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Analysis of the Determinants of Health Outcomes among Louisiana's Residents: A Test of the Precede-Proceed Theoretical Framework

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Abstract
The purpose of this study is to analyze the determinants of health outcomes among residents of the State of Louisiana following the implementation of the Patient Protection and Affordable Care Act (ACA) between 2011 and 2021 by applying the behavioral change approach's PRECEDE-PROCEED Model as well as using secondary sources of data to inform public policy. The study has made use of two dependent variables (i.e. mortality and morbidity), and the following independent variables such as Health behaviors, Clinical care, coupled with Social and economic factors, and Physical Environment, while lack of access to health insurance and access to primary care physician were treated as control variables. The study revealed that for every 1% increase in bad health behaviors among residents of Louisiana, morbidity rate increases by 98.7%, while mortality rate increases by 59.7%. The study has further revealed that for every 1% increase in the percentage of uninsured adults among the population of Louisiana, the State's mortality rate is likely to increase by 0.402 or 40.2%. Furthermore, the study revealed that, for every 1% increase in the access to primary care physician among the population of Louisiana, the State's mortality rate, and morbidity rate are likely to decrease by -0.426 or 42.6%, and -0.602 or 60.2%, respectively. The study recommends that government and policy makers should enforce all existing laws and policies toward protecting quality physical environment for air, natural resources, and the water bodies—rivers, oceans, etc. to save the lives of the people. All regulations on pollution should be intensified. Lastly, the creation of more infrastructure by policymakers, and all stakeholders will go a long way to help bridge the social & economic gap in the State of Louisiana.
Keywords: Clinical care, Healthcare, Precede-Proceed, Morbidity, Mortality, Insurance, Physicians, Primary care, Behaviors, Environment, and Health
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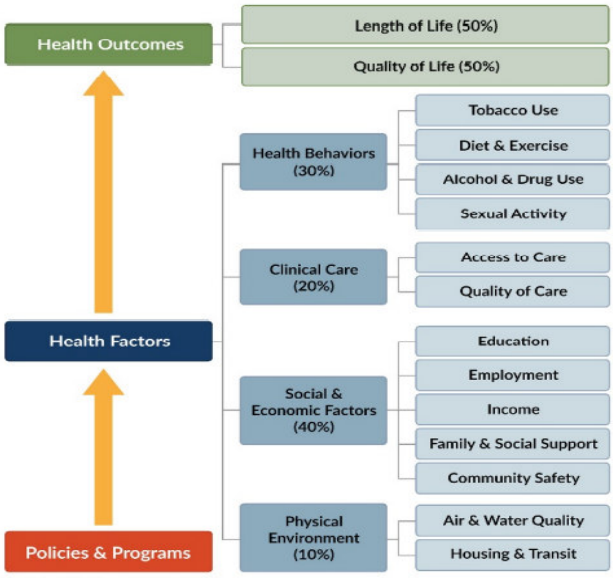
INTRODUCTION

Health outcomes and disparities have become critical concerns to policymakers in the State of Louisiana. According to the Country Rankings (2020), the state of Louisiana lags behind other states in health outcomes and specifically, health-related quality of life (i.e. morbidity), and mortality (i.e. length of life). The Health Rankings help policymakers to understand what influences the citizens health and how long and well the citizens have lived over the years (County Rankings, 2020). The Rankings are unique in their ability to provide measures of the current overall health of each county in all 50 states (County Rankings, 2020). They also looked at a variety of measures that affect the future health of communities, such as high school graduation rates, access to healthy foods, rates of smoking, children in poverty, and teen births (see Figure 1 for more details). For the past 10 years, both rural and urban communities have used the Rankings to garner support for local health improvement initiatives by engaging government agencies, health care providers, community organizations, business leaders, policymakers, and the general public (see Figure 1 for more details).

Figure 1: County Health Ranking Model



(Source: Country Rankings, 2020)

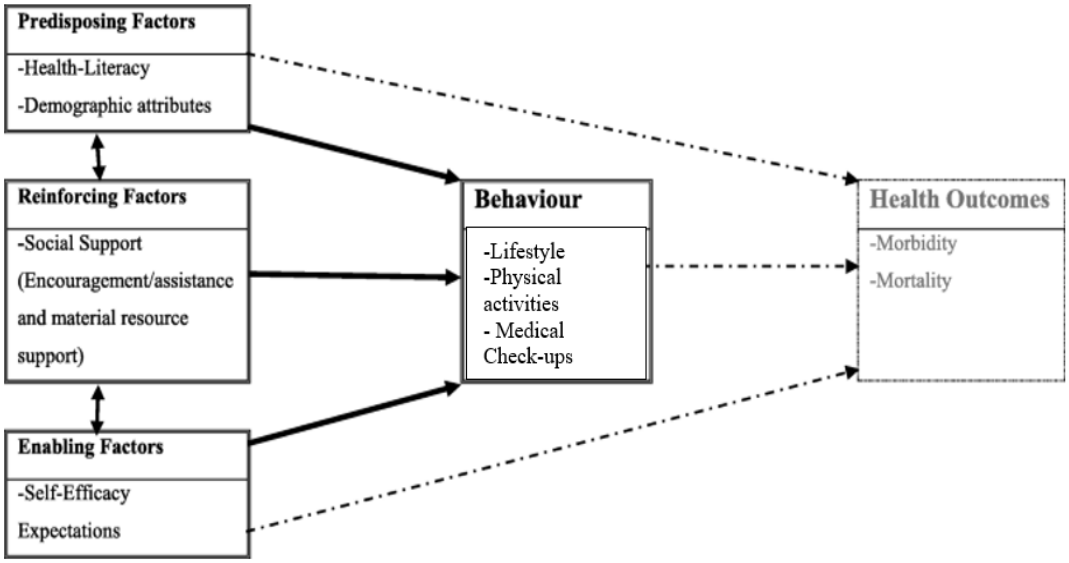
The county ranking model has empirically led to an increasing awareness that growing health and achieving health equity would necessitate more comprehensive methods that will help minimize the social, economic, and environmental impact on health outcome, such as mortality, length of life, quality of life, and morbidity (County Rankings, 2020). As a result, a widely used model in public health for bringing change in health behaviors to influence health outcome is Precede-Proceed model (see Figure 2 for more details). The PRECEDE-PROCEED, as can be inferred from its name, was developed in two stages. The "PRECEDE" framework was first developed and introduced in the 1970s by Green and colleagues, (Green, 1974; Green & Kreuter, 2005; Gielen, McDonald, Gary, & Bone, 2008; Freire & Runyan, 2006; Glanz & Rimer, 2005; Green, Kreuter, Deeds, & Partridge, 1980). In 1991, "PROCEED" was added to the framework in consideration of the growing recognition of the expansion of health education to encompass policy, regulatory and related ecological-cum-environmental factors in determining the relationship between utilization of healthcare and health behaviors (Green & Kreuter, 2005; Gielen et al., 2008; Glanz & Rimer, 2005; Green & Kreuter, 1991).

