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Association Between Educational Level, Unemployment, Race, and Chronic Kidney Disease Among African Americans

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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MS, University of Maryland University College, 2009

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

Chronic kidney disease (CKD) is one of the major health conditions that cause high morbidity and mortality in the United States. Although African Americans (AA) are only 12.9% of the population, they disproportionately suffer 25.1% of deaths due to CKD. It was not obvious how factors such as education and unemployment further complicate the condition. Thus, the purpose of this quantitative study was to examine the association between CKD and educational level, unemployment, and race when controlling for gender and underlying health conditions such as hypertension, obesity, and diabetes, which tend to exacerbate renal insufficiency. The study was based on the socio ecological model, which clarifies how individual lifestyles, interpersonal connections, community-based, and enabling environmental programs can promote kidney health. A secondary data analysis was performed using combined data from the 2016-2021 Behavior Risk Factor Surveillance System, applying the multi-variable logistic regression model. While controlling for gender, hypertension, obesity, and diabetes, race was not associated with CKD ($p=0.25$), among AA, there was a statistically significant association between levels of education/ unemployment and CKD such that those who graduated high school were more than twice as likely to report having CKD compared to those who did not (AOR=2.44, 95% CI=1.00, 5.92, $p=0.049$), as well as the unemployed as compared to their employed counterparts (AOR=2.83, 95% CI=1.84, 4.35, $p=<0.001$). The positive social change implication is that while the findings of this study highlight the need for further studies to help close the gap in literature concerning factors that may exacerbate CKD among AA, public health professionals need design initiatives to help address unemployment and promote kidney health in the AA community.

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Dedication

To God be the glory. I dedicate this dissertation to my mother, Elizabeth Sagoe, who was the force behind this journey but didn't live to see this day. Though you had no formal education, you envisioned how far I could go and encouraged me to undertake this journey. To my wife, Phyllis, and my three daughters, Sylvia, Sarah, and Elsie, thank you for your inspiration and support. Then to my siblings, Margaret, Cecilia, Sarah, Josiah, Dinah, and Gladys, I couldn't have done it without your prayers and support. Thank you, and God bless you all.

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Introduction

African Americans are affected by health disparities in the United States, and chronic kidney disease (CKD) is one of the major health conditions that cause high morbidity and mortality among them (Barreto et al, 2016). Risk factors associated with CKD disparities are socioeconomic conditions such as educational level, unemployment, and race, and comorbid health issues that include hypertension, diabetes, and obesity (Laster et al, 2019).

This study examined the association between educational level, unemployment, race, and CKD among African Americans over 20 years old residing in Maryland and their white counterparts. The importance was to raise awareness to the socioeconomic factors and the underlying health conditions that contribute to CKD, which is growing in Maryland, and to lessen the burden of the health disparities of African Americans. The significance of the study was its role in informing effective interventions to promote the overall health of African Americans, particularly those living in Maryland. The five levels of the social ecological model (SEM), which are individual, interpersonal, community, organizational, and policy or enabling environment, were needed to influence positive health behaviors, such as smoking cessation and increased physical activities.

Background of the Study

CKD is a growing public health issue that disproportionately affects ethnic minorities, particularly African Americans, in the United States (Hounkpatin et al, 2020).

According to the Centers for Disease Control and Prevention (CDC), CKD was listed as number 10 among the leading cause of deaths in the United States for all Americans, but for 5 years prior to 2019, it has remained the number 8 leading cause of death among African Americans (CDC, 2020). There is an evident need to reduce morbidity and mortality from CKD.

In a study by Chu et al. (2020), it was noted that people with CKD are often unaware of their disease status. The authors posit that more than half of adult African Americans who had CKD for 5 years were unaware of the disease (Chu et al, 2020). This study aimed to help to close the gap in lack of awareness of CKD. In addition, the findings could help ease access to basic screenings, which detect and treat the onset of the disease.

Problem Statement

According to Crews and Purnell (2020), though African Americans are only 12.9% of the United States population, their mortality rate due to CKD among all Americans is 25.1%. Data from the United States Census Bureau show that 31.1% of Maryland's population are African Americans, and 54% are Whites (US Census Bureau, 2020). According to America's Health Rankings (AHR; 2020), in 2019, 3.3% of African Americans and 2.8% Whites had CKD, which depicts higher rates of CKD morbidity and mortality among African Americans. The number of patients with CKD continues to rise in Maryland; for instance, there was an increase from 24% to 33% from 2012-2017 (AHRQ, 2018). If not controlled, CKD incidence and mortality rates in Maryland will continue to rise. Research by America's Health Rankings (AHR) (2020) reveals that

between 2015 and 2019, there was an increase in CKD prevalence in Maryland from 2.5% to 3.5% for people who are 25 years and older. The report shows that 4.7% of Maryland residents with less than a high school education have CKD, 3.5% High school graduates have CKD, 3.3% of those with some college education have CKD, 2.0% of college graduates have CKD and 3.3% of African Americans and 2.8% of Whites have CKD (AHR, 2020). Regarding income level, 5.2% of people who earn less than $25,000 have CKD**,** 2.9% of those who make between $25,000 - $49,000 have CKD, 2.8% of those with income between $50,000 -$74,999 have CKD and 2.0% of those making $75,000 or more have CKD (AHR, 2020).

This shows a clear progression of kidney health disparities in Maryland, and that African Americans were disproportionately affected. Laster et al. (2019) posit that the underlying causes of CKD are hypertension, diabetes, and obesity. Thus, my study examined the association between educational level, unemployment, race, and chronic kidney disease, and the underlying health conditions among African Americans in Maryland. The goal was to facilitate the creation of effective intervention strategies, including the provision of easy access to healthcare to enable regular screening for early detection and to remove all other barriers to improving health in Maryland.

Barreto et al. (2016) confirmed that the high incidence and progression of CKD are associated with socioeconomic status as such educational level, employment status, and income level. Research by the Regional Economic Studies Institute of Towson University also found that there were racial disparities in employment in Maryland, and that African Americans had the lowest rates of educational attainment and higher rates of

poverty than their white counterparts (RESI, 2020). Individuals with lower socioeconomic status may have undiagnosed and untreated CKD due to poor access to health information, quality healthcare, healthy diet, and lack of physical activity (Zeng et al., 2016). In a study by Laster et al. (2020), it was noted that African Americans are twice as likely than whites to have albuminuria and other CKD progression factors.

Though there are several studies about CKD and how it disproportionately affects African Americans, more studies are needed to determine the association between educational level, unemployment, race, and CKD. Chu et al. (2020) claimed that there was a gap in literature regarding the prevalence of CKD among African Americans. Laster et al. (2019) confirmed that lack of educational attainment limits health literacy in CKD among African Americans. My study aimed to examine the association between the socioeconomic factors such as educational level, unemployment, and comorbid conditions like hypertension, diabetes, obesity, and the rise in CKD in Maryland. Thus, all activities to reduce or eliminate kidney health disparities in Maryland should focus on diagnosing and treating hypertension, diabetes, and obesity while promoting access to healthcare, higher level of education and reducing unemployment rate among African Americans in the State.

Purpose of the Study

The purpose of this quantitative study was to examine the association between educational level, unemployment, race, and chronic kidney disease among individuals over 20 years old residing in Maryland. The independent variables were educational

level, unemployment and race, and the dependent variable is chronic kidney disease. The covariables were gender, hypertension, obesity, and diabetes.

CKD affects African Americans more than any other racial group in the United States (Chu et al., 2020). There is a lack of awareness about the progression of the disease and how it disproportionately affects African Americans. Thus, findings from this study could be a resource to help close the gap in literature, raise awareness of kidney health disparities, and help create effective intervention programs to alleviate the high rate of morbidity and mortality among African Americans.

Research Questions and Hypotheses

RQ 1: Is there a statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

RQ 2: Is there a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

RQ 3: Is there a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Variables for the study were educational level, unemployment, race, and chronic kidney disease, and the controlled variables were gender, hypertension, obesity, and diabetes. The population sample group was individuals over 20 years old residing in Maryland. The study examines the association between educational level, unemployment, race, and chronic kidney disease while controlling for gender, hypertension, obesity, and diabetes.

Research Question 1 (RQ1) focused examined the association between educational levels and CKD. The educational levels were those who did not graduate high school, graduated high school, attended college or technical school and graduated college or technical school. Responses were coded 1, 2, 3 and 4 respectively, according to the level of education. The dependent variable, CKD, required a Yes or No answer, whether participants had the disease or not. RQ2 examined whether the study participants were employed or unemployed and required a Yes/No answer. Lastly, RQ3 examined the race of participants, whether African American, White, Hispanic, or other race, and whether they had chronic kidney disease or not via a Yes/No answer.

Theoretical and/or Conceptual Framework

The social ecological model (SEM) is the theory that supported my study. The theory was developed by Bronfenbrenner in the 1970s (Kalinowski, 2017) and was based on understanding interrelations among various personal and environmental factors that could affect behaviors that influence the level of educational attainment, employment, and racial equity, while improving lifestyles that significantly reduce the underlying risk factors of CKD. SEM focuses on five levels of influence for achievements, which were individual factors, interpersonal, community, organizational, and the enabling environment or policy.

Figure 1

Socio Ecological Model (SEM)

Note: Image adapted from the Center for Disease Control and Prevention (CDC). https://www.cdc.org.gov/communityengagement/pce_models.html.

Individual Level

The individual level of the SEM revolved around personal traits that influence health behavior. It included personal choices such as dietary, physical activity, weight control, smoking, and alcohol consumption, which could all affect health (CDC, 2021). This level of the SEM could be applied to influence healthy lifestyles to promote kidney health and alleviate the disparities that exist. Under this model, personal lifestyle choices motivated individuals to attain higher or improved educational levels and sought employment or labor skills, in addition to having relationships that encouraged healthier living.

