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Exploration of COVID-19 Pandemic Using Variety of Frequency Tables

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Abstract. The coronavirus disease was first discovered in Malaysia on the 25th of January, 2020. The number of positive cases remained stable until March 2020, where a large spike emerged. Different exploratory data analysis tools need to be used to easily observe the trend of coronavirus infections and ascertain the end of the pandemic. Also, the growth rate of the pandemic seems to be under-reported in many countries due to some issues. In this research, we explored the reported COVID-19 data using different discrete frequency tables. The positive cases, deaths, and recoveries were organized in general cases, cumulative cases and 14 days moving cases frequency tables. The reported positive cases were displayed according to the states as states' new cases, cumulative cases, and 14 days moving cases frequency tables. The end of the pandemic can be detected when there is no infection for 14 consecutive days and was determined in the country as a whole using the cumulative cases and the 14 days moving cases general frequency tables. Whereas in the states, the states' cumulative cases and the 14 days moving cases frequency tables were used to detect the end of COVID-19 pandemic.

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1. Introduction

Coronavirus disease, COVID-19, is a disease that causes severe acute respiratory syndrome (SARS-CoV-2) and the Middle East respiratory syndrome (MERS). The name coronavirus was derived from a Latin word corona, which means crown or halo. The first world's coronavirus case was reported in Wuhan, China, on 31 December 2019 [3, 8, 21–23]. The Coronavirus outbreak was declared a world health emergency on 30 January 2020 and labeled a pandemic on 11 March 2020 by world health organization [21, 22]. At the time being, there is no ready vaccine or specific cure for the disease. Moreover, as of 4 May 2020, more than 3.5 million cases of the disease, over 250,000 mortality cases, and 1,167,883 recoveries were reported in 210 countries [10].

The majority of people who have been diagnosed with the disease develop slight to moderate respiratory illness and recover without requiring special care. The elderly and people with underlying health conditions such as diabetes, cancer, cardiovascular disease, and chronic respiratory disease have a higher risk of experiencing a severe illness [21, 23].

Mostly the virus can be contracted through close contact with an infected person, droplets when the person sneezes, coughs, or talks, and discharge from the nose [21]. Coronavirus is not airborne, but can also be spread during breathing, mostly when it dropped on surfaces. People can contract the virus by rubbing their face after touching a contaminated surface. The virus can live on surfaces for up to 3 days [21, 23].

Fever, tiredness, sore throat, dry cough, and difficulty in breathing are the usual symptoms of the disease. Complications can include symptoms such as acute respiratory distress syndrome and pneumonia [21].

The preventive measures recommended by health authorities include regular hand washing, using face masks, social distancing, shelter-in-place, for people not contracted, and self-isolation for those who suspect being infected [21]. Moreover, to halt the spread of the disease measures such as total lockdown, disinfecting areas where cases are reported, and restrict the movement of people were imposed by most of the countries.

The Coronavirus pandemic has resulted in several disruptions such as religious activities, cancellation of sports activities, social events, and calendars of schools and universities, affecting the majority of the world's students. More important to mention is, the pandemic has affected the economies of many countries of the world.

The first three cases of coronavirus in Malaysia were reported on the 25 January 2020 [6]. Since then, the number of infections was relatively minimal until the first week of March when a large number of cases were recorded, mostly connected to a religious gathering held between 27 February and 1st March [9]. As a result of the spike in the number of cases, on the 16 March, the Malaysian government imposed a movement control order (MCO) from 18 to 31 March 2020. Also, on 18 March 2020, Malaysia's Anthoney-General chambers (AGC) banned people from traveling to other states. To further curtail the spread of the virus, the movement control order (MCO) was extended three times, from 1 April to 14 April 2020, 14 April 2020 to 28 April 2020, and 28 April 2020 to 12 May 2020 [12, 23]. There are 6,353 cases, 4,484 recoveries, 105 deaths as of 4 May 2020 [12, 14, 23].

Though the Malaysia government are doing their best to curb the spread of the virus by taking different measures, the size of the pandemic is under-reported [18]. The size of the spread of the coronavirus disease is dependent on many parameters such as the availability of the testing kits, supply of reagents, the daily number of tests, the number of health personnel, testing ability, turnaround time, and people's cooperation[18]. In this article, we proposed an exploratory data analysis tool, frequency table, that can be used to detect the end of the pandemic. Also, determined the expected size of COVID-19 infections in Malaysia using back-of-the-envelope approaches. Though many countries are experiencing a similar issue, we chose Malaysia because the country is going through one complete cycle like China.

2. Coronavirus related literature

The coronavirus disease has posed a serious threat to the lives of people in the world. Studies on coronavirus have started for more than ten years back. Among the researches reported in the literature is the work of Cheng et al. (2007) who reviewed the severe acute respiratory syndrome (SARS-CoV) biology for epidemiology, clinical presentation, pathogenesis, laboratory diagnosis, animal models, treatment, immunization and infection prevention. Wang et al. (2020) and Colson, Rolain, and Raoult (2020) recommended the use of chloroquine and Remdesivir drugs for the treatment of the coronavirus disease. The emergence and pathogenicity of the current COVID-19 infection were compared with the previous coronaviruses, severe acute respiratory syndrome (SARS-CoV), and the middle east respiratory syndrome coronavirus (MERS-Cov) by Shereem et al. (2020), and also suggested some procedures for developing effective vaccines for the new pandemic. Verity et al. (2020) applied parametric and non-parametric methods, using Bayesian approaches, and obtained the estimates of China's overall case fatality ratio (CFR) and infection fatality ratio (IFR) to be 1.38 % and 0.66 %. 21. Similarly, Backer, Klinkenberg, and Wallinga (2020) fitted three parametric distributions, Weibull, gamma, and lognormal distributions, using a Bayesian approach and determined the incubation periods for travelers from Wuhan infected with the 2019 novel coronavirus. The incubation periods obtained were compared with that of the severe acute respiratory syndrome and the Middle East respiratory syndrome coronaviruses. In another research, Chang et al. (2020) examined the epidemiological and clinical characteristics of 138 hospitalized COVID-19 patients. Using some assumptions, Imai et al (2020) estimated the possible total number of COVID-19 infections in Wuhan. The finding of the study shows that the pandemic has caused more cases of moderate or severe respiratory illness than the reported. An article published on 14 April 2020 by Kissler et al. (2020) suggested that without a new vaccine or an effective therapeutic remedy, social distancing may have to be continued till the year 2022, and chances are there for infection resurgence until 2024.

3. Discrete frequency table

Discrete data are count values, which assumes only finite variates. When a discrete data set is organized in a tabular form is called a discrete frequency table. Data are more attractive and capture the minds of researchers if presented in either tabular or graphical form. The tabular representations are precise and provide the reader with apparent features of the data; however, the graphical representations have more visual significance since they are useful in detecting patterns in a data set [15, 16].