The PRECEDE–PROCEED model is a cost–benefit evaluation framework that can help health program planners as well as policymakers and other evaluators to analyze situations and design health programs efficiently (Green, 1974). It provides a comprehensive structure for assessing health and the quality of life needs, and for designing, implementing and evaluating health promotion and other public health programs to meet those needs (Green & Kreuter, 2005; Gielen et al., 2008; Freire & Runyan, 2006). Meanwhile, one singular purpose and guiding principle of the PRECEDE–PROCEED model is to direct initial attention to health outcomes, rather than health inputs. It guides planners through a process, which starts with desired outcomes and then works backwards in the causal chain to identify a mix of strategies for achieving those objectives (Glanz & Rimer, 2005). A fundamental assumption of the model is the active participation of its intended audience, thus ensuring that the participants (or "consumers") will take an active part in defining their own problems as well as establishing their goals and, in the final analysis, in developing their solutions (Paradis et al., 1995).

In the foregoing framework, health behavior is regarded as being influenced by both individual and environmental factors, and hence it has two distinct parts. The first part is an "educational diagnosis" – PRECEDE, an acronym for **P**redisposing, **R**einforcing and **E**nabling **C**onstructs in **E**ducational **D**iagnosis, and **E**valuation. The second part is an "ecological diagnosis" – PROCEED, for Policy, **R**egulatory, and **O**rganizational **C**onstructs in **E**ducational and **E**nvironmental **D**evelopment (Green & Kreuter, 2005; Gielen et al., 2008; Glanz & Rimer, 2005). The model is multidimensional, and it is founded in the social-cum-behavioral sciences, epidemiology, administration, and education. Meanwhile, two conceptual models of the PRECEDE-PROCEED framework are illustrated below. The PRECEDE–PROCEED planning model also consists of four planning phases, one implementation phase, and 3 evaluation phases (Green & Kreuter, 2005; Gielen et al., 2008; Glanz & Rimer, 2005). Therefore, this study tends to finds answers to the research question: are there some significant factors from the precede-proceed framework that could be used to explain the variation in the health outcomes among the residents of Louisiana by following the implementation of the Affordable Care Act (ACA) between 2011 and 2021? This is directed to Louisiana because according to the literature, the United States in general, some states including Louisiana, has been underinvesting in social services such as housing, income supplements and unemployment coverage (Bradley, Elkins, Herrin & Elbel,

2011) to promote good health among its citizens.

Figure 2: PRECEDE-PROCEED Theoretical Framework for Explaining Mortality & Morbidity Health Outcome among Louisiana Population



Source: (Green & Kreuter, 2005; Gielen et al., 2008; Glanz & Rimer, 2005).

Even though, the United States is among the world's top richest countries in terms of Gross Domestic Product (GDP) per capita, yet the nation has recorded some significant health disparities among its population due to social, economic, and environmental factors, for which COVID-19 exacerbated the situation (Country Rankings, 2020; Woodruff, 2021). As stated earlier, among the 50 states, the state of Louisiana falls behind other states in health outcomes and especially, when it comes to health outcomes such as morbidity, mortality, quality of life, and length of life (Country Rankings, 2020; Woodruff, 2021). In addition, over the past decades, the state has been ranked low compared to other states in the U.S. According to the U.S. News and World Report (2021), Louisiana has been ranked 46 in health care, 48 in education, 47 in economy, 50 in crime and corrections, 47 in infrastructure, 47 in employment, 50 in pollution, and 49 in natural environment. In terms of socioeconomic factors, Louisiana spent $2,621 per capita on health care for its residents in 2018 (Brymes, 2021). All the aforementioned factors could be attributed to the explanation of the high health disparity, and variation in health outcome that has been exacerbated by COVID-19 (Brymes, 2021), but little is known in the literature on how social, economic, clinical care, physical environment, and health behavior influences the Louisiana's health outcome. Therefore, this study is designed to fill-in the literature gap by testing the Precede-Proceed framework to inform public health policy across the state of Louisiana.

LITERATURE REVIEW

History of the Patient Protection and Affordable Care Act (Obamacare)

The Patient Protection and Affordable Care Act (often styled as Obamacare, and otherwise also referred to as the Affordable Care Act (ACA), or simply as "federal health reform," was heralded and signed into law by President Barack Obama on March 23, 2010. In essence, it was a landmark piece of legislation of the Obama Administration and, according to Gruber (2011), "the most comprehensive reform of the U.S. medical system in at least 45 years".

Furthermore, Gruber (2011) did underscore the fact that the core of the ACA is a "three-legged stool," i.e. three fundamental provisions, designed to fix the broken non-employer insurance market in the United States and to expand health insurance coverage as a result. Prior to the implementation of the ACA, the small group and individual markets (whereby most small businesses and individuals without coverage through an employer purchased health insurance) were characterized by expensive and low-quality health plans that provided little coverage at a very high cost. The ACA included several mechanisms, three of which are described as "three-legged stool" to address this issue, including: 1) requirements that everyone buy health insurance (i.e., individual mandate, minimum essential coverage); 2) rules that prevent insurers from denying coverage or raising premiums based on preexisting conditions (guaranteed issue); and 3) subsidies to make health insurance affordable (i.e., advanced premium tax credits, cost sharing reductions) (Hardy, 2020).

