

CHOLERA PANDEMIC IN MALAYA: A CASE STUDY IN THE STATE OF KEDAH, 1907–1940

MUHAMMAD HABIL SAHIDAN¹, MOHD FIRDAUS ABDULLAH^{2*}, ARBA'IYAH MOHD NOOR³ AND NORAINI MOHAMED HASSAN³

¹G5-1-1A Blok Hibiscus, Kompleks Penjara Bentong, 28600 Karak, Pahang, Malaysia. ²Center for Research in History, Politics and International Affairs, Faculty of Social Sciences and Humanities, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia. ³Department of History, Faculty of Arts and Social Sciences, Universiti Malaya, 50603 Kuala Lumpur, Malaysia.

*Corresponding author: mfa@ukm.edu.my

Submitted final draft: 7 March 2023

Accepted: 28 March 2023

<http://doi.org/10.46754/jssm.2023.05.012>

Abstract: This study aims to identify how far the cholera pandemic in the State of Kedah influenced the British in dealing with the pandemic from 1907 to 1940. The cholera pandemic in Malaya posed a threat to public health and economic viability. Kedah faced a severe spread of cholera, which caused Alor Setar to be declared an unhealthy city in Malaya in the 20th century. The authorities performed various efforts and actions to curb the spread of cholera in Kedah throughout the period stated. This study is a historical study that utilises the qualitative and quantitative methods fully. Resources and materials were obtained from the National Archives of Malaysia, National Archives of Malaysia Kedah/Perlis Branch, National Library of Malaysia, Kedah State Public Library, Chief Minister of Kedah Office, Public Higher Education Institution Libraries throughout Malaysia, etc. Until today, studies relating to the cholera pandemic in Malaya are lacking overall among researchers, even though through historical experiences, the pandemic shows that the spread of the disease has long occurred and relates to the health threat today. This study addresses historical experiences as references to enhance the nation's policies and health security. The results indicate that the Kedah government had successfully controlled the spread of cholera in the state within the specified period. The state government was also responsible for ensuring public health issues in Kedah could be solved to produce a better life.

Keywords: Cholera, Kedah, British, Malaya, public health.

Introduction

The world is shocked by the emergence of the COVID-19 pandemic, which has infected many people rapidly and caused an economic collapse, affecting food security worldwide. Previously, COVID-19 was only considered an epidemic as it only spread among Chinese citizens, and the world was not ready to face the spread of the pandemic (Khan *et al.*, 2020). The term pandemic refers to an epidemic that appears worldwide or involves a large area across international borders affecting a large portion of humanity (Porta, M., 2008). History has shown that spreading infectious diseases or pandemics is nothing new. In the past, humans faced various epidemics that claimed many lives and caused huge losses (Echenberg, 2011).

Among the worst pandemics in history are the Spanish Flu, the Plague, HIV/AIDS, cholera, and others (Leavitt, 2006). Cholera is an epidemic caused by the *Vibrio cholerae* bacteria (Muslimah, 2016). There may be symptoms such as vomiting, nausea, and liquid stool in the form of stools. When left untreated, patients can lead to dehydration, kidney disease, and even death if not treated. Cholera is also often associated with polluted water, lack of hygiene and sanitation, and the concentration of suburban squatter areas (Heymann (ed), 2004). The spread of cholera seems to occur due to the failure of the authorities to control water resources, causing the epidemic to appear and infect humans to the point of death (Abdullah *et al.*, 2022).

In the past, cholera outbreaks were detected in various areas worldwide, including Malaya and especially in the State of Kedah. Kedah is famous for its paddy cultivation activities. Rice production from this state was commercialised and exported throughout Malaya (Ahmat, 1970). The spread of cholera in Kedah affected the health of farmers, causing them to be unable to work and stunting economic activities in the state. The situation could affect food security in Malaya if left unchecked, as rice from Kedah was exported throughout Malaya in the past. The livestock sector in Kedah, which supplied the production of beef, buffalo, pork, and others to be exported to the United Kingdom, would also be disrupted if the British did not prevent the spread of the epidemic (Mohd Daud, 2022). This study seeks to determine how far the cholera pandemic in Kedah influenced the British in dealing with the pandemic from 1907 to 1940.

This study highlights historical experiences for strengthening national health policy and security. This is because most pandemics that occur worldwide, including in Malaysia, have similarities with the previous emergence of pandemics in Malaya. Therefore, past experiences in dealing with pandemics, such as cholera, should be used as references in dealing with pandemics in the present and the future. This situation shows that health issues and the spread of diseases have never been resolved, and they continue throughout the ages.

Literature Review

Academics worldwide have widely studied cholera, considered the worst pandemic in history. This situation shows that cholera-related research has significance in the field of history. However, studies related to this pandemic in Malaya, especially in Kedah, seem lacking among researchers. Only a few studies related to the cholera pandemic in Kedah and other Malay states were found. Abdullah and Mohd Noor (2019) conclude that the introduction of water imperialism in Alor Setar, Kedah, aimed to prevent the spread of cholera, indicating the

city to be an unhealthy location, and recording a high number of deaths due to this epidemic. According to Arikrishnan (2020), the spread of diseases such as dengue, dysentery, cholera, and others in Kedah caused the British to build several hospitals and dispensaries, improve existing infrastructure, and import medical expertise from abroad for the stated purposes. Sulaiman and Ariffin (2021) describe that to prevent the spread of cholera, the British initiated vaccination efforts, and the cholera vaccine was used to treat the epidemic in Selangor. Maslan (2011) also concludes that concerns about the spread of epidemics, such as cholera, bubonic plague, and others in Malaya, have contributed to quarantine enforcement, which involves controlling houses inhabited by infected patients and erecting fences around patients' homes.

Manderson (1996) states that imperialism has contributed to adopting modern medicine, which supports British economic and political domination in Malaya. Meanwhile, H Yadav (1981) concludes that the spread of cholera in Kerian, Perak, in 1978 was due to the socio-economic conditions of the population and the environment, such as poor clean water and the weather. Yadav and Chai (1990) also state that the spread of cholera in Sarawak before and after the formation of Malaysia was seen as a health issue that could not be resolved due to the failure of the British to prevent the epidemic in the state within the specified period.

Results and Discussion

Background of the Cholera Outbreak and Worldwide Contagion

The cholera pandemic is unique in that it has spread to almost all around the globe and is reported to have occurred since early human civilisation. Its characteristics are similar to the Sanskrit record in the fifth century BC, namely the Sushruta Samhita, which describes it as *Visuchika* (Barua & Greenough (ed), 1992). China also recorded the spread of this epidemic in the first century AD, and Wong and Wu Lien Teh recorded the epidemic in the seventh century (Jos Byrne (ed), 2008). The Muslim

world is also not far behind in coming up with a definition for this epidemic. The Arabic term for cholera is known as *heyda*, where a writer from Baghdad, Rhazes, described *heyda* around the year 900 (Lacey, 1995). This evidence indicates that cholera is common around the world. McPherson supports this claim, stating that:

He concluded that cholera must have been a familiar disease worldwide for almost every European country and every language in India had a popular name for it as do Chinese and Arabic languages (Barua & Greenough, 1992).

