COVID-19 Data Analysis with R - Worldwide*

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1 Introduction

This is an analysis report of the Novel Coronavirus (COVID-19) around the world, to demonstrate data processing and visualisation with R, *tidyverse* and *ggplot2*. This report will be updated from time to time, with new data and more analysis. Please find its latest version at http://www.rdatamining.com/docs/Coronavirus-data-analysis-world.pdf.

A similar COVID-19 analysis report for China is available at http://www.rdatamining.com/docs/Coronavirus-data-analysis-china.pdf, if you are particually interested what has happened in China.

1.1 Data Source

The data source used for this analysis is *the 2019 Novel Coronavirus COVID-19 (2019-nCoV) Data Repository*[1] built by the Center for Systems Science and Engineering, Johns Hopkins University.

1.2 R Packages

Blow is a list of R packages used for this analysis. Package *magrittr* is for pipe operations like `%>%` and `%<>%` and *lubridate* for date operations. Package *tidyverse* is a collection of R packages for data science, including *dplyr* and *tidyr* for data processing and *ggplot2* for graphics. Package *gridExtra* is for arranging multiple grid-based plots on a page and *kableExtra* works together with `kable()` from *knitr* to build complex HTML or LaTeX tables.

```
library(magrittr) # pipe operations
library(lubridate) # date operations
library(tidyverse) # ggplot2, tidyr, dplyr...
library(gridExtra) # multiple grid-based plots on a page
library(ggforce) # accelerating ggplot2
library(kableExtra) # complex tables
library(leaflet) # map
```

2 Loading Data

At first, the datasets, which are three CSV files, are downloaded and saved as local files and then are loaded into R.

```
## source data files
filenames <- c('time_series_covid19_confirmed_global.csv',
               'time_series_covid19_deaths_global.csv',
               'time_series_covid19_recovered_global.csv')
url.path <- paste0('https://raw.githubusercontent.com/CSSEGISandData/COVID-19/',
                   'master/csse_covid_19_data/csse_covid_19_time_series/')

## download files to local
download <- function(filename) {
  url <- file.path(url.path, filename)
  dest <- file.path('./data', filename)
  download.file(url, dest)
}
bin <- lapply(filenames, download)

## load data into R
raw.data.confirmed <- read.csv('./data/time_series_covid19_confirmed_global.csv')
raw.data.deaths <- read.csv('./data/time_series_covid19_deaths_global.csv')
```

[1] https://github.com/CSSEGISandData/COVID-19

```
raw.data.recovered <- read.csv('./data/time_series_covid19_recovered_global.csv')

dim(raw.data.confirmed)
```

```
## [1] 273 389
```

Each dataset has 273 rows, corresponding to country/region/province/state. It has 389 columns. Starting from column 5, each column corresponds to a single day. Here we have a look at the first 10 rows and the first 10 columns.

```
raw.data.confirmed[1:10, 1:10] %>%
  kable('latex', booktabs=T, caption='Raw Data (Confirmed, First 10 Columns only)') %>%
  kable_styling(font_size=5, latex_options = c('striped', 'hold_position', 'repeat_header'))
```

Table 1: Raw Data (Confirmed, First 10 Columns only)

Province.State	Country.Region	Lat	Long	X1.22.20	X1.23.20	X1.24.20	X1.25.20	X1.26.20	X1.27.20
	Afghanistan	33.93911	67.70995	0	0	0	0	0	0
	Albania	41.15330	20.16830	0	0	0	0	0	0
	Algeria	28.03390	1.65960	0	0	0	0	0	0
	Andorra	42.50630	1.52180	0	0	0	0	0	0
	Angola	-11.20270	17.87390	0	0	0	0	0	0
	Antigua and Barbuda	17.06080	-61.79640	0	0	0	0	0	0
	Argentina	-38.41610	-63.61670	0	0	0	0	0	0
	Armenia	40.06910	45.03820	0	0	0	0	0	0
Australian Capital Territory	Australia	-35.47350	149.01240	0	0	0	0	0	0
New South Wales	Australia	-33.86880	151.20930	0	0	0	0	3	4

Below we check the time frame of the data.

```
n.col <- ncol(raw.data.confirmed)
## get dates from column names
dates <- names(raw.data.confirmed)[5:n.col] %>% str_replace('X', '') %>% mdy()
range(dates)
```

```
## [1] "2020-01-22" "2021-02-09"
```

```
min.date <- min(dates)
max.date <- max(dates)
min.date.txt <- min.date %>% format('%d %b %Y')
max.date.txt <- max.date %>% format('%d %b %Y') %>% paste('UTC')
```

It shows that the data was last updated on 09 Feb 2021 UTC and all the stats and charts in this report are based on that data.

3 Data Preparation

3.1 Data Cleaning

The three datesets are converted from wide to long format and then are aggregated by country. After that, they are merged into one single dataset.

```
## data cleaning and transformation
cleanData <- function(data) {
  ## remove some columns
  data %<>% select(-c(Province.State, Lat, Long)) %>% rename(country=Country.Region)
  ## convert from wide to long format
  data %<>% gather(key=date, value=count, -country)
  ## convert from character to date
  data %<>% mutate(date = date %>% str_replace('X', '') %>% mdy())
```

```r
  ## aggregate by country
  data %<>% group_by(country, date) %>% summarise(count=sum(count, na.rm=T)) %>% as.data.frame()
  return(data)
}

## clean the three datasets
data.confirmed <- raw.data.confirmed %>% cleanData() %>% rename(confirmed=count)
data.deaths <- raw.data.deaths %>% cleanData() %>% rename(deaths=count)
data.recovered <- raw.data.recovered %>% cleanData() %>% rename(recovered=count)

## merge above 3 datasets into one, by country and date
data <- data.confirmed %>% merge(data.deaths, all=T) %>% merge(data.recovered, all=T)
# data %<>% mutate(recovered = ifelse(is.na(recovered), lag(recovered, 1), recovered))

## countries/regions with confirmed cases, excl. cruise ships
countries <- data %>% pull(country) %>% setdiff('Cruise Ship')

## latest 10 records in US
data %>% filter(country=='US') %>% tail(10) %>%
  kable('latex', row.names=F, booktabs=T,
        caption='Raw Data (with first 10 Columns Only)',
        format.args=list(big.mark=',')) %>%
  kable_styling(latex_options = c('striped', 'hold_position', 'repeat_header'))
```

Table 2: Raw Data (with first 10 Columns Only)

country	date	confirmed	deaths	recovered
US	2021-01-31	26,186,781	442,646	0
US	2021-02-01	26,321,120	444,697	0
US	2021-02-02	26,435,557	448,202	0
US	2021-02-03	26,557,026	452,114	0
US	2021-02-04	26,680,214	455,881	0
US	2021-02-05	26,813,772	459,555	0
US	2021-02-06	26,917,787	462,169	0
US	2021-02-07	27,007,368	463,476	0
US	2021-02-08	27,097,095	465,072	0
US	2021-02-09	27,192,455	468,203	0

There are 192 countries with confirmed COVID-19 cases, as of 09 Feb 2021 UTC.

3.2 Worldwide Cases

The raw data provide the daily number of cases in every country. They are aggregated below to derive the daily stats of the whole world.

```r
## counts for the whole world
data.world <- data %>% group_by(date) %>%
  summarise(country='World',
            confirmed = sum(confirmed, na.rm=T),
            deaths = sum(deaths, na.rm=T),
            recovered = sum(recovered, na.rm=T))
```

```r
data %<>% rbind(data.world)

## active confirmed cases
data %<>% mutate(active.confirmed = confirmed - deaths - recovered)
```

3.3 Daily Increases and Death Rates

After that, the daily increases of death and recovered cases and the death rates are calculated.

`rate.upper` is caculated with the total dead and recovered cases. It is the upper bound of death rate and the reasons are

1) there were much more deaths than recovered cases when the coronavirus broke out and when it was not contained, and
2) the daily number of death will decrease and that of recovered will increase as it becomes contained and more effective measures and treatments are used.

`rate.lower` is caculated with total dead and confirmed cases. It is a lower bound of death rate, because there are and will be new deaths from the active confirmed cases. The final death rate is expected to be in between of the above two rates.

`rate.daily` is caculated with the daily dead and recovered cases and therefore is more volatile than the above two. However, it can give us a clue of the current situlation: whether it is very serious or is getting better.

```r
## sort by country and date
data %<>% arrange(country, date)

## daily increases of deaths and recovered cases
## set NA to the increases on day1
n <- nrow(data)
day1 <- min(data$date)
data %<>% mutate(new.confirmed = ifelse(date == day1, NA, confirmed - lag(confirmed, n=1)),
                 new.deaths = ifelse(date == day1, NA, deaths - lag(deaths, n=1)),
                 new.recovered = ifelse(date == day1, NA, recovered - lag(recovered, n=1)))

## change negative number of new cases to zero
data %<>% mutate(new.confirmed = ifelse(new.confirmed < 0, 0, new.confirmed),
                 new.deaths = ifelse(new.deaths < 0, 0, new.deaths),
                 new.recovered = ifelse(new.recovered < 0, 0, new.recovered))

## death rate based on total deaths and recovered cases
data %<>% mutate(rate.upper = (100 * deaths / (deaths + recovered)) %>% round(1))
## lower bound: death rate based on total confirmed cases
data %<>% mutate(rate.lower = (100 * deaths / confirmed) %>% round(1))
## death rate based on the number of death/recovered on every single day
data %<>% mutate(rate.daily = (100 * new.deaths / (new.deaths + new.recovered)) %>% round(1))


## convert from wide to long format, for drawing area plots
data.long <- data %>%
  select(c(country, date, confirmed, active.confirmed, recovered, deaths)) %>%
  gather(key=type, value=count, -c(country, date))
## set factor levels to show them in a desirable order
data.long %<>% mutate(type=recode_factor(type, confirmed='Total Confirmed',
                                         active.confirmed='Active Confirmed',
```

```
                                        recovered='Recovered',
                                        deaths='Deaths'))


## convert from wide to long format, for drawing area plots
rates.long <- data %>%
  # filter(country %in% top.countries) %>%
  select(c(country, date, rate.upper, rate.lower, rate.daily)) %>%
  # mutate(country=factor(country, levels=top.countries)) %>%
  gather(key=type, value=count, -c(country, date))
# set factor levels to show them in a desirable order
rates.long %<>% mutate(type=recode_factor(type, rate.daily='Daily',
                                          rate.lower='Lower bound',
                                          rate.upper='Upper bound'))
```

4 Worldwide Cases

After tidying up the data, we visualise it with various charts.

4.1 World Map

Below is a world map of vconfirmed cases. An interactive map can be created if running the code in R or RStudio, or knitting it into a HTML file.

```
## select last column, which is the number of latest confirmed cases
x <- raw.data.confirmed
x$confirmed <- x[, ncol(x)]
x %<>% select(c(Country.Region, Province.State, Lat, Long, confirmed)) %>%
  mutate(txt=paste0(Country.Region, ' - ', Province.State, ': ', confirmed))

m <- leaflet(width=1200, height=800) %>% addTiles()
# circle marker (units in pixels)
m %<>% addCircleMarkers(x$Long, x$Lat,
                        # radius=2+log2(x$confirmed),
                        radius=0.03*sqrt(x$confirmed),
                        stroke=F,
                        color='red', fillOpacity=0.3,
                        popup=x$txt)

# world
m
```

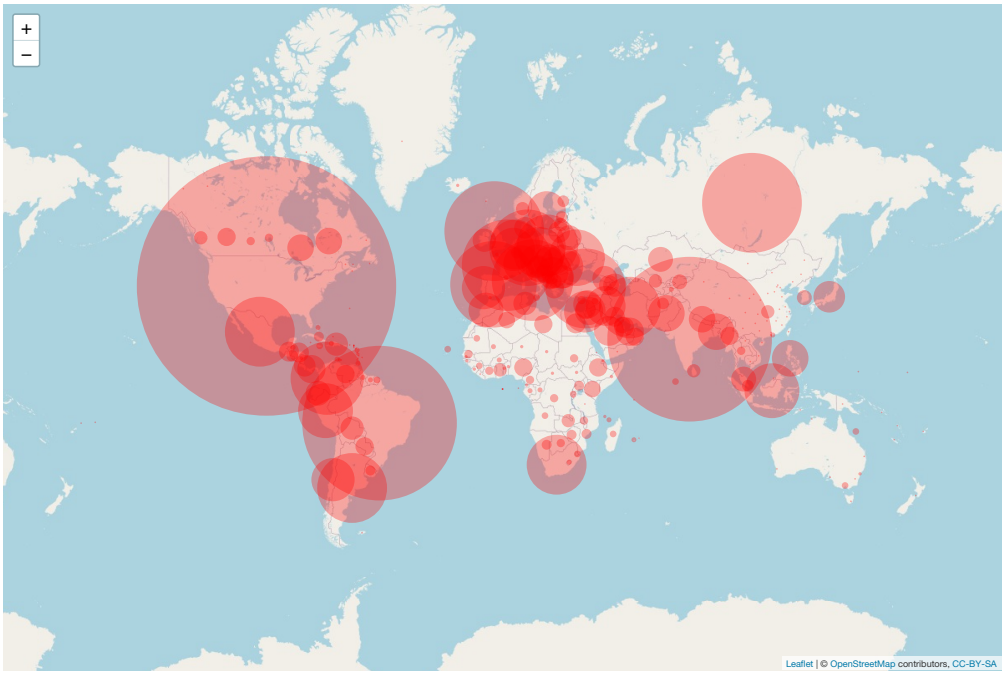


Figure 1: World Map

Views of some specific countries or regions can be produced with the script below.

```
## China
m %>% setView(95, 35, zoom=4)
## Australia and New Zealand
m %>% setView(135, -27, zoom=4)
## US and Canada
m %>% setView(-105, 40, zoom=4)
## Europe
m %>% setView(10, 50, zoom=4)
```

4.2 Number of Cases

In the rest of this section, we will focuse on the cases worldwide. Similar analysis for a single country can be done by filter the data with the corresponding country name.

```
# data %<>% filter(country=='China')
# data %<>% filter(country=='Australia')
world.long <- data.long %>% filter(country == 'World')

## cases - area plot
plot1 <- world.long %>% filter(type != 'Total Confirmed') %>%
  ggplot(aes(x=date, y=count)) +
  geom_area(aes(fill=type), alpha=0.5) +
  labs(title=paste0('Numbers of Cases Worldwide - ', max.date.txt)) +
  scale_fill_manual(values=c('red', 'green', 'black')) +
  theme(legend.title=element_blank(), legend.position='bottom',
        plot.title = element_text(size=7),
        axis.title.x=element_blank(),
        axis.title.y=element_blank(),
```

```
        legend.key.size=unit(0.2, 'cm'),
        legend.text=element_text(size=6),
        axis.text=element_text(size=7),
        axis.text.x=element_text(angle=45, hjust=1))

plot2 <- world.long %>%
  ggplot(aes(x=date, y=count)) +
  geom_line(aes(color=type)) +
  labs(title=paste0('Numbers of Cases Worldwide (log scale) - ', max.date.txt)) +
  scale_color_manual(values=c('purple', 'red', 'green', 'black')) +
  theme(legend.title=element_blank(), legend.position='bottom',
        plot.title = element_text(size=7),
        axis.title.x=element_blank(),
        axis.title.y=element_blank(),
        legend.key.size=unit(0.2, 'cm'),
        legend.text=element_text(size=6),
        axis.text=element_text(size=7),
        axis.text.x=element_text(angle=45, hjust=1)) +
  scale_y_continuous(trans='log10')
## show two plots side by side
grid.arrange(plot1, plot2, ncol=2)
```

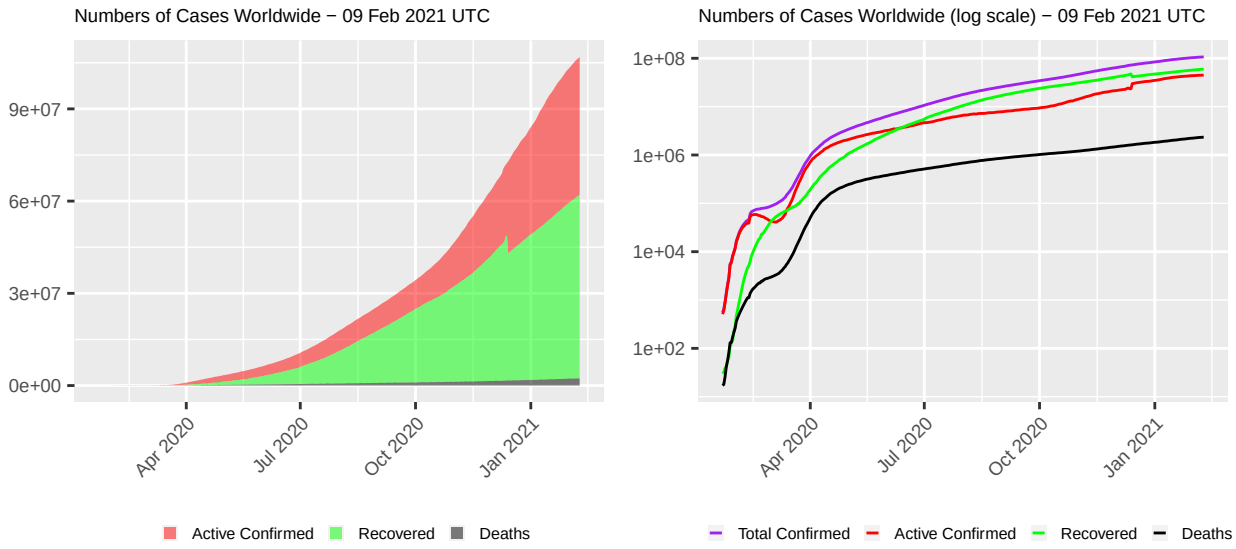


Figure 2: COVID-19 Cases Worldwide

4.3 Active Confirmed Cases

```
data.world <- data %>% filter(country=='World')
n <- nrow(data.world)
```

```
## active confirmed and daily new confirmed
plot1 <- ggplot(data.world, aes(x=date, y=active.confirmed)) +
  geom_point() + geom_smooth() +
  xlab('') + ylab('Count') + labs(title='Active Confirmed Cases') +
  theme(axis.text.x=element_text(angle=45, hjust=1))
plot2 <- ggplot(data.world, aes(x=date, y=new.confirmed)) +
```

```
  geom_point() + geom_smooth() +
  xlab('') + ylab('Count') + labs(title='Daily New Confirmed Cases') +
  theme(axis.text.x=element_text(angle=45, hjust=1))
## show two plots side by side
grid.arrange(plot1, plot2, ncol=2)
```

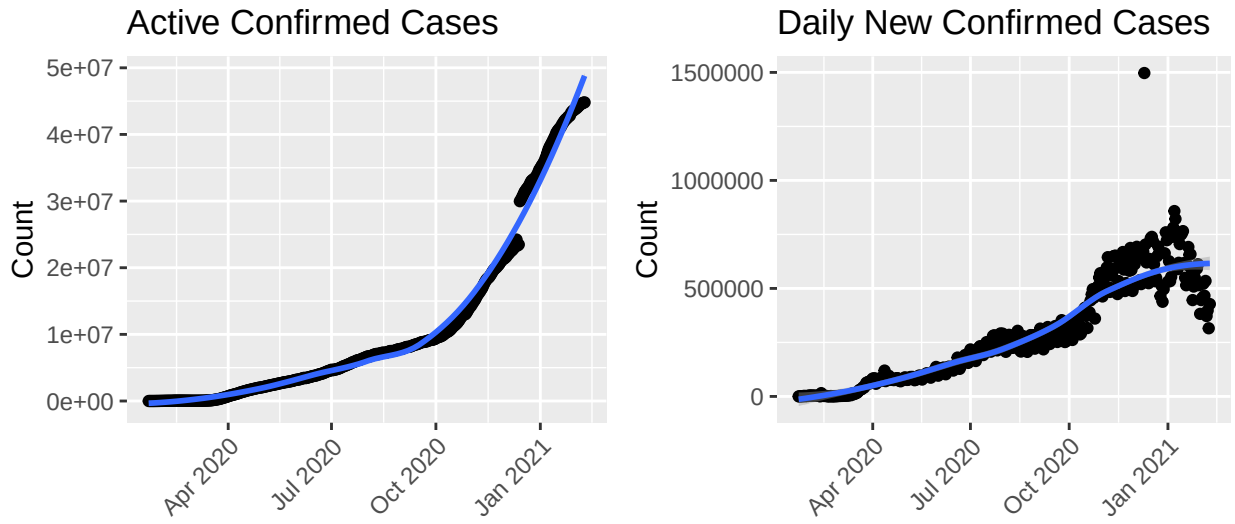


Figure 3: Active Confirmed Cases

Figure 3 shows the numbers of active (see left chart) and new (see right chart) confirmed cases. The blue lines are smoothed conditional means and the grey band around them show the 95% confidence interval.

