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The Final thesis

Major Causes of Death Across the Globe: A Study into Uruguay, Brazil, and Kenya.

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Summary

The World Health Organization (WHO) has and continuously updates the leading causes of death around the world. The ones that are highlighted by the WHO are ischemic heart disease (IHD), stroke, chronic obstructive pulmonary disease (COPD), lower respiratory tract infections (LRI), and neonatal conditions. This paper explores the leading 6 causes of death for both sexes, age group between 45-64 in Uruguay, Brazil, and Kenya in the time period of 2013-2019 in order to identify the causes of mortality and compare them with the worldwide ones. After the research, it was observed that there is a variation between Uruguay's Brazil's and Kenya's causes of death and the ones that are presented by the WHO worldwide. Uruguay shares the two leading causes of death in IHD as well as stroke and COPD, however, the list is also dominated by cancers such as trachea, bronchus and lungs cancer and breast cancer. In Brazil, IHD, stroke and LRIs are present however, trachea, bronchus and lungs cancers, diabetes mellitus and liver cirrhosis are in the group of leading causes of death. Kenya, similarly, to Uruguay and Brazil has IHD, stroke and LRI in the leading causes of death, however other diseases as HIV/AIDS, tuberculosis and liver cirrhosis, the latter of which takes the first position in the list of causes of death.

Introduction

Aims and objectives

This thesis' objective is to evaluate the causes of death of general population of specifically Uruguay, Brazil, and Kenya and to explore how the data differs between the summary of worldwide causes of death and directly in specific countries.

Overview of the topic

The leading 6 causes of death worldwide are ischemic heart disease (IHD), stroke, chronic obstructive pulmonary disease(COPD), lower respiratory tract infections(LRI), neonatal conditions and trachea, bronchus and lungs cancers respectively. (1) Further in the study the data

on the leading 6 causes of death from Uruguay, Brazil and Kenya will be presented and further analyzed.

Ischemic heart disease, also known as coronary artery disease (CAD)(2), is a condition in which the blood flow to the heart is blocked or reduced due to the narrowing or blockage of coronary arteries(2). This lack of blood flow and oxygen to the heart can cause chest pain (angina), shortness of breath, and even a heart attack (myocardial infarction).

The main cause of ischemic heart disease is the buildup of plaque (fatty deposits) inside the coronary arteries, which can lead to atherosclerosis(3). These deposits can cause the arteries to become narrow or blocked, reducing blood flow to the heart muscle. Risk factors for ischemic heart disease include high blood pressure, high cholesterol levels, smoking, obesity, diabetes, and a family history of heart disease(3). These risk factors can increase the likelihood of developing atherosclerosis and ischemic heart disease.

Ischemic heart disease represents cause of death with the highest mortality rate.(1) It is responsible for 16% of the world's total deaths, and between the year 2000 and 2019 the number of deaths rose by 2 million to 8.9million deaths.(1)

Stroke, also known as cerebrovascular accident (CVA), is a medical emergency that occurs when the blood supply to the brain is interrupted or reduced.(4) This disruption of blood flow can cause brain cells to rapidly die, leading to various cognitive and physical impairments. Stroke can happen in two main ways: ischemic stroke (the most common type), and hemorrhagic stroke(5).

Ischemic stroke occurs when a clot or blockage obstructs the flow of blood to the brain, depriving brain cells of oxygen and nutrients. This type of stroke accounts for around 87%(5) of all strokes, according to the American Stroke Association.

Hemorrhagic stroke, on the other hand, is caused by bleeding in the brain due to the rupture of a blood vessel. This type accounts for around 13%(5) of all strokes, but it is more severe and often more deadly compared to an ischemic stroke.

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that obstructs airflow from the lungs, causing difficulty breathing(6). The disease is progressive, meaning it worsens over time, and is characterized by chronic bronchitis, emphysema, and/or asthma. It is often caused by exposure to environmental toxins such as cigarette smoke, air pollution, and occupational hazards.

Chronic bronchitis refers to the inflammation of the bronchial tubes, which carry air to and from the lungs.(6) The inflammation causes the bronchial tubes to become narrow and swollen, making it harder to breathe. Symptoms of chronic bronchitis include coughing, excessive mucus production, and shortness of breath.

Emphysema refers to the destruction of the air sacs (alveoli) in the lungs, which help with the exchange of oxygen and carbon dioxide during breathing(6). As the air sacs are destroyed, the lungs lose their elasticity, making it more difficult to exhale and causing air to become trapped in the lungs. This leads to shortness of breath and can cause the chest to expand.

COPD is a significant cause of morbidity and mortality worldwide, with more than 65 million people currently living with the disease. COPD is the third leading cause of death worldwide(7). It caused 3.23 million(7) deaths in 2019, and it is estimated that COPD will become the fourth leading cause of disability by 2030.(7)

Stroke and chronic obstructive pulmonary disease are ranked second and third, accountable for roughly 11% and 6% of global deaths, respectively.(1)

Lower respiratory infections (LRIs) are the infections that affect the lungs and airways below the trachea, including bronchi and alveoli(8). These infections can be caused by various infectious agents such as bacteria, viruses, and fungi. LRIs can range from mild to severe, and can cause a variety of symptoms, which include cough, shortness of breath, fever, chest pain, and sputum production.

Pneumonia is a type of LRI that affects the alveoli in the lungs(9). It is mainly caused by bacteria such as Streptococcus pneumoniae, Haemophilus influenzae, and Mycoplasma

pneumoniae. Viral infections, such as respiratory syncytial virus (RSV) and influenza virus, can also lead to pneumonia.

Bronchitis is another LRI that affects the bronchi, the tubes that carry air to the lungs(10). It can be caused by either bacterial or viral infections, with the most common cause being a viral infection. Acute bronchitis usually resolves without treatment, while chronic bronchitis, which is characterized by a persistent cough and sputum production, can be managed with bronchodilators and other medications(11,12).

Lower respiratory infections continue to be the most fatal communicable disease, ranking fourth among leading causes of death(1). Nonetheless, the number of deaths has substantially declined, with 2.6 million deaths reported in 2019, which is 460, 000 fewer than recorded in 2000.(1)

In conclusion, LRIs are a significant health problem worldwide and can be caused by various infectious agents.(13) Proper diagnosis and treatment are essential to prevent morbidity and mortality associated with these infections.

Neonatal conditions ranked fifth on the list. However, this category has shown the most significant reduction in global deaths over the previous two decades, with 2 million fewer newborns and young children dying in 2019 than in 2000.(1)

Deaths from noncommunicable diseases are on the rise. Deaths due to trachea, bronchus, and lung cancers have risen from 1.2 million to 1.8 million, ranking sixth among leading causes of death.(1)

In 2019, Alzheimer's disease and other forms of dementia ranked seventh on the list, with women bearing a more significant burden, accounting for 65% of these deaths globally.(1)

Diarrheal diseases have recorded one of the most substantial declines in deaths, with death tolls dropping from 2.6 million in 2000 to 1.5 million in 2019.(1)

Diabetes has recently joined the top 10 leading causes of death, registering an increase of 70% since 2000. Males have experienced a more substantial increase, with an 80% rise in diabetes-related deaths since 2000.(1)

The list of the top causes of death has changed over the years. HIV/AIDS, which was in the top 10 causes of death in 2000, has fallen by 51%, now ranking as the 19th leading cause of death. Kidney diseases have risen from the 13th leading cause to the 10th, with mortality rates increasing from 813,000 deaths in 2000 to 1.3 million deaths in 2019.(1)

It is of outmost importance to collect the data regarding the causes of death worldwide in order to assess the quality and effectiveness of healthcare systems and to try and predict the trends in the years to come. Since there is a clear change of trends with some diseases on the rise and others on the downwards slope, it can be said that the healthcare systems approach to diseases is also staying dynamic and adjusts to these trends. Therefore, it is important to not only evaluate the leading causes of deaths in the world, but also the less prevalent ones to try and decrease the number of deaths even more.