In the modern world, cholera was first identified in India in the early 19th century in 1817, indicating that this development marked it as the first cholera epidemic. According to Dorothy Porter (1999), among the epidemics that struck in the 19th century, cholera was likened to a “king” of epidemics (Porter, 1999). Calcutta and some areas in Bengal became contagious in March 1817 before spreading to Delhi and other areas in Asia and Africa (Echenberg, 2011). The development of the first pandemic is crucial because humans began to study cholera in detail based on available resources, such as British military medical reports and Indian literature, as information on cholera before the first pandemic was incomplete and unstructured (Byrne, 2008).

After the first cholera pandemic ended in 1823 until the beginning of the 20th century, the world was still struggling by the extension of five phases of the pandemic. In fact, at this time, continents other than Asia and Africa were hit by this pandemic, such as Europe, North America, and South America. The second pandemic occurred between 1829 and 1851, in which Continental Europe began to receive cases of cholera infection from the southern regions of Russia. Finland, Poland, Austria, Prussia, England, Scotland, France, Belgium, the Netherlands, and Norway began to record cholera cases between 1831 and 1834. The same goes for the North and South American continents. Between 1848 and 1851, cholera epidemics arrived in the United States, Canada,

Mexico, Panama, Colombia, and Ecuador (Barua & Greenough, 1992).

The pandemic continued during the mid-19th century with the emergence of a third pandemic from 1852 to 1859. The third pandemic is the most life-threatening (Awosefo & Aldabk, 2018). Echenberg (2011) notes that for half of the provinces, the third pandemic was the worst in the 19th century (Echenberg, 2011). However, a significant development at this point is the discovery by a British physician, Jon Snow, that cholera is a waterborne epidemic that is contaminated and not airborne, although the pathogen for cholera was not yet identified (Awosefo & Aldabk, 2018). The fourth (1863–1879) and fifth (1881–1896) cholera pandemics appeared in the last four decades of the 19th century and affected almost the entire continent (Barua & Greenough, 1992). Human knowledge about this pandemic continued to increase through the studies conducted. During the fifth pandemic in 1883, German bacteriologist Robert Koch discovered the microorganisms that cause cholera (Malaysia Report on the Outbreak of Cholera in Malacca, 1963).

Cholera re-emerged in 1899 and was categorised as the sixth cholera pandemic until 1923 (Barua & Greenough, 1992). However, Western European countries were not severely affected as they pioneered the development of health systems based on the findings of cholera transmission patterns and preventive measures (Awosefo & Aldabk, 2018). There is no record of a major outbreak except for sporadic cases compared to Central and Southeastern Europe. Cholera still spread in other continental countries, such as China, Japan, Korea, the Philippines, Egypt, and South American countries. Cholera was still contagious until 1960, before World War II but was not classified as a pandemic (Barua & Greenough, 1992).

During the pandemic, efforts were made by the government to curb the spread of cholera. The quarantine method is a custom practised by the governments of countries threatened by cholera. Although this method was implemented, it still had its flaws in preventing the spread of cholera.



Figure 1: Cholera in Egypt: Quarantine inspection in Brindisi, 1883

Cholera also crossed the Atlantic to reach the distant shores of America in 1832, accompanying the ships carrying Irish immigrants. Quarantine could not prevent the importation of cases because not all ships could be quarantined and not always equally rigidly. Cholera broke out in Quebec on June 8 and on the 10th in Montreal and very fast along the St. Lawrence River and its tributaries into the interior of Canada (Barua & Greenough, 1992).

The cholera pandemic brought countries worldwide together to cooperate in finding a cure. The first conference was held in 1851 in Paris, followed by 14 International Hygiene Conferences between 1851 and 1938. Until 1938, the conferences primarily focus on the cholera epidemic. Several things were achieved through the conferences, such as the Paris conference of 1894, where the Ottoman Empire announced the reorganisation of the lazaretto (quarantine place) in Jeddah, improving hygiene in Mecca to include hospitals, shelters, pharmacies and allocating more doctors and

sanitary police (Echenberg, 2011). This effort clearly shows the cooperation of countries at the international level in their efforts to prevent the spread of cholera.

Cholera in Malaya

As noted, cholera epidemics have been detected since the fifth century BC, hitting the world through pandemics from the early 19th century to the early 20th century. In this regard, the Southeast Asian region, especially Malaya, also experienced a cholera outbreak. This epidemic hit Malaya before the first pandemic was recorded in 1817.

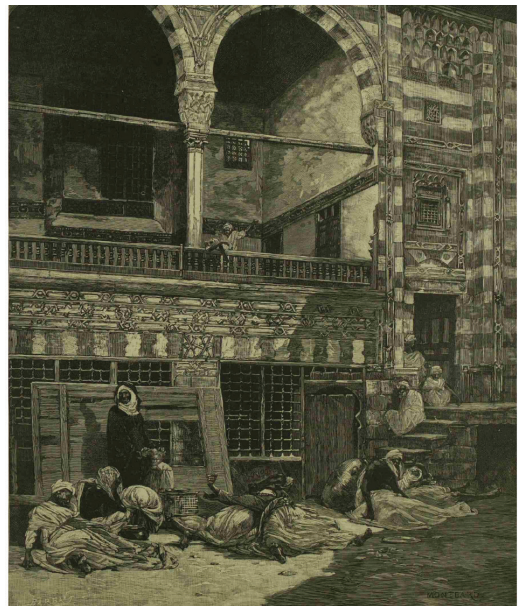


Figure 2: Atmosphere of Cholera in Egypt in 1883



Courtesy World Health Organization

Figure 3: Emergency Rehydration of Cholera Patients at a Dispensary near Calcutta, India

The earliest record of developing a cholera epidemic in Malaya is traced back to the 16th century, which shows Melaka as the location of the epidemic. The Portuguese historian da Cortu stated that the outbreak stemmed from Perigi Raja at the foot of Bukit Cina, which the Javanese army had polluted before the withdrawal of the Johor-Pahang-Perak-Java military alliance to reconquer the city of Melaka in 1551, infecting the inhabitants who drank water from the well and leading to the epidemic transmission. About 12 to 15 Portuguese and more than 200 locals died daily (Malaysia Report on the Outbreak of Cholera in Malacca, 1963). This event shows that Malaya has recorded cases of cholera in the past and early stages of Western colonialism, where cholera was used as a biological weapon to cripple the enemy during the war in Malaya.

Cholera began to be widely recorded in Malaya after the presence of British colonialists. The early 19th century saw the emergence of the first cholera pandemic in modern times. At this time, the Straits Settlements (NNS) were hit by a cholera epidemic. The spread of the epidemic only concentrated in the NNS without involving the Malay States due to two main factors: the close relationship with Bengal (the site of cholera transmission) and the position of the NNS in the Melaka Straits, which is the main route for ships from the east and west (Lee, 1973). Melaka reported a cholera infection on May 1819, then reported back in December and ended in February 1820. Penang recorded a case of cholera on October 1819. The average death due to cholera was recorded as 50 deaths per day. Melaka once again recorded a case of cholera between 1828 to 1830, involving a health premise called Durian Daun Lama Hospital. Military expeditions also played a significant role in contributing to the spread of cholera in Malaya. The event happened during the outbreak of the third pandemic in 1840, where British troops from Calcutta and Madras were on their way for a military campaign in East Asia and had brought cholera to Malaya (Malaysia Report on the Outbreak of Cholera in Malacca, 1963). Thus, imperialist, and military

activities also played a significant role in the spread of cholera in Malaya.