Overall, the key federal provisions in the ACA are intended to 1) expand access to insurance coverage, 2) increase consumer insurance protections, 3) emphasize prevention and wellness, 4) improve health quality and

system performance, 5) promote health workforce development, and 6) curb rising health care costs (Hardy, 2020). Gruber (2011), in a memorandum in August 2010, argued that the individual mandate was essential to balancing out the market failures that would otherwise result from requiring insurance companies to charge "analogous prices to people whether they were sick or healthy" (Hardy, 2020, p.1). Without any sort of mechanism that would require individuals to maintain health coverage, Gruber (2011) reasoned, that many healthy individuals would be less motivated to obtain coverage because their individual medical costs in a given year were likely much lower than the premium payments associated with a marketplace plan (Hardy, 2020). On the other hand, a lot of sicker individuals with higher medical costs, would make up a disproportionate share of the marketplace and, as a result, driving up the costs of plans and potentially driving more individuals, and plans, out of the market (Williams, Lopez et al., 2017; Hardy, 2020). The individual mandate, one leg of the "three-legged stool," was necessary to maintain the functionality of the Obamacare. In practice, according to Hardy (2020), the individual mandate has had the unintended consequence of making the entire law more vulnerable by signaling that repealing or striking it down would make the entire law inviable. In essence, critics of the ACA merely needed to kick out one "leg" to make the entire "stool" collapse (Hardy, 2020).

Under the ACA, various States have numerous roles and responsibilities to play, which include implementing new health insurance requirements to expanding their Medicaid programs. As it turned out, it became obvious that, in fact, too many American were either uninsured or underinsured. Furthermore, U.S. healthcare spending was high and unsustainable, and private insurance coverage was expensive, thereby driving up copays, and resulting in reduced benefits. According to the American College of Physicians (ACP), the Patient Protection and Affordable Care Act of 2010 (ACA) led to historic reductions in the number of uninsured persons, yet nearly 30 million remain uninsured, millions more are underinsured. African Americans and other minority category groups accounted for a disproportionate share of the uninsured and underinsured.

However, in a study carried out by Buchmueller et al. (2016), on how health insurance coverage changed for White, Black, and Hispanic adults after the Affordable Care Act (ACA) came into effect, they concluded that in "2013, 40.5% of Hispanics and 25.8% of Blacks were uninsured, compared with 14.8% of Whites. After the main ACA provisions went into effect in 2014, coverage disparities declined slightly as the percentage of adults who were uninsured decreased by 7.1 percentage points for Hispanics, 5.1 percentage points for Blacks, and 3 percentage points for Whites. Coverage gains were greater in states that expanded Medicaid programs. Based on the results, they concluded that "the ACA has reduced racial/ethnic disparities in coverage, although substantial disparities remain. Further increases in coverage will require Medicaid expansion by more states and improved program take-up in states that have already done so" (Buchmueller et al., 2016, p.1416).

Then followed a legal parlance: In NFIB v. Sebelius, the U.S. Supreme Court reviewed, and upheld, the constitutionality of the individual mandate and Medicaid expansion, but did not address the question as whether or not it was severable from the rest of the law. Instead, the Affordable Care (or Obamacare legislation) faced onslaughts, as Republican-controlled Congress attempted to repeal the ACA several times in the years immediately following the Supreme Court's decision in NFIB v. Sebelius. The republican-controlled Congress was unrelenting in trying to repeal the ACA, even though it lacked the votes to overcome then-President Obama's anticipated veto (Buchmueller et al, 2016). The dynamic changed after Trump was elected president in 2016. Congress unsuccessfully made several attempts to repeal the ACA during the first year of the Trump Administration. In a last-ditch effort after failing to repeal the ACA, the Republican-controlled Congress included a provision in the Tax Cuts and Jobs Act (TCJA) in 2017 to reduce the individual tax penalty to zero dollars beginning with 2019 calendar year.

In Texas v. Azar, a case brought by Texas and several other interested and like-minded States, a federal district court judge ruled and boldly struck down the entirety of the ACA in December of 2018. However, California, an alliance of Democratic States, and the House of Representatives appealed the case to the Supreme Court. Until the Supreme Court ruled, the individual mandate still exists in law, and the ACA remained a law of the land (Mangan, 2022; Hardy, 2020).

Social and Economic Factors and Health Outcome

Indeed, it is an undeniable fact that life expectancy at birth has increased and mortality rates have dropped in recent decades among Louisiana residents. Yet, the socioeconomic gaps, in health outcomes, have persisted over a very long time which sometimes traced back to the period of slavery. In previous research, social gradients in health have been extensively documented, with those from lower social classes having poorer health (i.e., high morbidity), a higher chance of sickness, and a shorter life expectancy or are more likely to die (i.e. mortality) (Mackenbach et al., 2008; Eikemo et al., 2008; Bor et al., 2017; Hu et al., 2016).

In the United States, for example, there is high growing disparities in socio-economic class, which has trickle-down effect on health outcome. It was not surprising that the COVID-19 pandemic brought to the notice of the policymakers the high incidence of health disparities among Louisiana's residents resulting from socioeconomic gap in that it has existed for many years (Mackenbach et al., 2008; Eikemo et al., 2008; Bor et al.,

2017; Hu et al., 2016). Although the link between social class and health has been extensively established, the mechanisms, by which social class affects health distribution, remain unknown. As a result, Zhang & Xiang (2019) came up with a study to examine the role of social networking time in the income-health link. The statistical analysis was based on a countrywide sample from the General Social Survey of the United States. The Atlanta-based Centers for Disease Control and Prevention's Healthy Days Measures are used to assess health-related quality of life in the general population. The number of social evenings, spent with neighbours, is used to calculate social networking time. The inflation-adjusted household income of individuals is used to calculate their earnings. Meanwhile, multiple linear regressions were used to calculate the connections between income and health-related quality of life, and the mediation effects of social networking time are further investigated using the Sobel test with bootstrapping. The study confirmed that lower-income individuals spend more time socializing with their neighbours than higher-income individuals. Income was also found to be linked to a better quality of life in terms of health. Subsequently, respondents, who socialize in their neighbourhoods more frequently, have a worse health-related quality of life in their lives. In mental health components, the income gradient in health-related quality of life is mostly replicated through social networking time. This research confirms the link between income and health-related quality of life, morbidity, and mortality. The findings further suggested that people's network links are influenced by their income, and that social networking time plays a major role in the reproduction of the income gradient in health-related quality of life.

