Does vaccination reduce death rated in the population of developing countries compared to developed countries

11

4/11/2022

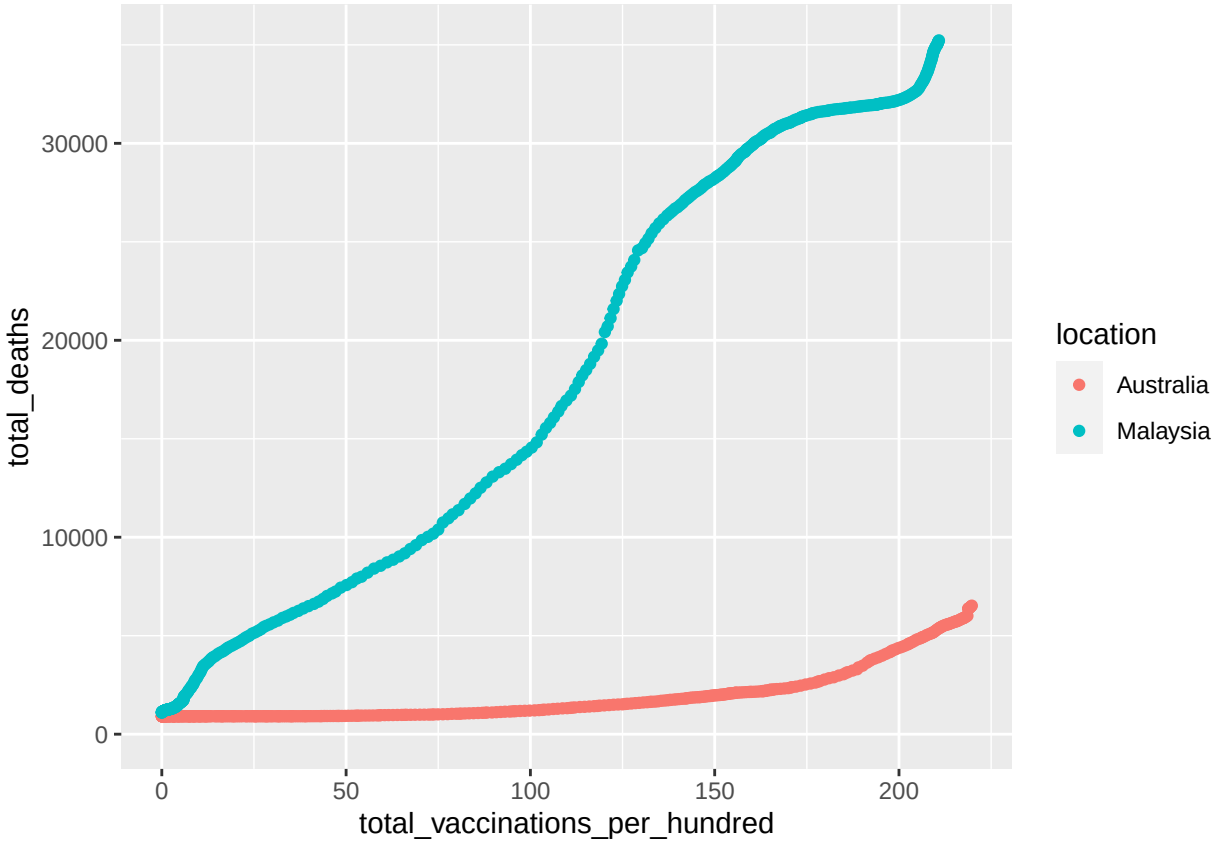
EDA

AIM: Does vaccination reduce death rated in the population of developing countries compared to developed countries

As you can see from the chart below, Australia has fewer deaths for the same level of vaccination than Malaysia. It can therefore be considered whether vaccination has reduced mortality in the Australian population compared to Malaysia.

```
data <- read.csv("owid-covid-data.csv")

# select Australia and Malaysia data
data <- rbind(data[data$location == 'Australia',],
              data[data$location == 'Malaysia',])


library(ggplot2)
ggplot(data = data) +
  geom_point(aes(x=total_vaccinations_per_hundred, y =total_deaths,color = location))
```

```
## Warning: Removed 798 rows containing missing values (geom_point).
```

