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The Relationship Between Health Insurance and Dialysis Utilization for Chronic Kidney Disease Patients in Saint Lucia

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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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Abstract

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MHA, Asia University, 2010

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Doctoral Study Submitted in Partial Fulfillment

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Doctor of Healthcare Administration

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Abstract

Chronic kidney disease (CKD) is a significant cause of disability and death in Saint Lucia. The incidence of CKD is disproportionately higher among individuals who are socially and financially disadvantaged. New evidence suggests that in resource-poor countries, government subsidization programs for dialysis treatment aid in the delay of disease progression and its associated costs. The purpose of this study was to examine the relationship between health insurance, government subsidization, employment, and dialysis utilization for CKD patients and the efficacy of subsidization for dialysis in Saint Lucia. The study included a retrospective cohort of 979 moderate-to-severe CKD patients from secondary data obtained from the Ministry of Health's renal registry database. Dialysis utilization among CKD patients was compared to usage across payment methods. Categorical data were measured and compared using crosstabulations, chi-square analyses, frequency distributions, and counts between groups. Logistic regression was applied to control for covariates and compare independent variables. A statistically significant relationship was found between employment and subsidization and dialysis utilization among CKD patients but not between insurance and dialysis utilization. Dialysis utilization among CKD patients in Saint Lucia was heavily influenced by government subsidization. Policy makers, healthcare officials, and other stakeholders may obtain information from this study that they can use to develop future initiatives for payment models and disease management of CKD in Saint Lucia, which may alleviate some of the financial barriers faced by the country's CKD patients.

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Dedication

This dissertation is dedicated first and foremost to Almighty God, who provided me with the resources--mental, financial, and spiritual--needed to realize this great dream. Also, to my most amazing and loving husband, Dr. Curby Dwaine Sydney, who provided inspiration, encouragement, and support throughout this journey. His mentorship allowed me to believe in myself and to tap into my full potential. This study is also dedicated to my brother-in-law Dr. Ali Sydney and my wonderful sister Netta Sydney, who, despite their busy lives and being miles away, always checked in on my progress and cheered me on to the finish line. Lastly, this study is dedicated to all the CKD patients and their families in Saint Lucia, whose struggles and resilience motivated my passion for this topic.

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I am most grateful to God for giving me the fortitude and faith needed to press on through the most challenging time and reassuring me that all things were possible and within my grasp. Even when I gave up on this dream, he answered my prayer and opened the way again for me to complete it. What a Mighty God! My deepest gratitude goes out to my committee chair, Dr. Sally Willis, for taking up this great responsibility and challenge to sail with me on this journey. Thank you for your confidence in me every step of the way, for your patience, support, and invaluable assistance. You made this experience so much more pleasant and achievable.

Many thanks to Dr. Kevin Broom for agreeing to be my committee member and providing much-needed feedback and advice to proceed through this process, especially his expertise in the methodology aspects of the study. I would also like to thank Dr. Rabeh Hijazi for serving as my university research reviewer (URR) and for his support and assistance. I am also grateful to the Ministry of Health, St. Lucia Medical and Dental Council, and the Research Ethics Committee for affording me the privilege to carry out this first-time study in St. Lucia.

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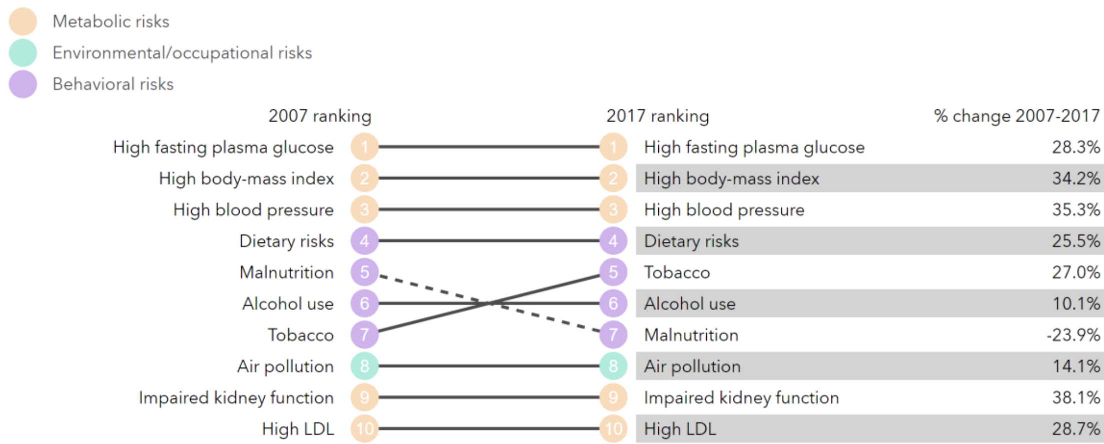
Section 1: Foundation of the Study and Literature Review

Introduction

Chronic kidney disease (CKD) has become a major contributing factor to the global burden of disease, with an estimated global prevalence of 11-13% (Hill et al., 2016; Morton et al., 2017; Nicoll et al., 2018). The prevalence of obesity, diabetes, hypertension, and CKD in aging populations has a high economic cost for health systems (Crews et al., 2017; Hill et al., 2016). Despite the increasing prevalence and burden, CKD remains a low priority within the public health response to noncommunicable diseases in low-and middle-income countries (LMICs; George et al., 2017; Stanifer et al., 2016). According to Nicoll (2018), CKD is a significant cause of death and disability worldwide. Consequently, the incidence of CKD is disproportionately higher among socially disadvantaged individuals and leads to many negative consequences for these individuals and their families (Morton et al., 2017). CKD rates are rising in Saint Lucia compared to the United States due primarily to lifestyle factors such as diet and exercise (Business View Caribbean, 2019; Ministry of Health, 2019). Additionally, a report by the Institute for Health Metrics and Evaluation (2018) revealed that some of the top risk factors for death and disability in Saint Lucia in 2017, as shown in Figure 1, were diabetes, obesity, and hypertension.

Figure 1

Top 10 Risks Contributing to Death and Disability in Saint Lucia, 2007-2017



Note. Figure 1 illustrates the top 10 risks contributing to death and disability in Saint Lucia, all ages combined, for 2007-2017. The graphic shows 2007 and 2017 rankings and percentage changes. From *Saint Lucia*, by Institute for Health Metrics and Evaluation, 2018 (http://www.healthdata.org/saint-lucia). CC BY-NC-ND 4.0.

CKD is a progressive noncommunicable disease that cannot be reversed and can lead to kidney failure or end-stage renal disease (ESRD) if it is not detected and treated early (Centers for Disease Control and Prevention [CDC], 2019). Significant CKD causes among adults in Saint Lucia are diabetes and high blood pressure (Pan American Health Organization [PAHO], 2019). Other risk factors include heart disease, obesity, past damage to the kidneys, a family history of CKD, and old age (Caribbean Renal Registry, 2018; Government of Saint Lucia, 2018). CKD has varying severity levels, and treatment slows progression (Caribbean Renal Registry, 2018; Hill et al., 2016; National Kidney Foundation [NKF], 2019).

The Caribbean is home to approximately 40 million people, and the majority of the population lives on islands considered LMICs, such as Saint Lucia. Kramer (2018) noted that economic, demographic, and health trends in the Caribbean region generally mirror global changes. A study of the English-speaking Caribbean revealed that CKD is associated with high morbidity and mortality and places a significant economic burden and decreased quality of life on affected patients (Meade et al., 2018). In a study carried out in Jamaica, the largest English-speaking country in the Caribbean, in 2007, of the 968 patients diagnosed with CKD in that year, 576 were on dialysis (Labonté et al., 2017). In that same year, Antigua reported 43 patients on dialysis (Meade et al., 2018). In 2015, Saint Lucia had an estimated 85 patients on dialysis between Victoria Hospital and St. Jude Hospital, with an estimated 85 on the waiting list (Government Information Service [GIS], 2019). Although most of the English-speaking Caribbean offers dialysis treatment for CKD patients, Jamaica and Trinidad and Tobago are the only two islands offering renal transplantation (Labonté et al., 2017). Negative cultural attitudes toward organ donations are considered a contributing factor to the lack of renal transplantation in other countries in the region (Kramer et al., 2018).

Consequently, the financial demands of CKD on governments and healthcare systems reflect global dialysis utilization trends. According to Pallayova et al. (2018), despite the remarkable global epidemiological changes occurring over the past 30 years, CKD's prevalence and the associated clinical and economic burden have risen worldwide.

Additionally, they noted that the fastest growth rates were occurring in LMICs, which accounts for the increased burden on these countries' governments.

Over the years, Saint Lucia has implemented various programs to address the CKD health crisis (GIS, 2016). The Ministry of Health has implemented free CKD screenings and lifestyle and nutrition services at the local level. The transfer of the national dialysis clinic to the Owen King European Union Hospital in 2008 was a response to long waiting lists for dialysis treatment (GIS, 2015). Despite these initiatives, more demands are placed on an already tasked health system due to the development of comorbidities, such as hypertension, diabetes, heart failure, cardiovascular diseases, atherosclerosis, and lipid disorders (Kramer et al., 2018). Through the Ministries of Health and Finance, the Government of Saint Lucia implemented a dialysis subsidization program for uninsured CKD patients that covers a significant part of dialysis treatment (GIS, 2016). The Healthcare Amnesty Program includes medication and doctor visits (GIS, 2016). According to Dr. Merle Clarke, the chief nephrologist on the island, these efforts have contributed significantly to CKD patients' care in Saint Lucia. However, the increasing numbers of patients demand more resources and support systems (Victoria Hospital, 2019).

In this section, I provide an overview of Saint Lucia's healthcare system and CKD management on the island. Next, the problem statement, the purpose of the study, the nature of the study, research questions (RQs) and hypotheses, and the theoretical framework for the study are discussed. The definitions of terms, assumptions, the scope and delimitations, and limitations, including threats to validity, are then presented. I conclude the chapter by discussing the significance of the study and summarizing key points.

Background

Saint Lucia is an island state in the Caribbean. The second largest of the Windward group of islands in the Lesser Antilles, it is 27 miles (43 km) long and 14 miles (23 km) wide, with a population of 183,000 (Government of Saint Lucia, 2018). The majority (85.3%) of the island's population is of African descent, followed by 10.8% mixed, 2.2% East Indian, and 0.6% Amerindian (Carib) population groups (PAHO, 2019). The Ministry of Health is responsible for overseeing the health of the population, providing finances, issuing regulations, and developing and enforcing public health policies (Government of Saint Lucia, 2015). Saint Lucia's health system offers primary care through a network of wellness centers, polyclinics, and secondary- and tertiary-level care through public and private hospitals (PAHO, 2019). In the absence of a national health insurance scheme, payment for health services is based on a fee-for-service system (St. Lucia News online, 2016). Individuals are free to access care in both the public and private sectors. Individuals with individual or group health insurance coverage through employment benefits obtain assistance in paying for health services. Individuals considered pensioners or having welfare or disability status receive medical aid from the Ministry of Health. Others assume full financial responsibility due to the lack of insurance or failure to fall within groups afforded medical assistance (GIS, 2016).

There are four hospitals where patients utilize dialysis treatment on the island: The Victoria Hospital (respiratory hospital), Owen King European Union Hospital, Tapion Hospital in the north of the island, and St. Jude Hospital in the south (Ministry of Health, 2019). In response to the COVID-19 pandemic, Victoria Hospital was recently transformed into a Covid hospital and offered dialysis only to admitted patients requiring such treatment (Ministry of Health, 2020). Before the transformation, Victoria Hospital was a primary acute care 130-bed hospital, equipped with medical, surgical, maternity, and pediatric wards; two operating rooms, one intensive care unit; a laboratory; an X-ray and ultrasound lab; a pharmacy; a physiotherapy department; and a pathology lab (Ministry of Health, 2019; see also Business View Caribbean, 2019). The Owen King European Union Hospital is a 120-bed hospital that provides inpatient and outpatient services (St. Lucia News online, 2016). It also houses the island's largest dialysis out-patient clinic, which opened in January 2018. This dialysis clinic has 17 nurses and one nephrologist (Government of Saint Lucia, 2015; Ministry of Health, 2016).

St. Jude Hospital, managed by a board of directors, is a 110-bed hospital with medical, surgical, maternity, and pediatric wards; two operating rooms; a recovery room; an intensive care unit; an emergency room; a pharmacy; a laboratory; an X-ray lab; an ultrasound lab; a pathology lab; and a physiotherapy department (St. Jude Hospital, 2019). St. Jude Hospital's dialysis clinic currently has eight dialysis machines, 11 nurses, two attendants, and one secretary. Operating hours are from Sunday to Saturday, and the clinic follows a shift system, the first running from 6:45 am to 2 pm and the second, 1 pm to 9 pm. This shift system was developed to benefit and accommodate CKD patients who are employed (St. Jude Hospital, 2019).

Tapion Hospital, situated in the north of the island, is a private 32-bed hospital, with two fully equipped operating rooms and a delivery suite, a laboratory for specimen testing, and sleep and radiology labs (Tapion Hospital, 2019). It provides specialty services such as neurosurgery, internal medicine; general surgery; dermatology; ear, nose, and throat; ophthalmology, pediatrics, orthopedics, oncology, obstetrics, and gynecology. It is the only hospital with computerized tomography and magnetic resonance imaging scanners on the island (Tapion Hospital, 2019). The dialysis clinic at Tapion Hospital has been in operation since 1999. According to Nurse Director Connie Hager (personal communication, 2019), this private dialysis clinic provides its services to local and foreign CKD patients. Patients who are insured or willing to pay out-of-pocket can access this service, considering the long waiting lists in the public sector for dialysis treatment. Tapion Hospital's dialysis clinic has eight dialysis stations and five dialysis nurses (Draper, 2019). Operating hours are flexible to accommodate patients who are employed seven days a week. The government subsidizes the cost of dialysis treatment at Tapion Hospital for some patients to address delayed treatment and long waiting lists in the public sector (Nurse Connie Hager, personal communication, April 15, 2019).