The discrete frequency table is very significant in statistics. It serves as a bridge between raw data and the bar plot. Furthermore, from the frequency table, the nature of the distribution of the data can be known. For instance, to know whether the distribution is normal or skewed or the degree of concentration of the elements. An important function to mention is the frequency table aid careful comparison of data sets. So also, some statistical measures can be obtained from the frequency table [**?**]. Since the daily reported COVID-19 data are in a count format, the discrete frequency table can be used to explore the hidden features of the data.

Tables 1 presents the daily new and cumulative positive cases, deaths, recoveries general discrete frequency table. Meanwhile, to show the distribution of the infections across the states, Tables 3 and 4 respectively depict the daily states' new and cumulative positive cases frequency tables. Moreover, to easily observe the end of the pandemic in the whole country as well as in each of the states, we proposed 14 days cases general and states' discrete frequency tables, Tables 2 and 5.

Table 1. Daily new and cumulative cases general discrete frequency table.

d	f^P	$_cf^P$	f^D	$_cf^D$	f^R	$_cf^R$	$_cf^A$
d_1	f_1^P	$_cf_1^P$	f_1^D	$_cf_1^D$	f_1^R	$_cf_1^R$	f_1^A
d_2	f_2^P	$_cf_2^P$	f_2^D	$_cf_2^D$	f_2^R	$_cf_2^R$	f_2^A
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
d_{k-1}	f_{k-1}^P	$_cf_{k-1}^P$	f_{k-1}^D	$_cf_{k-1}^D$	f_{k-1}^R	$_cf_{k-1}^R$	f_{k-1}^A
d_k	f_k^P	$_cf_k^P$	f_k^D	$_cf_k^D$	f_k^R	$_cf_k^R$	f_k^A

Table 2. 14 days cases general discrete frequency table.

ds	f^P	f^D	f^R	f^A
$d_1, \cdots, d_{14}$	$f_1^P + \cdots + f_{14}^P$	$f_1^D + \cdots + f_{14}^D$	$f_1^R + \cdots + f_{14}^R$	f_1^A
$d_2, \cdots, d_{15}$	$f_2^P + \cdots + f_{15}^P$	$f_2^D + \cdots + f_{15}^D$	$f_2^R + \cdots + f_{15}^R$	f_2^A
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
$d_m, \cdots, d_{m+14}$	$f_m^P + \cdots + f_{m+14}^P$	$f_m^D + \cdots + f_{m+14}^D$	$f_m^R + \cdots + f_{m+14}^R$	f_m^A
$d_{m+1}, \cdots, d_{m+15}$	$f_{m+1}^P + \cdots + f_{m+15}^P$	$f_{m+1}^D + \cdots + f_{m+15}^D$	$f_{m+1}^R + \cdots + f_{m+15}^R$	f_{m+1}^A

where f^P , f^D , f^R , and f^A are respectively daily new infections, deaths, recoveries, and active cases. While, $_cf_i^P = \sum_i^{d_i} f_i^P$, $_cf_i^D = \sum_i^{d_i} f_i^D$, $_cf_i^R = \sum_i^{d_i} f_i^R$, and $_cf^A =_c f_i^P -_c f_i^D -_c f_i^R$ are the cumulative infections, deaths, recoveries, and active cases.

At a point in time the end of pandemic can be detected if

$$\begin{aligned} f_1^P + f_2^P + \cdots + f_n^P &\approx f_1^P + f_2^P + \cdots + f_{n+1}^P \\ &\approx f_1^P + f_2^P + \cdots + f_{n+2}^P \\ &\approx f_1^P + f_2^P + \cdots + f_{n+3}^P \\ &\vdots \\ &\approx f_1^P + f_2^P + \cdots + f_{n+14}^P. \end{aligned} \tag{1}$$

Alternatively, using the 14 days moving infections, the pandemic ends in the country if

$$\begin{aligned} f_1^P + f_2^P + \cdots + f_n^P &\approx f_n^P + f_{n+1}^P + \cdots + f_{n+14}^P \\ &\approx 0. \end{aligned} \tag{2}$$

Table 3. States new cases discrete frequency table of the COVID-19 pandemic.

d	S_1	S_2	$\cdots$	S_ν
d_1	f_{11}^P	f_{12}^P	$\cdots$	$f_{1\nu}^P$
d_2	f_{21}^P	f_{22}^P	$\cdots$	$f_{2\nu}^P$
$\vdots$	$\vdots$	$\vdots$	$\cdots$	$\vdots$
d_{k-1}	f_{k-11}^P	f_{k-12}^P	$\cdots$	$f_{K-1\nu}^P$
d_k	f_{k1}^P	f_{k2}^P	$\cdots$	$f_{k\nu}^P$

where S_j denotes state j, f_{ij}^P is the number positive cases in S_j on d_i and ${}_cf_{ij}^P = \sum_{ij}^{d_i} f_{ij}^P$ is the cumulative positive cases in S_j as of d_i, $i = 1, 2, \cdots, k$ and $j = 1, 2, \cdots, \nu$. The end of pandemic can be detected in state, S_j at a particular day, d_n if

$$\begin{aligned} f_{1j}^P + f_{2j}^P + \cdots + f_{nj}^P &\approx f_{1j}^P + f_{2j}^P + \cdots + f_{(n+1)j}^P \\ &\approx f_{1j}^P + f_{2j}^P + \cdots + f_{(n+2)j}^P \\ &\approx f_{1j}^P + f_{2j}^P + \cdots + f_{(n+3)j}^P \\ &\vdots \\ &\approx f_{1j}^P + f_{2j}^P + \cdots + f_{(n+14)j}^P. \end{aligned} \tag{3}$$

Table 4. States cumulative cases discrete frequency table of the COVID-19 pandemic.

d	S_1	S_2	$\cdots$	S_ν
d_1	$_cf^P_{11}$	$_cf^P_{12}$	$\cdots$	$_cf^P_{1\nu}$
d_2	$_cf^P_{21}$	$_cf^P_{22}$	$\cdots$	$_cf^P_{2\nu}$
$\vdots$	$\vdots$	$\vdots$	$\cdots$	$\vdots$
d_{k-1}	$_cf^P_{k-11}$	$_cf^P_{k-12}$	$\cdots$	$_cf^P_{K-1\nu}$
d_k	$_cf^P_{k1}$	$_cf^P_{k2}$	$\cdots$	$_cf^P_{k\nu}$

Table 5. States 14 days cases discrete frequency table of the COVID-19 pandemic.