4.4 Deaths and Recovered Cases

```
## a scatter plot with a smoothed line and vertical x-axis labels
plot1 <- ggplot(data.world, aes(x=date, y=deaths)) +
  geom_point() + geom_smooth() +
  xlab('') + ylab('Count') + labs(title='Accumulative Deaths') +
  theme(axis.text.x=element_text(angle=45, hjust=1))
plot2 <- ggplot(data.world, aes(x=date, y=recovered)) +
  geom_point() + geom_smooth() +
  xlab('') + ylab('Count') + labs(title='Accumulative Recovered Cases') +
  theme(axis.text.x=element_text(angle=45, hjust=1))
plot3 <- ggplot(data.world, aes(x=date, y=new.deaths))  +
  geom_point() + geom_smooth()  +
  xlab('') + ylab('Count') + labs(title='New Deaths') +
  theme(axis.text.x=element_text(angle=45, hjust=1))
plot4 <- ggplot(data.world, aes(x=date, y=new.recovered)) +
  geom_point() + geom_smooth()  +
  xlab('') + ylab('Count') + labs(title='New Recovered Cases') +
  theme(axis.text.x=element_text(angle=45, hjust=1))
## show four plots together, with 2 plots in each row
grid.arrange(plot1, plot2, plot3, plot4, nrow=2)
```

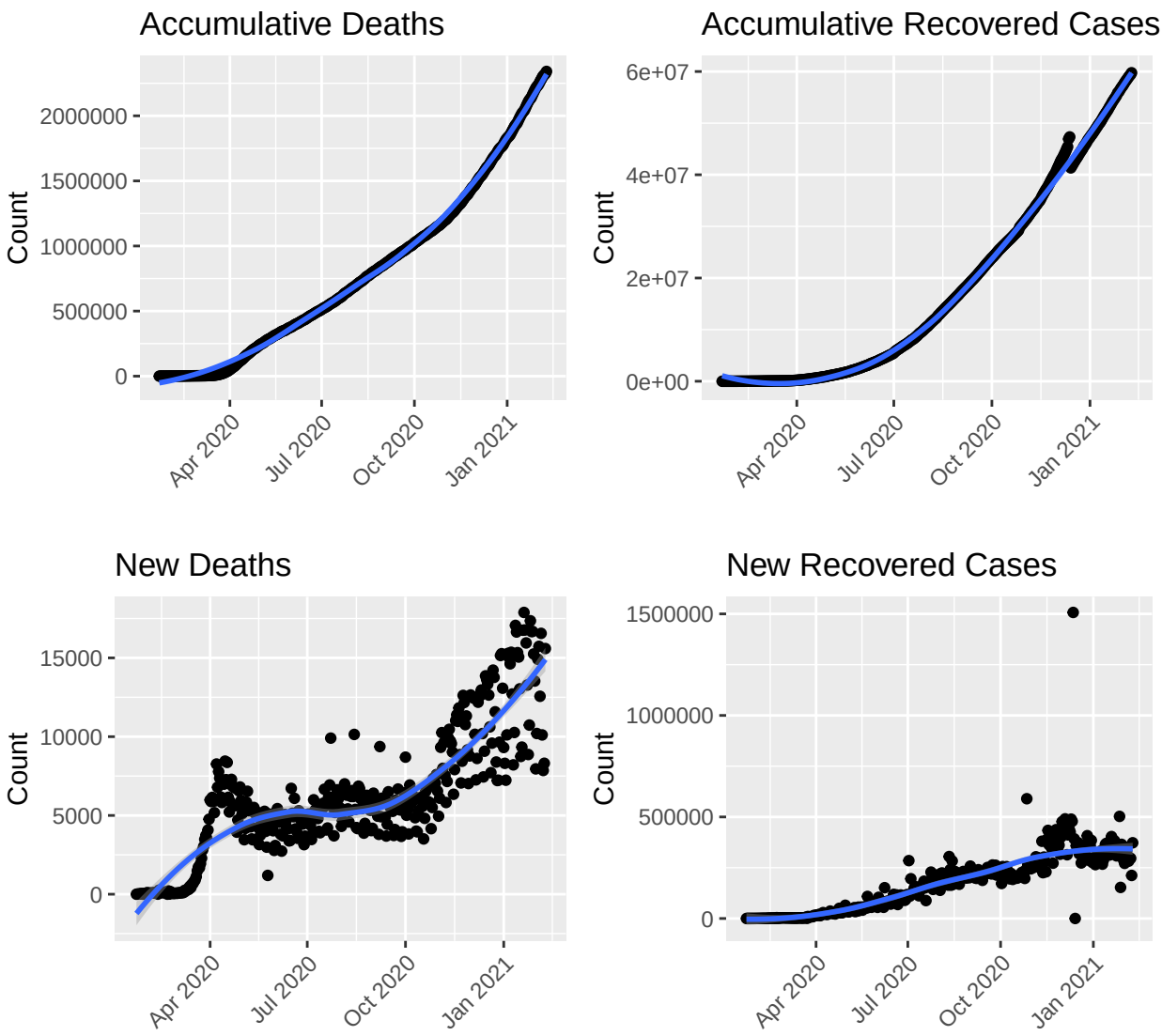


Figure 4: Deaths and Recovered Cases

4.5 Death Rates

Figure 5 shows death rates caculated in three different ways (see Section 3.3 for details). The left chart shows the death rates from 22 Jan 2020 to 09 Feb 2021 UTC and the right one is a zoom-in view of the rates in last two weeks.

In the right chart, the upper bound (in blue) is decreasing, as there will be more recovered cases and fewer dead ones daily as time goes on. However, the lower bound (in green) keeps going up, as there are and will be new deaths from the active confirmed cases. Therefore, the final death rate is expected to be in-between of those two rates, and based on the latest data retrieved as of 09 Feb 2021 UTC, it will be between 2.2% and 3.8%.

A surge in the daily death rate (in red) in late March suggests that the situlation is changing dramatically (actually, getting worse) and that above lower/upper bounds are likely to increase shortly. A likely reason of that surge is the outbreak of coronavirus in Iran, Europe and US.

```
## three death rates
plot1 <- ggplot(data.world, aes(x=date)) +
```

```
  geom_line(aes(y=rate.upper, colour='Upper bound')) +
  geom_line(aes(y=rate.lower, colour='Lower bound')) +
  geom_line(aes(y=rate.daily, colour='Daily')) +
  xlab('') + ylab('Death Rate (%)') + labs(title='Overall') +
  theme(legend.position='bottom', legend.title=element_blank(),
        legend.text=element_text(size=8),
        legend.key.size=unit(0.5, 'cm'),
        axis.text.x=element_text(angle=45, hjust=1)) +
  ylim(c(0, 99))
## focusing on last 2 weeks
# y.max <- data.world[n-(14:0), ] %>% select(rate.upper, rate.lower, rate.daily) %>% max()
plot2 <- ggplot(data.world[n-(14:0),], aes(x=date)) +
  geom_line(aes(y=rate.upper, colour='Upper bound')) +
  geom_line(aes(y=rate.lower, colour='Lower bound')) +
  geom_line(aes(y=rate.daily, colour='Daily')) +
  xlab('') + ylab('Death Rate (%)') + labs(title='Last two weeks') +
  theme(legend.position='bottom', legend.title=element_blank(),
        legend.text=element_text(size=8),
        legend.key.size=unit(0.5, 'cm'),
        axis.text.x=element_text(angle=45, hjust=1)) +
  ylim(c(0, 20))
grid.arrange(plot1, plot2, ncol=2)
```

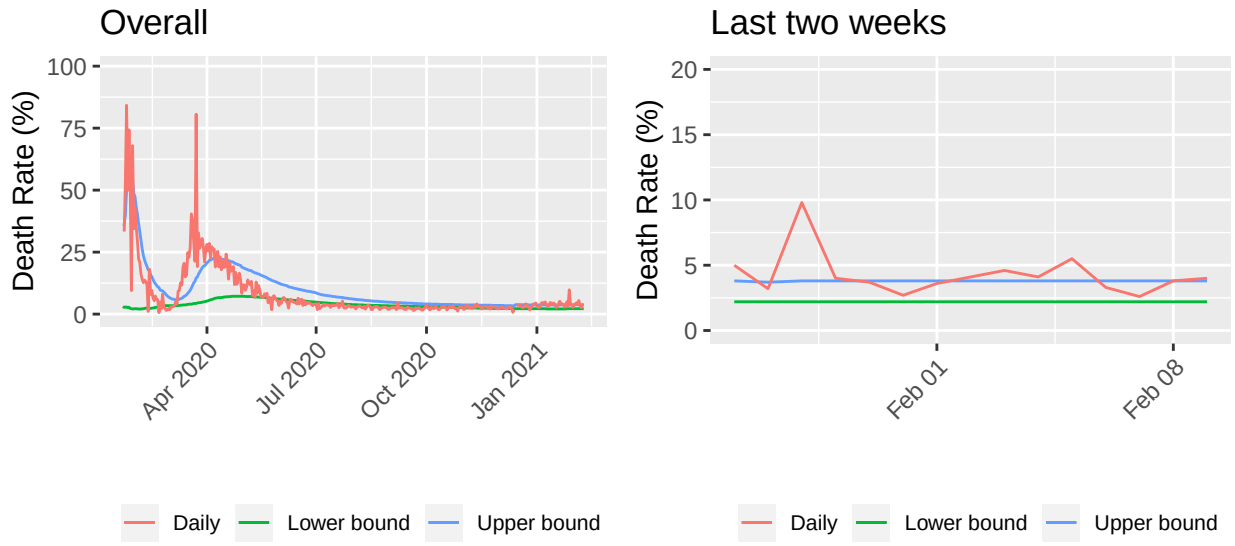


Figure 5: Death Rate

5 Top Twenty Countries

Next, we will have a look at the top 20 countries in total confirmed cases.

```
## ranking by confirmed cases
data.latest.all <- data %>% filter(date == max(date)) %>%
  select(country, date,
         confirmed, new.confirmed, active.confirmed,
         recovered, deaths, new.deaths, death.rate=rate.lower) %>%
  mutate(ranking = dense_rank(desc(confirmed)))
```

```r
k <- 20
## top 20 countries: 21 incl. 'World'
top.countries <- data.latest.all %>% filter(ranking <= k + 1) %>%
  arrange(ranking) %>% pull(country) %>% as.character()
top.countries %>% setdiff('World') %>% print()
```

```
##  [1] "US"             "India"          "Brazil"         "United Kingdom"
##  [5] "Russia"         "France"         "Spain"          "Italy"
##  [9] "Turkey"         "Germany"        "Colombia"       "Argentina"
## [13] "Mexico"         "Poland"         "Iran"           "South Africa"
## [17] "Ukraine"        "Peru"           "Indonesia"      "Czechia"
```

```r
## add 'Others'
# top.countries %<>% c('Others')
## put all others in a single group of 'Others'
data.latest <- data.latest.all %>% filter(!is.na(country)) %>%
  mutate(country=ifelse(ranking <= k + 1, as.character(country), 'Others')) %>%
  mutate(country=country %>% factor(levels=c(top.countries, 'Others')))
data.latest %<>% group_by(country) %>%
  summarise(confirmed=sum(confirmed), new.confirmed=sum(new.confirmed),
            active.confirmed=sum(active.confirmed),
            recovered=sum(recovered), deaths=sum(deaths), new.deaths=sum(new.deaths)) %>%
  mutate(death.rate=(100 * deaths/confirmed) %>% round(1))
data.latest %<>% select(c(country, confirmed, deaths, death.rate,
                 new.confirmed, new.deaths, active.confirmed))
```

```r
data.latest %>% mutate(death.rate=death.rate %>% format(nsmall=1) %>% paste0('%')) %>%
  kable('latex', booktabs=T, row.names=T, align=c('l', rep('r', 6)),
        caption=paste0('Cases in Top 20 Countries - ', max.date.txt,
                       '. See a complete list of all infected countries at the end of this report.'),
        format.args=list(big.mark=',')) %>%
  kable_styling(font_size=7, latex_options=c('striped', 'hold_position', 'repeat_header'))
```

```r
## convert from wide to long format, for drawing area plots
data.latest.long <- data.latest %>% filter(country!='World') %>%
  gather(key=type, value=count, -country)
## set factor levels to show them with proper text and in a desirable order
data.latest.long %<>% mutate(type=recode_factor(type,
                                    confirmed='Total Confirmed',
                                    deaths='Total Deaths',
                                    death.rate='Death Rate (%)',
                                    new.confirmed='New Confirmed (compared with one day before)',
                                    new.deaths='New Deaths (compared with one day before)',
                                    active.confirmed='Active Confirmed'))
```

```r
## bar chart
data.latest.long %>% ggplot(aes(x=country, y=count, fill=country, group=country)) +
  geom_bar(stat='identity') +
  geom_text(aes(label=count, y=count), size=2, vjust=0) +
  xlab('') + ylab('') +
  labs(title=paste0('Top 20 Countries with Most Confirmed Cases - ', max.date.txt)) +
  scale_fill_discrete(name='Country', labels=aes(count)) +
  theme(legend.title=element_blank(),
        legend.position='none',
        plot.title=element_text(size=11),
```

Table 3: Cases in Top 20 Countries - 09 Feb 2021 UTC. See a complete list of all infected countries at the end of this report.

	country	confirmed	deaths	death.rate	new.confirmed	new.deaths	active.confirmed
1	World	106,905,601	2,341,104	2.2%	427,555	15,592	44,809,563
2	US	27,192,455	468,203	1.7%	95,360	3,131	26,724,252
3	India	10,858,371	155,252	1.4%	11,067	94	141,511
4	Brazil	9,599,565	233,520	2.4%	74,925	1,986	788,838
5	United Kingdom	3,983,756	114,066	2.9%	12,441	1,052	3,859,263
6	Russia	3,953,970	76,347	1.9%	14,808	519	422,041
7	France	3,419,210	80,295	2.3%	18,886	724	3,096,991
8	Spain	3,005,487	63,061	2.1%	16,402	766	2,792,050
9	Italy	2,655,319	92,002	3.5%	10,612	422	413,967
10	Turkey	2,548,195	26,998	1.1%	8,636	98	83,815
11	Germany	2,302,051	63,006	2.7%	5,728	815	157,079
12	Colombia	2,166,904	56,507	2.6%	5,442	217	62,105
13	Argentina	1,993,295	49,566	2.5%	7,794	168	151,408
14	Mexico	1,946,751	168,432	8.7%	10,738	1,701	267,120
15	Poland	1,556,685	39,360	2.5%	3,999	228	199,851
16	Iran	1,481,396	58,625	4.0%	7,640	89	156,253
17	South Africa	1,479,253	46,869	3.2%	1,742	396	65,137
18	Ukraine	1,293,892	25,022	1.9%	2,867	138	145,958
19	Peru	1,196,778	42,626	3.6%	10,080	318	42,656
20	Indonesia	1,174,779	31,976	2.7%	8,700	213	169,351
21	Czechia	1,045,132	17,497	1.7%	7,727	164	95,479
22	Others	22,052,357	431,874	2.0%	91,961	2,353	4,974,438

```
      axis.text=element_text(size=7),
      axis.text.x=element_text(angle=45, hjust=1)) +
facet_wrap(~type, ncol=1, scales='free_y')
```