Problem Statement

In recent years, the worsening economy, high unemployment, and the continued escalation of health care costs have exacerbated the financial burden for many individuals globally (Alphonse, 2017; Tamura et al., 2018). Because employers provide most health insurance, loss of employment is frequently accompanied by loss of health insurance and the inability to afford health care (Garcia-Garcia & Jha, 2015; Nicoll et al., 2017). Most

CKD patients in Saint Lucia are unemployed because of high absenteeism and frequent comorbidities (Pan American Health Organization, 2019). The Ministry of Health has also reported an alarming increase in the number of patients diagnosed with CKD in both the public and private sectors (GIS, 2015; St. Lucia News Online, 2016).

According to officials from the Ministry of Health, dialysis constitutes a large part of the Saint Lucian health care budget, contributing to the increased burden of disease to the government. Consequently, hospitals treating CKD patients face challenges in providing care in a resource-poor environment (St. Lucia News Online, 2019). The lack of resources, including inadequate dialysis machines, long waiting lists, and the high cost of medication and dialysis treatment, contribute to the decreased access to care for CKD patients (Meade et al., 2018; St. Lucia News Online, 2016). According to the Institute for Health Metrics and Evaluation (2016), CKD was ranked as the seventh leading cause of death in 2005 and rose to the fifth leading cause of death in 2016 in Saint Lucia. Similarly, CKD rose from eighth to sixth place in similar years as the leading cause of premature death. Consequently, CKD was the leading cause of death and disability combined in 2016 in Saint Lucia (Institute for Health Metrics and Evaluation, 2018), making this topic critically important.

Purpose of the Study

This quantitative study's primary focus was to utilize secondary data to examine whether a relationship exists between dialysis utilization, health insurance, and government subsidization for CKD patients in Saint Lucia. I examined the efficacy of the government’s subsidization program for dialysis and CKD's baseline characteristics in

Saint Lucia. The study's covariates were age, race, gender, geographical location, CKD stage, and attending hospital.

Research Questions and Hypotheses

RQ1: Is there a relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, employment status, CKD stage, CKD cause, and attending hospital in Saint Lucia?

$H_0$1: There is no statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, employment status, CKD stage, CKD cause, and attending hospital in Saint. Lucia.

H_a1: There is a statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, employment status, CKD stage, CKD cause, and attending hospital in Saint. Lucia.

RQ2: Is there a relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia?

$H_0$2: There is no statistically significant relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint. Lucia.

H_a2: There is a statistically significant relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint. Lucia.

RQ3: Is there a relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia?

H_03: There is no statistically significant relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia.

H_a3: There is a statistically significant relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia.

Theoretical Framework

This study's theoretical framework was grounded in Andersen and Newman's (1995) health services utilization framework. This framework is a conceptual model aimed at demonstrating the factors that lead to health services usage. This framework's primary premise is that an individual's access to and use of health services is a direct function of three characteristics, including (1) predisposing factors, (2) enabling factors, and (3) need factors (Norton & Eggers, 2020). According to Andersen (1995), utilization of health services should be examined within the context of (1) Predisposing factors such as socio-cultural characteristics that exist before illness, (2) Enabling factors that address the logistical aspects of obtaining care, and (3) Need elements generated by functional and health problems of an individual.

This framework may help to grasp an understanding of why CKD treatment is lapsing within the Caribbean. Erickson et al. (2018) used this framework to examine enabling factors such as employment among patients utilizing dialysis in the United States. In another study, Perez et al. (2018) utilized this framework to test the hypothesis that the enabling factor, health insurance, influenced the use of peritoneal dialysis in the United States. Soyibo et al. (2011) used this framework to examine healthcare utilization trends among CKD and ESRD patients from the Caribbean renal registry. Pallayova et al. (2018) used this framework to explore the factors contributing to limited access to medical services, specialist care, diagnostic tests, and medications for CKD patients in LMICs. This study will examine the relationship between predisposing factors such as age and race and enabling factors, such as health insurance, employment, and subsidization, on dialysis utilization.

Nature of the Study

This study was quantitative and correlational. Data from the Ministry of Health's renal registry database was used in this retrospective cohort study to examine the relationship between independent variables; health insurance, employment, and subsidization, and CKD patients' dialysis utilization as the dependent variable. The relationship between insured/uninsured, employed/unemployed and subsidized and unsubsidized, and dialysis utilization are discussed. Other characteristics of the study population, such as age, gender, race, CKD stage, geographical location, CKD cause, and attending hospital, were examined.

Literature Search Strategy

The search strategy used for this literature review involved electronic research databases such as MEDLINE, CINAHL, ScienceDirect, and PubMed. The main keywords for this study related to the topic and Boolean operators to find relevant literature. The search keywords included *chronic kidney disease, dialysis utilization, renal disease, CKD in the Caribbean, ESRD in the Caribbean, subsidization, low-to-middle-income countries,* and *end-stage-renal disease*. Scholarly peer-reviewed journals from 2016 to 2020 were included in this study. The articles' reference list was scanned in the literature search to identify additional studies within the publication date range.

Literature Review Related to Key Variables and Concepts

This literature review includes studies on health insurance and government subsidization programs and their impact on CKD patients' dialysis utilization. The health services utilization model was the theoretical framework guiding this study (Norton & Eggers, 2020). The effect of this model's components (particularly predisposing factors) on dialysis utilization among CKD patients were examined. This literature review highlights scholarly literature pertinent to CKD in LMICs, dialysis utilization within the CKD population, health insurance impact on dialysis utilization, and subsidization impact on Saint Lucia's dialysis utilization.

Chronic Kidney Disease in Low-to Middle-Income Countries

Numerous studies dealing with CKD's implications describe the condition as a critical public health problem (Jager & Fraser, 2017). Consequently, general population-based studies, the CKD prognosis consortium, and renal registries worldwide have contributed to the description of CKD's scale as a significant public health problem (Thomas, 2019; George et al., 2017). The burden of CKD is increasing due to higher morbidity and mortality, especially in countries, regions, communities, and ethnicities with a higher-than-average CKD incidence (Lin et al., 2019; George et al., 2017). Pallayova et al. (2018) also supported this fact, stating that an increase in the global population and improvements in cardiovascular survival and aging have led to profound global epidemiological changes. However, CKD's prevalence, clinical, and economic burden has risen worldwide, particularly in LMICs. Although the global burden of CKD is primarily due to diabetes and hypertension, current studies purport that other contributing factors include limited access to health care, insufficient availability of renal replacement therapy, and a shortage of trained personnel (Obrador & Levin, 2019). Pallayova et al. (2018) found that LMICs have the fastest CKD growth due to limited access to medical services, such as dialysis treatment, specialist care, diagnostic tests, and medication. Osman et al. (2019) also suggest that LMICs have a more significant burden in managing CKD due to limited programs and surveillance systems.

The global disease burden of CKD was assessed in a recent report evaluating the 2017 Global Burden of Disease Study results. This study revealed that certain world regions, such as the Caribbean, reported higher CKD rates than other developed world regions, decreasing prevalence and mortality (Thomas, 2019). Stanifer et al. (2016) argue that countries that adopted the World Health Organization (WHO) 2015 people-centered health services framework contributed to CKD management improvements. The people-centered health services framework, especially for the CKD population, emphasizes health care that "adopts individuals, carers, families, and communities into trusted health systems" (Morton & Sellars, 2019). This adoption also sparked a movement among international policymakers, service providers, and professional disciplines to strive toward providing, at a reduced cost, all elements along the continuum of care for CKD patients. Conversely, countries that failed to adopt this framework purported to struggle significantly with improvement initiatives in addressing CKD's critical issue in the 21st century.

Saint Lucia has made progress toward the adoption of the WHO's 2017 person-centered framework. However, due to heavy reliance on international funding for health care, CKD initiatives fall short of meeting the increasing demands (GIS, 2016; Ministry of Health, 2019). Studies have shown that LMICs have a fragmented health system, and CKD is not a significant priority (Crews et al., 2017; Hill et al., 2016; National Institute of Diabetes and Digestive and Kidney Disease, 2019). Additionally, Stanifer et al. (2016) purport that factors such as lack of data, few studies, variable quality in reporting, and inconsistent methods for assessing and defining kidney dysfunction contribute significantly to discovering accurate trends of CKD in LMICs.

Management of Chronic Kidney Disease in Saint Lucia

A significant number of patients suffer from CKD in Saint Lucia. In Saint Lucia, CKD patients access dialysis treatment from either the public or the private sectors. According to Chief Nephrologist Dr. Merle Clarke, treatment is costly, particularly for patients at stage five requiring dialysis or a renal transplant (Ministry of Health, 2019). CKD patients can obtain an unofficial diagnosis from any of the island's wellness centers, polyclinics, or hospitals. However, a nephrologist officially diagnoses patients with CKD and determines a treatment plan. If dialysis is required, patients are free to access dialysis at any of the public or private clinics (Government of Saint Lucia, 2018). Upon official diagnosis, patients' data is entered into the renal registry database (Ministry of Health, 2019).

The CKD numbers are rising each year in St. Lucia. In 2015, 101 patients were on dialysis at Victoria Hospital and St. Jude Hospital, with a waiting list of 86 patients (Government of Saint Lucia, 2015; Ministry of Health, 2019). Data further indicated that among those documented with ESKD, 172 had progressed to stage three and 150 to stage four (Caribbean Renal Registry, 2018). For the average patient, dialysis treatment is out of reach without massive government subsidization of health insurance coverage subsidies. Dialysis subsidization does not include medication cost, which remains the patient's sole responsibility (GIS, 2015). As CKD's prevalence and incidence continue to rise, Saint Lucia's government turns to other countries, organizations, or financial institutions to assist in purchasing additional dialysis machines or covering patients' treatment through the established subsidization program (GIS, 2015).

Dialysis Utilization

Survival for individuals living with CKD depends on either a kidney transplant or renal replacement therapy (RRT) to substitute failed kidney function (Draper, 2019). Kidney transplantation is the transplant of a kidney into a patient with ESRD. Hemodialysis is the substitution of the kidneys function by a specialized machine called a dialyzer to purify the blood (Thomas, 2019). RRT is not available in all Caribbean countries, and where available, the most common modality is Hemodialysis [HD] (Meade et al., 2018). Liyanage et al. (2015), in a study examining universal access to dialysis treatment for CKD, found that in 2010, 2.618 million people received RRT. An estimated 4.902 million were reported in need of dialysis, and 2.284 million were estimated in their conservative model to be prone to premature death due to having no access to treatment (Liyanage et al., 2015; Luyckx et al., 2018). The rate of patients receiving dialysis is growing at an annual global average rate of 7%, due in part to the universal aging of populations (Mushi et al., 2015). Despite the high estimates (2 million) of CKD patients receiving dialysis in 2010, that figure was predicted to double by 2030 (Luyckx et al., 2017). CKD/ESRD was reported to be at an alarming growth rate of 1.3%, five times the world's population growth (Thomas, 2019). In 2008, approximately 1.75 million patients worldwide received regular renal replacement therapy in the form of dialysis. 1.55 million or 89% were on hemodialysis (HD), and about 197,000 (11%) were on peritoneal dialysis (PD). Interestingly, 62% of CKD patients were treated in LMICs.

Since 2013, the federal government assumed some or all financial responsibility for services rendered to nearly 450,000 Americans on dialysis (United States Renal Data System [USRDS], 2015). More recently, the CDC (2019) reported an estimated 37 million American adults diagnosed with CKD. Wu et al. (2017) assessed CKD care quality and its association with long-term dialysis, acute kidney injury (AKI), and death. A retrospective cohort study of 63, 260 adults with incident CKD, were enrolled in a Longitudinal Cohort of Diabetes study. Their findings revealed 1,471 patients commenced long-term dialysis treatment, 2,739 patients were hospitalized due to AKI, and 4,407 patients in the study died. Consequently, higher overall quality scores for CKD patients were associated with lower hazard long-term dialysis treatment (Mushi et al., 2015). Despite the quality outcomes of dialysis, Lin et al. (2019) purported that CKD patients had higher healthcare utilization rates, morbidity, and mortality in a study that examined the relationship between maintenance HD and emergency utilization.

Shaikh et al. (2018) also substantiated this claim in a study assessing utilization, costs, and outcomes for patients receiving publicly funded HD. Moreover, their research revealed that India's number of dialysis centers increased from 50 in 2008-2009 to 89 in 2011-2012. There was an estimated 29.5 percent of the population on HD in 2008 and 69.8 percent of the population in 2012. This study suggested that CKD patients absorbed a more substantial healthcare services portion, mainly because the health system cannot meet dialysis demands. The number of dialysis units for every 100 patients with CKD was 0 to 1.89 across all districts in Andhra Pradesh, India, and that there was one dialysis unit for every 100 CKD patients. Like India, Saint Lucia is considered a developing country or an LMIC with similar constraints and limited resources. Another study investigated dialysis provision and the implications of health economics in Malaysia. Studies also purport that inequality in access to dialysis exists within geographical locations in LMICs (Andersen, 2018; Mohd et al., 2017; George, Mogueo, Okpechi, Echouffo-Tcheugui & Kengne, 2017).

Mohd et al. (2017) found that CKD's prevalence increased from 504 per million in 2005 to 1155 per million in 2014. An estimated 1046 patients were on HD and 109 on PD in 2014. This study also revealed inequality in access to dialysis within geographical regions in Malaysia, despite government funding. From these studies, it is evident that CKD's prevalence and incidence continue to rise, especially among LMICs. Additionally, LMICs continue to struggle with meeting the health demands of CKD patients in need of RRT, such as HD (George et al., 2017).