Materials and Methods

The data that was collected to fulfill the aims and objectives of this thesis was gathered with World Health Organization's (WHO) cause-specific mortality tool. The information was collected between the years 2013 and 2019 on the leading 6 causes of death in Uruguay, Brazil, and Kenya. Cause-of-death statistics are reported to WHO on an annual basis by country, year,

cause, age and sex. These statistics can be accessed in the WHO Mortality Database. For these estimates, a total of 67 countries or territories had data that met our inclusion criteria, of which 33 countries had data for years 2018 or later. Twelve countries had reported data from 2019.(14)

WHO collects data from main three groups of causes of death: communicable, maternal, perinatal and nutritional (CMPN) conditions; non-communicable(N-C) diseases and injuries(I).CMPN conditions are comprised of HIV/AIDS, neonatal conditions, lower respiratory infections, diarrheal diseases, malaria, tuberculosis etc. N-C conditions are comprised of diseases like ischemic heart disease (IHD), stroke, cirrhosis of liver and others. Injuries consist of interpersonal violence, injuries during road accidents and others.

The data collected from the WHO source is presented in graphs that represent major causes of death in the specific country per 100,000 population. The age groups that were accounted for are between years 45-64 in the years 2013-2019. Data from both sexes was collected.

Uruguay and Brazil are both located on the eastern coast of South America. Due to their geographical closeness the data that will be presented in the results section is expected to be similar. However, Kenya, located in East Africa is expected to present widely different data. This is not only due to the different geographical location, but also due to the difference in the levels of available healthcare systems that are present in these countries.

Results

At this point the material from WHO sources regarding Uruguay, Brazil and Kenya can be implemented to assess the causes of death in general population As mentioned previously, the years that were selected for the data from WHO are 2013-2019. Six leading causes of death in Uruguay, Brazil and Kenya are chosen in each year according to the number of deaths occurring per 100,000 population.
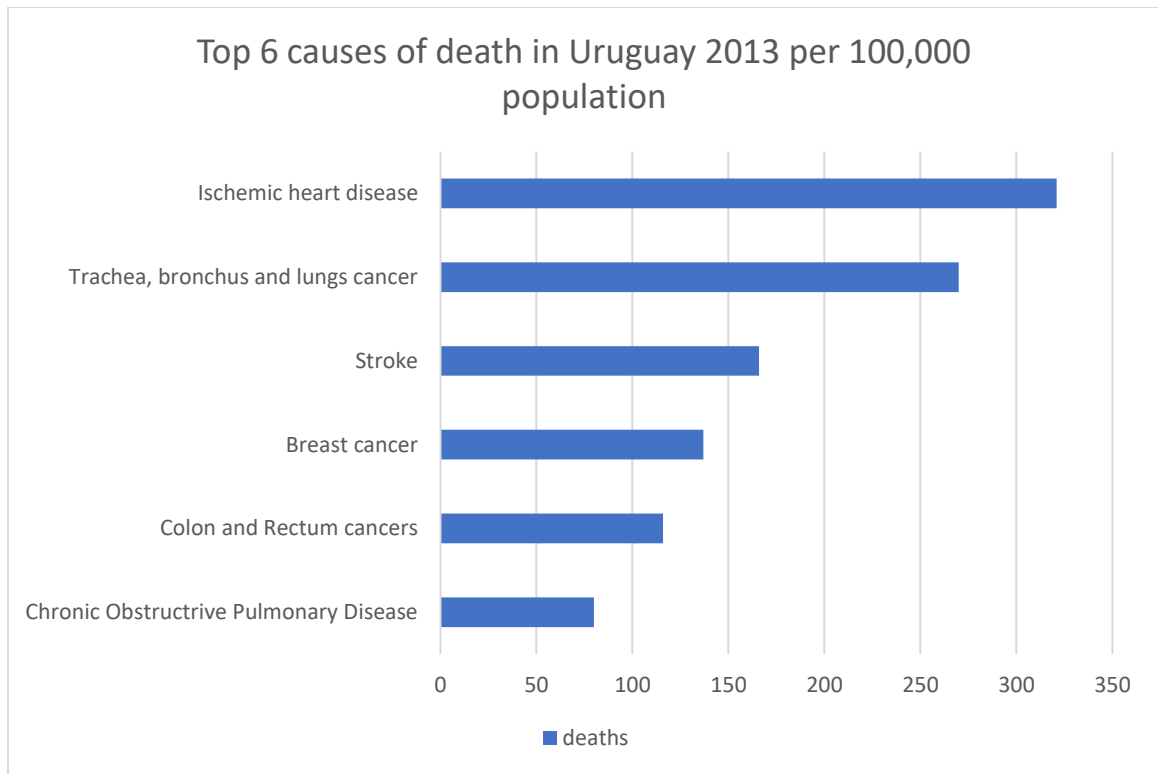
Top 6 causes of death in Uruguay 2013 per 100,000 population

Figure 1

Data from Figure 1 demonstrates the top 6 leading causes of death in Uruguay in 2013. At the number one position is IHD with 323(15) deaths. Then trachea, bronchus and lungs(TBL) cancers with 270 (15) deaths, then in the 3rd place is stroke with 166 (15)deaths. Breast cancer and colon and rectum(CR) cancers are in 4th and 5th positions with 137(15) and 116(15) deaths respectively. And finally in the 6th position for the year 2013 is chronic obstructive pulmonary disease(COPD) with 80(15) deaths.
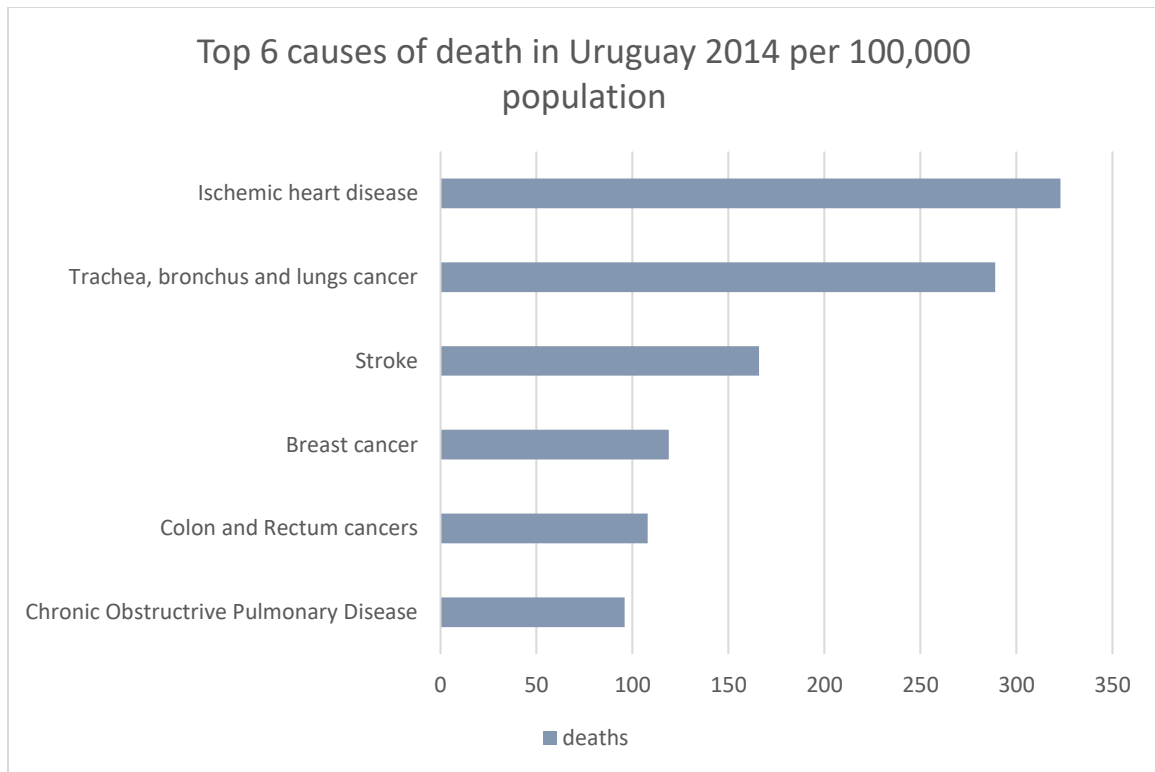
Top 6 causes of death in Uruguay 2014 per 100,000 population

