Project Report

Topic: Effects of COVID in New Zealand

By group Track Stars：

Zahid Khan
Pei (Perry) li
Jiani (Norie) Wu
Kaishun (Ted) Yang

Introduction：

The covid-19 epidemic is the biggest crisis the world has faced since World War II and has had a huge impact on the world, including people's psychology and livelihoods, economic growth and employment, and national governance. Our team will analyze the impact of the total number of covid cases for vaccinations, crime rate, deaths, agricultural and GDP (Gross Domestic Product) in New Zealand.

Target:

1. Find the change of crime rate before and after covid, and thus find out how much influence covid has caused on the general safety in New Zealand.
2. Find the change of agriculture(livestock) before and after covid, and thus find out how much influence covid has caused on the numbers of livestock.
3. Find the change of GDP (Gross Domestic Product) before and after covid and analyse the economic impact of the covid outbreak on New Zealand.
4. Find the change of death rate before and after covid, analysis of mortality caused by covid in New Zealand.
5. Find the number of Vaccines Administered before and after covid, Analysis of changes in people's willingness to receive vaccines during the covid.

Data sources:

Covid Data:
Ministry of Health NZ (Git Repo)

https://github.com/minhealthnz/nz-covid-data

Vaccination Data:
Ministry of Health NZ (Git Repo)
https://github.com/minhealthnz/nz-covid-data

Crime Rate:
New Zealand Police statistics
https://www.police.govt.nz/about-us/publications-statistics/data-and-statistics?nondesktop

Death Rate:
Ministry of Health NZ (Git Repo)
https://github.com/minhealthnz/nz-covid-data

Agriculture:
Before Covid:
https://www.stats.govt.nz/information-releases/agricultural-production-statistics-june-2019-final/?fbclid=IwAR2WAR9QR33HcLXF7Nt-JAZZRukfgQiDJhFAukYjOz_HKqKOeQ8kJzxky3c

After Covid:
https://www.stats.govt.nz/information-releases/agricultural-production-statistics-year-to-june-2021-final/?fbclid=IwAR04a29AGmveWZyfI0V9i9yD-5OP68RAazrGrpmOWMw4GRZKpane8jcWjzA

GDP:
https://www.stats.govt.nz/information-releases/gross-domestic-product-june-2022-quarter/?fbclid=IwAR1bfYeCwfOSBIp97SkhGlWFzReIxGYD5Q7Fl5jaCmCf3yLqgXgGKbgwjIw

Wrangling difficulties:

For Crime Rate and covid cases:

1. Column names, data types do not always match.
2. Merging of data frames does not always work with joins.
3. Values must be manually modified to match another data frame.
4. Ggplot configuration is cumbersome to setup 5 data maps require more packages to produce.

For Agriculture:

1. Excel form import data is some column name garbled，so we had to set new columns names.
2. There are a lot of N/A in the data table, and we need to do some row and column deletions.
3. Need to convert chr type of numbers to numeric.
4. Need to replace the data in the table that is invalid for suppressed and absent.

For GDP:

1. The formatting of the data tables was not standardized, and many unnecessary elements needed to be removed.
2. Quarterly data is not conducive to sorting the correct time, and sorting the month requires changing the data type.
3. Integrate wide tables into long tables to create graphs that are easier to compare and observe.
4. There are missing years in the table, which need to add the year into the table.

For effects of Vaccinations on Death Rate:

1. The vaccine data are relegated by daily basis, and it is a challenge to convert them into weekly data
2. It is extremely hard to comprehend the line graph even with legend and text, so finding a plot to clearly present data is not easy.
3. Multi data plot can be hard to display the tendency of each data set as the matter of fact that two data set have significant different range. Most time it only shows one set of data with other shows completely plain at the bottom of graph.

4. Packages for sp and sf had to be installed manually and it is time consuming.
5. The spatial data frame cannot be directly meddled with; thus, we need to change each different districts name/title to match the data correspondingly. And in the end, there are still some data cannot be aligned.
6 It’s unfortunate that the relevant resources including the ones that recommended in project often either have limited data or have no common factor to be merged with other data frames.

