



Assignment4_Group6

Chatpisut Makornkhan
Master of Business Analytics

BINGYU YANG
Master of Business Analytics

Phuong Trinh
Master of Business Analytics

Report for
Monash University

**Faculty of
Business &
Economics**

📞 (03) 9905 2478
✉️ questions@company.com

ABN: 12 377 614 630

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1 Report Introduction

The research project aims to explore and analyze the numbers and trends of human death caused by various air pollution.

2 Section 1

2.1 Introduction

- Ritchie and Roser (2019) point out that outdoor air pollution is one of the world's biggest health and environmental problems. The origin data in this section is from Our world in data and is based on the number of deaths caused by air pollution.
- This section is designed to research the four countries with the highest average number of deaths due to air pollution from 1990 to 2019 and to observe the changes in the number of deaths caused by the two main outdoor pollutants.

2.2 Research question

Q1:Top four countries with the highest average number of deaths due to air pollution since 1990 to 2019.

Q2:Is air pollution in these four countries improving until 2019?

Q3:The two main pollutants of outdoor air pollution are ozone and outdoor particulate matter. In the four countries with the highest average number of deaths caused by air pollution, what are the trends in the number of deaths caused by these two pollutants?

2.3 Exploratory data analysis

- Q1

Table 1: Average number of deaths from air pollution, 1990 to 2019

Entity	mean_total_air_polution
Solomon Islands	481.83
Afghanistan	342.58
Central African Republic	324.80
Somalia	310.11

In table 1, the four countries with the highest average number of deaths (per 100,000 population) due to air pollution are Solomon Islands,Afghanistan,Central African Republic, and Somalia.