Costs of Dialysis Treatment

According to Li et al. (2019), CKD and dialysis are medical and economic problems. RRT consumes many resources as equipment and materials are expensive (Mohd et al., 2017; Hill et al., 2016; Kramer et al., 2018). Consequently, dialysis requires qualified personnel. Cost is defined as “the monetary value of the resource consumption for producing a commodity or service, frequently expressed as a composite sum of quantities of some activity multiplied by their respective prices” (Mushi et al., 2015). There are four cost categories: “direct medical costs, direct non-medical costs, indirect costs, and intangible costs” (p.160). Direct medical costs of dialysis include “staffing costs, physician fees or salary, cost of dialyzers and tubing in hemodialysis, the cost associated with radiology, laboratory and medications, capital costs of HD machines, costs of hospitalizations and costs of out-patient consultations from other specialists (Mushi et al., 2015). Direct non-medical costs include building costs, facility utilities, and other overhead costs. Intangible costs are costs associated with pain, suffering, and impairment in quality of life”(p.162). In the Caribbean region, most, if not all, countries cannot sustain the financial burden of CKD. Shechter et al. (2017) investigated the timing of vascular access (VA) referral for patients with CKD in need of hemodialysis (HD), concerning age and costs. This study revealed that the cost-effectiveness of VA referral was primarily driven by HD's annual expenses, erythropoietin costs, and access-specific utilities.

The increasing number of dialysis units through-out the English-speaking Caribbean has doubled between 2006 and 2011, placing an increased financial strain on these governments and health systems. However, issues such as limited personnel in managing these units, lack of financial resources, and support from both the government and private sector continue to affect the availability of these treatments in the Caribbean. Saint Lucia continues to battle the increasing numbers of CKD patients needing RRT, and as such, has expanded the public dialysis clinic's capacity to accommodate more patients (GIS, 2015). According to the Ministry of Health, the primary barrier to CKD management's improvement efforts is the economic constraints (Government of Saint Lucia, 2015). Saint Lucia has adopted a public-private financing model for HD, where patients receive funding for treatment at both public and private clinics. Dr. Merle Clarke (2019) stated that the allocation of healthcare funds in the budget falls short of meeting the growing demand for HD, personnel, and unit maintenance. Moreover, she lamented that CKD's poor management in a resourced poor healthcare system was consequential to the limited funding (Ministry of Health, 2019).

In the English-speaking Caribbean and other LMICs, healthcare has become one of the most significant financial burdens on the government (Jager & Fraser, 2017). The government adopted various models of care, improvement initiatives, and subsidization programs to address this burden. For example, Malaysia, an LMIC, established an HD subsidization program in 2008 to provide treatment to CKD patients. Like Saint Lucia, the government adopted a public-private financing model to cover HD's cost through a national insurance scheme (Mohd et al., 2017). Dialysis costs in Barbados were approximately USD 156.64 per treatment in the first year and USD 145.55 in subsequent years (Labonté et al., 2017). A total cost per patient per year of USD 18,327.22 in the first year of HD was found, including surgical setup, and USD 17,029.54 for subsequent years and the direct costs of HD contributed overall was 80.7% (Caribbean Renal Registry, 2018). These findings presented data that sparked health officials' attention and encouraged CKD patients' development funding programs.

Employment and Dialysis Utilization

Employment for CKD patients on dialysis has recently become an essential outcome in kidney management (Liyanage et al., 2015; CDC, 2019; Draper, 2019). Long-term dialysis therapy takes a heavy toll on the quality of life for CKD patients. Fatigue, decreased physical capability, impaired social and mental functioning all contribute to this forlorn state. CKD patients experience tremendous difficulty maintaining dialysis treatment while keeping regular employment (Erickson et al., 2018; Luyckx et al., 2017). Lakshmi (2017), in a cross-sectional study of employment and dialysis utilization in South India, found that patients' employment status before dialysis was 60% (93 out of 155) for patients receiving HD. The study revealed that 44% (41 out of 93) experienced a loss of employment status after initiation. Chironda and Bhengu (2019) also agreed that long-term dialysis affected employment status. Another study explored barriers to CKD management in renal clinics in KwaZulu – Natal Province, South Africa. The researchers examined the side effects of treatment, the longevity of hemodialysis treatment, lack of employment opportunities resulting from CKD, and health insurance coverage. All barriers to the management of CKD. Despite current measures by state hospitals to provide CKD management, barriers to the management of CKD still exist.

Harris (2017) examined the issue of ESKD in a study that included 92 participants from around the globe, including 16 participants from 11 LMICs. This study found that LMIC countries were severely affected by the lack of resources and finances to manage CKD, particularly with a loss of employment for long-term dialysis patients. The study further purported that LMICs would benefit from improved workforce training, equitable, efficient, and cost-effective funding models, among others, in the management of CKD. Coming a little closer to home, Meade et al. (2018) examined the causes of CKD and its association with high morbidity and mortality at two hospitals in Antigua. A retrospective review of CKD patients' medical records diagnosed between January 1, 2005, and December 1, 2013, was performed. The results revealed that CKD causes were diabetes mellitus, hypertension, glomerulonephritis, and lupus nephritis.

Consequently, most of the CKD patients in the study faced difficulty keeping employment, and thus, the financial burden fell upon their families and the government. Early recognition and aggressive CKD management significantly reduced the clinical and economic burden (Meade et al., 2018). In Saint Lucia, most CKD patients are unemployed and reliant on their families and the government for financial assistance (Government Information System, 2015; Ministry of Health, 2019). Furthermore, HD and the medications usually prescribed to CKD patients are not affordable for the average patient. Dialysis is an intensive and time-consuming treatment. Patients on dialysis may have other medical problems, including cardiovascular disease, diabetes, bone disorders, anemia, visual impairment, malnutrition, depression, and cognition changes. These factors are often associated with job loss (Jager & Fraser, 2017).

The Ministry of Health embarked on numerous initiatives, especially at the primary level, to curb CKD's growing prevalence in Saint Lucia (GIS, 2016). The negative consequences of CKD are evident at both the social and economic levels. Improvement efforts in CKD management resulted in expanding dialysis accessibility (Government of Saint Lucia, 2018). Okpechi, Bello, Ameh, and Swanepoel (2017) examined appropriate approaches to manage CKD in LMICs. Their study revealed that workforce deficiencies, infrastructure, cost of treatment, lack of proper systems approach policies were barriers to effective CKD care delivery in LMICs. Additionally, they concluded that the adoption of WHO proposed Innovative Care for Chronic Conditions (ICCC) was presented as a suitable health system model to help manage CKD's increasing incidence in LMICs.

Health Insurance, Subsidization, and Dialysis Utilization

According to Luyckx et al. (2017), access to dialysis remains highly inequitable in LMICs despite dialysis facilities' existence. To address CKD's growing prevalence and its financial impact on Saint Lucia, the government launched a dialysis subsidization program in 1999 (Government Information System, 2016; Ministry of Health, 2019). Consequently, this subsidization program helps cover some of the cost of care for patients with no medical insurance coverage, unemployed, or disabled due to CKD (Ministry of Health, 2019). Like Saint Lucia, many countries take the lead from the United States, where the government intervenes in providing support for vulnerable patients on dialysis (Ajmal et al., 2019). Some individuals purchase private health insurance covering some, if not all, of their dialysis treatments, labs, and medications. However, this is not the norm, as most CKD patients obtain health insurance coverage through their employment (GIS, 2016). Saint Lucia is far from reaching the financial support level that countries like the United States make toward CKD management (Caribbean Renal Registry, 2018). In 1972, the United States Congress established Medicare coverage for ESRD patients, despite age or high treatment costs (USRDS, 2015). These initiatives have contributed significantly to the improvement of the management of CKD. According to Andersen (2018), the impact of Medicare's expansion among individuals with CKD has increased coverage by 30% and increased doctor visits by 35%.

Additionally, this expansion decreased mortality due to CKD in the under 65 population between 0.5, 50, 1.0 deaths per 100,000 (Andersen, 2018). Perez et al. (2018) examined the effect of health insurance on dialysis utilization using a retrospective cohort analysis of patients with similar socioeconomic status, and limited insurance coverage was included in the study. This study found that patients with limited insurance had an absolute lower probability of dialysis use. Ajmal et al. (2019) corroborated these findings and found that improvement initiatives by the Centers for Medicare and Medicaid Services (CMS) revealed improved outcomes for CKD patients. Many countries are adopting programs that improve access to care for CKD patients. Before 2016, CKD was managed locally by internal medicine physicians. Since then, the island now has two nephrologists (GIS, 2016). For example, through the Department of Medicine’s rigorous efforts at the University of the West Indies, Jamaica has nine adult and two pediatric nephrologists (Horspool, 2018). The Caribbean Institute of Nephrology (2018), aside from conducting programs and forums to educate the public, also extend training to health professionals in neighboring islands. Many Caribbean countries subsidize a large extent of health care for CKD patients (Caribbean Renal Registry, 2018; George et al., 2017). Tourism generates an extensive amount of revenue for Caribbean Countries. Countries like Barbados, Jamaica, Cayman Islands, Trinidad, Tobago, and Saint Lucia offer dialysis for tourists traveling. Dialysis availability and accessibility are essential factors in the sustainability of the tourism industry.

According to Dr. Merle Clarke, government subsidization does not cover all the costs associated with CKD patients' health expenses. Patients assume responsibility for out-of-pocket costs, including weekly dialysis treatments, not subsidized, laboratory testing, and medication. Patients can receive coverage for dialysis through the subsidization program, anywhere from one to three treatment sessions a week. Additionally, for patients who have no health insurance coverage or are not recipients of a subsidization program, dialysis becomes tremendously inaccessible (Luyckx et al., 2017). Krishnan (2019) argues that government subsidization provides a substantial benefit to CKD patients who have limited income and must cover part of treatment costs and other ancillary expenses, such as transportation to and from treatments and medications. Jager and Fraser (2017) purport that in countries like India, where much of the payment for dialysis is out-of-pocket, subsidies could significantly impact CKD patients. There are substantial differences in how various governments provide and subsidize disability and unemployment benefits to those affected by CKD. As the world's population increases, so will societal demands for health equity. Morton and Sellars (2019) suggest that balancing societal and personal costs for CKD will be a continuous learning curve for policymakers, health leaders, communities, families, and patients.

This literature review presents the global trends, management, costs, employment, subsidization, and dialysis utilization for CKD in the Caribbean and other LMICs.

Definitions

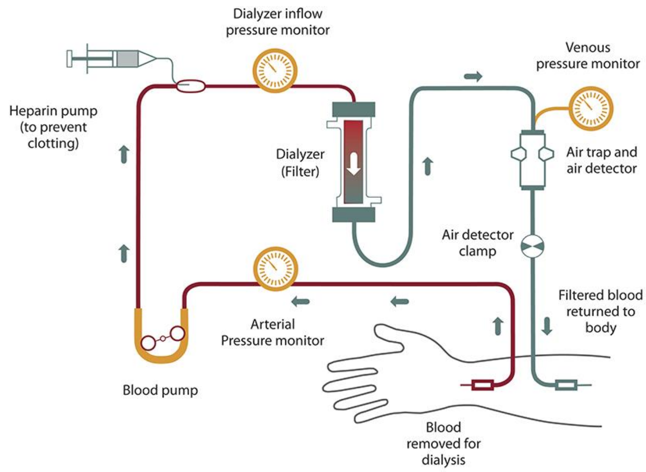
Chronic kidney disease (CKD): A progressive loss of renal function that lasts for more than three months and is classified according to the degree of kidney damage measured by the level of proteinuria and the decline in glomerular filtration rate (GFR; NKF, 2019).

Dialysis: The clinical purification of blood as a substitute for the normal function of the kidney. The two main types of dialysis are peritoneal dialysis and hemodialysis. Peritoneal dialysis entails placing a soft, hollow tube into the lower abdomen near the navel and a particular dialysate solution into the peritoneal cavity (Draper, 2019). The dialysate left in the stomach for a period absorbs waste products and toxins through the peritoneum. Fluid drained from the abdomen is measured and discarded (Vadakedath & Kandi, 2017). Hemodialysis is a procedure where a dialysis machine and a special filter called an artificial kidney, or a dialyzer, are used to clean the blood. The process entails an arteriovenous fistula access in the arm, and the joining of an artery and a vein for blood purification (National Kidney Foundation, 2019). As shown in Figure 2, a hemodialysis machine connected to the arteriovenous access in the arm of a patient drains the blood and bathes it in a particular dialysate solution to remove waste substances, fluid, and toxins, and then returns it into the bloodstream (National Institute of Diabetes and Digestive and Kidney Diseases, 2019).

Dialysis utilization: The measure of CKD patients' use of dialysis treatment to manage their condition.

Figure 2

Diagrammatic Representation of a Dialyzer



Note. This figure presents a diagrammatic representation of a dialyzer, depicting the dialysis process. From *Hemodialysis*, by the National Institute of Diabetes and Digestive and Kidney Disease, 2018 (https://www.niddk.nih.gov/health-information/kidney-disease/kidney-failure/hemodialysis). In the public domain.

Employment: The relationship between the employer and employee based on a contractual agreement for paid work.

End-stage renal disease: An irreversible decline in a person's kidney function that is severe enough to be fatal in the absence of dialysis or kidney transplantation (Benjamin & Lappin, 2020).

Health care utilization: The quantification or description of the use of services by persons to prevent and cure health problems, maintain health and well-being, or obtain information about one's health status and prognosis (Encyclopedia of Behavioral Medicine, 2019).

Health insurance: Coverage that provides payments of benefits in whole or in part for an individual's risk of incurring medical expenses (Perez et al., 2018).

Kidney transplant: A healthy kidney's surgical placement into the body from a deceased donor or a close living relative. A kidney transplant is a treatment, not a cure, and requires antirejection and other medications to maintain the transplant (NKF, 2019).

Ministry of Health: The government body set up by the central government of Saint Lucia and mandated with the health sector's stewardship and leadership. This ministry is responsible for providing "quality care to individuals, families, and communities regardless of race, religion, socioeconomic status or political affiliation" (Ministry of Health, 2019, Mission section).

Pan American Health Organization (PAHO): An entity that proclaims itself as "the world's oldest international public health agency" and which engages in "strategic collaborative efforts among the Member States and other partners to promote equity in health, to combat disease, and to improve quality of life of the peoples of the Americas" (PAHO, 2017, para. 1).