Achievements:

For Crime Rate and covid cases:

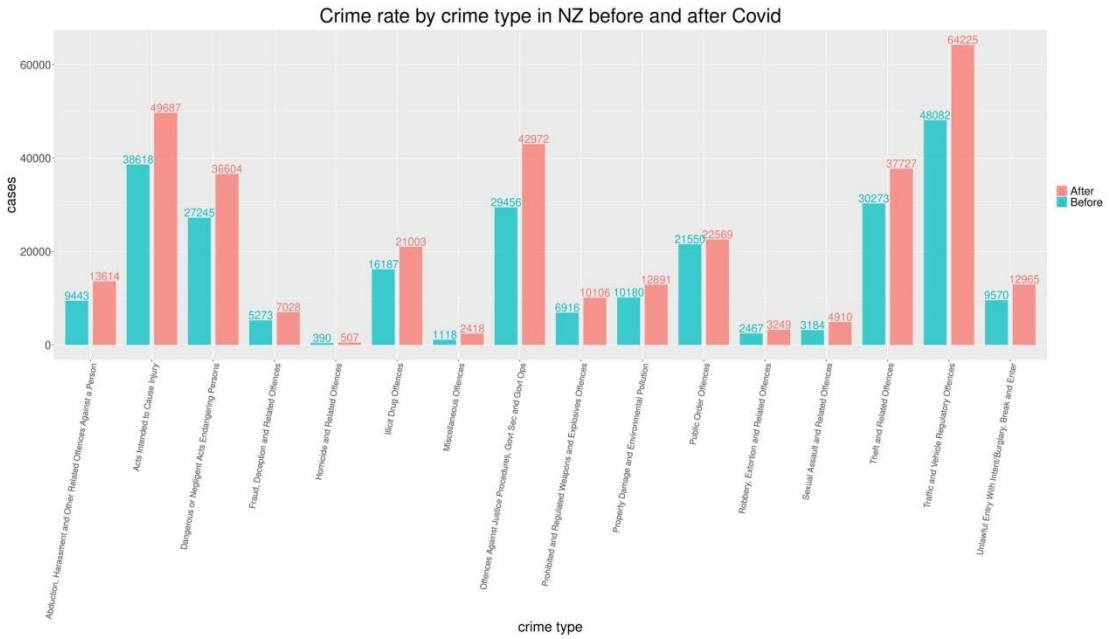
Target: Find the change of crime rate before and after covid, and thus find out how much influence covid has caused on the general safety in New Zealand.

Result:

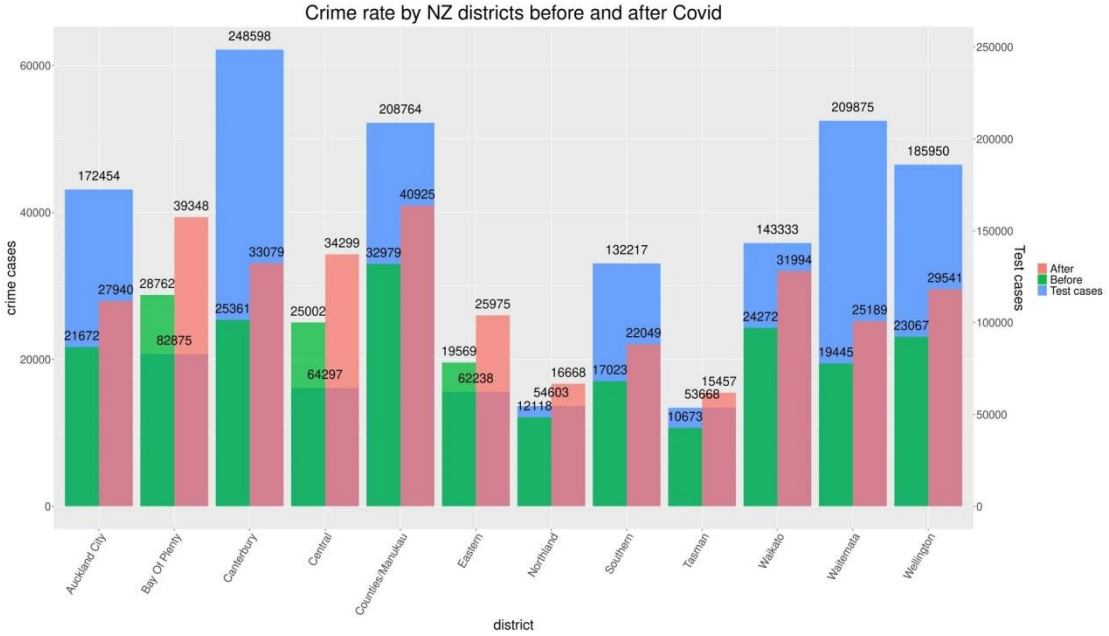
1. Compared to the pre-outbreak period, the crime rate increased significantly after the outbreak of COVID.
2. Until January 2022, the daily number of cases in New Zealand decreased almost close to 0. After January 2022, the daily number of cases in New Zealand suddenly rose straight up to the peak of 25,000, and then began to decline, and so far, the number of cases is still showing a downward trend.

