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Distribution and Trend of COVID-19 Cases and Death among Population in Bachok, Kelantan

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Abstract

The COVID-19 infection has been widely spread since it was first declared as a pandemic in late 2019. The trend of COVID-19 cases and death varies across regions. The study sought to describe the distribution and trend of COVID-19 cases and death in the Northeast Malaysia region for 2021. This cross-sectional study analyzed data on COVID-19 infection cases and death in 2021 from the COVID-19 surveillance database (eCOVID system). All confirmed COVID-19 cases and death in Bachok, Kelantan from 1 January 2021 until 31 October 2021 were included in the study. Descriptive analysis of trend and distribution of COVID-19 cases and deaths were conducted using R software. A total of 8384 and 151 COVID-19 cases and death were respectively recorded between the study period. Age less than thirty (34%), females (57%), unemployment (44%), clinical category 2 (86%), and unvaccinated individuals (47%) contributed mostly to COVID-19 cases. Meanwhile, only the age category more than 50 (51-60: 22%, 61-70: 30%, > 70: 36%) contributed most to the COVID-19 deaths in Bachok, Kelantan. The COVID-19 cases and deaths peaked in August 2021. The distribution and trend of COVID-19 cases and death vary across different sociodemographic categories and echoed the national and global trends, respectively.

Keywords: COVID-19, Cases, Death, Northeast Malaysia.

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Introduction

The COVID-19 pandemic has infected 245 million people globally, killing over 5 million, and the pandemic is far from over (WHO, 2021). Meanwhile, in Malaysia, the Covid-19 infections have increased to nearly 2.8 million cases and caused more than 30 thousand death by end of December 2021 (MOH, 2021a). As for Kelantan, the confirmed cases of COVID-19 were nearly 170 thousand and the death toll was nearly 13 hundred deaths for the year 2021 (MOH, 2021a).

Our local COVID-19 situation echoed the trend and distribution of COVID-19 cases and death at the national and global levels. Events such as low compliance to COVID-19 standard operation procedure, the emergence of new COVID-19 variance, and the high prevalence of chronic diseases contributed to the increase in COVID-19 infection cases and deaths in our region (Bernama, 2021; MOH, 2021b; National Institutes of Health (NIH), 2019).

Epidemiological surveillance is the foundation of all preventative and control efforts. Covid-19 surveillance is monitoring the disease's spread to ascertain its progression patterns, including mortality, and to implement preventative and control measures (Ibrahim, 2020). Identification of high-risk patients in hospital and community settings, as well as insights from population-based research, will be critical in assisting us in focusing our community- and hospital-based public health programs (Madahar, Wunsch, Jha, Slutsky, & Brodie, 2021).

Studies regarding the trend and distribution of COVID-19 cases and deaths based on local epidemiological surveillance have been limited. Furthermore, reports on COVID-19 instances and fatalities fluctuate by geographic region, resulting in disparities in outcomes and risk factors (Huang et al., 2020; Sim et al., 2020; Surendra, Elyazar, & 2021, 2021a). The effectiveness of government regulations, epidemic readiness and response, and bias in reporting the real number of COVID-19 cases and deaths have all been speculated as reasons for the gap (Rajgor, Lee, & 2020, 2020). Thus, the present study aimed to provide current distribution and trends on COVID-19 cases and death due to COVID-19 in the northeast Malaysia region for 2021.

Methods

Study design and data collection

This was a cross-sectional study to observe the distribution and trend of COVID-19 cases and death in Bachok, Kelantan, Northeast Malaysia region. Data were collected from the Bachok eCOVID system (an online database for infectious diseases under the governance of the Ministry of Health Malaysia) and recorded in the patient's proforma. The eCOVID system capture date for the whole and each district in Kelantan state. We applied a universal sampling method to obtain the study sample. The study population included all Polymerase Chain Reaction (PCR), Nasopharyngeal Antigen Rapid Test Kit (NPS RTK-Ag), and Saliva Antigen Rapid Test Kit (Saliva RTK-Ag) verified by healthcare professional confirmed COVID-19 patients recorded by the Bachok District Health Office who either died or were alive between January 2021 until October 2021. We excluded patients with positive home-based self saliva COVID-19 test in our study.

