



The Causes of Death around the World

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1 Introduction

Do you know around 56 million people die each year? What caused their death? How did the causes of death change over time and difference between countries and world regions? And can we prevent death early. There are the big questions we are answering in our report.

Our data is from “data in our world”, It counts more than 20 causes of death in countries around the world from 1990 to 2018. From the table1, here is a list of the causes of death covered by this report. From the plot1, we can see Cardiovascular diseases are the leading cause of death globally. The second biggest cause is Neoplasms. What about the specific situation in the different countries? The four members of our group will choose two countries of interest and make an analysis.

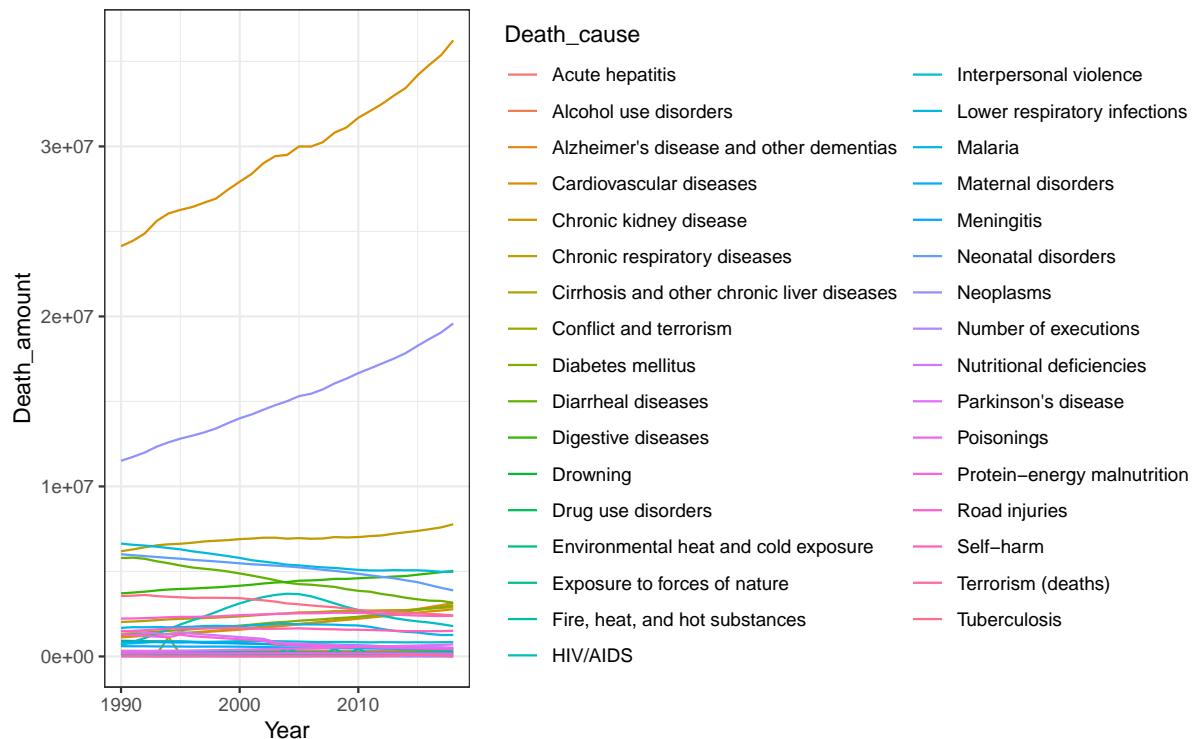


Figure 1: Number of deaths by cause, World, 1990 to 2019

Table 1: *The causes of death*

X
Acute hepatitis
Alcohol use disorders
Alzheimer's disease and other dementias
Cardiovascular diseases
Chronic kidney disease
Chronic respiratory diseases
Cirrhosis and other chronic liver diseases
Conflict and terrorism
Diabetes mellitus
Diarrheal diseases
Digestive diseases
Drowning
Drug use disorders
Environmental heat and cold exposure
Exposure to forces of nature
Fire, heat, and hot substances
HIV/AIDS
Interpersonal violence
Lower respiratory infections
Malaria
Maternal disorders
Meningitis
Neonatal disorders
Neoplasms
Number of executions
Nutritional deficiencies
Parkinson's disease
Poisonings
Protein-energy malnutrition
Road injuries
Self-harm
Terrorism (deaths)
Tuberculosis

2 Main body

2.1 Australia and Switzerland

Research Question:

Q1: What can be observed in the chart of causes of death due to disease?