- Q2

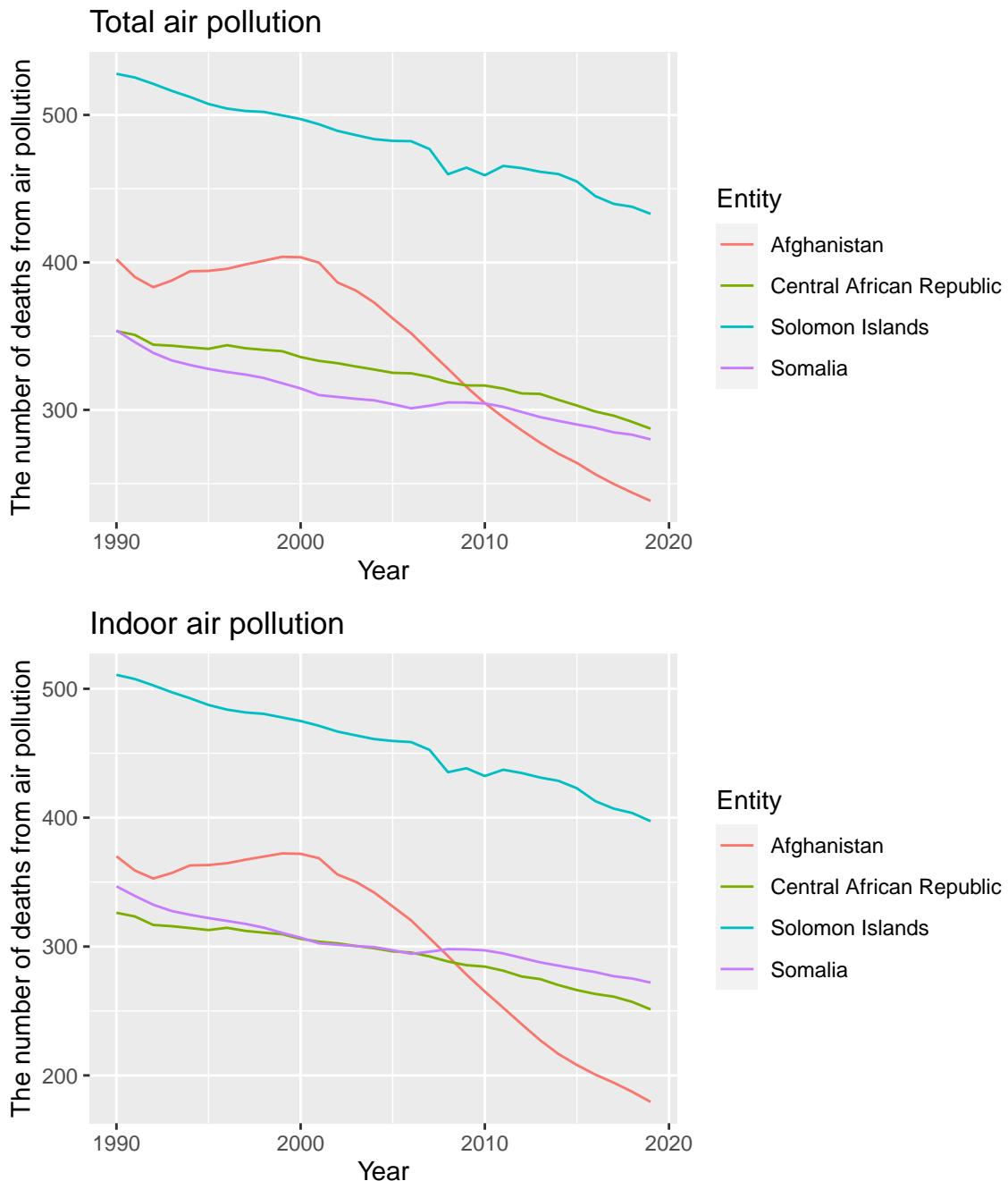


Figure 1: Air pollution trends in different countries

In figure 1, I found significant improvements in total air pollution in these four countries, and a continuous downward trend in the number of deaths caused by indoor air pollution.