Renal replacement therapy (RRT): Therapy that replaces the normal blood-filtering function of the kidneys due to kidney failure; it includes hemodialysis, peritoneal dialysis, and kidney transplantation, which is the ultimate form of replacement of the old kidneys (National Institute of Diabetes and Digestive and Kidney Disease , 2019).

Assumptions

There were several assumptions for this study. The first assumption was that the existing National Renal Registry cohort data contains accurate and reliable information. This assumption was essential because retrospective cohort data may involve selection bias and misclassification bias (Back & Kelly, 2019). An examination of patients with CKD who accessed dialysis treatment from 2015 to 2019 in Saint Lucia was carried out to limit misclassification bias. Cohort data from the national renal registry of the Ministry of Health, central statistics office, was used in this study. The central statistics office is responsible for internal automated and external quality control scrutiny to ensure that databases are accurate and beneficial to researchers, practitioners, and policymakers.

The second assumption was that the existing database would contain all the variables needed for this study. Heinze et al. (2018) highly recommend that researchers use variables from the same dataset to avoid reliability issues. The third assumption was that the data set variables would be valid and appropriate for measuring the conceptual framework domains. Shang et al. (2018) purported that data suitability and quality are essential to a successful study. Furthermore, they suggest that a dataset's fitness is determined by the extent to which it meets the research purpose or needs. Finally, the assumption that the simple random sampling procedure is accurate and truthful eliminates potential internal and external validity threats. According to Back and Kelly (2019), stratified random sampling allows the opportunity to obtain a sample population that best represents the entire population studied.

Scope and Delimitations

To answer the RQs and address the research gap, this study was delimited to a national sample of CKD patients who accessed dialysis for five years from 2015 to 2019. Additionally, it was delimited to only hemodialysis utilization. All other forms of RRTs were excluded. Therefore, the sample selected may not represent all patients in the national CKD population who utilized dialysis and received government subsidies. Due to this delimitation, the study's findings had limited external validity and were not generalizable to other CKD patients outside Saint Lucia.

A significant strength of this study was the use of a National Dataset. Access to this dataset provided the opportunity to use CKD information, dialysis utilization, and sufficient numbers of males and females in the CKD population for meaningful analysis. According to Frankfort-Nachmias (2018), national datasets are seen as the intellectual output of research and prove beneficial for longitudinal or retrospective studies.

Limitations

One limitation of this study was generalizability. This study's findings could not be generalized to the entire CKD population in Saint Lucia because it was limited to only those who accessed hemodialysis from 2015 to 2019. Excluded from this study were CKD patients who received other RRTs, were non-national (visitor), or accessed hemodialysis outside this period. Additionally, due to demographic differences in the study’s population, the findings may not be generalized to other CKD populations of LMICs.

A second limitation of this study was the reliance on self-reported information, which may be subject to misclassification, selection, and reporting bias. Data was crossed-checked and compared with administrative data from the chief nephrologist or dialysis clinics to address this limitation. A third limitation was that medical costs due to comorbidities were not included in this study's primary or sensitivity analysis.

Significance

This study's quantitative findings may provide insight into the financial barriers that affect dialysis utilization and, by extension, the management of CKD patients in Saint Lucia. This project was unique because it was the first to examine this specific population and address a non-communicable disease that had not been thoroughly examined in Saint Lucia before. It may add to the limited research on CKD management related to health delivery (Tamura et al., 2018) in LMICs. Additionally, this study may inform government health officials, policy makers, and healthcare leaders of the efficacy of the dialysis subsidization program for CKD patients in Saint Lucia.

This study may lead to a greater understanding of how access to dialysis treatment has improved due to government subsidization. Information from this study may contribute to health service delivery improvement initiatives and motivate policies that may remedy financial barriers and improve access and quality of care for CKD patients in Saint Lucia (Wilk et al., 2019). Consequently, the findings may provide information about CKD trends, financial barriers to access care for CKD patients, and recommendations for policy or social change improvement initiatives. Furthermore, the proposed study was essentially a policy analysis of the government subsidization program efficacy and, therefore, potential societal relevance. If the findings reveal that government subsidization is positively impacting dialysis utilization, then the policy works. If it does not, this provides evidence that the policy should be revised.

Summary and Conclusions

CKD is considered a progressive disease in patients with hypertension and diabetes that efficient primary care interventions can help (NIH, 2014). Implementing health initiatives at the local level, such as subsidizing anti-hypertensive and diabetic medications, facilitating lifestyle and lipid modification programs, and equipping wellness centers and polyclinics with the necessary human resource is essential (Business View Caribbean, 2019; National Institute of Diabetes and Digestive and Kidney Disease, 2019; Nicoll et al., 2017). Implementing measures to decrease the number of patients who develop CKD may reduce the demands for more resources (Caribbean Renal Registry, 2018).

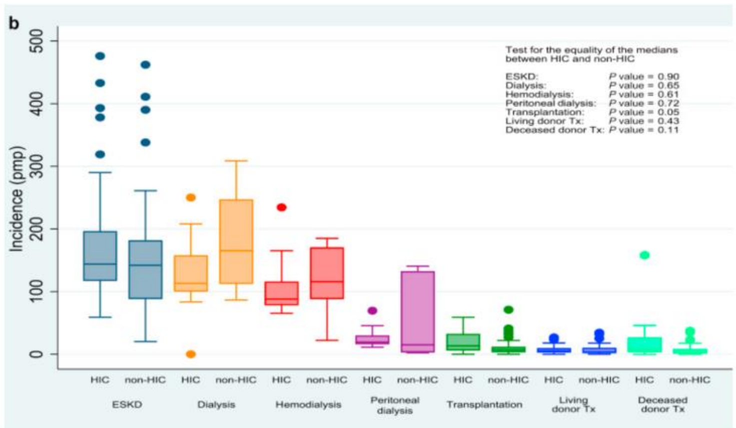
Current research suggests that as the global population increases annually, so will the number of patients who develop CKD (Jager & Fraser, 2017; Morton & Sellars, 2019; Business View Caribbean, 2019). Investment in more equipment and health professionals specialized in this area is essential but may not be sustainable, particularly in LMICs where patients lack the financial resources to manage CKD (Erickson et al., 2018). LMICs could glean from implementing government programs such as the Affordable Care Act of 2010, which provided coverage for many uninsured CKD patients who needed critical care access. Making CKD a significant health priority by implementing subsidy programs or strengthening existing ones may help alleviate its current financial burden (Draper, 2019; Tamura et al., 2018; Anderson, 2018).

Although the CDC (2018) has stated that CKD is a global health problem, the International Society of Nephrology (2019) further purports that CKD's prevalence and its complications vary widely worldwide. Socha (2019) concluded that a patient's health insurance status affects dialysis utilization and modality choice after conducting a retrospective cohort analysis to examine whether peritoneal dialysis was affected by health insurance status. According to a report from the USRDS (2018), dialysis utilization for new patients was recorded at an increased 80% due in part to Medicare coverage and improved health awareness. A study that examined the effect of universal insurance coverage on access to care for CKD patients, Harris and Davies (2019), purported that inequities, as shown in Figure 3, were evident in dialysis utilization CKD implementation of universal health coverage in LMICs. Additionally, they found that dialysis utilization varied in different regions of the same country and between urban and rural areas.

Stanifer et al. (2016) argue that priority is low in the public health response to CKD among LMICs. Consequently, making CKD a priority could lead to social change in CKD management and the reversal of its high ranking as a cause of death and disability in Saint Lucia.

Figure 3

Prevalence and Incidence Rates of End-Stage Renal Disease



Note. This figure presents the (a) Prevalence and (b) incidence rates of end-stage kidney disease (ESKD) (treated), dialysis, hemodialysis, peritoneal dialysis, kidney transplantation (Tx), and donor type in high-income countries versus non-high-income countries (Harris & Davies, 2019).

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative study was to examine the relationship between health insurance, employment, subsidization, and dialysis utilization among CKD patients in Saint Lucia. Although there have been numerous studies on dialysis utilization's financial barriers, few researchers have examined the efficacy of government subsidization for dialysis utilization in LMICs (Caribbean Renal Registry, 2018; Erickson et al., 2018; Li et al., 2019). Consequently, policymakers, healthcare officials, and other stakeholders may obtain information that can impact CKD's future payment models and disease management in Saint Lucia. In this section, I discuss the research and design rationale, methodology, and threats to validity.

Research and Design Rationale

The quantitative causal-comparative research design was used in this doctoral study to investigate group populations. I compared same subjects (individuals diagnosed with CKD) across the period 2015–2019, using a single data set with information on dialysis treatment at any of the dialysis clinics on the island (Owen King European Union Hospital, Victoria Hospital, St. Jude Hospital, and Tapion Hospital). The dependent variable in the study was dialysis utilization. The independent variables were subsidization, employment, and health insurance. Covariates included age, gender, race, geographical location, CKD stage, CKD cause, and attending hospital. Secondary data for this study were obtained from the Ministry of Health's Central Statistics Office, which is responsible for the collection, compilation, analysis, and dissemination of statistical information in Saint Lucia (Government of Saint Lucia, 2018). In this way, the data were obtained in a manner that was feasible and accessible (Frankfort-Nachmias, 2018). Raw data from the various dialysis clinics on the island are submitted central statistics office through the Ministry of Health for further analysis. Specifically, I obtained data for the study from the renal registry, which records data for all CKD patients accessing dialysis treatment in both the public and private sectors. The renal registry was developed in response to the need of health officials, policy makers, and health care providers to understand the prevalence of CKD and why it has become the number one cause of death and disability combined in Saint Lucia (Caribbean Renal Registry, 2018). This study may help bridge the gap and provide necessary information for social change, including insight into the dialysis subsidization program's efficacy.

Specifically, I analyzed a retrospective CKD cohort using data from three dialysis clinics in Saint Lucia that accessed care between 2015 and 2019. The quantitative causal-comparative design was chosen for four reasons. First, the quantitative methodology is employed when the goal is to measure variables numerically using commonly accepted measures of the physical world (Creswell, 2018; Hair et al., 2018; Leedy & Omrod, 2018). Second, the quantitative methodology is used when RQs are examined through the statistical examination of data (Creswell & Creswell, 2018). Third, the quantitative methodology is employed when the goal of the research is to generalize the findings to a larger population from which the study sample is derived (Creswell, 2018; Hair et al., 2018; Leedy & Omrod, 2018). Fourth, a quantitative study involves using a relatively large sample size, which allows for the projection of results to the target population

(Creswell & Creswell, 2018). The use of retrospective data helps researchers to determine trends in health service utilization (Creswell & Creswell, 2018). Strengths of retrospective cohort studies include maintaining a sequence of events and exploring several outcomes, such as developing a disease over some time and risk factors of an illness and other factors associated with disease outcomes (Creswell & Creswell, 2018; Hsu et al., 2019).

I chose this study's design to address the gaps in research. A comparative analysis allowed for examining the relationship between government subsidization, employment status, and health insurance in dialysis utilization trends. Use of this research design may advance health knowledge on the efficacy of health subsidization programs and health insurance's impact on disease management. It may also guide policy makers and stakeholders in selecting the best approaches in developing payment models and implementing disease management interventions in the future in Saint Lucia and other LMICs.

Methodology

Population

The target population comprised males and females 18 years of age and older diagnosed with CKD in Saint Lucia and accessed dialysis treatment between 2015-2019. Additionally, the target population included patients within the race categories of African Descent, East Indian, or Mixed. The estimated sample size was approximately 979 CKD patients registered in the national renal registry from 2015 to 2019. The target population was limited to St. Lucian residents accessing dialysis at any of the four clinics located on the island.

Sampling and Sampling Procedures

For this study, the data analyzed were secondary data modified based on the inclusion and exclusion criteria outlined in this section. The sampling procedures involved collecting and organizing secondary data from the renal registry (Caribbean Renal Registry, 2018; Government of Saint Lucia, 2018). The sampling process included analyzing the patients diagnosed with CKD and examining the renal registry's total population. I selected applicable data using simple random sampling.

After examining the data's characteristics, it became clearer that simple random sampling was a more appropriate sampling methodology, given that all patients in the renal registry satisfied essential variables such as age, gender, and the like. According to Depersio (2018), "simple random sampling is a method used to pull a smaller sample from a larger population and use it to research and make generalizations about the larger group" (p.124). The use of a simple random sample also allows for an equal probability of selecting each unit within a group (Creswell & Creswell, 2018). By using specific procedures, I examined dialysis utilization among CKD patients and compared usage across payment methods. Additionally, logistic regression was applied to control for covariates and compare independent variables. This study's data included descriptive statistics using categorical data to measure and compare with crosstabulations, chi-square analysis, frequency distributions, and counts between groups.

Sample Size and Power Analysis

At the time of the study, 1,250 individuals were enrolled in the Central Statistics Office's renal registry. I further stratified this sample by using a proportional stratification process that included using simple random stratum selection. To calculate this study's effect size, I used both chi-square analysis and correlation analysis to measure the effect size between groups. Using multiple methods allowed for comparisons of dialysis utilization among the CKD population based on three factors: health insurance, subsidization, and employment (see Faul et al., 2008). Power analysis for a linear regression was conducted in G*Power to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, and a small effect size (f2 = 0.02) (Creswell & Creswell, 2018). Based on the assumptions, the desired sample size was 979. Lakens et al. (2018) suggested that researchers may anchor their power analysis on the smallest effect size with clear benchmarks if reluctant to rely on the literature.

Instrumentation and Operationalization of Constructs

Before data collection, I obtained Institutional Review Board (IRB) approval from Walden University and the local site, the Ministry of Health. The Ministry of Health approval was a two-step process, requiring permission from the Research Ethical Committee (REC) of the Medical and Dental Council, and the Medical Directors of the various hospitals. IRB approval was needed to obtain data use agreements approved for data collection and analysis. This study posed minimal risk, primarily because it included data from an existing cohort with no identifiers and secondary. The data file contained no personally identifiable information. Therefore, there was no concern for violations of confidentiality.

Operationalization

Across the three RQs, there were three independent variables, employment, health insurance, and subsidization, and one dependent variable, dialysis utilization. RQ1 asked, Is there any relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia. For this study, health insurance referred to any form of insurance coverage covering dialysis treatment costs. The independent variable health insurance was described as a binary variable (*yes*/*no*).