Q2: What can be observed in the chart of causes of death due to others?

1. Plot death due to disease factors

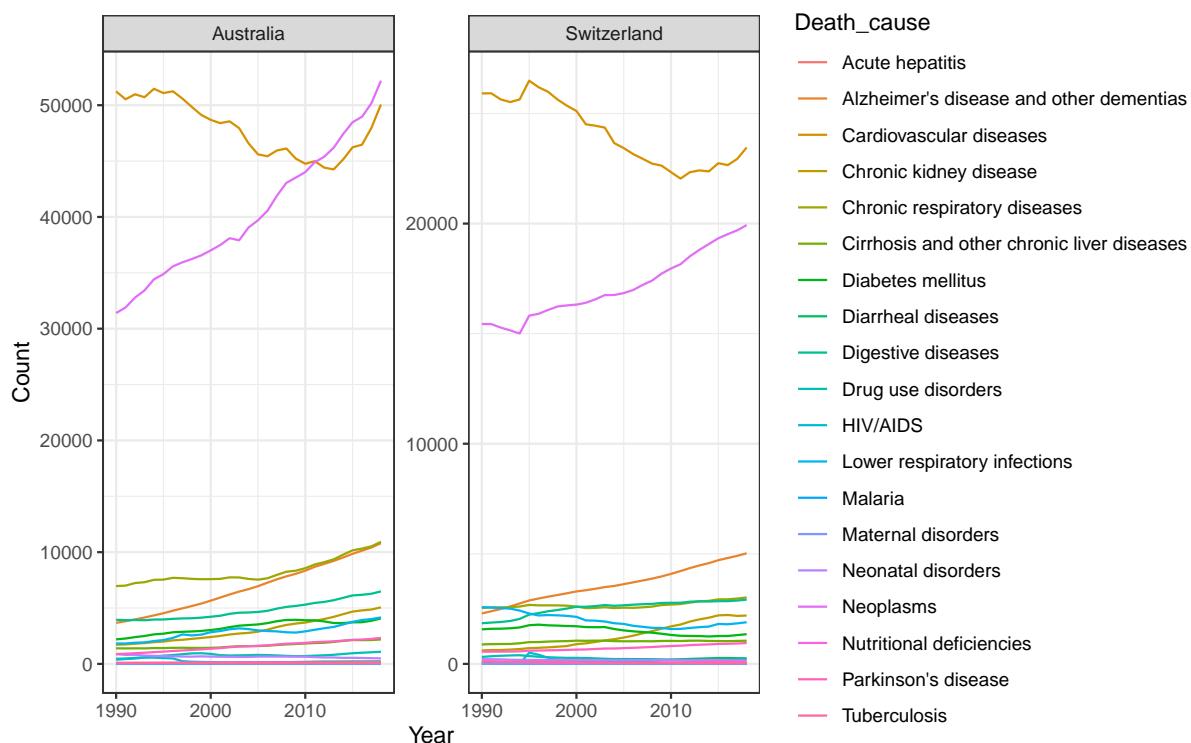


Figure 2: Number of deaths by disease causes, 1990 to 2018

As we can see from this graph², cardiovascular disease and Neoplasm are the leading causes of death in both Australia and Switzerland, with cardiovascular disease decreasing but starting to rise again after about 2011, and the number of deaths from Alzheimer's and neoplasm rising sharply.

This result confused me. I would have thought that because of the advancement of medicine, the causes of death from disease should gradually decrease. So I looked up these three conditions online, all of which are highly prevalent in older people, and then in this table ², I listed life expectancy in Australia and Switzerland from 1990 to 2019. As can be seen from the table², life expectancy increases as the years go by, meaning that more people are living old enough so that the number of people who are sick increases.

Table 2: Life Expectancy in Australia and Switzerland

	Country	Year	Life_expectancy	Country	Year	Life_expectancy
20	Australia	2009	81.764	Switzerland	2009	82.077
21	Australia	2010	81.944	Switzerland	2010	82.269
22	Australia	2011	82.119	Switzerland	2011	82.450
23	Australia	2012	82.291	Switzerland	2012	82.626
24	Australia	2013	82.460	Switzerland	2013	82.799
25	Australia	2014	82.627	Switzerland	2014	82.971
26	Australia	2015	82.794	Switzerland	2015	83.142
27	Australia	2016	82.959	Switzerland	2016	83.310
28	Australia	2017	83.122	Switzerland	2017	83.473
29	Australia	2018	83.281	Switzerland	2018	83.630

In plot3, I have added this life expectancy line to the first graph for better visualization and you can see that it is all on an up trend.