Graph:

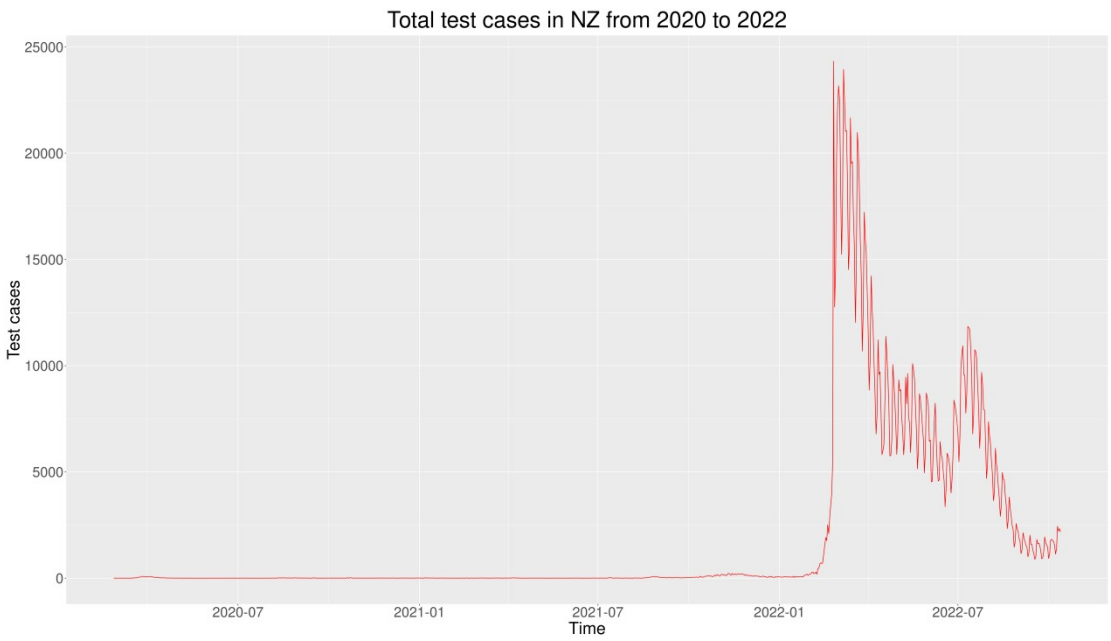
1.


Crime rate by crime type in NZ before and after Covid
cases
60000
40000
20000
0
9443
13614
38618
49687
27245
36604
5273
7028
390
507
16187
21003
1118
2418
29456
42972
6916
10106
10180
12891
21550
22569
2467
3249
3184
4910
30273
37727
48082
64225
9570
12965
After
Before
Abduction, Harassment and Other Related Offences Against a Person
Acts Intended to Cause Injury
Dangerous or Negligent Acts Endangering Persons
Fraud, Deception and Related Offences
Homicide and Related Offences
Illicit Drug Offences
Miscellaneous Offences
Offences Against Justice Procedures, Govt Sec and Govt Ops
Prohibited and Regulated Weapons and Explosives Offences
Property Damage and Environmental Pollution
Public Order Offences
Robbery, Extortion and Related Offences
Sexual Assault and Related Offences
Theft and Related Offences
Traffic and Vehicle Regulatory Offences
Unlawful Entry With Intent/Burglary, Break and Enter
crime type

2.


Crime rate by NZ districts before and after Covid
crime cases
Test cases
60000
40000
20000
0
250000
200000
150000
100000
50000
0
172454
27940
21672
39348
28762
82875
248598
33079
25361
34299
25002
64297
208764
40925
32979
25975
19569
62238
16668
54603
12118
132217
22049
17023
15457
53668
10673
143333
31994
24272
209875
25189
19445
185950
29541
23067
After
Before
Test cases
Auckland City
Bay Of Plenty
Canterbury
Central
Counties Manukau
Eastern
Northland
Southern
Tasman
Waikato
Waitemata
Wellington
district

3.