Figure 2

A very similar trend is observed in Figure 2, in the year 2014 in Uruguay. IHD leads with 323(15) deaths, then TBL cancer with 289(15) deaths, stroke with 166(15), breast cancer with 119 (15), CR cancers with 108(15) and COPD with 96(15) deaths respectively. A general trend of diseases being lead causes of death in Uruguay can be seen. Throughout the years, IHD strongly holds the first position without change. The second position is also quite strongly held by TBL cancers. The trend varies among the next positions in the charts. For example, in the year 2016 the first four positions remained unchanged, however, last two positions did undergo a variation. 5th position was occupied by CR cancer and 6th position was occupied by self-harm. Nonetheless, the general trend from the years 2013-2019 remains unchanged. As observed in Figure 6, the number one position is IHD with 2351(15) deaths , followed by TBL cancers with 1825(15) deaths, stroke with 1086(15) deaths , breast cancer with 916(15) deaths, colon and rectum cancers with 715 (15) deaths and finally COPD with 618 (15) deaths respectively.
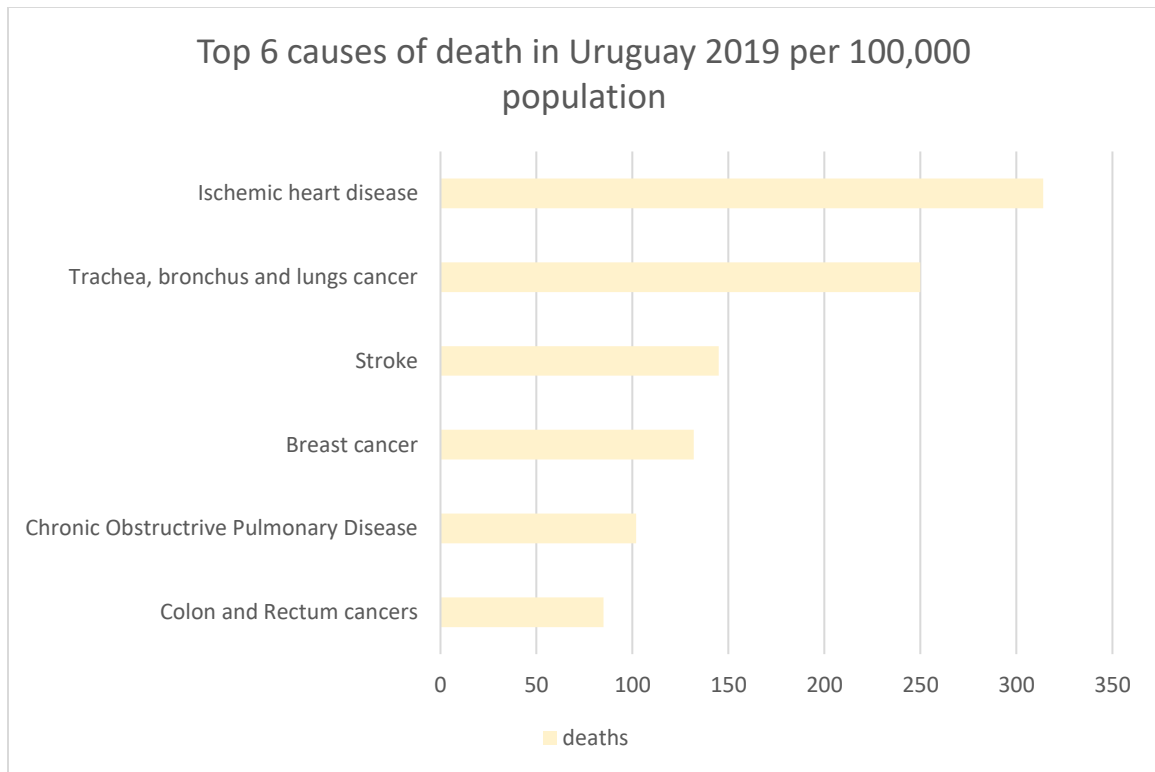
Top 6 causes of death in Uruguay 2019 per 100,000 population

Figure 3

In an attempt to try and observe the trend of the causes of death in Uruguay, the data from 2019 is presented. When the data from 2019 is compared to that of 2013 and 2014, the only change is that COPD overtakes colon and rectum cancers for position 5 in the chart. IHD leads the chart with 314(15) deaths, followed by TBL cancers with 250(15) deaths, stroke with 145(15) deaths, breast cancer with 132(15) deaths, COPD with 102(15) deaths and colon and rectum cancers with 85(15) deaths respectively. It is hard to establish a pattern among the number of deaths caused by specific disease since the values are very similar and thus a major change in the progression of a specific cause of death is impossible to identify.
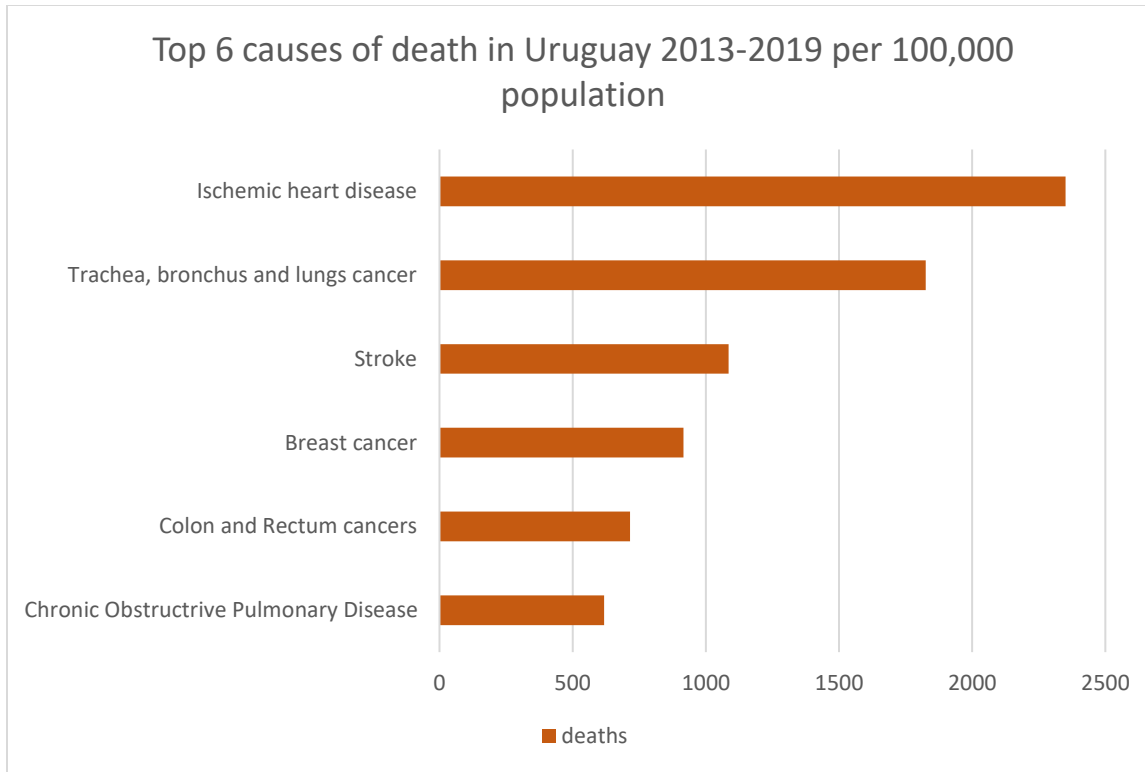
Top 6 causes of death in Uruguay 2013-2019 per 100,000 population

Figure 4

To sum up the data collected from Uruguay, the leading cause of death from 2013-2019 is IHD. This comes as no surprise, as the leading cause of death worldwide is IHD(1) . More interestingly trachea, bronchus and lungs cancers occupy the 2nd position in the leading causes of death chart. This cause of death is not present amongst the top 5 worldwide. Moreover, other groups of neoplasms join the leading causes of death in Uruguay, the colon and rectum cancers as well breast cancers.