Following China's major socioeconomic transformation, during the 1980s, some people have lost their jobs and their incomes have plummeted. Hence, Zhang et al. (2015) explored a study to see how low poverty affected people's health-related quality of life (HRQOL) in northeast China. From November 2005 to October 2006, 5100 individuals were randomly selected and researched using the 36-item Short-Form Health Survey (SF-36). The population was separated into various categories for investigation based on the monthly per capita income level. Low income, older age, sickness, and unemployment were found to be major factors that could contribute to poor HRQOL in multiple linear regressions. HRQOL scores differed significantly among subgroups of the low-income population, according to covariance analysis. HRQOL scores improved as income levels increased. This research can, therefore, be useful in developing integrated economic and public health policies to improve the health of low-income people.

Furthermore, Rajmil et al. (2013) conducted a study on the socio-economic inequalities in mental health and health-related quality of life in children and adolescents from 11 European countries. The objective of the study was to determine the presence and severity of social inequalities in mental health and health-related quality of life among people aged 8 to 18 in the earmarked European nations. The regression-based relative index of inequalities (RII) and population attributable risk were used to examine the relationship between health outcomes and socioeconomic status. There were 16,210 parent–child pairings in all. The study revealed differences in mental health based on family education level. The study further revealed that the socioeconomic disparities in mental health were identified all over Europe.

Physical Environment and Health Outcome

According to Live Well San Diego (2014), the physical environment refers to the external surroundings and conditions, in which we live, and which influence a person's health. The physical environment comprises all the different factors of nature, which include air as well as trees, natural vegetation, lakes, and the ocean (World Health Organization, 2002). The quality of the community's physical environment greatly impacts the health and well-being of the population. The quality of air and water are important to health; poor air quality can be particularly detrimental to vulnerable populations (Live Well San Diego, 2014; World Health Organization, 2002). So is exposure to decease-causing organisms, to loud noise, and to radiation from the sun and other sources. Negative consequences of air pollution, include: decreased lung function, chronic bronchitis, asthma and other adverse pulmonary effects. Being aware of potential risk in your physical environment, can help a person to protect his or her health. If also, one has daily information about the air's condition and how polluted it might be, can plan outdoor activities accordingly to reduce associated health effects (Live Well San Diego, 2014). Communities can help promote healthy and safe physical environments by: (1) increasing bicycling and walking for transportation and pleasure, (2) establishing community design standards for clean and safe environments, and (3) establishing protocols to assess community health and wellness and other amenities (Live Well San Diego, 2014).

Additionally, the introduction of biological and chemical elements or particulate matter into the atmosphere causes air pollution, a severe environmental health concern that affects everyone. These materials introduced into the environment are harmful or uncomfortable to humans or other living organisms, and they also impair the natural or built environment (Darçın, 2014). Outdoor air pollution exposure accounted for approximately 2% of the global cardiopulmonary disease burden (World Health Organization, 2002). Development and aggravation of conditions such as asthma has been shown to be triggered by various environmental outdoor and indoor environmental exposures (Darçın, 2014). Dust, fungal allergen, smoke, and dampness all contribute to long-term

effects of air pollution (American Lung Association 2008). People's satisfaction, physical health, and use of environmental and urban amenities are influenced by their perceptions of such amenities. The quality of the environment as regards water, noise and air and natural resources are environmental amenities which should be closely monitored (Change et al., 2020).

Several studies have shown that road transportation, oil refineries, and mining contributes significantly to the air quality problem through CO_2 emissions, which have a variety of negative effects on public health and the environment. Jakubiak-Lasocka et al. (2015) investigated the health effects of traffic-related air pollution. Their study evaluated the influence of traffic-related air pollution on the health of Warsaw residents, using the Health Impact Assessment (HIA) method, and to calculate the social cost. Jakubiak-Lasocka et al. (2015) found out in their study that about 827 Warsaw citizens die each year as a result of traffic-related air pollution, 566 and 250 hospital admissions are due to cardiovascular and respiratory diseases, respectively, and more than 128,453 restricted activity days can be attributed to traffic emissions.

Clinical Care and Health Outcome

According to US Legal (n.d.), clinical health service means a single diagnostic, therapeutic, rehabilitative, preventive or palliative procedure or a series of such procedures that may be separately identified for billing and accounting purposes. It mainly focuses on disease prevention, community, and individual education and **wellness.** In fact, when caring for pregnant women during the coronavirus disease 2019 (COVID-19) pandemic, the delivery of clinical and high-quality care is a major concern. As a result, Alaya et al. (2021) investigated the health-related quality of life, morbidity, mortality, and clinical care in pregnant and postnatal women during the 2019 coronavirus pandemic. A prospective cohort study of perinatal women, who are attending a tertiary maternity unit during the pandemic, was conducted. Eighteen women, who tested positive for severe or acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and twenty women, who tested negative for SARS-CoV-2 were recruited. The study found that pregnant women with COVID-19, had a significantly higher burden on their physical health.

Various studies have focused on the competence of nurses in clinical settings over the years, indicating the critical importance placed on ensuring superior competence among such nurses. The nature of this profession's work is both stressful and challenging, which can endanger nurses' health and negatively impact their quality of life. Low quality of life may have an impact on the services that nurses are obligated to provide to their patients.

Additionally, Cruz (2017) also investigated the impact of clinical competence in nurses on health outcome. This study was based on self-reporting datasets in the healthcare facility or clinic. The 'role limitation due to emotional problems' dimension got the highest weighted mean for quality-of-life, while the 'vitality' dimension received the least. A very good competence, in all clinical competence categories, was also reported. 'Managing situation' scored the highest among the clinical competence dimensions, while 'ensuring quality' received the lowest. The number of clinical years of experience, educational level, marital status, 'role limitation due to emotional problems,' 'emotional well-being, "social functioning,' and 'physical functioning' were identified as major elements that have been likely to affect clinical competence.

Education & Health Outcome

Decent education generally affects access to health care because of the inherent economic advantages, the availability of employment opportunities, for example, that it bestows on those, who are educated. Those with education have higher incomes than those, who are uneducated and -- as argued above -- income-provides the means to pay for insurance premiums and therefore get health insurance coverage, and thus create access to healthcare.