Subsequently, cholera continued to appear in Malaya from the 19th century to the 20th century. The years recorded are 1841, 1857, 1863, 1873–1874, 1900–1903, 1910–1914, 1924–1928, and during World War II in 1943 (Malaysia Report on the Outbreak of Cholera in Malacca 1963). Apart from the Straits Settlements (NNS), the Federated Malay States (NNMB) also reported cholera cases. In Selangor, the cholera outbreak involved Malay villages in Kuala Langat (the late 1870s) and Pudu Prison. In the early 20th century, Perak also recorded a similar epidemic that caused the state government to take certain measures to prevent the spread. The Singapore Free Press and Mercantile Advertiser in 1911 stated that:

Cholera in Lower Perak is bad at present. A company of Guides is now stationed at Ayer Kuning to prevent all Asiatics from moving eastward (The Singapore Free Press and Mercantile Advertiser, 1911, May 25).

The evidence shows that the cholera epidemic is nothing new in Malaya. The epidemic can be attributed to the state of cleanliness in Malaya, which was in poor condition. Parmer (1989) notes that in the early 20th century, British Malaya was the unhealthiest area that contributed to various diseases, resulting in thousands of deaths in the 1920s (Parmer, 1989). This statement portrays poor hygiene and health conditions in Malaya at the time. This condition led to the spread of cholera epidemics in Malaya and threatened its people. A high number of deaths accompanied the cholera outbreak within the community. Death from cholera was associated with spiritual beliefs. The Malay and Chinese communities fear the spirits of people who died of cholera. Cholera was also associated with the element of evil spirits. Maslan (2011) stated that:

During Hugh Low's visit to Kuala Kurau, he saw a community of Chinese fishermen living in 40 houses running

around carrying flags that were said to be aimed at appeasing evil spirits caused by cholera (Maslan, 2011).

The development of cholera in Malaya, which led to many deaths, impacted the development of the public health sector. The spread of cholera and several other epidemics urged the British to establish medical and health institutions. The existence of cholera and other diseases led Frank Swettenham to initially propose the establishment of the Institute of Medical Research (IMR) to study epidemics in Malaya, including cholera (Sulaiman & Ariffin 2021). IMR was established in 1900 in Kuala Lumpur, where the initial focus was more on the study of beriberi and malaria in the first ten years of its establishment.

However, the role of IMR was later expanded to study the causes, transmission, treatment, and prevention of several other diseases, including cholera (Sungat & Sundhara Raja 2016). Thus, cholera was also a significant issue for the colonial administration to secure their position in Malaya by improving the health sector (Abdullah 2019). The existence of cholera since the days of the previous sultanate and colonialism in Malaya raised concerns among the community and the government in taking certain measures.

Cholera Outbreak in Kedah from 1907 to 1914

The cholera outbreak in Kedah occurred in the early 20th century between 1907 to 1914. However, Kedah reported cases of cholera infection much earlier. According to records of the Colonial Office (CO 716/1 September 1905 to September 1906), the cholera epidemic spread in Kedah in 1896. The 1905–1906 Annual Report records stated that Kedah was also threatened by cholera cases in the border areas. The records reported a cholera case in 1906 in south Wellesley Province (Seberang Perai) near the Kedah border, causing several measures to be taken to prevent the cholera epidemic from spreading (CO 716/1 September 1905 to September 1906). In fact, during that period, the Perlis Government prevented Kedah residents

from visiting their state to prevent the spread of the epidemic in Perlis (SUK 204/1332).

Cholera in Kedah was considered an epidemic between 1907 and 1914, as several epidemics threatened the state (Porta, 2008). In the 1914 Kedah Annual Report, Dr A L Hoops, a doctor assigned by the British in Kedah, said that four epidemics were recorded. The first epidemic occurred in 1907, the second in 1908, the third in 1911, and the fourth from late 1913 to 1914 (CO 716/1 1332 A.H.). Throughout the eight years of record on cholera, the state did experience several years without an epidemic, such as 1909, 1910, and 1912. The first epidemic (first cholera) occurred from August to September 1907 (CO 716/1 September 1906 to February 1908).

The Straits Times stated on August 19, 1907, Kedah officially reported a case of cholera (The Straits Times, 1907, August 19). The cause of infection during the first epidemic was not identified (CO 716/1 September 1906 to February 1908). The earliest cases were recorded in prisons, with 62 infections and 48 deaths involving prisoners. The cholera infection was more concentrated in Alor Setar and Kuala Kedah (North Kedah). Jalan Langgar, Jalan Bharu, and Kling workers' areas in Bakar Bata, Pekan Malayu, and Pekan Cina each recorded cholera cases. However, no spread of cholera was detected along the canal in South Kedah. In total, 330 cases of infection, with 247 deaths, were recorded for the first epidemic. It was estimated that the number of infected and death cases could be double the reported (CO 716/1 1332 A.H: Monthon Saiburi Administration Report of the State of Kedah September 1906 to February 1908). Although the epidemic lasted until September 1907, Kedah was officially declared free of cholera on October 1907, with the quarantine order at the Port of Kedah being revoked on October 15 1907 (Straits Echo, 1907, October 14: Eastern Daily Mail and Straits Morning Advertiser, 1907, October 15).

The second epidemic occurred in 1908, from March to April. The first report of cholera infection that year began on March 12, 1908,

when it was reported that the condition was not so severe (Straits Echo, 1908, March 12). However, the 1914 Annual Report stated that the epidemic was becoming widespread (CO 716/1 1332 A.H) (CO 716/1 1332 A.H). The report showed the assumptions of the press during the initial stages of the epidemic in March 1908. However, it was proven that infection and death cases during the second epidemic were higher than the first. In fact, in early April 1908, other newspapers reported that cholera cases in Kedah were in serious condition (The Singapore Free Press and Mercantile Advertiser, 1908, April 2). A total of 686 cases of infection were reported at the time, with 541 cases of death. At this point, cholera cases were considered serious based on the death rate, which recorded an average increase to 1,000 in 1908 (CO 716/1 1332 A.H).

Based on the observations of this study, cholera cases were concentrated in Alor Setar and Kuala Muda due to their economic focus, such as the paddy and livestock sector, which was concentrated in the specified locations. Thus, it was not surprising that the British were worried about the spread of the epidemic because the farmers could not continue their jobs, which disrupted food security in the state and Malaya. The second cholera epidemic ended on April 28 1908, with only one cholera case in Alor Setar and no new cases was detected the following day (Straits Echo 1908, May 2, 4). At that time, efforts also involved bringing water from Penang to be sold in Alor Setar, where the sale was followed by a decrease in cholera cases in Alor Setar (CO 716/1 1329 A.H (January 2 1911 –December 21 1911)).