Variables

The retrieved information for independent variables included socio-demographic and clinical characteristics such as age, age group, gender, occupation, ethnicity, citizenship, case category, clinical category, reinfection, and vaccination status. The occupation is divided into six categories that are not under state control. The private sector category refers to a group of workers in registered private groups or companies. Meanwhile, the self-employed categories is a group of freelance workers or owner of unregistered business. Besides, vaccination status was categorized as complete vaccination if the COVID-19 patients received two doses injection of COVID-19 vaccine of more than fourteen days and non-vaccinated if vice versa. The uncomplete vaccination status is when the COVID-19 patients received only one dose of COVID-19 vaccine or two doses in less than 14 days after getting the COVID-19 infection. The dependent variable will be the COVID-19 status of either of the confirmed cases and death. We review for all individuals investigated for COVID-19 notified for the period indicated.

Statistical analysis

Secondary data with no identifiers were utilized for analysis using R version 4.1.2, a language and environment for statistical computing (R Core Team, 2020). Descriptive analysis of trend and distribution of COVID-19 cases and death were performed using *gtsummary* and *incidence* packages in R (Sjoberg, Whiting, Curry, Lavery, & Larmarange, 2021; Thibaut Jombart, 2020). Sociodemographic and COVID-19 infection characteristics were summarized in table. Meanwhile, frequency histograms were used to depict the COVID-19 trend over the time.

Results

Sociodemographic characteristics and distribution of the COVID-19 cases and death in Bachok, Kelantan

Our analyses for 8535 COVID-19 cases and death in Bachok showed that the majority of the cases were recovered from COVID-19 infection with an overall fatality rate of 1.8%. The age category was predominated by an age group of less than thirty (34.0%), followed by an aged group of thirty-one to forty (22.1%), forty-one to fifty (15.9%), and other age groups. The distribution of COVID-19 infections in our sample was higher in the younger age group. Meanwhile, the dead were mostly occurred among those aged forty years and above (94.7%).

In terms of gender, the occurrence of COVID-19 infection was were higher among females (57.0%) and males (43.0%), respectively. The COVID-19 related deaths were higher among males (56.0%) than females (44.0%). The type of occupation showed that the unemployed category dominated the total COVID-19 infection cases (44.0%) as well as the death (71.8%). Ethnically, the majority of the COVID-19 cases and death were predominated by Malay, 98.4% and 98.6%, respectively. Nearly all of the COVID-19 cases and death were Malaysian.

The COVID-19 cases were categorized based on clinical category upon diagnosis which will help the decision for the admission. Clinically, COVID-19 cases were divided into five categories depending on the severity of the symptoms and signs. In Bachok, nearly 85.0% of the COVID-19 cases were in category 2 upon diagnosis. On the other hand, a total of 55.1% of COVID-19 death recorded among cases in clinical category 3 and above. The rate of reinfection in our sample was 0.2%.

Besides, the occurrence of COVID-19 infection and death varied upon vaccination status with 62.0% of the cases occurring among unvaccinated and incomplete vaccination categories. In addition, a similar trend also occurred for COVID-19 related death as 77.0% of death occurred in those categories. All related information is available in Table 1.