Interpersonal Level

The interpersonal level of SEM refers to relationships that a person develops that influence healthy behaviors. Walking clubs, cooking groups, community gardening, and weight loss clubs are forms of interrelationships that could be used to promote activities or lifestyles that can prevent the risk factors for CKD (CDC, 2021). This level of the SEM also facilitates the creation of networks that promote employment opportunities. In addition, relationships that develop from this model could influence healthy behaviors and generate friendships that could create skills building, such as cooking lessons that can turn people into chefs and lead to gainful employment. The interpersonal level of SEM promotes interracial relationships, such as weight loss clubs and cooking groups, that work together to reduce the risk factors of CKD and the association between unemployment and lower level of educational attainment.

Community Level

The community level of SEM involves networks between organizations and institutions that constitute the community. This includes "built environments" such as parks, neighborhood basketball courts, fitness centers, grocery stores, and other amenities that promote health (CDC, 2021). Residents of Maryland who were affected by health disparities could take advantage of these community amenities by adopting habits such as buying healthy foods and exercising to enhance their health.

Furthermore, under this level of SEM, amenities in the community could be used to improve the educational level of community members to generate employment opportunities. For instance, programs such as computer classes, small business training,

community health education, and financial management training could be initiated to reduce unemployment in the community.

Organizational Level

The organizational level includes schools, workplaces, faith-based organizations, and institutions where professionals such as teachers, nurses and doctors promote healthy lifestyles, such as smoking cessation campaigns that help to minimize the risk factors of CKD. In a study by Hwang et al. (2020) regarding barriers to CKD care, it was noted that lack of knowledge and awareness of CKD is a major barrier to its management. It's important to note that this level of SEM was significant in providing health information and boosting the level of education to the under privileged, as well as creating employment opportunities.

Enabling Environment or Policy

This level of SEM involves policies that regulate health activities and practices to prevent diseases. An example is the Affordable Care Act, which was enacted in March of 2010 to lower healthcare costs to make it easily accessible to all Americans. Early detection of the onset of CKD risk factors is the key to eradicating the disproportionate health burden on minorities, and laws like the ACA would ease access to care. Furthermore, under this level of SEM, policies could be enacted to regulate unhealthy behaviors, such as not wearing a mask during a pandemic. The enabling environment or policies could create employment opportunities and educational programs to control the underlying health conditions for CKD, such as dietary programs and fitness activities.

Nature of the Study

This is a cross-sectional study based on observational study design. The sample participants were selected based on unique criteria for the study (Setia, 2016). In such studies, the researcher observes the participants to assess the exposure and the outcomes (Setia, 2016). In this study, the exposure points were educational level, unemployment, and race with CKD as the outcome variable. The covariates were gender, hypertension, obesity, and diabetes. The rationale for using cross-sectional study design was its value in providing information about the prevalence of the outcomes, and in this case, information about the association that exists between the dependent and independent variables (Setia, 2016). This is a quantitative study utilizing secondary data drawn from the databases of Maryland Behavioral Risk Factors Surveillance System (MBRFSS) from 2016-2021, which contained all the variables needed for the study. SPSS version 28 software will be used to conduct quantitative analysis of the statistically significant association between the variables and the covariates.

Literature Search Strategy

To review literature for this study, I used the Walden University library and searched the databases of PubMed, CINAHL Plus, Medline, the CDC, NHANES and Google scholar. I searched data about my variables from 2010-2020, but focused on literature from the past five years, 2016-2021. My search terms included *chronic kidney disease disparities, African Americans and chronic kidney disease, health disparities in Maryland, chronic kidney disease disparities in Maryland, risk factors of chronic kidney disease, socioeconomic factors and chronic kidney disease disparities in the United*

States, association of chronic kidney disease and socioeconomic status, educational level, unemployment,t and chronic kidney disease.

Literature Review Related to Key Variables and/or Concepts.

I reviewed literature published between 2016 and 2021 about CKD and the risk factors associated with it. Then, I searched CKD disparities that exist and discussed what researchers have noted about symptoms or prevalence, progression, mortality, the risk factors, and preventive measures. I also discussed the risk factors that I reviewed, including CKD, hypertension and CKD, diabetes and CKD, obesity and CKD, socioeconomic status and CKD, prevention of CKD, access to healthcare and CKD disparities.

Chronic Kidney Disease (CKD)

The kidney is an organ in the body that is shaped like a bean and is the size of a computer mouse (CDC, 2020). It performs various critical functions in the body including stimulating the production of red blood cells, keeping the bones healthy, regulating blood chemicals in the body, and helping to control blood pressure (CDC, 2020). Its major function is to filter waste from the blood (CDC, 2020).

CKD occurs when the kidney can no longer perform this function, which leaves excess fluid and waste from the blood inside the body and causes health problems such as stroke, cardiovascular disease, anemia, depression, lower quality of life, and increased occurrence of infections (CDC, 2020). CKD gets worse over time, but treatment slows the progression (CDC, 2020). If not detected early or stays untreated, CKD progresses to kidney failure, which may require dialysis or transplant for survival, a condition known

as end-stage renal disease (ESRD; CDC, 2020). CKD is a serious health problem that needs strategic intervention because people who have it may not notice any symptoms (CDC, 2020). It was noted by Chu et al. (2020) that people with CKD are often unaware of their disease status.

Symptoms of CKD include albuminuria, which occurs when there is too much protein in the urine (CDC, 2021). Worsening anemia is another sign of kidney disease and occurs when the kidney's ability to make urine properly decreases over time; this is a condition that usually occurs with people with sickle cell disease (CDC, 2021). Other symptoms of CKD include worsening fatigue, muscle movement difficulties, pale skin, cold hands and feet, dizziness, shortness of breath, swelling of the feet and ankles, chest pain, which occurs when fluids build up around the lining of the heart, and dry and itchy skin (CDC, 2021). CKD can also progress into end-stage kidney disease when the kidney stops working, a condition that requires a replacement of the damaged kidney via transplant (CDC, 2021). The major treatment for CKD is focusing on slowing down the progression of it or controlling the causes of the disease (CDC, 2021).

Hypertension and CKD

Hypertension, or high blood pressure, is when the pressure of the blood flow in the blood vessels is too high and is exerted against the walls of the arteries throughout the body (CDC, 2020). This process eventually results in preventing the kidneys from performing its function of filtering the blood in the body, which causes kidney disease (CDC, 2020). CKD can cause hypertension, and hypertension can cause CKD (CDC, 2021). The kidney's inability to filter blood properly leaves toxic waste and extra fluid to

build up in the body and cause high blood pressure (CDC, 2021). Ku et al. (2019) noted in their study about hypertension that it is closely interlinked with CKD. Their research also revealed that uncontrolled hypertension can accelerate the progression of end-stage kidney disease (Ku et al, 2019).

Satoh et al. (2020) examined the association between blood pressure and the risk factors of CKD by gender, noting that blood pressure is significantly associated with an elevated risk of CKD. High blood pressure affects kidney function by constricting and narrowing the blood vessels and eventually damaging the kidney (NIDDK, 2017). The link between hypertension and CKD was also noted in a study by Nishiwaki et al. (2021), in which the authors examined the association of blood pressure and renal outcome in patients with CKD. The results revealed that hypertension is present in approximately 80 to 85% of patients with CKD, and that hypertension exacerbates CKD progression and incidence of ESRD (Nishiwaki et al, 2021).

Diabetes and CKD

Diabetes is one of the leading causes of CKD. It occurs when the body does not make enough insulin or cannot use the insulin it makes as it should (CDC, 2020). Insulin is a hormone that controls the amount of sugar in the blood (NKF, 2020). There are two main types of diabetes: Type 1 and Type 2. Type 1 diabetes is when the body cannot make insulin, and Type 2 is when it makes some insulin but cannot use it properly (NKF, 2020).

High blood sugar can damage the blood vessels in the kidneys and increase the risk for developing kidney disease (NIDDK, 2017). A normal blood sugar level is less

than 100mg/dl (5.6 mmol/l) when fasting; when it's above 5.6 to 6.9 mmol/l, it's considered prediabetes; and when it's 126 mg/dl (7 mmol/l) or higher, it's considered diabetic (Brutsaert, 2020). The relationship between diabetes and CKD is called diabetic kidney disease (DKD; NIDDK, 2017). Jitraknatee et al. (2020) noted in their cross-sectional study that CKD is a common diabetic related complication among Type 2 diabetic patients. Wei and Jiang (2021) confirmed in their study about diabetic kidney disease that the most common complication of diabetes mellitus is CKD, and it occurs in more than 20-40% of diabetic patients (Wei and Jiang, 2021).

Obesity and CKD

Obesity is a serious public health problem worldwide. There was 42.4% prevalence of obesity among adults in the United States between 2017 and 2018 (CDC, 2020). A body mass index (BMI) of 25 is considered overweight, and over 30 is obese (WHO, 2017). The growing prevalence of obesity contributes to the risk of diabetes, hypertension, cardiovascular disease, and CKD (Kovesdy et al, 2017).

Barrington et al. (2020) analyzed obesity among gender and ethnicity and noted that African Americans have the highest prevalence of obesity as compared to non-Hispanic whites in the United States. The Center for Disease Control and Prevention (CDC) also noted that obesity is 13.8% higher among non-Hispanic Blacks (CDC, 2020). In addition, Yun et al. (2018) revealed in a study about obesity and CKD that metabolic abnormality and obesity are associated with significant increased risk for CKD progression, which means people with metabolic abnormality have higher risk for CKD progression (Yun et al., 2018).

Reducing the higher incidence of obesity will minimize the prevalence of CKD significantly. Furthermore, the association between obesity and CKD is noted in a study by Than et al. (2020), which revealed that there is a complex link between obesity, CKD, and cardiovascular disease. Obesity strongly predicts the progression of renal function loss in CKD (Than et al., 2020). The researchers examined the complex links between obesity, CKD, and cardiovascular disease to find that there is association of anatomy, physiology and biochemistry of adipose tissue and a direct link to obesity and progression of CKD (Than et al, 2020). They also noted that there is excessive risk of CKD development and progression in obese patients, and that while obesity has no independent effect on mortality, it is associated with patients with stage 4 or 5 CKD and peritoneal dialysis (Than et al, 2020).

