors.

INTRODUCTION

Chronic kidney disease (CKD) is a clinical syndrome that results from the definitive change in function and/or structure of the kidney with an irreversible, slow but progressive evolution. Chronic kidney disease is identified when a patient's glomerular filtration rate (GFR) is less than 60 mL/min/1.73 m² for a period equal to or greater than 3 months or GFR greater than 60 mL/min/1.73 m², but with evidence of injury of the renal structure irrespective of cause.¹ Chronic kidney disease (CKD) is a serious health problem, which could progress to end-stage renal disease (ESRD) with an enormous cost of treatment and increased cardiovascular morbidity and mortality. CKD affects 10–16% of adults worldwide with almost a million patients currently on dialysis or are living with a renal transplant in the United States.^{2,3} Some factors predispose to and/or are associated with CKD. It is important to identify these factors as some of them can be modified in order to prevent or at least slow down the progression of CKD to end stage renal disease. These factors include age, gender, family history, race and ethnicity, exposure to nephrotoxins, smoking, poor socioeconomic state, chronic glomerulonephritis, autoimmune diseases, polycystic kidney disease, drug use and concurrent diseases, such as hypertension and diabetes.²

Age is an important factor to consider in CKD as the prevalence of CKD has been shown to rise dramatically with increasing age, over 30 percent of people above 70 years are estimated to have CKD.⁴ This has been attributed to the older individuals having associated risk factors for CKD such as diabetics and hypertension as well as age associated reduction in kidney function which cannot be accounted for by other risk factors. However, the elderly have a reduced risk of progressing to end stage renal disease.⁵ Gender is another important factor to be considered in CKD. Studies have shown that the prevalence of CKD is higher in women compared to men.⁶ This disparity has been linked to women being prone to having urinary tract infections, a risk factor for CKD. Also, pregnancy is another factor predisposes women to having kidney damage from pregnancy induced hypertension and eclampsia [Silbiger 2002]. However, men are likely to progress to kidney failure sooner than women. This is thought to be influenced by potential antifibrotic and antiapoptotic effects of estrogen or the proinflammatory deleterious effects of testosterone as found in animal studies.⁷

Whereas hypertension, diabetes, chronic glomerulonephritis, polycystic kidney disease and other age and obesity associated conditions are well documented causes of CKD, environmental factors such as occupational exposure to nephrotoxins are underappreciated.⁸ Several well documented as well as lesser-known associations exist between chronic kidney disease (CKD) and environmental agents and conditions, such as heavy metals, industrial chemicals and elevated ambient temperatures and infections. Genetic susceptibility and other comorbid conditions may vary the effect of these conditions in the development of CKD.⁸ Several

occupation groups have been found to have increased risk for CKD. For instance, workers in building, grounds cleaning and maintenance occupations have about 4.3 times higher risk of developing CKD.⁹ kidney disease has a major effect on global health with significant morbidity and mortality as well as enormous economic cost. CKD is largely preventable and treatable and deserves greater attention in global health policy decision making especially in low countries with low socioeconomic status like Nigeria. Hence this study aims at find out how environmental factors influence kidney disease, using research survey study.

RESEARCH METHOD

This study adopted a survey design. It was a descriptive research type. Eighty-six (86) participants were involved in the study. A purposive sampling technique was adopted in selecting the participants. One instrument; the diagnosing form for kidney patients (DFKP) were used to collect data for this study. The instrument was developed by the hospital and adapted for the study. The instrument has two sections (section A & section B). Section A include the bio-data of the patients (patient name, gender, age, address, occupation). Section B also involved type of kidney diseases and the symptoms. Also, four research questions guided the study. The research questions were stated to investigate the influence of environmental factors on kidney disease and to ascertain the main environmental factors that cause kidney disease.

The following research questions guided the study;

1. Does gender have effect on kidney disease?
2. Does age have effect on kidney disease?
3. Does occupation have effect on kidney disease?
4. What is the main environmental factor that contribute to kidney disease?