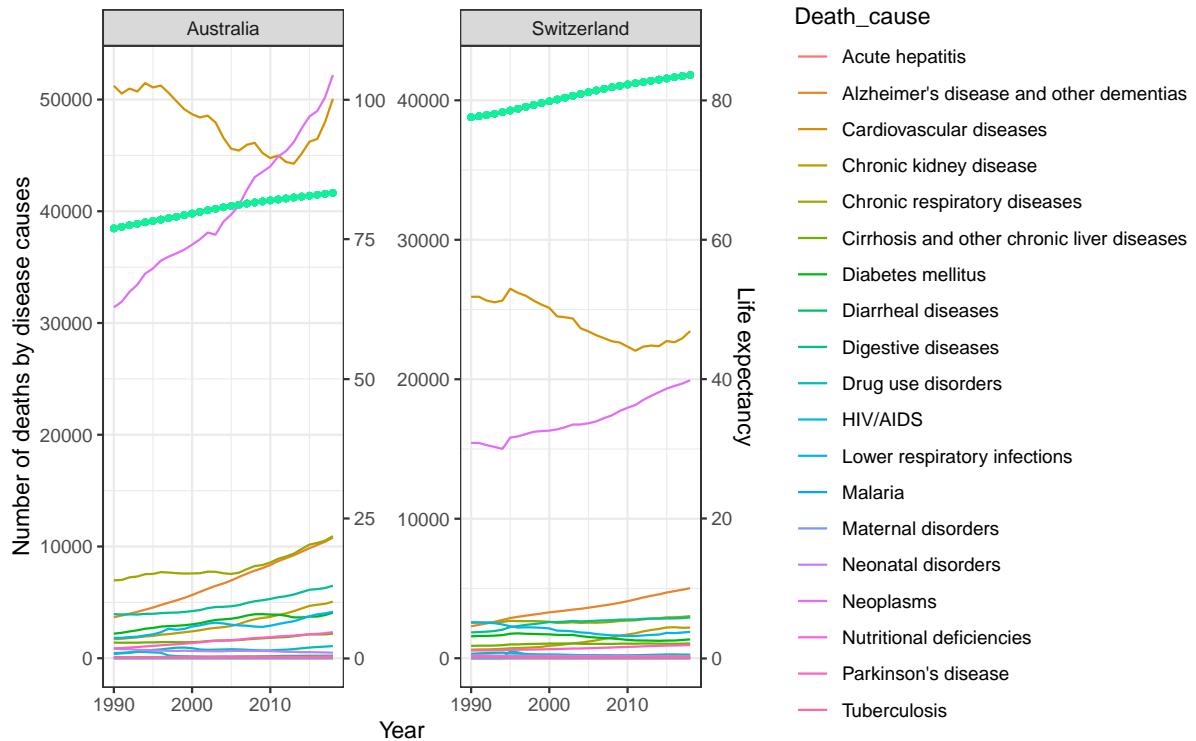


Figure 3: Add the line of life expectancy to fig1.

2.Plot death due to other factors

For other causes. This graph 4shows that self-harm, road injuries are the main causes of death from other causes. Road injuries have been decreasing and I think this is closely related to the improving traffic laws and the popularity of driving tests. I noticed that Australia had an unusual peak in 2009. I searched Google for three keywords: Australia Fire 2009 and I got the information that there was

