Analyzing the Factors Influencing Mortality in Saudi Arabia

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ABSTRACT

Background: Non-communicable diseases (NCDs) are a leading cause of death worldwide, and their prevalence is increasing in Saudi Arabia due to unhealthy lifestyles and longer life expectancy. This research aims toinvestigate the primary causes of mortality in Saudi Arabia and develop healthcare management strategies to improve mortality outcomes, reduce preventable deaths, and enhance the delivery of healthcare services.

Method: The analysis of death rates and non-communicable diseases in Saudi Arabia from 2017 to 2021 relies on secondary quantitative data obtained from local statistics provided by GASTAT and WHO. The study encompasses the complete population of Saudi Arabia, and statistical analysis is conducted using IBM SPSS Statistics version 27 and Microsoft Excel.

Results: Upon analyzing death rates in Saudi Arabia over a span of five years, it becomes evident that non-communicable diseases are the main factors responsible for the rise in mortality. Differences in death rates are noted between adult females and men, with standard deviations (SD) of 3.69 for females and 3.53 for males. Ischemic Heart Disease exhibits a greater average death rate in males (133.25) than in females (87.84), followed by Stroke, Neoplasms, Kidney disorders, and Diabetes Mellitus. The regression model demonstrates the substantial influence of various causes of death on mortality rates, providing a reliable structure for forecasting these rates ($p < 0.001$).

Conclusion: In order to successfully tackle the main causes of death, Saudi Arabia needs to implement comprehensive policy measures to oversee healthcare. The measures encompass public health campaigns, wellness programs, early detection initiatives, government funding for medical research, regulatory actions, and laws that encourage healthy lives.

KEYWORDS: mortality, healthcare, deaths, diseases, non-communicable diseases, medical

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INTRODUCTION

Non-communicable diseases (NCDs) are the primary cause of mortality on a global scale. It is responsible for 74% of deaths worldwide [1]. In Saudi Arabia, 73% of deaths are attributed to non-communicable diseases (NCDs). The majority of deaths, accounting for 37%, are attributed to cardiovascular illnesses, with cancers being the second leading cause at 10%. The prevalence of chronic respiratory disorders is 3%, while diabetes also has a prevalence of 3%. Other non-communicable diseases (NCDs) account for 20% of the total. An further 16% of deaths are attributed to injuries, while 11% are caused by communicable, maternal, perinatal, and nutritional disorders [2].

The increasing prevalence of non-communicable diseases (NCDs) in Saudi Arabia can be ascribed to two primary sources. Initially, there has been an increasing inclination towards unhealthy lifestyles and activities that contribute to poor health. This shift in disease patterns, from predominantly communicable diseases to noncommunicable diseases, can be attributed to these factors. Furthermore, the longevity of the Saudi Arabian population has experienced a notable growth, as the average lifespan has risen from 64 years during the 1980s to 74 years during the 2000s. The occurrence of non-communicable diseases (NCDs), which becomes more common as people get older, has risen at the same time as the increase in life expectancy [3]. Furthermore,

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NCD mortality and morbidity rates are influenced by behavioral risk factors including tobacco use, poor diet, physical inactivity, and alcohol consumption, as well as biological risk factors like high blood glucose, elevated blood pressure, obesity, and abnormal blood lipids [4]. By implementing efficient control methods, the impact of this worldwide epidemic can be reduced. To prevent premature death, sickness, and disability, it is essential to decrease the risk factors associated with chronic diseases [5]. Assuming that the risk variables stay the same, it is projected that the number of DALYs (disability-adjusted life years) per 100,000 for women will rise from 3,550 in 2020 to 8,628 in 2050, and for males from 5,073 in 2020 to 12,198 in 2050 [6]. Implementing changes in these risk factors, such as quitting smoking, adopting a healthy diet, and engaging in regular exercise, might significantly decrease the burden of disability-adjusted life years (DALYs) caused by non-communicable diseases (NCDs) in Saudi Arabia by 4.9% by the year 2050 [6].