Now data from Brazil in the time period of 2013-2019 on the top 6 causes of death will be analyzed. The age groups remain the same as for Uruguay (ages 45-64) and information from both sexes is collected.
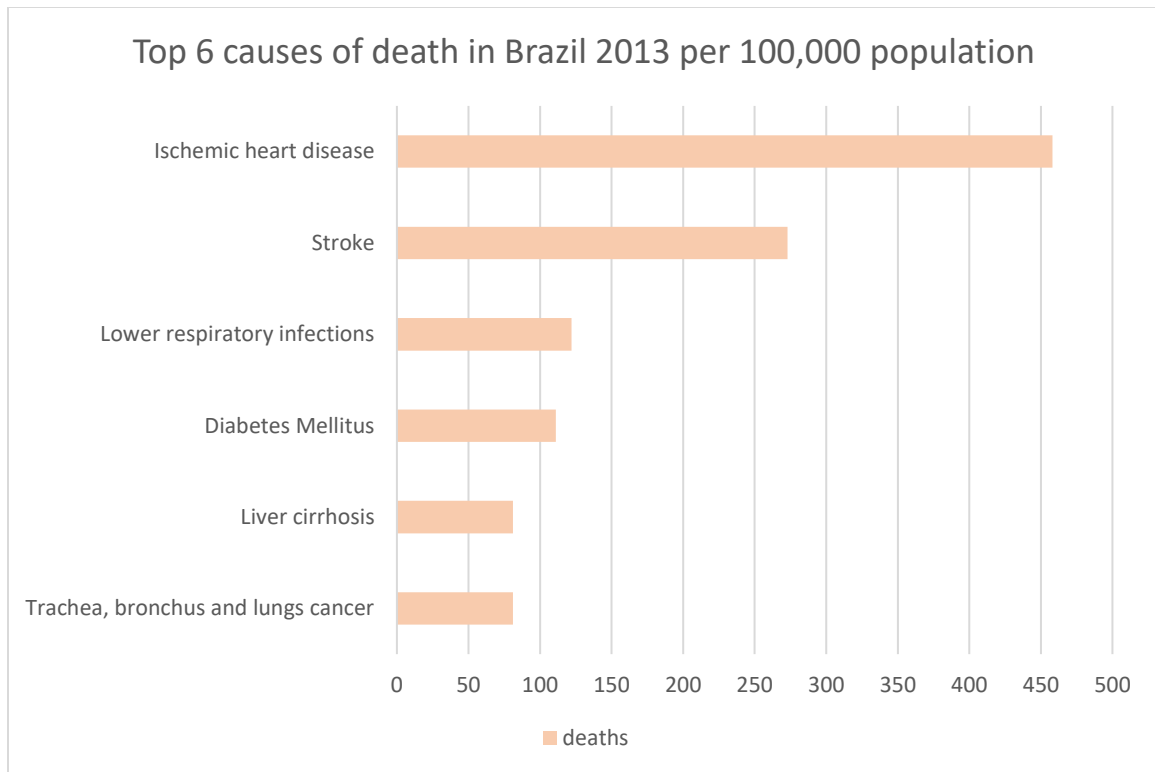
Top 6 causes of death in Brazil 2013 per 100,000 population

Figure 5

As can be seen in Figure 5, in the year 2013 only the first position is the same as in Uruguay. Following IHD with 458(15) deaths are stroke with 273(15) deaths, lower respiratory infections(LRI) with 122(15) deaths, diabetes mellitus(DM) with 111(15) deaths and finally liver cirrhosis(LC) with 81(15) deaths and TBL cancers with 81(15) deaths respectively. The causes of death in Brazil are evidently rather different from those in Uruguay even though these countries are neighbors. It can immediately be seen that when comparing Figure 5 to Figure 1, that TBL cancers in Brazil cause 81(15) deaths which is a significantly lower amount when compared to 270(15) deaths of Uruguay in 2013. The situation follows the same trend with other causes of death; however, the leading cause of death is the same in both Brazil and Uruguay-IHD. In order to further assess and compare the main 6 causes of death in Brazil Figure 8 and Figure 9 present the data on the year 2014 specifically and the whole period between 2013 and 2019.
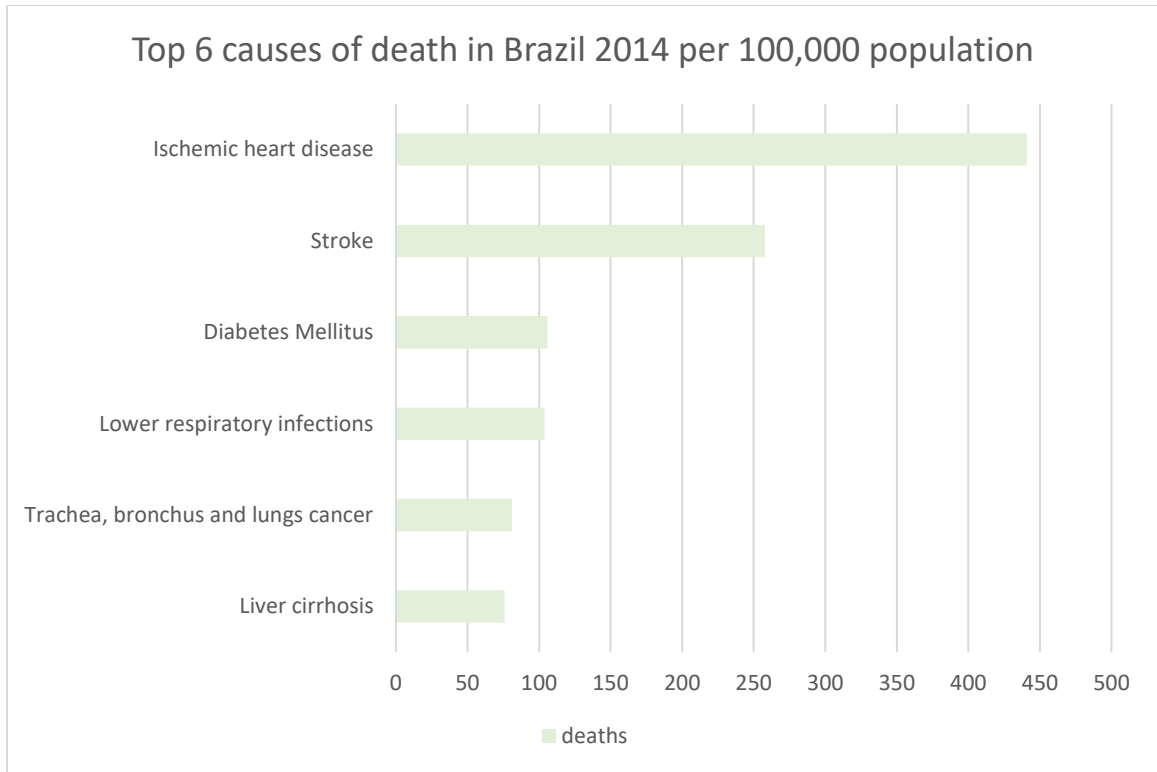
Top 6 causes of death in Brazil 2014 per 100,000 population

Figure 6

In Figure 6 the first 2 positions remained the same, however the following positions were interchanged. DM took the 3rd position with 106(15) deaths, followed by LRI with 104(15). Finally, TBL cancer and LC exchanged places with 81(15) and 76(15) deaths respectively.