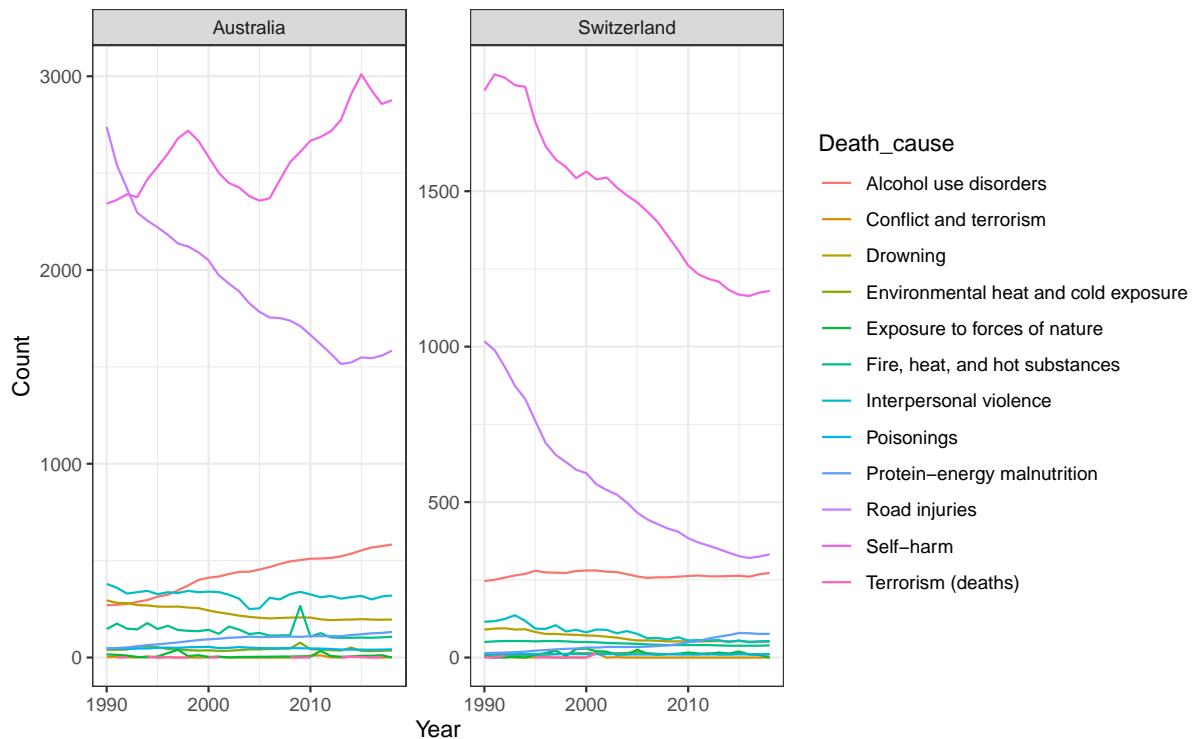


Figure 4: Number of deaths by other causes in Australia and Switzerland.

a very serious forest fire in Vic in 2009. Hub ([2009](#)) said that the Black Saturday fires started on 7 February 2009. Approximately 400 fires were recorded across Victoria, affecting 78 communities. A total of 173 people died in the fires, and 2029 houses were lost. So in 2009 an unusually high number of people died in fires in Australia.

In order to read data used R package Wickham, Hester, and Bryan ([2022](#)), clean the data used R package Wickham et al. ([2019](#)), plotting picture used R package Wickham ([2016](#)).

2.2 China and India

The health conditions are different due to the resources that different countries control. Which leads to an inequality in health in different areas Emadi, Delavari, and Bayati (2021). Countries in different developing conditions would have different health conditions. This section will focus on 2 typical developing countries : China and India. Investigate diseases that cause the most death in China and India, and how they are related with the GDP per capita.

Research Question:

Q1: What are the diseases that cause the most death in China and India?

Q2: How the death caused by those diseases change with the change of GDP per capita?

We will focusing on 6 typical diseases: they are : Cardiovascular Diseases, Diabetes mellitus, HIV, Neoplasms, Nutritional deficiencies and, Malaria