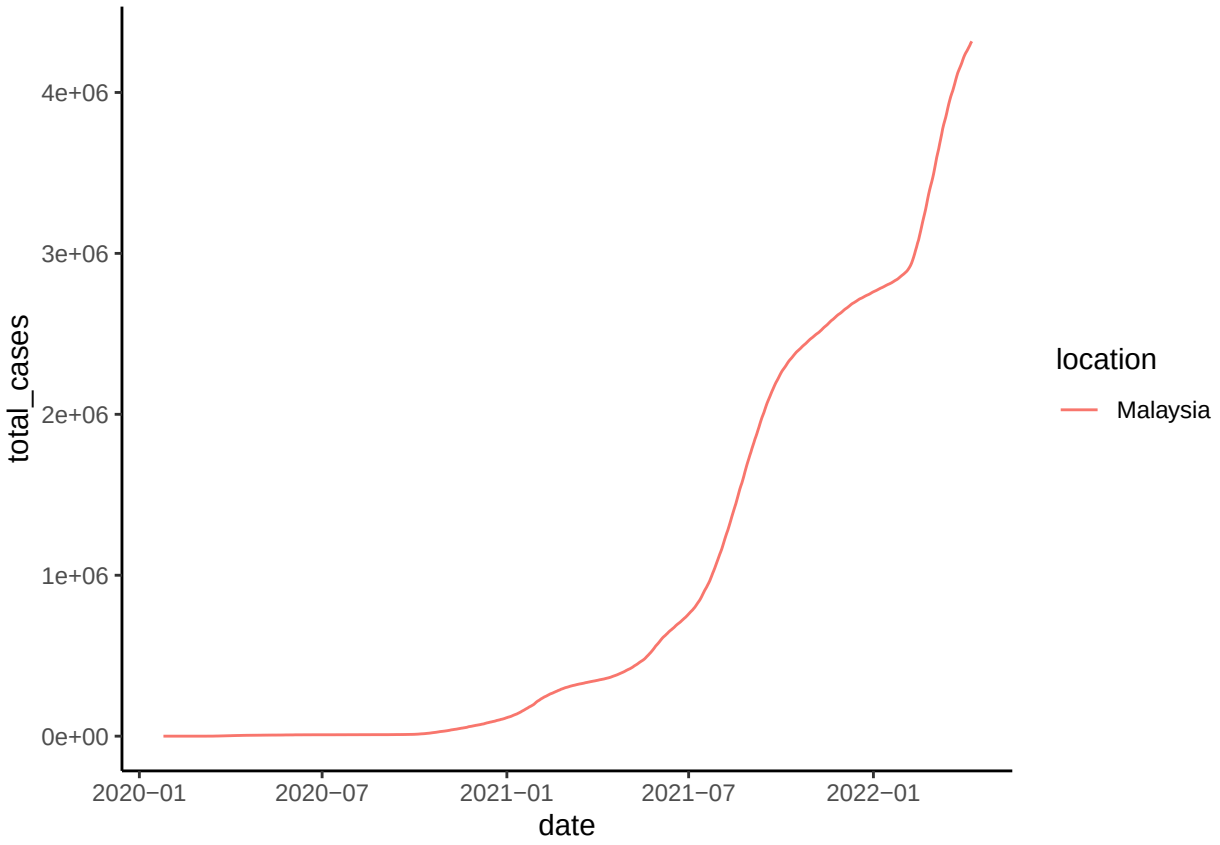


We first filter out suitable countries that represents developing countries and developed countries, as we can see from the view() function, only Australia and Malaysia has a suitable human development index.