Research has demonstrated that implementing effective national policies and initiatives targeting non-communicable diseases (NCDs) might reduce the burden of these diseases. However, despite these efforts, the frequency and impact of NCDs are still increasing, which presents a problem for all health systems. Saudi Arabia's Ministry of Health (MOH) has implemented various policies and programs aimed at enhancing the early detection and treatment of non-communicable diseases (NCDs) [5]. The national health policies encompass the Nutrition policy, Physical activity policies, and Tobacco policies. The national programs encompass the implementation of an NCD control program, surveillance, and assessment, collaboration across many sectors, and the adoption of the chronic care model [5].

The Nutrition Policy

Excessive consumption of salt and sugar, intake of trans fat, and insufficient consumption of fruits and vegetables are some of the most prevalent instances of nutritional risk factors [7]. According to the World Health Survey Saudi Arabia 2019, a staggering 94% of the population in Saudi Arabia habitually consumes insufficient amounts of fruits and vegetables. Saudi Arabia has adopted some measures from the World Health Organization's Global Action Plans for The Prevention and Control of Non-Communicable Diseases 2013–2020. These measures include monitoring the amount of salt consumed by the population, prohibiting the use of trans fat in food products, and implementing taxes on sweetened beverages [7, 9–11].

The physical activity policy

The absence of physical activity is a significant issue in Saudi Arabia. An extensive examination revealed that individuals in Saudi Arabia, including children, adolescents, and adults, fail to meet the physical exercise guidelines set by the World Health Organization (WHO). Women, in particular, exhibit a high degree of sedentary behavior [12]. Saudi Arabia implemented initiatives to promote public awareness of physical activity, including conducting campaigns and educating the populace on the significance of engaging in physical activity [13].

The Tobacco policy

Tobacco usage is prevalent in Saudi Arabia, with 19.8% of the population reported to be smoking tobacco products according to the 2019 Global Adults Tobacco Survey [7]. In 2019, the Ministry of Health (MOH) enforced Anti-smoking regulations that encompassed various measures such as banning the production of tobacco goods, prohibiting tobacco advertising, restricting smoking in numerous public areas, mandating warning labels on tobacco packaging, and imposing higher taxes on tobacco products [14, 15].

Non-Communicable Diseases Control Program

MOH implemented multiple projects with the explicit aim of reducing the prevalence of non-communicable diseases (NCDs) and improving people's overall quality of life. These programs, focusing on cardiovascular diseases, cancer, diabetes, respiratory problems, and obesity, are implemented at all primary healthcare facilities. The initiatives encompass a nationwide initiative for diabetes and preventative management, a nationwide initiative for cardiovascular illnesses, a nationwide initiative for cancer prevention, and a nationwide initiative for obesity. The program tactics focus on primary prevention, secondary prevention, quality health services, monitoring, evaluation, and research [5].

Monitoring and Evaluations

Regularly, the Ministry of Health (MOH) carries out surveys across the country to monitor and evaluate the efficacy of the adopted policies and procedures for controlling non-communicable diseases (NCDs) [7].

Multisectoral Collaboration

The Public Health Authority is responsible for promoting collaboration between other sectors and has established and endorsed various intersectoral programs, including the partnership between the Ministry of Health and the Ministry of Education in the RASHAKA program and The Healthy Schools program [7].

Chronic Care Model

The Chronic Care Model (CCM) is a collaborative care model that seeks to integrate evidence-based chronic illness care with actual care delivery by facilitating effective communication between primary care teams and patients. In order to ensure that patients suffering from non-communicable diseases (NCDs) receive excellent care, the CCM incorporates six key elements of clinical practice: decision support, design of the healthcare delivery system, clinical information systems, support for self-management, utilization of community resources, and improvement of healthcare organization. Interventions that include one or more of the primary components of the Chronic Care Model

(CCM) have been shown to improve clinical outcomes and care processes for patients with noncommunicable diseases (NCDs) [16].

The Saudi Arabian government has implemented many measures to reduce mortality rates in the kingdom by formulating laws targeting the primary cause of death, which is non-communicable diseases (NCDs). The objective of this study is to examine the primary factors that contribute to mortality in Saudi Arabia and devise healthcare administration approaches that can be utilized to boost mortality results, diminish avoidable deaths, and improve the provision of healthcare services.