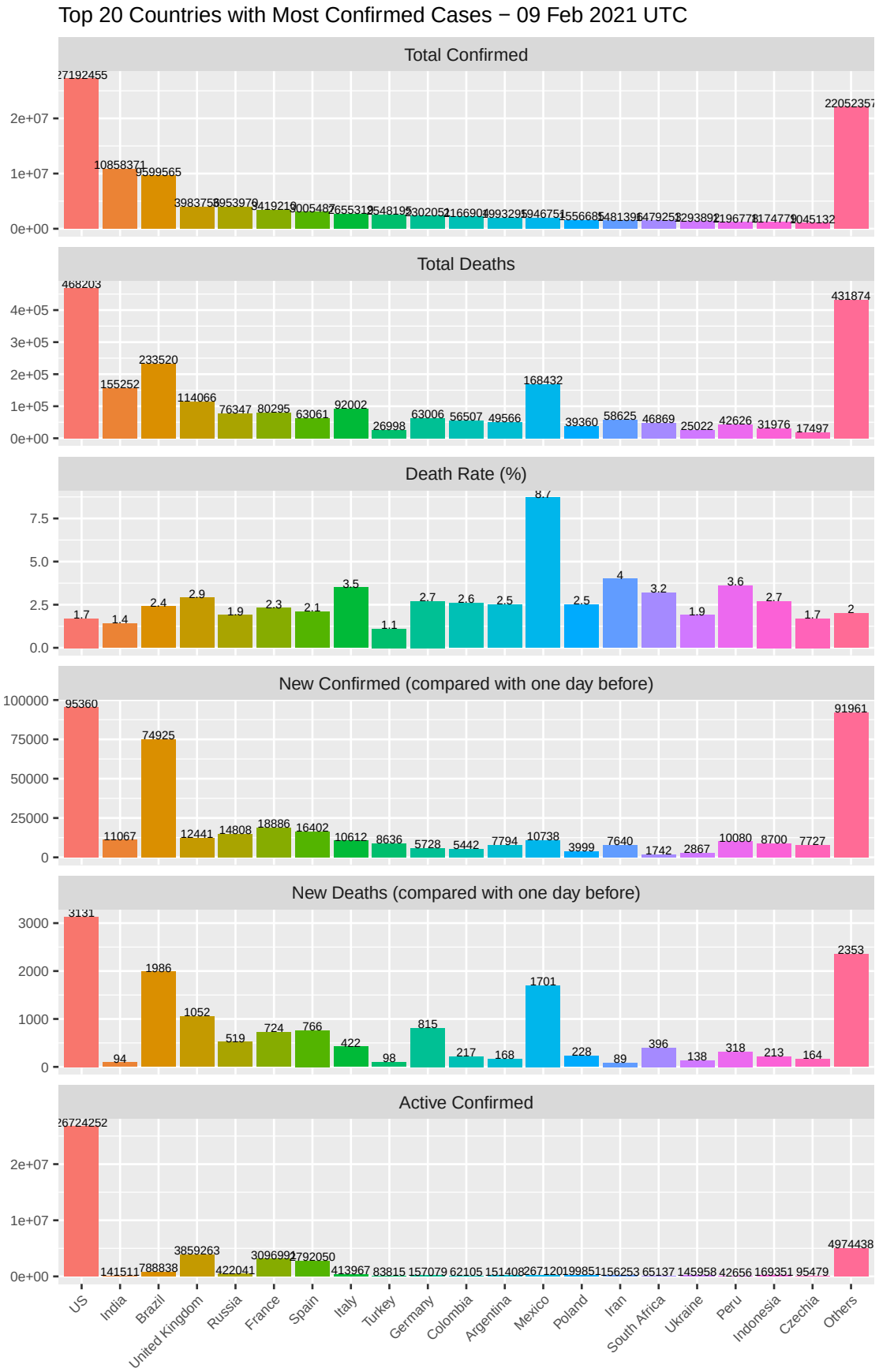
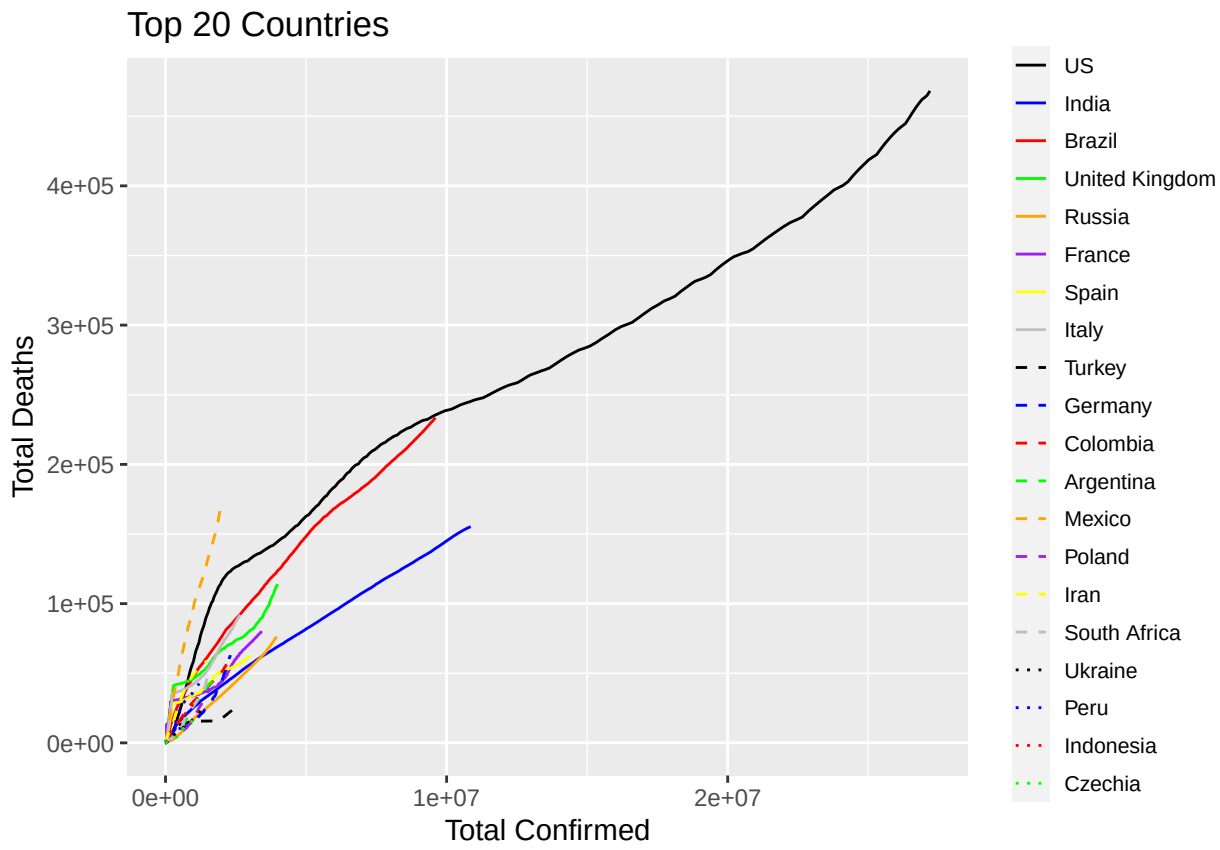


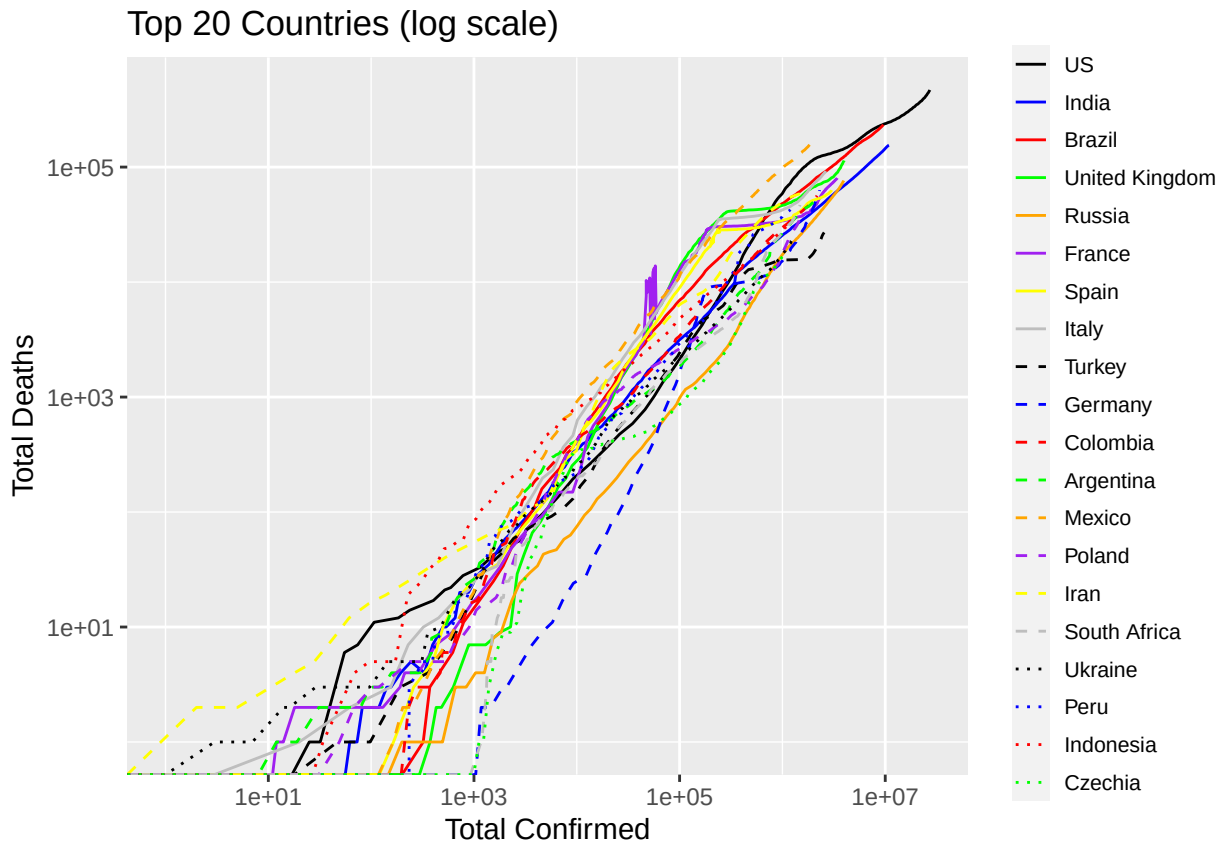
Figure 6: Top 20 Countries with Most Confirmed Cases

5.1 Confirmed vs Deaths

```
# linetypes <- rep(c("dotted", "dashed", "solid"), each=8)
# colors <- rep(c('grey', 'yellow', 'purple', 'orange', 'green', 'red', 'blue', 'black'), 3)
linetypes <- rep(c("solid", "dashed", "dotted"), each=8)
colors <- rep(c('black', 'blue', 'red', 'green', 'orange', 'purple', 'yellow', 'grey'), 3)
df <- data %>% filter(country %in% setdiff(top.countries, c('World'))) %>%
  mutate(country=country %>% factor(levels=c(top.countries)))
p <- df %>% ggplot(aes(x=confirmed, y=deaths, group=country)) +
  geom_line(aes(color=country, linetype=country)) +
  xlab('Total Confirmed') + ylab('Total Deaths') +
  scale_linetype_manual(values=linetypes) +
  scale_color_manual(values=colors) +
  theme(legend.title=element_blank(),
        legend.text=element_text(size=8),
        legend.key.size=unit(0.5, 'cm'))
p + labs(title=paste0('Top 20 Countries'))
```




```
p + scale_x_log10() + scale_y_log10() +
  labs(title=paste0('Top 20 Countries (log scale)'))
```



The two figures below show the numbers of confirmed cases and deaths of top 20 countries, as well as the death rates up to 09 Feb 2021 UTC.

```
df <- data.latest %>% filter(country %in% setdiff(top.countries, 'World'))
## breaks for circle size in legend; needs to be adjusted accordingly when the number of total confirme
breaks.confirmed <- c(5e3, 1e4, 2e4, 5e4, 1e5, 2e5, 5e5, 1e6, 2e6, 5e6, 1e7)

plot1 <- df %>% ggplot(aes(x=confirmed, y=deaths, col=death.rate, size=active.confirmed)) +
  scale_size(name='Active Confirmed', trans='log2', breaks=breaks.confirmed) +
  geom_text(aes(label=country), size=2.5, check_overlap=T, vjust=-1.6) +
  geom_point() +
  xlab('Total Confirmed') + ylab('Total Deaths') +
  labs(col="Death Rate (%)") +
  scale_color_gradient(low='#56B1F7', high='#132B43') +
  scale_x_log10() + scale_y_log10() +
  labs(title=paste0('Top 20 Countries - Confirmed vs Deaths (log scale)'))

plot2 <- df %>% ggplot(aes(x=new.confirmed, y=new.deaths, col=death.rate, size=active.confirmed)) +
  scale_size(name='Active Confirmed', trans='log2', breaks=breaks.confirmed) +
  geom_text(aes(label=country), size=2.5, check_overlap=T, vjust=-1.6) +
  geom_point() +
  xlab('New Confirmed') + ylab('New Deaths') +
  labs(col="Death Rate (%)") +
  scale_color_gradient(low='#56B1F7', high='#132B43') +
  scale_x_log10() + scale_y_log10() +
  labs(title=paste0('Top 20 Countries - New Confirmed vs New Deaths (log scale)'))
```

```
grid.arrange(plot1, plot2, ncol=1)
```

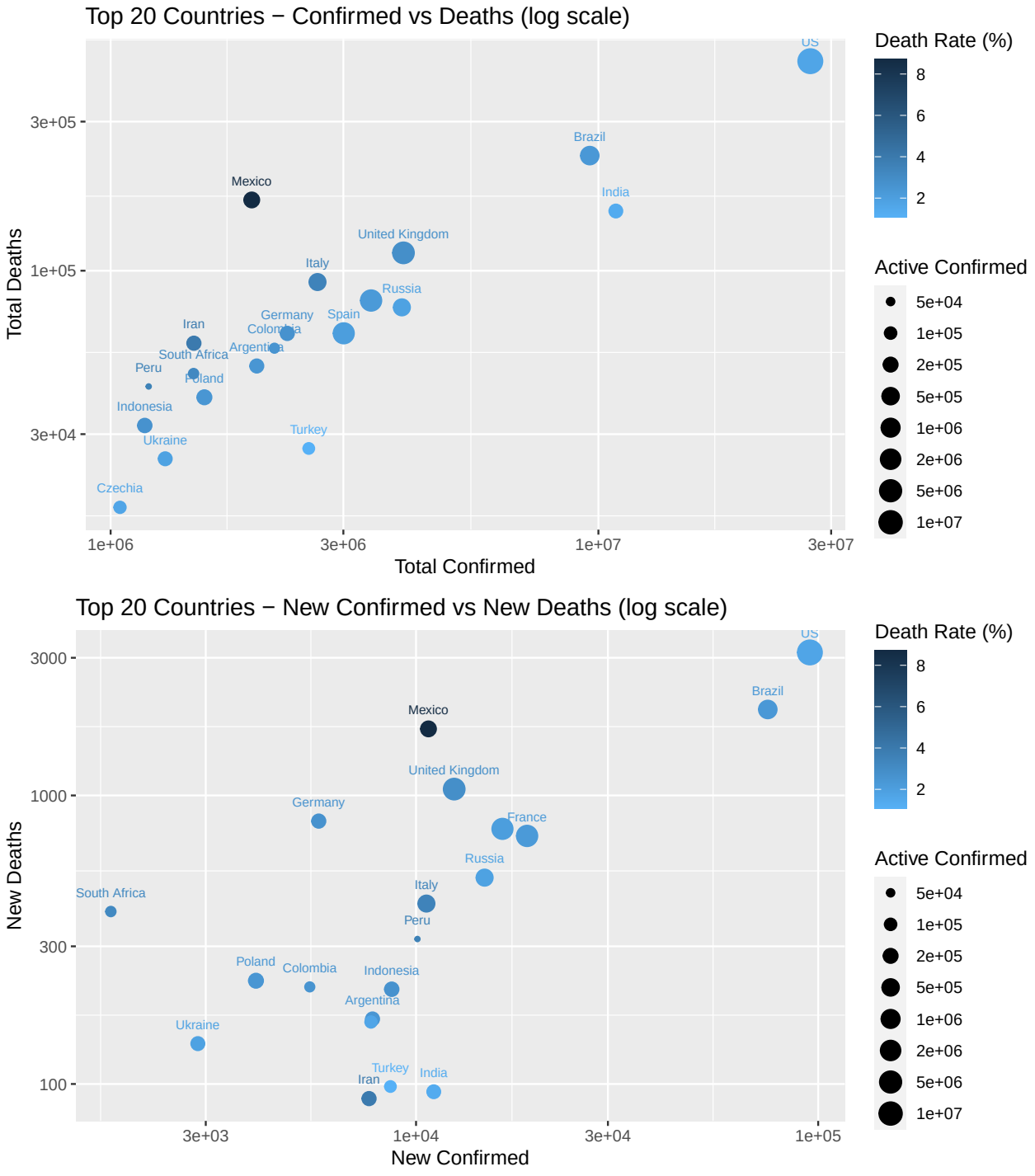


Figure 7: Top 20 Countries

5.2 Comparison across Countries

The area plots blow show the numbers of dead, recovered, total and active confimed cases. Note that, in the area plot, the total number of total confirmed cases is represented by the total areas of active confirmed,

recovered and dead.

```
## plot: cases by type
df <- data.long %>% filter(country %in% top.countries) %<>%
  mutate(country=country %>% factor(levels=c(top.countries)))

p <- df %>% filter(country != 'World') %>%
  ggplot(aes(x=date, y=count)) + xlab('') + ylab('Count')  +
  theme(legend.title=element_blank(),
        legend.text=element_text(size=8),
        legend.key.size=unit(0.5, 'cm'),
        plot.title=element_text(size=11),
        axis.text.x=element_text(angle=45, hjust=1)) +
  facet_wrap(~type, ncol=2, scales='free_y')

## area plot
plot1 <- p + geom_area(aes(fill=country)) +
  labs(title=paste0('Cases around the World - ', max.date.txt))

## line plot and in log scale
# linetypes <- rep(c("solid", "dashed", "dotted"), each=8)
# colors <- rep(c('black', 'blue', 'red', 'green', 'orange', 'purple', 'yellow', 'grey'), 3)
plot2 <- p + geom_line(aes(color=country, linetype=country)) +
  scale_linetype_manual(values=linetypes) +
  scale_color_manual(values=colors) +
  labs(title=paste0('Cases around the World - Log Scale - ', max.date.txt)) +
  scale_y_continuous(trans='log10')

grid.arrange(plot1, plot2, ncol=1)
```