The third cholera epidemic occurred in 1911 from February to July after being detected in late January. The outbreak stopped for a while in March before spreading again in April until the end of August (CO 716/1 1332 A. H: CO 716/1 1329 A. H). This time, cholera infection was more concentrated in North Kedah, while South Kedah did not report any cases. Cholera cases during the epidemic started in Alor Setar due to a prolonged drought followed by the lack of clean drinking water supply during the

dry season (CO 716/1 1329). Alor Setar and the surrounding areas were reported to be the most affected, while another district of North Kedah, Langkawi Island, was affected for the first time. A total of 1,111 infection cases were recorded, with a total of 866 deaths. However, the 1914 Annual Report recorded an increase of 100 cases of infection and death during the third epidemic. The report shows that the percentage of deaths during this epidemic is 78%. A total of 151 cases were treated in hospitals. However, of that number, 88 deaths were recorded. Plans were made to improve the water supply system, such as the rain trap system, in Alor Setar, which is channelled to large tanks for drinking water (CO 716/1 1332: CO 716/1 1329).

The cholera epidemic in Kedah halted in 1912, in which no record of cholera was detected (CO 716/1 1330 A.H (December 22 1911–December 10 1912)). However, the epidemic reappeared at the end of 1913, with the emergence of cases on November 30 1913, which spread in Alor Setar, Kuala Kedah, and the surrounding areas [HCO No. Kedah 1832/1913, (Outbreak) of Cholera in Alor Setar]. Cases of infection during the fourth epidemic were higher than the previous epidemic, which was 2,196 cases of infection, with 1,502 deaths (a death rate of 68%) (CO 716/1 1332 A.H). In the early stages of this epidemic, the Kedah River and all ports in Kedah from Yan to the north were threatened by cholera (The Straits Times, 1913, December 22). Other than reporting the highest number of cases, the fourth epidemic differed from the previous ones because it appeared after the rainy season when the rains had not fully subsided. However, the transmission became more serious during the dry season (CO 716/1 1332 A.H). During the outbreak, important individuals in the Kedah administration were also infected with cholera, such as the British Adviser of Kedah, George Maxwell and the Prince of the Sultan of Kedah, Mat Jiwa (Straits Echo, 1914, January 31: Malaya Tribune, 1914, June 5).

The four cholera epidemics that occurred within eight years in Kedah resulted in high

cases of infection and death. The 1914 Annual Report states that:

It is a conservative estimate that there have been 5,500 deaths from cholera in Kedah in the past eight years out of a total of 37,000 from all cases—that is to say, cholera is responsible for nearly 15 per cent. over the whole period (CO 716/1 1332).

Based on the development of the cholera epidemic, several causes that contributed to the epidemic were identified. This study observes that water issues and the weather played a role in cholera transmission. The evidence can be seen when the people of Kedah depended on natural water resources through rivers and canals. This dependence was the cause of cholera transmission, as water resources were polluted, and the residents had no choice but to use them (Abdullah & Mohd Noor, 2019). In addition, weather conditions, namely the dry season, also played a role in the emergence of cholera. For example, the cholera outbreak in 1911 stemmed from a prolonged drought, and the epidemic worsened in 1913–1914 during the drought season.

Efforts and Actions to Reduce the Spread of Cholera in Kedah

The development of the cholera epidemic urged various parties to act to eradicate the threat of the epidemic. In this case, the Kedah state government was mostly responsible for implementing measures in the interest of the people and the state. The cholera epidemic contributed to high death rates, threatening Kedah's political, economic, and social interests. In Alor Setar, rice production was threatened when the population was infected with cholera because the population plays an active role in economic activities that can affect the economy. From a political perspective, the Kedah administration was at risk of being affected (Abdullah & Mohd Noor, 2019). Throughout the epidemic, the Kedah government spent much money to control and eradicate cholera.

This situation can be seen during the third epidemic in 1911 when the state government spent \$16,435 to curb cholera, which involved an expenditure of more than 40% for the health sector in the state during that year, amounting to \$40,613 (CO716/1 1329: The Annual Report of the Adviser to the Kedah Government for the year 1330 A.H (December 22, 1911–December 10 1912)).

However, when the fourth epidemic hit Kedah in 1913–1914, the total expenditure to curb cholera increased drastically, where \$41,043 was spent by the state government throughout the contagion period. A total of \$12,700 was spent on water works, and \$3,268 was used on cholera patients' diet for seven months in the quarantine camp in Alor Setar (The Annual Report of the Adviser to the Kedah Government for the year 1332 A.H (November 30, 1913–December 18, 1914)). The increase in expenditure contributed to the high number of infected cases and death toll, as well as the contagion period that lasted longer than the previous epidemic. This development also shows that cholera impacted the state's finance, where money spent on the health sector increased drastically.

Besides the health sector, the state government also upgraded the water supply system to supply clean water to the residents. This initiative prevented them from using polluted water resources, thus avoiding cholera spread. According to the 1914 Yearly Report, it was estimated that \$670,000 was spent on upgrading the clean water supply system in Alor Setar. On December 1914, Alor Setar received a continuous supply of clean water (The Annual Report of the Adviser to the Kedah Government for the year 1332 A.H). The state government continued to spend to upgrade the clean water supply system even after the epidemic ended and involved other districts and areas within the state. This situation indicates that the state government was serious about curbing and eradicating cholera from spreading further to preserve the state's interest and its citizens in terms of politics, economics, and society.

Cholera Laws and Guidelines

Among the measures or actions the Kedah state government took to eradicate the spread of cholera was introducing infectious disease laws. The laws related to infectious diseases provide instructions and regulations on the control and prevention of an epidemic. In Kedah, the role of the state government in controlling and preventing the spread of the epidemic was done by local administrators. Before the onset of the cholera epidemic between 1907 and 1914, local administrators enacted several laws in the late 19th and early 20th centuries. Among them are the 1896 Infectious Diseases Law, the 1896 Disease Prevention Law, and the 1899 Vaccination Law (Arikrishnan, 2020). The introduction of the laws showed that the Kedah state administration was concerned about public health development at the time.

In January 1911, the state government introduced the Infectious 1329 Diseases Law, which was approved by Sultan Abdul Hamid and was seen in parallel with the emergence of the cholera epidemic at the end of January of the same year. The emergence of current and previous cholera epidemics caused the state government to respond by introducing this law. The law outlines 13 matters relating to infectious diseases. It includes instructions to make a report if an infected individual is detected, the role of chiefs and the police during the spread of an epidemic, the power of the State Surgeon and head of the hospital, quarantine instructions, and a ban on bringing infected individuals out of the area (SUK 392/1329).

The Kedah government implemented this law to curb the spread of cholera. During the fourth cholera epidemic in late 1913 to 1914, the State Surgeon of Kedah, Dr A L Hoops, used this law to mandate the participation of chiefs and the police through the submission of teaching circulars related to the cholera epidemic based on a memorandum issued by Dr Hoops regarding their assignments:

- (1) *They should also be willing to assist all members of the Medicine Dept in dealing with cholera.*

- (2) *A copy of the attached circular might be sent to each of them (SUK 145/1332).*

The state government also issued guidelines and information for the people to control and minimise cholera transmission. Announcements made by the state government can be traced back to the outbreak of the first cholera epidemic in 1907. A set of regulations was drafted, as recorded in the 1906–1908 Annual Report:

A meeting of the State Council and several Heads of Departments drew up simple regulations for combating the disease (CO 716/1 September 1906 to February 1908).