On a narrower level, yet very importantly, individuals, who are educated, are better able to understand and evaluate health insurance policies sold privately by health insurance companies or marketplace plans than the uneducated. According to Williams et al (2017), the lack of insurance literacy, such as "understanding terminology beyond premiums, such as deductibles and copayments, and coinsurance," was a significant barrier to insurance coverage, and thus hindered access to healthcare by African Americans in New Orleans.

Underpinning all the foregoing variables and measures of healthcare access, is racism. There is evidence in case studies and the literature that racism affects access to healthcare. In their study, Ortega & Roby (2021) argued that "racism resulted in hospitals refusing to desegregate despite the passage of the Civil Rights Act in 1964 until they were forced under the threat of losing federal funds from the newly -enacted Medicaid and Medicare programs in 1966"... Racism continues to impact access to healthcare post- Obama Care.

Insurance Coverage, & Health Outcome

Although Chen et al (2015), in their study, found that "probabilities of delaying or foregoing any necessary care have been consistently reduced each year since 2011" and the uninsured rate in 2014 (the first year of implementation of the ACA) had been reduced by 7% for African Americans, they are less likely than

Caucasians to have health insurance as well as have a lot more difficulty in getting healthcare, and have fewer choices in where to receive care (Smedley, Stith, & Nelson, 2003), because they are unable to afford to pay the insurance premiums which are perceived and considered as too high, especially by ethnic minority group populations who often are at the low end of the social ladder. In the same study, Chen et al (2015) also found that "African Americans were more likely to have any delayed or forgone care in 2014, compared with other racial and ethnic groups" (p.141).

Krumholz et al. (2021) argued that "even after the Affordable Care Act was implemented, affordability of health care appeared to have not substantially improved from what it was in 1999," (p. 647). This line of argument was echoed by Buchmueller et al. (2016), who in their study concluded that although the rate of uninsured African Americans had decreased by 5.1 percentage points in 2013, "further increases in coverage will require Medicaid expansion by more states," such as Louisiana State (p.1416).

According to Waidmann (2000), "insurance coverage and the existence of a usual source of care are both important for timely access to care". (p. 57). Care, received through an emergency room is, by definition, non-routine and, therefore, individuals who do not have a usual source of care and those whose usual source of care is a hospital emergency room, are considered uninsured and not having a usual source of care (Krumholz et al., 2021). This is an indication that such individuals lack access to healthcare.

Although the ACA provided for the expansion of Medicaid, it was optional for the States to do so. Louisiana, for example, failed to take advantage of expanding the Medicaid program, not until July 2016. This was a public health policy failure, which according to Williams et al. (2017), "created not only a gap in coverage but also confusion for some people about whether health insurance was available to them" (p. 7). The gap in coverage found in the study corroborates a similar finding by Buchmueller et al. (2016) when they noted that "the percentage of Blacks without insurance decreased by 5.6 percentage points in expansion states and by 4 percentage points in non-expansion states" (p.1418). Louisiana was one of the states that failed to expand Medicaid.

Earnings/Wealth, Access to Healthcare, & Health Outcome

Income (or earnings) refers to a stream of monetary values over a period of time. Wealth, on the other hand, is a much broader concept, it encompasses the accumulated assets of an individual (or family, or household), which includes home ownership, investments, in stocks for example, and retirement savings (Howard, Shegog, McNair, & Lowery, 2019; Chokshi, 2018). Income and wealth affect health outcomes in various ways; individuals and families with high income and wealth are able to invest in activities that promote health and wellbeing (Howard et al., 2019).

Whilst the relationship between income and access to healthcare appears obvious, because, for example, individuals with high income are able to buy health insurance or allocate more of their discretionary income to purchase healthy, nutritious food, etc., that in the end ensures good health, the relationship between access to healthcare and wealth is not so obvious or well understood (Howard et al., 2019). Nevertheless, an obvious relationship exists between infant mortality and children's health and family income, as well as to an individual or family wealth (Pollack et al., 2013).

Household Incomes, Access to Healthcare, & Health Outcome

Generally, households with high incomes are able to afford access to healthcare because they are able to buy health insurance (Aliferis et al., 2019; Howard et al., 2019). Those with low incomes are often not able to buy health insurance. In addition, "a lack of education, complications with health insurance, and a distrust of care providers," have been identified in the review of literature as the key barriers for families with low incomes to accessing healthcare in the U.S. (Lazar & Davenport, 2018, p. 28).

"The likelihood of having health insurance is related to income" (Rushefsky, 2013, (p. 299).) This conclusion is supported by data published in 2010 by the U.S. Census Bureau which, inter alia, stated that one-quarter of households with income under $25,000 were uninsured compared with 21.8 percent of those with incomes between $25,000 and $49,999; and for those with incomes over $75,000 a year, the uninsured rate was 8 percent (Rushefsky, 2013).

A California study by Hamel et al. (2019), concluded that low-income families are also more likely than other residents to report nonfinancial barriers, such as long wait times to get an appointment, to accessing health care.

Vilhjalmsson (2020), in a study on equity of access to healthcare in Iceland, based on a national panel survey of Icelandic, adults, aged 18–75, examined the effects of family income on insufficient care for medical services. The study found that individuals, with lower family incomes, were more likely to delay or cancel a needed physician visit and underutilize medical care compared to their higher-income counterparts. The study concluded that "poorer access to needed medical care among lower-income individuals was explained by high relative out-of-pocket costs, overall financial strain and negative medical-care experiences" (p. 875).

Meanwhile, some of the consequences for low-income households not being able to access healthcare is that a family member can have a delayed or forego medical treatment (Hamel et al., 2019), or would be unable to get the needed prescription medicines because they could not afford them (Krumholz et al., 2021).

METHODOLOGY

This study is purely quantitative in nature. The study utilizes the correlational research design. The selection of this design is premised on the fact that the researcher seeks to investigate probable determinants of health outcome and also control for both lack of access to healthcare and access to primary care physician based on the PRECEDE-PROCEED theoretical framework for measuring a parish's health outcome to inform public health policy. This study utilized a secondary source of data on Louisiana Parishes' health rankings for the years between 2011 and 2021 provided by the United States Department of Health and Human Services (US DHHS) in conjunction with the Center for Disease Control and Prevention (CDC), and the National Center for Health Statistics (HCHS).