Total test cases in NZ from 2020 to 2022
Test cases
25000
20000
15000
10000
5000
0
2020-07
2021-01
2021-07
2022-01
2022-07
Time

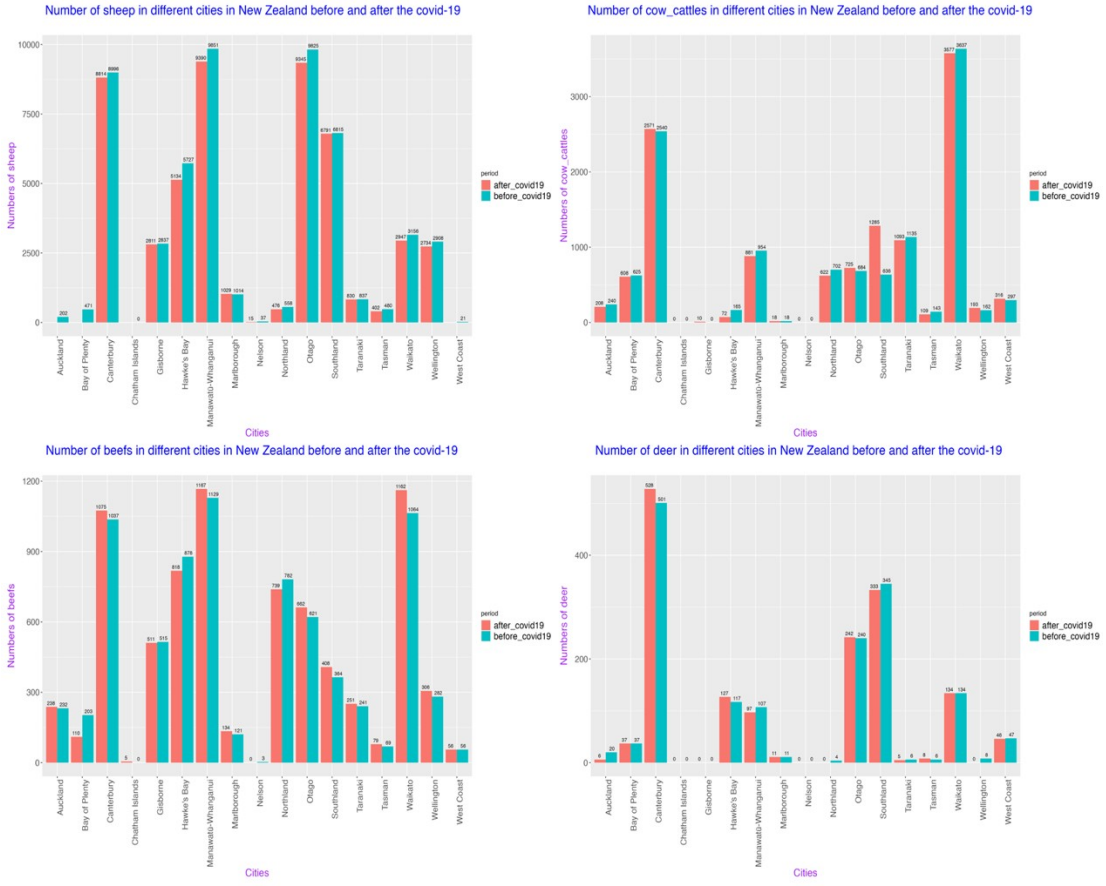
For Agriculture:

Target: Find the change of agriculture(livestock) before and after covid, and thus find out how much influence covid has caused on the numbers of livestock.

Result:

The total number of livestock did not change much before and after the outbreak, and except for the number of sheep, which decreased slightly in different cities in New Zealand after the outbreak, the total number of livestock cow cattle, beef and deer did not decrease but increased in most of the (75%) cities in New Zealand after the outbreak.

Graph:



For GDP:

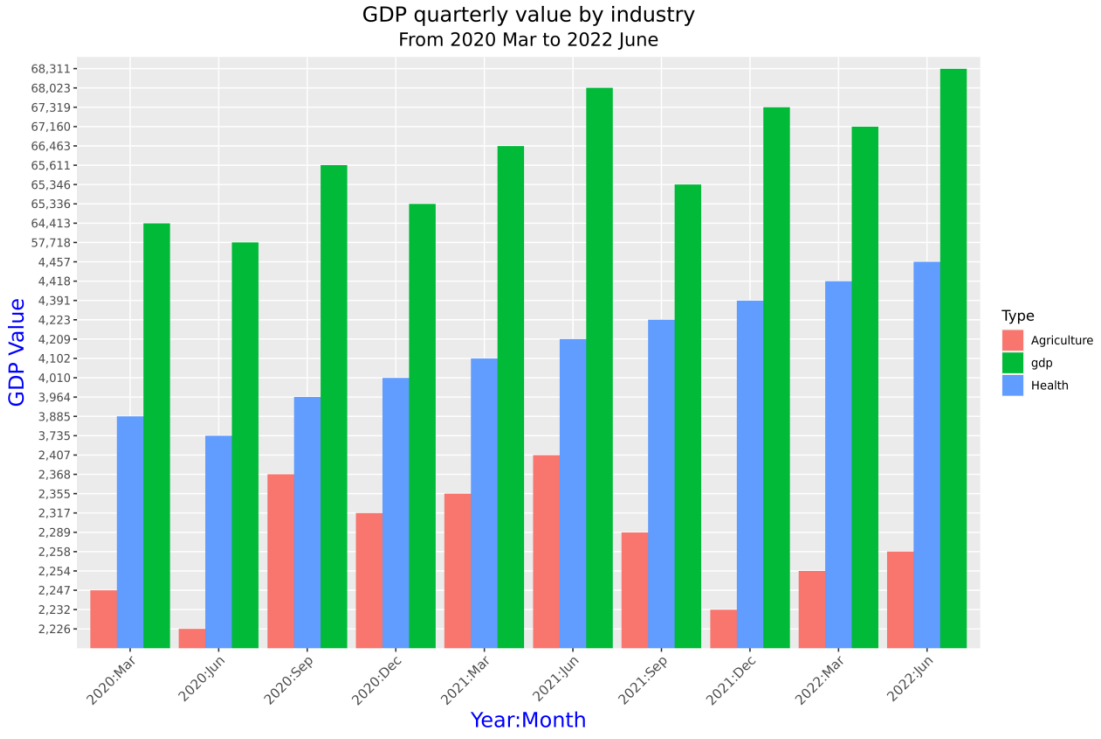
Target: Find the change of GDP (Gross Domestic Product) before and after covid, analyse the economic impact of the covid outbreak on New Zealand.

Result:

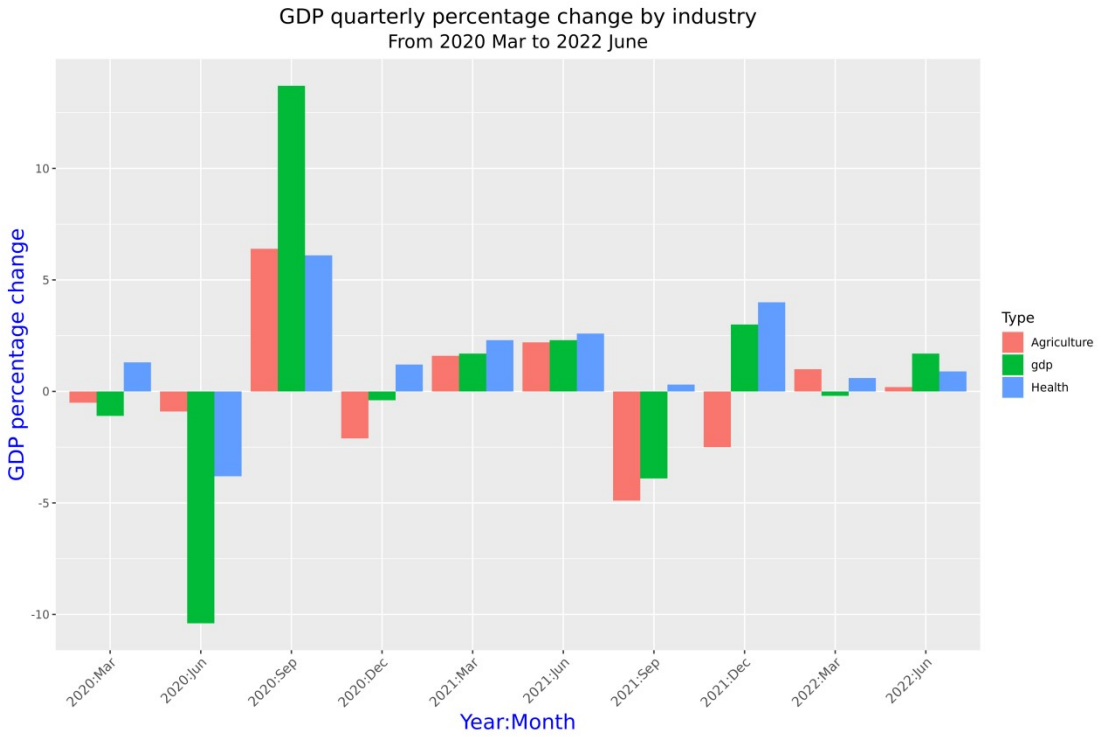
GDP decreased significantly during the New Zealand lockdown but bounced back when the lockdown is over. Health GDP has been rising gradually, people will pay more attention to health because of the epidemic.
In short, preventive and control measures for the outbreak have a greater impact on GDP than the virus itself.

Graph:

1.



2.