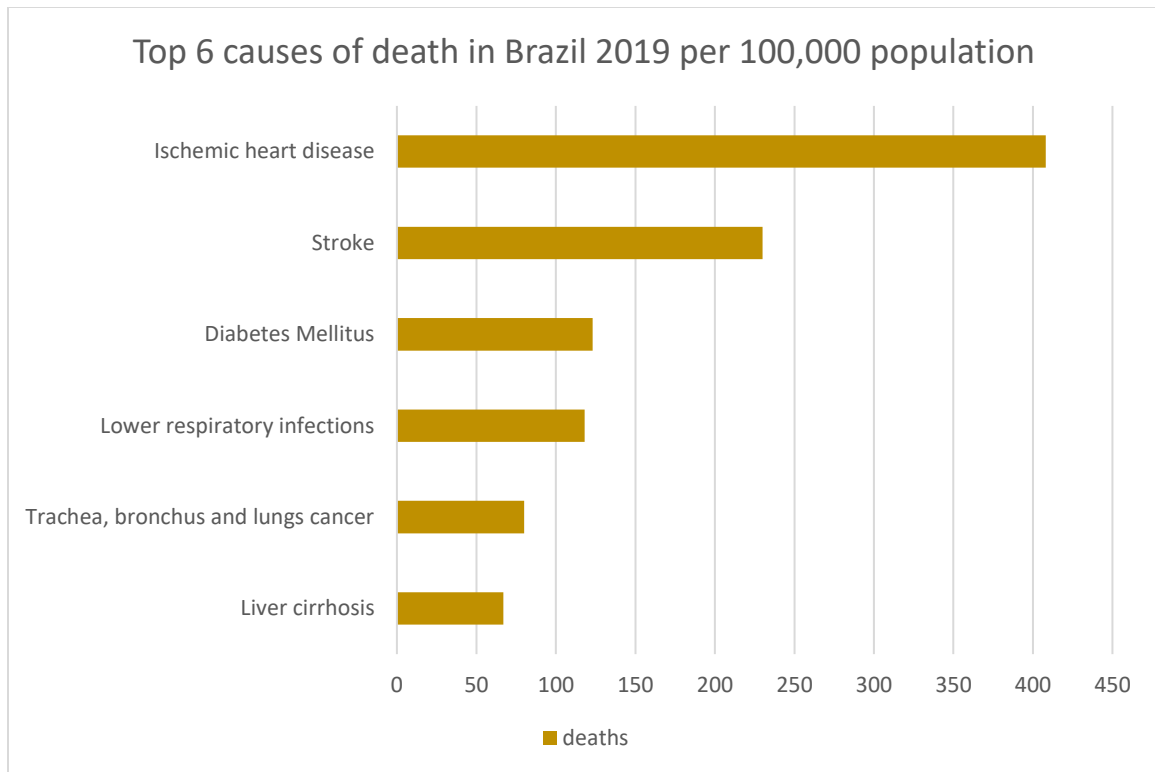## Top 6 causes of death in Brazil 2019 per 100,000 population

Figure 7

When comparing the data from 2019, presented in Figure 7, to previous years, it is evident that the causes of death are arranged the same way as in 2014. IHD leads the chart with 408(15) deaths, followed by stroke with 230(15), DM with 123(15), LRI with 118(15), TBL cancers with 80(15) and liver cirrhosis with 67(15) deaths respectively. Unfortunately, same as with Uruguay, it is hard to establish a trend of numbers of deaths since the values both go up and down and stay highly similar to one another.
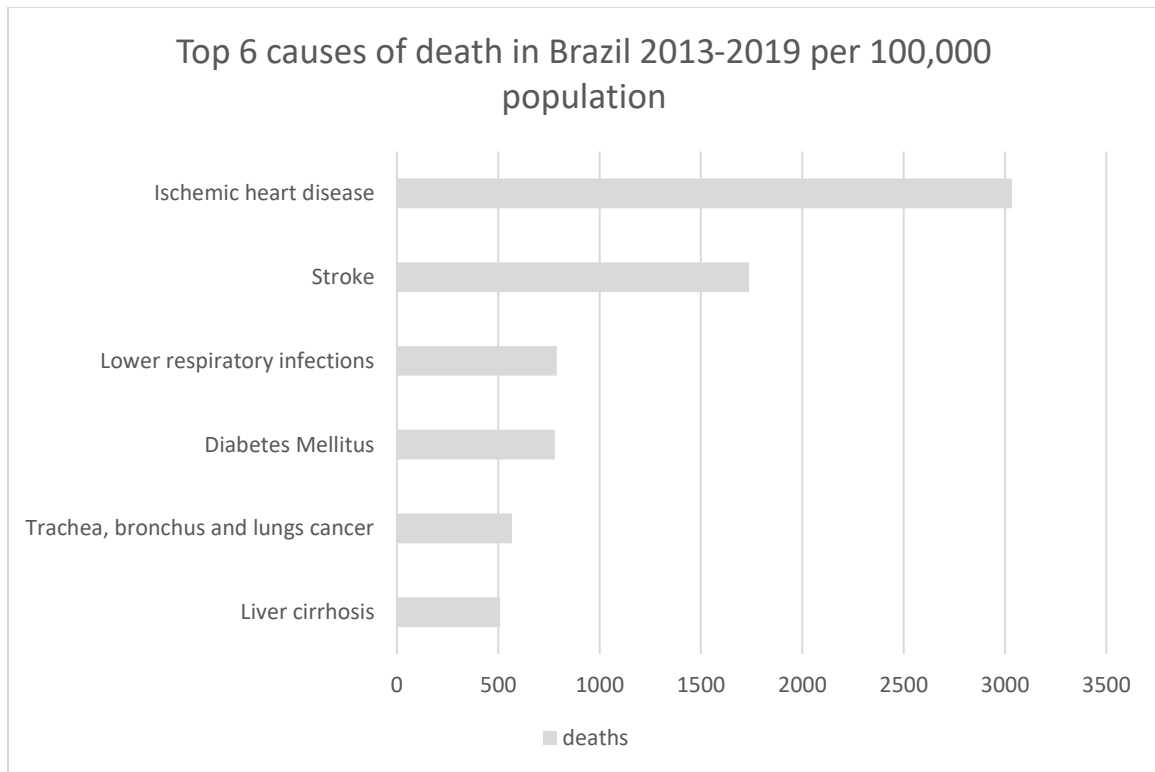
Top 6 causes of death in Brazil 2013-2019 per 100,000 population

Figure 8

Figure 8 presents the data from the entire 2013-2019 period combined. In this figure it is seen that overall, IHD takes the first place with 3033(15)deaths, followed by stroke with 1737 (15) deaths and then LRI with 789(15), DM with 780(15), TBL cancer with 568(15) and finally LC with 510(15) deaths per 100,000 population.

Summing up the data collected from Brazil, the leading cause of death in both Uruguay and Brazil is IHD. However, despite close geographical location as well as cultural and economic situations the following causes of death are widely different. Diabetes Mellitus, lower respiratory infections and liver cirrhosis are found amongst the top causes of death in Brazil but not in Uruguay. Stroke and trachea, bronchus and lungs cancers are present for both countries, however, differ in positions in the charts with stroke in 2nd place in Brazil, while being in the 3rd position in Uruguay. TBL cancers are in the 5th position in Brazil and in 2nd in Uruguay.

The data from 2013-2019 Kenya will be presented next. It is the researcher's expectation that the data will be vastly different from that of Brazil and Uruguay.
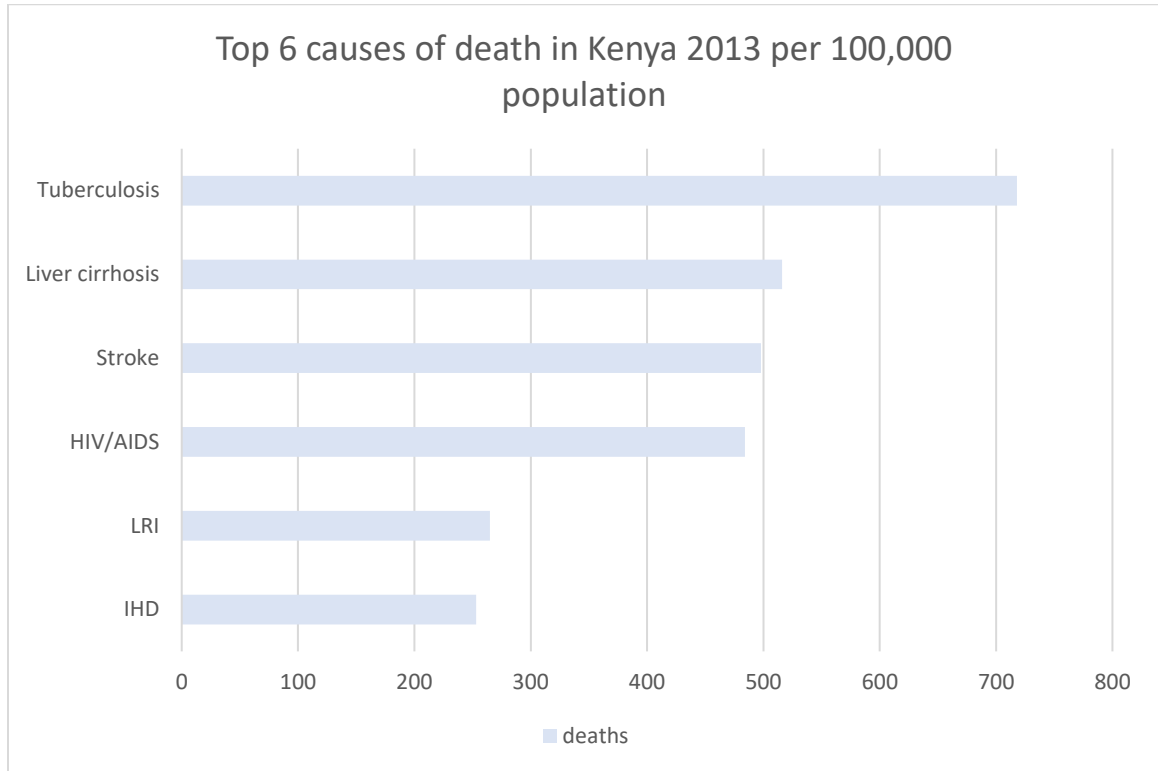