Socioeconomic Status and CKD

According to the American Psychological Association, socioeconomic status is the social standing or class of a person or group as measured by education, income, and occupation (APA, 2020). Socioeconomic status restricts access to health care. Several studies have noted that there is an association between socioeconomic status and CKD. Laster et al. (2018) claimed in their research that CKD disproportionately affects minority and low-income populations in the United States. They also noted that the minority group is affected by low-income, low level of educational attainment, employment, insurance, and community level assets deficits (Laster et al, 2018). This warrants further research into the association between CKD, unemployment, and educational level, which my study seeks to do.

In another study about social determinants of health and CKD, Quinones and Hammad (2020) found that lower socioeconomic status is correlated to higher prevalence and incidence of CKD in communities. They noted that besides low income, Americans with fewer than 12 years of education are found to have higher prevalence of CKD (Quinones & Hammad, 2020). Vart et al. (2020) also found the link between socioeconomic status and CKD in their cross-sectional study. They posit that among all sociodemographic groups, CKD is associated with low educational level, income, and poverty.

Socioeconomic status affects health literacy, access to health care, and basic preventive screenings among low-income families and communities. Beech et al. (2021) pointed out in their study about poverty, racism, and public health, that African Americans are afflicted by poverty, which has contributed to the health disparities in the United States (Beech et al, 2021). They noted that discriminatory race-based policies produce racial disparities in socioeconomic status (Beech et al, 2021).

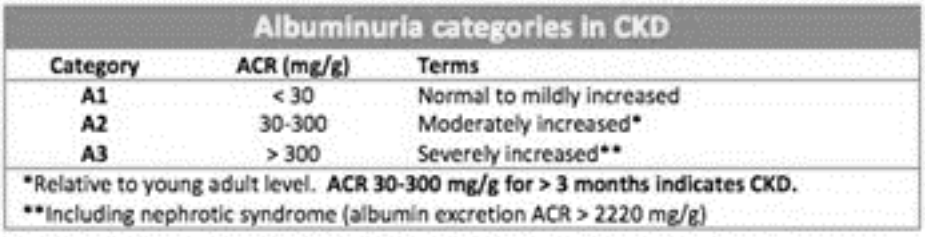
Prevention of CKD

All initiatives to prevent CKD should focus on controlling the risk factors that contribute to the rapid increase of CKD incidence and progression in the United States. Typically, prevention of CKD is categorized into primary, secondary, and tertiary prevention (Li et al., 2021). Primary prevention is detecting the disease before health effects occur. This means preventing the onset of the disease at the screening level where elevated levels of serum creatinine and albuminuria are diagnosed, and prognostic signs of CKD can be detected (Gaitonde et al., 2017). The most common screening is to detect

levels of albuminuria, which is increased excretion of urinary albumin and a marker of kidney damage (NKF, 2020). Normal levels of albumin in the urine means a small amount, which is ACR 30-300 mg/g, and ACR > 300 means higher elevation of albumin associated with progressive decline in glomerular filtration rate (NKF, 2020).

Figure 2

CKD Prevention (Image adapted from the National Kidney Foundation)



Albuminuria categories in CKD		
Category	**ACR (mg/g)**	**Terms**
A1	< 30	Normal to mildly increased
A2	30-300	Moderately increased*
A3	> 300	Severely increased**
*Relative to young adult level. **ACR 30-300 mg/g for > 3 months indicates CKD.**		
**Including nephrotic syndrome (albumin excretion ACR > 2220 mg/g)		

Secondary prevention of CKD refers to preventive measures that foster early diagnosis and prompt treatment (Li et al., 2021). It is important to emphasize that early treatment of a disease comes after it's been diagnosed. Tertiary prevention of CKD means managing it after diagnosis to control progression and emergence of more severe complications (Li et al., 2021). Thus, preventing CKD requires starting with the major risk factors including hypertension, diabetes, and obesity at the primary, secondary, and tertiary levels. The most notable way of preventing or controlling CKD is to prevent or manage high blood pressure, diabetes, and obesity, which are shown to lower the risk of developing CKD (CDC, 2020). Blood pressure should be kept at the normal level of below 140/90, or at target levels set by doctors. Blood sugar levels should also be

maintained at required levels, as well as cholesterol levels at the prescribed levels (CDC, 2020).

Managing blood pressure and cholesterol levels are important because they are part of the major risk factors for CKD (CDC, 2020) However, reaching these goals will require lifestyle adjustments such as maintaining a healthy diet or healthy eating habits and staying away from habits that can harm the kidneys. For example, refraining from overuse of over-the-counter medications and herbal supplements, and minimized exposure to kidney infections will all promote healthy lifestyle and kidney health (CDC, 2020).

Access to Healthcare

Early detection of kidney disease is paramount for faster intervention. The frequency of screening, especially among minority groups, prevents the higher incidence and progression of CKD (Li et al., 2020). Harasemiw et al. (2017) revealed in their study about screening for hypertension, diabetes, and progression of CKD that screened participants received earlier intervention than the unscreened population. They noted that screening programs could improve chronic disease care in high-risk populations (Harasemiw et al., 2017).

Access to healthcare is a challenge for racial and ethnic minorities in the United States. African Americans have faced long standing disparities in health coverage (Artiga et al., 2021). The researchers posit that prior to the onset of COVID 19, there have been health disparities, and that people of color were more likely to be uninsured and lack access to screening than their white counterparts. To prevent or control the risk factors of

CKD, it is important to facilitate easy access to healthcare and basic screenings. The researchers in this review all stressed the risk factors and the importance of access to healthcare. It is also worth noting that health literacy plays a major role in the CKD prevention process.

CKD Disparities

Even though, African Americans are only 13% of the United States population, they suffer a higher incidence of contracted CKD as compared to Caucasian Americans (Harding et al., 2017). Nally (2017) noted in his study about CKD and African Americans that they carry a greater burden of CKD than white Americans; further, they account for 31% of end-stage renal disease, 34% of kidney transplant waiting list names, 28% of kidney transplants in 2015. Similarly, they also have more advanced kidney disease than whites, and much more likely than whites to have diabetes and hypertension (Nally, 2017). Multiple attempts to examine why African Americans are disproportionately affected by progression of CKD revealed that they have increased risk factors compared to whites (Nally, 2017). Genetic factors were found to be one of the reasons for the CKD disparities. Two variant alleles of the APOL 1 gene on chromosome 22 were found to be associated with nondiabetic kidney disease in African Americans (Nally, 2017). The APOL 1 variant increases the risk of CKD, and the variant is prevalent among African Americans.

The most dramatic example of racial/ethnic disparities in health is end-stage kidney disease (ESKD) and earlier stages of CKD in the United States, as specifically related to quality healthcare access, health beliefs, and health behaviors (Laster et al.,

2018). According to the Center for Disease Control and Prevention (CDC), differences in social determinants of health contribute to persistent CKD disparities in the United States (CDC, 2021). Social determinants of health (SDOH) refer to conditions in which we are born, live, learn, work, play, worship, and age (CDC, 2021). Specifically, SDOH limit opportunities for certain populations to have access to health equities. Thus, closing the gap means creating opportunities for health equity or conditions in which every person has access to the highest level of health (CDC, 2021).

Definitions

African Americans: The descendants of enslaved people brought from African homelands to the United States (Britannica, 2020)

Chronic Kidney Disease (CKD): It is the gradual loss of the kidney's function of filtering wastes and excess fluid from the body (NIDDK, 2017).

Comorbidities: Underlying health conditions, or the presence of more than one disease condition, that coexist or co-occur with CKD (CDC, 2020)

Disparities: When a group of people experience a noticeable difference in health, such as higher rate of illness, injury, disability, or death than another group (CDC, 2020).

End-Stage Renal Disease (ESRD): It is the permanent and final stage of chronic kidney disease when the kidney can no longer function independently. Patients with ESRD depend on dialysis or kidney transplant in order to survive (John Hopkins Medicine, 2020).

Educational Level: It is the grade or the highest level of education a person has completed such as high school, associate degree, bachelor's degree, master's degree, or Doctoral/PhD.

White Counterparts: Caucasians who are in the same category, such as age, gender, and social status, as African Americans.

Assumptions

I assumed that during the data collection process, participants will provide truthful and honest answers and that the health information obtained from the databases, including Maryland Department of health and Maryland Behavior Risk Factor Surveillance System (MBRFSS), were accurate and with reasonable questions that were clearly asked.

Scope and Delimitations

This study sought to address the chronic kidney disease disparities affecting African Americans. It covered African Americans over 18 years old and their white counterparts residing in Maryland. The study also examined the association between educational level, unemployment, race, and CKD, along with the underlying health conditions including hypertension, diabetes, obesity, and gender. Crews and Purnell (2020) posit that African Americans suffer higher deaths among all Americans due to kidney disease; however, according to Chu et al. (2020), there were gaps in literature, health literacy, or the awareness of the prevention of the prevalence and progression of CKD among African Americans.

This is a cross-sectional study to find the association between the variables, as the findings would be an additional resource to existing literature to address the kidney health disparities. I used various levels of SEM conceptual theory to identify how the concept influenced kidney health behaviors. I did not use other theories such as the health behavior model, which was very related to how my study participants may perceive health, because SEM specifically addressed how its various social levels affected health behaviors. Data for the study were drawn from the databases of BRFSS from 2010-2021.

Limitations

The social ecological model (SEM), which was the main theoretical concept, is comprised of five levels of interrelationships that influence health behaviors and is paramount to the results of the study; in that, the overall outcome of the study was limited to the accuracy of the SEM framework (Dusick, 2015). Another limitation was the accuracy of the results of the study, which depended on the truthfulness of the self-report responses gathered from the study participants. Data collection might be limited to what was available and accessible in the databases, and this might make the outcome of the study not externally valid or generalized.