METHODS
Data
The study utilized secondary quantitative data obtained from The General Authority for Statistics (GASTAT) and The World Health Organization (WHO). The data sets cover a 5-year timeframe, specifically from 2017 to 2021, and include extensive information on death rates in Saudi Arabia for both males and females. The second dataset contains data on several non-communicable diseases that were recorded as the cause of death for both males and females between 2015 and 2019. These data sources are highly dependable and have been utilized in numerous healthcare-related research investigations.

The study population encompasses the entirety of the Saudi Arabian population, comprising both residents and Saudi nationals. The findings of this study are intended to be applicable to the entire population of Saudi Arabia, as the data collected are representative of the entire nation.

Variables
The key variables examined in this study are the causes of death, which are classified as the most prevalent causes of death in Saudi Arabia. The number of deaths represents the total number of deaths associated with each cause, categorized by year and gender. The year variable indicates the specific year for each cause of death, considering both males and females. Gender is further categorized as male or female. This variable facilitates the examination of mortality rates based on gender.

Analytical Approach
Descriptive statistics were employed to examine and show the data. The statistical analysis is carried out utilizing IBM SPSS Statistics version 27, while data visualization is executed using Microsoft Excel.

The primary analytical methods utilized are as follows:
Computing the mortality rates per 1,000 adults for both males and females for each year spanning from 2017 to 2021. Computing the mortality rates per 1,000 adults across all age groups for each year spanning from 2018 to 2022. Determining the mortality rate for each specific cause of death per 100,000 individuals, encompassing both genders, for each year spanning from 2015 to 2019.

Frequency distributions and proportions are utilized to analyze the fundamental factor leading to mortality. Correlation and regression analysis are employed to ascertain the association between the causes of death and mortality rates.

RESULTS
Figure 1. The death rates in Saudi Arabia exhibit variation among different age cohorts from 2018 to 2022. One striking pattern is that the death rates for the 5–9 age group regularly show a drop from 2018 to 2019, with the lowest rates reported in this age group. Conversely, the age group of individuals aged 65 and above exhibits the highest rates of death, which reach their highest point in 2021 and then decline in 2022. Significant variations are noticed in the age ranges of 35–39 and 55–59, with the highest mortality rates occurring in 2021 and 2019, respectively. In 2021, the death rates for those in the age group of 50-54 also witnessed a significant rise. Overall, these trends highlight the significance of taking age-specific factors into account when analyzing mortality rates and designing healthcare interventions that are tailored to certain age group.

Table 1. Demographic Table for Mortality Rates by Gender Per 1000 Adults (2017–2021).

Year	Female Mortality Rate per 1000 (n)	n (%)	Male Mortality Rate per 1000 (n)	n (%)
2017	79.41	7.94%	100.02	10%
2018	79.49	7.94%	101.80	10.18%
2019	81.36	8.13%	100.89	10.08%
2020	88.31	8.83%	108.38	10.83%
2021	80.84	8.08%	99.91	10%
	81.88		102.20	
	3.69		3.53	

The data presented in Table 1 demonstrates clear and discernible patterns in mortality rates for adult girls and males per 1000 population across the five-year timeframe. The death rate for adult females displayed a consistent pattern from 2017 to 2019, with a further rise in 2020. Conversely, adult males had a greater death rate across the years,

exhibiting a comparable pattern of initial rise and subsequent decline.

The standard deviation for both groups remained quite low, with a value of 3.69 for females and 3.53 for males. This suggests that the data points were closely clustered around the mean values for each group. These findings highlight the disparities in death rates between adult females and males.

Table 2. Leading Causes of Death in Saudi Arabia for Femalesand Males Per 100,000 population (2015– 2019).

Cause of Death	%	Mean	Std Deviation
Ischemic heart disease			
Female			
Male	0.08%	87.84	0.3
Stroke	0.13%	133.25	0.42
Female			
Male	0.05%	50.38	0.51
Neoplasm	0.04%	49.54	0.78
Female	0.03%	37.48	0.84
Male	0.03%	33.55	1.18
Kidney Disease			
Female	0.02%	27.24	0.53
Male	0.02%	25.63	0.23
Diabetes Mellitus			
Female	0.009%	9.86	0.15
Male	0.01%	11.84	0.35