Two health outcome variables are identified in the dataset, namely, mortality, and morbidity, which are otherwise referred to as the dependent variables in this study. The Independent Variables used in this study includes the following: physical environment, social and economic factors, clinical care, and health behavors. Data collected on each independent variable were analyzed to determine how each, and collectively, affects the two identified health outcomes among Louisiana's residents in the 10-years period from 2011 to 2021.

The model estimation is of the form:

The model estimate follows the general form as: **Y=f(X),** such that Y is a measure of each health outcome due to the combined effect of all of the covariates (independent variables and control variables) known to be related to Louisiana's health outcome. Because two health outcomes are identified, therefore, two regression equations are also stated and estimated. Therefore, the general and specific models for both mortality and morbidity can be stated as:

General Model for Mortality: $\mathbf{Y_1 = f(PHE, SEF, CLC, HB, UNI, PCP)}$……..[Eqn.1]

Specific Model: $\mathbf{Y_1 = \alpha_0 + \alpha_1\ PHE + \alpha_2\ SEF + \alpha_3\ CLC + \alpha_4\ HB + \alpha_5\ UNI + \alpha_6\ PCP + U_t}$

General Model for Morbidity: $\mathbf{Y_2 = f(PHE, SEF, CLC, HB, UNI, PCP)}$……..[Eqn. 2]

Specific Model: $\mathbf{Y_2 = \alpha_0 + \alpha_1\ PHE + \alpha_2\ SEF + \alpha_3\ CLC + \alpha_4\ HB + \alpha_5\ UNI + \alpha_6\ PCP + U_t}$

Where,

Dependent Variables: Health Outcomes

- Y_1 = Mortality; and Y_2 = Morbidity;

Independent Variables: Lack of Healthcare Access

- PHE=Physical Environment
- SEF=Social and Economic Factors
- CLC= Clinical care
- HB= Health Behavior

Control Variables

- UNI=Uninsured Adults (or lack of access to health insurance)
- PCP=Lack of Access to Primary Care Physicians
- α_0= constant term
- U_t = Error term.
- $\alpha_1, \alpha_2, \ldots\ldots\ldots\ldots \alpha_6$= Coefficients of the explanatory variables (i.e. both independent and control variables)

RESULTS AND ANALYSIS

Table 1: Summary Statistics of the Study Variables

Summary Statistics	Mean	Median	Standard Deviation	Range	Minimum Value	Maximum Value	Count
Mortality	0.0002	-0.0274	0.4952	3	-1.5	1.5	640
Morbidity	-0.0018	-0.0046	0.3809	2.4661	-1.0392	1.4268	640
Health Behaviors	-0.0010	0.0072	0.1589	1.0154	-0.4739	0.5414	640
Clinical Care	-0.0009	0.0049	0.1211	0.6038	-0.2789	0.3248	640
Social & Economic Factors	-0.0019	-0.0036	0.2560	1.4910	-0.6168	0.8742	640
Physical Environment	0.0003	-0.0010	0.0450	0.2871	-0.1329	0.1542	640
Uninsured adults	19.2162	18.2916	7.8098	33.6502	6.5498	40.2	640
% of Access to Primary care physicians*	50.6648	42.7434	34.3784	178.9291	0	178.9291	640

Source: Data Output from Microsoft Excel

Table 1 shows the summary statistics for all the study variables. In all, 640 observations (64 parishes multiplied by 10 years period) were used for the analysis of the entire study. The summary statistics takes into account the following analysis— mean, median, standard deviation, and range. For the case of Mortality, the average mortality rate between 2011 and 2021 in Louisiana was 0.0002, where the median was given as -0.0274, the standard deviation was 0.4952, and the range was 3.0, the highest level of mortality for Louisiana within this period was 1.50 while the lowest was -1.5 and the difference between them was 3.0. While, with respect to morbidity, the average rate between 2011 and 2021 in Louisiana stood at -0.0018, where the median was given as -0.0046, the standard deviation was 0.3809, and the range was 2.4661, the highest level of morbidity for Louisiana within this period was 1.4268 while the lowest was -1.0392 and the difference between them was 2.4661.

Independent Variables

For the case of health behavior, Table 1 reveals that the mean for health behavior was -0.0010, while the median was 0.0072, the measure of dispersion of the data set as related to the mean was given as 0.1589. The minimum value was -0.4739 and the maximum value was 0.5414 with the range of 1.0154. In relation to clinical care, Table 1 reveals that the mean value for clinical care between the period of 2011 to 2021 in the state of Louisiana was -0.0009, the median was 0.0049, the measure of dispersion as related to the mean was given as 0.1211. The difference between the minimum and the maximum (range) was 0.6038, with a minimum value of -0.2789 and a maximum value of 0.3248.

Table 1, for example, further presents the summary statistics for social & economic factors. Table 5.1 reveals that the average value for social & economic factor for the period of 2011 through 2021 was -0.0019 while the median was -0.0036, the standard deviation was given as 0.2560. The difference between the minimum value of -0.6168 and the maximum value of 0.8742 represent a range value of 1.4910. While for the case of physical environment, Table 1 reveals that the mean value for physical environment for the period under review (2011-2021) was estimated as -0.0003. Standard deviation was 0.045 while the median value was -0.0010. The difference between the minimum value of -0.1329 and the maximum value of 0.1542 represent a range value of 0.2871.

Control Variables

For the case of lack of access to health insurance, the average percentage of uninsured adults in Louisiana between 2011 and 2021 was pegged at 19.2162, where the median was given as 18.2916, the standard deviation was 7.8098, and the range was 33.6502, the highest level of the percentage of uninsured adults for Louisiana within this period was 40.2 while the lowest was 6.5498 and the difference between them was 33.6502 (see Table 1 for more details). While, with respect to access to primary care physicians, the average percentage of access to primary care physicians between 2011 and 2021 in Louisiana was 50.6648, where the median was given as 42.7434, the standard deviation was 34.3784, and the range was 178.9291, the highest percentage of access to primary care physicians for Louisiana within this period was 178.9291 while the lowest was 0 and the difference between them was 178.9291 (see Table 1 for more details).