Significance of my Study

There have been several studies about chronic kidney disease and how it disproportionately affected African Americans, but there was not enough literature to determine the influence of educational level, unemployment, race, and the underlying conditions of hypertension, diabetes, obesity, and gender on kidney health disparities. For instance, a study conducted by Chu et al. (2020) found that there a was gap in literature

about the persistence of CKD among African Americans, and that CKD patients were unaware that they had the disease due to lack of information about the disease. My study was also significant because it could create awareness of CKD, and the findings could be a resource for further research on how to eradicate the disparities that existed. In addition, the findings could be used to educate and influence African American communities, particularly in Maryland, to seek health care or basic screenings to prevent minor health conditions from becoming chronic. Moreover, the results of the study could help establish the link between educational level unemployment, race, gender, hypertension, obesity, diabetes, and chronic kidney disease.

Social Change Implication

My study is designed to raise awareness of the impact of socioeconomic factors, including educational level, employment status, income, and access to healthcare on CKD and the overall health of minorities in the United States. The application of various levels of SEM might significantly influence positive health behaviors and outcomes, particularly in African American communities, such as staying physically fit, seeking higher education, getting employment, and staying informed to make better health choices. Organizations and both local and state governments could influence health through regulations and practices that promote health while abolishing or discouraging unhealthy ones.

Furthermore, my study aims to fill the gaps in literature about health literacy and lack of awareness of the risk factors of CKD, such as weight loss, proper diet, smoking cessation, and physical fitness, along with their association with CKD, as noted by

Hwang et al. (2020). It could impact society as an educational tool to promote healthy lifestyles by influencing individuals, families, and communities to adapt behaviors that, for instance, will control blood pressure, avoid sleep deprivation, and seek regular health screenings to detect kidney disease early enough to avoid complications.

Summary and Conclusion

Chronic kidney disease is a public health problem that disproportionately burdens African Americans in the United States. Despite its prevalence, high incidence and mortality rates among African Americans, there was lack of adequate knowledge about the progression of CKD among people affected, and more than half of patients who had had the disease for over five years were not aware of their situation (Chu et al., 2020). Thus, it was important to conduct more studies to close the gap in literature and to raise awareness to CKD health disparities.

My study examines the relationship between educational level, unemployment, race, and the underlying health conditions, including hypertension, diabetes, obesity, gender, and chronic kidney disease. Other studies suggested that there was a link between socioeconomic status and chronic kidney disease, but my study focuses on the association between the independent variables, which included socioeconomic factors and risk factors of chronic kidney disease. My study also addresses why there seems to be a higher prevalence and increased mortality rates among African Americans. The study also aimed to fill the gap in literature or information about the CKD, and to create adequate awareness in African American communities, particularly in Maryland. Though the study focused on participants in Maryland, its findings could be a great resource for

further research to African Americans in the entire country and elsewhere. For instance, findings could raise awareness to CKD disparities that exist and create avenues to push for access to health care and basic health screenings for early detection of the onset of CKD to create the most effective intervention strategies.

The five levels of influence of the socio ecological model were useful to promote lifestyles and health behaviors that could minimize the risk factors of CKD that disproportionately affects African Americans. The influence of individuals, interpersonal, community, organizations, and enabled environment or policies on CKD can serve as health promotional tools that create positive social change.

Section 2: Research Design and Data Collection

Introduction

This quantitative study examined the association between educational level, unemployment, race, and CKD among participants over 20 years old residing in Maryland while controlling for hypertension, diabetes, and obesity. Data retrieved from the United States Census Bureau show that 31.1% of Maryland's population were African Americans, and 54% were Caucasians (US Census Bureau, 2020). However, there were disproportionately higher rates of CKD morbidity and mortality among African Americans than their white counterparts, at rates of 3.3% and 2.8% respectively. The number of CKD cases continued to grow; for instance, between 2012 and 2017, there was an increase from 24% to 33% CKD morbidity and mortality in Maryland (AHRQ, 2018). African Americans were twice as likely than whites to have CKD progression (Laster et al., 2020). The incidence and progression of CKD were associated with socioeconomic conditions that included educational level, unemployment, and income level (Barreto et al, 2016). Zeng et al. (2016) posit that individuals with lower socioeconomic status could have undiagnosed and untreated CKD as the result of lack of access to quality healthcare, health information, healthy diet, and lack of physical activity.

Thus, my study aimed to investigate the relationship between the independent and dependent variables while controlling for the co-variables to facilitate the creation of the most effective interventions to promote health. It is an important study because while there had been several similar studies in the past, there is still a gap in the literature

regarding the persistence of CKD among African Americans, and that patients were unaware that they had the disease, which warranted the need for intervention (Chu et al., 2020).

Research Design and Rationale

The independent variables for my study were educational level, unemployment, and race, and the dependent variable was CKD. The control variables were hypertension, obesity, and diabetes. This was a quantitative study, which was most suitable to understand the factors or variables that influence the outcome (Creswell, 2014). I used the cross-section research design for the study, which is an observational study that analyzes data from a population at a point in time (Wang & Cheng, 2020). It was used to analyze the exposures and outcomes of variables. Thus, it was best for my study because it could measure the relationship between the independent variables, which were educational level, unemployment, and race, and the outcome or dependent variable, CKD.

Methodology

The population for my study was made up of individuals with African American, Caucasian, Hispanic, and other ethnicities who were over 18 years of age residing in Maryland. I targeted a population size of approximately 1,000. This enabled me to obtain an effect size that reflected statistically significant association between my variables.

Sampling Procedures

I drew samples from the databases of Behavioral Risk Factor Surveillance System (BRFSS) from 2016-2021. This was a state-based cross-sectional telephone survey

collected by the Maryland Health Department (CDC, 2020). According to the Center for Disease Control and Prevention (CDC), these data were collected monthly about the prevalence among adult residents of the state regarding their risk behaviors and preventive health practices that affected their health status (CDC, 2020). My study participants included individuals of various races, all over the age of 18 years and residing in Maryland; notably, I excluded anyone who was under 18 years or who did not reside in Maryland. I also excluded any unrelated comorbidities, such as respiratory disease, that could bias the results of my study (Patino and Ferreira, 2018).

A random sampling method was used to gather the data contained in the Behavioral Risk Factor Surveillance System (BRFSS). The survey was conducted by random digit dialing technology on both landlines and cell phones to gather state data about its residents (CDC, 2020). BRFSS data are in the public domain and were obtained without permission. The data and materials are produced by federal agencies and were dependable. For instance, the survey questionnaires are designed by state coordinators and CDC staff and then approved by the state coordinator (CDC, 2020). It was therefore the best source of data for my study; it also contained all the data about my study participants and all the variables, including the co-variables.

G*Power Analysis

For this study, I used the G*Power software version 3.1.97 to determine the desired sample size. It was the appropriate statistical tool to calculate sample size and was helpful for estimation when establishing research goals and hypothesis, choosing

appropriate statistical tests, and choosing a power analysis method (Kang, 2021). Using G*Power, I calculated the minimum sample size for each of my research questions.

Power Analysis for Research Questions

RQ 1: Is there a statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

DV: Chronic Kidney Disease.

IVs: Educational level

CoV: Hypertension, diabetes, obesity, and gender.

Test statistic: Logistic Regression

Pr(Y=1/X=1) H0: 0.35

OR = 2.44

R = 0.40

R^2= 0.16

Educational level has a moderate effect on diabetes, hypertension, and obesity, which are the major of causes CKD.

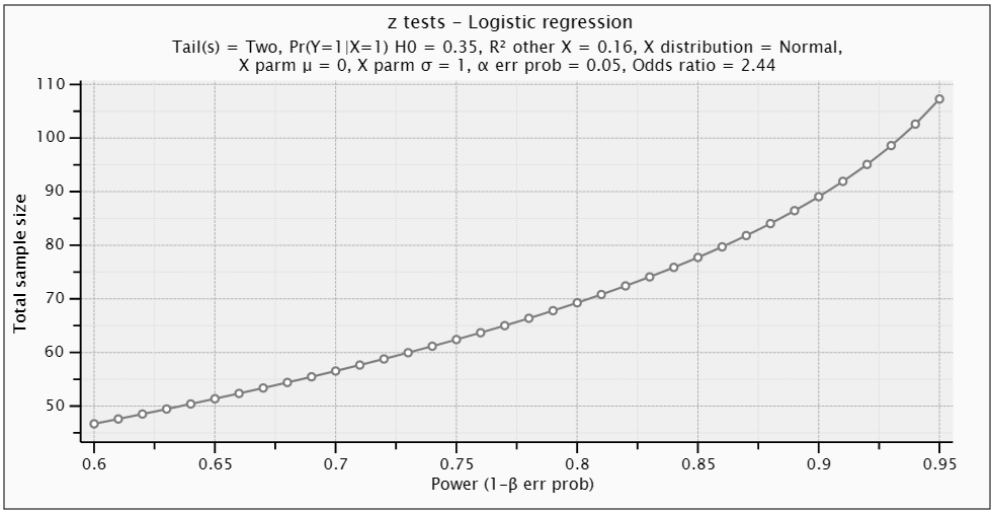
Alpha: 0.05

Power: 0.80

Minimum sample size: 70

Figure 3

Logistic Regression Analysis for Minimum Sample Size for RQ1



RQ 2: Is there a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

DV: Chronic Kidney Disease.

IVs: Unemployment.

CoV: Hypertension, diabetes, obesity, and gender.

Test statistic: Logistic Regression.

Pr(Y=1/X=1) H0 = 0.20.

OR = 2.44

R = 0.5

R^2 = 0.25

Unemployment has a medium association with diabetes, hypertension, and obesity, which are causes of CKD.