Table 2 presents the descriptive statistics of the primary causes of mortality in Saudi Arabia for both females and men from 2015 to 2019. To summarize, the average of the causes of mortality is computed over a period of 5 years. The data shown in the table indicates that non-communicable diseases (NCDs) are the primary cause of the observed increase in mortality rates. Furthermore, the data highlights disparities in mortality rates between adult females and males across different causes of death. Ischemic heart disease had a greater average mortality rate in adult males (133.25) compared to females (87.84). The low standard deviations suggest a more consistent trend in both genders. On the other hand, the mortality rates due to stroke are quite comparable between females (50.38) and males (49.54), but the standard deviation for males is significantly greater. Neoplasm-related death rates exhibit a comparable trend, with males having a little lower average (33.55) than females (37.48). When it comes to kidney illness and diabetes mellitus, males have greater average mortality rates than females. However, the standard deviations for both genders are low, indicating that there is less variation in mortality rates for these causes.

Note

H = Ischemic Heart Disease, S = Stroke, N = Neoplasm, K = Kidney Disease, DM = Diabetes Mellitus.

According to the World Health Organization (WHO), the main causes of death in Saudi Arabia between 2015 and 2019 are ischemic heart disease, stroke, neoplasms, kidney disease, and diabetes mellitus, as shown in Figure 2. The graph illustrates that ischemic heart disease is the predominant cause, resulting in a mortality rate of 220 deaths per 100,000 individuals. The leading causes of death, in descending order, are stroke (100), neoplasms (70), kidney disease (52), and diabetes mellitus (21) per 100,000 people.

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Table 3. Correlations for Study Variables.

Correlations				
Cause of Death			Mortality	
Spearman's rho	Death Cause	Correlation Coefficient	1.000	- .981**
		Sig. (2-tailed)	.	.000
		N	25	25
	Mortality	Correlation Coefficient	- .981**	1.000
		Sig. (2-tailed)	.000	.
		N	25	25
Note: **. Correlation is significant at the 0.01 level (2-tailed).				

Table 3 displays the outcomes of Spearman's rank correlation analysis, which examines the relationship between two variables, "Death Cause" and "Mortality." The study was conducted using a dataset consisting of 25 data points. The analysis sought to evaluate the correlation between the causes of death and the mortality rates in the dataset. The Spearman's rho coefficient of roughly −0.981 indicates a robust negative correlation between "Death Cause" and "Mortality." This means that if the values of "Death Cause" vary, the corresponding values of "Mortality" tend to change in the opposite way. This implies that specific factors leading to death are correlated with elevated mortality rates, whilst other factors are linked to reduced mortality rates.

The p-value of 0.000, which is highly statistically significant, suggests that the observed connection is not a product of random chance. This implies that the negative correlation is genuine and not a consequence of random fluctuations. The observed negative correlation has significant implications for comprehending the connection between particular causes of death and mortality rates. It suggests that certain causes of death may be linked to greater mortality rates, while others may be linked to lower mortality rate.

Table 4. Regression analysis for Study Variables.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	- .917ᵃ	.841	.834	28.49313

Coefficientsᵇ						
Model	B	Std. Error	Beta	t		Sig.
(constant)	226.788	13.364		16.969		.000
Cause ofDeath	-44.510	4.030	- .917	-11.046		.000

a. Note: Predictors: (Constant), Cause of Death
b. Dependent Variable: Mortality

Table 4 presents the results of the regression analysis (Model 1) examining the association between the independent variable "Cause of Death" and the dependent variable "Mortality Rate." The correlation value of -.917 suggests a robust inverse association between the cause of death and mortality rate. The coefficient of determination (R Square) indicates that around 84.1% of the variation in mortality rates can be accounted for by the cause of death. The corrected R Square, which takes into consideration the complexity of the model, remains significantly high at .834. The standard error of the estimate is 28.49313, which is the average difference between the observed values and the anticipated values. The

model incorporates a constant factor and highlights the importance of the cause of death as a predictor. Overall, the analysis offers valuable information into the influence of the cause of death on mortality rates.

The Coefficients Table provides a comprehensive overview of the relationships between variables in the regression model, as well as their statistical significance. The constant term (intercept) in the model has a coefficient of 226.788, with a standard error of 13.364. The t-value of 16.969 is highly significant ($p < 0.001$), showing that the constant term makes a considerable contribution to the model.