Announcements continued to be made in 1914 during the outbreak of the fourth epidemic. Guidelines on cholera were issued by the government, which consist of 27 items that cover information on cholera bacteria, ways of transmission, treatment, and prevention. The guidelines were distributed to North and South Kedah, in which 700 copies in Malay-Jawi language were distributed to the police, chiefs, Public Works Department (PWD), mosques, and estates in North Kedah (SUK 990/1332, Instructions Regarding Cholera).

Water Supply and Sanitation System Improvement

The state government's action in preventing the spread of cholera was also linked to water and sanitation efforts. The water effort refers to the use of water resources and the improvement of the water supply system. As mentioned earlier, cholera is an epidemic caused by contaminated water. Kedah has various water resources, such as rivers and wells. However, a study conducted by the British on the Alor Setar River found that the river was polluted, and even the water content in the river helped the growth of the *vibrio cholerae* bacteria (CO 716/1 1332). This is coupled with the population's dependence on polluted resources causing the spread of the epidemic. As a safety measure, the Kedah government banned using river water and wells during the cholera outbreak. During the first epidemic, quarantine guards were placed near

the river to prohibit the residents from using the river. During the fourth epidemic, a ban on bathing in the river was enforced, and guards were also placed near the river (SUK 892/1332).

Other than banning the use of river water, measures to decontaminate the water were also carried out. The process was done to kill the *Vibrio cholera* bacteria. This can be seen when the state government imposed this directive on mosques. Through a memorandum by Dr A L Hoops, it was suggested that the water used in mosques be boiled and changed daily:

I recommend that all water used in the mosque, in and around Alor Setar for mouth washing should be boiled and renewed daily (SUK 162/1332).

In addition, the state government also mobilised efforts to supply water to the population during the cholera outbreak. The issue of polluted rivers required the government to find alternatives so that the water supply was not cut off for basic needs. Two methods were used to solve the issue: Water was brought in from outside, and tanks were used. During the second cholera epidemic, water from Penang was brought into Kedah for sale. During the third and fourth epidemics, the state government used water channelled into tanks for the use of the population. In 1911, a rain catchment area was established in Alor Setar, and rainwater was channelled into large tanks (CO 716/1 1329). It was the same during the fourth epidemic, where the government ordered the residents to take drinking water from tanks provided by the government (SUK 2176/32).

The state government also improved the Kedah water supply system because Alor Setar needed a good water supply (Abdullah & Mohd Noor, 2017). The construction of the Bukit Wang water plant was considered significant in the effort to supply water because it was the earliest plant that increased access to a clean water supply to residents in North and South Kedah. According to the 1914 Annual Report, pipe installation was done in Alor Setar and Jitra. The plant allowed the people to obtain a clean water supply. At the end of April 1914,

the people of Jitra obtained a clean water supply, followed by people in Alor Setar in early November 1914. The construction of water plants and installation of pipes were significant as residents could obtain a clean water supply without relying on river water, which was at risk of being contaminated by cholera bacteria (Abdullah & Mohd Noor, 2017). The 1914 Annual Report stated that:

It is reasonable to express hope that Alor Setar will never again suffer as it has in the past from severe pandemics of cholera. Anyhow, if cholera occurs, the State is in a position to fight the disease far more easily and economically than before (CO 716/1 1332).

The above statement clearly shows the importance of a clean water supply system, which the government provided to curb the spread of cholera. Kedah's water supply system improved through certain plans and implementations. Other than focusing on the water aspect, the hygiene aspect was also given attention by the state government to curb the spread of cholera. In this case, the focus was on establishing the Sanitary Board. According to Sankar (2018), the Sanitary Board refers to:

Administrative bodies play a role in hygiene, health and safety in urban and rural areas (Arikrishnan, 2020).

In Kedah, the cholera outbreak in 1908 led to the establishment the Emergency Sanitation Board and was considered the first attempt to establish sanitation control. The Sanitation Board was also expanded to curb the spread of cholera by controlling unsanitary premises. This attempt indicated that the Kedah administration highlights the aspect of hygiene as a measure to prevent the spread of cholera (CO 716/1 1327: CO 716/1 1329).

House cleaning efforts were also conducted during the first epidemic (Monthon Saiburi Administration Report of the State of Kedah September 1906 to February 1908). According to a report from the Kedah Advisor, George Maxwell, this practice continued during the last

epidemic, where the detoxification process from house to house was done under the supervision of health officers and the Sanitation Board officers (HCO No. Kedah 1832/1913). Therefore, hygienic practices were also performed as a measure by the Kedah government to eradicate the spread of cholera.

Quarantine Order and Movement Control Order

Another initiative taken was a quarantine order. The implementation of quarantine was intended to isolate potentially infected or infected individuals from healthy individuals. Quarantine was also enforced internationally, where the state imposed a quarantine for other countries affected by the epidemic. The Quarantine Law was introduced in 1906. During the cholera outbreak in 1907, quarantine guards were stationed in urban areas as a measure to enforce quarantine during the cholera outbreak (CO 716/1 September 1906 to February 1908). The quarantine order was also clear in the 1329 Infectious Diseases Law, which prohibits the sick from leaving their houses, as stated below:

So, anyone who gets cholera or plague from his house and mixes with the crowd will be fined no more than \$100 (SUK 392/1329).

The above statement indicates that sick people must undergo quarantine and are prohibited from leaving their houses. The Kedah government also imposed quarantine for other locations with cholera cases, which means banning residents of a country threatened by a cholera epidemic from visiting Kedah. In February 1913, when a cholera outbreak was reported in Tongkah to Setul (Siam province), Kedah banned ships from there from entering Kedah (SUK 991/1331: SUK 204/1332). This enforcement shows that even when Kedah was not in the epidemic phase, control and prevention measures were still in place to prevent the spread of cholera infection from outside.

Apart from the quarantine order, the state government also implemented a movement control order to curb the spread of cholera. The

movement control order prohibited movement from one place to another and enforced the closure of certain premises. The Kedah government at the time tried to restrict any movement in the state when certain districts were reportedly threatened by cholera outbreaks. For example, when Kuala Kedah and Kuala Salak were threatened by cholera, the state government banned ships from the two areas from entering Langkawi (SUK 144/1332A). The movement of individuals was also restricted, as people were banned from moving inside and outside the area to prevent the spread of cholera. According to a statement below:

It is said that in the time of the disease, do not invite people from outside the area on small jobs unless they can be called if there is work to be done and cannot be avoided because they are afraid of bringing the disease to town or worried if they bring home disease. So, this matter does not apply to people who commit offences and are arrested by the police (SUK 929/1332).

The statement above indicates the efforts to prevent the spread of cholera and reduce the risk of transmission in Kedah through movement restrictions. In addition, the state government also closed several social premises. Among the places closed were Chinese movie shows, liquor stores, and gambling centres (SUK 1152/1332: The Singapore Free Press & Mercantile Advertiser 1913, December 12, 6: The Straits Times 1914, February 26, 8). This action was enforced because those places attracted people at high risk of spreading the epidemic.