Day	S_1	S_2	$\cdots$	S_ν
$d_1, \cdots, d_{14}$	$f^P_{11} + \cdots + f^P_{(14)1}$	$f^P_{12} + \cdots + f^P_{(14)2}$	$\cdots$	$f^P_{1\nu} + \cdots + f^P_{14\nu}$
$d_2, \cdots, d_{15}$	$f^P_{21} + \cdots + f^P_{(15)1}$	$f^P_{22} + \cdots + f^P_{(15)2}$	$\cdots$	$f^P_{2\nu} + \cdots + f^P_{15\nu}$
$\vdots$	$\vdots$	$\vdots$	$\cdots$	$\vdots$
$d_m, \cdots, d_{m+14}$	$f^P_{m1} + \cdots + f^P_{(m+14)1}$	$f^P_{m2} + \cdots + f^D_{(m+14)2}$	$\cdots$	$f^P_{m\nu} + \cdots + f^P_{(m+14)\nu}$
$d_{m+1}, \cdots d_{m+15}$	$f^P_{(m+1)1} + \cdots + f^P_{(m+15)1}$	$f^P_{(m+1)2} + \cdots + f^P_{(m+15)2}$	$\cdots$	$f^P_{(m+1)\nu} + \cdots + f^P_{(m+15)\nu}$

Alternatively, using 14 days moving infections, the pandemic ends in S_j if

$$\begin{aligned} f^P_{1j} + f^P_{2j} + \cdots + f^P_{nj} &\approx f^P_{nj} + f^P_{(n+1)j} + \cdots + f^P_{(n+14)j} \\ &\approx 0. \end{aligned} \tag{4}$$

4. Application of the discrete frequency table for the selected country

The ministry of health Malaysia reports the daily number of people tested positive, recoveries, deaths, and active cases. The use of this data is because the authors are staying in the country during the outbreak. The daily new and cumulative positive cases, deaths, recoveries, and active cases are displayed in a discrete frequency table, Tables 6. The daily new cases and the cumulative cases are visualized using bar plots, Figures 1, and 2. Moreover, to have a manageable table and easily observe the end of the pandemic, the data is displayed in fourteen days frequency table, Table 7. The plotting was done using Rstudio and R package, version 3.6.3.

The trend of the virus's spread as observed from the Tables, and the bar plots was stable from the first-day infections were discovered until the end of February. The number of cases kept increasing with slight fluctuations until the first week of April and start dropping afterward. The decreasing number of infections might be a result of the movement control order (MCO) imposed by the Malaysian government.
where $J_{25} - J_{31}$, $F_1 - F_{29}$, $M_1 - M_{31}$, $A_1 - A_{30}$, and $Ma_1 - Ma_{31}$ respectively denote Jan-25 to Jan-31, Feb-01 to Feb-29, Mar-01 to Mar-31, Apr-01 to Apr-30, and May-01 to May-31.

Also, the virus infections are displayed according to the sixteen states in Malaysia, Johor Baru (JB), Kedah (KD), Kelantan (KE), Melaka (ML), Negeri

Table 6. Daily new and cumulative cases frequency table of the Malaysia Covid-19 pandemic.

	f^P	$_cf^P$	f^D	$_cf^D$	f^R	$_cf^R$	$_cf^A$
J_{25}	3	3	0	0	0	0	3
J_{26}	1	4	0	0	0	0	4
J_{27}	0	4	0	0	0	0	4
J_{28}	3	7	0	0	0	0	7
J_{29}	0	7	0	0	0	0	7
J_{30}	1	8	0	0	0	0	8
J_{31}	0	8	0	0	0	0	8
F_1	0	8	0	0	0	0	8
F_2	0	8	0	0	0	0	8
F_3	0	8	0	0	0	0	8
F_4	2	10	0	0	1	1	9
F_5	2	12	0	0	0	1	11
F_6	2	14	0	0	0	1	13
F_7	0	14	0	0	0	1	13
F_8	2	16	0	0	1	2	14
F_9	1	17	0	0	1	3	14
F_{10}	1	18	0	0	0	3	15
F_{11}	0	18	0	0	0	3	15
F_{12}	0	18	0	0	0	3	15
F_{13}	1	19	0	0	0	3	16
F_{14}	0	19	0	0	4	7	12
F_{15}	2	21	0	0	0	7	14
F_{16}	1	22	0	0	1	8	14
F_{17}	0	22	0	0	1	9	13
F_{18}	0	22	0	0	2	11	11
F_{19}	0	22	0	0	4	15	7
F_{20}	0	22	0	0	2	17	5
F_{21}	0	22	0	0	0	17	5
F_{22}	0	22	0	0	0	17	5
F_{23}	0	22	0	0	1	18	4
F_{24}	0	22	0	0	2	20	2
F_{25}	0	22	0	0	0	20	2
F_{26}	0	22	0	0	0	20	2
F_{27}	2	24	0	0	2	22	2
F_{28}	1	25	0	0	0	22	3
F_{29}	4	29	0	0	0	22	7
M_1	4	33	0	0	0	22	11
M_2	0	33	0	0	0	22	11
M_3	3	36	0	0	0	22	14
M_4	14	50	0	0	0	22	28
M_5	5	55	0	0	0	22	33
M_6	28	83	0	0	0	22	61
M_7	10	93	0	0	1	23	70
M_8	6	99	0	0	1	24	75
M_9	18	117	0	0	0	24	93
M_{10}	12	129	0	0	1	25	104
M_{11}	20	149	0	0	1	26	123
M_{12}	9c	158	0	0	6	32	126
M_{13}	45	203	0	0	0	32	171
M_{14}	35	238	0	0	3	35	203
M_{15}	190	428	0	0	7	42	386
M_{16}	125	553	0	0	0	42	511
M_{17}	120	673	2	2	7	49	622
M_{18}	117	790	1	3	11	60	727
M_{19}	110	900	0	3	15	75	822
M_{20}	130	1,030	1	4	12	87	939
M_{21}	153	1,183	4	8	27	114	1061
M_{22}	123	1,306	3	11	25	139	1156
M_{23}	212	1,518	3	14	20	159	1345
M_{24}	106	1,624	1	15	24	183	1426
M_{25}	172	1,796	5	20	16	199	1577
M_{26}	235	2,031	5	25	16	215	1791
M_{27}	130	2,161	1	26	44	259	1876
M_{28}	159	2,320	1	27	61	320	1973
M_{29}	150	2,470	8	35	68	388	2047
M_{30}	156	2,626	2	37	91	479	2110
M_{31}	140	2,766	6	43	58	537	2186
A_1	142	2,908	2	45	108	645	2218
A_2	208	3,116	5	50	122	767	2299
A_3	217	3,333	3	53	60	827	2453
A_4	150	3,483	4	57	88	915	2511
A_5	179	3,662	4	61	90	1,005	2596
A_6	131	3,793	1	62	236	1,241	2490
A_7	170	3,963	1	63	80	1,321	2579
A_8	156	4,119	2	65	166	1,487	2567
A_9	109	4,228	2	67	121	1,608	2553
A_{10}	118	4,346	3	70	222	1,830	2450
A_{11}	184	4,530	3	73	165	1,995	2462
A_{12}	153	4,683	3	76	113	2,108	2499
A_{13}	134	4,817	1	77	168	2,276	2464
A_{14}	170	4,987	5	82	202	2,478	2427
A_{15}	85	5,072	1	83	169	2,647	2342
A_{16}	110	5,182	1	84	119	2,766	2332
A_{17}	69	5,251	2	86	201	2,967	2198
A_{18}	54	5,305	2	88	135	3,102	2198
A_{19}	84	5,389	1	89	95	3,197	2103
A_{20}	36	5,425	0	89	98	3,295	2041
A_{21}	57	5,482	3	92	54	3,349	2041
A_{22}	50	5,532	1	93	103	3,452	1987
A_{23}	71	5,603	2	95	90	3,542	1966
A_{24}	88	5,691	1	96	121	3,663	1,932
A_{25}	51	5,742	2	98	99	3,762	1,882
A_{26}	38	5,780	0	98	100	3,862	1,820
A_{27}	40	5,820	1	99	95	3,957	1,764
A_{28}	31	5,851	1	100	75	4,032	1,719
A_{29}	94	5,945	0	100	55	4,087	1,758
A_{30}	57	6,002	2	102	84	4,171	1,729
A_{30}	57	6,002	2	102	84	4,171	1,729
Ma_1	69	6,071	1	103	39	4,210	1,758
Ma_2	105	6,176	0	103	116	4,326	1,747
Ma_3	122	6,298	2	105	87	4,413	1,780
Ma_4	55	6,353	0	105	71	4,484	1,764