The "Death Cause" coefficient is -44.510, indicating that each change in the cause of death is linked to a drop in mortality rates. The association between the variables is strongly supported by a large standardized coefficient (Beta) of -0.917 and a highly significant t-value of -11.046 ($p < 0.001$). These findings highlight the strong and inverse relationship between the cause of death and mortality rates. Practically speaking, this implies that many factors leading to death significantly influence mortality, and the model offers a robust foundation for forecasting mortality rates based on the cause of death.

DISCUSSION

The objective of this study is to analyze the main causes that lead to mortality in Saudi Arabia and provide efficient healthcare management strategies that can decrease mortality rates, minimize preventable deaths, and enhance the provision of healthcare services.

The data indicates that the age category comprising individuals aged 65 years and beyond demonstrates the highest death rates in Saudi Arabia. This trend can be ascribed to the elevated incidence of chronic illnesses within this demographic [17].

The findings combined suggest that the main factors leading to death rates in Saudi Arabia can be ranked in the following sequence: The most prevalent condition is ischemic heart disease, followed by stroke, neoplasms, kidney diseases, and diabetes mellitus, in that order. The observation highlights the overwhelming occurrence of non-communicable diseases (NCDs) as the primary reason for death among the population of Saudi Arabia.

The study revealed a detrimental association between non-communicable diseases (NCDs) and elevated mortality rates in Saudi Arabia. This tendency can be explained by advancements in mitigating risk factors and effectively managing non-communicable diseases throughout the population. Studies have demonstrated that implementing public health initiatives can effectively decrease mortality rates linked to diseases such as cancer, diabetes, and cardiovascular disease. Nevertheless, the outcomes may vary depending on the specific conditions and the nature of the programs [18]. The results of various approaches to cancer prevention and screening differed greatly, depending on the individual kind of cancer [19]. However, programs have the potential to improve outcomes and save healthcare costs by incentivizing persons with chronic illnesses to follow their outpatient treatment plans and attend planned sessions [20].

The correlation test results suggest that certain causes of death are positively correlated with higher mortality rates, whereas others are associated with lower mortality rates. The notable fatality rates found in cardiovascular disease give rise to substantial concerns. The Saudi population has a noteworthy incidence of risk factors for cardiovascular disease (CVD). Approximately two-thirds of the population exhibit low levels of physical activity, while half of the population is obese. One-third of the population consumes an unhealthy diet, has dyslipidemia, or suffers from hypertension. Additionally, one-quarter of the population has diabetes [21].

A study in Saudi Arabia utilized the World Health Organization's STEPwise technique to track the occurrence of particular risk factors associated with non-communicable illnesses. The findings indicated a significant prevalence of sedentary lifestyle, obesity, high cholesterol levels, high blood pressure, diabetes, and regular smoking among the population being studied [22].

Patients in Saudi Arabia encounter acute coronary syndromes and acute heart failure at an age about 10 years below the average in developed nations due to the notably high prevalence of cardiovascular disease (CVD) risk factors. As a result, they are more likely to experience cardiovascular problems and have a higher risk of death [23–25]. Individuals diagnosed with diabetes have a significantly elevated risk, ranging from 2 to 4 times greater, of developing cardiovascular disease (CVD) in comparison to the overall population [26]. According to the International Diabetes Federation Diabetes Atlas (8th edition) [27], Saudi Arabia is among the top 10 countries with the highest prevalence of diabetes.

A study revealed a remarkably high prevalence of obesity in Saudi Arabia [28]. Emphasizing the inefficacy of obesity prevention programs un the monarchy. Moreover, the increasing prevalence of obesity in the country might be attributed to certain risk factors, including a lack of physical activity and an increasing inclination towards consuming excessive calories [21].

The government's recognition of the need of primary prevention in managing cardiovascular diseases (CVD) As part of the Saudi Vision 2030, the Saudi government has made substantial changes to its healthcare system with the goal of providing top-notch medical care and improving the efficiency of service delivery [21]. The implementation of these measures is being conducted via the National Transformation Program. In addition, the government has recognized the importance of primary prevention in combating cardiovascular diseases (CVD) and has implemented substantial initiatives to improve lifestyles, such as the Saudi Guideline for Tobacco [29], Obesity Control & Prevention Strategy 2030 [30], RASHAKA

Program [31], Saudi Hypertension Guideline [32], KSA National Strategy for Diet and Physical Activity [33], and City humanization and walkability [34].