Table 1: Characteristics of the participants

Characteristic	N	Overall, N = 8,535[1]	Recovered, N = 8,384[1]	Dead, N = 151[1]
Age category	8,535			
< 30		2,865 (34.0%)	2,863 (34.2%)	2 (1.3%)
31-40		1,889 (22.1%)	1,883 (22.4%)	6 (4.0%)
41-50		1,353 (15.9%)	1,343 (16.2%)	10 (6.6%)
51-60		1,143 (12.9%)	1,110 (13.1%)	33 (22.1%)
61-70		799 (9.4%)	754 (9.0%)	45 (30.0%)
> 70		486 (5.7%)	431 (5.1%)	55 (36.0%)
Gender	8,535			
Female		4,832 (57.0%)	4,765 (57.0%)	67 (44.0%)
Male		3,703 (43.0%)	3,619 (43.0%)	84 (56.0%)
Occupation	8,535			
Government sector		1,065 (12.2%)	1,059 (13.0%)	6 (4.0%)
Pensioner		159 (1.9%)	149 (1.8%)	10 (6.6%)
Private sector		1,719 (20.2%)	1,712 (20.0%)	7 (4.6%)
Self-employed		1,330 (16.0%)	1,311 (16.0%)	19 (13.0%)
Student		488 (5.7%)	488 (5.8%)	0 (0%)
Unemployed		3,774 (44.0%)	3,665 (43.4%)	109 (71.8%)
Ethnicity	8,535			
Malay		8,405 (98.4%)	8,256 (98.4%)	149 (98.6%)
Chinese		31 (0.4%)	30 (0.4%)	1 (0.7%)
Indian		4 (0.1%)	4 (0.1%)	0 (0%)
Others		41 (0.5%)	41 (0.5%)	0 (0%)
Siamese		54 (0.6%)	53 (0.6%)	1 (0.7%)
Citizenship	8,535			
Malaysian		8,438 (98.9%)	8,288 (98.9%)	150 (99.3%)
Non-Malaysian		97 (1.1%)	96 (1.1%)	1 (0.7%)
Case category	8,535			
Local case		8,447 (99.0%)	8,296 (99.0%)	151 (100.0%)
Import case		88 (1.0%)	88 (1.0%)	0 (0%)
Clinical category (upon diagnosis)	8,535			
Category 1		1,071 (13.0%)	1,059 (13.0%)	12 (7.9%)
Category 2		7,252 (84.3%)	7,196 (85.2%)	56 (37.0%)
Category 3		49 (0.6%)	42 (0.5%)	7 (4.6%)
Category 4		112 (1.3%)	82 (1.0%)	30 (20.3%)
Category 5		51 (0.6%)	5 (0.1%)	46 (30.2%)
Reinfection, Yes	8,535	17 (0.2%)	17 (0.2%)	0 (0%)

Vaccination status	8,535			
Unvaccinated		4,018 (47.0%)	3,916 (47.0%)	102 (67.7%)
Complete		3,241 (38.0%)	3,206 (38.0%)	35 (23.0%)
Incomplete		1,276 (15.0%)	1,262 (15.0%)	14 (9.3%)