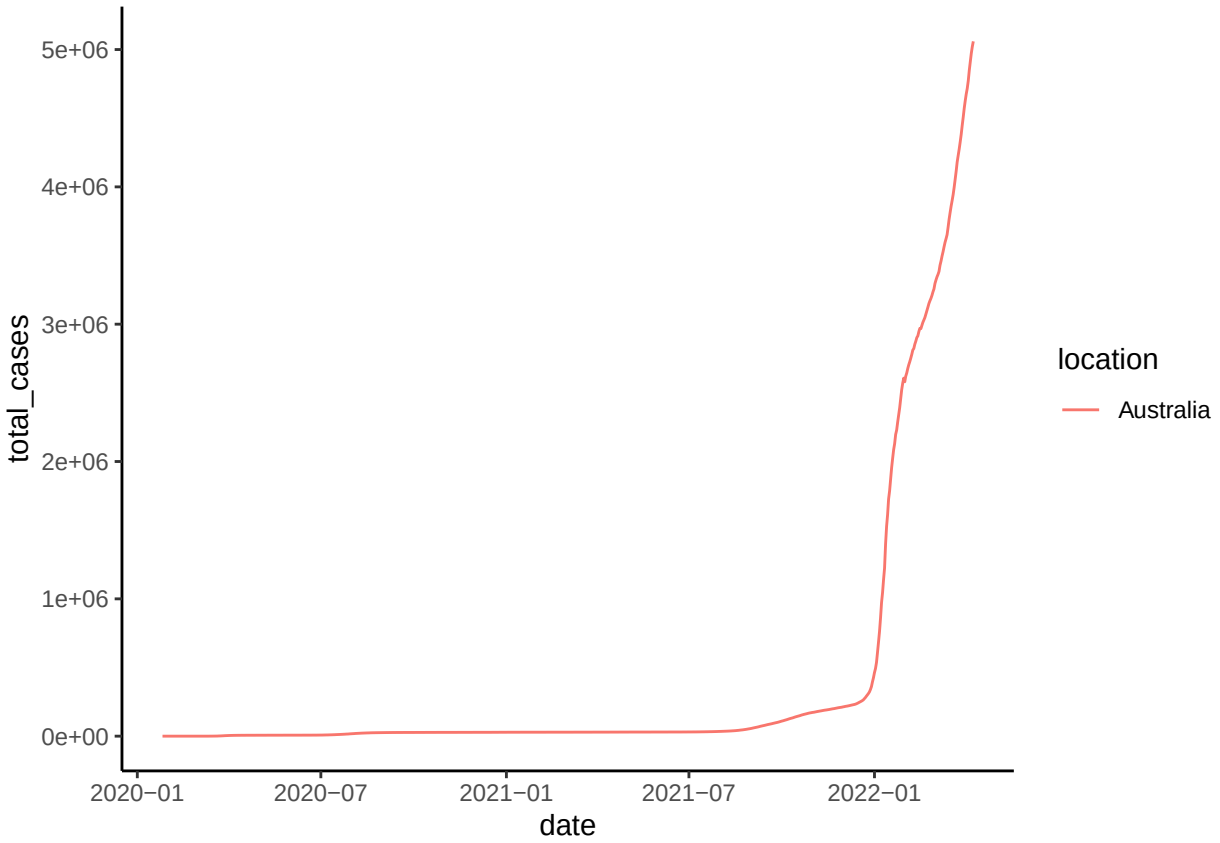
```
developed_countries = data %>%
  filter(human_development_index >= 0.854)

developing_countries = data %>% #Filtering countries which are developing and already developed by thei
  filter(human_development_index < 0.854)
developing_countries = subset(developing_countries, location!="World")

view(developed_countries)
view(developing_countries)
```

```
Malaysia <- data[data$location == 'Malaysia',]
Malaysia$date <- as.Date(Malaysia$date)


ggplot(data = Malaysia) +
    geom_line(aes(x=date, y =total_cases,color = location)) +
    theme_classic()
```

```
## Warning: Removed 1 row(s) containing missing values (geom_path).
```