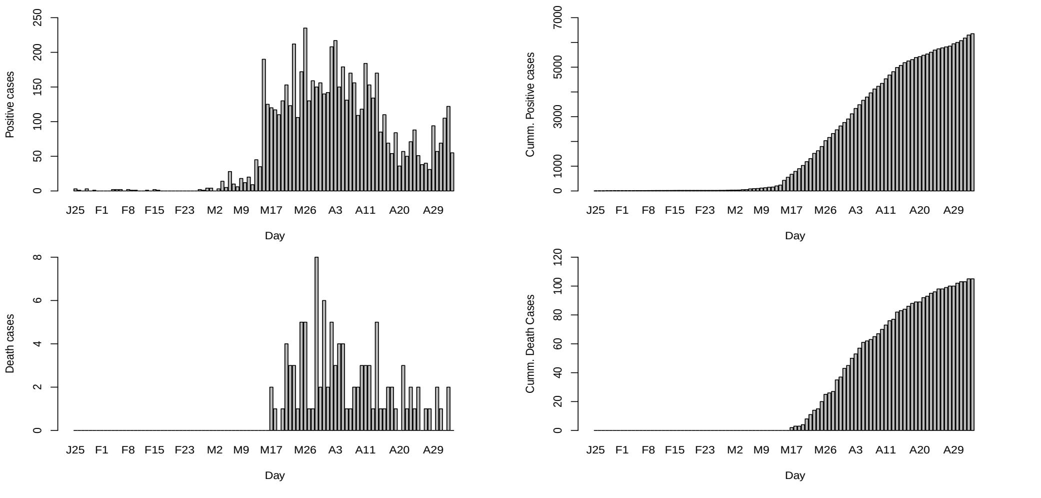

Figure 1. Bar plot of the daily cases frequency table, top left, the new positive cases, top right, cumulative positive cases, bottom left, the new death cases, and bottom right, the cumulative deaths cases.

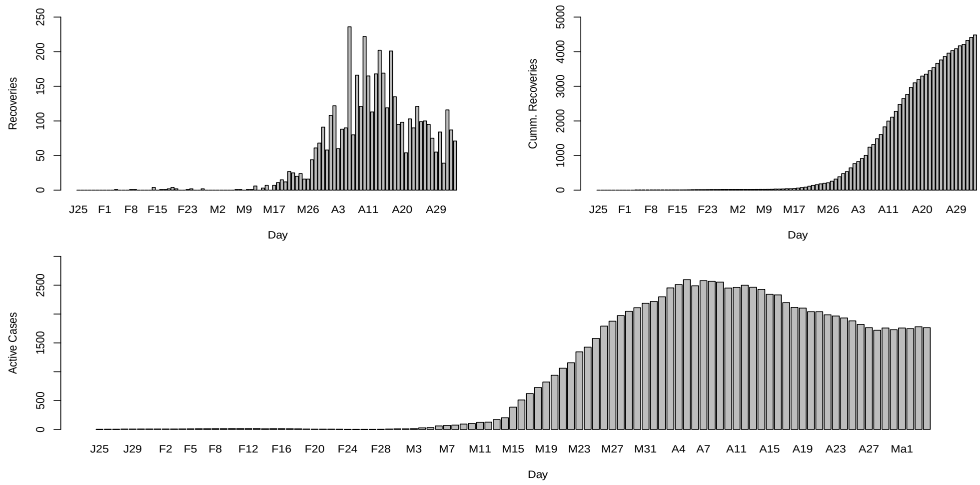

Figure 2. Bar plot of the daily cases frequency table, top left, the new recoveries, top right, cumulative recoveries, and bottom, the active cases.

Table 7. Fourteen days frequency table of the Covid-19 pandemic.