Table 2: Correlation Analysis between Morbidity and All the Other Independent Variables

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Morbidity	1						
2. Health Behaviors	0.714	1					
3. Clinical Care	0.403	0.577	1				
4. Social & Economic Factors	0.760	0.670	0.460	1			
5. Physical Environment	0.506	0.016	-0.151	0.136	1		
6. Uninsured adults	0.606	0.050	0.102	-0.002	-0.056	1	
7. % of Access to Primary care physicians*	-0.667	-0.219	-0.417	-0.053	0.042	0.010	1

Source: Data Output from Microsoft Excel

Table 2 presents the correlation analysis between morbidity and all the control and independent variables, which include: percentage of uninsured population or adults, access to primary care physician, physical environment, social & economic factors, clinical care, and health behaviors. Table 2 reveals that health behaviors, and social & economic factors have strong positive correlation with Louisiana's morbidity rates, with a Pearson correlation coefficient value of 0.714 for health behaviors, and 0.760 for social & economic factors.

Table 2 further reveals that the lack of access to health insurance variable has a positive moderate relationship or correlation with Louisiana's mortality rate, with a Pearson correlation coefficient value of 0.606, while the access to primary care physician variable has either negative moderate relationship or correlation with Louisiana's morbidity rate, with a Pearson correlation coefficient value of -0.667. Table 2 reveals also that both physical environments has moderate positive correlation with Louisiana's morbidity rates, with a Pearson correlation coefficient value of 0.506 for physical environment. Above all, the remaining variable that is, clinical care has either a weak positive relationship or correlation with Louisiana's morbidity rate.

Table 3: Correlation Analysis between Mortality and All the Other Independent Variables

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Mortality	1						
2. Health Behaviors	0.612	1					
3. Clinical Care	0.218	0.577	1				
4. Social & Economic Factors	0.749	0.670	0.460	1			
5. Physical Environment	0.063	0.016	-0.150	0.137	1		
6. Uninsured adults	0.517	0.051	0.103	-0.001	-0.057	1	
7. % of Access to Primary care physicians*	-0.554	-0.219	-0.417	-0.053	0.042	0.010	1

Source: Data Output from Microsoft Excel

Table 3 presents the correlation analysis between mortality and all the control and independent variables, which include: percentage of uninsured population or adult, access to primary care physician, physical environment, social & economic factors, clinical care, and health behaviors. Table 3 confirms that health behaviors, and social & economic factors have strong positive correlation with Louisiana's mortality rates, with a Pearson correlation coefficient value of 0.612 for health behaviors, and 0.749 for social & economic factors.

Table 3 further reveals that the lack of access to health insurance variable has a positive moderate relationship or correlation with Louisiana's mortality rate, with a Pearson correlation coefficient value of 0.517, while the access to primary care physician variable has negative moderate relationship or correlation with Louisiana's mortality rate, with a Pearson correlation coefficient value of -0.554. The remaining variables which includes—physical environment, and clinical care have a weak positive relationship or correlation with Louisiana's mortality rate.

Regression Output for Mortality & Morbidity Equations

Table 4: Predicting the Determinants of Louisiana's Mortality Rate & Morbidity

Variables	Mortality Model		Morbidity Model	
	B	Beta	B	Beta
Health Behaviors	0.597*** (0.120)	0.345	0.587*** (0.082)	0.341
Clinical Care	-0.026 (0.145)	-0.013	-0.070 (0.099)	-0.022
Social & Economic Factors	1.177*** (0.071)	0.727	0.714*** (0.048)	0.479
Physical Environment	-0.235 (0.002)	0.019	1.106*** (0.201)	0.631
Percentage of Uninsured Population or Adult	0.402** (0.112)	0.313	0.410** (0.182)	0.325
Access to Primary Care Physician	-0.426** (0.184)	0.331	-0.602 (0.231)	-0.499
Constant	0.061 (0.146)		0.043 (0.106)	
F-statistics	88.654***		129.424***	
R^2	0.578		0.665	
Adjusted R^2	0.571		0.659	

Source: Data Output from SPSS

Table 4 reveals R-square value of 0.578, and adjusted R-square value of 0.571 for morbidity model. The R-square value of 0.578 implies that about 58% variations in the Louisiana's mortality rate could be explained by the following variables: Percentage of Uninsured Population or Adult, Access to Primary Care Physician, Physical Environment, Social & Economic Factors, Clinical Care, and Health Behaviors. Also, Table 4 reveals R-square value of 0.665, and adjusted R-square value of 0.669 for mortality model. The R-square value of 0.665 implies that about 67% variations in the Louisiana's mortality rate could be explained by the following variables: Percentage of Uninsured Population or Adult, Access to Primary Care Physician, Physical Environment, Social & Economic Factors, Clinical Care, and Health Behaviors.

Determinants of Louisiana's Mortality

Table 4 further shows the various coefficients for both the control variables and the independent variables estimated in the mortality rate model. Table 4 reveals that the following control and independent variables are statistically significant at 5% (0.05) significance level: Health Behaviors, Social & Economic Factors, Percentage of Uninsured Population or Adult, and, Access to Primary Care Physician. For the case of Health behavior, Table 4 offers positive, significant coefficient value of 0.597 with an associated p-value of 0.0000. This implies that for every 1% increase in bad health behaviors such as smoking lifestyle, drinking behavior, then Louisiana's mortality rate is likely to increase by 0.597. This finding is consistent with a study conducted by Stranberg et al. (2018). The co-authors have argued in the literature that smokers never have a top health rating and a lower morbidity (or high quality of life) and/or low mortality (high length of life) compared to non-smokers. This agrees with the findings from this work, which showed that for every increase in health behavior (alcohol and drug use, tobacco use, sexual activity and diet and exercise), quality of life deteriorates (morbidity increases) and length of life decreases (mortality rate increases).

For the case of social and economic factors, Table 4 reveals positive significant coefficient value of 1.177 with an associated p-value of 0.0000. This implies that for every 1% increase in the social and economic gap among the Louisiana's population such as low education, low employment, low income, etc. among the minority or people of color, then Louisiana's mortality rate is likely to increase by 1.177. The finding from this study is consistent with previous research. In previous research, social gradients in health have been extensively documented, with those from lower social classes having poorer health (i.e. high morbidity), a higher chance of sickness, and a shorter life expectancy or are more likely to die (i.e. mortality) (Mackenbach et al., 2008; Eikemo et al., 2008; Bor et al., 2017; Hu et al., 2016).