- Q3

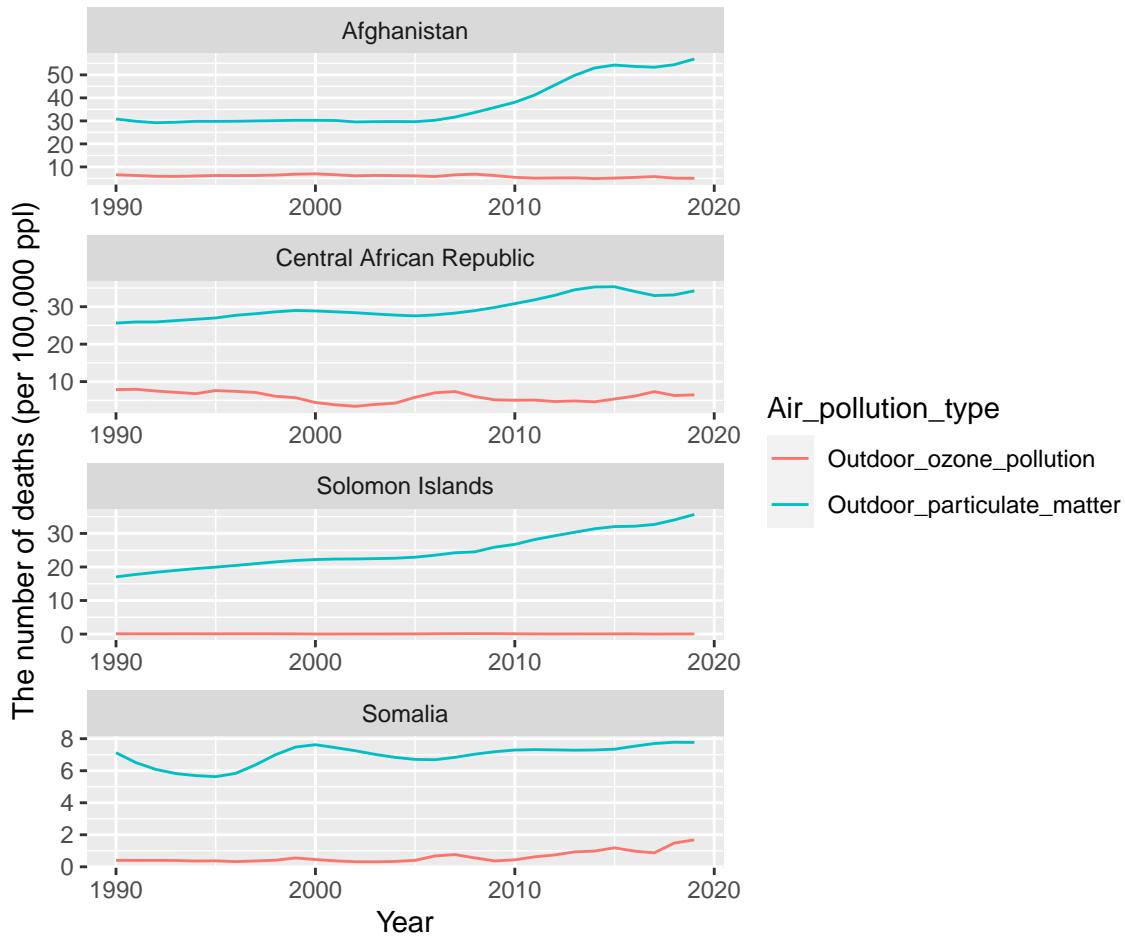


Figure 2: The trends in the number of deaths caused by these two pollutants

In figure 2, I found a small increase in the number of deaths caused by particulate pollution in Solomon Islands, Central African Republic and Afghanistan, while only a very small number of people in Somalia die from outdoor pollution.

2.4 Conclusion

From the above studies, I conclude that the number of deaths due to indoor air pollution has declined in most countries in recent decades. However, the number of deaths due to outdoor air pollution, such as outdoor particulate matter, is still on the rise. Therefore, Neidell (2004) indicated that the world should regularly monitor air quality and reduce sources of particulate pollution.

Vietnam and New Zealand

3 Section 2

3.1 Introduction

Pollution is not only the leading factor taking away peoples' lives, it also leaves serious long-term effects on our living quality.

In this section we will compare the relationship between death rates and different types of pollution from 1990 to 2019 in two countries, Vietnam and New Zealand.

The data set was originated from Ritchie and Roser (2017).

3.2 Research question

- Q1: Which type of pollution is the most common attribute of death in each country?
- Q2: How did the death rates associated with different types of pollution change over the years in both countries?

3.3 Exploratory data analysis

- Q1

From table 2, we can observe that air pollution contributed most to the death rates in New Zealand with 7 deaths per 100,000 people.

Table 2: Death rate related to different risk factors in New Zealand

Entity	Risk_factor	mean_rate
New Zealand	Air_pollution	7.11
New Zealand	Ambient_ozone_pollution	0.20
New Zealand	Ambient_particulate_matter_pollution	6.77
New Zealand	Household_air_pollution	0.14

Table 3: Death rate related to different risk factors in Vietnam

Entity	Risk_factor	mean_rate
Vietnam	Air_pollution	131.61
Vietnam	Ambient_ozone_pollution	1.74
Vietnam	Ambient_particulate_matter_pollution	38.99
Vietnam	Household_air_pollution	91.56

Similarly, in table 3, it can be seen that air pollution is also the leading factor in Vietnam, accounting for 132 deaths per 100,000 people.

According to Mannucci and Franchini (2017), there were almost seven million deaths associated with the effects of air pollution. In addition, the impacts tend to be greater across low and middle income countries, mainly due to the increasing shift to industrialization. The notion has been demonstrated in the case of Vietnam and New Zealand, where the number of deaths in Vietnam is approximately 18 times higher than New Zealand.

- Q2

The graph 3 shows the rate at which people died due to the effects of different types of pollution over a 29-year period from 1990 to 2019.

There was an overall downward trend in the impacts of air pollution and ambient particulate matter pollution to death rate. Rate of people died associated air pollution originated from household and ambient ozone pollution showed a slight decrease over the years.

In contrast, the rate at which pollution from ambient ozone contributed to death remained relatively steady.

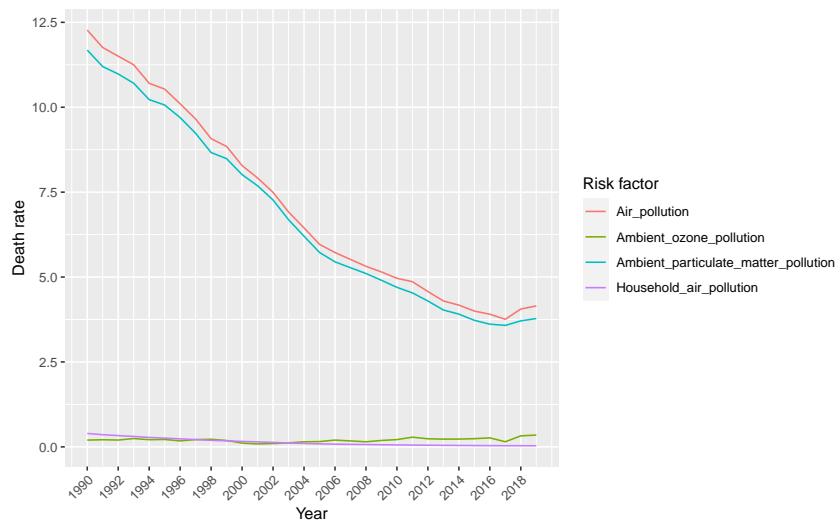


Figure 3: Death rates attributed to pollution in New Zealand from 1990 to 2019

Overall, in 4, death rate associated with air pollution and pollution resulted from household decreased dramatically over the years.