Providing Treatment to Cholera Patients

The Kedah government conducted various measures to prevent the spread of cholera. At the same time, they were also paying attention to the population infected by the epidemic. Treatment was carried out either in a hospital or at home. Cholera patients were treated in hospitals for the absence of a camp or quarantine centre and the need to prevent becoming more seriously infected. During the first epidemic, patients

were treated in general hospitals due to the absence of a quarantine centre for cholera. They were placed in wards designed for inmates in lockups and asylums. Workers were also placed in hospitals to avoid violations of quarantine orders involving visits to infected workers. Alor Setar Hospital became the focus of treatment, as they received cholera cases in 1907, 1908, 1911, and 1914.

Apart from the general hospital, the hospital located in the sugar estate also treated cholera. In 1907, eight people were admitted there (CO 716/1 September 1906 to February 1908). Quarantine camps were also used to isolate cholera patients. A memorandum from Dr A L Hoops relates to using stretchers to carry cholera patients to quarantine camps. The memorandum indicates quarantine camps were established to treat cholera patients (SUK 153/1332).

The efforts and initiatives by the Kedah state government show they were focused on rehabilitating cholera patients through the treatment provided. This further explains the significant role of the population in socio-economic aspects, as the state government tirelessly protected the health and safety of the population from the threat of infectious diseases through control, prevention, and treatment measures. If the population is severely affected, it will affect the state of Kedah.

Impact of Efforts and Actions to Reduce the Spread of Cholera in Kedah

Water Supply System Improvement

One of the actions taken by the state government during the cholera epidemic in Kedah was introducing a water supply system. As described earlier, natural water resources in Kedah, such as rivers and wells, were polluted by the *vibrio cholera* bacteria, the cause of the cholera epidemic. The state government's introduction of a water supply system enabled the people of Kedah to obtain a clean water supply. This initiative was significant as it improved the basic needs of the population. It was a good development because the Northern Malay States,

including Kedah, were relatively backward in terms of water supply compared to the Straits Settlements (NNS) and Federated Malay States (NNMB) in the late 19th century and early 20th century (Abdullah & Mohd Noor, 2020).

The water supply system introduced during the outbreak developed after 1914. The development of the water supply system in Kedah indicates that not only major areas or cities were given priority. Rural areas also enjoyed the same facilities. The participation of rural areas in the water supply project resulted from the development of the water supply system in the district. A few years after the fourth cholera epidemic ended, the system extended to the rural areas in the Yan district due to the growing water supply system there. The state government also allocated expenditure for the village area so that residents can benefit from acquiring clean water.

This was evident when pipes were purchased to supply water to the village in Gurun. As a result, the area finally enjoyed a clean water supply (Abdullah & Mohd Noor, 2019). The development of the water supply system also benefited the population from an economic aspect. This study found that using a clean water supply significantly increases the population's economic productivity. The use of treated and secure water supply ensured the population's health, thus increasing their productivity in the agricultural sector, such as paddy cultivation and livestock.

Improving Kedah's Hygiene Level through the Sanitary Board

As previously stated, among the area of focus of the state government in eradicating the spread of cholera was the aspect of hygiene. This has led to the establishment of the Sanitary Board. According to Arikrishnan (2020), the emergence of the cholera epidemic in Alor Setar contributed to the establishment of this board.

The establishment of the Sanitary Board played a significant role in improving the health of the population. In addition to treatment and medical aspects, hygiene ensures that the population remains healthy and free from certain

diseases, especially epidemics or infectious diseases. This coincides with the role played by the Sanitary Board, which was to prevent and control any infectious disease from infecting and threatening the population and maintain the health and safety of the population in urban and rural areas (Arikrishnan, 2020). Their importance in improving hygiene and health is also straightforward, namely checking and prosecuting individuals related to public health and hygiene (Manderson, 1996).

The number of Sanitary Boards established increased yearly and expanded to most areas in Kedah. This study sees this as a good development, considering their role in ensuring the population's hygiene, health, and safety. The table below shows the Sanitary Board established in the state of Kedah.

Based on Table 1, the number of Sanitary Boards established increased every year. This development seemed to be related to the population's health status, especially regarding the number of people infected with cholera. This was evident when Kedah did not record the latest cholera epidemic between 1915 (after the end of the fourth cholera epidemic) to 1940. If there were cholera cases, they were isolated and did not record high numbers of infections and mortality. From 1915 to 1920, only 12 cases of cholera were recorded, and between 1920–1930, 23 cases were recorded. Although there was an increase in cases between 1931–1935, it was still under control and lesser compared to the four epidemics. The statistics show that the population was healthier and was spared from the massive spread of cholera that threatened the health and lives of the population.

Table 1: Sanitary board in Kedah, 1909–1940

Year	Location of the Sanitary Board
1909–1911	Alor Setar
1912–1913	Alor Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Petani, and Semiling
1914–1916	Alor Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Petani, Semiling, Bedong, and Baling
1917–1920	Kota Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Petani, Semiling, Bedong, Baling, and Changloon
1921–1925	Kota Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Petani, Semiling, Bedong, Baling, Changloon, Bandar Baharu, Yan, Kubang Pasu, and Langkawi
1926	Kota Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Petani, Semiling, Bedong, Baling, Changloon, Bandar Baharu, Yan, Kubang Pasu, Langkawi, Kota Sarang Semut, and Kuala Nerang
1927	Kota Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Petani, Semiling, Bedong, Baling, Changloon, Bandar Baharu, Yan, Kubang Pasu, Langkawi, Kota Sarang Semut, Kuala Nerang, and Padang Terap
1928–1929	Kota Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Lalang, Sungai Petani, Semiling, Bedong, Gurun, Baling, Changloon, Bandar Baharu, Yan, Kubang Pasu, Langkawi, Kota Sarang Semut, Kuala Nerang, Padang Terap, Tikam Batu, and Sungai Karangan
1930	Kota Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Lalang, Sungai Petani, Semiling, Bedong, Gurun, Baling, Changloon, Bandar Baharu, Yan, Kubang Pasu, Langkawi, Kota Sarang Semut, Kuala Nerang, Padang Terap, Tikam Batu, Sungai Karangan, Kodiang, Pulau, Tawar, Junun, and Pendang
1931–1940	Kota Setar, Jitra, Kulim, Lunas, Padang Serai, Kuala Muda, Sungai Lalang, Sungai Petani, Semiling, Bedong, Gurun, Baling, Changloon, Bandar Baharu, Yan, Kubang Pasu, Langkawi, Kota Sarang Semut, Kuala Nerang, Padang Terap, Tikam Batu, Sungai Karangan, Kodiang, Pulau, Tawar, Junun, Pendang, Kepala Batas, and Merbuk

Source: Arikrishnan, Sankar. (2020). Sejarah Perubatan dan Kesihatan di Kedah, 1882–1909. *SEJARAH: Journal of the Department of History*, 29(1), 56-73.

The statistics also show a positive development in socio-economy, as the population was getting healthier and better than in the 1907 to 1914 period, based on the number of people infected with cholera and the development of the Sanitary Board, which helped strengthen the health sector in Kedah.

Improving the Health Level of Kedah Residents

The outbreak of four cholera epidemics between 1907 and 1914 urged the Kedah government to implement various measures to curb them from spreading. This study argues that the effectiveness of the Kedah state government's actions should be measured based on cholera cases that appeared from 1914 to 1940.