[1]n (%) for categorical, mean (SD) for numerical

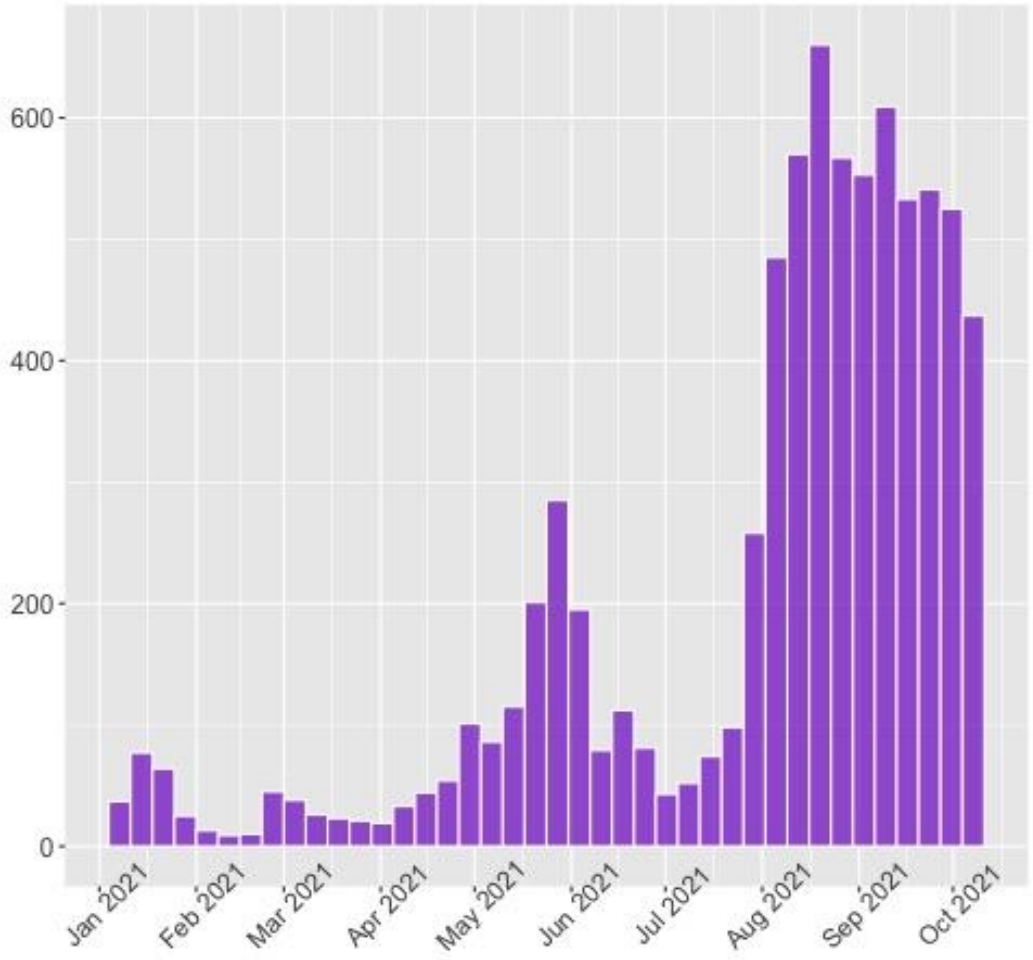

Figure 1: Weekly COVID-19 cases trend in Bachok

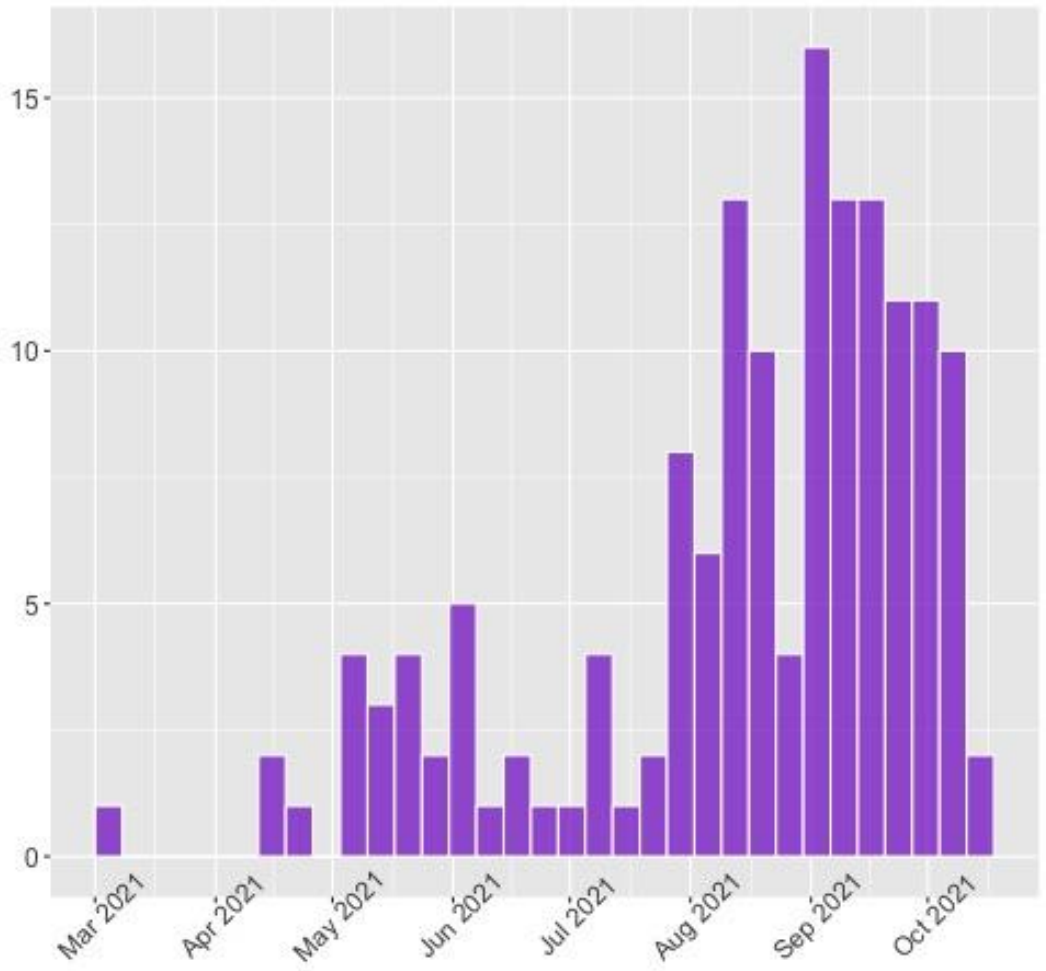

Figure 2: Weekly COVID-19 death trend in Bachok.

Figure 1 and Figure 2 depicted the trend for COVID-19 cases and death in Bachok for the year 2021. In early 2021, the recorded COVID-19 cases were less than a hundred cases while less than five deaths were recorded per week. The COVID-19 cases and death were increasing in a trend started in May and July 2021, reaching the peak in June and August 2021, respectively. The peak of the COVID-19 cases reached nearly six hundred cases per week and nearly 15 deaths were recorded at the end of August 2021. The decreasing trend of COVID-19 cases and death per epidemiological week can be observed after September 2021 onwards.

Discussion

Our analysis showed that younger age group, female, unemployed, clinical category 2, incomplete vaccination, and unvaccinated individuals contributed to the majority of the COVID-19 cases in Bachok, Kelantan. Meanwhile, COVID-19 death mostly occurred among the older age group, males, unemployed, clinical category 3 and above, incomplete vaccination, and unvaccinated individuals. The trend for COVID-19 cases and death showed remarkable increment started in May 2021 and July 2021 and peaked in June 2021 and August 2021, respectively.

The distribution of COVID-19 cases and death in our population is contradicted according to age group. Our findings showed that the younger age group (aged less than forty) contributed to most of the COVID-19 cases and parallel to findings in other studies (Boehmer, DeVies, & 