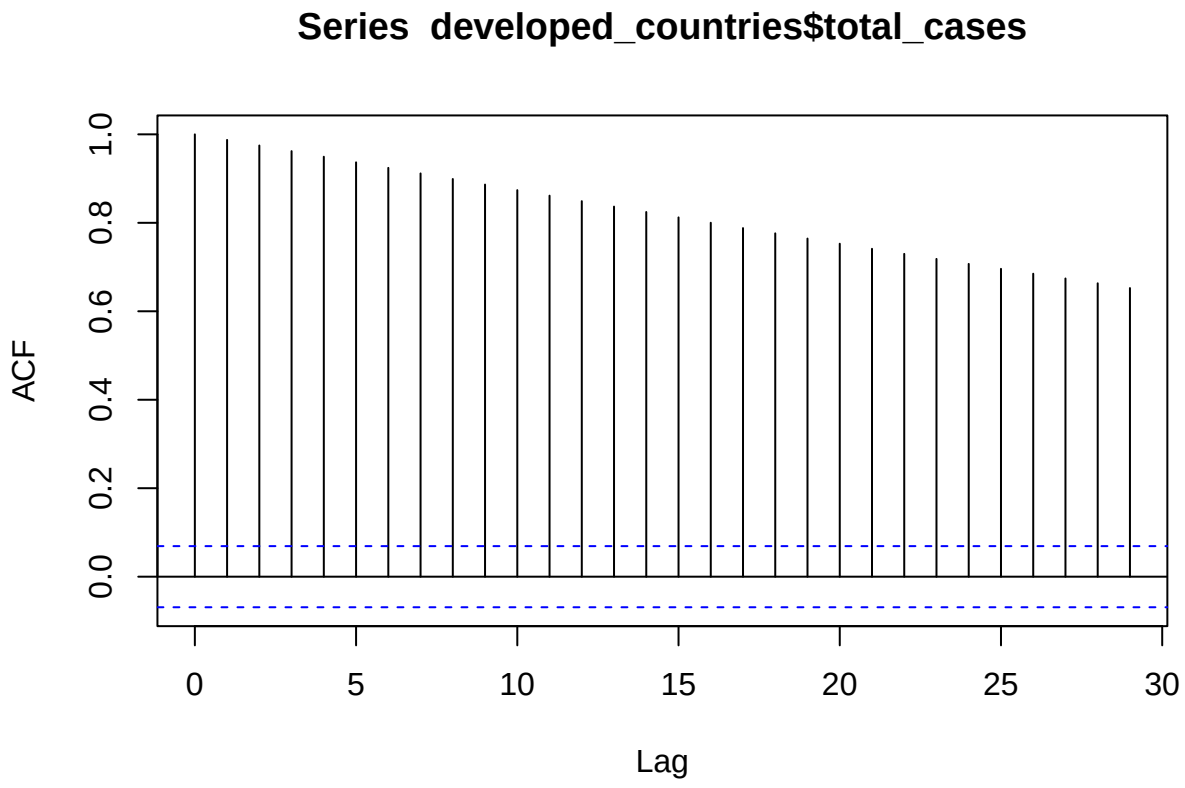

```
Australia <- data[data$location == 'Australia',]
Australia$date <- as.Date(Australia$date)


ggplot(data = Australia) +
    geom_line(aes(x=date, y =total_cases,color = location)) +
    theme_classic()
```



model: Time series model of the number of confirmed cases in Australia

This part will establish a time series model for the total number of confirmed cases in Australia. First, a sample of The Australian region was selected and a trend chart of the total number of confirmations was drawn. As can be seen from the figure, there is an overall upward trend in the change time series.

```
acf(developed_countries$total_cases)
```



As can be seen from the automatic grading of arima model, the most suitable model is arima (0,2,1).