Top 6 causes of death in Kenya 2013 per 100,000 population

Figure 9

Figure 9 represents data about the top 6 causes of death in Kenya in 2013. Immediately, the difference in represented disease can be observed. The first position in the chart is taken by tuberculosis with 718 (15)deaths. Next in line is liver cirrhosis with 516(15) deaths, stroke with 498(15) deaths, HIV/AIDS with 484(15), followed by LRI with 265(15) deaths and finally IHD with 253(15) deaths. The overlap in diseases between Kenya, Uruguay, and Brazil in the year 2013 are stroke, LRI, IHD and liver cirrhosis. However, the number of deaths caused by stroke in Kenya is much higher than those in Brazil and Uruguay.
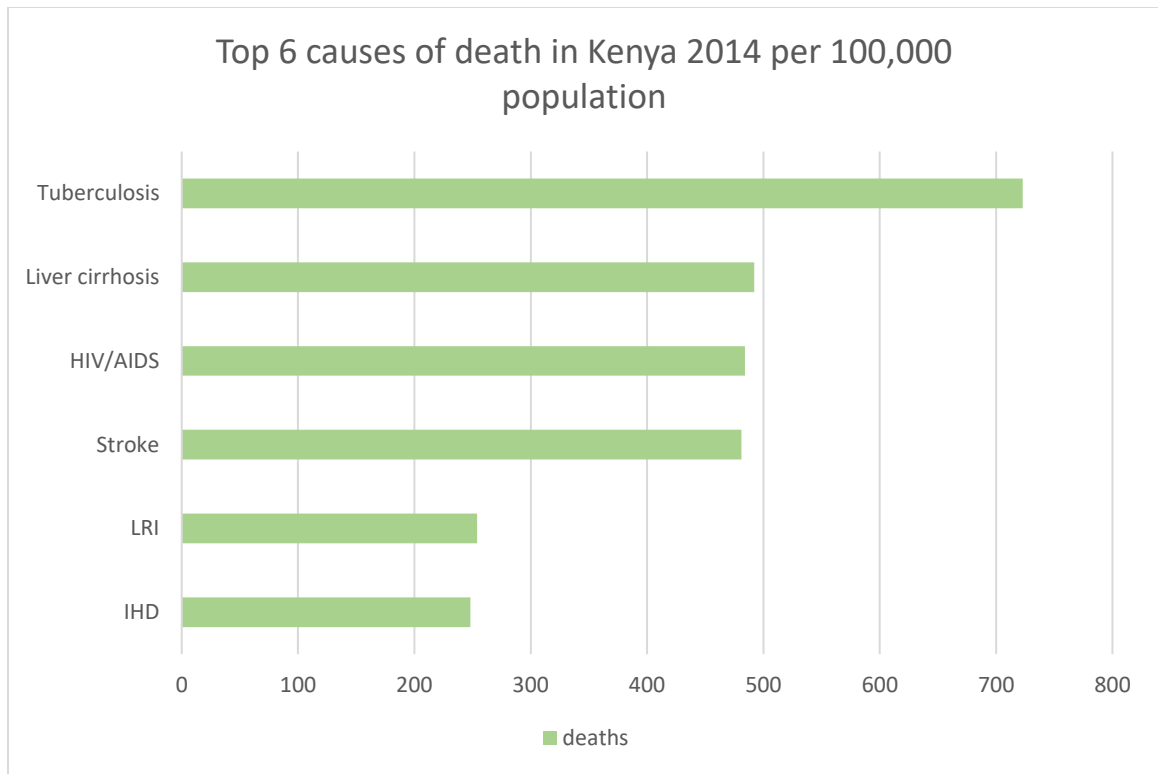
Top 6 causes of death in Kenya 2014 per 100,000 population

Figure 10

Analysing Figure 10, the data seems to be rather dynamic compared to the information from 2013. Tuberculosis with 723(15) deaths remains at the top of the chart, LC remains at the 2nd position in the chart with 492(15)deaths. However, stroke and HIV/AIDS switch positions with HIV/AIDS taking 3rd position with 484(15) and stroke taking 4th position with 481(15) deaths. LRI and IHD remain at the bottom of the chart with 254(15) and 248(15) deaths respectively.
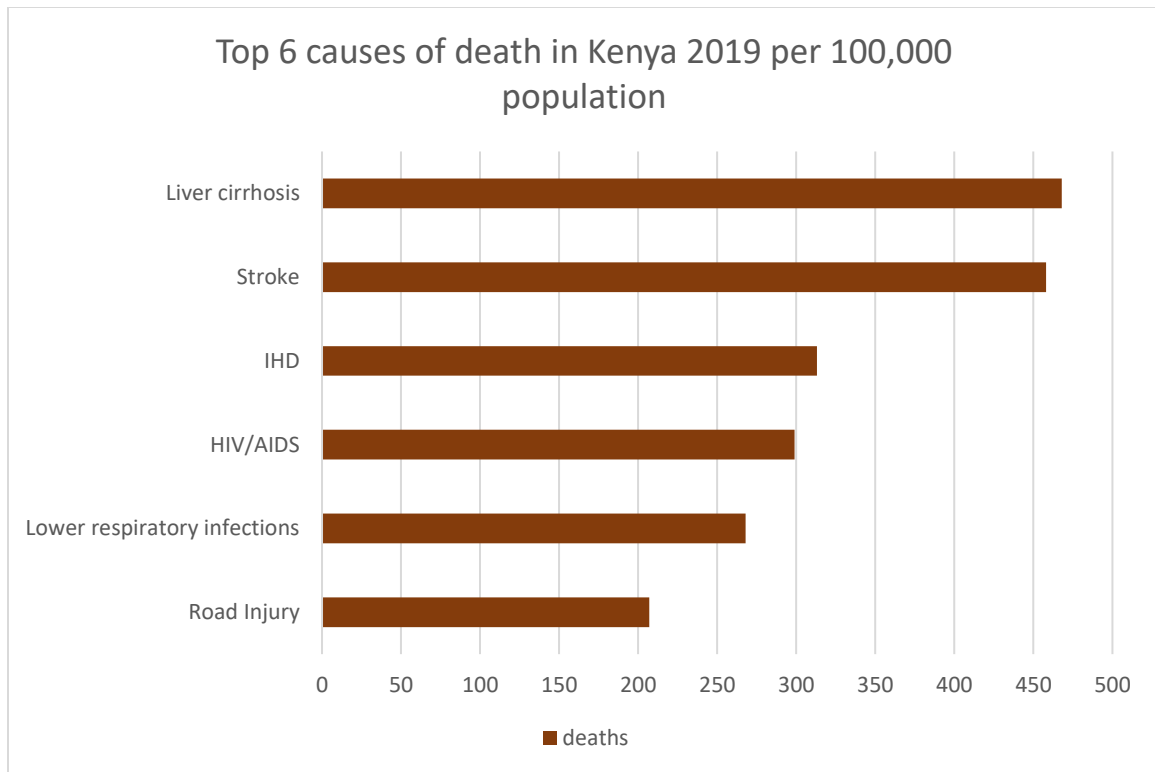
Top 6 causes of death in Kenya 2019 per 100,000 population