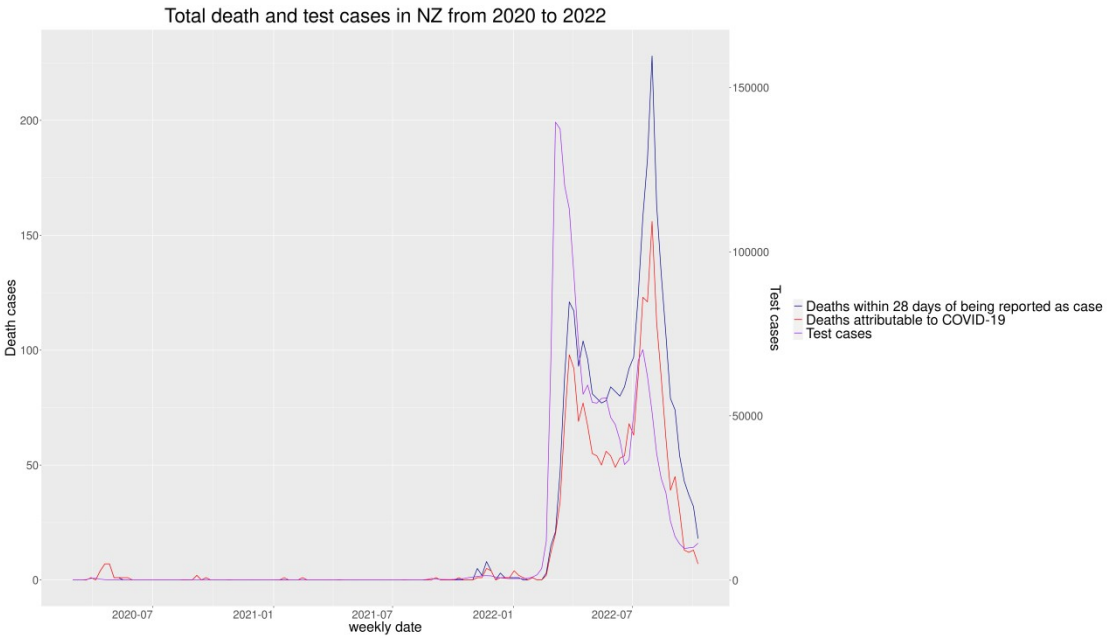
For Death Rate:

Target: Find the change of death rate before and after covid, analysis of mortality caused by covid in New Zealand.

Result:

Mortality is strongly correlated with cases that test positive. The number of deaths due to the covid is about 0.001 percent of the total test results. From February to August 2022 is the time when New Zealand is most affected by the virus, with a significant increase in tests and deaths during this period. And it ends after September.

Graph:



For Vaccinations:

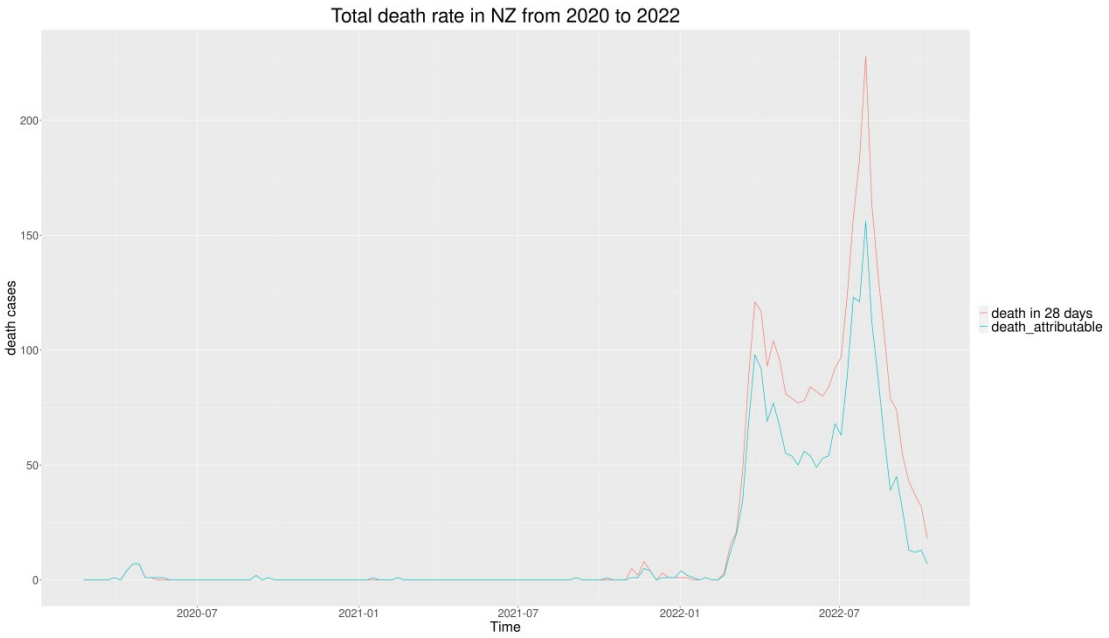
Target: Find the number of Vaccines Administered before and after covid, Analysis of changes in people's willingness to receive vaccines during the covid.