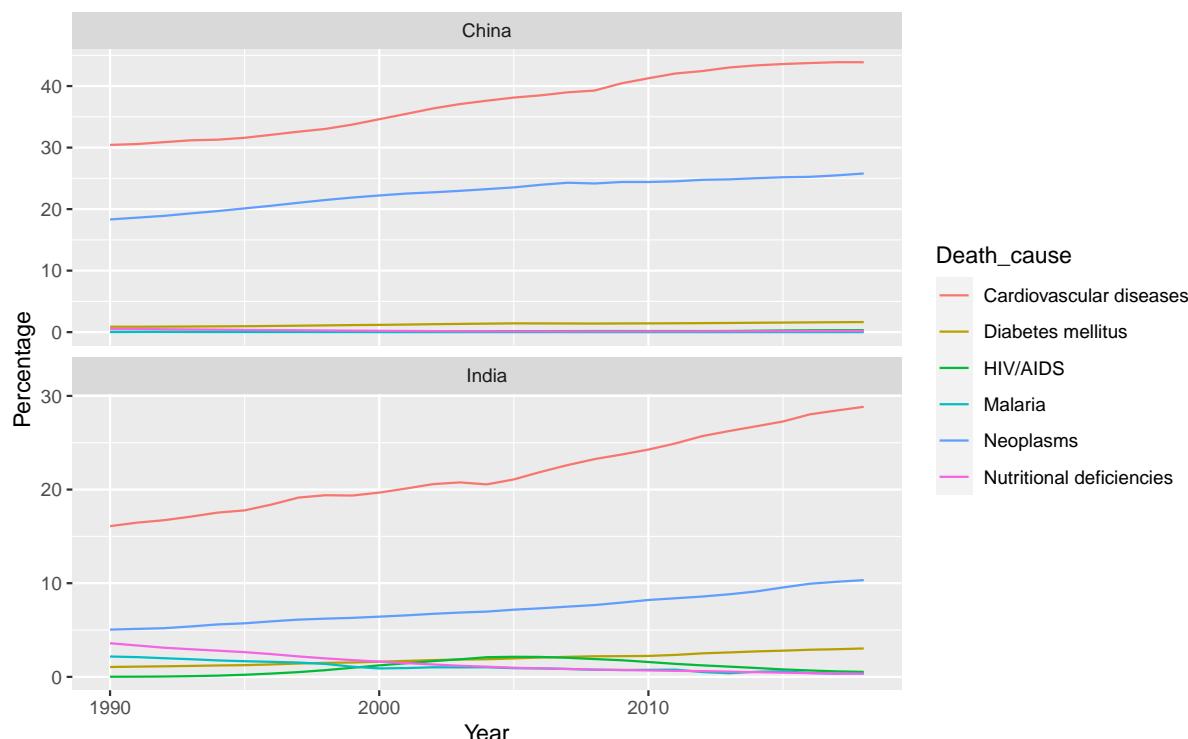


Figure 5: Percentage of different causes of death by year

In this graph 5 , it is clear that both Cardiovascular Diseases and Neoplasms contribute the most among other diseases we are interested in both China and India and the trend is still increasing. So we will mainly focus on these 2 diseases. There are 43% deaths caused by Cardiovascular diseases and 26% caused by Neoplasms in China. 29% deaths caused by Cardiovascular diseases and 10% caused

Table 3: Parameters of model

Country	Death_cause	r.squared	intercept	slope
China	Cardiovascular diseases	0.96	2085613.4	181.99
China	Neoplasms	0.90	1404129.3	90.30
India	Cardiovascular diseases	0.98	1031131.3	221.18
India	Neoplasms	0.98	306150.6	85.49

by Neoplasms in India. So, diseases that cause the most deaths in China and India are Cardiovascular diseases and Neoplasms.