14 Days	f^P	f^R	f^D	f^A
$J_{25} - F_7$	14	1	0	13
$J_{26} - F_8$	13	2	0	14
$J_{27} - F_9$	13	3	0	14
$J_{28} - F_{10}$	14	3	0	15
$J_{29} - F_{11}$	11	3	0	15
$J_{30} - F_{12}$	11	3	0	15
$J_{31} - F_{13}$	11	3	0	16
$F_1 - F_{14}$	11	7	0	12
$J_2 - F_{15}$	13	7	0	14
$F_3 - F_{16}$	14	8	0	14
$F_4 - F_{17}$	14	9	0	13
$F_5 - F_{18}$	12	10	0	11
$F_6 - F_{19}$	10	14	0	7
$F_7 - F_{20}$	8	16	0	5
$F_8 - F_{21}$	8	16	0	5
$F_9 - F_{22}$	6	15	0	5
$F_{10} - F_{23}$	5	15	0	4
$F_{11} - F_{24}$	4	17	0	2
$F_{12} - F_{25}$	4	17	0	2
$F_{13} - F_{26}$	4	17	0	2
$F_{14} - F_{27}$	5	19	0	2
$F_{15} - F_{28}$	6	15	0	3
$F_{16} - F_{29}$	8	15	0	7
$F_{17} - M_1$	11	14	0	11
$F_{18} - M_2$	11	13	0	11
$F_{19} - M_3$	14	11	0	14
$F_{20} - M_4$	28	7	0	28
$F_{21} - M_5$	33	5	0	33
$F_{22} - M_6$	61	5	0	61
$F_{23} - M_7$	71	6	0	70
$F_{24} - M_8$	77	6	0	75
$F_{25} - M_9$	95	4	0	93
$F_{26} - M_{10}$	107	5	0	104
$F_{27} - M_{11}$	127	6	0	123
$F_{28} - M_{12}$	134	10	0	126
$F_{29} - M_{13}$	178	10	0	171
$M_1 - M_{14}$	209	13	0	203
$M_2 - M_{15}$	395	20	0	386
$M_3 - M_{16}$	520	20	0	511
$M_4 - M_{17}$	637	27	2	622
$M_5 - M_{18}$	740	38	3	727
$M_6 - M_{19}$	845	53	3	822
$M_7 - M_{20}$	947	65	4	939
$M_8 - M_{21}$	1,090	91	8	1,061
$M_9 - M_{22}$	1,207	115	11	1,156
$M_{10} - M_{23}$	1,401	135	14	1,345
$M_{11} - M_{24}$	1,495	158	15	1,426
$M_{12} - M_{25}$	1,647	173	20	1,577
$M_{13} - M_{26}$	1,873	183	25	1,791
$M_{14} - M_{27}$	1,958	227	26	1,876
$M_{15} - M_{28}$	2,082	285	27	1,973
$M_{16} - M_{29}$	2,042	346	35	2,047
$M_{17} - M_{30}$	2,073	437	37	2,110
$M_{18} - M_{31}$	2,093	488	41	2,186
$M_{19} - A_1$	2,118	585	42	2,218
$M_{20} - A_2$	2,216	692	47	2,299
$M_{21} - A_3$	2,303	740	49	2,453
$M_{22} - A_4$	2,300	801	49	2,511
$M_{23} - A_5$	2,356	866	50	2,596
$M_{24} - A_6$	2,275	1,082	48	2,490
$M_{25} - A_7$	2,339	1,138	48	2,579
$M_{26} - A_8$	2,323	1,288	45	2,567
$M_{27} - A_9$	2,197	1,393	42	2,553
$M_{28} - A_{10}$	2,185	1,571	44	2,450
$M_{29} - A_{11}$	2,210	1,675	46	2,462
$M_{30} - A_{12}$	2,213	1,720	41	2,499
$M_{31} - A_{13}$	2,191	1,797	40	2,464
$A_1 - A_{14}$	2,221	1,941	39	2,427
$A_2 - A_{15}$	2,164	2,002	38	2,342
$A_3 - A_{16}$	2,066	1,999	34	2,332
$A_4 - A_{17}$	1,918	2,140	33	2,198
$A_5 - A_{18}$	1,822	2,187	31	2,115
$A_6 - A_{19}$	1,727	2,192	28	2,103
$A_7 - A_{20}$	1,632	2,054	27	2,041
$A_8 - A_{21}$	1,519	2,028	29	2,041
$A_9 - A_{22}$	1,413	1,965	28	1,987
$A_{10} - A_{23}$	1,375	1,934	28	1,966
$A_{11} - A_{24}$	1,345	1,833	26	1,932
$A_{12} - A_{25}$	1,212	1,767	25	1,882
$A_{13} - A_{26}$	1,097	1,754	22	1,820
$A_{14} - A_{27}$	1,003	1,681	22	1,764
$A_{15} - A_{28}$	864	1,554	18	1,719
$A_{16} - A_{29}$	873	1,440	17	1,758
$A_{17} - A_{30}$	820	1,405	18	1,729
$A_{18} - Ma_1$	820	1,243	17	1,758
$A_{19} - Ma_2$	871	1,224	15	1,747
$A_{20} - Ma_3$	909	1,216	16	1,780
$A_{21} - Ma_4$	928	1,189	16	1,764

Sembilan (NS), Pahang (PH), Penang (PN), Perak (PK), Perlis (PR), Sabah (SB), Sarawak (SR), Selangor (SE), Terengganu (TR), Kuala Lumpur (KL), Putrajaya

(PT), and Labuah (LB). The reason for choosing all the states is the data can show how the pandemic ended the chain.

Because from the onset of the outbreak, some data are missing, only data from 19 March 2020 to date are used. The daily new and cumulative infections are classified according to states as Tables 8 and 9. Selangor, Kuala Lumpur, and Johor are the states with the highest number of infections. Whereas Labuah, Perlis, and Putrajaya are the least infected states.

The recent figures indicated that the COVID-19 pandemic is getting to an end in some states. Since if a state with fourteen consecutive days without new infection is regarded as COVID-19 free state, the pandemic has ended in that state, we constructed fourteen days state frequency table, Table 10, to easily notice the end of the pandemic. Using the proposed tables, Tables 10 and 9, and applying Equations 3 and 4, the pandemic ends in Kelantan, Perlis, and Labuah states.

Table 8. States daily new cases discrete frequency table for Covid-19 pandemic.