Figure 4 shows the prevalence of cholera epidemics in Kedah between 1915 and 1940. The number of infections recorded in the first five years after the end of the cholera epidemic was 12 cases, namely cases recorded between 1919–1920 (1338 AH) (CO 716/1) 1338 A.H (September 26, 1919–September 14 1920). No new cholera cases were reported between 1921 and 1925, and between 1926 and 1930, only

23 cases were detected. However, of the 23 cases, only 4 were local cases that appeared in 1927–1928 (CO 716/2 1346). Meanwhile, 19 cases of infection recorded in the previous year (1926–1927) were imported cases, namely cases brought by labourers from South India, and the epidemic did not spread among the locals (CO 716/1 1345 A.H) (July 12, 1926– June 30 1927). From 1931 to 1940, the prevalence of cholera epidemics increased, where a total of 262 cases divided into five years were recorded, namely in 1931 (47 cases), 1932 (31 cases), 1933 (39 cases), 1934 (85 cases), and 1935 (54 cases). The cases decreased drastically from 1936 to 1940, with only 38 cases reported in 1936 (Arikrishnan, 2020).

Thus, the first 15 years after the cholera epidemic ended in 1914 showed that Kedah's health condition was very satisfactory, based on the number of cholera cases. This was evident when only 35 cases of cholera were detected. These developments indicate the promising efforts of the state government in preventing the spread of cholera during the four epidemics. It was evident that out of the 35 cases reported,

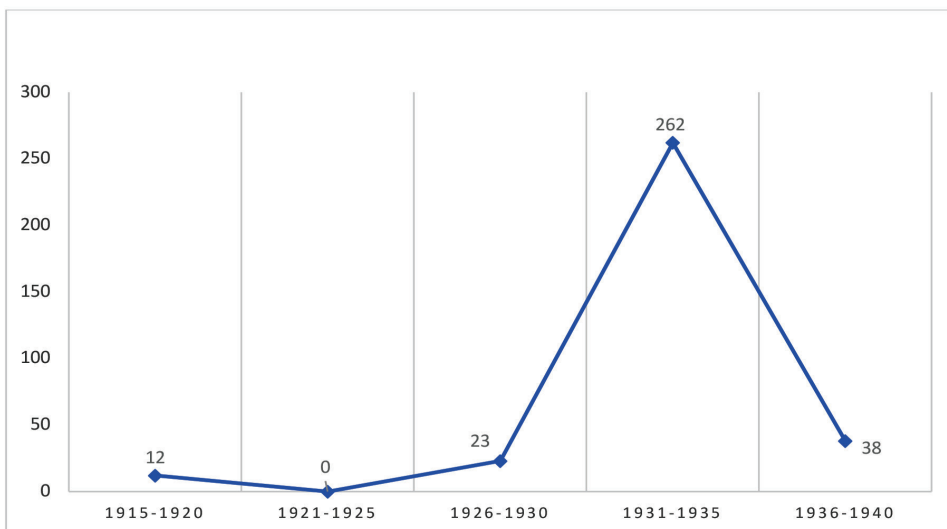


Figure 4: Cases of Cholera Outbreak in Kedah, 1915 – 1940

Source: Adapted from CO716/1, The Annual Report of the Adviser to the Kedah Government for the Year 1333–1338 A.H; CO 716/2, The Annual Report of the British Adviser to the Kedah Government for the Year 1339–1348 A.H; CO 716/4, Kedah and Perlis Annual Report of the Medical Department for 1936–1939: Arikrishnan, Sankar. (2020). Sejarah Perubatan dan Kesihatan di Kedah, 1882–1909. *SEJARAH: Journal of the Department of History*, 29(1), 56-73.

only 16 were local infections, indicating that the government managed to control domestic infections. This development was attributed to the effectiveness of the state government's efforts to upgrade the water supply system and facilities.

In 1931–1935, the cholera epidemic rose again. However, if observed based on the year of infection, the cases were small. The number of reported cases was not as significant as during the spread of the four cholera epidemics in 1907–1914. The highest number of cases during this period occurred in 1934, with only 85 reported, representing only a quarter of the cases during the first epidemic in 1907, which was the epidemic with the fewest cases of infection compared to the other three epidemics. Despite the reported cases, this indicates that the efforts were still considered effective and manageable.

Thus, the efforts initiated by the Kedah state government during the outbreak of the four cholera epidemics between 1907 to 1914 showed the strength and readiness of the state government to deal with the water-borne epidemic. This claim was based on the absence of any new epidemic after 1914. The emerging cases of infection after that were small, signifying the effectiveness of the actions taken by the state government in controlling and eradicating the spread of the epidemic.

Conclusion

This study shows that the spread of cholera in Kedah between 1907 and 1940 and its emergence as an epidemic from 1907 to 1914 forced the state government to implement measures to eradicate the disease. The government was considered successful in controlling the spread of cholera even though there were small cases. It was proven effective when no large-scale transmissions occurred in the state. The state government's experience dealing with the cholera epidemic between 1907 and 1914 taught them how to apply the necessary measures during the 1914–1940 epidemics.

The success was also due to the participation of all levels of society, who played a significant role in facing the epidemic in Kedah. The Kedah government was responsible for resolving public health issues in the state to create a better life. It is the responsibility of the authorities to ensure their government functions properly. Hence, public health should be among the primary interest of the government. The success of the state government also maintained the good image of the British, who were considered the greatest colonial power during the time. Overall, this study shows that the spread of diseases happened in the past, and we should learn from it to ensure our lives are safer and healthier from the threat of diseases.

This study also shows that diseases evolve with the surroundings and can attack human lives if we do not learn from the explicit and implicit signs of past pandemics. The cholera pandemic that threatened the world, including Malaya, especially in Kedah, within the stated period, was considered similar to the COVID-19 pandemic today and should be taken as a lesson to prepare for facing the challenges and threats of future pandemics.

Acknowledgements

We want to thank the members of Universiti Kebangsaan Malaysia, Universiti Sains Malaysia and Universiti Malaya for their support and encouragement while writing this paper.

References

- Abdullah, M. F., & Mohd Noor, A. (2017). Sejarah perkembangan bekalan air domestik di Negeri Kedah Sehingga Tahun 1957. *SEJARAH: Journal of the Department of History*, 26(2), 24-37.
- Abdullah, M. F. (2019). *Pembangunan bekalan air domestik di Negeri Kedah, 1957–1992*. (Doctoral's dissertation, Universiti Malaya).
- Abdullah, M. F., & Mohd Noor, A. (2019). *Perlaksanaan rancangan bekalan air luar*.