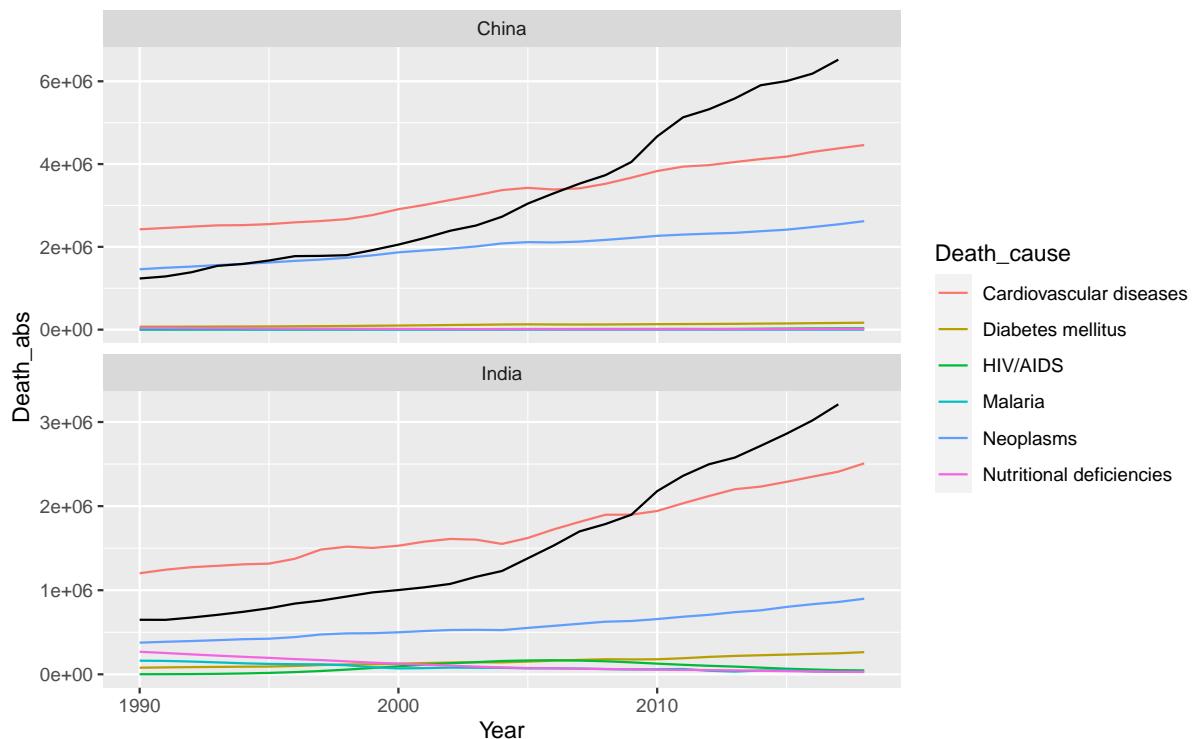


Figure 6: Total number of death by year and GDP per capita

In this graph 6, we combine them with the GDP per capita graph, which is the black line. There is a clear trend that the death caused by these 2 diseases are highly correlated with GDP per capita. To find out the relations between them.

I run a regression, using the death caused by “Cardiovascular diseases” and “Neoplasms” against GDP per capita shown in the table 3. The r^2 is quite high means they fitted into the linear model quite well

More than 90% of deaths caused by Cardiovascular diseases and Neoplasms can be explained by the model. In China, for every 1 unit increase in the GDP per capita, the deaths caused by Cardiovascular

diseases and Neoplasms will increase for 182 and 90. In India, for 1 unit increase in the GDP per capita, the deaths caused by Cardiovascular diseases and Neoplasms increased by 221 and 85 respectively.

It is corresponding to common sense as well. Because both Cardiovascular Diseases and Neoplasms occur more in the area with higher income. The longer one lives, the higher the possibility one can get these 2 diseases. Richer a country is, more resources can be used on transmitted diseases. therefore we can observe that death caused by transmitted diseases decreased to a very low level

In this part, I used package `readr` Wickham, Hester, and Bryan (2022) to read data, package `broom` Robinson, Hayes, and Couch (2022) to get statistic data from model, package `knitr` Xie (2014) to make table, package `tidyverse` Wickham et al. (2019) for basic calculation and package `ggplot2` Wickham (2016) to plot.

Table 4: Deaths by cause of Mexico

Death_cause	Death_amount
Cardiovascular diseases	1977765
Neoplasms	1279390
Digestive diseases	858807
Chronic kidney disease	847610
Diabetes mellitus	827878

Table 5: Deaths by cause of Germany

Death_cause	Death_amount
Cardiovascular diseases	4991605
Neoplasms	3926141
Digestive diseases	681341
Alzheimer's disease and other dementias	608309
Chronic respiratory diseases	584420

2.3 Mexico and Germany

Research Question:

Q1: In Mexico and Germany what are the top five diseases that cause the most deaths from 2005?

Q2: What are the trends of these countries over the 15 years?

1.The tables of top five diseases in Mexico and Germany

From the table 4 we can see that there are most people die from cardiovascular diseases with almost two million (1977765) deaths. The second is Neoplasms. Digestive diseases, Chronic kidney disease and Diabetes mellitus are the third, fourth and fifth respectively.

On the other hand, from the table 5 it is easy to see it's similar to Mexico, where the top three are Cardiovascular diseases, Neoplasms and Digestive diseases. But the number of Cardiovascular deaths in Germany is almost five million (4991605) which is more than twice as high as in Mexico. Alzheimer's diseases and other dementias is the fourth, followed by the Chronic respiratory diseases.

2.The figure of trend of these diseases in Mexico and Germany

The graph 7 shows that the number of deaths from these five diseases is increasing every year, with the biggest increase in deaths from cardiovascular diseases. The number of deaths from Chronic kidney disease, Diabetes mellitus and Digestive diseases is similar every year. By contrast, the trend of above diseases in Germany has seen a relatively flat. Except for the significant increase in the