Figure 11

Comparing the data from Figure 11 to Figures 9 and 10 it can be seen that tuberculosis is no longer present among the top 6 causes of death. In fact, in the year 2019 it is replaced completely, as a new cause of death is observed- road injury which claims 207(15) deaths. Liver cirrhosis takes the 1st position with 468(15) deaths, followed by stroke with 458(15), IHD with 313(15), HIV/AIDS with 299(15), LRI with 268(15) and road injury with 207(15) deaths respectively.
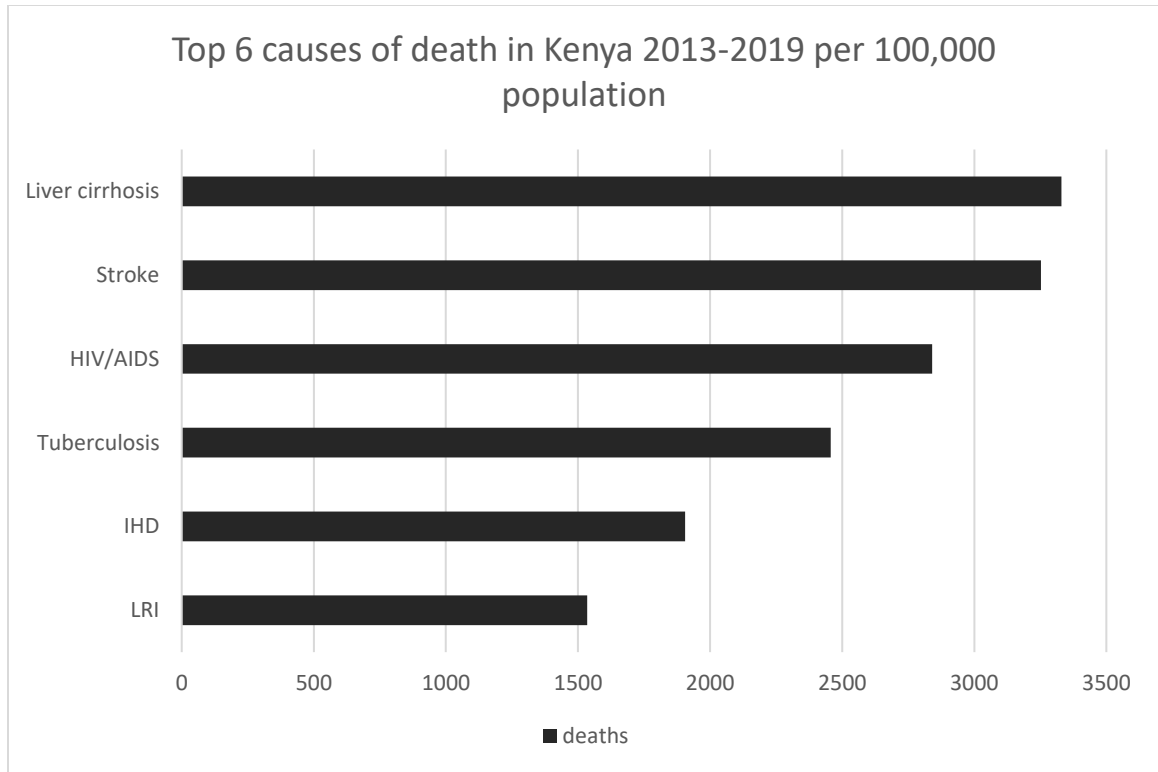
Top 6 causes of death in Kenya 2013-2019 per 100,000 population

Figure 12

Finally, Figure 12 represents the data about the top 6 causes of death in Kenya from 2013-2019. The data is rather different when compared to that of the years 2013 and 2014. At the top of the chart is liver cirrhosis with 3330(15) as the leading cause of death in Kenya. Next up is stroke with 3253(15) deaths, followed by HIV/AIDS in position 3 with 2841(15)deaths. Tuberculosis takes 4th place with 2457(15) deaths, followed by ischemic heart disease with 1906(15)deaths and finally lower respiratory diseases with 1535(15)deaths.

DISCUSSION

When comparing the results from leading causes of death for Uruguay, Brazil and Kenya of general population collected from the WHO variations in the data is identified. Both Uruguay and Brazil are dominated by IHD as the leading cause of death. TBL cancers in Uruguay take the 2nd position in the leading causes of death of general population. In Brazil, the 2nd position is taken by stroke. Kenya's data is vastly different than that of any other country mentioned in this study. The leading causes of death are predominantly liver cirrhosis and stroke.

A rather intriguing fact is that trachea, bronchus, and lung cancers are so high in both Brazil and Uruguay. It was the researcher's immediate intuition to look into tobacco product consumption in these countries. Uruguay stands with 21.8%(16) of adult smoking prevalence. The annual numbers of death attributed to tobacco smoking is 5.1 thousand(16) in Uruguay. In Brazil around 13%(17) of the population smokes. Around 24.7%(18) of all deaths in Brazil are related to the use of tobacco.

Liver cirrhosis being the most prevalent cause of death in Kenya in the researched time period also begs the question as to why that is the case. Hepatocellular carcinoma is the 3rd most common malignancy in Kenya and it occurs at peak age of 40(19). J. Mwangi in his work highlights that aflatoxin and non A/B hepatitis viruses may play a significant role in causation of liver diseases in Kenya.(19)

The healthcare system situation in the countries mentioned in this study is rather different. Infectious diseases such as tuberculosis, lower respiratory infections and HIV/AIDS are among the main leading causes of deaths in Kenya in the 2013-2019 period. However, the situation in Uruguay, Brazil is rather different. In Uruguay, infectious diseases are not among the top 6 causes of death. In Brazil LRI are present among the top 6 causes of death. This in term leads to further considerations about coverage of infection diseases by the local healthcare

systems. In Uruguay and Brazil the coverage for tuberculosis and HIV/AIDS is much higher than that of Kenya.(20-22)

To get a better perspective on the causes of death in the world and to compare them between one another a few more examples: Lithuania, Germany and USA are introduced. In Lithuania, USA and Germany the leading cause of death is IHD(23-24,30). Surprisingly, in 2019 Lithuania reported to have the highest level of mortality from cardiovascular diseases in the whole European Union.(28) Other causes of death in Lithuania are stroke, lung cancer, hypertensive disease, colon and rectum cancer and suicide respectively(25,31,32). In Germany the leading causes of death are cardiovascular diseases, neoplasms and cerebrovascular diseases(stroke) which accounted for over 70% of deaths between 1990-2020 (27,29,33). Other diseases that are included in the leading causes of death in Germany are lung cancer, COPD, colorectal cancer and diabetes.(23) Finally, the leading causes of death from 2013-2019 in the United States of America are IHD, malignancies, accidents(unintentional injuries),COPD ,stroke and Alzheimer's disease respectively(26,34–40)

It is rather obvious at this point that the leading causes of death in the aforementioned countries are IHD and stroke. When one compares Uruguay, Brazil, and Kenya to Lithuania, Germany, and USA some similarities are observed. Uruguay and Brazil have a rather similar picture of causes of death as Lithuania, Germany and USA. However, Kenya has a completely different one. Infectious diseases are rampant in Kenya compared to all other countries mentioned in this study. This can be attributed not only to the overall medical systems quality but also to the possible underestimation of disease burdens by the local hospitals(41).

Life expectancy is another factor that could help objectively assess the country's state of health. The life expectancy in Uruguay between 2013 and 2019 was 77(42) years old . In Brazil it increased from 74 to 75 (43,44) years old in that time period. Kenya has also seen an increase in the life expectancy from 72 to73(45) years old. Lithuania saw a sharp increase from 69 to

72(46). In Germany the life expectancy went up from 80 to 81(47). Finally, in the USA the life expectancy actually went down from 78.6 to 78.5(48–50) .

CONCLUSIONS

This study has demonstrated that within certain countries there is an overlap of causes of death between the general populations. The findings from the general population of Uruguay and Brazil reveal that all are suffering from IHD as the main cause of death. However, the leading cause of death in Kenya is inconsistent with other countries researched in this work as the leading cause of death is liver cirrhosis. Furthermore, the cancers that are identified in both Uruguay and Brazil are a major contributor to causes of death in these countries. This in term raises the question about the awareness of cancers in this region and perhaps requires the local medical systems to contribute more research and attention. The same could be concluded regarding the state of attention towards both liver cirrhosis and infectious diseases which are very prevalent in the leading causes of death in Kenya.