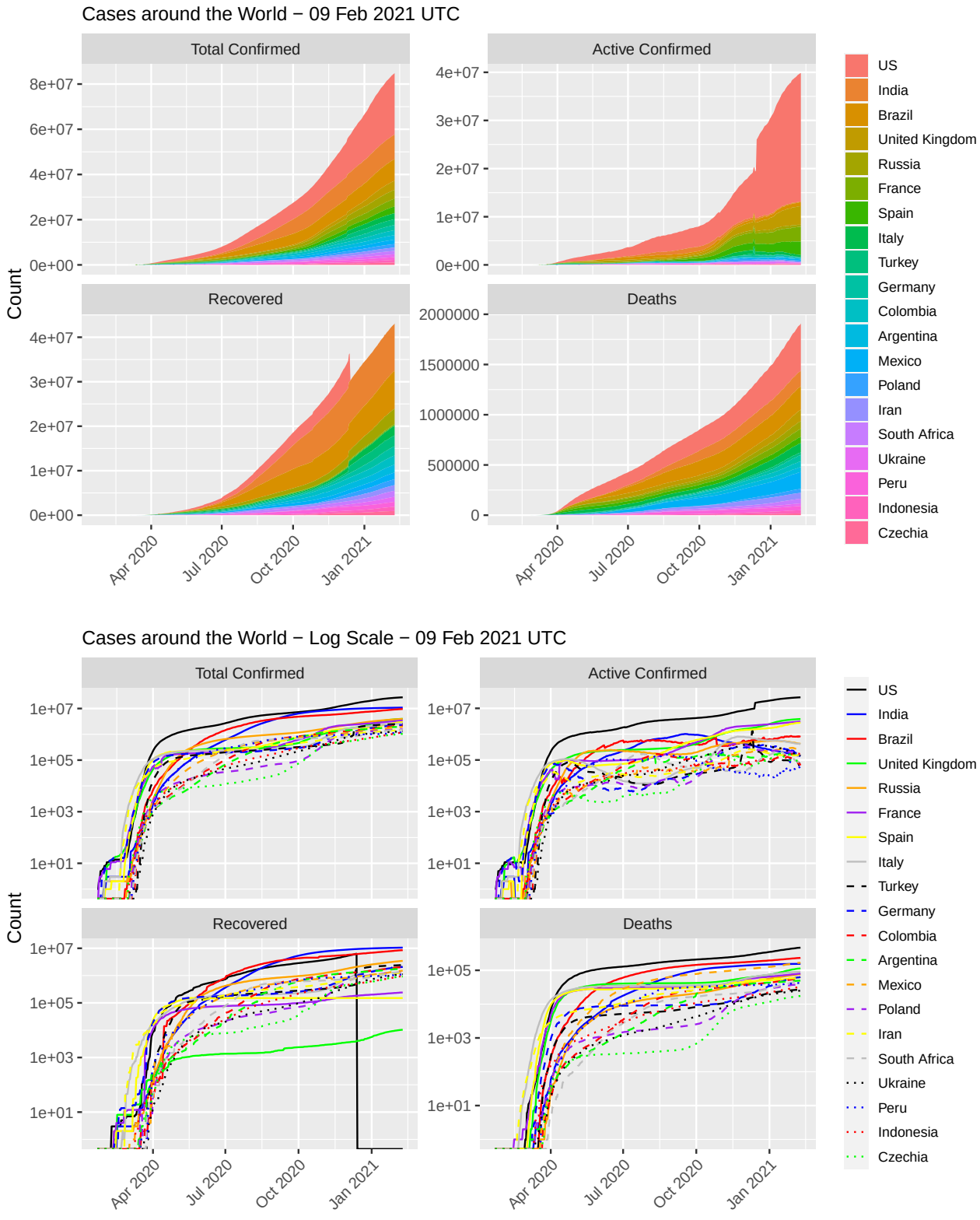


Figure 8: Cases around the World

```
## plot: excluding China
p <- df %>% filter(!(country %in% c('World', 'China'))) %>%
```

```
  ggplot(aes(x=date, y=count)) + xlab('') + ylab('Count') +
  theme(legend.title=element_blank(),
        legend.text=element_text(size=8),
        legend.key.size=unit(0.5, 'cm'),
        plot.title=element_text(size=11),
        axis.text.x=element_text(angle=45, hjust=1)) +
  facet_wrap(~type, ncol=2, scales='free_y')
p + geom_area(aes(fill=country)) +
  labs(title=paste0('Cases around the World (excl. China) - ', max.date.txt))
```

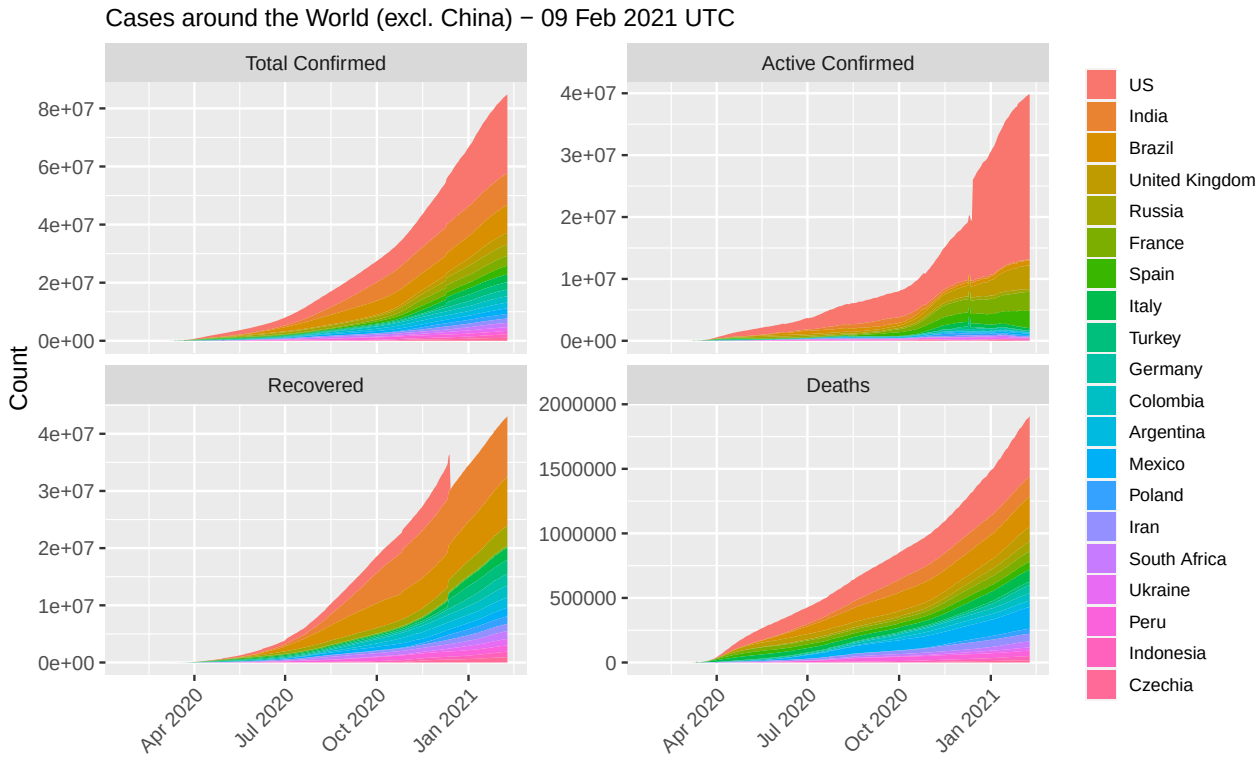


Figure 9: Cases around the World (excl. China)

```
## remove 'Others'
top.countries %<>% setdiff('Others')
## if China or Australia not in top 20, add them in
if(!('China' %in% top.countries)) {
  top.countries %<>% c('China')
}
if(!('Australia' %in% top.countries)) {
  top.countries %<>% c('Australia')
}
df <- data.long %>% filter(country %in% top.countries) %<>%
  mutate(country=country %>% factor(levels=c(top.countries)))

## cases by country - area plot
df %>% filter(country != 'World' & type != 'Total Confirmed') %>%
  ggplot(aes(x=date, y=count, fill=type)) +
  geom_area(alpha=0.5) +
```

```
  # xlab('') + ylab('') +
  labs(title=paste0('Numbers of COVID-19 Cases in Top 20 Countries - ',
                    max.date.txt)) +
  scale_fill_manual(values=c('red', 'green', 'black')) +
  theme(legend.title=element_blank(), legend.position='bottom',
        plot.title = element_text(size=12),
        axis.title.x=element_blank(),
        axis.title.y=element_blank(),
        legend.key.size=unit(0.4, 'cm'),
        # legend.text=element_text(size=7),
        strip.text.x=element_text(size=7),
        axis.text=element_text(size=7),
        axis.text.x=element_text(angle=45, hjust=1)) +
  facet_wrap(~country, ncol=4, scales='free_y')
```

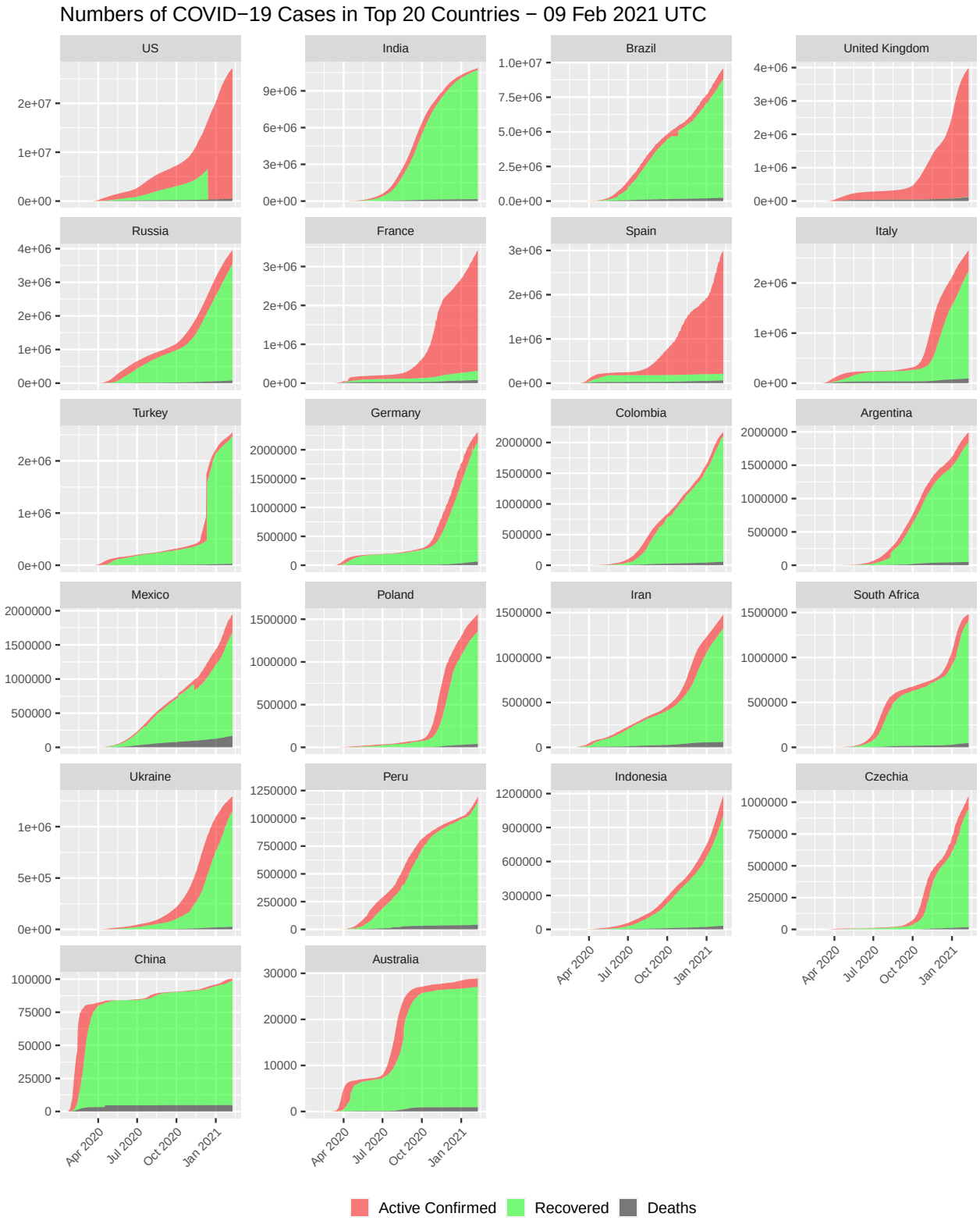


Figure 10: COVID-19 Cases in Top 20 Countries. Ordered descendingly by number of confirmed cases.

```r
## cases by country - line plot - log scale
p <- df %>% filter(country != 'World') %>%
  ggplot(aes(x=date, y=count, color=type)) +
  geom_line() +
  labs(title=paste0('Numbers of COVID-19 Cases in Top 20 Countries (log scale) - ',
                    max.date.txt)) +
  scale_color_manual(values=c('purple', 'red', 'green', 'black')) +
  theme(legend.title=element_blank(), legend.position='bottom',
        plot.title = element_text(size=12),
        axis.title.x=element_blank(),
        axis.title.y=element_blank(),
        legend.key.size=unit(0.4, 'cm'),
        # legend.text=element_text(size=7),
        strip.text.x=element_text(size=7),
        axis.text=element_text(size=7),
        axis.text.x=element_text(angle=45, hjust=1)) +
  scale_y_continuous(trans='log10')
p + facet_wrap(~country, ncol=4, scales='free_y')
```

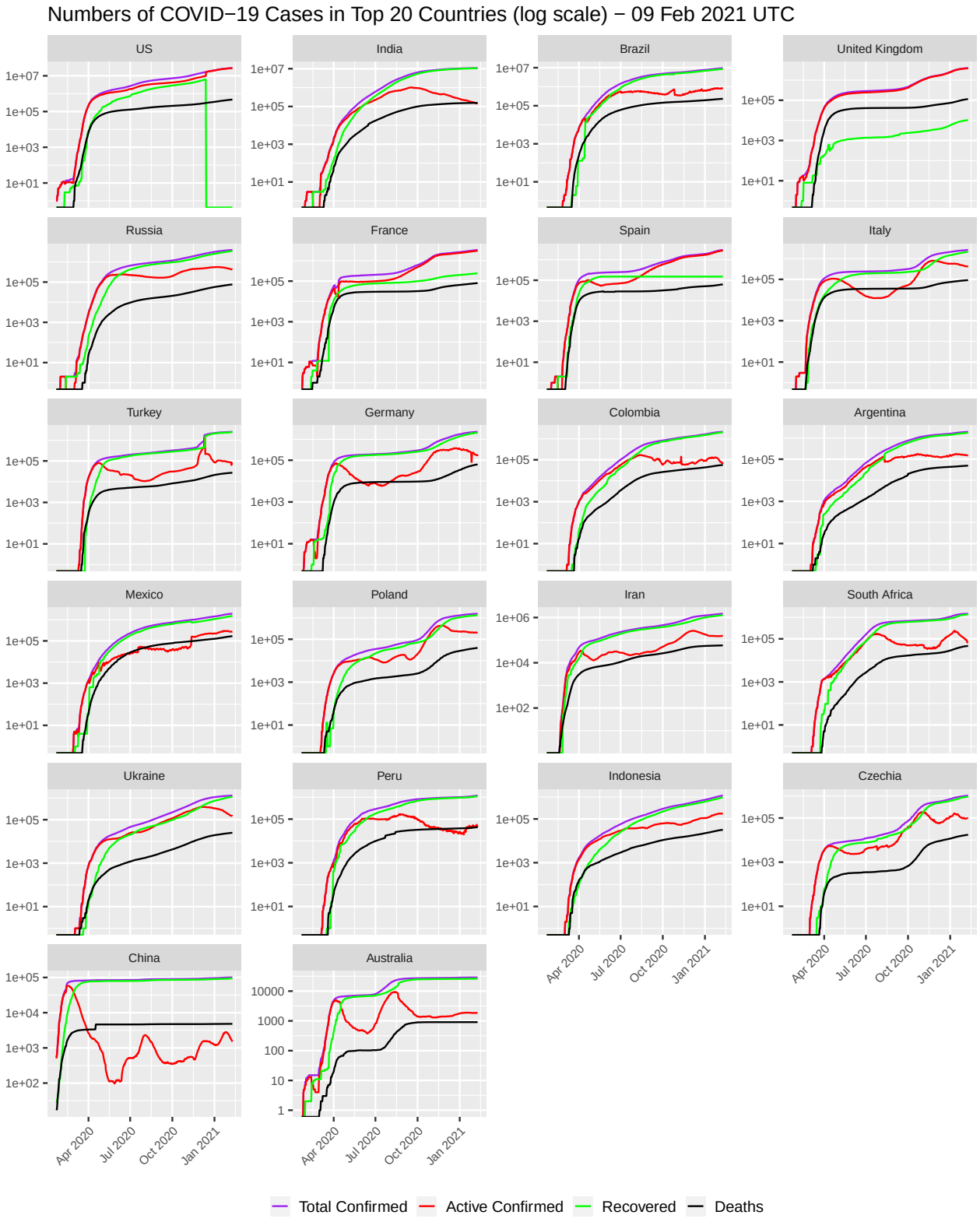


Figure 11: COVID-19 Cases Top 20 Countries (log scale). Ordered descendingly by number of confirmed cases.

```
## plot over multiple pages
# p + facet_wrap_paginate(~country, nrow=4, ncol=3, page=1, scales='free_y')
# p + facet_wrap_paginate(~country, nrow=4, ncol=3, page=2, scales='free_y')
```

Figures 10 and 11 show that China has entered a post-epidemic phase, followed by Australia and Germany, with an increase of recovered cases (in green) every day and a shrinking of the active confirmed cases (in red). In contrast, there are sharp surges in Russia, South America (incl. Brazil, Peru, Chile and Mexico) and West/South Asia (incl. Saudi Arabia, India and Pakistan), which suggests that the virus spread is accerelating there.