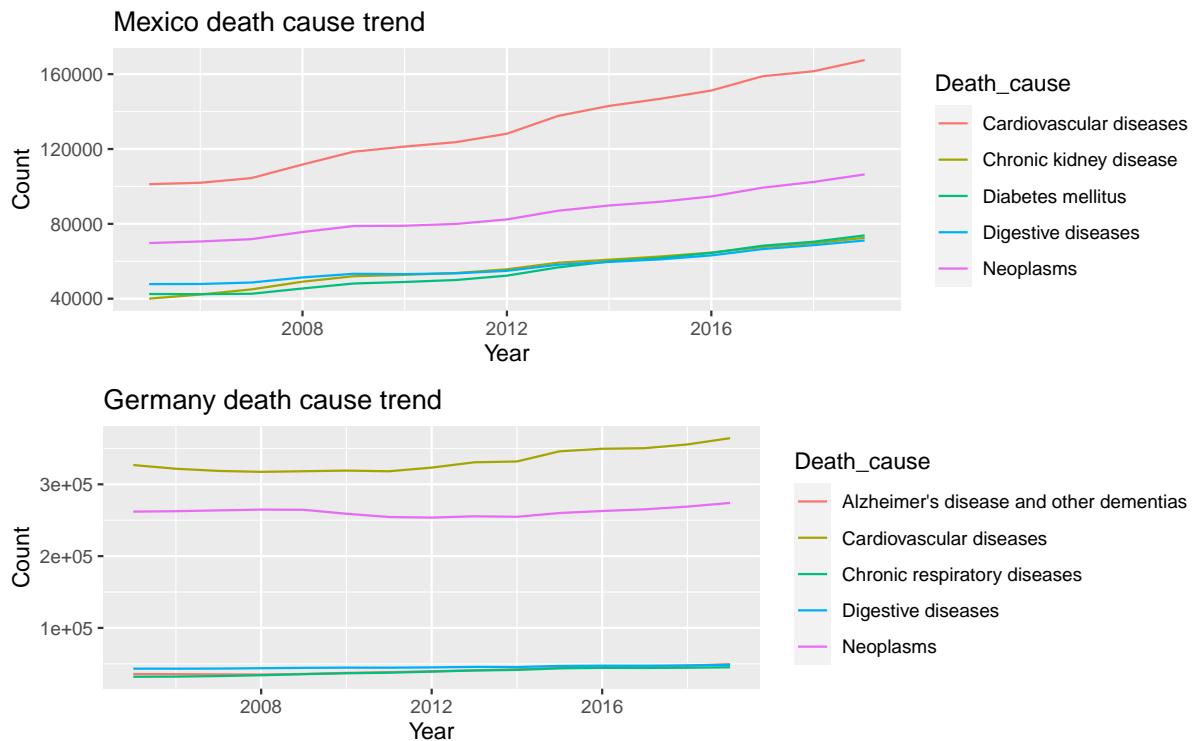


Figure 7: Deaths by cause in Mexico and Germany

number of deaths due to cardiovascular diseases since 2011, the other four causes of death showed a relatively stable trend.

Summary

To this data set, I selected the data of Mexico and Germany from 2005 to do a research. My conclusion is as I said, cardiovascular disease, Neoplasms and digestive disease are the top three causes of death in Mexico and Germany. The article written by Miller, Balady, and Fletcher (1997) said most of these diseases are caused by bad living habits. We should pay attention to this problem and call on all of us to change the bad lifestyle, keep exercising and have a regular diet. In this report, I used R package Wickham et al. (2019), Wickham (2016) and Wickham, Hester, and Bryan (2022).

Table 6: *The top 5 death causes of Benin from 2000 until now*

Death_cause	Death_amount
Malaria	253392
Neonatal disorders	232414
Lower respiratory infections	183930
Cardiovascular diseases	181463
Diarrheal diseases	121827

Table 7: *The top 5 death causes of Mozambique from 2000 until now*

Death_cause	Death_amount
HIV/AIDS	1385012
Malaria	513519
Neonatal disorders	509414
Cardiovascular diseases	502641
Tuberculosis	415674

2.4 Benin and Mozambique

Research Question:

Q1: What are top 5 causes of death in Benin and Mozambique, and what may be the reason for it?

Q2: What is the development trend of these causes in the above question?

1. Top 5 death causes in Benin and Mozambique

According to that table 6, Top five death reasons for Benin from 2000 until now are: Malaria, Neonatal disorders, Lower respiratory infections, cardiovascular disease, Diarrheal diseases. Meanwhile, according to table 7 top five death reasons for Mozambique from 2000 until now are: HIV/AIDS, Malaria, Neonatal disorders, Cardiovascular diseases, Tuberculosis. Comparing to other countries, Benin and Mozambique have totally different results. For those high-income or developed countries and middle-income countries, the main death causes are Cardiovascular disease, cancers, or diabetes mellitus, which are mainly caused by getting old, or unhealthy lifestyle. However, in Benin and Mozambique the main cause of death are different types and infectious diseases and neonatal disorders. The reason for this phenomena is the bad circumstance and the poor medical system in these countries, also they are lack of vaccines and medicines, according to Mbeye et al. (2019). Many people could have been saved if they have a good treatment. For example, Malaria is mainly transmitted by mosquitoes, and in Africa there are so many mosquitoes. However people can be saved if they have

specific drugs like artemisinin. In this way, Malaria, a not very severe disease in other countries, become the top death cause in Benin and Mozambique.