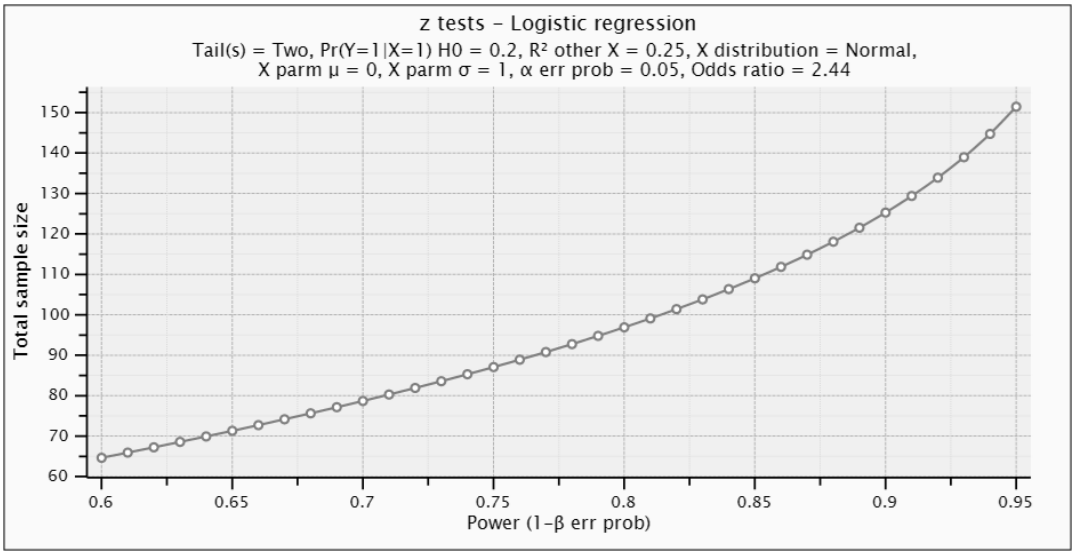
Alpha: 0.05

Power: 0.80

Minimum sample size: 97

Figure 4

Logistic Regression analysis for minimum sample size for RQ 2



RQ 3: Is there a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

DV: Chronic Kidney Disease.

IVs: Race.

CoV: Hypertension, diabetes, obesity, and gender.

Test statistics: Logistic regression.

Pr(Y=1/X=1) H0 = 0.25

OR = 2.44

R = 0.7

R^2= 0.49

There is a higher association between race, gender, hypertension, diabetes, and obesity, which are causes of CKD.

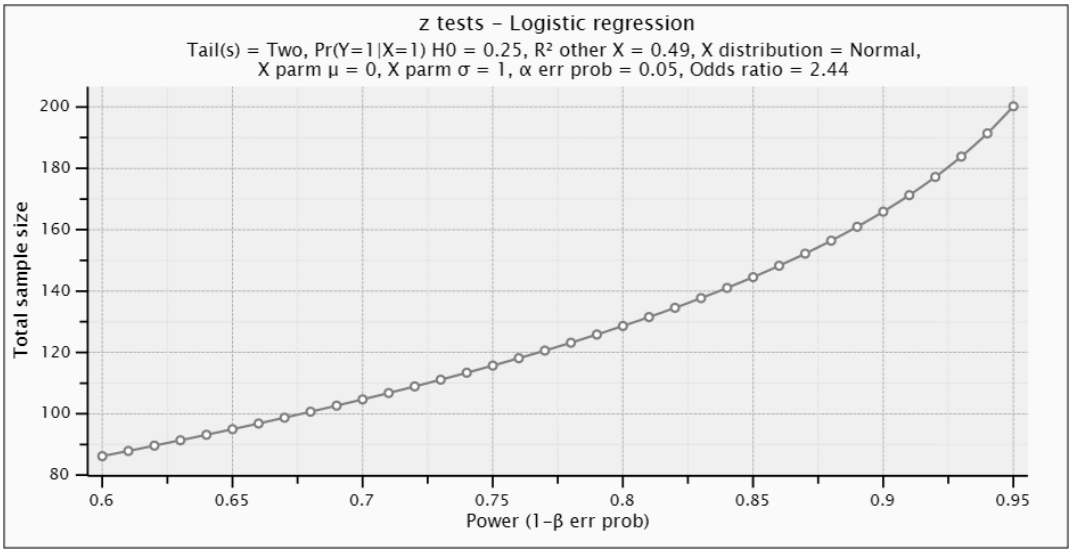
Alpha: 0.05

Power: 0.80

Minimum sample size: 129

Figure 5

Logistic Regression Analysis for Minimum Sample Size for RQ3



Operational Definition of Variables

This study sought to examine the statistically significant association between educational level, unemployment, race, and CKD among participants. Samples were

drawn from the following ethnicities: African American, Caucasian, Hispanic, and other races. The participants were all over the age of 18 years and residing in Maryland. In research question (RQ) 1, which was finding whether there was a statistically significant association between educational level and CKD among participants, I categorized educational level into achievement levels such as, 1. Did not graduate high school, 2. Graduated high school, 3. Attended college/technical school, and 4. Graduated college/technical school.

RQ 2 was to examine whether there was a statistically significant association between unemployment and CKD among African Americans over 20 years.
old. I framed the variables into two categories that required a yes/no answer, such as answering yes or no for employment and CKD statuses.

Table 1

Description of Variables

Definition	Category	Variables Type	Measurement
CKD	0: No 1: Yes	Dichotomous	DV
Race	1: White 2: African American 3: Hispanic 4: Other	Nominal	IV
Educational Level	1: Did not graduate high school 2: Graduated high school 3: Attended college/technical school 4: Graduated college/technical school	Ordinal	IV
Unemployed	1: Yes 0: No	Dichotomous	IV

Data Analysis Plan

I used SPSS statistical software version 28 for the study. The most important next step after data collection was to analyze the data to achieve the desired outcome. I used the descriptive analysis method for this study to show the frequency and percentage distributions and analyze the demographic characteristics of the population. This method is usually used to summarize and describe a variable or variables for a sample (Curtin University, 2021). I also used binary logistic regression for my multivariable analysis since the dependent variable was dichotomous. Then, for power analysis, I used the G*Power software to estimate the minimum sample size for the study.

Research Questions and Hypotheses

RQ 1: Is there a statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Q 2: Is there a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

RQ 3: Is there a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Assumptions Pertaining to the Statistical Analysis

I assumed that when using the binary logistic regression for the analysis, all the variables were categorical and mutually exclusive, meaning a variable or an individual

could not be in two categories. I also assumed that the value of a cell should be at least 80% or higher (Statology, 2021).

Threats to Validity

The validity of a study refers to whether the results are trustworthy and meaningful (Cuncic, 2021). Further, threats to validity are factors that do not make the study trustworthy or meaningful (Cuncic, 2021). There are two types of validity, which are external and internal. Internal validity is about how well the study is conducted, or the extent to which it establishes trustworthy cause-and-effect relationship, while external validity is about how well the outcome of the study is expected to apply to other settings or the generalizability of the findings (Cuncic, 2021).

Internal threats to validity depend largely on things that influence the procedures of the study, as well as how it is conducted that make the findings questionable (Cuncic, 2021). Internal threats to the validity of my study included construct validity, which was about whether my statistical test measured what it was intended to measure; another example is whether the objectives for using the binary regression analysis were met or was the appropriate method to answer my research questions.

Another threat to the internal validity of my study was selection bias, which would show up as misrepresentation of my study participants. To avoid this threat, I ensured that my sample size was not too small, I had equal representation of participants and, questions in the survey were asked in an understandable way, and the answers being provided are true (Cuncic, 2021).Threats to the external validity of my study were minimized because I drew the sample from the databases of BRFSS, which contained

randomly collected data that avoided gender, cultural, and racial biases, which could threaten the validity of my study (CDC, 2020).

Ethical Procedures

The BRFSS dataset was compiled through a random digit telephone dialing system, followed ethical guidelines, and is confidential. The Centers for Disease Control and Prevention ensured that necessary changes were maintained to the security, validity, and the usefulness of BRFSS data. For instance, in 2006, an extensive development was initiated by experts in collaboration with State BRFSS coordinators to ensure ethical improvements to the security of cell phone responses (CDC, 2020).

BRFSS data were collected from all 50 states, the District of Columbia, and the United States territories regarding health risk behaviors, chronic disease, access to care, and other health related information; this information was then stored securely (CDC, 2020). Ethical values such as informed consent, confidentiality, and fair compensation were considered when compiling the data as the CDC officials and state coordinators were highly qualified. I sought approval from the institutional Review Board (IRB) to proceed with my study and followed all ethical guidelines of the board. I restored the data in a code protected software, was the only person with access, and will destroy the data after five years after my study was conducted.

Summary

Section 2 of my study focused on the study design and data collection techniques. The section highlighted the research questions, the independent variables, dependent variables and the covariables, including the research design and the rationale for the

study. The methodology and sampling procedures of the study were also outlined in the section. The Behavior Risk Factor Surveillance System (BRFSS) was identified as the source from which data was drawn. Logistic regression statistical analysis was used to estimate the minimum sample size for each of the research questions by using G*Power software 3.1.9.7. In addition, threats to validity of the study and ethical procedures were noted in the section.

Section 3: Presentation of the Results and Findings

Introduction

This was a quantitative study to examine the association between education level, unemployment, race, and CKD among individuals over 18 years old and residing in Maryland. This study sought to raise awareness of CKD, which disproportionately affects African Americans more than any other racial or ethnic group in the United States (Chu et al., 2020). In this section of the study, I discussed access to the dataset from the BRFSS databases and the conduction of statistical analysis using multivariable regression method. In addition, I presented the descriptive and demographic characteristics of the sample and analyzed the relationship between the predictor and response variables by focusing on answering the following research questions and hypotheses:

RQ 1: Is there a statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

RQ 2: Is there a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing and in Maryland, controlled for gender, hypertension, obesity, and diabetes.

RQ 3: Is there a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between race and chronic kidney disease among individuals over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Accessing the Data Set for Secondary Analysis

I accessed the databases of Behavioral Risk Factor Surveillance System (BRFSS), which comprises an ongoing telephone-based chronic disease surveillance that collects

and reports data on risky health behaviors and conditions faced by adults in Maryland (BRFSS, 2022).

I obtained approval from the Institutional Review Board (IRB; approval number 10-04-22-00571100), before searching through the databases of BRFSS to select the dataset of 2021, which contains all the variables for my study. The data comprises a telephone survey and responses from participants residing in Maryland. The interviewers conducted the survey between January 2021 and December 31st, 2021. The results and outcomes of the survey were obtained from responses from interviews via landlines and cell phones with adults in households in Maryland (BRFSS, 2022).