RESULT AND DISCUSSION

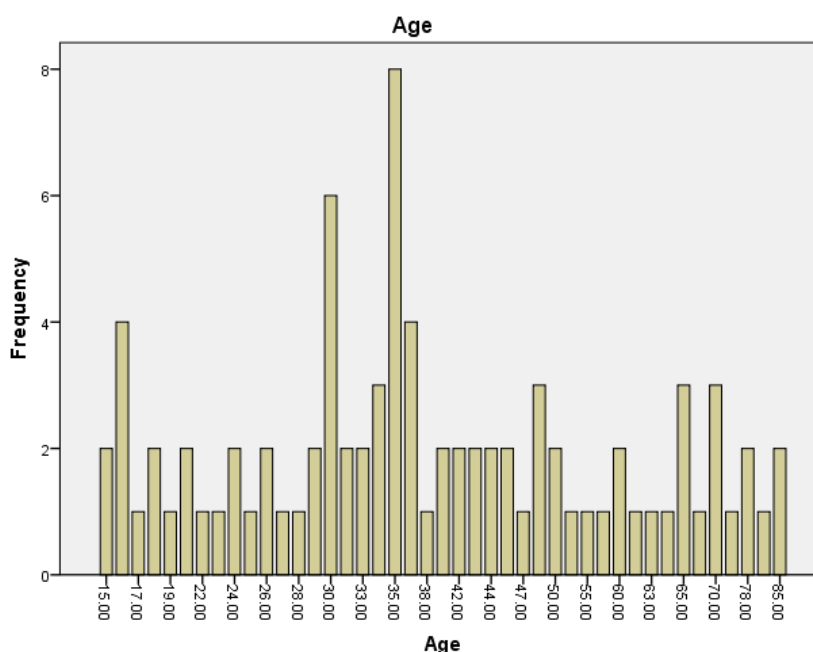


Figure 1: The table shows frequency distribution of respondents age that have kidney disease the highest age of respondents that have kidney disease is 35 years follow by 30years.

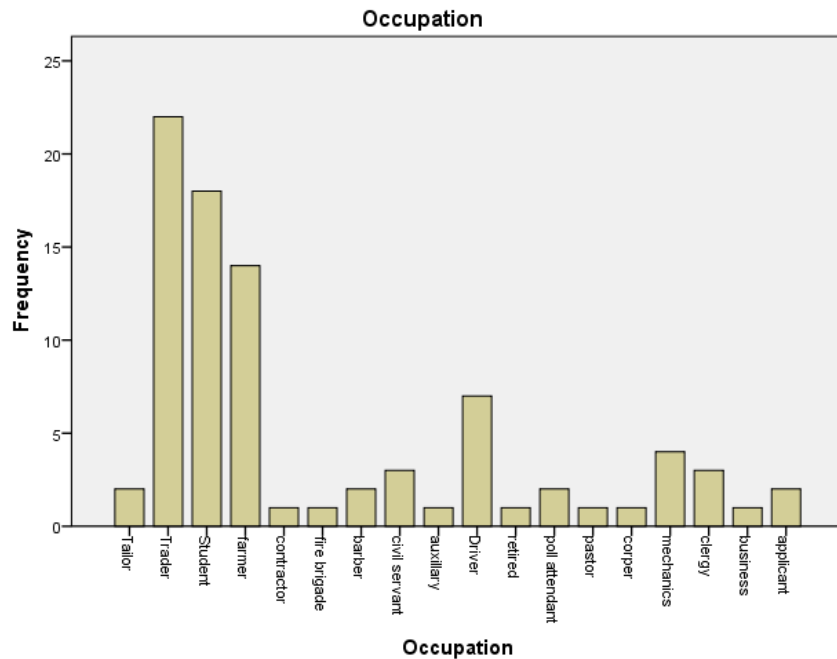


Figure 2: The graph of frequency distribution of the occupation of respondents with kidney disease it was revealed that traders have the highest kidney disease follow by students and farmers.

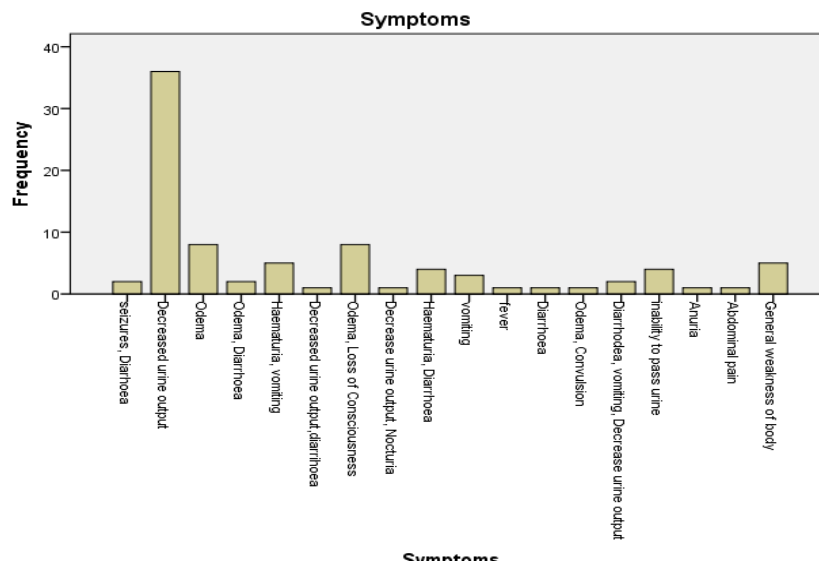


Figure 3: figure 3 revealed the main symptoms of kidney disease, the frequency distribution shows that the main symptoms of kidney disease is decreased in urine output.