RQ2 asked, Is there any relationship between employment and dialysis utilization for CKD patients, when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia? Employment was defined as any form of paid work in which a CKD patient is actively involved. The independent variable employment was described as a binary variable (*yes*/*no*). RQ3 asked, Is there any relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia? For this study, subsidization was defined as a benefit given by the government to CKD patients, resulting in reduced dialysis treatment costs to help reduce the economic burden on these patients. Independent variable subsidization is described as a binary variable and assigned the following categories: 1 for subsidization and 0 for no subsidization.

Dialysis utilization will be described as a binary variable due to the utilization of logistic regression analysis for this study and assessed by the long-term rate of dialysis treatments a CKD patient received. In the binary coding process, dialysis utilization was coded as, “1” for yes utilization, and “0” for no utilization. This study focuses on hemodialysis because it is the only type of dialysis provided to and utilized by CKD patients in Saint Lucia.

Data Analysis Plan

The data analysis process consisted of three phases, the data preparation phase, the preliminary analysis phase, and the primary analysis phase. The data preparation phase comprised the data imputation into SPSS v26 (IBM SPSS Statistics, 2019). After that, frequency descriptive statistics were performed to evaluate any missing data or data errors. Data errors found were fixed and kept for analysis. Data errors that could not be fixed were removed from the data file and were not included in the study. The same was done for missing values. Data errors and missing values were minimal in this study. After the data was checked for errors and missing values, new variables or variable recoding was completed at this point. The preparation phase was completed when all the data had been recorded.

The next phase was the preliminary phase. During this phase, the tests of parametric assumptions were conducted. A multiple logistic regression analysis was conducted to predict a correlation between independent variables, medical insurance, employment, government subsidization, and dependent variable, dialysis utilization while controlling the covariates. This study's data includes descriptive statistics using categorical data to measure and compare crosstabulations, chi-square analysis, frequency distributions, and counts between groups. Conducting a multivariable analysis helped establish the relationship between the dependent and the independent variables (Creswell & Creswell, 2018). The findings of this study may provide information about current CKD trends. They may reduce the literature gap about government subsidization's efficacy and the relationship between health insurance and employment on dialysis utilization for CKD patients in Saint Lucia.

Finally, the primary analysis was conducted to address the three RQs. The binary logistic regression analysis was performed three times. If the p-value is less than .05, then the relationship between the dependent and independent variables in the model is statistically significant. If the p-value is less than .05, then the odds ratios will be reviewed to determine which independent variable makes a considerable contribution to the model. The target populations consist of males and females 18 years and older diagnosed with CKD in Saint Lucia throughout 2015-2019. Additionally, the target population is limited to the race categories: African descent, East Indian, Mixed, or other.

Threats to Validity

Internal validity refers to whether the conclusions that are reached in a study are trustworthy, meaningful, and accurate (Heinze et al., 2018; Creswell & Creswell, 2018). One threat to internal validity is maturation. It may be that the passing of time and the progression of their disease affects their ability to access dialysis treatment and not financial factors. Another threat to internal validity is confounding. Confounding refers to changes in an outcome variable that is thought to have resulted from a third variable. It may be that dialysis utilization may be affected by other factors such as patient health literacy level. External validity refers to the generalizability of a study (Creswell & Creswell, 2018).

Ethical Procedures

The data from the Renal Registry is made available for download through the Minsity of Health. The data file contains no personally identifiable information in the data, so there is no concern for confidentiality violations. Once the analysis was completed and the report was written, the data was stored in a secure, password-protected computer that was not connected to the internet. All IRB protocols were followed to ensure no violations of ethical research standards or IRB regulations.

Summary

The purpose of this proposed quantitative causal-comparative research study was to examine dialysis utilization based on CKD patient's health insurance status, government subsidization, and employment status using a retrospective cohort study design for the five years from January 2016 to December 2019. The sample was obtained from secondary data in an existing Ministry of Health National Renal Registry extracted from all dialysis clinics in Saint Lucia. Descriptive analyses were performed to describe the study population and provide the means, standard deviations, frequencies, a range of scores, and percentages (Creswell & Creswell, 2018).

The data analysis process consisted of three phases; the data preparation phase, the preliminary analysis phase, and the primary analysis phase. The relationship between health insurance, subsidization, employment, and dialysis utilization was examined using binary logistic regression analysis to predict a correlation while controlling the covariates. This study's data includes descriptive statistics using categorical data to measure and compare with crosstabulations, chi-square analysis, frequency distributions, and counts between groups. The primary analysis was conducted to address the three RQs. The multiple linear regression analysis was performed three times. If the p-value was less than .05, then the model as-a-whole is significant. If the p-value was less than .05, then the odds ratios were reviewed to determine which groups significantly contributed to the model.

Due to limited research on the efficacy of government subsidization for dialysis in Saint Lucia, this study was geared toward providing information on the relationship between subsidization and dialysis utilization and insight into future payment models and disease management initiatives. Furthermore, the study findings may provide insight into the financial barriers that affect dialysis utilization in the management of CKD and, thus, contribute to health service delivery improvement initiatives to remedy these barriers and improve access and quality of care for CKD patients in Saint Lucia.

Section 3: Presentation of the Results and Findings

Introduction

The study's purpose was to determine if a relationship existed between health insurance, employment, subsidization, and dialysis utilization among CKD patients in Saint Lucia. It sought to gain information about the government subsidization program's efficacy for dialysis treatment. This study was the first examination of CKD characteristics in the population of Saint Lucia. The following RQs were addressed through various statistical analyses:

RQ1: Is there a relationship between health insurance and dialysis utilization for CKD patients, when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia?

$H_0$1: There is no statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia.

H_a1: There is a statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia.

RQ2: Is there a relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia?

H$_0$2: There is no statistically significant relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in Saint. Lucia.

H$_a$2: There is a statistically significant relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, and attending hospital in St. Lucia.

RQ3: Is there a relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia?

H$_0$3: There is no statistically significant relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia.

H$_a$3: There is a statistically significant relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia.

In this section, I describe the secondary data set and the analyses used to address the RQs. The statistical analyses, crosstabulations, chi-square analysis, frequency distributions, counts between groups, and statistical hypothesis testing are presented. I discuss whether the results are statistically significant and whether the null hypotheses were rejected or failed to be rejected.

Data Collection of Secondary Data Set

I obtained secondary deidentified data from the Ministry of Health renal registry. Raw data are collected by the Ministry of Health from all dialysis clinics at the various hospitals through the Central Statistics Office. These data are updated periodically. The Central Statistics Office required time to update the data and have it coded to maintain confidentiality before handing it over for processing. Despite obtaining official IRB approval from the Ministry of Health and Walden University, I had to seek additional authorization from each hospital to use their data for research purposes per the research ethics protocols for Saint Lucia. Therefore, before the data set was released, I contacted each hospital and provided key staff with a copy of IRB approvals. Once I obtained final approvals, the data set was then released for analysis. A password-protected Microsoft Excel file containing the data set was submitted electronically to me, including all the required variables for analyses.

The sample included 979 CKD patients belonging to one of three hospitals on the island: Tapion Hospital, Owen King European Union Hospital, and St. Jude Hospital. Patients in the sample were placed into three race categories: African, West Indian, and Mixed. They were coded into one of 10 district categories: Anse La Raye, Canaries, Castries, Choiseul, Dennery, Gros Islet, Laborie, Micoud, Soufriere, and Vieux Fort. The sample represented patients diagnosed with CKD registered in the renal registry and accessed dialysis treatment for 2015–2019. This study sought to determine whether there was a relationship between employment, insurance, subsidization, and dialysis utilization and assess the government subsidization program's efficacy for CKD patients requiring dialysis. The sample population included in the data set was appropriate for this study.

Data Analysis

I undertook a preliminary coding exercise for each of the variables to facilitate data processing in IBM-SPSS Statistics Version 26.0. The data were thoroughly reviewed and checked at the case and variable level for consistency to ensure successful importation into IBM-SPSS Statistics Version 26.0 and eventual interpretation of the results. Additionally, data adjustments were made using Microsoft Excel before transferring it into SPSS. I implemented various values coding and parameter settings for each variable.

The first procedure performed in IBM-SPSS Statistics Version 26.0 was running the frequency tables for each variable to report on basic descriptive statistics that would help understand each variable and the dataset by extension. Most importantly, the frequency tables reported zero missing cases. This indicated that the data entry process was successful and that the data was ready for further analysis. The second procedure performed in IBM-SPSS Statistics Version 26.0 was the generation of crosstabs for relevant variables such as

- dialysis utilization and insurance
- dialysis utilization and employment
- dialysis utilization and subsidization
- dialysis utilization and gender
- dialysis utilization and race
- dialysis utilization and district
- district and gender
- hospital and subsidization

The third procedure performed in SPSS before running the multiple logistic regression analysis checked for multicollinearity between independent variables to ensure that the regression analysis would be valid. I present these results and conclusions in the section on correlation and multicollinearity. The fourth procedure was multiple logistic regression analysis between the dependent variable (dialysis utilization). It combined independent variables (insurance, employment, and subsidization) to determine whether a relationship/dependence between these variables existed. The statistics applied were Pearson's chi-square test to determine statistical significance between variables. Cox & Snell R Square and Nagelkerke R Square were employed to assess the strength of the independent variables' impact on the dependent variable. The interpretation of results will be addressed later on in this section.

Ultimately, I performed separate chi-square tests for each independent variable against the dependent variable to determine whether there was any relationship/dependence between them separately and respond to each RQ and test-related hypotheses. Statistics applied to measure the strength of the association were eta statistic, and phi-Cramer's V. The results and interpretations are presented later on in this section.

Results

Frequency tables for each variable are presented to report on basic descriptive statistics that would help understand each variable and the dataset by extension. This is important to this study because it is the first time this population was investigated in Saint Lucia. As shown in Table 1, the sample comprised 979 CKD patients. Covariates for this study included age, race, geographical location or district, CKD stage, CKD Cause, and attending hospital. Given that this study is the first to provide descriptive statistics about the CKD population in Saint Lucia, I examined the frequencies for this population across the variables.

Table 1

Frequency Table: General Statistics of CKD Population

	Covariate					
Statistic	Gender	Race	District	CKD stage	Hospital	Cause of CKD-coded
N (valid)	979	979	979	979	979	979
Missing	0	0	0	0	0	0
Mode	2	1	3	5	2	1
Range	1	2	10	4	2	7
Minimum	1	1	1	1	1	1
Maximum	2	3	11	5	3	8

As shown in Table 2, the CKD population in this study comprised 470 males and 509 females, representing a ratio of 0.48:0.52, male to female. According to the Institute for Health Metrics and Evaluation (2020), Saint Lucia's population is 182,790, with the male population is 90,019 and the female population is 92,771. Given the country's gender demographic, it is essential to note that the CKD population mirrors that distribution, where more females make up the CKD population.

Table 2

Frequency Table: Gender of CKD Population

	Gender			
	Frequency	Percent	Valid Percent	Cumulative Percent
Male	470	48	48	48
Female	509	52	52	100
Total	979	100	100	

Saint Lucia's population is predominantly of African Descent/black (85.3% of the total population), followed by mixed African-European or mixed African- India descent (11% of the total population), then West Indian (2.2% of the total population) and white (0.6% of the total population). For this study, the CKD population fell within 1 of 3 ethnic groups (African Descent, West Indian, and mixed). Since there were no individuals of white descent in the dataset, this category was omitted during the coding and analysis process. As shown in Table 3, the largest CKD population consists of 93.3 % African Descent (913 of the total CKD population). 4.4% of the CKD population were West Indian (43 of the total CKD population), and 2.3% of the CKD population were mixed (23 of the total CKD population).

Table 3

Frequency Table: Race of CKD Population

	Race			
	Frequency	Percent	Valid Percent	Cumulative Percent
African Descent	913	93.3	93.3	93.3
West Indian	43	4.4	4.4	97.7
Mix	23	2.3	2.3	100
Total	979	100	100	

As shown in Table 4, the median age of this sample population was 65 years. The minimum and maximum ages were 20 and 102, respectively. The mean age was 63.39

Table 4

Frequency Table: Age Distribution of CKD Population

	Age
Mean	63.39
Median	65
Std. Deviation	14.107
Range	82
Minimum	20
Maximum	102

Saint Lucia has 11 districts: Anse La Raye, Canaries, Castries, Choiseul, Dennery, Forest Reserve, Gros Islet, Laborie, Micoud, Soufriere, and Vieux Fort. For this study, District 6, a Forest Reserve, was omitted because none of the Saint Lucian population reside in this geographical area. As shown in Table 4, the largest CKD population districts were the three major cities, Castries, Vieux Fort, and Gros Islet. Castries, which is the capital city, located to the north of the island, comprised 33.5% of the CKD population (328 of the total CKD population), Vieux Fort, the second-largest city, located to the south of the island, comprised 22.4% of the CKD population (219 of the total CKD population). Gros Islet, a city in the north of the island, comprised 13.4% of the CKD population (131 of the total CKD population).

Table 5

Frequency Table: Geographical Location of CKD Population

	District			
	Frequency	Percent	Valid Percent	Cumulative Percent
Anse La Raye	28	2.9	2.9	2.9
Canaries	1	0.1	0.1	3
Castries	328	33.5	33.5	36.5
Choiseul	39	4	4	40.4
Dennery	92	9.4	9.4	49.8
Gros Islet	131	13.4	13.4	63.2
Laborie	47	4.8	4.8	68
Micoud	58	5.9	5.9	74
Soufriere	36	3.7	3.7	77.6
Vieux Fort	219	22.4	22.4	100
Total	979	100	100	

The kidneys of individuals diagnosed with CKD do not usually fail at once. Kidney disease often progresses slowly over five years. Consequently, if CKD is detected early, medication and lifestyle changes may slow its progression (CDC, 2019). The NKF (2020) divided kidney disease into five stages. The GFR is the best measure of kidney function. The GFR is calculated using the math formula, including a person's age, race, gender, and serum creatinine (NKF, 2020). The NKF (2020) further explains that Creatinine is a waste product that comes from muscle activity. When kidneys are working well, they remove creatinine from the blood as kidney function slows and creatinine levels rise. The five stages of CKD are presented in Figure 4. The GFR number tells how much kidney function is left. As the disease worsens, the GFR number decreases.