REFERENCES

1. The top 10 causes of death [Internet]. [cited 2023 Apr 11]. Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death

2. Coronary Heart Disease - What Is Coronary Heart Disease? | NHLBI, NIH [Internet]. 2022 [cited 2023 May 2]. Available from: https://www.nhlbi.nih.gov/health/coronary-heart-disease

3. Coronary Artery Disease - Coronary Heart Disease [Internet]. www.heart.org. [cited 2023 May 2]. Available from: https://www.heart.org/en/health-topics/consumer-healthcare/what-is-cardiovascular-disease/coronary-artery-disease

4. Stroke [Internet]. National Institute of Neurological Disorders and Stroke. [cited 2023 May 2]. Available from: https://www.ninds.nih.gov/health-information/disorders/stroke

5. About Stroke [Internet]. www.stroke.org. [cited 2023 May 2]. Available from: https://www.stroke.org/en/about-stroke

6. COPD - What Is COPD? | NHLBI, NIH [Internet]. 2022 [cited 2023 May 2]. Available from: https://www.nhlbi.nih.gov/health/copd

7. Chronic respiratory diseases (asthma, COPD) [Internet]. [cited 2023 May 2]. Available from: https://www.who.int/westernpacific/health-topics/chronic-respiratory-diseases

8. Acute Lower Respiratory Tract Infection|Diagnosis & Treatment|ELF [Internet]. European Lung Foundation. [cited 2023 May 2]. Available from: https://europeanlung.org/en/information-hub/lung-conditions/acute-lower-respiratory-infections/

9. Pneumonia - What Is Pneumonia? | NHLBI, NIH [Internet]. 2022 [cited 2023 May 2]. Available from: https://www.nhlbi.nih.gov/health/pneumonia

10. Association AL. Bronchitis (Acute) [Internet]. [cited 2023 May 2]. Available from: https://www.lung.org/lung-health-diseases/lung-disease-lookup/bronchitis

11. Wark P. Bronchitis (acute). BMJ Clin Evid. 2015 Jul 17;2015:1508.

12. Woodhead M, Blasi F, Ewig S, Garau J, Huchon G, Ieven M, et al. Guidelines for the management of adult lower respiratory tract infections--full version. Clin Microbiol Infect Off Publ Eur Soc Clin Microbiol Infect Dis. 2011 Nov;17 Suppl 6(Suppl 6):E1-59.

13. Global, regional, and national age–sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. The Lancet. 2015 Jan;385(9963):117–71.

14.   WHO methods and data sources.pdf.

15.   Global health estimates: Leading causes of death [Internet]. [cited 2023 Apr 17]. Available from: https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death

16.   Tobacco smoking in Uruguay [Internet]. Global State of Tobacco Harm Reduction. [cited 2023 May 4]. Available from: https://gsthr.org/countries/profile/ury/1/

17.   Smoking, vaping, HTP, NRT and snus in Brazil [Internet]. Global State of Tobacco Harm Reduction. [cited 2023 May 4]. Available from: https://gsthr.org/countries/profile/bra/

18.   State of Smoking in Brazil [Internet]. Foundation for a Smoke-Free World. [cited 2023 May 5]. Available from: https://www.smokefreeworld.org/health-science-research-2/health-science-technology-agenda/data-analytics/global-state-of-smoking-landscape/state-smoking-brazil/

19.   Mwangi J, Gatei DG. Hepatitis B virus, hepatocellular carcinoma and liver cirrhosis in Kenya. East Afr Med J. 1993 Apr;70(4 Suppl):34–6.

20.   Brazil [Internet]. [cited 2023 Apr 24]. Available from: https://www.who.int/data/gho/data/countries/country-details/GHO/brazil?countryProfileId=4cb28d44-b963-4b91-a607-83e3d282291d

21.   Kenya [Internet]. [cited 2023 Apr 24]. Available from: https://www.who.int/data/gho/data/countries/country-details/GHO/kenya?countryProfileId=26e47f18-038f-4560-8c78-0c70e7ebdfe8

22.   Uruguay [Internet]. [cited 2023 Apr 24]. Available from: https://www.who.int/data/gho/data/countries/country-details/GHO/uruguay?countryProfileId=8e541240-6336-4e89-a982-8cabe671b690

23.   Germany: Country Health Profile 2021. Paris: OECD Publishing; 2021.

24.   Global health estimates: Leading causes of death [Internet]. [cited 2023 May 8]. Available from: https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death

25.   Lithuania: Country Health Profile 2021. Paris: OECD Publishing; 2021.

26.   FastStats [Internet]. 2023 [cited 2023 May 8]. Available from: https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm

27.   Causes of death [Internet]. Federal Statistical Office. [cited 2023 May 8]. Available from: https://www.destatis.de/EN/Themes/Society-Environment/Health/Causes-Death/_node.html

28. Cardiovascular diseases statistics [Internet]. [cited 2023 May 8]. Available from: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Cardiovascular_diseases_statistics

29. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Lond Engl. 2020 Oct 17;396(10258):1204–22.

30. Institute for Health Metrics and Evaluation. Institute for Health Metrics and Evaluation:GLOBAL BURDEN OF DISEASES, INJURIES, AND RISK FACTORS STUDY.

31. Causes of Death Register - Higienos institutas [Internet]. [cited 2023 May 8]. Available from: https://www.hi.lt/en/mortality-in-lithuania.html

32. Causes of death - Oficialiosios statistikos portalas [Internet]. [cited 2023 May 8]. Available from: https://osp.stat.gov.lt/en/lietuvos-gyventojai-2020/mirtingumas/gyventoju-mirties-priezastys

33. Montano D. Causes of death in Germany: A time series analysis of official statistics from 1990 to 2020. Eur J Public Health. 2022 Oct 25;32(Suppl 3):ckac130.198.

34. Xu J, Murphy S, Arias E, Kochanek K. Deaths: Final Data for 2019 [Internet]. National Center for Health Statistics; 2021 Jul [cited 2023 May 8]. Available from: https://stacks.cdc.gov/view/cdc/106058

35. National Center for Health Statistics, Heron M. Deaths: Leading Causes for 2013 [Internet]. National Center for Health Statistics; 2021 May [cited 2023 May 8]. Available from: https://stacks.cdc.gov/view/cdc/104186

36. National Center for Health Statistics, Heron M. Deaths: Leading Causes for 2014 [Internet]. National Center for Health Statistics; 2021 May [cited 2023 May 8]. Available from: https://stacks.cdc.gov/view/cdc/104186

37. National Center for Health Statistics, Heron M. Deaths: Leading Causes for 2015 [Internet]. National Center for Health Statistics; 2021 May [cited 2023 May 8]. Available from: https://stacks.cdc.gov/view/cdc/104186

38. National Center for Health Statistics, Heron M. Deaths: Leading Causes for 2016 [Internet]. National Center for Health Statistics; 2021 May [cited 2023 May 8]. Available from: https://stacks.cdc.gov/view/cdc/104186

39. National Center for Health Statistics, Heron M. Deaths: Leading Causes for 2017 [Internet]. National Center for Health Statistics; 2021 May [cited 2023 May 8]. Available from: https://stacks.cdc.gov/view/cdc/104186

40. National Vital Statistics Reports Volume 70, Number 8 July 26, 2016 Deaths: Final Data 2019.

41.   Etyang AO, Munge K, Bunyasi EW, Matata L, Ndila C, Kapesa S, et al. Burden of disease in adults admitted to hospital in a rural region of coastal Kenya: an analysis of data from linked clinical and demographic surveillance systems. Lancet Glob Health. 2014 Apr 27;2(4):e216–24.

42.   Uruguay data | World Health Organization [Internet]. [cited 2023 May 9]. Available from: https://data.who.int/countries/858

43.   World Bank Open Data [Internet]. World Bank Open Data. [cited 2023 May 9]. Available from: https://data.worldbank.org

44.   Brazil data | World Health Organization [Internet]. [cited 2023 May 9]. Available from: https://data.who.int/countries/076

45.   Kenya data | World Health Organization [Internet]. [cited 2023 May 9]. Available from: https://data.who.int/countries/404

46.   Lithuania data | World Health Organization [Internet]. [cited 2023 May 9]. Available from: https://data.who.int/countries/440

47.   Germany data | World Health Organization [Internet]. [cited 2023 May 9]. Available from: https://data.who.int/countries/276

48.   United States of America data | World Health Organization [Internet]. [cited 2023 May 9]. Available from: https://data.who.int/countries/840

49.   Arias E. United States Life Tables, 2013.

50.   Arias E. United States Life Tables, 2014.