2. Figure of the trends of these diseases in Benin and Mozambique

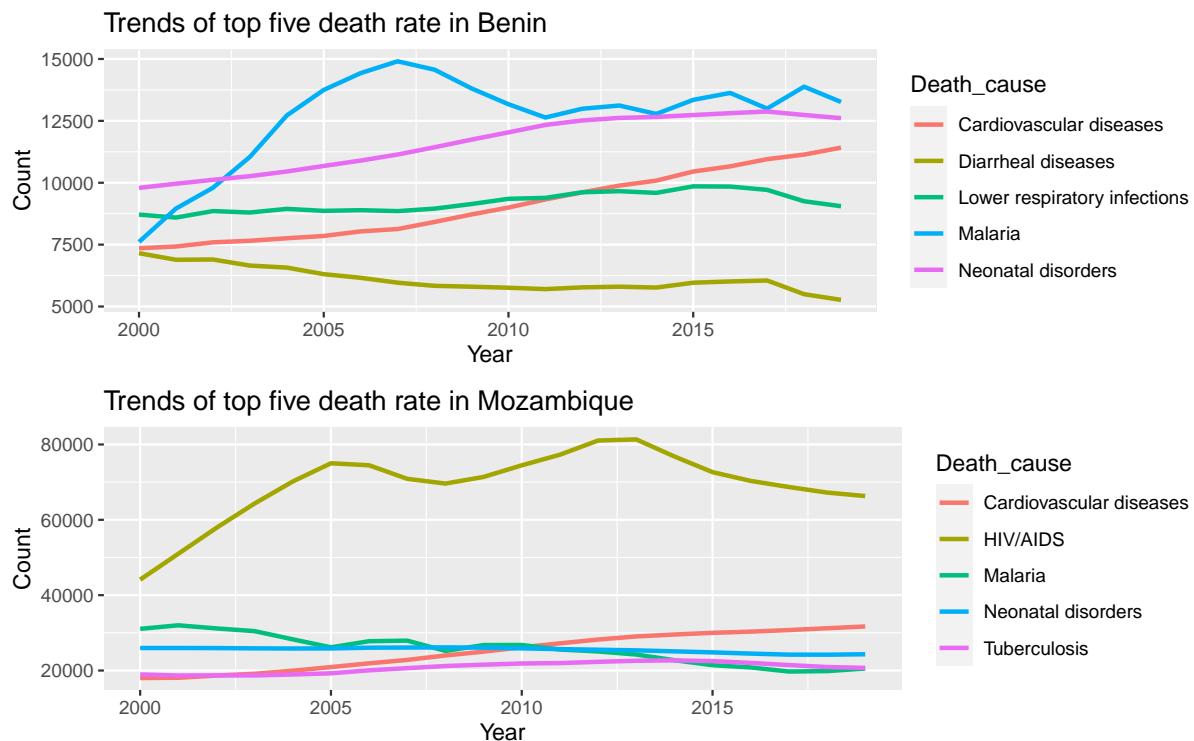


Figure 8: figure of top5 death reason in Benin and Mozambique

According to figure graph8, except Diarrheal disease, all the other four diseases were increasing from 2000 until now. Lower respiratory infections death reached the peak around 2015, and began to decrease in recent years. For Mozambique, the death rate of Cardiovascular disease was increasing from 2000 until now. Death number for HIV and Tuberculosis reached the peak in around 2013 and began to drop. The death number of Malaria and Neonatal disorder was deceasing from 2000 until now. In order to help these low-income countries get out of these difficulties, and save more life, high-income developed countries should help them by serving more medicines and vaccines. Also, more medical teams should support Africa and help patients in those low-income countries. To make these tables and figure, I can also cite R packages as follows Wickham et al. (2019), Wickham (2016), Wickham, Hester, and Bryan (2022), Auguie (2017).

3 Conclusion

In conclusion, we can see that in high-income or developed countries like Australia, Switzerland, and Germany, the main death causes are cardiovascular diseases and they are caused by bad lifestyles and a long life time. People need to pay more attention to their mental health, and have a healthy diet. For those middle-income countries like China, India, and Mexico, the main death reason are cardiovascular and cancer, and the death reason is very related to the GDP of these countries. For those low-income countries, like Benin and Mozambique, people are suffering in many kinds of infectious diseases. We hope more high-income and developed countries can help those poor counties by severing more medical help, medicines and vaccines. All the countries in the world should collaborate with each other and make more people have happiness and healthy life.

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