5.3 Death Rates

```
## three death rates
rate.max <- rates.long$count %>% max(na.rm=T)
df <- rates.long %>% filter(country %in% setdiff(top.countries, 'World')) %>%
  mutate(country=factor(country, levels=top.countries))
df %>% ggplot(aes(x=date, y=count, color=type)) +
  geom_line() +
  xlab('') + ylab('Death Rate (%)') +
  theme(legend.position='bottom', legend.title=element_blank(),
        legend.text=element_text(size=8),
        legend.key.size=unit(0.5, 'cm'),
        axis.text.x=element_text(angle=45, hjust=1)) +
  ylim(c(0, 99)) +
  facet_wrap(~country, ncol=4)
```

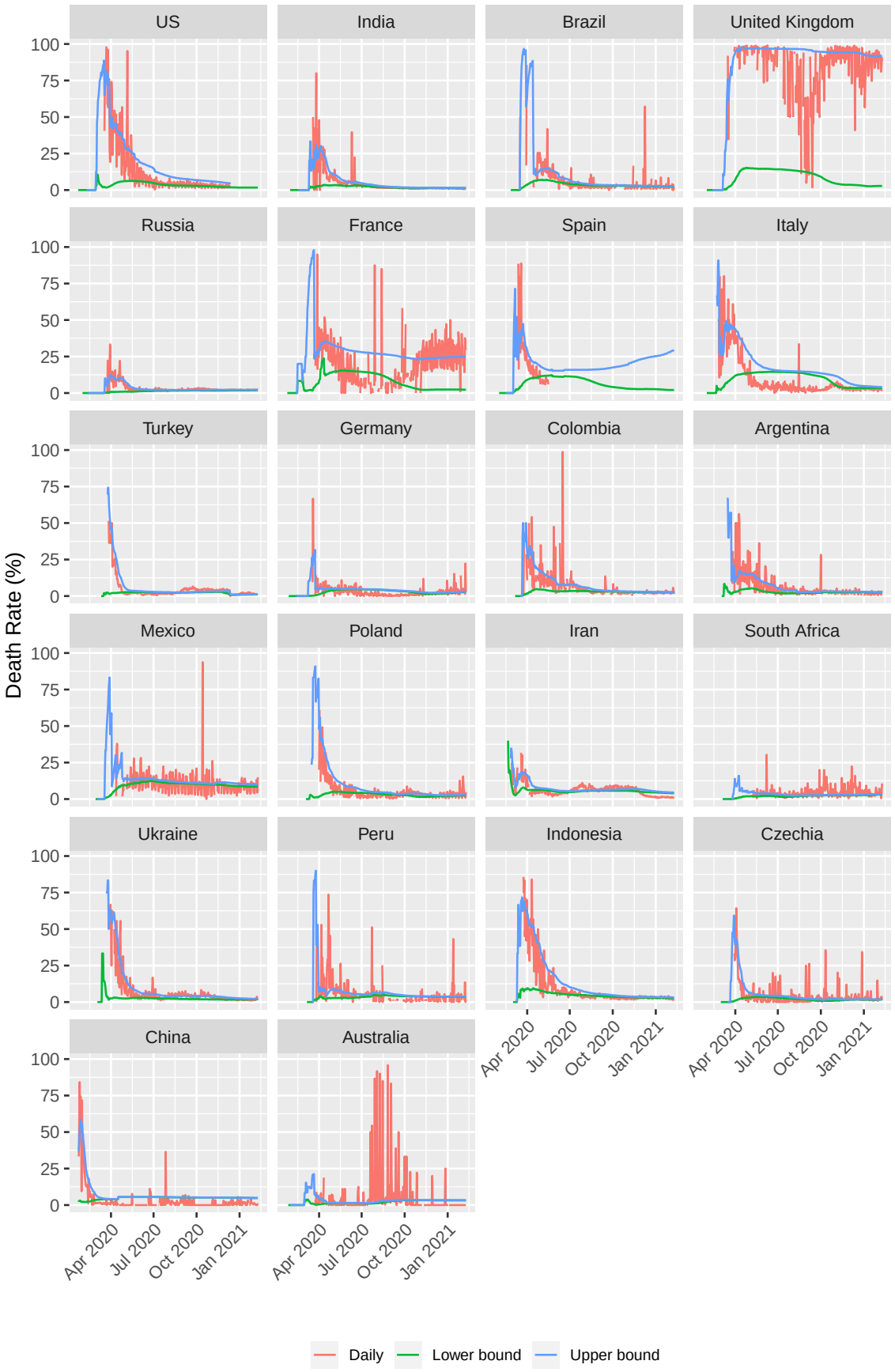


Figure 12: Death Rates

5.4 Countries with Highest Death Rates

Below are a list of top 20 countries with the highest death rates out of countries having 2000+ confirmed cases.

```
## sort the latest data by death rate, and if tie, by confirmed
df <- data %>% filter(date == max(date) & country != 'World' & confirmed >= 2000) %>%
  select(country, confirmed, new.confirmed, active.confirmed,
         recovered, deaths, new.deaths, death.rate=rate.lower) %>%
  arrange(desc(death.rate, confirmed))

df %>% head(20) %>%
  mutate(death.rate=death.rate %>% format(nsmall=1) %>% paste0('%')) %>%
  kable('latex', booktabs=T, row.names=T, align=c('l', rep('r', 7)),
        caption=paste0('Top 20 Countries with Highest Death Rates - ', max.date.txt),
        format.args=list(big.mark=',')) %>%
  kable_styling(font_size=7, latex_options=c('striped', 'hold_position', 'repeat_header'))
```

Table 4: Top 20 Countries with Highest Death Rates - 09 Feb 2021 UTC

	country	confirmed	new.confirmed	active.confirmed	recovered	deaths	new.deaths	death.rate
1	Yemen	2,131	0	88	1,428	615	0	28.9%
2	Mexico	1,946,751	10,738	267,120	1,511,199	168,432	1,701	8.7%
3	Syria	14,611	60	5,362	8,288	961	3	6.6%
4	Sudan	29,851	86	5,964	22,052	1,835	0	6.1%
5	Ecuador	259,783	1,176	24,299	220,398	15,086	73	5.8%
6	Egypt	170,780	573	27,931	133,098	9,751	52	5.7%
7	China	100,475	40	1,504	94,147	4,824	2	4.8%
8	Bolivia	230,731	1,544	48,830	170,972	10,929	65	4.7%
9	Afghanistan	55,384	25	4,861	48,109	2,414	1	4.4%
10	Bulgaria	226,061	1,212	22,065	194,514	9,482	62	4.2%
11	Mali	8,192	11	1,763	6,090	339	0	4.1%
12	Iran	1,481,396	7,640	156,253	1,266,518	58,625	89	4.0%
13	Bosnia and Herzegovina	124,443	342	19,940	99,669	4,834	21	3.9%
14	Zimbabwe	34,781	123	4,139	29,289	1,353	14	3.9%
15	Comoros	3,179	91	543	2,518	118	6	3.7%
16	Eswatini	16,288	54	3,821	11,857	610	3	3.7%
17	Greece	166,067	1,492	66,286	93,764	6,017	20	3.6%
18	Guatemala	163,993	746	7,494	150,544	5,955	33	3.6%
19	Niger	4,643	22	474	4,002	167	1	3.6%
20	Peru	1,196,778	10,080	42,656	1,111,496	42,626	318	3.6%

6 Conclusions

As of 09 Feb 2021 UTC, there are 192 countries with confirmed COVID-19 cases. It seems to be contained in China, but starts to break out in rest of the world. The current death rate is in between 2.2% and 3.8%, but it is likely to change dramatically with the breakout in many countries, such as European countries.

Appendix A. Processed Data

Blow is the processed data for this analysis.

Appendix A.1 COVID-19 Cases Worldwide

```
## sort by date descendingly and re-order columns
data.world %<>% arrange(desc(date)) %>%
```

```r
  select(c(date, confirmed, deaths, recovered, active.confirmed,
           new.confirmed, new.deaths, new.recovered, rate.lower, rate.upper, rate.daily))
## output as a table
data.world %>%
  mutate(rate.upper = rate.upper %>% format(nsmall=1) %>% paste0('\\%'),
         rate.lower = rate.lower %>% format(nsmall=1) %>% paste0('\\%'),
         rate.daily = rate.daily %>% format(nsmall=1) %>% paste0('\\%')) %>%
  kable('latex', escape=F, booktabs=T, longtable=T,
        caption='Cases in the Whole World',
        format.args=list(big.mark=','),
        align=c('l', rep('r', 10))) %>%
  kable_styling(font_size=4, latex_options=c('striped', 'hold_position', 'repeat_header'))
```

Table 5: Cases in the Whole World

date	confirmed	deaths	recovered	active.confirmed	new.confirmed	new.deaths	new.recovered	rate.lower	rate.upper	rate.daily
2021-02-09	106,905,601	2,341,104	59,754,934	44,809,563	427,555	15,592	372,767	2.2%	3.8%	4.0%
2021-02-08	106,478,046	2,325,512	59,382,167	44,770,367	315,510	8,311	211,994	2.2%	3.8%	3.8%
2021-02-07	106,162,536	2,317,201	59,170,173	44,675,162	397,806	7,855	296,080	2.2%	3.8%	2.6%
2021-02-06	105,764,730	2,309,346	58,874,093	44,581,291	372,153	10,111	296,978	2.2%	3.8%	3.3%
2021-02-05	105,392,577	2,299,235	58,577,115	44,516,227	534,589	16,557	282,364	2.2%	3.8%	5.5%
2021-02-04	104,857,988	2,282,678	58,294,751	44,280,559	466,120	12,564	293,454	2.2%	3.8%	4.1%
2021-02-03	104,391,868	2,270,114	58,001,297	44,120,457	522,030	15,733	329,958	2.2%	3.8%	4.6%
2021-02-02	103,869,838	2,254,381	57,671,339	43,944,118	456,840	14,911	350,636	2.2%	3.8%	4.1%
2021-02-01	103,412,998	2,239,470	57,320,703	43,852,825	445,911	10,202	271,355	2.2%	3.8%	3.6%
2021-01-31	102,967,087	2,229,268	57,049,348	43,688,471	382,272	7,957	287,134	2.2%	3.8%	2.7%
2021-01-30	102,584,815	2,221,311	56,762,214	43,601,290	514,874	13,531	353,222	2.2%	3.8%	3.7%
2021-01-29	102,069,941	2,207,780	56,408,992	43,453,169	612,001	15,249	365,076	2.2%	3.8%	4.0%
2021-01-28	101,457,940	2,192,531	56,043,916	43,221,493	591,749	16,681	152,938	2.2%	3.8%	9.8%
2021-01-27	100,866,191	2,175,850	55,890,978	42,799,363	589,641	16,674	502,779	2.2%	3.7%	3.2%
2021-01-26	100,276,550	2,159,176	55,388,199	42,729,175	550,277	17,356	330,414	2.2%	3.8%	5.0%
2021-01-25	99,726,273	2,141,820	55,057,785	42,526,668	508,737	10,737	312,758	2.1%	3.7%	3.3%
2021-01-24	99,217,536	2,131,083	54,745,027	42,341,426	445,944	8,867	308,586	2.1%	3.7%	2.8%
2021-01-23	98,771,592	2,122,216	54,436,441	42,212,935	567,372	13,274	319,921	2.1%	3.8%	4.0%
2021-01-22	98,204,220	2,108,942	54,116,520	41,978,758	658,340	15,951	382,701	2.1%	3.8%	4.0%
2021-01-21	97,545,880	2,092,991	53,733,819	41,719,070	656,217	16,773	365,654	2.1%	3.7%	4.4%
2021-01-20	96,889,663	2,076,218	53,368,165	41,445,280	691,958	17,885	327,836	2.1%	3.7%	5.2%
2021-01-19	96,197,705	2,058,333	53,040,329	41,099,043	608,369	16,758	403,416	2.1%	3.7%	4.0%
2021-01-18	95,589,336	2,041,575	52,636,913	40,910,848	514,578	9,337	316,391	2.1%	3.7%	2.9%
2021-01-17	95,074,758	2,032,238	52,320,522	40,721,998	549,274	8,744	312,610	2.1%	3.7%	2.7%
2021-01-16	94,525,484	2,023,494	52,007,912	40,494,078	617,419	13,035	320,144	2.1%	3.7%	3.9%
2021-01-15	93,908,065	2,010,459	51,687,768	40,209,838	765,209	15,053	320,911	2.1%	3.7%	4.5%
2021-01-14	93,142,856	1,995,406	51,366,857	39,780,593	754,816	15,334	370,191	2.1%	3.7%	4.0%
2021-01-13	92,388,040	1,980,072	50,996,666	39,411,302	747,577	16,643	365,409	2.1%	3.7%	4.4%
2021-01-12	91,640,463	1,963,429	50,631,257	39,045,777	705,145	17,061	344,019	2.1%	3.7%	4.7%
2021-01-11	90,935,318	1,946,368	50,287,238	38,701,712	618,580	10,265	287,777	2.1%	3.7%	3.4%
2021-01-10	90,316,738	1,936,103	49,999,461	38,381,174	589,167	8,211	267,399	2.1%	3.7%	3.0%
2021-01-09	89,727,571	1,927,892	49,732,062	38,067,617	762,273	12,708	334,144	2.1%	3.7%	3.7%
2021-01-08	88,965,298	1,915,184	49,397,918	37,652,196	821,564	15,358	297,915	2.2%	3.7%	4.9%
2021-01-07	88,143,734	1,899,826	49,100,003	37,143,905	858,062	14,623	321,108	2.2%	3.7%	4.4%
2021-01-06	87,285,672	1,885,203	48,778,895	36,621,574	781,555	15,015	312,887	2.2%	3.7%	4.6%
2021-01-05	86,504,117	1,870,188	48,466,008	36,167,921	738,537	15,286	316,521	2.2%	3.7%	4.6%
2021-01-04	85,765,580	1,854,902	48,149,487	35,761,191	553,626	10,116	287,900	2.2%	3.7%	3.4%
2021-01-03	85,211,954	1,844,786	47,861,587	35,505,581	533,449	7,236	265,068	2.2%	3.7%	2.7%
2021-01-02	84,678,505	1,837,550	47,596,519	35,244,436	626,043	8,307	300,717	2.2%	3.7%	2.7%
2021-01-01	84,052,462	1,829,243	47,295,802	34,927,417	531,461	9,312	284,651	2.2%	3.7%	3.2%
2020-12-31	83,521,001	1,819,931	47,011,151	34,689,919	722,976	13,075	275,982	2.2%	3.7%	4.5%
2020-12-30	82,798,025	1,806,856	46,735,169	34,256,000	759,831	15,267	384,623	2.2%	3.7%	3.8%
2020-12-29	82,038,194	1,791,589	46,350,546	33,896,059	662,787	15,150	355,196	2.2%	3.7%	4.1%
2020-12-28	81,375,407	1,776,439	45,995,350	33,603,618	496,400	9,651	296,118	2.2%	3.7%	3.2%
2020-12-27	80,879,007	1,766,788	45,699,232	33,412,987	438,241	7,236	287,821	2.2%	3.7%	2.5%
2020-12-26	80,440,766	1,759,552	45,411,411	33,269,803	513,158	7,217	407,751	2.2%	3.7%	1.7%
2020-12-25	79,927,608	1,752,335	45,003,660	33,171,613	464,360	8,390	290,587	2.2%	3.7%	2.8%
2020-12-24	79,463,248	1,743,945	44,713,073	33,006,230	666,152	11,578	318,333	2.2%	3.8%	3.5%
2020-12-23	78,797,096	1,732,367	44,394,740	32,669,989	693,995	13,764	324,475	2.2%	3.8%	4.1%
2020-12-22	78,103,101	1,718,603	44,070,265	32,314,233	649,204	14,223	361,131	2.2%	3.8%	3.8%
2020-12-21	77,453,897	1,704,380	43,709,134	32,040,383	548,856	9,587	340,807	2.2%	3.8%	2.7%
2020-12-20	76,905,041	1,694,793	43,368,327	31,841,921	533,203	7,715	273,421	2.2%	3.8%	2.7%
2020-12-19	76,371,838	1,687,078	43,094,906	31,589,854	611,479	10,621	355,188	2.2%	3.8%	2.9%
2020-12-18	75,760,359	1,676,457	42,739,718	31,344,184	719,253	12,641	317,985	2.2%	3.8%	3.8%
2020-12-17	75,041,106	1,663,816	42,421,733	30,955,557	738,690	13,329	372,705	2.2%	3.8%	3.5%
2020-12-16	74,302,416	1,650,487	42,049,028	30,602,901	732,766	13,626	361,652	2.2%	3.8%	3.6%
2020-12-15	73,569,650	1,636,861	41,687,376	30,245,413	636,389	13,859	358,555	2.2%	3.8%	3.7%
2020-12-14	72,933,261	1,623,002	41,328,821	29,981,438	523,954	9,078	0	2.2%	3.8%	100.0%
2020-12-13	72,409,307	1,613,924	47,321,008	23,474,375	544,274	7,445	392,410	2.2%	3.3%	1.9%
2020-12-12	71,865,033	1,606,479	46,928,598	23,329,956	620,153	10,196	1,507,118	2.2%	3.3%	0.7%
2020-12-11	71,244,880	1,596,283	45,421,480	24,227,117	702,975	12,961	478,572	2.2%	3.4%	2.6%
2020-12-10	70,541,905	1,583,322	44,942,908	24,015,675	1,497,122	12,596	489,272	2.2%	3.4%	2.5%
2020-12-09	69,044,783	1,570,726	44,453,636	23,020,421	669,032	12,599	425,902	2.3%	3.4%	2.9%
2020-12-08	68,375,751	1,558,127	44,027,734	22,789,890	642,903	12,187	440,936	2.3%	3.4%	2.7%
2020-12-07	67,732,848	1,545,940	43,586,798	22,600,110	519,752	8,618	411,618	2.3%	3.4%	2.1%
2020-12-06	67,213,096	1,537,322	43,175,180	22,500,594	538,748	7,259	313,940	2.3%	3.4%	2.3%