The weighing methodology for the survey was the iterative proportional fitting, also referred to as raking, which replaced the post-stratification method (BRFSS, 2022). The raking methodology allows cellular telephone survey data and demographic characteristics such as educational level, marital status, and race/ethnicity to be incorporated (BRFSS, 2022). The sample, which is made up of combined landline and cell phone interviews, is weighted and has a response rate of 38.9%, 11,361 interviews by cell phones and 4,892 by landlines for a total of 16,253 (BRFSS, 2022). The sample was weighted with a design factor and demographic adjustment of the population (BRFSS, 2022).

Discrepancies in The Dataset

In my proposal, I stated that the sample would be drawn from individuals over 20 years old and residing in Maryland, but the BRFSS dataset has adults over 18 years and not 20 years old, so I used 18 years old for my statistical analysis.

Descriptive Characteristics of the Study Variables

The descriptive characteristics of the outcome variable, CKD, are summarized in Table 2, which describes the distribution of CKD among the respondents in the State of Maryland based on educational level, unemployment, and race while controlling for gender, hypertension, obesity, and diabetes. The demographic for CKD shows that, (n =621, 4.0%) participants answered yes for having it, while (n =14957, 96.1%) answered no.

For the predictive variable educational level, the responses of those who did not graduate high school show that, (n = 40, 4.8%) have CKD while (n = 785, 95.2%) do not have it. For those who graduated high school, (n = 182, 5.0%) have CKD while (n = 3441, 95%) do not have it. Then, for respondents who attended college or technical school, (n= 159, 4.6%) have CKD and (n = 3306, 95.4%) do not have it. In addition, (n = 236, 3.1%) of those who graduated college or technical school have CKD while (n= 7285, 96.9%) do not have it.

The responses for the predictor variable unemployment indicate that (n = 461, 6.6%) of the unemployed have CKD, while (n = 6475, 93.4%) do not have it. For those who are employed, (n = 145, 1.8%) have CKD while (n = 8121, 98.2%) do not have it. For the predictor variable race, (n = 405, 4.2%) Whites have CKD while (n = 9265, 95.8%) do not have it. (n = 147, 4.3%) of Blacks have CKD, while (n = 3264, 95.7%) do not have it. Then for Hispanics, (n= 22, 2.1%) have CKD, while (n = 1031, 97.9%) do not have it. For other races, (n = 28, 2.9%) have CKD, while (n = 948, 97.1%) do not have it.

Regarding the control variables, (n =297, 4.2%) of males and (n = 324, 3.8%) of females have CKD, while (n = 6846, 95.8%) of males and (n = 8111, 96.2%) do not have the disease. For hypertension, (n = 490, 7.4%) of those who are hypertensive have CKD, while (n = 6127, 92.6%) do not have it. For those who are not hypertensive, (n = 131, 1.5%) have CKD, while (n = 8830, 98.5%) do not have it. For respondents who have obesity, (n = 443, 4.7%) have CKD, while n (= 9002, 95.3%) do not have it. For respondents who do not have obesity, (n = 119, 2.9%) have CKD, and (n = 3932, 97.1%) do not have it. For respondents who have diabetes, (n = 264, 11.4%) have CKD, while (n = 1975, 88.2%) do not have CKD. For those who do not have diabetes, (n = 357, 2.7%) have CKD, while (n = 12959, 97.3%) do not have CKD.

Table 2

Distribution of Chronic Kidney Disease Among Residents of the State of Maryland, USA, Based on Education, Unemployment, Race, Gender, Hypertension, Obesity, and Diabetes Status [Behavioral Risk Factor Surveillance System (BRFSS) 2016-2021, N=15627]

Characteristics		Total n (%)	Chronic Kidney Disease Yes n (%)	Chronic Kidney Disease No n (%)	p-value
Dependent Variable					
CKD	Yes	621 (4.0)			
	No	14957 (96.0)			
Independent Variable					
Race	White	9670	405 (4.2)	9265 (95.8)	0.002
	African American	3411	147 (4.3)	3264 (95.7)	
	Hispanic	1053	22 (2.1)	1031 (97.9)	
	Other	976	28 (2.9)	948 (97.1)	
Educational Level	Did not graduate high school	825 (5.3)	40 (4.8)	785 (95.2)	<0.001
	Graduated high school	3623 (23.5)	182 (5.0)	3441 (95.0)	
	Attended college/technical school	3465 (22.5)	159 (4.6)	3306 (95.4)	
	Graduated college/technical school	7521 (48.7)	236 (3.1)	7285 (96.9)	
Unemployed	Yes	6936	461 (6.6)	6475 (93.4)	<0.001
	No	8266	145 (1.8)	8121 (98.2)	
Covariates					
Gender	Male	7143	297 (4.2)	6846 (95.8)	0.31
	Female	8435	324 (3.8)	8111 (96.2)	
Hypertension	Yes	6617	490 (7.4)	6127 (92.6)	<0.001
	No	8169	131 (1.5)	8830 (98.5)	
Obesity	Yes	9445	443 (4.7)	9002 (95.3)	<0.001
	No	4051	119 (2.9)	3932 (97.1)	
Diabetes	Yes	2239	264 (11.4)	1975 (88.2)	<0.001
	No	13316	357 (2.7)	12959 (97.3)	

Table 2 displays the distribution of CKD among African Americans who responded to the survey in the State of Maryland based on educational level and unemployment status while controlling for gender, hypertension, obesity, and diabetes. While (n = 147, 4.3%) have CKD, (n = 3264, 95.7%) do not have it. For educational level, (n = 8, 4.5%) of the African Americans who did not graduate high school have CKD, while (n = 171, 95.5%) do not have it. For those who graduated high school, (n = 50, 5.6%) have CKD, while (n = 846, 94.4%) do not have it. (n = 43, 4.7%) of African Americans who attended college or technical school have CKD, while (n = 863, 95.3%) of them do not have it. For African Americans who graduated college or technical school, (n = 46, 3.3%) have CKD, and (n = 1364, 96.7%) do not have the disease.

For African Americans who are unemployed, (n = 111, 7.6%) have CKD and (n = 1340, 92.4%) do not have it. Then for those employed, (n = 33, 1.8%) have CKD while (n = 1838, 98.2%) do not have it. Regarding gender, (n = 67, 4.9%) of males and (n = 80, 3.9%) of females have CKD while (n = 1307, 95.1%) of males and (n = 1957, 96.1%) do not have the disease. For hypertension, (n = 130, 7.9%) of the African Americans who are hypertensive have CKD while (n = 1521, 92.1%) do not have it. For those who are not hypertensive, (n = 17, 1.0%) have CKD while (n = 1743, 99.0%) do not have CKD. Then for the African Americans who have obesity, (n = 104, 4.6%) have CKD while (n = 2172, 95.4%) do not have it. (n = 28, 4.3%) of those who do not have obesity have CKD while (n = 624, 95.7%) do not have CKD. Furthermore, for the African Americans who have diabetes, (n = 75, 12.4%) have CKD while (n = 531, 87.6%) do not have it. Then for

those who do not have diabetes, (n = 72, 2.6%) have CKD while (n = 2729, 97.4%) do not have it.

Table 3

Distribution of Chronic Kidney Disease Among African Americans Residing in the State of Maryland, USA, Based on Education, Unemployment, Race, Gender, Hypertension, Obesity, and Diabetes Status [Behavioral Risk Factor Surveillance System (BRFSS) 2021, N=3420]

Characteristics		Total n (%)	Chronic Kidney Disease Yes n (%)	Chronic Kidney Disease No n (%)	p-value
Dependent Variable					
CKD	Yes	621 (4.0)			
	No	14957 (96.0)			
Independent Variable					
Educational Level	Did not graduate high school	179	8 (4.5)	171 (95.5)	0.05
	Graduated high school	896	50 (5.6)	846 (94.4)	
	Attended college/technical school	906	43 (4.7)	863 (95.3)	
	Graduated college/technical school	1410	46 (3.3)	1364 (96.7)	
Unemployed	Yes	1451	111 (7.6)	1340 (92.4)	<0.001
	No	1871	33 (1.8)	1838 (98.2)	
Covariates					
Gender	Male	1374	67 (4.9)	1307 (95.1)	0.18
	Female	2037	80 (3.9)	1957 (96.1)	
Hypertension	Yes	1651	130 (7.9)	1521 (92.1)	<0.001
	No	1760	17 (1.0)	1743 (99.0)	
Obesity	Yes	2276	104 (4.6)	2172 (95.4)	0.77
	No	652	28 (4.3)	624 (95.7)	
Diabetes	Yes	606	75 (12.4)	531 (87.6)	<0.001
	No	2801	72 (2.6)	2729 (97.4)	

Assumptions

I used multivariable logistic regression method for my statistical analysis. The response variable, CKD, was binary, required a yes/no answer, and aligns with the assumptions of the model. The predictor variables, educational levels, unemployment status, and race were independent of each other and did not correlate, which fit the model of multivariable regression. In addition, the sample size drawn from the BRFSS dataset was large enough to draw valid conclusions (Statology, 2020). There were no influential observations or extreme outliers of the dataset (Statology, 2020).

Research Question 1

RQ 1: Is there a statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between educational level and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

In answering RQ 1, I used multivariable logistic regression to find if there is a statistically significant association between the outcome and predictor variables, as shown in Table 4 below.

Based on the model fit parameter, 15.5% of the variation in CKD is explained by educational level (the independent variable), and the co-variates (gender, hypertension, obesity, and diabetes) are indicative of a good fit. Negelkerke R-square = 0.155.

Findings for RQ 1

Using respondents who did not graduate high school as referent and after adjusting for gender, hypertension, obesity, and diabetes, I detected that those who graduated high school were more than twice as likely to report having CKD (AOR=2.44, 95% CI=1.00, 5.92, p=0.049). Similarly, those who attended college or technical school (AOR=1.67, 95% CI=0.68,4.10, p=0.26) showed 71% and 67% increased odds, respectively, of reporting CKD; although, these were not statistically significant. Overall, there was a statistically significant association between educational level and CKD (p=0.049) after adjusting for gender, obesity, and diabetes, thus, rejecting the null hypothesis that suggested that there is no statistically significant association.