- bandar di Negeri Kedah, 1909–1957. *International Journal of the Malay World and Civilization*, 7(1), 55–67.
- Abdullah, M. F., & Mohd Noor, A. (2019). The 20th century domestic water supply in Alor Star. *JEBAT: Malaysian Journal of History, Politics & Strategic Studies*, 46(2), 240–271.
- Abdullah, M. F., & Mohd Noor, A. (2020). Pembangunan Bekalan Air Domestik di Negeri Kedah. *Kajian Malaysia*, 36(1), 89–113.
- Abdullah, M. F., & Zakarya, Z. (2022). Politik Air di Negeri Perlis dalam Pilihan Raya Umum (PRU) ke-14. *SEJARAH: Journal of the Department of History*, 31(1), 140–162.
- Ahmat, S. (1970). The structure of the economy of Kedah, 1879–1905. *Journal of the Malaysian Branch of the Royal Asiatic Society*, 43(2), 1–24. <http://www.jstor.org/stable/41492027>
- Arikrishnan, Sankar. (2018). *Perkhidmatan perubatan dan kesihatan di Negeri Kedah, 1909–1941*. (Doctoral dissertation, Universiti Sains Malaysia).
- Arikrishnan, Sankar. (2020). Sejarah perubatan dan kesihatan di Kedah, 1882–1909. *SEJARAH: Journal of the Department of History*, 29(1), 56–73.
- Awofeso, N., & Aldbak, K. (2018). Cholera, migration, and global health—A critical review. *International Journal of Travel Medicine and Global Health*, 6(3), 92–99.
- Barua, D., & Greenough W. B. (1992). *Cholera*. New York & London: Plenum Medical Book Company.
- Byrne, J. B. (2008). *Encyclopedia of pestilence, pandemics, and plague*. Westport & London: Greenwood Press.
- Eastern Daily Mail and Straits Morning Advertiser 1907. (1907, April 22). *Untitled*. <https://eresources.nlb.gov.sg/newspapers/digitised/article/easterndaily19070423-1>.
- 2.7
- Echenberg, M. (2011). *Africa in the time of cholera: A history of pandemics from 1817 to the present*. Cambridge: Cambridge University Press.
- HCO No. Kedah 1832/1913. [Outbreak] of Cholera in Alor Star.
- Heymann, D. L. (2004). *Control of communicable diseases manual 18th Edition*. United States: American Public Health Association.
- Khan, M., Adil, S. F., Alkhatlan, H. Z., Tahir, M. N., Saif, S., Khan, M., & Khan, S. T. (2020). COVID-19: A global challenge with old history, epidemiology, and progress so far. *Molecules*, 26(1), 39.
- Lacey, S. W. (1995). Cholera: Calamitous past, ominous future. *Clinical Infectious Diseases*, 20(5), 1409–1419.
- Leavitt, M. O. (2006). *Preparing for Pandemic Flu*. U.S. Department of Health and Human Services, 1–16.
- Lee, Y. K. (1973). Cholera in early Singapore (Part 1) (1819–1849). *Singapore Medical Journal*, 14(1), 42–48.
- Malaya Tribune 1914. (1914, March 2). *Cholera in Kedah*. <https://eresources.nlb.gov.sg/news/papers/digitised/article/maltribune19140302-1.2.61>
- Malaysia Report on the Outbreak of Cholera in Malacca 1963. The Committee of Enquiry Appointed by the Cabinet, Malaysia Government.
- Manderson, L. (1996). *Sickness and the state: health and illness in colonial Malaya, 1870–1940*. Cambridge: Cambridge University Press.
- Maslan, A. (2011). Sistem kuarantin dan pelaksanaannya di Tanah Melayu pada sekitar abad ke-19. *SEJARAH: Journal of the Department of History*, 19(19), 79–103.
- Mohd Daud, M. S. A. (2022). *Perkembangan aktiviti penternakan di Kedah, 1909–1940*. (Degree's dissertation, Universiti Sains Malaysia).
- Muslimah, A. (2016). Wabah Kolera di Jawa Timur tahun 1918–1927. *AVATARA*,

- e-Journal Pendidikan Sejarah*, 4(3), 892–901.
- Parmer, J. N. (1989). Health and health services in British Malaya in the 1920s. *Modern Asian Studies*, 23(1), 49–71.
- Porta, M. (2008). *A dictionary of epidemiology* (5th ed.). Oxford: Oxford University Press.
- Porter, D. (1999). *Health, civilization, and the State: A history of public health from ancient to modern state*. London dan New York: Routledge.
- Straits Echo 1907–1914.
- SUK 1152/1332. Daripada fasal orang2 bermain wayang China di Alor Star masa dalam penyakit Cholera.
- SUK 144/1332A. That boats from Kuala Kedah and Kuala Salak should not be allowed to go to Langkawi Owing to Cholera.
- SUK 145/1332. Police penghulus should assist in Cholera outbreak.
- SUK 153/1332. Arrangement for conveying Cholera patients in stretchers to quarantine camp.
- SUK 162/1332. Recommends that all water used in the mosque in & around Alor Star Should be boiled & supply renewed daily during Cholera outbreak.
- SUK 204/1332. Daripada fasal yang ia tahan orang-orang Kedah tiada boleh masuk Perlis oleh kerana report tuan adviser kata ada penyakit Cholera di dalam Kedah.
- SUK 2176/32. Notice preventing the towns people turn using river water.
- SUK 392/1329. Infectious Diseases Enactment 1329.
- SUK 892/1332. Fasal tegah orang2 daripada mandi turun di dalam Sungai Raja di dalam Masa Penyakit Cholera.
- SUK 929/1332. Perkara fasal hendak menahankan penyakit Cholera daripada Melarat Rata2.
- SUK 990/1332. Instructions regarding Cholera.
- SUK 991/1331. Recommends that quarantines be imposed at Pulau Langkawi and Kedah against people coming from Setul loan selling, as Cholera broken in Setul.
- Sulaiman, F. I., & Ariffin, K. (2021). Penggunaan vaksin era kolonial di Selangor. *Asian Journal of Environment, History and Heritage*, 5(1), 103–112.
- Sungat, S. L., & Raja, S. S. (2016). Peranan institut penyelidikan perubatan dalam menangani masalah sosioekonomi Negeri-negeri Melayu Bersekutu, 1896–1914. *SEJARAH: Journal of the Department of History*, 25(2), 109–129.
- The Singapore Free Press and Mercantile Advertiser 1908. (1908, April 2). *Cholera in Kedah*. <https://eresources.nlb.gov.sg/news/papers/digitised/article/singfreepresswk19080402-1.2.129>
- The Singapore Free Press and Mercantile Advertiser 1911. (1911, May 25). *Cholera in Perak*. <https://eresources.nlb.gov.sg/news/papers/digitised/article/singfreepresswk19110525-1.2.95>
- The Singapore Free Press and Mercantile Advertiser 1913. (1913, December 12). *Untitled*. <https://eresources.nlb.gov.sg/news/papers/digitised/article/singfreepressb19131212-1.2.21>
- The Straits Times 1907. (1907, August 19). *Untitled*. <https://eresources.nlb.gov.sg/news/papers/digitised/article/straitstimes19070819-1.2.22>
- The Straits Times 1913. (1913, December 22). *Untitled*. <https://eresources.nlb.gov.sg/news/papers/digitised/article/straitstimes19131222-1.2.25>
- The Straits Times 1914. (1914, February 26). *Untitled*. <https://eresources.nlb.gov.sg/news/papers/digitised/article/straitstimes19140226-1.2.41>
- Yadav, H. (1981). The 1978 Cholera Outbreak in Krian District. *Medical Journal of Malaysia*, 36(3), 129–135.
- Yadav, H., & Chai, M. C. (1990). Cholera in Sarawak: A historical perspective (1873–1989). *Medical Journal of Malaysia*, 45(3), 194–201.