Figure 4

Stages of Chronic Kidney Disease

STAGES OF CHRONIC KIDNEY DISEASE		GFR*	% OF KIDNEY FUNCTION
Stage 1	Kidney damage with **normal** kidney function	90 or higher	90-100%
Stage 2	Kidney damage with **mild loss** of kidney function	89 to 60	89-60%
Stage 3a	**Mild to moderate** loss of kidney function	59 to 45	59-45%
Stage 3b	**Moderate to severe** loss of kidney function	44 to 30	44-30%
Stage 4	**Severe** loss of kidney function	29 to 15	29-15%
Stage 5	Kidney **failure**	Less than 15	Less than 15%

Note. The National Kidney Foundation, 2020

As shown in Table 6, the Saint Lucian CKD population falls within these five groups or stages. Stage 1 and 2 comprise 2 (0.2%) and 7 (0.7%) individuals respectively. The second-largest group was at Stage 3, representing 41.6% of the CKD population (407 of the total CKD population). Stage 4 comprised 13.7% of the CKD population (134 of the total CKD population). As revealed in this study, the largest group was Stage 5 or ESRD, accounting for 43.8% of the CKD population in Saint Lucia (429 of the total CKD population).

Table 6

Frequency Table: CKD Stage of CKD Population

	CKD Stage			
	Frequency	Percent	Valid Percent	Cumulative Percent
Stage 1	2	0.2	0.2	0.2
Stage 2	7	0.7	0.7	0.9
Stage 3	407	41.6	41.6	42.5
Stage 4	134	13.7	13.7	56.2
ESRD/Stage 5	429	43.8	43.8	100
Total	979	100	100	

CKD patients were treated at any one of the three hospitals' dialysis clinics. From 2015 to 2019, Tapion Hospital (Private hospital) treated 0.9% of the CKD population (9 of the total CKD population). St. Jude Hospital (Statutory hospital) treated 36.1% of the CKD population (353 of the total CKD population), and Owen King European Union Hospital (the major public hospital on the island) treated 63% of the CKD population (617 of the total CKD population) for the same period. It is not surprising that the Owen King European Union Hospital served the most significant CKD population. It is the only major public hospital in Saint Lucia situated in one of the most populated regions. Table 7 clearly outlines the frequency distribution of the CKD population across hospitals.

Table 7

Frequency Table: Attending Hospital

	Hospital			
	Frequency	Percent	Valid Percent	Cumulative Percent
Tapion Hospital	9	0.9	0.9	0.9
OKEU Hospital	617	63	63	63.9
St. Jude Hospital	353	36.1	36.1	100
Total	979	100	100	

Upon assessing the data set, the cause of CKD for that population was a myriad of conditions. As a result of the long list of causes of CKD for those analyzed in this data set, I categorized the causes into eight categories: Category 1: Hypertension and Diabetes Mellitus with no other preexisting cause, category 2: Hypertension with no other preexisting cause; category 3: Diabetes Mellitus with no other preexisting cause, category 4: Hypertension, Diabetes Mellitus and other combinations such as polycystic kidney disease (PKD), congestive heart failure (CHF), angina, prostate cancer, peripheral venous disease (PVD), Parkinson, and metabolic syndrome; category 5: Hypertension and other combinations such as, polycystic kidney disease, morbid obesity, dyslipidemia, prolapse uterus, glaucoma, valvopathy, seizure disorder, venous insufficiency, cerebral aneurysm, acute kidney injury, and proteinuria, hematuria and pagets; category 6: Diabetes Mellitus and other combinations such as, solitary kidney, HIV, glomerulopathy, and nephrolithiasis; category 7: Other causes such as, PKD, CHF, calculus, sickle cell disease, lupus, chronic venous ulcers, immunocompromised, obesity, multiple myeloma, kidney stones, and depression. The final category comprised unknown cause.

As shown in Table 8, the most common cause of CKD was a combination of hypertension and diabetes mellitus with no other cause, accounting for 40.6% of the CKD population (397 of the total CKD population). The second most common cause of CKD was hypertension only, accounting for 25.5% of the CKD population examined (250 of the total CKD population). The third most common cause of CKD was a combination of hypertension, diabetes mellitus, and other diseases or conditions, accounting for 12.9% of the CKD population (126 of the total CKD population). According to this data, the fourth leading cause of CKD was hypertension and a combination of other diseases or conditions, accounting for 10.4% of the CKD population (102 of the total CKD population). CKD caused by diabetes mellitus alone accounted for 2.9% of the CKD population (28 of the total CKD population), and diabetes mellitus with a combination of other diseases or conditions accounted for 1.6% of the CKD population (16 of the total CKD population). CKD caused by other conditions or diseases other than hypertension and or diabetes mellitus accounted for 5.5% of the CKD population (54 of the total CKD population). Finally, 0.6% of CKD was caused by unknown conditions or diseases in this study (6 of the total CKD population).

Table 8

Frequency Table: Cause of CKD

	Cause of CKD			
	Frequency	Percent	Valid Percent	Cumulative Percent
HTN, DM	397	40.6	40.6	40.6
HTN	250	25.5	25.5	66.1
DM	28	2.9	2.9	68.9
HTN, DM, Combinations	126	12.9	12.9	81.8
HTN, Combinations	102	10.4	10.4	92.2
DM, Combinations	16	1.6	1.6	93.9
Other Causes	54	5.5	5.5	99.4
Unknown	6	0.6	0.6	100
Total	979	100	100	

Note. “DM” refers to Diabetes Mellitus and “HTN” refers to Hypertension.

One of the independent variables that this study sought to examine was employment. As shown in Table 9, from the total of 979 CKD patients in this study, 20.8% had some form of employment (204 of the total CKD population). The majority of the CKD population were unemployed, accounting for 79.2% of the CKD population (775 of the total CKD population). These findings will be further explained later on in this section.

Table 9

Frequency Table: Employment Status of CKD Population

	Employment Status			
	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	204	20.8	20.8	20.8
No	775	79.2	79.2	100
Total	979	100	100	

Saint Lucia does not have a national health insurance program for its citizens covering care for CKD patients. Therefore such individuals seek coverage from private insurance companies. Consequently, most individuals who have some form of medical insurance would obtain this as a benefit of their employment. As shown in Table 10, most of the CKD population were uninsured in this study. 94.6% of the CKD population had no form of medical insurance, accounting for 926 of the total CKD population. Only 5.4% of the CKD population had some form of insurance (53 of the total CKD population). These findings will be further explained later on in this section.

Table 10

Frequency Table: Insurance Status of CKD Population

	Insurance			
	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	53	5.4	5.4	5.4
No	926	94.6	94.6	100
Total	979	100	100	

A very significant variable in this study was subsidization for dialysis. For a basic overview of this variable, frequency distribution was performed. As was shown in Tables 9 and 10, very few CKD patients are employed and or have medical insurance. As a result of the prevalence and incidence of CKD in Saint Lucia, the government has implemented a dialysis subsidization program to assist patients in treating this disease (Government of Saint Lucia, 2018).

Table 11 shows the number of CKD patients receiving full subsidization, partial subsidization, and no subsidization. 66.1% received no subsidization (representing 647 of the total CKD population). These individuals consisted of persons at stages 1 to 4 who did not receive dialysis (only Stage 5 or ESRD receive dialysis treatment), persons who rejected treatment, and persons at stage 5 or ESRD awaiting treatment. Further analysis of this variable is presented.

Table 11

Frequency Table: CKD Population Receiving Subsidization for Dialysis

	Subsidization			
	Frequency	Percent	Valid Percent	Cumulative Percent
None	647	66.1	66.1	66.1
Full Subsidization	64	6.5	6.5	72.6
Partial Subsidization	268	27.4	27.4	100
Total	979	100	100	

Table 12

Frequency Table: CKD Population Accessing Dialysis

	Dialysis Utilization			
	Frequency	Percent	Valid Percent	Cumulative Percent
None	699	71.4	71.4	71.4
Once a Week	1	0.1	0.1	71.5
Twice a Week	51	5.2	5.2	76.7
Three times a Week	228	23.3	23.3	100
Total	979	100	100	

Note. “None” (699) refers to CKD patients within stages 1-4, who are not being dialyzed.

Table 13

Multiple Logistic Regression for Combined Variables: Case Summary

Case Processing Summary			
Unweighted Cases		N	Percent
Selected Cases	Included in Analysis	979	100.0
	Missing Cases	0	0.0
	Total	979	100.0
Unselected Cases		0	0.0
Total		979	100.0

a. If weight is in effect, see classification table for the total number of cases.

Note. This table shows the number of cases considered in this test. It includes 979 cases with 0 cases excluded or missing.

Table 14 shows encoding for the dependent variable, dialysis utilization. The binary coding, yes =1; "meaning uses Dialysis," No=0; "meaning not using Dialysis." This also meant that the model would be predicting the odds of 'Yes", or the odds of dialysis utilization as the answer "Yes" had been given the larger internal value code in the model. Yes =1, No=0.

Table 14

Dependent Variable Coding

Dependent Variable Encoding	
Original Value	Internal Value
No	0
Yes	1

Note. Dialysis Utilization Coding for logistic regression analysis

Table 15 shows a standard correlation matrix as performed in SPSS for the independent variables (Employment, Insurance, and Subsidization) and dependent variable (dialysis utilization) in the study. This step is important before running the multiple logistic regression to determine and treat (if necessary) for multicollinearity in independent variables. Multicollinearity will cause unstable estimates and inaccurate variances that affect confidence intervals and hypothesis tests (Senaviratna & Cooray, 2019)

Table 15

Correlation Table

Correlations					
		EMPLOYMENT	INSURANCE	SUBSIDIZATION	DIALISYS UTILIZATION
EMPLOYMENT	Pearson Correlation	1	.389**	-.136**	-.108**
	Sig. (2-tailed)		0	0	0.001
	N	979	979	979	979
INSURANCE	Pearson Correlation	.389**	1	-0.028	-0.048
	Sig. (2-tailed)	0		0.38	0.135
	N	979	979	979	979
SUBSIDIZATION	Pearson Correlation	-.136**	-0.028	1	.777**
	Sig. (2-tailed)	0	0.38		0
	N	979	979	979	979
DIALYSIS UTILIZATION	Pearson Correlation	-.108**	-0.048	.777**	1
	Sig. (2-tailed)	0.001	0.135	0	
	N	979	979	979	979

**. Correlation is significant at the 0.01 level (2-tailed).

Multicollinearity happens in a regression model when the independent variables are correlated. The degree of change in one variable is closely affected by the change in another independent variable. If the degree of correlation is high and not corrected, this may result in undesirable results after running the regression analysis (Frost, 2021). Although it was observed that there was some correlation between employment and insurance (p= .389) and employment and subsidization (p= -.136) however, observing the correlation table was not enough to explain multicollinearity between these variables and therefore the study applied further analysis of the collinearity statistics *tolerance* and its reciprocal called *the variance inflation factor* (VIF) as shown in Table 16.

Table 16

Collinearity Statistics: Coefficients

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.14	0.08		1.746	0.08		
	EMPLOYMENT	0.01	0.025	0.009	0.417	0.68	0.833	1.2
	INSURANCE	-0.06	0.044	-0.029	-1.349	0.18	0.848	1.179
	SUBSIDIZATION	0.397	0.01	0.777	38.21	0	0.981	1.02

a. Dependent Variable: Dialysis Utilization

In the collinearity statistics, tolerance measures the percentage of the variance in a given predictor variable (employment, insurance, subsidization) that the other predictors cannot explain. Although there is no formal threshold value for this, the literature suggests that a tolerance below 0.2 suggests serious collinearity (Senaviratna et al., 2019). The Collinearity statistic for all of the independent variables in Table 16 is closer to 1, meaning that there is very little correlation between them.

Further, the VIF shows how much the variance of the coefficient estimate is inflated by multicollinearity. Again, like the tolerance statistic, there is no formal cutoff value for the VIF for determining multicollinearity. However, it is generally accepted that values of VIF that exceed 10 indicate multicollinearity. In logistic regression, values above 2.5 may cause concern (Midi et al., 2010). In this study, the VIF numbers were below the considered 2.5 threshold for all variables in the model.

The findings of the collinearity statistics of *tolerance* and the *variance inflation factor* for all of the independent variables led to the conclusion that correlation among these variables was not substantial. Therefore these variables could not be voided during the process of performing the multiple logistic regression and hypothesis testing to answer the associated RQs.

The Categorical Variables Coding Table 17 shows the frequencies of the various independent variables that were forced into the model. In the independent variable category, subsidization, 647 patients received no subsidization. Of the 332 that receive subsidization, 268 patients received partial subsidization, and 64 patients received full subsidization. In the insurance category, 926 patients were uninsured, and 53 patients were insured. In the employment category, 775 patients were unemployed, and 204 were employed.

Table 17

Logistic Regression: Independent Variable Coding

Categorical Variables Codings			
		Frequency	Parameter coding
			(1)
SUBSIDIZATION	No	647	1
	Yes	332	0
INSURANCE	yes	53	1
	No	926	0
EMPLOYMENT	Yes	204	1
	No	775	0

It revealed each independent variable's categories, manually recoded into the regression as dummy variables under parameter coding (1). In logistic regression, just as in linear regression, groups are compared to each other. One group has to be omitted from the comparison to serve as the baseline category (Creswell & Creswell, 2018). In this case, for each independent variable, one dummy variable was selected as the constant. In subsidization, “No” was selected as constant, to which predictions for “Yes” were compared. Likewise, in insurance, "No" was constant to which predictions for Yes were compared in this category, and employment "No" was selected automatically, against which employment "Yes" were compared.