In addition to assessing RQ 1, it was also observed that when compared to males, females had a non-statistically significant decreased odds of reporting CKD (AOR=0.80, 95% CI=0.56,1.16, p=0.24). Those who were hypertensive showed a statistically significant increased likelihood of reporting CKD compared to their non-hypertensive counterparts (AOR=6.74, 95% CI= 3.84, 11.83, p=<0.001).

Obesity and diabetes were also statistically significantly associated with CKD. While those who were obese showed a decreased odds (AOR=0.61, 95% CI=0.39, 0.97, p=0.04). Those who were diabetic showed an increased likelihood (AOR=3.32, 95%

CI=2.28, 4.83, p= <0.001) of reporting CKD compared to their counterparts without the respective conditions.

Table 4

Association Between Educational Level and Chronic Kidney Disease Among African Americans Aged 18 and Above Residing in the State of Maryland, USA, Controlling Gender, Hypertension, Obesity, and Diabetes Status [Behavioral Risk Factor Surveillance System (BRFSS) 2016-2021, N=3420]

Characteristics		Crude		Adjusted	
		OR (95% CI)	p-value	OR (95% CI)	p-value
Educational Level	Did not graduate high school	Ref	-	Ref	-
	Graduated high school	1.26 (0.59, 2.71)	0.55	2.44(1.00, 5.92)	0.049
	Attended college/technical school	1.07 (0.49, 2.31)	0.87	1.71 (0.70, 4.20)	0.24
	Graduated college/technical school	0.721 (0.34, 1.55)	0.40	1.67 (0.68, 4.10)	0.26
Gender	Male	Ref.	-	Ref.	-
	Female	0.80 (0.57, 1.11)	0.18	0.80 (0.56, 1.16)	0.24
Hypertension	Yes	8.76 (5.26, 14.60)	<0.001	6.74 (3.84, 11.83)	<0.001
	No	Ref.	-	Ref.	-
Obesity	Yes	1.07(0.70, 1.64)	0,77	0.61 (0.39, 0.97)	0.04
	No	Ref.	-	Ref.	-
Diabetes	Yes	5.35(3.82, 7.50)	<0.001	3.32 (2.28, 4.83)	<0.001
	No	Ref.	-	Ref.	-

Research Question 2

RQ 2: Is there a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between unemployment and chronic kidney disease among African Americans over 20 years old residing and in Maryland, controlled for gender, hypertension, obesity, and diabetes.

I used multi-variable logistic regression for the statistical analysis of RQ 2 to find if there is a statistically significant association between unemployment and CKD. Based on the model fit parameter, 17.5% of the variation in CKD is explained by unemployment (the independent variable) and the co-variates (gender, hypertension, obesity, and diabetes) are indicative of a good fit. Negelkerke R-square=0.175.

Findings for RQ 2

Using African Americans who are employed as referent and after adjusting for gender, hypertension, obesity, and diabetes, I detected that those who are unemployed are more likely to report CKD (AOR=2.83, 95% CI=1.84, 4.35, p=<0.001). Overall, there is a statistically significant association between unemployment and CKD (p=<0.001), thus rejecting the null hypothesis that suggested that there is no statistically significant association between unemployment and CKD.

In further assessment of RQ 2, I also detected that African American females have decreased odds of reporting CKD compared to their male counterparts (AOR=0.77, 95% CI=0.53, 1.11, p=0.16). Those who were hypertensive showed statistically significant increased likelihood of reporting CKD as compared to their non-hypertensive

counterparts (AOR=5.57, 95% CI=3.16, 9.79, p=<0.001). Obesity and diabetes were also statistically significantly associated with CKD, while those who were obese showed decreased odds of reporting CKD (AOR=0.71, 95% CI=0.45, 1.11, p=0.14). Those who are diabetic showed increased likelihood of reporting CKD (AOR=2.89, 95% CI=1.98, 4.21, p=<0.001) compared to their counterparts without the respective conditions.

Table **5**

Association Between Unemployment Status and Chronic Kidney Disease Among African Americans Aged 18 and Above Residing in the State of Maryland, USA, Controlling Gender, Hypertension, Obesity, and Diabetes Status [Behavioral Risk Factor Surveillance System (BRFSS) 2021, N=3420]

Characteristics		Crude		Adjusted	
		OR (95% CI)	p-value	OR (95% CI)	p-value
Unemployment	Yes	4.61 (3.11, 6.85)	<0.001	2.83 (1.84, 4.35)	<0.001
	No	Ref.	-	Ref.	-
Gender	Male	Ref.	-	Ref.	-
	Female	0.80 (0.57, 1.11)	0.18	0.77 (0.53, 1.11)	0.16
Hypertension	Yes	8.76 (5.26, 14.60)	<0.001	5.57 (3.16, 9.79)	<0.001
	No	Ref.	-	Ref.	-
Obesity	Yes	1.07(0.70, 1.64)	0,77	0.71 (0.45, 1.11)	0.14
	No	Ref.	-	Ref.	-
Diabetes	Yes	5.35(3.82, 7.50)	<0.001	2.89 (1.98, 4.210	<0.001
	No	Ref.	-	Ref.	-

Research Question 3

RQ 3: Is there a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes?

Hypothesis: H_a: There is a statistically significant association between race and chronic kidney disease among individuals over 20 years old residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

Null Hypothesis: H_0: There is no statistically significant association between race and chronic kidney disease among individuals over 20 years old and residing in Maryland, controlled for gender, hypertension, obesity, and diabetes.

I used multivariable logistic regression to analyze the likelihood that race predicts CKD, as shown in table 6 below. Based on the model fit parameter, 11.8% of the variation in CKD is explained by race (the independent variable) and the covariates (gender, hypertension, obesity, and diabetes) are indicative of a good fit. Nagelkerke R-Square= 0.118.

Findings for RQ 3

Using Whites as referent, and after adjusting for gender, hypertension, obesity, and diabetes, I detected that Blacks have decreased odds of reporting CKD (AOR=0.88, 95% CI=0.72, 1.09, p=0.25). Similarly, Hispanics, (AOR=0.63, 95% CI=0.38, 1.04, p=0.07) and respondents of other races (AOR=0.80, 95% CI=0.53, 1.20, p=0.29) have increased odds of reporting CKD than Whites respectively. Overall, there is a statistically significant association between race and CKD (p=0.25), thus rejecting the null hypothesis that suggested that there is no statistically significant association between race and CKD.

In addition, I also observed that when compared to males, females had a non-statistically significantly decreased odds of reporting CKD (AOR=0.31, 95% CI=0.80, 1.14, p=0.60). Those who were hypertensive showed a statistically significant increased likelihood of reporting CKD compared to their non-hypertensive counterparts (AOR=4.01, 95% CI=3.22, 5.00, p=<0.001).

Obesity and diabetes were also statistically significantly associated with CKD. While those who are obese showed a deceased odds of reporting CKD (AOR=1.04, 95% CI=0.83, 1.29, p=0.75). Those who are diabetic showed an increased likelihood (AOR=3.25, 95% CI= 2.70, 3.91, p=<0.001) of reporting CKD compared to their counterparts without the respective conditions.

Table 1

Association between race and chronic kidney disease among individuals aged 18 and above residing in the State of Maryland, USA, controlling gender, hypertension, obesity, and diabetes status [Behavioral Risk Factor Surveillance System (BRFSS) 2016-2021, N=3420]

Characteristics		Crude		Adjusted	
		OR (95%CI)	p-value	OR (95%CI)	p-value
Race	White	Ref.	-	Ref.	-
	Black	1.03 (0.85, 1.25)	0.76	0.88 (0.72, 1,09)	0.25
	Hispanic	0.49 (0.32, 0.75)	<0.001	0.63 (0.38, 1.04)	0.07
	Other	0.67 (0.46, 1.00)	0.05	0.80 (0.53, 1.20)	0.29
Gender	Male	Ref.	-	Ref.	-
	Female	0.92 (0.78, 1.08)	0.31	0.95 (0.80, 1.14)	0.60
Hypertension	Yes	5.39 (4.43, 6.56)	<0.001	4.01 (3.22, 5.00)	<0.001
	No	Ref.	-	Ref.	-
Obesity	Yes	1.63 (1.32, 2.00)	<0.001	1.04 (0.83, 1.29)	0.75
	No	Ref.	-	Ref.	-
Diabetes	Yes	4.85 (4.11, 5.73)	<0.001	3.25 (2.70, 3.91)	<0.001
	No	Ref.	-	Ref.	-

Additional analysis

Although not one of the research questions for this study, it is also important to fit a completely adjusted model exploring the relation of chronic kidney disease to educational level, unemployment, and race, controlling for each other as well as for gender, hypertension, obesity, and diabetes status as depicted in table 6 below.

Based on the model fit parameter, 14.8 % of the variation in CKD is explained by the independent variables (education, unemployment, and race) and the covariates (gender, hypertension, obesity, and diabetes), indicative of a good fit. Nagelkerke R-Square= 0.148. Among the independent variables, only unemployment shows a statistically significant association with CKD along with hypertension and diabetes in the completely adjusted model. Those who are unemployed reported over 195% increased odds of having CKD compared to their employed counterparts (AOR=2.95, 95 % CI=2.38, 3.66, $p<0.001$).