Table 5: Cases in the Whole World *(continued)*

date	confirmed	deaths	recovered	active.confirmed	new.confirmed	new.deaths	new.recovered	rate.lower	rate.upper	rate.daily
2020-12-05	66,674,348	1,530,063	42,861,240	22,283,045	641,150	10,150	437,976	2.3%	3.4%	2.3%
2020-12-04	66,033,198	1,519,913	42,423,264	22,090,021	682,912	12,442	490,618	2.3%	3.5%	2.5%
2020-12-03	65,350,286	1,507,471	41,932,646	21,910,169	692,809	12,496	425,481	2.3%	3.5%	2.9%
2020-12-02	64,657,477	1,494,975	41,507,165	21,655,337	650,516	12,548	462,796	2.3%	3.5%	2.6%
2020-12-01	64,006,961	1,482,427	41,044,369	21,480,165	611,926	12,646	476,908	2.3%	3.5%	2.6%
2020-11-30	63,395,035	1,469,781	40,567,461	21,357,793	508,121	8,776	401,391	2.3%	3.5%	2.1%
2020-11-29	62,886,914	1,461,005	40,166,070	21,259,839	488,224	7,025	316,445	2.3%	3.5%	2.2%
2020-11-28	62,398,690	1,453,980	39,849,625	21,095,085	585,752	9,158	361,114	2.3%	3.5%	2.5%
2020-11-27	61,812,938	1,444,822	39,488,511	20,879,605	687,311	11,316	381,681	2.3%	3.5%	2.9%
2020-11-26	61,125,627	1,433,506	39,106,830	20,585,291	581,595	10,766	365,617	2.3%	3.5%	2.9%
2020-11-25	60,544,032	1,422,740	38,741,213	20,380,079	635,448	12,169	437,306	2.3%	3.5%	2.7%
2020-11-24	59,908,584	1,410,571	38,303,907	20,194,106	589,947	12,619	372,386	2.4%	3.6%	3.3%
2020-11-23	59,318,637	1,397,952	37,931,521	19,989,164	524,695	8,441	410,037	2.4%	3.6%	2.0%
2020-11-22	58,793,942	1,389,511	37,521,484	19,882,947	488,001	7,063	272,424	2.4%	3.6%	2.5%
2020-11-21	58,305,941	1,382,448	37,249,060	19,674,433	587,259	8,864	340,475	2.4%	3.6%	2.5%
2020-11-20	57,718,682	1,373,584	36,908,585	19,436,513	668,403	11,824	355,690	2.4%	3.6%	3.2%
2020-11-19	57,050,279	1,361,760	36,552,895	19,135,624	653,190	10,973	373,521	2.4%	3.6%	2.9%
2020-11-18	56,397,089	1,350,787	36,179,374	18,866,928	626,943	11,388	363,200	2.4%	3.6%	3.0%
2020-11-17	55,770,146	1,339,399	35,816,174	18,614,573	610,585	11,024	433,886	2.4%	3.6%	2.5%
2020-11-16	55,159,561	1,328,375	35,382,288	18,448,898	534,172	7,911	389,933	2.4%	3.6%	2.0%
2020-11-15	54,625,389	1,320,464	34,992,355	18,312,570	473,709	6,345	229,725	2.4%	3.6%	2.7%
2020-11-14	54,151,680	1,314,119	34,762,630	18,074,931	594,751	9,023	278,938	2.4%	3.6%	3.1%
2020-11-13	53,556,929	1,305,096	34,483,692	17,768,141	651,870	9,560	302,315	2.4%	3.6%	3.1%
2020-11-12	52,905,059	1,295,536	34,181,377	17,428,146	649,807	9,731	225,460	2.4%	3.7%	4.1%
2020-11-11	52,255,252	1,285,805	33,955,917	17,013,530	648,180	10,465	380,316	2.5%	3.6%	2.7%
2020-11-10	51,607,072	1,275,340	33,575,601	16,756,131	558,937	9,941	257,511	2.5%	3.7%	3.7%
2020-11-09	51,048,135	1,265,399	33,318,090	16,464,646	501,236	7,157	256,622	2.5%	3.7%	2.7%
2020-11-08	50,546,899	1,258,242	33,061,468	16,227,189	483,802	5,821	252,904	2.5%	3.7%	2.2%
2020-11-07	50,063,097	1,252,421	32,808,564	16,002,112	596,650	7,533	299,516	2.5%	3.7%	2.5%
2020-11-06	49,466,447	1,244,888	32,509,048	15,712,511	644,599	9,632	288,419	2.5%	3.7%	3.2%
2020-11-05	48,821,848	1,235,256	32,220,629	15,365,963	596,864	7,991	303,673	2.5%	3.7%	2.6%
2020-11-04	48,224,984	1,227,265	31,916,956	15,080,763	511,156	10,257	279,451	2.5%	3.7%	3.5%
2020-11-03	47,713,828	1,217,008	31,637,505	14,859,315	553,359	9,324	251,446	2.6%	3.7%	3.6%
2020-11-02	47,160,469	1,207,684	31,386,059	14,566,726	562,729	6,094	279,894	2.6%	3.7%	2.1%
2020-11-01	46,597,740	1,201,590	31,106,165	14,289,985	462,710	4,953	257,935	2.6%	3.7%	1.9%
2020-10-31	46,135,030	1,196,637	30,848,230	14,090,163	476,543	6,546	244,485	2.6%	3.7%	2.6%
2020-10-30	45,658,487	1,190,091	30,603,745	13,864,651	570,607	7,594	255,763	2.6%	3.7%	2.9%
2020-10-29	45,087,880	1,182,497	30,347,982	13,557,401	550,501	7,055	246,701	2.6%	3.8%	2.8%
2020-10-28	44,537,379	1,175,442	30,101,281	13,260,656	511,484	7,137	266,089	2.6%	3.8%	2.6%
2020-10-27	44,025,895	1,168,305	29,835,192	13,022,398	469,808	7,351	589,819	2.7%	3.8%	1.2%
2020-10-26	43,556,087	1,160,954	29,245,373	13,149,760	486,490	5,505	239,005	2.7%	3.8%	2.3%
2020-10-25	43,069,597	1,155,449	29,006,368	12,907,780	360,366	4,160	197,211	2.7%	3.8%	2.1%
2020-10-24	42,709,231	1,151,289	28,809,157	12,748,785	456,759	5,805	211,631	2.7%	3.8%	2.7%
2020-10-23	42,252,472	1,145,484	28,597,526	12,509,462	496,571	6,958	206,797	2.7%	3.9%	3.3%
2020-10-22	41,755,901	1,138,526	28,390,729	12,226,646	472,630	5,885	226,758	2.7%	3.9%	2.5%
2020-10-21	41,283,271	1,132,641	28,163,971	11,986,659	444,780	6,691	211,472	2.7%	3.9%	3.1%
2020-10-20	40,838,491	1,125,950	27,952,499	11,760,042	389,014	6,537	211,507	2.8%	3.9%	3.0%
2020-10-19	40,449,477	1,119,413	27,740,992	11,589,072	387,013	4,817	202,413	2.8%	3.9%	2.3%
2020-10-18	40,062,464	1,114,596	27,538,579	11,409,289	316,530	3,509	201,416	2.8%	3.9%	1.7%
2020-10-17	39,745,934	1,111,087	27,337,163	11,297,684	372,577	5,581	198,322	2.8%	3.9%	2.7%
2020-10-16	39,373,357	1,105,506	27,138,841	11,129,010	411,668	6,171	202,994	2.8%	3.9%	3.0%
2020-10-15	38,961,689	1,099,335	26,935,847	10,926,507	406,871	6,102	207,278	2.8%	3.9%	2.9%
2020-10-14	38,554,818	1,093,233	26,728,569	10,733,016	382,189	6,069	212,238	2.8%	3.9%	2.8%
2020-10-13	38,172,629	1,087,164	26,516,331	10,569,134	319,257	5,278	192,423	2.8%	3.9%	2.7%
2020-10-12	37,853,372	1,081,886	26,323,908	10,447,578	291,647	3,958	200,078	2.9%	3.9%	1.9%
2020-10-11	37,561,725	1,077,928	26,123,830	10,359,967	286,968	4,006	222,637	2.9%	4.0%	1.8%
2020-10-10	37,274,757	1,073,922	25,901,193	10,299,642	356,970	4,855	195,426	2.9%	4.0%	2.4%
2020-10-09	36,917,787	1,069,067	25,705,767	10,142,953	360,781	6,142	206,806	2.9%	4.0%	2.9%
2020-10-08	36,557,006	1,062,925	25,498,961	9,995,120	361,236	6,265	219,495	2.9%	4.0%	2.8%
2020-10-07	36,195,770	1,056,660	25,279,466	9,859,644	350,875	5,825	255,185	2.9%	4.0%	2.2%
2020-10-06	35,844,895	1,050,835	25,024,281	9,769,779	326,310	5,777	232,636	2.9%	4.0%	2.4%
2020-10-05	35,518,585	1,045,058	24,791,645	9,681,882	300,997	6,934	237,442	2.9%	4.0%	2.8%
2020-10-04	35,217,588	1,038,124	24,554,203	9,625,261	261,424	3,825	222,136	2.9%	4.1%	1.7%
2020-10-03	34,956,164	1,034,299	24,332,067	9,589,798	332,162	5,365	255,624	3.0%	4.1%	2.1%
2020-10-02	34,624,002	1,028,934	24,076,443	9,518,625	297,630	5,010	172,304	3.0%	4.1%	2.8%
2020-10-01	34,326,372	1,023,924	23,904,139	9,398,309	318,236	8,700	221,534	3.0%	4.1%	3.8%
2020-09-30	34,008,136	1,015,224	23,682,605	9,310,307	326,110	6,445	248,205	3.0%	4.1%	2.5%
2020-09-29	33,682,026	1,008,779	23,434,400	9,238,847	282,437	5,945	241,288	3.0%	4.1%	2.4%
2020-09-28	33,399,589	1,002,834	23,193,112	9,203,643	254,748	3,961	222,517	3.0%	4.1%	1.7%
2020-09-27	33,144,841	998,873	22,970,595	9,175,373	251,706	3,672	213,862	3.0%	4.2%	1.7%
2020-09-26	32,893,135	995,201	22,756,733	9,141,201	288,316	5,345	262,153	3.0%	4.2%	2.0%
2020-09-25	32,604,819	989,856	22,494,580	9,120,383	330,771	5,882	239,207	3.0%	4.2%	2.4%
2020-09-24	32,274,048	983,974	22,255,373	9,034,701	352,988	6,676	255,645	3.0%	4.2%	2.5%
2020-09-23	31,921,060	977,298	21,999,728	8,944,034	275,791	5,642	263,412	3.1%	4.3%	2.1%
2020-09-22	31,645,269	971,656	21,736,316	8,937,297	284,314	5,963	219,475	3.1%	4.3%	2.6%
2020-09-21	31,360,955	965,693	21,516,841	8,878,421	276,028	4,107	245,451	3.1%	4.3%	1.6%
2020-09-20	31,084,927	961,586	21,271,390	8,851,951	251,999	3,728	237,058	3.1%	4.3%	1.5%
2020-09-19	30,832,928	957,858	21,034,332	8,840,738	292,082	5,262	236,986	3.1%	4.4%	2.2%
2020-09-18	30,540,846	952,596	20,797,346	8,790,904	325,783	5,685	251,146	3.1%	4.4%	2.2%
2020-09-17	30,215,063	946,911	20,546,200	8,721,952	314,939	5,480	220,185	3.1%	4.4%	2.4%
2020-09-16	29,900,124	941,431	20,326,015	8,632,678	304,352	5,803	229,464	3.1%	4.4%	2.5%
2020-09-15	29,595,772	935,628	20,096,551	8,563,593	285,382	6,503	226,276	3.2%	4.4%	2.8%
2020-09-14	29,310,390	929,125	19,870,275	8,510,990	263,701	4,436	228,469	3.2%	4.5%	1.9%
2020-09-13	29,046,689	924,689	19,641,806	8,480,194	242,634	3,693	187,838	3.2%	4.5%	1.9%
2020-09-12	28,804,055	920,996	19,453,968	8,429,091	286,593	4,885	222,933	3.2%	4.5%	2.1%
2020-09-11	28,517,462	916,111	19,231,035	8,370,316	321,241	5,875	223,664	3.2%	4.5%	2.6%
2020-09-10	28,196,221	910,236	19,007,371	8,278,614	299,923	5,803	216,640	3.2%	4.6%	2.6%
2020-09-09	27,896,298	904,433	18,790,731	8,201,134	284,519	6,098	240,241	3.2%	4.6%	2.5%
2020-09-08	27,611,779	898,335	18,550,490	8,162,954	242,241	4,918	201,798	3.3%	4.6%	2.4%

Table 5: Cases in the Whole World *(continued)*

date	confirmed	deaths	recovered	active.confirmed	new.confirmed	new.deaths	new.recovered	rate.lower	rate.upper	rate.daily
2020-09-07	27,369,538	893,417	18,348,692	8,127,429	217,781	9,371	197,519	3.3%	4.6%	4.5%
2020-09-06	27,151,757	884,046	18,151,173	8,116,538	230,595	3,801	211,771	3.3%	4.6%	1.8%
2020-09-05	26,921,162	880,245	17,939,402	8,101,515	269,885	4,951	201,003	3.3%	4.7%	2.4%
2020-09-04	26,651,277	875,294	17,738,399	8,037,584	314,038	5,867	213,508	3.3%	4.7%	2.7%
2020-09-03	26,337,239	869,427	17,524,891	7,942,921	281,294	5,704	221,345	3.3%	4.7%	2.5%
2020-09-02	26,055,945	863,723	17,303,546	7,888,676	283,430	6,072	219,245	3.3%	4.8%	2.7%
2020-09-01	25,772,515	857,651	17,084,301	7,830,563	264,728	6,412	257,944	3.3%	4.8%	2.4%
2020-08-31	25,507,787	851,239	16,826,357	7,830,191	262,978	4,182	200,777	3.3%	4.8%	2.0%
2020-08-30	25,244,809	847,057	16,625,580	7,772,172	220,980	4,037	210,232	3.4%	4.8%	1.9%
2020-08-29	25,023,829	843,020	16,415,348	7,765,461	263,738	5,322	211,421	3.4%	4.9%	2.5%
2020-08-28	24,760,091	837,698	16,203,927	7,718,466	283,732	5,514	199,119	3.4%	4.9%	2.7%
2020-08-27	24,476,359	832,184	16,004,808	7,639,367	283,700	5,889	207,222	3.4%	4.9%	2.8%
2020-08-26	24,192,659	826,295	15,797,586	7,568,778	283,917	6,272	225,740	3.4%	5.0%	2.7%
2020-08-25	23,908,742	820,023	15,571,846	7,516,873	243,757	6,260	231,491	3.4%	5.0%	2.6%
2020-08-24	23,664,985	813,763	15,340,355	7,510,867	225,346	4,495	199,403	3.4%	5.0%	2.2%
2020-08-23	23,439,639	809,268	15,140,952	7,489,419	206,178	3,877	216,527	3.5%	5.1%	1.8%
2020-08-22	23,233,461	805,391	14,924,425	7,503,645	264,251	5,564	209,929	3.5%	5.1%	2.6%
2020-08-21	22,969,210	799,827	14,714,496	7,454,887	261,082	5,430	168,497	3.5%	5.2%	3.1%
2020-08-20	22,708,128	794,397	14,545,999	7,367,732	272,302	6,058	207,796	3.5%	5.2%	2.8%
2020-08-19	22,435,826	788,339	14,338,203	7,309,284	279,578	6,708	218,002	3.5%	5.2%	3.0%
2020-08-18	22,156,248	781,631	14,120,201	7,254,416	258,220	6,858	227,607	3.5%	5.2%	2.9%
2020-08-17	21,898,028	774,773	13,892,594	7,230,661	207,710	4,167	211,010	3.5%	5.3%	1.9%
2020-08-16	21,690,318	770,606	13,681,584	7,238,128	214,467	4,231	232,952	3.6%	5.3%	1.8%
2020-08-15	21,475,851	766,375	13,448,632	7,260,844	247,689	5,383	168,607	3.6%	5.4%	3.1%
2020-08-14	21,228,162	760,992	13,280,025	7,187,145	303,730	10,142	283,237	3.6%	5.4%	3.5%
2020-08-13	20,924,432	750,850	12,996,788	7,176,794	289,179	6,202	163,909	3.6%	5.5%	3.6%
2020-08-12	20,635,253	744,648	12,832,879	7,057,726	276,581	6,579	240,644	3.6%	5.5%	2.7%
2020-08-11	20,358,672	738,069	12,592,235	7,028,368	257,524	6,205	305,064	3.6%	5.5%	2.0%
2020-08-10	20,101,148	731,864	12,287,171	7,082,113	226,025	5,283	164,194	3.6%	5.6%	3.1%
2020-08-09	19,875,123	726,581	12,122,977	7,025,565	224,677	4,587	178,775	3.7%	5.7%	2.5%
2020-08-08	19,650,446	721,994	11,944,202	6,984,250	258,510	5,414	200,252	3.7%	5.7%	2.6%
2020-08-07	19,391,936	716,580	11,743,950	6,931,406	282,211	6,288	192,052	3.7%	5.8%	3.2%
2020-08-06	19,109,725	710,292	11,551,898	6,847,535	285,179	6,482	188,808	3.7%	5.8%	3.3%
2020-08-05	18,824,546	703,810	11,363,090	6,757,646	276,566	7,004	221,694	3.7%	5.8%	3.1%
2020-08-04	18,547,980	696,806	11,141,396	6,709,778	257,913	6,600	223,658	3.8%	5.9%	2.9%
2020-08-03	18,290,067	690,206	10,917,738	6,682,123	206,467	4,674	222,447	3.8%	5.9%	2.1%
2020-08-02	18,083,600	685,532	10,695,291	6,702,777	230,994	4,308	138,722	3.8%	6.0%	3.0%
2020-08-01	17,852,606	681,224	10,556,569	6,614,813	248,328	5,465	183,900	3.8%	6.1%	2.9%
2020-07-31	17,604,278	675,759	10,372,669	6,555,850	290,722	6,204	199,612	3.8%	6.1%	3.0%
2020-07-30	17,313,556	669,555	10,173,057	6,470,944	280,061	6,038	213,524	3.9%	6.2%	2.8%
2020-07-29	17,033,495	663,517	9,959,533	6,410,445	291,688	6,628	202,593	3.9%	6.2%	3.2%
2020-07-28	16,741,807	656,889	9,756,940	6,327,978	252,777	6,284	170,455	3.9%	6.3%	3.6%
2020-07-27	16,489,030	650,605	9,586,485	6,251,940	226,417	5,190	171,377	3.9%	6.4%	2.9%
2020-07-26	16,262,613	645,415	9,415,108	6,202,090	213,108	3,705	143,300	4.0%	6.4%	2.5%
2020-07-25	16,049,505	641,710	9,271,808	6,135,987	254,038	5,519	219,812	4.0%	6.5%	2.4%
2020-07-24	15,795,467	636,191	9,051,996	6,107,280	281,052	6,083	228,305	4.0%	6.6%	2.6%
2020-07-23	15,514,415	630,108	8,823,691	6,060,616	282,842	9,908	176,228	4.1%	6.7%	5.3%
2020-07-22	15,231,573	620,200	8,647,463	5,963,910	279,865	6,936	179,738	4.1%	6.7%	3.7%
2020-07-21	14,951,708	613,264	8,467,725	5,870,719	233,648	6,189	174,697	4.1%	6.8%	3.4%
2020-07-20	14,718,060	607,075	8,293,028	5,817,957	207,108	4,203	159,132	4.1%	6.8%	2.6%
2020-07-19	14,510,952	602,872	8,133,896	5,774,184	213,429	4,078	88,057	4.2%	6.9%	4.4%
2020-07-18	14,297,523	598,794	8,045,839	5,652,890	236,180	5,602	150,791	4.2%	6.9%	3.6%
2020-07-17	14,061,343	593,192	7,895,048	5,573,103	242,730	6,664	183,422	4.2%	7.0%	3.5%
2020-07-16	13,818,613	586,528	7,711,626	5,520,459	251,301	5,778	152,487	4.2%	7.1%	3.7%
2020-07-15	13,567,312	580,750	7,559,139	5,427,423	231,455	5,440	159,811	4.3%	7.1%	3.3%
2020-07-14	13,335,857	575,310	7,399,328	5,361,219	222,164	5,590	142,248	4.3%	7.2%	3.8%
2020-07-13	13,113,693	569,720	7,257,080	5,286,893	191,437	3,900	140,320	4.3%	7.3%	2.7%
2020-07-12	12,922,256	565,820	7,116,760	5,239,676	192,286	3,989	111,837	4.4%	7.4%	3.4%
2020-07-11	12,729,970	561,831	7,004,923	5,163,216	216,464	4,804	125,692	4.4%	7.4%	3.7%
2020-07-10	12,513,506	557,027	6,879,231	5,077,248	232,658	5,293	139,440	4.5%	7.5%	3.7%
2020-07-09	12,280,848	551,734	6,739,791	4,989,323	226,818	5,396	134,624	4.5%	7.6%	3.9%
2020-07-08	12,054,030	546,338	6,605,167	4,902,525	214,150	5,300	158,058	4.5%	7.6%	3.2%
2020-07-07	11,839,880	541,038	6,447,109	4,851,733	211,350	5,995	145,025	4.6%	7.7%	4.0%
2020-07-06	11,628,530	535,043	6,302,084	4,791,403	163,962	3,843	123,689	4.6%	7.8%	3.0%
2020-07-05	11,464,568	531,200	6,178,395	4,754,973	184,004	3,473	119,365	4.6%	7.9%	2.8%
2020-07-04	11,280,564	527,727	6,059,030	4,693,807	193,807	4,383	195,766	4.7%	8.0%	2.2%
2020-07-03	11,086,757	523,344	5,863,264	4,700,149	201,381	4,911	109,888	4.7%	8.2%	4.3%
2020-07-02	10,885,376	518,433	5,753,376	4,613,567	209,943	5,091	284,935	4.8%	8.3%	1.8%
2020-07-01	10,675,433	513,342	5,468,441	4,693,650	217,597	4,940	115,914	4.8%	8.6%	4.1%
2020-06-30	10,457,836	508,402	5,352,527	4,596,907	174,538	4,958	117,339	4.9%	8.7%	4.1%
2020-06-29	10,283,298	503,444	5,235,188	4,544,666	155,343	3,688	94,580	4.9%	8.8%	3.8%
2020-06-28	10,127,955	499,756	5,140,608	4,487,591	163,866	3,146	89,205	4.9%	8.9%	3.4%
2020-06-27	9,964,089	496,610	5,051,403	4,416,076	178,126	4,458	106,287	5.0%	9.0%	4.0%
2020-06-26	9,785,963	492,152	4,945,116	4,348,695	191,585	4,751	105,983	5.0%	9.1%	4.3%
2020-06-25	9,594,378	487,401	4,839,133	4,267,844	178,379	4,702	92,880	5.1%	9.2%	4.8%
2020-06-24	9,415,999	482,699	4,746,253	4,187,047	172,576	5,196	115,744	5.1%	9.2%	4.3%
2020-06-23	9,243,423	477,503	4,630,509	4,135,411	166,797	5,298	104,064	5.2%	9.3%	4.8%
2020-06-22	9,076,626	472,205	4,526,445	4,077,976	139,356	3,546	91,629	5.2%	9.4%	3.7%
2020-06-21	8,937,270	468,659	4,434,816	4,033,795	127,700	4,003	68,686	5.2%	9.6%	5.5%
2020-06-20	8,809,570	464,656	4,366,130	3,978,784	157,447	4,145	115,856	5.3%	9.6%	3.5%
2020-06-19	8,652,123	460,511	4,250,274	3,941,338	179,913	6,086	94,993	5.3%	9.8%	6.0%
2020-06-18	8,472,210	454,425	4,155,281	3,862,504	141,059	4,919	81,159	5.4%	9.9%	5.7%
2020-06-17	8,331,151	449,506	4,074,122	3,807,523	143,740	5,138	118,829	5.4%	9.9%	4.1%
2020-06-16	8,187,411	444,368	3,955,293	3,787,750	142,084	6,718	97,865	5.4%	10.1%	6.4%
2020-06-15	8,045,327	437,650	3,857,428	3,750,249	119,658	3,410	80,262	5.4%	10.2%	4.1%
2020-06-14	7,925,669	434,240	3,777,166	3,714,263	132,284	3,382	70,816	5.5%	10.3%	4.6%
2020-06-13	7,793,385	430,858	3,706,350	3,656,177	135,289	4,149	85,896	5.5%	10.4%	4.6%
2020-06-12	7,658,096	426,709	3,620,454	3,610,933	128,764	4,198	79,727	5.6%	10.5%	5.0%