Table 18

Classification Table

Classification Table[a,b]

Observed		Predicted		
		Dialysis Utilization		Percentage Correct
		No	Yes	
Dialysis Utilization	No	698	0	100.0
	Yes	281	0	0.0
Overall Percentage				71.3

a. Constant is included in the model.
b. The cut value is .500

Table 18 shows predictions for the dependent variable “use of dialysis” without introducing any independent variables into the regression. In other words, the odds that a patient may not use dialysis without taking into account employment, insurance, or any level of subsidization was predicted at roughly 71.3%. For example, suppose a case would be selected randomly from the CKD cases in Saint Lucia. In that case, the likelihood of selecting someone who does not use dialysis is predicted at 71.3% higher compared to selecting someone who uses dialysis. This reflects the existing ratio of dialysis non-users compared to persons using dialysis in the sample. Numerically represented as: $\frac{non-users}{Total} = \frac{698}{979} = 71.3\%$

Table 19

Variables in the Equation

Variables in the Equation						
	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	-0.910	0.071	165.856	1	0.000	0.403

In Table 19, the Odds of dialysis utilization by a CKD patient is shown. The odds ratio represented by the Exponential B; Exp(B) means that without the addition of any of the independent variables, the odds of using dialysis was predicted at 0.403, representing the odds that a CKD patient would not use dialysis.

Table 20

Multiple Regression model

Multiple Regression Table				
		Score	df	Sig.
Variables	EMPLOYMENT(1)	11.443	1	0.001
	INSURANCE(1)	2.234	1	0.135
	SUBSIDIZATION (1)	679.773	1	0.000
Overall Statistics		681.31	3	0.000

Table 20 shows the significance of each independent variable related to the dependent variable, dialysis utilization. For satisfying the logistic regression requirements, two variables in this analysis were recoded from their original multiple tier responses to binary coding[1]. If "P" (Sig.) is less than 0.05, then the model determines that these independent variables' relationship to the dependent variable is significant. In this case significance of the independent variable, employment is lower than the threshold of 0.05; therefore, it is significant, just as is the case with subsidization. Insurance was not significant in the model with a p-value of 0.135, which is above the threshold of 0.05. This may be influenced by the comparatively low number of patients with insurance in the model. However, this multiple logistic regression model had an overall significance level of 0.00, meaning that the independent variables (Employment and Subsidization) did influence dialysis utilization. This was supported by the results of the Omnibus Tests of Model Coefficients in Table 21. Each of these independent variables will also be individually tested (Chi-square test) against the dependent variable (dialysis utilization) to determine the strength of significance and respond to each RQ separately.

Table 21

Omnibus Tests of Model Coefficients

Omnibus Tests of Model Coefficients				
		Chi-square	Df	Sig.
Step 1	Step	771.795	4	0.000
	Block	771.795	4	0.000
	Model	771.795	4	0.000

Note. Block 1: Method =Enter

Table 21 shows the multiple logistic regression results, including both dependent variable (dialysis utilization) and Independent Variables (Employment, Insurance, and

- [1] *Dialysis Utilization* was recoded from responses “0=None, 1= Once Weekly, 2=Twice Weekly, 3 = Three times weekly”, to Binary coding “0=No” for None, and “1=Yes”, for all responses other than None.
- *Subsidization* was recoded from responses “0=None, 1= Full subsidization, 2=Partial Subsidization” to Binary coding “0=No”for None and “1=Yes”, for all responses other than None.

Subsidization). The "Omnibus Tests of Model Coefficients" show the result of a chi-square test to determine whether or not the independent variables' addition has a statistically significant relationship with the dependent variable (Creswell & Creswell, 2018), dialysis utilization. This chi-square Test returned the value of 0.000, indicating a statistically significant relationship between dialysis utilization and employment and dialysis utilization and subsidization.

Table 22 provides pseudo-R-squared measures of Cox & Snell and Nagelkerke. These R-Square measures inform on the variability in the dependent variable (Creswell & Creswell, 2018); dialysis utilization was explained by the independent variables, employment, and subsidization. Cox & Snell R-squared determines that this model explains 54.5% of the variation in dialysis utilization. In contrast, Nagelkerke R-Squared determines that this model explains 78.1% variation in dialysis utilization. In both instances, however, this reveals implicitly that other factors outside of this model influence dialysis utilization.

Table 22

Cox & Snell and Nagelkerke R Square Measures

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	401.965[a]	0.545	0.781

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

The Pearson chi-square significance level of 0.135, shown in Table 23, was above the recommended significance level of 0.05, indicating that the association between insurance and dialysis utilization was not significant. Insurance in the model is not a significant predictor of dialysis utilization.

Table 23

Chi-Square Tests

	Chi-Square Tests				
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.234[a]	1	0.135		
Continuity Correction[b]	1.792	1	0.181		
Likelihood Ratio	2.125	1	0.145		
Fisher's Exact Test				0.159	0.092
Linear-by-Linear Association	2.232	1	0.135		
N of Valid Cases	979				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.21.
b. Computed only for a 2x2 table

Further, the eta statistic application to measure the level of variability in the dependent variable accounted for by the independent variable is reported in Table 24.

Table 24 shows the crosstabs for independent variable Insurance against dependent variable, dialysis utilization. The observed and expected count values for dialysis utilization (Yes, No) were recorded against Insurance (Yes, No). The expected count shows what should be expected or observed if the independent variable had no relationship to the dependent variable. The chi-square test helps determine if the observed counts are different enough for the association between these two variables to be significant (Creswell & Creswell, 2018).

Table 24

Crosstabulation: Dialysis Utilization and Insurance

Dialysis Utilization * INSURANCE Crosstabulation					
			INSURANCE		Total
			yes	No	
Dialysis Utilization	No	Count	33	665	698
		Expected Count	37.8	660.2	698.0
	Yes	Count	20	261	281
		Expected Count	15.2	265.8	281.0
Total		Count	53	926	979
		Expected Count	53.0	926.0	979.0

Table 25

Chi-Square Test

Chi-Square Tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.234[a]	1	0.135		
Continuity Correction[b]	1.792	1	0.181		
Likelihood Ratio	2.125	1	0.145		
Fisher's Exact Test				0.159	0.092
Linear-by-Linear Association	2.232	1	0.135		
N of Valid Cases	979				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.21.
b. Computed only for a 2x2 table

The Pearson chi-square significance level was at 0.135, as shown in Table 25, above the recommended significance level of 0.05, which indicates that the association between insurance and dialysis utilization is not significant. Insurance in the model is not a significant predictor of dialysis utilization. RQ1 and its associated hypotheses were as follows:

RQ1: What is the relationship, if any, between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint. Lucia?

$H_0$1: There is no statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint Lucia.

H_a1: There is a statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint. Lucia.

Based on the "P" value of 0.135 from the multiple regression model (Table 20) and the Pearson chi-square significance level of 0.135 (Table 23), insurance did not have a statistically significant relationship with dialysis utilization; therefore, the null hypothesis for RQ could not be rejected. Therefore, dialysis utilization is not necessarily dependent on whether or not a patient has Insurance in this study. While the relationship did not meet the threshold for statistical significance, it did "approach significance." This may be reflective of the comparatively low number of patients with insurance. Further, the Eta Statistic application to measure the level of variability in the dependent variable accounted for by the independent variable is reported in Table 26.

Table 26

Eta Statistic for Insurance

Directional Measures			
			Value
Nominal by Interval	Eta	Dialysis Utilization Dependent	0.048
		INSURANCE Dependent	0.048

Eta-squared is the most typically reported measure of effect size in measuring variance analysis (Creswell & Creswell, 2018). It represents the percentage of variance in the dependent variable accounted for by the independent variable. Eta-Squared as regards to the effect of insurance in dialysis utilization was; $\eta 2 = 0.0482 = 0.002304 * 100 = 0.23\%$. Only 0.23% (less than half a percent) of the dialysis utilization variance was accounted for by insurance.

The Pearson Chi-Square significance level is at 0. 001 as shown in Table 28. This was below the recommended significance level of 0.05, indicating that the association between employment and dialysis utilization is significant. Employment in the model is a significant predictor of dialysis utilization.

Table 27

Crosstabulations: Dialysis Utilization and Employment

Dialysis Utilization * EMPLOYMENT Crosstabulation					
			EMPLOYMENT		Total
			Yes	No	
Dialysis Utilization	No	Count	126	572	698
		Expected Count	145.4	552.6	698
	Yes	Count	78	203	281
		Expected Count	58.6	222.4	281
Total		Count	204	775	979
		Expected Count	204	775	979

Table 28

Chi-Square Tests: Dialysis Utilization and Employment

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	11.443[a]	1	0.001		
Continuity Correction[b]	10.862	1	0.001		
Likelihood Ratio	10.995	1	0.001		
Fisher's Exact Test				0.001	0.001
Linear-by-Linear Association	11.431	1	0.001		
N of Valid Cases	979				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 58.55.
b. Computed only for a 2x2 table

RQ2 and its associated hypotheses were as follows:

RQ2: What is the relationship, if any, between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint. Lucia?

$H_0$2: There is no statistically significant relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint. Lucia.

H_a2: There is a statistically significant relationship between employment and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in St. Lucia.

The model does present a degree of significance enough to reject the Null Hypothesis, $H_0$2. Therefore, dialysis utilization is somewhat influenced by whether or not a patient is employed. The relationship between employment and dialysis utilization is statistically significant. Further application of the Eta Statistic to measure the level of variability in dialysis utilization accounted for by the employment is reported in Table 29.

Eta-squared is the most typically reported measure of effect size in measuring analysis of variance. It represents the percentage of variance in the dependent variable accounted for by the independent variable. Eta-Squared as regards to the effect of employment on dialysis utilization is; $\eta^2 = 0.108^2 = 0.011664 * 100 = 1.16\%$. at least 1.16% of the variance in dialysis utilization is accounted for by employment.

Table 29

Directional Measures: Dialysis Utilization and Employment

Directional Measures			
			Value
Nominal by Interval	Eta	Dialysis Utilization Dependent	0.108
		EMPLOYMENT Dependent	0.108

Table 30

Crosstabulations: Dialysis Utilization and Subsidization

Dialysis Utilization * SUBSIDIZATION Crosstabulation						
			SUBSIDIZATION			Total
			None	Full Subsidization	Partial Subsidization	
Dialysis Utilization	No	Count	636	1	61	698
		Expected Count	461.3	45.6	191.1	698
	Yes	Count	11	63	207	281
		Expected Count	185.7	18.4	76.9	281
Total		Count	647	64	268	979
		Expected Count	647	64	268	979

Table 31

Chi-Square Tests: Dialysis Utilization and Subsidization

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	691.118[a]	2	0.000
Likelihood Ratio	764.511	2	0.000
Linear-by-Linear Association	590.234	1	0.000
N of Valid Cases	979		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.37.

The Pearson chi square significance level was at 0.000, below the recommended significance level of 0.05. This indicates that the association between subsidization and dialysis utilization is significant. Subsidization in the model is a significant predictor of dialysis utilization. RQ3 and its associated hypotheses were as follows:

RQ3: What is the relationship, if any, between government subsidization and dialysis utilization for CKD patients in Saint Lucia?

$H_0$3: There is no statistically significant relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia.

H_a3: There is a statistically significant relationship between government subsidization and dialysis utilization for CKD patients in Saint Lucia.

The model does present a degree of significance enough to reject the null hypothesis, $H_0$3. Therefore, dialysis utilization is influenced by whether or not a patient received subsidies for dialysis. The relationship between subsidization and dialysis utilization was statistically significant.

Further application of the Eta Statistic to measure the level of variability in dialysis utilization accounted for by the Subsidization is reported in Table 32.

Table 32

Directional Measures: Dialysis Utilization and Subsidization

Directional Measures			
			Value
Nominal by Interval	Eta	Dialysis Utilization Dependent	0.84
		SUBSIDIZATION Dependent	0.777

Eta-squared is the most typically reported measure of effect size in measuring analysis of variance. It represents the percentage of variance in the dependent variable accounted for by the independent variable. Eta-Squared as regards to the effect of subsidization on dialysis utilization is; $\eta^2 = 0.777^2 = 0.603729 * 100 = 60.37\%$. Roughly 60% of the variance in dialysis utilization was accounted for by subsidization.

Summary

Through the various statistical analyses of logistic regression, chi-square, and crosstabulation, the three RQs for this study were answered. For RQ1, there was no statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital in Saint. Lucia. Insurance was not statistically significant in the multiple regression model with a p-value of 0.135, which is higher than the threshold of 0.05. Additionally, the Pearson chi-square significance level of 0.135 was above the recommended significance level of 0.05 in the model. This revealed that the association between insurance and dialysis utilization was not significant and that insurance in the model was not a significant predictor of dialysis utilization.

Further, the Eta Statistic application measures variability in the dependent variable accounted for by the independent variable. In this study, only 0.23% (less than half a percent) of the dialysis utilization variance was accounted for by insurance. Therefore, the null hypothesis ($H_0 1$) was not rejected. The data concluded that dialysis utilization was not dependent on whether or not a patient had insurance.

The null hypotheses ($H_0 2$, $H_0 3$) for RQs 2 and 3 were rejected, and the alternative hypotheses were accepted. This study revealed a statistically significant relationship between employment and dialysis utilization and between subsidization and dialysis utilization. The multiple regression model (Table 20) returned the value of 0.000, respectively, for dialysis utilization and employment and dialysis utilization and subsidization, indicating a statistically significant relationship.

For RQ2, the Pearson chi-square significance level was 0.001, below the recommended significance level of 0.05, indicating that the association between employment and dialysis utilization is significant. Employment in the model is a significant predictor of dialysis utilization. Eta-squared regarding the effect of employment on dialysis utilization was 1.16%., meaning at least 1.16% of the variance in dialysis utilization was accounted for by employment.