Result:

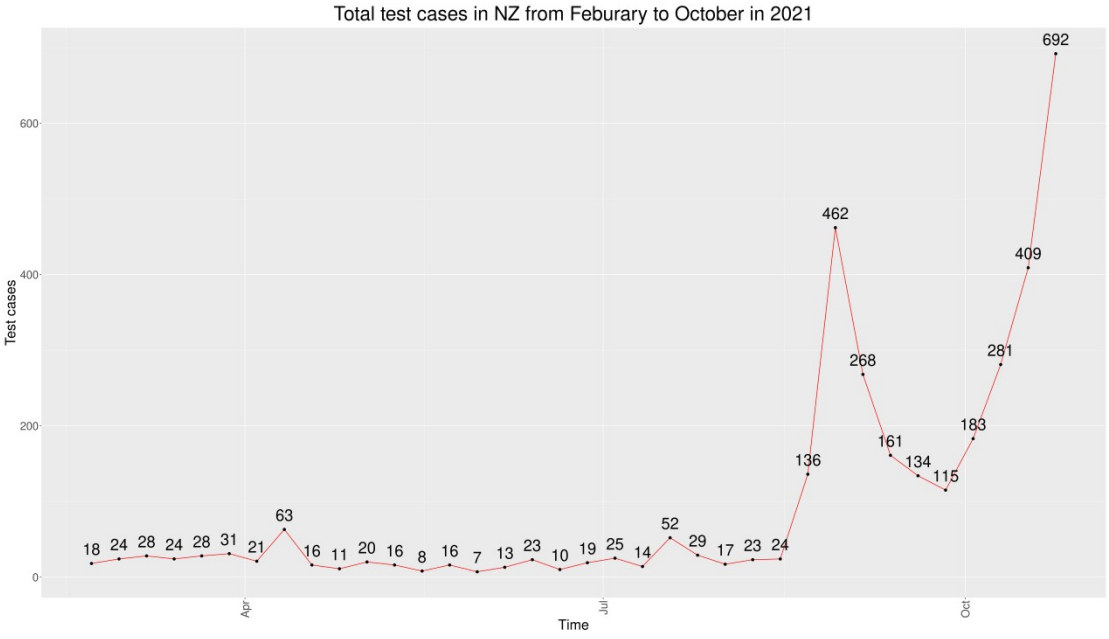
In 2021, the number of vaccinations is generally on the rise. The national trends in vaccination numbers are all roughly the same. The Auckland region has the highest number of vaccinations by region in New Zealand. September is a peak month for the number of vaccinations. There was a significant drop in October.

Graph:

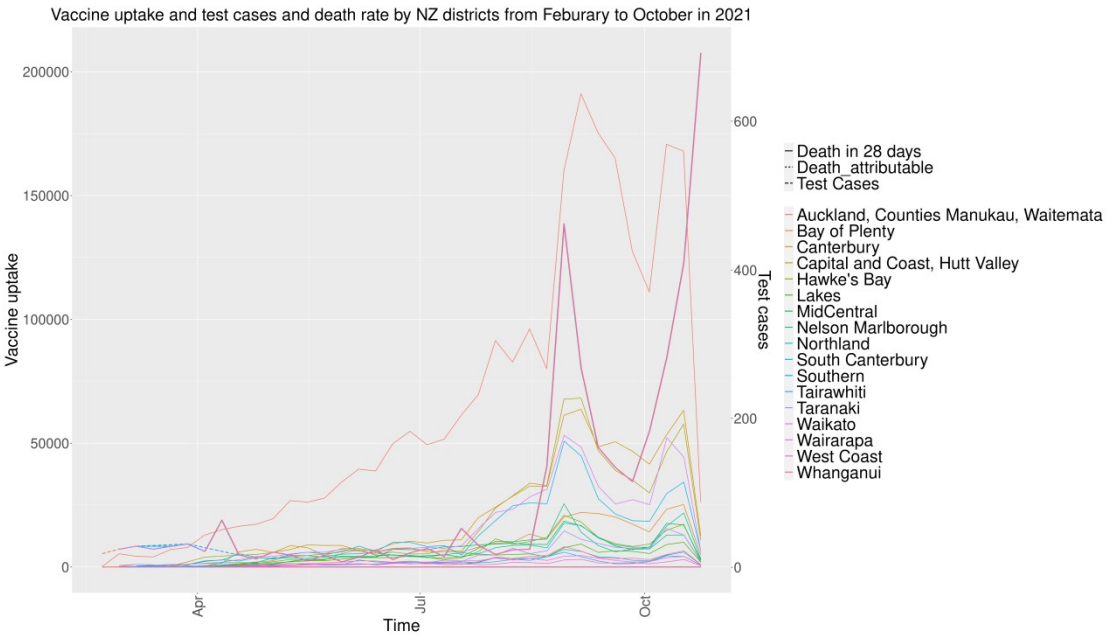
1.