Table 7

The relation of chronic kidney disease to educational level, unemployment and race among individuals aged 18 and above residing in the State of Maryland, USA, controlling gender, hypertension, obesity, and diabetes status [Behavioral Risk Factor Surveillance System (BRFSS) 2016-2021, N=15146]

Characteristics		Crude OR (95%CI)	p-value	Adjusted OR (95%CI)	p-value
Level of Education	Did not graduate high school	Ref.	-	Ref.	-
	Graduated high school	1.04 (0.73, 1.47)	0.84	1.04(0.70, 1.54)	0.84
	Attended college or technical school	0.94 (0.66, 1.35)	0.75	0.94 (0.63, 1.41)	0.78
	Graduated college or technical school	0.64 (0.45, 0.90)	0.01	0.91 (0.61, 1.34)	0.62
Unemployment	Yes	3.99 (3.30, 4.82)	<0.001	2.95 (2.38, 3.66)	<0.001
	No	Ref.	-	Ref.	-
Race	White	Ref.	-	Ref.	-
	Black	1.03 (0.85, 1.25)	0.76	0.94 (0.76, 1.17)	0.59
	Hispanic	0.49 (0.32, 0.75)	<0.001	0.89 (0.41, 1.35)	0.43
	Other	0.67 (0.46, 1.00)	0.05	0.92 (0.61, 1.38)	0.67
Gender	Male	Ref.	-	Ref.	-
	Female	0.92 (0.78, 1.08)	0.31	0.85 (0.71, 1.01)	0.06
Hypertension	Yes	5.39 (4.43, 6.56)	<0.001	3.26 (2.61, 4.07)	<0.001
	No	Ref.	-	Ref.	-
Obesity	Yes	1.63 (1.32, 2.00)	<0.001	1.13 (0.90, 1.41)	0.29
	No	Ref.	-	Ref.	-
Diabetes	Yes	4.85 (4.11, 5.73)	<0.001	3.86 (2.37, 3.46)	<0.001

Summary

This was a quantitative study that examined the association between educational level, unemployment, race, and CKD among individuals over 20 years old residing in Maryland, while controlling for gender, hypertension, obesity, and diabetes, which are comorbid conditions for CKD. Findings of RQ 1, which examined the statistically significant association between educational level and CKD, showed an association ($p=0.049$) after adjusting for gender, hypertension, obesity, and diabetes; thus, the null hypothesis was rejected. The model fit parameter showed that 15.5% of the variation in CKD is explained by educational level, and the model fit is a good fit.

RQ 2 examined the statistically significant association between unemployment and CKD and the findings showed that there is a statistically significant association between unemployment and CKD (AOR=2.83, 95% CI=1.84, 4.35, $p=<0.001$). Thus, the null hypothesis that suggested that there is no statistically significant association was rejected. In addition, the model fit parameter showed that 17.5% of the variation in CKD is explained by unemployment, and the model is a good fit.

RQ 3 examined the statistically significant association between race and CKD. The model fit parameter of 11.8% of the variation in CKD is explained by race and the co-variables and is indicative of a good fit. The findings showed a statistically significant association between race and CKD ($p=0.25$). Thus, I rejected the null hypothesis that suggested that there is no association. Section 4 of this study presents the interpretation of

the findings, discussion of the limitations, and recommendations for further research of the problem.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

This was a quantitative study that sought to examine the association between educational level, unemployment, race, and CKD among African Americans over age 20 and residing in the state of Maryland. According to Crews and Purnell (2020), African Americans are only 12.9% of the United States population, but they suffer 25.1% of deaths among all Americans due to kidney illness. Chu et al. (2020) also posit that African Americans are affected by CKD more than any other racial group in the United States. Thus, this study was conducted to examine the association between kidney illness among participants, while it controlled for gender, hypertension, obesity, and diabetes, which are underlying conditions that cause CKD.

The study answered three research questions about the association between educational level, unemployment, race, and CKD. Based on the model fit parameter of RQ 1, 15.5% of the variation in CKD is explained by educational level and the co-variates, indicating that the model is a good fit. The findings of RQ 2, which examined the association between unemployment and CKD, also showed that based on the model fit parameter, 17.5% of the variation in CKD is explained by unemployment and the co-variates, meaning the model is a good fit. Then, the findings of RQ 3 revealed that, based on the model fit parameter, 11.8% of the variation in CKD is explained by race and the co-variates, and that the model is a good fit.

Interpretation of the Findings

For RQ1, which examined the association between educational level and CKD among African Americans aged 20 in Maryland while controlling for the comorbid conditions, 15.5% of the variation in CKD is explained by educational level (the independent variable) and the co-variates (gender, hypertension, obesity, and diabetes) based on the model fit parameter, which aligns with what is noted in the literature noted by Vart et. al (2020). The findings also showed that those who graduated high school were more than twice as likely to report having CKD, (AOR=2.44, 95% CI=1.00,5.92, p-0.049). This aligns with what was noted by Quinones and Hammad (2020) that Americans with fewer education have higher prevalence of CKD.

In examining the association between unemployment and CKD among African Americans, as in RQ 2, the findings depicted that the model fit parameter shows that 17.5% of the variation in CKD is explained by unemployment (the independent variable) and the co-variates. This aligns with a similar study by Laster et al. (2019) that the minority group is affected by unemployment. Barreto et al. (2016) also posit that high incidence and progression of CKD are associated with low educational level, employment status, and income level.

The findings of RQ 3 show that, based on the model fit parameter, 11.8% of the variation in CKD is explained by race. Using Whites as referent, African Americans have decreased odds of reporting having CKD (AOR=0.88, 95% CI=0.72, 1.29, p=0.25), meaning CKD is higher among Whites than African Americans in the State of Maryland. This finding is different from those in a similar study presented in Section 1, which noted

that CKD affects African Americans more than any other racial group in the United States (Chu et al., 2020).

It was also noted in the literature presented in Section 1 that CKD is associated with hypertension, obesity, diabetes, and that access to health care hinders basic preventive measures. Ku et al. (2019) claimed that hypertension is interlinked with CKD, while Yun et al. (2018) noted that obesity is associated with CKD. Adding to this, Wei, and Jiang (2021) confirmed that the complication of diabetes causes CKD. The results of the statistical analysis of the three research questions all showed an association between educational level, unemployment, race, and the co-variables (gender, hypertension, obesity, diabetes) and CKD, as presented in the literature. Moreover, it was noted that the frequency of screening, which often detects the underlying health conditions of CKD and fosters early intervention, is limited to the minority group, thereby contributing to higher incidence and progression of the disease among these populations.

The Findings in the Context of the Theoretical and/or Conceptual Framework

As the findings of the study depicted a significant association between educational level and CKD, the SEM can be applied to promote higher levels educational attainment to reduce the incidence and prevalence of CKD. The association between hypertension, obesity, diabetes, and CKD, as shown in the findings, can be positively influenced by the application of the individual levels of SEM. This tool can be used to promote healthy lifestyles that reduce the underlying risk factors of CKD, such as smoking cessation, weight control, dietary, and physical activity.

At the community level of the SEM, educational opportunities can be created through computer classes, small business training, community health education, and financial management training to facilitate job opportunities and overcome unemployment. Furthermore, the concept of the enabling environment of SEM can be applied to guide the enactment of policies to regulate and promote health initiatives that prevent kidney health disparities.

Limitations

This study focused on residents of the state of Maryland and respondents, particularly African Americans, may not reflect the actual representation of their population in United States. Thus, the findings cannot be generalized. However, the data were drawn from the databases of BRFSS databases of the Centers for Disease Control and Prevention (CDC), which is valid and reliable because numerous studies have been conducted to test its reliability and validity, in which it has achieved higher rankings (BRFSS, 2022).

Recommendations

Review of literature and the findings of the study revealed that hypertension causes CKD, and if not controlled, can accelerate the progression of end-stage kidney disease (Ku et al, 2019) It was also noted that obesity and diabetes are associated with the development of CKD. Thus, it is my recommendation that further research be conducted to devise strategic interventions to halt the increase in incidence of CKD in the United States.

The study pertained to residents of Maryland, but I recommend that more studies that focus on the entire country be conducted to obtain a more accurate result. This is because a larger sample size will give a better representation of the population and yield more accurate results (Chittaranjan, 2020). In addition, future research should target the underlying factors that influence increase in kidney illness, such as access to screening for early detection and intervention of the disease. The policy level of SEM should be considered within the context of how it can be applied to initiate prevention activities at the individual, interpersonal, and community levels to promote kidney health.

Implication for Professional Practice

The findings of this study have shed light on the need for further research to close the gap in literature and to conduct more public health initiatives to raise awareness to kidney health. The study serves as an additional tool to public health professionals to apply the theoretical concept of SEM to design programs that target the most affected populations to alleviate kidney health disparities in the United States.

Social Change Implications

Findings of the study revealed the significant association between education level, unemployment, race, and the comorbid conditions that include gender, hypertension, obesity, and diabetes; however, the theoretical concept of social ecological model (SEM) guides the impact of positive social benefits. For instance, the individual level of the theory can be applied to generate positive health behaviors such as smoking cessation, attainment of higher education, healthy nutrition, and physical activities. In addition, based on the interpersonal level of the theory, people can develop relationships that are

useful in promoting health behaviors such as walking or fitness clubs, weight loss clubs and cooking groups, all of which are healthy lifestyles that prevent the risk factors of CKD. Furthermore, based on the community level of SEM, programs such as groceries stores, fitness centers, neighborhood parks, and basketball courts can be created to promote healthy lifestyles. Community-based activities such as computer classes, small business training, arts and crafts lessons and financial management classes can be organized to upgrade the level of education and to create employment opportunities.

This study has drawn awareness to the need to prevent the risk factors for CKD. Adding to this, the study has emphasized that early intervention is the key to prevention, and that the enabling environment can facilitate the enactment of policies, such as the Affordable Care Act of 2010, which has made it easier for many under privileged populations to have access to early intervention.

Conclusion

This study sought to examine the association between education level, unemployment, race, among African Americans who are residents of Maryland. In the United States, kidney disease affects African Americans or ethnic minorities more than any other racial group, and there is higher morbidity and mortality due to CKD among these minority populations (Barreto et al., 2016). The findings of the study showed the association between educational level, unemployment, and race. It also revealed that gender, hypertension, obesity, and diabetes significantly influence CKD. The importance of preventing the risk factors of CKD is emphasized, and further studies are recommended to resolve the kidney health disparities in the United States. The SEM is

referenced as a useful guide for influencing positive health behaviors and acquiring access to health and early intervention. Thus, this study is a useful resource for additional inquiry into promoting the overall kidney health of populations in the United States and elsewhere.

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