2020, 2020; Ecdc, 2020; Stokes, Zambrano, & 2020, 2020). Meanwhile, the COVID-19 death in our population was predominated by the older aged group. Similar findings were also reported in Indonesia and the United Kingdom which showed that the older population had a high rate of death as compared to their counterparts (Bhaskaran, Bacon, Evans, & 2021, 2021; Surendra, Elyazar, & 2021, 2021b). The contradicted finding of the rate of COVID-19 infection and death between age groups occurred due to a higher prevalence of comorbidities were identified in the older age group (Guo et al., 2020; MV Blagosklonny - Aging (Albany NY) & 2020, 2020).

The gender distribution of COVID-19 cases in our population was higher in females than in males and the COVID-19 death was higher in males as compared to females. A study conducted across ten European countries also showed a similar trend when females outnumbered the COVID-19 infection cases than males (Sobotka, Brzozowska, Muttarak, Zeman, & di Lego, 2020). Whereas study conducted in China depicted the distribution of COVID-19 cases was equal between males and females (Jin et al., 2020). However, two other studies in China showed contradicted findings where 51% and 73% of the COVID-19 cases were males, respectively (Huang et al., 2019; Wu, Jama, & 2020, 2020). In terms of death distribution, multiple studies in various regions showed that males had a higher rate of death than females due to the presents of co-morbidities and severe COVID-19 infection (Ecdc, 2020; Guo et al., 2020; Jin et al., 2020; MedRxiv & 2020, 2020; MV Blagosklonny - Aging (Albany NY) & 2020, 2020; Williamson, Walker, Bhaskaran, Nature, & 2020, 2020).