The Pearson chi-square significance level of 0.000 was below the recommended significance level of 0.05, indicating that the association between subsidization and dialysis utilization was statistically significant. Subsidization in the model was a statistically significant predictor of dialysis utilization. Eta squared as it pertained to the effect of subsidization on dialysis utilization was equal to 60.37%. Roughly 60% of the variance in dialysis utilization was accounted for by subsidization. These significant findings reveal the efficacy of the government's subsidization program for dialysis treatment for CKD patients. Additionally, the findings also point out that employment status influenced dialysis utilization among CKD patients in Saint Lucia. These results provide relevant and valuable information to CKD patients' management and care in Saint Lucia.

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

Introduction

In this study, I applied a quantitative approach with a correlational analysis to determine whether a relationship existed between the independent variables, health insurance, employment, subsidization, and the dependent variable, dialysis utilization. The purpose of the study was to assess the efficacy of the government's subsidization program for dialysis in Saint Lucia and the utilization of hemodialysis given a patient's employment status, health insurance status, or receipt of government subsidization. Additionally, an assessment of the CKD population's baseline characteristics in was carried out for the first time. I begin this section by interpreting the findings, followed by this study's limitations, then the recommendations, and finally, the study's implications for professional practice and social change.

Interpretation of the Findings

This study's specific problem was the financial barriers that affect dialysis utilization in managing CKD patients in Saint Lucia. According to my research, this project was unique because it was the first to be specific to this population. This study was also motivated by my desire to understand better the CKD population's specific baseline characteristics in Saint Lucia and the impact of payment models on dialysis utilization. Given that government dialysis subsidization has been in effect since 1999, it was essential to assess this program's efficacy, which is essential to the effective management of CKD (Government Information Service, 2015).

The frequency tables provide first-time insight into some of the characteristics of the CKD population in Saint Lucia. I found that there was a higher percentage of females than males diagnosed with CKD in this study. Previous population-based studies indicate a higher prevalence of CKD in women (Brar & Markell, 2019); however, men were found to progress more rapidly to ESRD (Brar & Markell, 2019; Chang et al., 2016; De Rosa, et al., 2017). The literature further suggests that fewer males were screened for CKD or monitored conditions such as hypertension and diabetes, leading to CKD's onset (Chen et al., 2019). Consequently, this study suggests that lifestyle-related factors may also play a role in CKD's development and progression. Another finding of this study was that CKD's major causes in Saint Lucia were hypertension and diabetes. Support from the literature suggests that CKD is most commonly attributed to hypertension and diabetes worldwide (Chen et al., 2019; Kramer et al., 2018). I also found that the average age of CKD patients was 63 years. Noble and Taal (2019) postulated that CKD affects 13% of the adult population globally and that the prevalence rises significantly with age. Chen et al. (2019) also substantiated this finding by stating that kidney function deteriorates with aging. This finding is of significance, primarily because Saint Lucia’s average age for CKD falls below the average global age of 65 years, according to the CDC (2020).

It was not surprising that the most densely populated districts in Saint Lucia, namely Castries, Vieux Fort, and Gros Islet, had the highest CKD patients. Districts situated in the outskirts of the cities and rural areas, such as Canaries and Anse La Raye, were reported to have fewer CKD patients. Over 90% of CKD patients in this study were of African descent, which mirrors the general population’s ethnic or racial distributions

(Pan American Health Organization, 2019). Another important finding of this study was the distribution of patients across CKD Stages 1 to 5. The majority of CKD patients were at Stages 3 and 5 (ESRD), followed by Stage 4, with fewer in the other stages. According to Chen et al. (2019), less than 5% of patients with early CKD report their disease awareness. The majority become aware when they are at advanced stages and symptomatic (Caribbean Renal Registry, 2018; George et al., 2017). Chen et al. could also explain why the numbers in this study were higher at these stages. From the frequencies reported on the causes of CKD, CKD's most common cause in Saint Lucia was a combination of hypertension and diabetes, accounting for 40.6% of the population examined, followed by patients with hypertension only. These results are significant because they provide essential information about the influence of lifestyle-related factors on CKD. Goro et al. (2019) suggest that CKD's burden disproportionately impacts LMICs, where diabetes and hypertension are the most significant risk factors for the CKD growth rate.

Though this study did not include a complete exploration of the gaps and inequities in renal treatment therapy, hemodialysis provided relevant information and answered the RQs. The focus of RQ1 was on determining whether there was a statistically significant relationship between health insurance and dialysis utilization. There was no statistically significant relationship between health insurance and dialysis utilization for CKD patients when controlling for age, race, gender, geographical location, employment status, CKD stage, and attending hospital in Saint. Lucia. Insurance did not appear to be significant for both the multiple regression and Pearson chi-square models with a low *p*-value of 0.135, reflective of the comparatively low number of patients with insurance in the study.

Consequently, the null hypothesis for RQ1 ($H_0$1) could not be rejected. Therefore, dialysis utilization is not necessarily dependent on whether or not a patient has insurance. To further determine the percentage of variance in dialysis utilization accounted for by insurance, the eta-squared percentage was calculated. Less than half a percent of the variance in dialysis utilization was accounted for by insurance. Consequently, R-Squared measures (Cox & Snell and Nagelkerke) revealed that the influence of employment and subsidization explained more than 50% of dialysis utilization.

The focus of RQ2 was on determining whether or not there was a statistically significant relationship between employment and dialysis utilization. This study found that the majority (more than 50%) of CKD patients on dialysis were unemployed, further substantiating current literature, which purports that CKD patients with ESRD face many barriers to remaining in the workforce after starting dialysis (Erickson et al., 2018; Hallab & Wish, 2018; Krishnan, 2019). In this study, further analysis using multiple regressions and the Pearson chi-square test revealed a *p*-value of 0.000, which indicated a statistically significant relationship between dialysis utilization and employment. Therefore these findings presented a degree of significance enough to reject the null hypothesis ($H_0$2). Eta-squared for the effect of employment on dialysis utilization accounted for at least 1.16% of the variance in dialysis utilization. This finding is consistent with previous studies stating that employed persons have increased dialysis utilization than those who are not employed (Hallab & Wish, 2018; Norton & Eggers, 2020).

The focus of RQ3 was on examining the relationship between dialysis utilization and subsidization. I answered this question through logistic regression, chi-square analysis, and the eta squared statistic. The Pearson chi-square *p*-value of 0.000 and the multiple regression *p*-value of 0.000 revealed that the association between subsidization and dialysis utilization was statistically significant. That subsidization was a significant predictor of dialysis utilization. Consequently, dialysis utilization was influenced by whether or not a patient received government subsidization for dialysis. The eta statistic application to measure the level of variability revealed that 60% of the variance in dialysis utilization was accounted for by subsidization. The null hypothesis ($H_0$3) was rejected based on the degree of significance from the statistical measures employed. This finding was very significant since most CKD patients from the population were unemployed and uninsured, providing further evidence that the government's dialysis subsidization program was effective. These findings supported the current literature that dialysis utilization is significantly impacted by subsidization, particularly among the unemployed and uninsured CKD population in LMICs (Anderson, 2018; Business View Caribbean, 2019; Chen et al., 2019; Erickson et al., 2018).

Limitations of the Study

There were several limitations to this research design. Firstly, the data set was limited to only CKD patients who accessed dialysis from 2015 to 2019. Therefore, the generalizability of the findings of this study was limited. Secondly, other factors outside those examined influenced dialysis utilization. Further analysis of the data is encouraged to determine what other factors contribute to dialysis utilization.

Additionally, hemodialysis gaps and inequities, which may help better understand dialysis utilization trends, were not explored. Type of insurance coverage and its influence on dialysis utilization was not examined. Therefore further examination of a CKD patient's type of insurance and its relation to dialysis utilization may provide greater insight into the impact of insurance on dialysis utilization. Additionally, though the relationship between insurance and dialysis utilization did not meet the statistical significance threshold, it did approach significance, leading to the possibility of a relationship. Further exploration into this relationship is encouraged by using a larger sample size or extending to other populations.

Recommendations

The study findings revealed a significant relationship between employment, subsidization, and dialysis utilization. Against the backdrop of a worsening economy, high unemployment rates, and escalation of health care costs, it was essential to examine the relationship between the study's variables. There are several avenues that this research could be extended to build upon the current findings. One avenue for future research would be an analysis of CKD progression, more specifically from progression from stage 3 to stage 5 (ESRD). This may provide important information about the time a patient takes to progress from one stage to another, providing pertinent information to improve quality care outcomes. Further examination of the factors other than insurance, employment, and subsidization that influence dialysis utilization is recommended. Factors such as socioeconomic status or educational background may be considered.

A more in-depth examination of demographics, ethnicity, and compliance to dialysis treatment is also recommended. This study could also be extended to investigating CKD incidence in Saint Lucia to help predict future cases, mainly because utilization heavily depends on government subsidization. This study may provide relevant information to health officials and other stakeholders in decision-making for the current subsidization program. The majority of CKD patients in this study were at stages 5 (ESRD) or 3. Further investigation may help determine the factors contributing to CKD progression, particularly from stage 3 to ESRD.

Implications for Professional Practice and Social Change

Despite the inescapable financial obligations faced by CKD patients, their families, and the government in assisting in accessing dialysis treatment, the reality is that poor management of this condition invariably leads to even more financial burdens. According to De Rosa et al. (2017), patients with CKD are at high risk for developing other critical conditions that most often warrant admission to intensive care units. Saint Lucia's already burdened health care system is not exempt from the increasing hospitalizations and critical care sought by CKD patients. This is further substantiated by this study's findings of CKD's causes, thus leading to more economic burdens (Government of Saint Lucia, 2018). In the wake of health reform initiatives, an integrated multidisciplinary effort is necessary to adequately manage such patients' multi-organ damage (De Rosa et al., 2017). Current research about CKD proves vital information to decision-makers to develop more appropriate strategies to address this chronic disease. Health leaders, governments and other stakeholders should recognize the true situation of

CKD management in Saint Lucia. The government can only subsidize dialysis treatment for only a finite number of CKD patients. As a result, this should motivate exploration of other preventative programs that may assist in modifying the general population's lifestyle choices to prevent the onset and further progression of CKD. Other studies have established an association between a healthy lifestyle with decreased CKD risk and mortality in the general population (Lee et al., 2019; Morton & Sellars, 2019). A recent study by Evangelidis et al. (2019) proposed that lifestyle behavior change interventions for CKD patients can prevent disease progression. Consequently, such initiatives can be implemented in resource-poor countries, or already overburdened health systems seeking for alternatives to curtail the increasing costs of health care for CKD patients.

This quantitative study's findings provide insight into the financial barriers that affect dialysis utilization in managing CKD patients in Saint Lucia. Pertinent information needed by health leaders and other stakeholders are presented for the first time for this specific population and non-communicable disease in Saint Lucia. It will add to the limited research on CKD management related to health delivery (Tamura et al., 2018) in LMICs. Additionally, this study will inform government health officials, policy makers, and healthcare leaders of the efficacy of the dialysis subsidization program for CKD patients in Saint Lucia. This study provides a greater understanding of how government subsidization has impacted access to dialysis treatment. This study's information may contribute to health service delivery and implement policies to remedy financial barriers and improve access and quality of care for CKD patients in Saint Lucia (Wilk, Hirth, & Messana, 2019). This study's results may also provide information to both government and health officials about CKD trends, financial barriers to access care for CKD patients, and recommendations for policy or social change improvement initiatives.

Furthermore, the study is essentially a policy analysis of government subsidies' efficacy. Therefore, it is of potential societal relevance, primarily because the findings reveal that government subsidization positively impacts dialysis utilization. Consequently, policy makers, healthcare officials, and other stakeholders may obtain information from this study that can impact future initiatives for payment models and disease management of CKD in Saint Lucia.

Conclusion

This study, grounded in the Andersen and Newman (1995) Health Services Utilization Framework, sought to determine whether a relationship existed between insurance, employment, subsidization, and dialysis utilization. It also sought to determine, for the first time, the efficacy of the government subsidization program for dialysis in Saint Lucia and assess the CKD population's baseline characteristics in Saint Lucia. A literature review indicated that financial barriers such as unemployment, lack of insurance, and or subsidization are significant factors influencing dialysis utilization, particularly among LMICs. This study sought to fill the gap between the efficacy of government subsidization and dialysis utilization in LMICs (Caribbean Renal Registry, 2018; Erickson et al., 2018; Li et al., 2019). While there have been numerous studies on financial barriers to dialysis utilization, few studies have examined government subsidization efficacy.

The research design was a quantitative causal-comparative cohort to investigate group populations. Same subjects (individuals diagnosed with CKD) across the period 2015-2019 who accessed dialysis treatment at any of the dialysis clinics were compared. The dependent variable was dialysis subsidization, and the independent variables were subsidization, employment, and insurance. Covariates included age, race, gender, geographical location, CKD stage, CKD cause, and attending hospital. The data file for this study contained no personally identifiable information. Therefore there were no confidentiality violations. Current research about CKD provides vital information to decision-makers and other stakeholders in developing more appropriate strategies to address this chronic disease. Upon recognizing that the government bears the most significant responsibility for covering the cost of dialysis treatment through its subsidization program, health officials, government leaders, and other pertinent stakeholders may begin to explore alternative solutions for sustainability. Based on the fact that government can only subsidize dialysis treatment for a finite number of CKD patients, preventative programs may be implemented to modify the general population's lifestyle choices to prevent further disease progression or even delay the onset. Other studies have established an association between a healthy lifestyle with decreased CKD risk and mortality in the general population (Lee et al., 2019; Morton & Sellars, 2019). Despite the inescapable financial obligations that CKD patients, their families, and the government face concerning dialysis utilization, the reality is that poor management of this disease invariably leads to even more financial burdens.

This study provided a greater understanding of how government subsidization has impacted access to dialysis treatment. This study's information may contribute to health service delivery improvements and policies to remedy financial barriers and improve access and quality of care for CKD patients in Saint Lucia (Wilk, Hirth, & Messana, 2019). This study's results may also provide information to both the government and pertinent health officials about trends in CKD, financial barriers to accessing care, and recommendations for policy or social change improvement initiatives. Furthermore, the study is essentially a policy analysis of the government subsidization program's efficacy. Therefore, it is of potential societal relevance because the findings reveal that government subsidization positively impacts dialysis utilization for numerous Saint Lucians with CKD.

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