Furthermore, The World Heart Federation has initiated an endeavor to develop a series of "roadmaps" with the objective of reducing premature mortality resulting from cardiovascular disease (CVD) by at least 25% by the year 2025. These roadmaps function as a blueprint for countries seeking to build or update their national strategies for the prevention and management of non-communicable illnesses [35].

Currently, non-communicable diseases are the main burden of disease in Saudi Arabia [36]. The yearly economic cost of non-communicable diseases in Saudi Arabia is estimated to be US$24.4 billion, with direct expenses accounting for 45% of this financial burden [37].

In Saudi Arabia (KSA), the allocation of healthcare funds is focused on enhancing primary and preventive care, driven by the goal of achieving maximum efficiency and value for money. An essential requirement in this situation is to thoroughly assess the national preparedness of Primary Health Care Centers (PHCs) to successfully carry out the suggested reforms, especially in terms of their dedication to prioritizing the new care model [38].

Primary healthcare centers (PHCs) have a vital function in evaluating, handling, and providing treatment for non-communicable diseases (NCDs). The Saudi Ministry of Health (MOH) is presently implementing a strategy to reduce the prevalence of chronic diseases. This proposal entails establishing specialized clinics for the management of chronic diseases within Primary Health Care centers (PHCs). In 2019, Electronic Health Records (EHRs) were implemented across all Primary Health Centers (PHCs) with the aim of improving their operational effectiveness in managing chronic illnesses and reducing hospital admissions. Although clinicians recognize the positive impact of electronic health records (EHRs), the system has not yet achieved its full potential. The current Electronic Health Record (EHR) system lacks the capability to provide patients with full access to their health information, hence restricting its capacity to successfully aid in the management of chronic diseases. Additionally, there is a need for improved capacity to support patients in regards to their nutritional and physical activity needs [39].

Individuals with chronic illnesses who are facing financial challenges may struggle to follow their prescribed medication regimen [40, 41]. Legislation in many other nations safeguards individuals with chronic conditions from incurring an overwhelming financial burden. For example, France introduced a decrease in copayments for individuals with chronic illnesses, whereas Germany restricts the amount of money people have to pay to 1% of their income instead of 2% for everyone [42]. Saudi Arabia is classified as a high-income nation. A significant percentage of this revenue has been allocated to the Saudi populace by offering free healthcare services to individuals who can provide proof of their legal residency in the country, irrespective of their nationality [43].

STUDY LIMITATIONS

In the year 2020 and beyond, the World Health Organization (WHO) does not possess extensive data on the main causes of death in Saudi Arabia. Therefore, recent and up-to-date information on this issue is currently unavailable.

RECOMMENDATION

Additional research should be undertaken using the latest data from 2023 to better examine the correlation between non-communicable diseases and mortality rates in Saudi Arabia.

CONCLUSION

To successfully manage healthcare and address the main causes of death in Saudi Arabia, a variety of policy proposals might be implemented. Healthcare promotion and preventative interventions are essential techniques for reducing the primary causes of death in the country. Prioritizing comprehensive public health campaigns and initiatives that aim to foster a healthy lifestyle, with a specific emphasis on areas such as food, exercise, and smoke cessation, is essential. Moreover, it is crucial to create health and wellness programs in educational institutions and businesses. Furthermore, it is imperative to build early detection and screening programs, specifically targeting widespread diseases such as chronic disorders. Early screening is crucial for timely intervention and treatment of diseases like diabetes. It is crucial to motivate persons who are at a higher risk of developing diseases to regularly undertake health check-ups and tests. Furthermore, it is imperative for the government to make significant investments in medical research and innovation in order to gain a comprehensive understanding of illness patterns, trends, prevention methods, and treatment options. It is crucial to provide more resources to healthcare in order to gain a comprehensive understanding of the causes of diseases and to create efficient prevention methods.