Our data showed that unemployment contributed the largest proportion of COVID-19 cases and death for the year 2021. These findings were consistent with sociodemographic and epidemiological trends of the population in Ecuador (Ortiz-Prado et al., 2021). The authors stated that the case fatality rate for unemployed was nearly 17% in Ecuador and at higher risk of death. Unemployment is associated with low education and low net income which predisposed them to COVID-19 infection and death due to lack of health-seeking behavior (Amal, Paramesarvathy, & 2011, 2006; Drefahl, Wallace, Mussino, & 2020, 2020).

The Ministry of Health, Malaysia categorized the confirmed COVID-19 infection cases into five clinical categories as stated in the guidelines (MOH, 2020). Our findings showed that the proportion of COVID-19 cases in category 3 and below was higher as compared to the national data (Sim et al., 2020). Meanwhile, the proportion of COVID-19 cases in categories 4 and 5 is lower as compared to the national data (Sim et al., 2020). The COVID-19 death in Bachok mostly occurred among patients in category 3 and above upon diagnosis. This finding was consistent with two studies conducted among the Indonesian and Indian population which showed that severe clinical category of COVID-19 infection was associated with a higher rate of mortality (Mahendra, Nuchin, Kumar, Shreedhar, & Mahesh, 2021; Surendra et al., 2021a).

COVID-19 vaccination help to protect individuals against severe COVID-19 infection their related death (Bermingham et al., 2021; Nunes et al., 2021; Sadarangani et al., 2021). Our data showed that the mortality rate of COVID-19 infection was decreasing among fully vaccinated individuals which is consistent with the study conducted in the United States (Scobie et al., 2021). The study depicted that the incidence of COVID-19 death was significantly reduced from an incidence rate ratio of 16.6 (95% CI=13.5-20.4) to 11.3 (95% CI=9.1-13.9) when the population achieved the targetted vaccination coverage.

The trend of COVID-19 cases and death in Bachok echoed the national trend reported by the Ministry of Health, Malaysia on the COVIDNOW webpage available at covidnow.moh.gov.my (MOH, 2021a). The national data showed increasing in COVID-19 cases and death in early May and July 2021 which is similar to our COVID-19 cases' trend. The increase of COVID-19 cases and death during the period was due to the emergence of new COVID-19 variants namely variant of concern and variants of interest which increased the transmission of the disease and causing high fatality rate (CDC, 2021; Loo & Letchumanan, 2021). Besides, a similar trend was also observed in multiple regions of the world as depicted in the World health Organization COVID-19 dashboard which is available at covid19.who.int (WHO, 2021).

This study has a limitation that must be acknowledged as we did not include variables related to pre-existing co-morbidities such as cardiovascular and cerebrovascular diseases. As a result, the COVID-19 cases and deaths cannot be comapred to the distribution and trend of patients' comorbidities.

Conclusion and recommendation

The distribution of COVID-19 cases in Bachok predominantly occurred in the younger age group, females, unemployed, and incomplete and unvaccinated individuals. Meanwhile, The COVID-19 deaths in Bachok mainly occurred among the elderly, males, severe clinical category, and incomplete and unvaccinated individuals. The trend of COVID-19 cases and deaths in Bachok followed the national and global trend of COVID-19. We recommend future study to search for signifiacant sociodemographic risk factor associated with COVID-19 death among population in Bachok, Kelantan.

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This study was performed following the principles of the Helsinki Declaration. Ethical approval was obtained from the Medical Research and Ethics Committee of the National Institute of Health, Ministry of Health Malaysia NMRR ID-22-00191-8PM (IIR).

Patient consent was waived as this dataset is secondary data, and we did not take new data from the participants. To obtain permission to reanalyze the data, we have obtained ethical approval from the Medical Research and Ethics Committee, Ministry of Health Malaysia.

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