Table 5: Cases in the Whole World *(continued)*

date	confirmed	deaths	recovered	active.confirmed	new.confirmed	new.deaths	new.recovered	rate.lower	rate.upper	rate.daily
2020-06-11	7,529,332	422,511	3,540,727	3,566,094	138,019	4,653	85,874	5.6%	10.7%	5.1%
2020-06-10	7,391,313	417,858	3,454,853	3,518,602	135,105	5,061	79,198	5.7%	10.8%	6.0%
2020-06-09	7,256,208	412,797	3,375,655	3,467,756	125,058	4,784	82,276	5.7%	10.9%	5.5%
2020-06-08	7,131,150	408,013	3,293,379	3,429,758	102,497	3,706	151,598	5.7%	11.0%	2.4%
2020-06-07	7,028,653	404,307	3,141,781	3,482,565	112,363	2,735	55,103	5.8%	11.4%	4.7%
2020-06-06	6,916,290	401,572	3,086,678	3,428,040	133,737	3,806	72,202	5.8%	11.5%	5.0%
2020-06-05	6,782,553	397,766	3,014,476	3,370,311	131,223	4,569	69,187	5.9%	11.7%	6.2%
2020-06-04	6,651,330	393,197	2,945,289	3,312,844	130,954	5,038	70,061	5.9%	11.8%	6.7%
2020-06-03	6,520,376	388,159	2,875,228	3,256,989	114,238	5,432	79,089	6.0%	11.9%	6.4%
2020-06-02	6,406,138	382,727	2,796,139	3,227,272	121,965	4,702	104,111	6.0%	12.0%	4.3%
2020-06-01	6,284,173	378,025	2,692,028	3,214,120	95,994	3,089	54,928	6.0%	12.3%	5.3%
2020-05-31	6,188,179	374,936	2,637,100	3,176,143	106,408	2,779	76,388	6.1%	12.4%	3.5%
2020-05-30	6,081,771	372,157	2,560,712	3,148,902	136,515	4,028	70,464	6.1%	12.7%	5.4%
2020-05-29	5,945,256	368,129	2,490,248	3,086,879	120,902	4,622	77,284	6.2%	12.9%	5.6%
2020-05-28	5,824,354	363,507	2,412,964	3,047,883	119,283	4,599	66,868	6.2%	13.1%	6.4%
2020-05-27	5,705,071	358,908	2,346,096	3,000,067	102,762	5,082	63,342	6.3%	13.3%	7.4%
2020-05-26	5,602,309	353,826	2,282,754	2,965,729	93,967	4,228	55,157	6.3%	13.4%	7.1%
2020-05-25	5,508,342	349,598	2,227,597	2,931,147	86,716	1,193	63,703	6.3%	13.6%	1.8%
2020-05-24	5,421,626	348,405	2,163,894	2,909,327	94,211	2,988	55,531	6.4%	13.9%	5.1%
2020-05-23	5,327,415	345,417	2,108,363	2,873,635	104,805	3,986	54,844	6.5%	14.1%	6.8%
2020-05-22	5,222,610	341,431	2,053,519	2,827,660	106,421	5,262	108,552	6.5%	14.3%	4.6%
2020-05-21	5,116,189	336,169	1,944,967	2,835,053	106,644	4,671	51,232	6.6%	14.7%	8.4%
2020-05-20	5,009,545	331,498	1,893,735	2,784,312	101,878	4,785	58,990	6.6%	14.9%	7.5%
2020-05-19	4,907,667	326,713	1,834,745	2,746,209	96,775	4,663	52,047	6.7%	15.1%	8.2%
2020-05-18	4,810,892	322,050	1,782,698	2,706,144	89,167	3,739	52,898	6.7%	15.3%	6.6%
2020-05-17	4,721,725	318,311	1,729,800	2,673,614	78,022	3,149	41,002	6.7%	15.5%	7.1%
2020-05-16	4,643,703	315,162	1,688,798	2,639,743	94,439	4,230	56,407	6.8%	15.7%	7.0%
2020-05-15	4,549,264	310,932	1,632,391	2,605,941	95,732	5,211	48,085	6.8%	16.0%	9.8%
2020-05-14	4,453,532	305,721	1,584,306	2,563,505	96,231	5,171	39,674	6.9%	16.2%	11.5%
2020-05-13	4,357,301	300,550	1,544,632	2,512,119	84,980	5,134	55,872	6.9%	16.3%	8.4%
2020-05-12	4,272,321	295,416	1,488,760	2,488,145	84,490	5,505	37,066	6.9%	16.6%	12.9%
2020-05-11	4,187,831	289,911	1,451,694	2,446,226	76,631	3,454	46,877	6.9%	16.6%	6.9%
2020-05-10	4,111,200	286,457	1,404,817	2,419,926	74,976	3,508	33,798	7.0%	16.9%	9.4%
2020-05-09	4,036,224	282,949	1,371,019	2,382,256	85,223	4,279	53,467	7.0%	17.1%	7.4%
2020-05-08	3,951,001	278,670	1,317,552	2,354,779	90,278	5,533	36,416	7.1%	17.5%	13.2%
2020-05-07	3,860,723	273,137	1,281,136	2,306,450	88,707	5,297	39,496	7.1%	17.6%	11.8%
2020-05-06	3,772,016	267,840	1,241,640	2,262,536	90,027	6,533	46,116	7.1%	17.7%	12.4%
2020-05-05	3,681,989	261,307	1,195,524	2,225,158	80,502	5,845	36,472	7.1%	17.9%	13.8%
2020-05-04	3,601,487	255,462	1,159,052	2,186,973	77,689	4,178	34,060	7.1%	18.1%	10.9%
2020-05-03	3,523,798	251,284	1,124,992	2,147,522	76,373	3,458	32,496	7.1%	18.3%	9.6%
2020-05-02	3,447,425	247,826	1,092,496	2,107,103	79,200	5,459	40,637	7.2%	18.5%	11.8%
2020-05-01	3,368,225	242,367	1,051,859	2,073,999	88,376	5,106	38,152	7.2%	18.7%	11.8%
2020-04-30	3,279,849	237,261	1,013,707	2,028,881	83,495	5,944	65,086	7.2%	19.0%	8.4%
2020-04-29	3,196,354	231,317	948,621	2,016,416	77,110	6,807	42,046	7.2%	19.6%	13.9%
2020-04-28	3,119,244	224,510	906,575	1,988,159	75,540	6,557	33,191	7.2%	19.8%	16.5%
2020-04-27	3,043,704	217,953	873,384	1,952,367	70,192	4,714	27,851	7.2%	20.0%	14.5%
2020-04-26	2,973,512	213,239	845,533	1,914,740	71,588	3,938	28,749	7.2%	20.1%	12.0%
2020-04-25	2,901,924	209,301	816,784	1,875,839	82,258	5,620	27,768	7.2%	20.4%	16.8%
2020-04-24	2,819,666	203,681	789,016	1,826,969	84,096	6,744	50,026	7.2%	20.5%	11.9%
2020-04-23	2,735,570	196,937	738,990	1,799,643	84,249	6,826	28,721	7.2%	21.0%	19.2%
2020-04-22	2,651,321	190,111	710,269	1,750,941	81,247	6,852	30,102	7.2%	21.1%	18.5%
2020-04-21	2,570,074	183,259	680,167	1,706,648	75,749	7,289	34,803	7.1%	21.2%	17.3%
2020-04-20	2,494,325	175,970	645,364	1,672,991	76,018	5,861	22,163	7.1%	21.4%	20.9%
2020-04-19	2,418,307	170,109	623,201	1,624,997	76,605	5,220	31,770	7.0%	21.4%	14.1%
2020-04-18	2,341,702	164,889	591,431	1,585,382	77,240	6,150	23,880	7.0%	21.8%	20.5%
2020-04-17	2,264,462	158,739	567,551	1,538,172	87,997	8,366	26,184	7.0%	21.9%	24.2%
2020-04-16	2,176,465	150,373	541,367	1,484,725	95,551	7,269	30,915	6.9%	21.7%	19.0%
2020-04-15	2,080,914	143,104	510,452	1,427,358	77,148	8,448	36,573	6.9%	21.9%	18.8%
2020-04-14	2,003,766	134,656	473,879	1,395,231	83,967	6,987	25,077	6.7%	22.1%	21.8%
2020-04-13	1,919,799	127,669	448,802	1,343,328	70,732	5,947	27,274	6.7%	22.1%	17.9%
2020-04-12	1,849,067	121,722	421,528	1,305,817	119,694	5,821	19,401	6.6%	22.4%	23.1%
2020-04-11	1,729,373	115,901	402,127	1,211,345	74,311	6,167	26,291	6.7%	22.4%	19.0%
2020-04-10	1,655,062	109,734	375,836	1,169,492	85,535	7,372	21,760	6.6%	22.6%	25.3%
2020-04-09	1,569,527	102,362	354,076	1,113,089	87,019	7,781	25,271	6.5%	22.4%	23.5%
2020-04-08	1,482,508	94,581	328,805	1,059,122	83,355	6,793	28,890	6.4%	22.3%	19.0%
2020-04-07	1,399,153	87,788	299,915	1,011,450	69,829	8,264	23,271	6.3%	22.6%	26.2%
2020-04-06	1,329,324	79,524	276,644	973,156	73,143	5,932	16,717	6.0%	22.3%	26.2%
2020-04-05	1,256,181	73,592	259,927	922,662	72,592	5,177	13,841	5.9%	22.1%	27.2%
2020-04-04	1,183,589	68,415	246,086	869,088	58,389	5,909	20,414	5.8%	21.8%	22.4%
2020-04-03	1,125,200	62,506	225,672	837,022	83,551	6,145	15,429	5.6%	21.7%	28.5%
2020-04-02	1,041,649	56,361	210,243	775,045	83,063	5,880	17,147	5.4%	21.1%	25.5%
2020-04-01	958,586	50,481	193,096	715,009	82,792	5,982	15,277	5.3%	20.7%	28.1%
2020-03-31	875,794	44,499	177,819	653,476	76,845	4,761	13,594	5.1%	20.0%	25.9%
2020-03-30	798,949	39,738	164,225	594,986	65,294	4,077	15,337	5.0%	19.5%	21.0%
2020-03-29	733,655	35,661	148,888	549,106	59,237	3,504	9,458	4.9%	19.3%	27.0%
2020-03-28	674,418	32,157	139,430	502,831	67,280	3,729	8,513	4.8%	18.7%	30.5%
2020-03-27	607,138	28,428	130,917	447,793	65,041	3,482	8,785	4.7%	17.8%	28.4%
2020-03-26	542,097	24,946	122,132	395,019	62,877	3,034	8,374	4.6%	17.0%	26.6%
2020-03-25	479,220	21,912	113,758	343,550	51,001	2,807	5,781	4.6%	16.2%	32.7%
2020-03-24	428,219	19,105	107,977	301,137	41,179	2,288	9,640	4.5%	15.0%	19.2%
2020-03-23	387,040	16,817	98,337	271,886	42,835	1,948	469	4.3%	14.6%	80.6%
2020-03-22	344,205	14,869	97,868	231,468	34,856	1,678	6,218	4.3%	13.2%	21.3%
2020-03-21	309,349	13,191	91,650	204,508	31,991	1,722	4,247	4.3%	12.6%	28.8%
2020-03-20	277,358	11,469	87,403	178,486	30,775	1,485	2,445	4.1%	11.6%	37.8%
2020-03-19	246,583	9,984	84,958	151,641	27,049	1,111	1,642	4.0%	10.5%	40.4%
2020-03-18	219,534	8,873	83,316	127,345	19,564	906	2,486	4.0%	9.6%	26.7%
2020-03-17	199,970	7,967	80,830	111,173	15,943	814	2,744	4.0%	9.0%	22.9%
2020-03-16	184,027	7,153	78,086	98,788	14,808	678	2,055	3.9%	8.4%	24.8%

Table 5: Cases in the Whole World *(continued)*

date	confirmed	deaths	recovered	active.confirmed	new.confirmed	new.deaths	new.recovered	rate.lower	rate.upper	rate.daily
2020-03-15	169,219	6,475	76,031	86,713	11,269	641	3,411	3.8%	7.8%	15.8%
2020-03-14	157,950	5,834	72,620	79,496	11,074	420	2,372	3.7%	7.4%	15.0%
2020-03-13	146,876	5,414	70,248	71,214	14,384	497	1,927	3.7%	7.2%	20.5%
2020-03-12	132,492	4,917	68,321	59,254	5,790	306	1,323	3.7%	6.7%	18.8%
2020-03-11	126,702	4,611	66,998	55,093	7,661	344	2,598	3.6%	6.4%	11.7%
2020-03-10	119,041	4,267	64,400	50,374	4,822	274	1,907	3.6%	6.2%	12.6%
2020-03-09	114,219	3,993	62,493	47,733	4,172	190	1,799	3.5%	6.0%	9.6%
2020-03-08	110,047	3,803	60,694	45,550	3,949	239	2,337	3.5%	5.9%	9.3%
2020-03-07	106,098	3,564	58,357	44,177	4,095	104	2,494	3.4%	5.8%	4.0%
2020-03-06	102,003	3,460	55,863	42,680	3,913	111	2,068	3.4%	5.8%	5.1%
2020-03-05	98,090	3,349	53,795	40,946	2,811	94	2,626	3.4%	5.9%	3.5%
2020-03-04	95,279	3,255	51,169	40,855	2,308	95	2,942	3.4%	6.0%	3.1%
2020-03-03	92,971	3,160	48,227	41,584	2,594	75	2,626	3.4%	6.1%	2.8%
2020-03-02	90,377	3,085	45,601	41,691	1,983	89	2,884	3.4%	6.3%	3.0%
2020-03-01	88,394	2,996	42,717	42,681	2,381	54	2,936	3.4%	6.6%	1.8%
2020-02-29	86,013	2,942	39,781	43,290	1,891	69	3,071	3.4%	6.9%	2.2%
2020-02-28	84,122	2,873	36,710	44,539	1,386	59	3,432	3.4%	7.3%	1.7%
2020-02-27	82,736	2,814	33,278	46,644	1,360	43	2,892	3.4%	7.8%	1.5%
2020-02-26	81,376	2,771	30,386	48,219	977	61	2,481	3.4%	8.4%	2.4%
2020-02-25	80,399	2,710	27,905	49,784	853	80	2,678	3.4%	8.9%	2.9%
2020-02-24	79,546	2,630	25,227	51,689	564	160	1,833	3.3%	9.4%	8.0%
2020-02-23	78,982	2,470	23,394	53,118	380	11	505	3.1%	9.5%	2.1%
2020-02-22	78,602	2,459	22,889	53,254	1,761	207	3,997	3.1%	9.7%	4.9%
2020-02-21	76,841	2,252	18,892	55,697	629	4	713	2.9%	10.7%	0.6%
2020-02-20	76,212	2,248	18,179	55,785	560	125	2,058	2.9%	11.0%	5.7%
2020-02-19	75,652	2,123	16,121	57,408	500	115	1,769	2.8%	11.6%	6.1%
2020-02-18	75,152	2,008	14,352	58,792	1,882	140	1,769	2.7%	12.3%	7.3%
2020-02-17	73,270	1,868	12,583	58,819	2,035	98	1,717	2.5%	12.9%	5.4%
2020-02-16	71,235	1,770	10,866	58,599	2,183	104	1,470	2.5%	14.0%	6.6%
2020-02-15	69,052	1,666	9,396	57,990	2,143	143	1,339	2.4%	15.1%	9.6%
2020-02-14	66,909	1,523	8,057	57,329	6,527	152	1,763	2.3%	15.9%	7.9%
2020-02-13	60,382	1,371	6,294	52,717	15,153	253	1,143	2.3%	17.9%	18.1%
2020-02-12	45,229	1,118	5,151	38,960	418	5	467	2.5%	17.8%	1.1%
2020-02-11	44,811	1,113	4,684	39,014	2,042	100	737	2.5%	19.2%	11.9%
2020-02-10	42,769	1,013	3,947	37,809	2,609	107	702	2.4%	20.4%	13.2%
2020-02-09	40,160	906	3,245	36,009	3,030	100	629	2.3%	21.8%	13.7%
2020-02-08	37,130	806	2,616	33,708	2,734	87	600	2.2%	23.6%	12.7%
2020-02-07	34,396	719	2,016	31,661	3,593	85	524	2.1%	26.3%	14.0%
2020-02-06	30,803	634	1,492	28,677	3,160	70	363	2.1%	29.8%	16.2%
2020-02-05	27,643	564	1,129	25,950	3,745	72	272	2.0%	33.3%	20.9%
2020-02-04	23,898	492	857	22,549	4,011	66	230	2.1%	36.5%	22.3%
2020-02-03	19,887	426	627	18,834	3,100	64	151	2.1%	40.5%	29.8%
2020-02-02	16,787	362	476	15,949	4,749	103	189	2.2%	43.2%	35.3%
2020-02-01	12,038	259	287	11,492	2,111	46	62	2.2%	47.4%	42.6%
2020-01-31	9,927	213	225	9,489	1,692	42	80	2.1%	48.6%	34.4%
2020-01-30	8,235	171	145	7,919	2,068	38	18	2.1%	54.1%	67.9%
2020-01-29	6,167	133	127	5,907	589	2	19	2.2%	51.2%	9.5%
2020-01-28	5,578	131	108	5,339	2,651	49	43	2.3%	54.8%	53.3%
2020-01-27	2,927	82	65	2,780	809	26	9	2.8%	55.8%	74.3%
2020-01-26	2,118	56	56	2,006	685	14	14	2.6%	50.0%	50.0%
2020-01-25	1,433	42	42	1,349	492	16	3	2.9%	50.0%	84.2%
2020-01-24	941	26	39	876	286	8	7	2.8%	40.0%	53.3%
2020-01-23	655	18	32	605	98	1	2	2.7%	36.0%	33.3%
2020-01-22	557	17	30	510				3.1%	36.2%	NA%