However, the rate attributable to pollution from ambient particulate matter pollution showed a noticeable surge despite having a slight drop in 2010.

Similarly, deaths impacted by pollution from ambient ozone contributed to global death showed little or no signs of changing during the period.

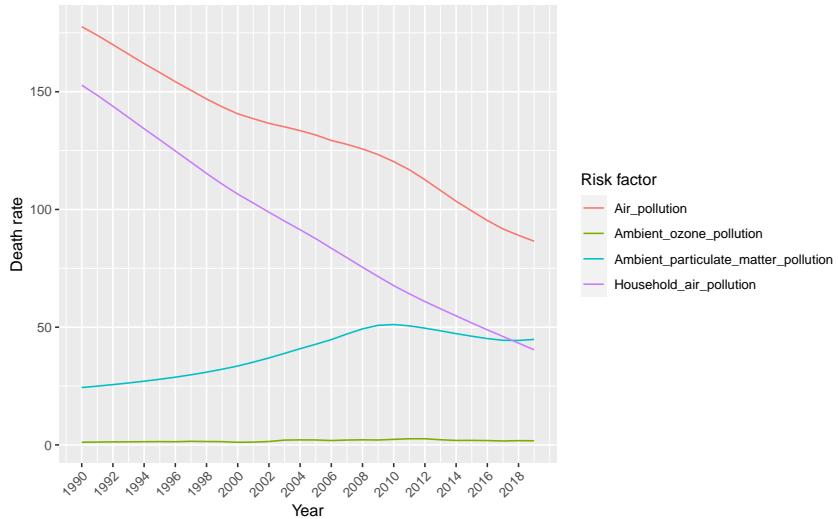


Figure 4: Death rates attributed to pollution in Vietnam from 1990 to 2019

3.4 Conclusion

Overall, it is obvious that air pollution is the largest contributor of deaths in both countries.

It can be seen that there was a overall decrease in deaths attributed to air pollution and pollution from household in recent decades.

However, the death rate in Vietnam remained much higher than in New Zealand. Gordon et al. (2014) explained this by the increase in urbanization and lack of access to clean fuels for cooking in developing nations.

4 Section 3

4.1 Introduction

Last but not least, we would like to further explore countries with extreme values on both ends. Henceforth, we can see the nature of trends and numbers across the year, along with reasonable research and facts which support those unfortunate number of deaths by pollution. Which lead us to formulate research questions as below:

4.2 Research Questions

- Q1: Which country has the highest number of Air Pollution caused casualties? And what is its trend across the year pertaining to their cause of deaths severity?
- Q2: What is the 4 lowest polluted countries? Regarding the comparison between them, what are possible reasons for these significantly low results?

4.3 Exploratory data analysis

By exploring the highest ends of the data, we discovered that Solomon Islands has the greatest number of deaths caused by pollution in significant margins of gap comparatively to latter ranked countries. Therefore, Solomon Islands data set is further explored into detail on its trend across the year.