Research Question 1: Does gender have effect on kidney disease

Table 1: Research Question 1

		Sum of Squares	Df	Mean Square	F	Sig.
	Between Groups	9.146	4	2.286	5.816	.000
	Within Groups	31.843	81	.393		
	Total	40.988	85			

A one-way analysis of variance (ANOVA) was conducted to show if gender has effect on kidney disease. Table 1 reveals that the result is statistically significant $F(4,85) = 5.816$, $P < 0.05$. This shows that gender has effect on kidney disease.

Research Question 2: Does age have effect on kidney disease

Table 2: Research Question 2

	Sum of Squares	Df	Mean Square	F	Sig.
Between groups	11.840	4	2.960	8.225	.000
Within Groups	29.148	81	.360		
Total	40.988	85			

A one-way analysis of variance (ANOVA) was conducted to show if age has effect on kidney disease. The result is statistically significant $F(4,85) = 8.225$, $P < 0.05$ as revealed in table 2. This implied that age has effect on kidney disease.

Research Question 3: Does occupation have effect on kidney disease

Table 3: Research Question 3

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.541	3	.514	1.068	.367
Within Groups	39.447	82	.481		
Total	40.988	85			

A one-way analysis of variance (ANOVA) was conducted to show if occupation has effect on kidney disease. The result is not significant $F(3,85) = 1.068$, $P > 0.05$ as revealed in table 3. This implied that occupation has no effect on kidney disease.

Research Question 4: What are the main environmental factors that contribute to kidney disease.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.459a	.211	.182	.62815

Table 6: Predictors: (Constant), Occupation, Age, Gender

Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8.633	3	2.878	7.293
	Residual	32.355	82	.395	
	Total	40.988	85		

Table 7: Dependent Variable: Kidney Disease

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	52.768	3.908		13.502	.000
Age	.441	.145	.561	3.038	.003

Gender	.727	.163	.860	4.468	.000
Occupation	.108	.051	.223	2.097	.039

Multiple regression analysis was conducted in order to show the main environmental factors that contribute to kidney disease. The result in table 5 and 6 shows the multiple regression coefficient (R) which indicates that a linear relationship exists between the three predictors (gender, age and occupation). In this model, they significant predict the criterion variable, $F(3,85) = 7.293$, and jointly account for 21.1% observed variance in kidney disease. Furthermore, results in table 4.3 show that two predictors age ($\beta = .561$, $t(86) = 3.038$, $P < 0.05$) and gender ($\beta = .860$, $t(86) = 4.468$, $P < 0.05$) have significant effect in this prediction model. This mean that the variables are related and significantly predict the cause of kidney disease. However, occupation did not contribute significantly to this particular model. Gender is the most potent in predicting kidney disease in this model.

DISCUSSION

The result shows that gender has a significant effect on kidney disease. This is in agreement with findings of Seppi et.al,¹⁰ as well as Silbiger and Neugarten¹¹ which shows that the female gender has a higher prevalence for CKD.

Furthermore, the result also shows that age has an effect on kidney disease, this is consistent with Pietro et al⁴ which shows that as one gets older, one is more likely to suffer from chronic kidney disease.

In addition, the result shows that occupation has no effect on kidney disease which disagrees with the study of Van et.al (2011) and sofia et al. ⁹ that occupational factors can cause kidney disease.

The result established that there is a linear relationship between age, gender, and occupation which gives significant predictions of the criterion variable kidney disease. The model jointly accounted for some observed variance in kidney disease. Gender was reported as the most potent variable that predicts kidney disease in this model. This result shows that gender contributes more to kidney disease.

CONCLUSIONS

Based on the result of the study, it can be concluded that environmental factors such as age and gender have a great effect on the kidney which can result in kidney disease. Since aged people are prone to diseases such as hypertension, diabetes, etc. Likewise, gender is the major factor that causes kidney disease, sometimes it depends on the patient's lifestyle, and the type of job they do for a living, some work in the industrial area where they inhale toxic such as lead, mercury which are the major players in patients with kidney diseases, etc.

This study has provided data on the influence of environmental factors on kidney disease. Therefore, it is recommended that we must constantly check our blood sugar, especially for diabetes patients and to also know the level of the toxicity in the blood. Also, we must regularly embark on urine tests and blood tests with the doctor's advice. Not only that we must control our blood cholesterol level, drink plenty of water and eat food that is very low in sugar, fat, and

salt but high in fiber, and avoid smoking and alcoholic drinks. The scope of the research is restricted to Owo town in Ondo State, South West, Nigeria. There is need for expansion of the other geo-political zone in the country, so as to give room for comparison.

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