Appendix A.2 Latest Cases by Country

```
## hightlight high death rates (if >= 5%) for those countries with 2000+ confirmed cases
data.latest.all %>% arrange(desc(confirmed)) %>% select(-c(date, ranking)) %>%
  mutate(death.rate=ifelse(confirmed >= 2000 & death.rate >= 5,
                           cell_spec(format(death.rate, big.mark=',') %>% paste0('%'),
                                     "latex", color="red", bold=T),
                           cell_spec(format(death.rate, big.mark=',') %>% paste0('%'),
                                     "latex", color="black", bold=F))) %>%
  kable(format='latex', escape=F, booktabs=T, longtable=T, row.names=T,
        caption=paste0('Cases by Country (', max.date.txt, ')'),
        format.args=list(big.mark=','),
        align=c('l', rep('r', 7))) %>%
  kable_styling(font_size=6, latex_options=c('striped', 'hold_position', 'repeat_header'))
```

Table 6: Cases by Country (09 Feb 2021 UTC)

	country	confirmed	new.confirmed	active.confirmed	recovered	deaths	new.deaths	death.rate
1	World	106,905,601	427,555	44,809,563	59,754,934	2,341,104	15,592	2.2%

Table 6: Cases by Country (09 Feb 2021 UTC) *(continued)*

	country	confirmed	new.confirmed	active.confirmed	recovered	deaths	new.deaths	death.rate
2	US	27,192,455	95,360	26,724,252	0	468,203	3,131	1.7%
3	India	10,858,371	11,067	141,511	10,561,608	155,252	94	1.4%
4	Brazil	9,599,565	74,925	788,838	8,577,207	233,520	1,986	2.4%
5	United Kingdom	3,983,756	12,441	3,859,263	10,427	114,066	1,052	2.9%
6	Russia	3,953,970	14,808	422,041	3,455,582	76,347	519	1.9%
7	France	3,419,210	18,886	3,096,991	241,924	80,295	724	2.3%
8	Spain	3,005,487	16,402	2,792,050	150,376	63,061	766	2.1%
9	Italy	2,655,319	10,612	413,967	2,149,350	92,002	422	3.5%
10	Turkey	2,548,195	8,636	83,815	2,437,382	26,998	98	1.1%
11	Germany	2,302,051	5,728	157,079	2,081,966	63,006	815	2.7%
12	Colombia	2,166,904	5,442	62,105	2,048,292	56,507	217	2.6%
13	Argentina	1,993,295	7,794	151,408	1,792,321	49,566	168	2.5%
14	Mexico	1,946,751	10,738	267,120	1,511,199	168,432	1,701	**8.7%**
15	Poland	1,556,685	3,999	199,851	1,317,474	39,360	228	2.5%
16	Iran	1,481,396	7,640	156,253	1,266,518	58,625	89	4.0%
17	South Africa	1,479,253	1,742	65,137	1,367,247	46,869	396	3.2%
18	Ukraine	1,293,892	2,867	145,958	1,122,912	25,022	138	1.9%
19	Peru	1,196,778	10,080	42,656	1,111,496	42,626	318	3.6%
20	Indonesia	1,174,779	8,700	169,351	973,452	31,976	213	2.7%
21	Czechia	1,045,132	7,727	95,479	932,156	17,497	164	1.7%
22	Netherlands	1,023,779	1,813	995,706	13,444	14,629	86	1.4%
23	Canada	815,487	2,683	37,985	756,588	20,914	84	2.6%
24	Portugal	770,502	2,583	127,867	628,078	14,557	203	1.9%
25	Chile	758,189	2,839	21,797	717,308	19,084	28	2.5%
26	Romania	749,434	2,797	34,980	695,398	19,056	95	2.5%
27	Belgium	728,334	1,851	706,862	0	21,472	49	2.9%
28	Israel	703,719	7,191	70,499	628,004	5,216	45	0.7%
29	Iraq	632,257	1,994	17,105	602,018	13,134	8	2.1%
30	Sweden	596,174	8,112	583,986	0	12,188	73	2.0%
31	Pakistan	557,591	1,072	30,512	514,951	12,128	62	2.2%
32	Philippines	540,227	1,232	29,167	499,764	11,296	65	2.1%
33	Bangladesh	538,765	387	45,963	484,573	8,229	8	1.5%
34	Switzerland	536,516	1,363	209,229	317,600	9,687	36	1.8%
35	Morocco	476,125	536	11,669	456,032	8,424	16	1.8%
36	Austria	426,093	1,197	13,346	404,676	8,071	39	1.9%
37	Serbia	411,855	2,014	407,701	0	4,154	15	1.0%
38	Japan	408,550	1,558	33,292	368,657	6,601	94	1.6%
39	Hungary	378,734	1,079	82,203	283,282	13,249	94	3.5%
40	Saudi Arabia	370,987	353	2,515	362,062	6,410	4	1.7%
41	Jordan	338,322	1,483	11,779	322,148	4,395	10	1.3%
42	United Arab Emirates	332,603	3,310	18,596	313,060	947	17	0.3%
43	Panama	328,476	822	25,295	297,650	5,531	25	1.7%
44	Lebanon	324,866	2,886	105,770	215,359	3,737	60	1.2%
45	Nepal	272,215	160	1,737	268,431	2,047	2	0.8%
46	Slovakia	265,807	1,724	12,039	248,386	5,382	111	2.0%
47	Georgia	263,057	829	4,835	254,916	3,306	8	1.3%
48	Belarus	260,060	561	10,195	248,064	1,801	9	0.7%
49	Ecuador	259,783	1,176	24,299	220,398	15,086	73	**5.8%**
50	Malaysia	248,316	2,764	50,841	196,566	909	13	0.4%
51	Kazakhstan	246,474	1,123	26,072	217,275	3,127	3	1.3%
52	Croatia	235,756	283	2,329	228,203	5,224	26	2.2%
53	Azerbaijan	231,362	164	2,521	225,678	3,163	2	1.4%
54	Bolivia	230,731	1,544	48,830	170,972	10,929	65	4.7%
55	Bulgaria	226,061	1,212	22,065	194,514	9,482	62	4.2%
56	Dominican Republic	224,538	419	51,831	169,843	2,864	21	1.3%
57	Tunisia	218,564	811	34,373	176,859	7,332	75	3.4%
58	Ireland	204,940	543	177,824	23,364	3,752	65	1.8%
59	Denmark	203,104	367	6,260	194,599	2,245	28	1.1%
60	Costa Rica	197,852	417	36,334	158,820	2,698	6	1.4%
61	Lithuania	187,421	382	44,001	140,448	2,972	17	1.6%
62	Slovenia	174,364	364	14,444	156,266	3,654	19	2.1%
63	Kuwait	172,996	1,002	9,310	162,711	975	6	0.6%
64	Egypt	170,780	573	27,931	133,098	9,751	52	**5.7%**
65	Armenia	168,300	123	5,005	160,169	3,126	3	1.9%
66	Greece	166,067	1,492	66,286	93,764	6,017	20	3.6%
67	Moldova	165,663	805	7,646	154,444	3,573	16	2.2%
68	Guatemala	163,993	746	7,494	150,544	5,955	33	3.6%
69	West Bank and Gaza	163,975	762	8,396	153,682	1,897	9	1.2%

Table 6: Cases by Country (09 Feb 2021 UTC) *(continued)*

	country	confirmed	new.confirmed	active.confirmed	recovered	deaths	new.deaths	death.rate
70	Honduras	156,606	871	90,849	61,968	3,789	47	2.4%
71	Qatar	155,002	477	7,558	147,191	253	2	0.2%
72	Ethiopia	143,566	572	15,404	126,004	2,158	2	1.5%
73	Burma	141,448	21	9,831	128,437	3,180	3	2.2%
74	Nigeria	141,447	1,056	23,998	115,755	1,694	21	1.2%
75	Paraguay	139,819	874	20,897	116,060	2,862	16	2.0%
76	Oman	136,187	197	6,562	128,089	1,536	1	1.1%
77	Venezuela	131,096	500	6,858	122,991	1,247	7	1.0%
78	Libya	125,561	679	17,202	106,377	1,982	8	1.6%
79	Bosnia and Herzegovina	124,443	342	19,940	99,669	4,834	21	3.9%
80	Algeria	109,559	246	31,578	75,057	2,924	6	2.7%
81	Bahrain	108,807	759	6,131	102,289	387	4	0.4%
82	Kenya	102,048	104	15,717	84,542	1,789	3	1.8%
83	China	100,475	40	1,504	94,147	4,824	2	4.8%
84	North Macedonia	95,347	476	6,546	85,846	2,955	9	3.1%
85	Albania	87,528	1,239	33,107	52,933	1,488	16	1.7%
86	Kyrgyzstan	85,171	58	1,913	81,825	1,433	2	1.7%
87	Korea, South	81,930	443	8,218	72,226	1,486	4	1.8%
88	Uzbekistan	79,204	42	974	77,609	621	0	0.8%
89	Ghana	73,003	675	6,938	65,583	482	10	0.7%
90	Latvia	72,869	781	10,708	60,798	1,363	16	1.9%
91	Sri Lanka	71,211	976	5,788	65,053	370	5	0.5%
92	Montenegro	66,234	577	7,959	57,423	852	10	1.3%
93	Norway	65,338	220	46,757	17,998	583	1	0.9%
94	Zambia	64,610	1,037	5,410	58,319	881	12	1.4%
95	Kosovo	62,548	0	6,789	54,233	1,526	0	2.4%
96	Singapore	59,732	11	197	59,506	29	0	0.0%
97	El Salvador	56,653	0	3,953	50,999	1,701	9	3.0%
98	Afghanistan	55,384	25	4,861	48,109	2,414	1	4.4%
99	Luxembourg	52,022	143	2,576	48,846	600	3	1.2%
100	Estonia	48,809	542	9,605	38,730	474	8	1.0%
101	Finland	48,407	438	16,704	31,000	703	15	1.5%
102	Uruguay	46,153	503	5,375	40,272	506	9	1.1%
103	Mozambique	45,785	873	17,491	27,814	480	15	1.0%
104	Uganda	39,883	23	25,116	14,440	327	0	0.8%
105	Namibia	35,201	131	1,149	33,675	377	2	1.1%
106	Zimbabwe	34,781	123	4,139	29,289	1,353	14	3.9%
107	Cuba	34,064	580	5,127	28,693	244	4	0.7%
108	Cyprus	31,959	95	29,688	2,057	214	0	0.7%
109	Cameroon	31,394	0	1,419	29,501	474	0	1.5%
110	Cote d'Ivoire	29,967	0	1,616	28,186	165	0	0.6%
111	Sudan	29,851	86	5,964	22,052	1,835	0	**6.1%**
112	Senegal	29,245	188	4,479	24,066	700	11	2.4%
113	Australia	28,871	11	1,857	26,105	909	0	3.1%
114	Malawi	27,722	300	14,774	12,065	883	9	3.2%
115	Botswana	24,435	0	3,714	20,542	179	0	0.7%
116	Congo (Kinshasa)	23,771	100	7,936	15,151	684	3	2.9%
117	Thailand	23,746	189	5,301	18,366	79	0	0.3%
118	Angola	20,163	51	1,062	18,623	478	3	2.4%
119	Madagascar	19,360	0	585	18,490	285	0	1.5%
120	Malta	19,015	202	2,406	16,325	284	2	1.5%
121	Jamaica	17,701	403	4,980	12,362	359	1	2.0%
122	Maldives	17,101	192	2,223	14,822	56	1	0.3%
123	Mauritania	16,868	41	355	16,086	427	0	2.5%
124	Rwanda	16,811	190	3,597	12,988	226	3	1.3%
125	Eswatini	16,288	54	3,821	11,857	610	3	3.7%
126	Guinea	14,791	27	326	14,381	84	0	0.6%
127	Syria	14,611	60	5,362	8,288	961	3	**6.6%**
128	Cabo Verde	14,479	28	441	13,901	137	1	0.9%
129	Tajikistan	13,308	0	0	13,218	90	0	0.7%
130	Belize	12,079	9	237	11,532	310	3	2.6%
131	Haiti	11,908	102	2,485	9,177	246	0	2.1%
132	Gabon	11,836	0	727	11,038	71	0	0.6%
133	Burkina Faso	11,367	58	1,001	10,232	134	0	1.2%
134	Andorra	10,312	37	532	9,674	106	0	1.0%
135	Lesotho	9,718	338	6,669	2,842	207	24	2.1%
136	Suriname	8,710	20	457	8,090	163	1	1.9%
137	Bahamas	8,289	0	1,276	6,837	176	0	2.1%

Table 6: Cases by Country (09 Feb 2021 UTC) *(continued)*

	country	confirmed	new.confirmed	active.confirmed	recovered	deaths	new.deaths	death.rate
138	Mali	8,192	11	1,763	6,090	339	0	4.1%
139	Congo (Brazzaville)	8,060	0	2,092	5,846	122	0	1.5%
140	Guyana	8,041	18	834	7,026	181	0	2.3%
141	Trinidad and Tobago	7,617	1	179	7,302	136	1	1.8%
142	Nicaragua	6,347	48	1,951	4,225	171	1	2.7%
143	Iceland	6,025	5	28	5,968	29	0	0.5%
144	Djibouti	5,959	9	42	5,854	63	0	1.1%
145	Equatorial Guinea	5,614	0	114	5,413	87	0	1.5%
146	Togo	5,576	80	866	4,630	80	0	1.4%
147	Central African Republic	4,989	0	41	4,885	63	0	1.3%
148	Somalia	4,862	0	1,008	3,720	134	0	2.8%
149	South Sudan	4,804	195	1,026	3,709	69	3	1.4%
150	Niger	4,643	22	474	4,002	167	1	3.6%
151	Gambia	4,302	0	276	3,891	135	0	3.1%
152	Benin	4,193	0	575	3,563	55	0	1.3%
153	Sierra Leone	3,801	12	1,228	2,494	79	0	2.1%
154	Chad	3,539	31	370	3,044	125	0	3.5%
155	San Marino	3,187	50	230	2,886	71	2	2.2%
156	Comoros	3,179	91	543	2,518	118	6	3.7%
157	Guinea-Bissau	2,810	30	332	2,432	46	0	1.6%
158	Liechtenstein	2,527	1	24	2,451	52	0	2.1%
159	Eritrea	2,401	75	613	1,781	7	0	0.3%
160	New Zealand	2,324	2	59	2,240	25	0	1.1%
161	Mongolia	2,174	54	626	1,546	2	0	0.1%
162	Yemen	2,131	0	88	1,428	615	0	**28.9%**
163	Vietnam	2,064	14	557	1,472	35	0	1.7%
164	Saint Lucia	2,027	0	1,091	917	19	0	0.9%
165	Liberia	1,956	0	102	1,770	84	0	4.3%
166	Barbados	1,814	82	324	1,470	20	2	1.1%
167	Burundi	1,730	2	954	773	3	0	0.2%
168	Monaco	1,695	30	265	1,411	19	0	1.1%
169	Seychelles	1,695	120	493	1,195	7	0	0.4%
170	Sao Tome and Principe	1,385	30	290	1,077	18	0	1.3%
171	Saint Vincent and the Grenadines	1,283	0	864	415	4	0	0.3%
172	Taiwan*	933	5	74	850	9	0	1.0%
173	Papua New Guinea	900	0	45	846	9	0	1.0%
174	Bhutan	861	0	6	854	1	0	0.1%
175	Diamond Princess	712	0	0	699	13	0	1.8%
176	Mauritius	594	1	40	544	10	0	1.7%
177	Tanzania	509	0	305	183	21	0	4.1%
178	Cambodia	476	0	19	457	0	0	0.0%
179	Antigua and Barbuda	316	0	119	189	8	1	2.5%
180	Brunei	182	0	4	175	3	0	1.6%
181	Grenada	148	0	1	146	1	0	0.7%
182	Dominica	121	0	11	110	0	0	0.0%
183	Timor-Leste	86	6	25	61	0	0	0.0%
184	Fiji	56	0	1	53	2	0	3.6%
185	Laos	45	0	4	41	0	0	0.0%
186	Saint Kitts and Nevis	40	0	2	38	0	0	0.0%
187	Holy See	27	0	12	15	0	0	0.0%
188	Solomon Islands	17	0	7	10	0	0	0.0%
189	MS Zaandam	9	0	0	7	2	0	22.2%
190	Marshall Islands	4	0	0	4	0	0	0.0%
191	Samoa	2	0	0	2	0	0	0.0%
192	Micronesia	1	0	0	1	0	0	0.0%
193	Vanuatu	1	0	0	1	0	0	0.0%

Appendix B. How to Cite This Work

Citation

Yanchang Zhao, COVID-19 Data Analysis with R – Worldwide. RDataMining.com, 2020. URL: http://www.rdatamining.com/docs/Coronavirus-data-analysis-world.pdf.

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Comments and suggestions and welcome. Thanks!