d	**JB**	**KD**	**KE**	**ML**	**NS**	**PH**	**PN**	**PK**	**PR**	**SB**	**SR**	**SE**	**TR**	**KL**	**PT**	**LB**
$\mathbf{M_{19}}$	13	4	14	2	10	3	2	7	1	9	2	31	1	0	0	0
$\mathbf{M_{20}}$	13	1	7	2	10	4	5	10	0	7	7	40	9	16	0	0
$\mathbf{M_{21}}$	15	6	10	0	5	1	13	10	0	17	10	29	7	27	3	0
$\mathbf{M_{22}}$	16	5	2	1	8	3	8	11	0	22	8	17	5	17	0	0
$\mathbf{M_{23}}$	13	7	8	2	16	16	8	15	0	11	2	45	6	59	4	0
$\mathbf{M_{24}}$	4	5	7	6	15	0	2	17	0	1	5	27	0	15	2	0
$\mathbf{M_{25}}$	34	5	6	2	14	8	2	30	1	0	2	54	0	13	1	0
$\mathbf{M_{26}}$	43	3	10	0	9	2	4	23	0	2	10	75	1	51	2	0
$\mathbf{M_{27}}$	20	1	4	0	6	4	6	8	0	10	15	36	2	16	2	0
$\mathbf{M_{28}}$	26	1	10	9	15	14	6	6	0	15	8	33	4	7	0	5
$\mathbf{M_{29}}$	24	1	15	1	9	12	1	11	0	0	11	33	2	28	2	0
$\mathbf{M_{30}}$	24	2	4	7	10	3	1	8	1	4	6	60	0	24	2	0
$\mathbf{M_{31}}$	16	0	4	2	9	3	6	5	1	5	21	32	0	34	2	0
$\mathbf{A_{1}}$	19	2	3	11	8	9	2	5	0	3	32	22	1	25	0	0
$\mathbf{A_{2}}$	27	1	3	7	18	3	2	6	0	1	23	74	2	33	8	0
$\mathbf{A_{3}}$	21	1	0	3	4	13	0	5	0	5	28	63	18	55	1	0
$\mathbf{A_{4}}$	6	0	2	2	9	24	1	2	0	10	7	27	6	52	1	1
$\mathbf{A_{5}}$	16	1	2	14	11	7	2	6	1	13	15	53	10	27	1	0
$\mathbf{A_{6}}$	30	3	1	10	8	3	0	6	0	2	12	27	6	18	4	1
$\mathbf{A_{7}}$	10	5	5	4	22	5	1	14	4	1	15	50	0	31	2	1
$\mathbf{A_{8}}$	18	1	0	13	9	3	6	4	0	7	18	58	3	14	2	0
$\mathbf{A_{9}}$	7	2	1	3	11	14	0	4	0	0	6	40	5	14	2	0
$\mathbf{A_{10}}$	20	0	1	14	11	4	1	1	0	2	15	30	3	14	2	0
$\mathbf{A_{11}}$	21	0	2	8	17	27	5	1	0	10	7	35	1	46	2	2
$\mathbf{A_{12}}$	14	0	1	3	9	11	2	1	0	6	8	53	0	44	1	0
$\mathbf{A_{13}}$	21	0	2	0	42	0	0	3	0	14	6	13	4	27	2	0
$\mathbf{A_{14}}$	8	0	0	3	2	11	3	3	1	5	15	50	0	69	0	0
$\mathbf{A_{15}}$	14	1	0	0	1	17	0	0	0	0	8	17	0	27	0	0
$\mathbf{A_{16}}$	13	0	1	0	26	8	0	1	0	3	16	13	2	26	1	0
$\mathbf{A_{17}}$	9	0	0	1	13	1	0	1	0	5	10	9	0	19	0	1
$\mathbf{A_{18}}$	16	0	0	0	3	2	0	0	0	10	6	2	1	14	0	0
$\mathbf{A_{19}}$	3	0	0	37	0	5	0	0	0	3	5	3	0	19	9	0
$\mathbf{A_{20}}$	2	0	0	2	3	2	0	0	0	2	6	2	0	4	13	0
$\mathbf{A_{21}}$	1	0	0	1	1	8	0	0	0	0	22	11	0	13	0	0
$\mathbf{A_{22}}$	3	1	0	1	2	6	0	0	0	0	19	1	0	16	1	0
$\mathbf{A_{23}}$	3	0	0	0	20	1	0	0	0	1	4	12	1	29	0	0
$\mathbf{A_{24}}$	4	0	0	3	2	1	0	0	0	2	9	18	0	49	0	0
$\mathbf{A_{25}}$	0	0	0	0	0	1	0	0	0	0	10	1	0	39	0	0
$\mathbf{A_{26}}$	4	0	0	1	1	0	2	0	0	0	7	6	0	16	1	0
$\mathbf{A_{27}}$	0	0	0	0	1	0	0	1	0	1	3	4	0	30	0	0
$\mathbf{A_{28}}$	1	0	0	0	1	0	0	0	0	1	8	5	0	14	1	0
$\mathbf{A_{29}}$	0	0	0	0	72	5	0	0	0	2	6	1	0	8	0	0
$\mathbf{A_{30}}$	3	0	0	5	5	1	0	0	0	0	5	27	0	10	1	0
$\mathbf{Ma_{1}}$	3	0	0	1	0	3	0	0	0	0	2	24	0	32	4	0
$\mathbf{Ma_{2}}$	1	0	0	2	8	8	0	0	0	0	9	63	0	14	0	0
$\mathbf{Ma_{3}}$	0	0	0	3	71	0	0	0	0	1	5	11	0	30	1	0
$\mathbf{Ma_{4}}$	0	0	0	3	6	0	0	0	0	0	0	21	0	25	0	0

Table 9. States cummulative cases discrete frequency table for Covid-19 pandemic.

d	**JB**	**KD**	**KE**	**ML**	**NS**	**PH**	**PN**	**PK**	**PR**	**SB**	**SR**	**SE**	**TR**	**KL**	**PT**	**LB**
$\mathbf{M_{19}}$	101	40	44	20	55	32	32	35	9	112	51	223	11	123	6	5
$\mathbf{M_{20}}$	114	41	51	22	65	36	37	45	9	119	58	263	20	139	6	5
$\mathbf{M_{21}}$	129	47	61	22	70	37	50	55	9	136	68	292	27	166	9	5
$\mathbf{M_{22}}$	145	52	63	23	78	40	58	66	9	158	76	309	32	183	9	5
$\mathbf{M_{23}}$	158	59	71	25	94	56	66	81	9	169	78	354	38	242	13	5
$\mathbf{M_{24}}$	162	64	78	31	109	56	68	98	9	170	83	381	38	257	15	5
$\mathbf{M_{25}}$	196	69	84	33	123	64	70	128	10	170	85	435	38	270	16	5
$\mathbf{M_{26}}$	239	72	94	33	132	66	74	151	10	172	95	510	39	321	18	5
$\mathbf{M_{27}}$	259	73	98	33	138	70	80	159	10	182	110	546	41	337	20	5
$\mathbf{M_{28}}$	285	74	108	42	153	84	86	165	10	197	118	579	45	344	20	10
$\mathbf{M_{29}}$	309	75	123	43	162	96	87	176	10	197	129	612	47	372	22	10
$\mathbf{M_{30}}$	333	77	127	50	172	99	88	184	11	201	135	672	47	396	24	10
$\mathbf{M_{31}}$	349	77	131	52	181	102	94	189	12	206	156	704	47	430	26	10
$\mathbf{A_{1}}$	368	79	134	63	189	111	96	194	12	209	188	726	48	455	26	10
$\mathbf{A_{2}}$	395	80	137	70	207	114	98	200	12	210	211	800	50	488	34	10
$\mathbf{A_{3}}$	416	81	137	73	211	127	98	205	12	215	239	863	68	543	35	10
$\mathbf{A_{4}}$	422	81	139	75	220	151	99	207	12	225	246	890	74	595	36	11
$\mathbf{A_{5}}$	438	82	141	89	231	158	101	213	13	238	261	943	84	622	37	11
$\mathbf{A_{6}}$	468	85	142	99	239	161	101	219	13	240	273	970	90	640	41	12
$\mathbf{A_{7}}$	478	90	147	103	261	166	102	233	17	241	288	1,020	90	671	43	13
$\mathbf{A_{8}}$	496	91	147	116	270	169	108	237	17	248	306	1,078	93	685	45	13
$\mathbf{A_{9}}$	503	93	148	119	281	183	108	241	17	248	312	1,118	98	699	47	13
$\mathbf{A_{10}}$	523	93	149	133	292	187	109	242	17	250	327	1,148	101	713	49	13
$\mathbf{A_{11}}$	544	93	151	141	309	214	114	243	17	260	334	1,183	102	759	51	15
$\mathbf{A_{12}}$	558	93	152	144	318	225	116	244	17	266	342	1,236	102	803	52	15
$\mathbf{A_{13}}$	579	93	154	144	360	225	116	247	17	280	348	1,249	106	830	54	15
$\mathbf{A_{14}}$	587	93	154	147	362	236	119	250	18	285	363	1,299	106	899	54	15
$\mathbf{A_{15}}$	601	94	154	147	363	253	119	250	18	285	371	1,316	106	926	54	15
$\mathbf{A_{16}}$	614	94	155	147	389	261	119	251	18	288	387	1,329	108	952	55	15
$\mathbf{A_{17}}$	623	94	155	148	402	262	119	252	18	293	397	1,338	108	971	55	16
$\mathbf{A_{18}}$	639	94	155	148	405	264	119	252	18	303	403	1,340	109	985	55	16
$\mathbf{A_{19}}$	642	94	155	185	405	269	119	252	18	306	408	1,343	109	1,004	64	16
$\mathbf{A_{20}}$	644	94	155	187	408	271	119	252	18	308	414	1,345	109	1,008	77	16
$\mathbf{A_{21}}$	645	94	155	188	409	279	119	252	18	308	436	1,356	109	1,021	77	16
$\mathbf{A_{22}}$	648	95	155	189	411	285	119	252	18	308	455	1,357	109	1,037	78	16
$\mathbf{A_{23}}$	651	95	155	189	431	286	119	252	18	309	459	1,369	110	1,066	78	16
$\mathbf{A_{24}}$	655	95	155	192	433	287	119	252	18	311	468	1,387	110	1,115	78	16
$\mathbf{A_{25}}$	655	95	155	192	433	288	119	252	18	311	478	1,388	110	1,154	78	16
$\mathbf{A_{26}}$	659	95	155	193	434	288	121	252	18	311	485	1,394	110	1,170	79	16
$\mathbf{A_{27}}$	659	95	155	193	435	288	121	253	18	312	488	1,398	110	1,200	79	16
$\mathbf{A_{28}}$	660	95	155	193	436	288	121	253	18	313	496	1,403	110	1,214	80	16
$\mathbf{A_{29}}$	660	95	155	193	508	293	121	253	18	315	502	1,404	110	1,222	80	16
$\mathbf{A_{30}}$	663	95	155	198	513	294	121	253	18	315	507	1,431	110	1,232	81	16
$\mathbf{Ma_{1}}$	666	95	155	199	513	297	121	253	18	315	509	1,455	110	1,264	85	16
$\mathbf{Ma_{2}}$	667	95	155	201	521	305	121	253	18	315	518	1,518	110	1,278	85	16
$\mathbf{Ma_{3}}$	667	95	155	204	592	305	121	253	18	316	523	1,529	110	1,308	86	16
$\mathbf{Ma_{4}}$	667	95	155	207	598	305	121	253	18	316	523	1,550	110	1,333	86	16