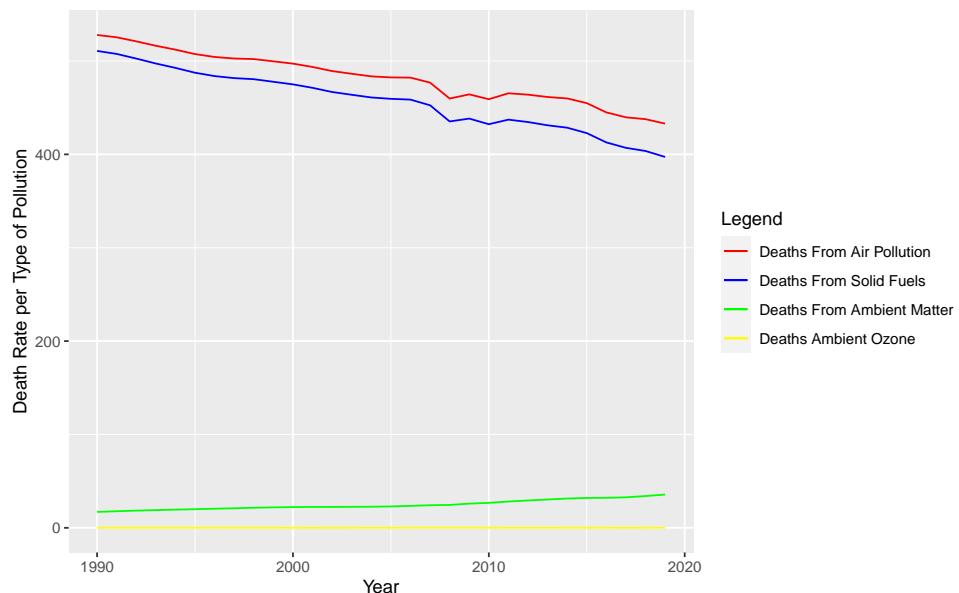


Figure 5: Solomon Islands - Annual Trend

Referring to figure 5) above, we can see that, although trends are in the declining movement since the start of 1990, the number of deaths caused by both air pollution and solid fuels are terrifyingly high comparatively. With these numbers, Solomon Islands is assured to be in the stage of air pollution crisis.

As stated by Hunt (2011) in the research paper, health hazards endpoints which quantified are including, but not limited to Premature Mortality, Respiratory and Cardiovascular Illness, Cancer, or even Infant Mortality. Therefore, Solomon Islands living condition is still at an alarming stage which need immediate addressed.

Following this, we are looking at the lowest end for least number of deaths caused by pollution; in which Iceland, New Zealand, Australia, and Puerto Rico hold top spots.

Table 4: Top 4 Countries with lowest Air Pollution Death

Country	Deaths_From_Air_Pollution
Iceland	6.789
New Zealand	7.073
Australia	7.428
Puerto Rico	8.288

From table 4), we can see that less than 9 persons on average resulted in a fatal incident caused by air pollution.

Table 5: Top 4 Countries with lowest Air Pollution Death from Solid Fuels

Country	Deaths_From_Solid_Fuels
Puerto Rico	0.027
Iceland	0.076
New Zealand	0.138
Australia	0.213

Furthermore, comparatively to solid fuels-led death, with even less numbers are shown as a result in table 5).

By using Iceland as the main example, according to Barsotti (2020), even though air pollution rate is generally excellent in Iceland, a subtle surge in chemical or pollution such as SO2 is considered as a threat to their ozone and breathing environment. Which they have immediate action to tackle and resolve problem as quick as possible.

4.4 Conclusion

Hence, these countries are ensured that rapid response in air pollution issue could make a potential bright further for their countries' air for generations.

5 Report Conclusion

In conclusion, we can see that air pollution is subtle yet highly severe global issues. Even though many countries can manage to suppress their toxic footprint, this is a global matter that every country needs to address for the better and brighter future of air pollution-less world.

References

- Barsotti, S (2020). Probabilistic hazard maps for operational use: the case of SO₂ air pollution during the Holuhraun eruption (Bárðarbunga, Iceland) in 2014–2015. *Bulletin of Volcanology* **82**(7), 1–15.
- Gordon, SB, NG Bruce, J Grigg, PL Hibberd, OP Kurmi, KbH Lam, K Mortimer, KP Asante, K Balakrishnan, J Balmes, et al. (2014). Respiratory risks from household air pollution in low and middle income countries. *The Lancet Respiratory Medicine* **2**(10), 823–860.
- Hunt, A (2011). Policy interventions to address health impacts associated with air pollution, unsafe water supply and sanitation, and hazardous chemicals.
- Mannucci, PM and M Franchini (2017). Health effects of ambient air pollution in developing countries. *International journal of environmental research and public health* **14**(9), 1048.
- Neidell, MJ (2004). Air pollution, health, and socio-economic status: the effect of outdoor air quality on childhood asthma. *Journal of health economics* **23**(6), 1209–1236.
- Ritchie, H and M Roser (2017). Air Pollution. *Our World in Data*. <https://ourworldindata.org/air-pollution>.
- Ritchie, H and M Roser (2019). Outdoor Air Pollution. *Our World in Data*. <https://ourworldindata.org/outdoor-air-pollution>.