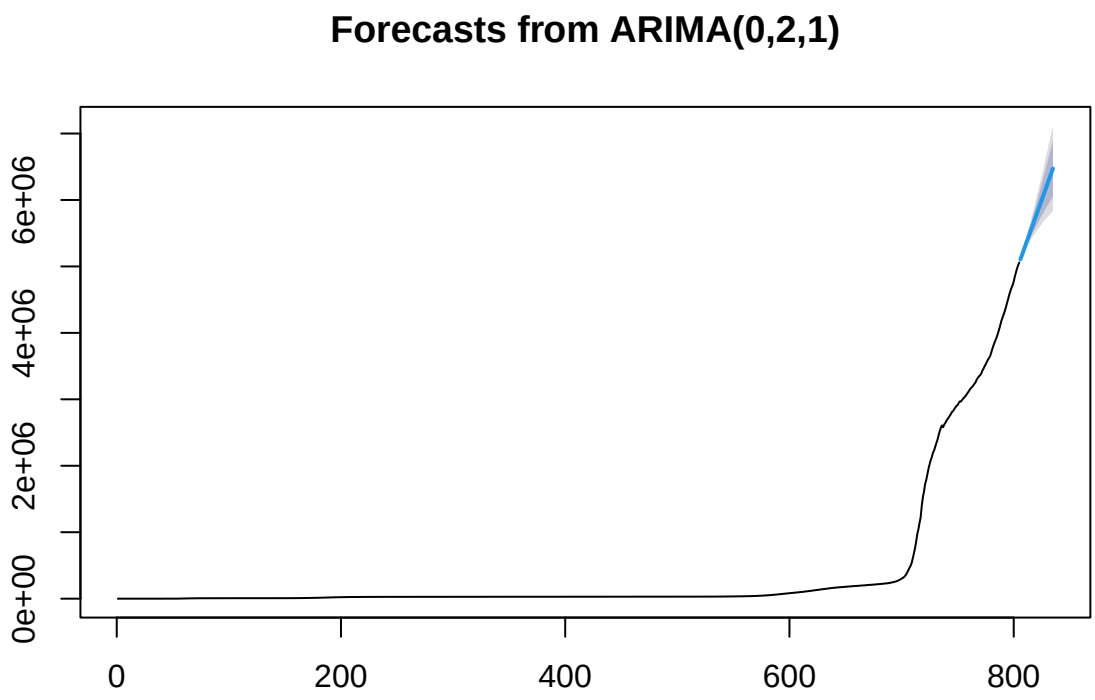
Trends in the number of people diagnosed in developed countries over the next 30 days based on the ARIMA model. As can be seen from the graph, the number of confirmed cases is still on the rise.

```
fit <- auto.arima(developed_countries$total_cases)
forecast(fit, 30)
```

```
##     Point Forecast   Lo 80   Hi 80   Lo 95   Hi 95
## 806        5106757 5098623 5114890 5094317 5119196
## 807        5153871 5139155 5168587 5131365 5176377
## 808        5200986 5178956 5223016 5167294 5234678
## 809        5248101 5217991 5278210 5202052 5294149
## 810        5295215 5256299 5334131 5235698 5354732
## 811        5342330 5293925 5390735 5268301 5416359
## 812        5389444 5330908 5447981 5299921 5478968
## 813        5436559 5367285 5505833 5330613 5542505
## 814        5483674 5403086 5564262 5360425 5606922
## 815        5530788 5438338 5623239 5389397 5672179
## 816        5577903 5473064 5682742 5417566 5738240
## 817        5625018 5507287 5742749 5444963 5805072
## 818        5672132 5541023 5803242 5471618 5872647
## 819        5719247 5574290 5864203 5497555 5940939
## 820        5766362 5607104 5925619 5522798 6009925
## 821        5813476 5639478 5987474 5547369 6079583
## 822        5860591 5671425 6049757 5571286 6149895
```

```
## 823        5907705 5702956 6112455 5594568 6220843
## 824        5954820 5734082 6175558 5617230 6292410
## 825        6001935 5764813 6239057 5639288 6364581
## 826        6049049 5795158 6302940 5660757 6437342
## 827        6096164 5825127 6367201 5681648 6510680
## 828        6143279 5854726 6431831 5701976 6584581
## 829        6190393 5883965 6496822 5721751 6659036
## 830        6237508 5912848 6562167 5740984 6734032
## 831        6284622 5941385 6627860 5759686 6809559
## 832        6331737 5969580 6693894 5777866 6885608
## 833        6378852 5997441 6760263 5795534 6962170
## 834        6425966 6024972 6826961 5812698 7039235
## 835        6473081 6052179 6893983 5829367 7116795
```

```
plot(forecast(fit, 30))
```