5. The expected size of the Covid-19 pandemic

The reported data can not be used to judge the overall size of the pandemic, because the data is constrained by the available testing kits, pending results, testing ability, and so on. In this article, we estimated the expected size of the COVID-19 pandemic

Table 10. States 14 days new cases discrete frequency table for Covid-19 pandemic.

d	**JB**	**KD**	**KE**	**ML**	**NS**	**PH**	**PN**	**PK**	**PR**	**SB**	**SR**	**SE**	**TR**	**KL**	**PT**	**LB**
$\mathbf{M_{19}-A_{1}}$	280	43	104	45	144	82	66	166	4	106	139	534	38	332	20	5
$\mathbf{M_{20}-A_{2}}$	294	40	93	50	152	82	66	165	3	98	160	577	39	365	28	5
$\mathbf{M_{21}-A_{3}}$	302	40	86	51	146	91	61	160	3	96	181	600	48	404	29	5
$\mathbf{M_{22}-A_{4}}$	293	34	78	53	150	114	49	152	3	89	178	598	47	429	27	6
$\mathbf{M_{23}-A_{5}}$	293	30	78	66	153	118	43	147	4	80	185	634	52	439	28	6
$\mathbf{M_{24}-A_{6}}$	310	26	71	74	145	105	35	138	4	71	195	616	52	398	28	7
$\mathbf{M_{25}-A_{7}}$	316	26	69	72	152	110	34	135	8	71	205	639	52	414	28	8
$\mathbf{M_{26}-A_{8}}$	300	22	63	83	147	105	38	109	7	78	221	643	55	415	29	8
$\mathbf{M_{27}-A_{9}}$	264	21	54	86	149	117	34	90	7	76	217	608	59	378	29	8
$\mathbf{M_{28}-A_{10}}$	264	20	51	100	154	117	29	83	7	68	217	602	60	376	29	8
$\mathbf{M_{29}-A_{11}}$	259	19	43	99	156	130	28	78	7	63	216	604	57	415	31	8
$\mathbf{M_{30}-A_{12}}$	249	18	29	101	156	129	29	68	7	69	213	624	55	431	30	5
$\mathbf{M_{31}-A_{13}}$	246	16	27	94	188	126	28	63	6	79	213	577	59	434	30	5
$\mathbf{A_{1}-A_{14}}$	238	16	23	95	181	134	25	61	6	79	207	595	59	469	28	5
$\mathbf{A_{2}-A_{15}}$	233	15	20	84	174	142	23	56	6	76	183	590	58	471	28	5
$\mathbf{A_{3}-A_{16}}$	219	14	18	77	182	147	21	51	6	78	176	529	58	464	21	5
$\mathbf{A_{4}-A_{17}}$	207	13	18	75	191	135	21	47	6	78	158	475	40	428	20	6
$\mathbf{A_{5}-A_{18}}$	217	13	18	73	185	113	20	45	6	78	157	450	35	390	19	5
$\mathbf{A_{6}-A_{19}}$	204	12	14	96	174	111	18	39	5	68	147	400	25	382	27	5
$\mathbf{A_{7}-A_{20}}$	176	9	13	88	169	110	18	33	5	68	141	375	19	368	36	4
$\mathbf{A_{8}-A_{21}}$	167	4	8	85	148	113	17	19	1	67	148	336	19	350	34	3
$\mathbf{A_{9}-A_{22}}$	152	4	8	73	1141	116	11	15	1	60	149	279	16	352	33	3
$\mathbf{A_{10}-A_{23}}$	148	2	7	70	150	103	11	11	1	61	147	251	12	367	31	3
$\mathbf{A_{11}-A_{24}}$	132	2	6	59	141	100	10	10	1	61	141	239	9	402	29	3
$\mathbf{A_{12}-A_{25}}$	111	2	4	51	124	74	5	9	1	51	144	205	8	395	27	1
$\mathbf{A_{13}-A_{26}}$	101	2	3	49	116	63	5	8	1	45	143	158	8	367	27	1
$\mathbf{A_{14}-A_{27}}$	80	2	1	49	75	63	5	6	1	32	140	149	4	370	25	1
$\mathbf{A_{15}-A_{28}}$	73	2	1	86	74	52	2	3	0	28	133	104	4	315	26	1
$\mathbf{A_{16}-A_{29}}$	59	1	1	46	145	40	2	3	0	30	131	88	4	296	26	1
$\mathbf{A_{17}-A_{30}}$	49	1	0	51	124	33	2	2	0	27	120	102	2	280	26	1
$\mathbf{A_{18}-Ma_{1}}$	43	1	0	51	111	35	2	1	0	22	112	117	2	293	30	0
$\mathbf{A_{19}-Ma_{2}}$	28	1	0	53	116	41	2	1	0	12	115	178	1	293	30	0
$\mathbf{A_{20}-Ma_{3}}$	25	1	0	19	187	36	2	1	0	10	115	186	1	304	22	0
$\mathbf{A_{21}-Ma_{4}}$	23	1	0	20	190	34	2	1	0	8	109	205	1	325	9	0