Also, in the case of lack of access to health insurance, Table 4 reveals positive significant coefficient value of 0.402 with an associated p-value of 0.000. This implies that for every 1% increase in the percentage of uninsured adults among the Louisiana population, the Louisiana's mortality rate is likely to increase by 0.402. This finding is consistent with the study conducted by the Institute of Medicine (2002). The Institute of Medicine research findings led to the conclusion that providing health insurance coverage to uninsured adults would likely improve their health status and reduce their risk of premature death. Above all, For the case of access to primary

care physician, Table 4 reveals a negative significant coefficient value of -0.426 with an associated p-value of 0.040. This implies that for every 1% increase in the access to primary care physician among the Louisiana population, the Louisiana's mortality rate is likely to decrease by -0.426.

Determinants of Louisiana's Morbidity

Table 4 further shows the various coefficients for both the control variables and the independent variables, which are estimated in morbidity rate model. Table 4 reveals that the following control and independent variables are statistically significant at 5% (0.05) significance level: Health Behaviors, Social & Economic Factors, Physical Environment, Percentage of Uninsured Population or Adults, and Access to Primary Care Physician.

For the case of Health behaviors, Table 4 reveals positive significant coefficient value of 0.587 with an associated p-value of 0.0000. This implies that for every 1% increase in bad health behaviors such as smoking lifestyle, drinking behavior, then Louisiana's morbidity rate is likely to increase by 0.587. This finding is consistent with a study conducted by Stranberg et al. (2018). The co-authors argued in the literature that smokers never have a top health rating and a lower morbidity (or high quality of life) and/or low mortality (high length of life) compared to non-smokers. This agrees with the findings from this work that showed that for every increase in health behavior (alcohol and drug use, tobacco use, sexual activity and diet and exercise), quality of life deteriorates (morbidity increases) and length of life decreases (mortality rate increases).

For the case of social and economic factors, Table 4 does confirm positive significant coefficient value of 0.714 with an associated p-value of 0.0000. This implies that – for every 1% increase in the social and economic gap among the Louisiana's population such as low education, low employment, low income, etc. among the minority or people of color—Louisiana's morbidity rate is likely to increase by 0.714. The finding from this study is consistent with previous research, whereby previous research and social gradients in health have been extensively documented, with those from lower social classes having poorer health (i.e. high morbidity), a higher chance of sickness, and a shorter life expectancy or are more likely to die (i.e. mortality) (Mackenbach et al., 2008; Eikemo et al., 2008; Bor et al., 2017; Hu et al., 2016).

For the case of physical environment, Table 4 demonstrates positive significant coefficient value of 1.106 with an associated p-value of 0.0000. This implies that for every 1% increase in the pollution of the physical environment (such as air, natural vegetation, lakes, and the ocean, etc.) of the state of Louisiana, then Louisiana's morbidity rate is likely to increase by 1.106. This finding is consistent with a study conducted by Darçın (2014). Darçın argued that the introduction of biological and chemical elements or particulate matter into the atmosphere causes air pollution, a severe environmental health concern that affects everyone. These materials introduced into the environment are harmful or uncomfortable to humans or other living organisms, and they also impair the natural or built environment (Darçın, 2014).

For the case of lack of access to health insurance, Table 4 reveals positive significant coefficient value of 0.410 with an associated p-value of 0.030. This implies that for every 1% increase in the percentage of uninsured adults among the Louisiana population, the Louisiana's morbidity rate is likely to increase by 0.410. This finding is consistent with the study conducted by the Institute of Medicine (2002). The Institute of Medicine research findings led to the conclusion that providing health insurance coverage to uninsured adults would likely improve their health status and reduce their risk of premature death.

CONCLUSION AND POLICY RECOMMENDATIONS

As already noted earlier in the introduction, the PRECEDE-PROCEED framework is essentially a planning model, especially designed for health programs. However, it contains a mechanism for process evaluation, impact evaluation, and outcome evaluation, which are the linkages to the findings of the study.

The outcome of the predisposing, enabling, and reinforcing variables/factors in the study variables enable the researcher to explain the relationship between the findings and the Framework. The findings of the study confirm the existence of two health outcomes, namely the length of life (mortality rate), and quality of life (morbidity rate), which are akin to the desired outcomes of a PRECEDE-PROCEED Model health program or study, that is, the outcome evaluation phase. The mortality rate and morbidity rate among Louisiana's residents due to lack of healthcare access following the implementation of the ACA from 2011 to 2022 are determined by predisposing, enabling and reinforcing factors (the process evaluation phase of the model). Statistical analysis of the predisposing factors of bad health behaviors, social & economic factors, and pollution of the physical environment reveals they, individually and collectively, have significant effect on the mortality and morbidity rates among Louisiana's residents following the implementation of the ACA from 2011 to 2021.

Subsequently, the statistical analysis of the enabling factors, namely, uninsured adults among the population (i.e. lack of access to health insurance), access to primary care physician (a decrease in both mortality and morbidity rates), also have significant increased effect on mortality, and morbidity rates among Louisiana's residents during the decade covered in the study. Towards this end, the study recommends the following policies:

- Intensifying existing health promotion, and education programs to reach many in order to create the

awareness of the health behavioral choices such as smoking, drinking, lack of exercise, etc. consequences on their health outcome. This initiative will enable the citizens to be aware of some of their lifestyles and their effect on their health. By doing so will enable the mortality rate and the morbidity rate in the state of Louisiana to go down.

- Government and policy makers should enforce all existing laws and policies toward protecting quality physical environment for air, natural resources, and the water bodies—rivers, oceans, etc. to save the lives of the people. All regulations on pollution should be intensified.
- Creation of more infrastructure that will bridge the social & economic gap in the State of Louisiana. It was observed from findings that both mortality and morbidity are influenced positively by the social and economic gap that has created health disparities among the Louisiana's residents. Therefore, it is expected that the government, and the political leaders should put in place infrastructure that will improve the quality-of-life of residents of Louisiana via empowerment through investment in job creation, promoting diversity and inclusion at workplace environment, etc. Above all, enforcing policies, and laws that are aimed at ensuring all citizens to have at least high school certificates will go a long way to minimizing the social and economic gap among the Louisiana's residents.

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