It is essential to adopt technology in order to analyze illness trends and enable early detection. Finally, it is necessary to establish regulatory procedures to supervise the quality of food products in the market. These regulations aim to guarantee the sale of only nutritious goods, thereby enhancing public availability of safe dietary choices. Enacting policies that promote healthy lifestyle choices, such as implementing substantial tariffs on cigarettes and setting limitations on the advertising of unhealthy foods, have a crucial impact on reducing the prevalence of diseases in the population

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Figures
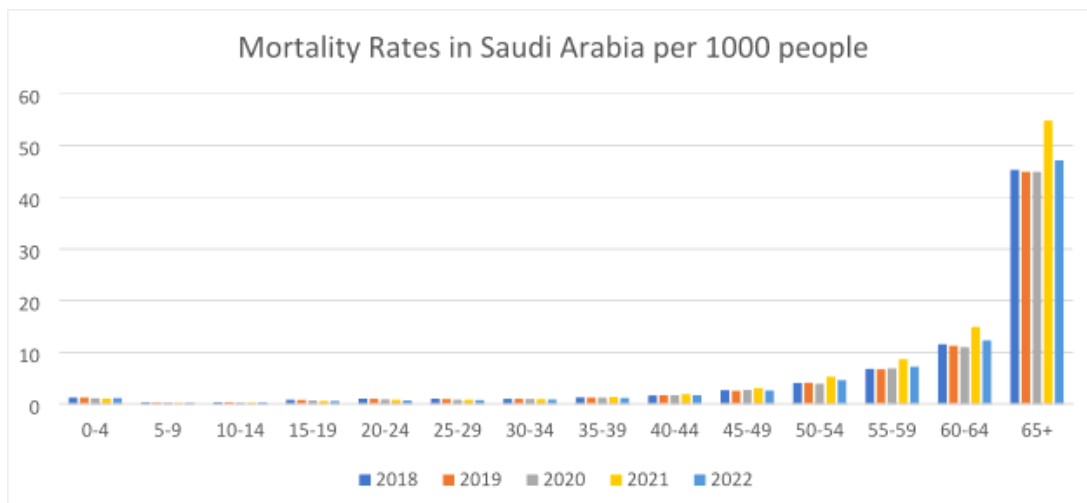
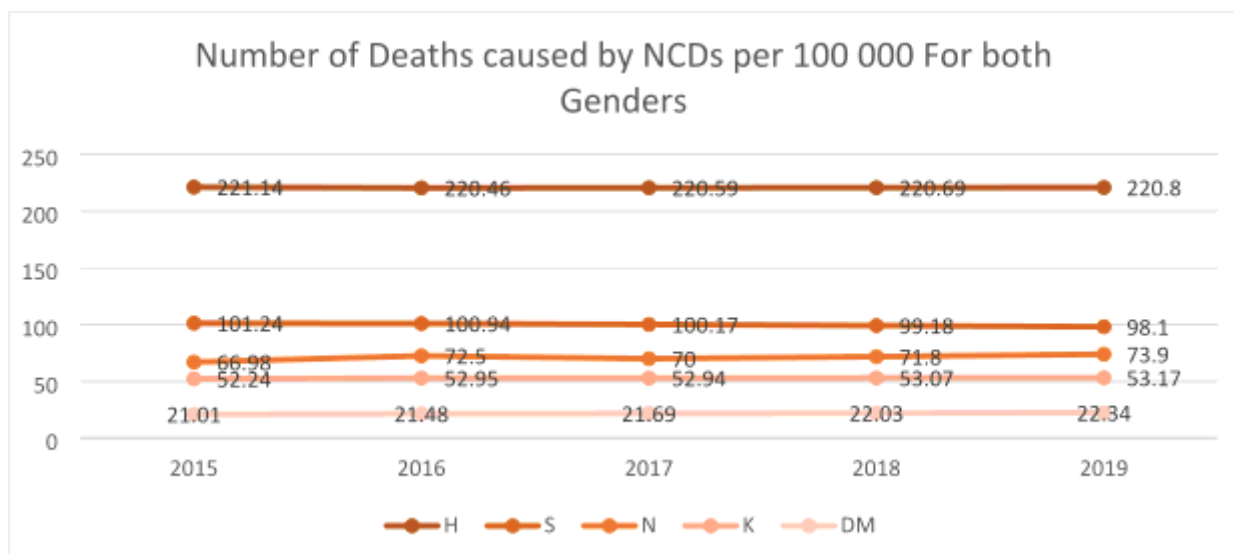Morality Rates by age group in Saudi Arabia Per 1000 people (2018 -2020.

Figure 1