Total death rate in NZ from 2020 to 2022
death cases
200
150
100
50
0
2020-07
2021-01
2021-07
2022-01
2022-07
Time
death in 28 days
death_attributable

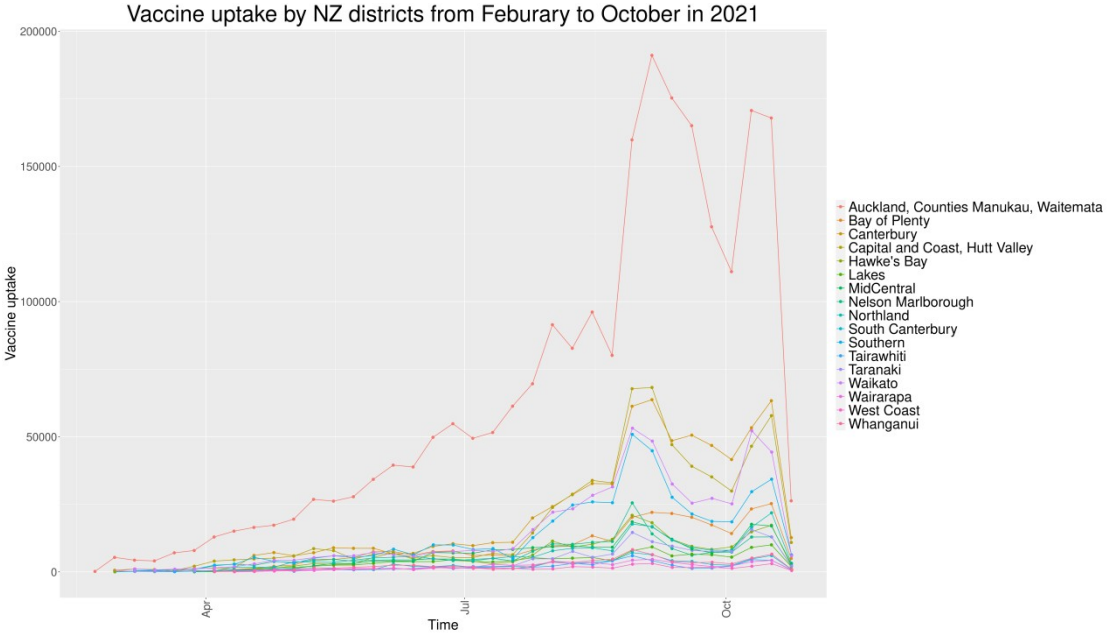
2.


Total test cases in NZ from Feburary to October in 2021
Test cases
600
400
200
0
18 24 28 24 28 31 21 63 16 11 20 16 8 16 7 13 23 10 19 25 14 52 29 17 23 24 136 462 268 161 134 115 183 281 409 692
Apr
Jul
Oct
Time

3.


Vaccine uptake and test cases and death rate by NZ districts from Feburary to October in 2021
Vaccine uptake
Test cases
Time
Apr
Jul
Oct
0
50000
100000
150000
200000
200
400
600
Death in 28 days
Death_attributable
Test Cases
Auckland, Counties Manukau, Waitemata
Bay of Plenty
Canterbury
Capital and Coast, Hutt Valley
Hawke's Bay
Lakes
MidCentral
Nelson Marlborough
Northland
South Canterbury
Southern
Tairawhiti
Taranaki
Waikato
Wairarapa
West Coast
Whanganui

4.


Vaccine uptake by NZ districts from Feburary to October in 2021
Vaccine uptake
Time
Apr
Jul
Oct
0
50000
100000
150000
200000
Auckland, Counties Manukau, Waitemata
Bay of Plenty
Canterbury
Capital and Coast, Hutt Valley
Hawke's Bay
Lakes
MidCentral
Nelson Marlborough
Northland
South Canterbury
Southern
Tairawhiti
Taranaki
Waikato
Wairarapa
West Coast
Whanganui