in Malaysia. The estimations are limited to two weeks COVID-19 data, from 22 March to 6 April 2020, reported by the ministry of health (MOH) Malaysia [13, 14].

Two different approaches are used to estimate the expected number of positive cases. The estimates are respectively presented in Tables 11 and 12. Using the first approach, the pending results that will return positive are estimated using the daily positive rates. Thus, the expected positive cases are obtained by adding the reported positive cases with the expected positive cases from the pending results. In the second method, we used the approach suggested by Dr. Amar Singh [18], using the death cases, back-of-the-envelope calculation. The method uses the mortality rate to estimate the actual size of positive cases.

Using Equation 5 is the conventional way of computing the mortality rate of a disease at a given time t, however people need to be cautious when using this method since the outbreak of the disease is still on[2].

$$M_{r_1} = \frac{f_t^D}{f_t^P}, \tag{5}$$

alternatively, Ghani et al. (2005)[7] suggested that the mortality rate can be calculated using

$$M_{r_2} = \frac{f_t^D}{f_t^D + f_t^R}, \tag{6}$$

where f_t^D and f_t^R are respectively the cummulative death and recoveries at time t.

In Table 11, f^P, f^N, and f^T respectively denoted the tested positive cases, tested negative cases, and the total number of people tested, excluding the pending cases. The value P_r, given as $P_r = \frac{f^P}{f^T}$ is the positive rate. The reported number of pending results are denoted as P_e. Meanwhile, P^p are the predicted positive cases from the pending results. The expected positive cases, f^{P^*}, are obtained by adding the reported positive cases, f^P, and the predicted pending positive cases, P^p. Table 12 displayed the computed expected positive cases using the second method. The notations, f^D, and f^R, respectively, represent the reported mortality cases and recoveries as of the days. The expected positive cases, f^{P^2} and f^{P^3} are respectively obtained using Equations (5) and (6). Using the mortality rate declared by the Malaysian prime minister, 1.6 %, we obtained f^{P^4}, while f^{P^5} is computed by assuming a mortality rate of 1%. Both the two approaches gave expected positive cases higher than what the ministry of health reported.

Unlike our research that used an explanatory data analysis tool to estimate the expected size and the end of the pandemic, most of the research in the literature are based on predictive models such as the work of Verity et al. (2020) who applied the Bayesian approach and obtained estimates of China's overall case fatality ratio (CFR) and infection fatality ratio (IFR). Backer, Klinkenberg, and Wallinga (2020) fitted a model using a different Bayesian approach. Toğa, Atalay, and Toksari(2021) used Autoregressive Integrated Moving Average (ARIMA) and Artificial Neural Networks (ANN) models to predict the infected cases, number of deaths, and the recovered cases in Turkey. In forecasting the pandemic size, and peak time and studying the effects of public health interventions, Nawaz et al. (2021) proposed a hybrid model.

6. Conclusion

Based on the proposed frequency tables, the pandemic is still on in the country but has ended in Perlis, Labuan, and Kelantan states. We suggest that the proposed frequency tables should be used in detecting the end of coronavirus pandemic in other affected countries.

Moreover, the daily positive cases reported did not reflect the true size of the coronavirus infections in Malaysia. The expected cases obtained in this research showed a better picture of the number of positive cases. However, to get a precise size of the pandemic, different parameters need to be taken into consideration.

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Table 11. The expected COVID-19 positive cases when the pending positive results are considered.

	(f^P)	(f^N)	(f^T)	(P_r)	(P_e)	(P^p)	(f^{p^*})
M_{22}	1306	9969	11275	11.58	3921	454	1760
M_{23}	1518	11592	13110	11.58	4813	557	2075
M_{24}	1624	11970	13594	11.95	4822	576	2200
M_{25}	1796	14024	15820	11.35	5041	572	2368
M_{26}	2031	14952	16983	11.96	4902	586	2617
M_{27}	2161	22007	24068	8.98	6780	609	2770
M_{28}	2320	24727	27047	8.58	8469	727	3047
M_{29}	2470	26991	29461	8.38	8213	688	3158
M_{30}	2626	28580	31206	8.42	8457	712	3338
M_{31}	2766	29498	32264	8.57	8219	704	3470
A_{01}	2908	32894	35802	8.12	7660	622	3530
A_{02}	3116	34483	37599	8.29	7779	645	3761
A_{03}	3333	36125	39458	8.45	8265	698	4031
A_{04}	3483	37440	40923	8.51	8647	736	4219
A_{05}	3662	39877	43539	8.41	8398	706	4368
A_{06}	3793	43664	47457	7.99	8109	648	4441

Table 12. The expected COVID-19 positive cases obtained using the back-of-the-envelope approach.

Day	f^p	f^R	f^D	f^{p_2}	f^{p_3}	f^{p_4}	f^{p_5}
M_{22}	1306	139	11	926	8,063	1760	1100
M_{23}	1518	159	14	1383	11326	2240	1400
M_{24}	1624	183	15	1385	11370	2400	1500
M_{25}	1796	199	20	2227	18260	3200	2000
M_{26}	2031	215	25	3077	26,050	4000	2500
M_{27}	2161	259	26	3128	24154	4160	2600
M_{28}	2320	320	27	3142	21006	4320	2700
M_{29}	2470	388	35	4960	28945	5600	3500
M_{30}	2626	479	37	5213	26529	5920	3700
M_{31}	2766	537	43	6685	31863	6880	4300
A_{01}	2908	645	45	6964	29340	7200	4500
A_{02}	3116	767	50	8023	30600	8000	5000
A_{03}	3333	827	53	8428	31906	8480	5300
A_{04}	3483	915	57	9328	33402	9120	5700
A_{05}	3662	1005	61	10161	34892	9760	6100
A_{06}	3793	1241	62	10134	29512	9920	6200

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