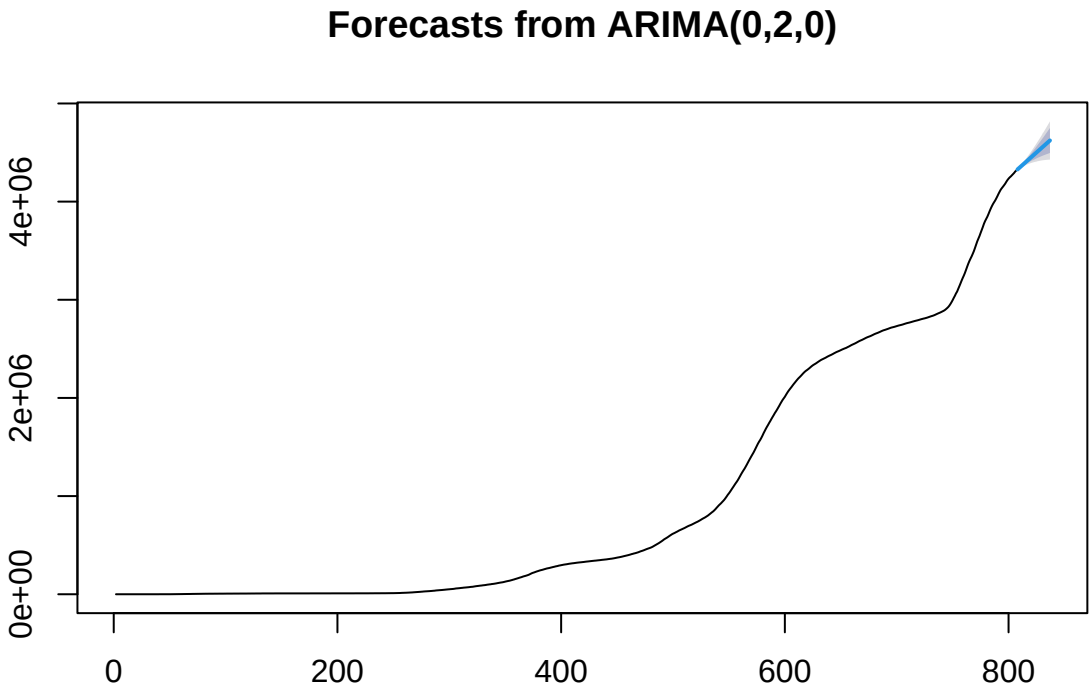
Trends in the number of people diagnosed in developing countries over the next 30 days based on the ARIMA model. As can be seen from the graph, the number of confirmed cases is still on the rise.

```
fit <- auto.arima(developing_countries$total_cases)
forecast(fit, 30)
```

```
##     Point Forecast   Lo 80   Hi 80   Lo 95   Hi 95
## 808        4327883 4326573 4329193 4325880 4329886
## 809        4338060 4335131 4340989 4333581 4342539
## 810        4348237 4343337 4353137 4340743 4355731
```

```
## 811        4358414 4351241 4365587 4347443 4369385
## 812        4368591 4358878 4378304 4353737 4383445
## 813        4378768 4366275 4391261 4359661 4397875
## 814        4388945 4373449 4404441 4365246 4412644
## 815        4399122 4380416 4417828 4370514 4427730
## 816        4409299 4387189 4431409 4375485 4443113
## 817        4419476 4393778 4445174 4380175 4458777
## 818        4429653 4400193 4459113 4384597 4474709
## 819        4439830 4406440 4473220 4388764 4490896
## 820        4450007 4412527 4487487 4392686 4507328
## 821        4460184 4418459 4501909 4396371 4523997
## 822        4470361 4424243 4516479 4399829 4540893
## 823        4480538 4429882 4531194 4403067 4558009
## 824        4490715 4435382 4546048 4406091 4575339
## 825        4500892 4440747 4561037 4408908 4592876
## 826        4511069 4445980 4576158 4411523 4610615
## 827        4521246 4451084 4591408 4413942 4628550
## 828        4531423 4456063 4606783 4416170 4646676
## 829        4541600 4460920 4622280 4418210 4664990
## 830        4551777 4465657 4637897 4420068 4683486
## 831        4561954 4470277 4653631 4421746 4702162
## 832        4572131 4474783 4669479 4423250 4721012
## 833        4582308 4479176 4685440 4424581 4740035
## 834        4592485 4483459 4701511 4425745 4759225
## 835        4602662 4487634 4717690 4426742 4778582
## 836        4612839 4491703 4733975 4427578 4798100
## 837        4623016 4495668 4750364 4428254 4817778
```

```
plot(forecast(fit, 30))
```


Forecasts from ARIMA(0,2,0)
0e+00
2e+06
4e+06
0
200
400
600
800