Journal of Communicable Diseases
Volume 57, Issue 1 - 2025, Pg. No. 167-184
Peer Reviewed & Open Access Journal

Review Article

Current Status of Communicable Diseases – International, National and Kerala Scenarios

R Rajendran[1], S B Anusree[2], M S Sasi[3], D Sheela Devi[4], K Regu[5]

[1]Former Joint Director, [2]Research Assistant, National Centre for Disease Control, Ministry of Health and Family Welfare, Government of India, Thiruvananthapuram, Kerala, India
[3]Assistant Director, Directorate of Health services, Government of Kerala, India
[4]Former Associate Professor, MMNSS College, Kottiyam, Kollam, Kerala, India
[5]Former Additional Director, National Centre for Disease Control, Ministry of Health and Family welfare, Government of India, Kozhikode, Kerala, India
DOI: https://doi.org/10.24321/0019.5138.202522

I N F O

Corresponding Author:
R Rajendran, National Centre for Disease Control, Ministry of Health and Family Welfare, Government of India, Thiruvananthapuram, Kerala, India
E-mail Id:
rajendran061@gmail.com
Orcid Id:
https://orcid.org/0000-0003-2080-9723
How to cite this article:
Rajendran R, Anusree S B, Sasi M S, Devi D S, Regu K. Current Status of Communicable Diseases – International, National and Kerala Scenarios. J Commun Dis. 2025;57(1):167-184.

Date of Submission: 2025-10-25
Date of Acceptance: 2025-02-12

A B S T R A C T

Communicable diseases (CDs) are illnesses caused by certain contagious agents that spread from infected people, animals or contaminated environments to exposed individuals. Transmission can occur directly or indirectly through various methods, including contact, air-borne particles, contaminated objects, or intermediary organisms. CDs are the most important cause of morbidity and mortality around the globe. Infectious diseases, once the leading public health issue in developed nations, have become less prevalent. However, the advent of new infectious diseases poses new threats, while communicable diseases continue to be a major health issue in developing countries. Kerala has experienced an alarming rise in morbidity and mortality due to communicable diseases during the past decade. The state has encountered periodic outbreaks of various infectious diseases, including Nipah, West Nile, and Zika viruses. Additionally, the emergence of Primary Amoebic Meningoencephalitis (PAM) as a public health threat and the endemic status of dengue and leptospirosis in all fourteen districts emphasise the rising challenges in disease control. Communicable disease control requires a multi-faceted approach including vigilant surveillance, rapid detection, and thorough investigation. Promoting good hygiene practices through IEC and BCC, as well as providing prompt treatment, care and support to affected individuals are essential components. This paper offers a thorough examination of communicable diseases worldwide, in India, and specifically in Kerala.

Keywords: Communicable Diseases, Global Health, Public Health Challenges, Community Involvement

Copyright (c) 2025: Author(s). Published by Indian Society for Malaria and Other Communicable Diseases

Introduction

Communicable diseases (CDs) are illnesses spread from person to person through different means, including contact with contaminated objects or people, exposure to infected bodily fluids, insect bites, or airborne transmission.[1] Although often used interchangeably, the terms "infectious" and "contagious" delineate different perspectives of disease transmission. While all communicable diseases involve infection, not all infections are spreadable. Tetanus, for example, is an infection but it cannot be transmitted from person to person.[2]

The immense variety of microbes, coupled with their capacity to rapidly evolve and adjust to shifting populations, environments, and technological advancements, poses a constant and evolving threat to human health, persistently challenging our ability to prevent and control the disease.[3]

Socio-economic, environmental, and behavioural conditions, coupled with global mobility through travel and migration, contribute to the increased spread of CDs. Vaccine-preventable, food-borne, zoonotic, and healthcare-associated communicable diseases pose significant risks to human health and can jeopardise global health security.[4]

The 21st century has seen a dramatic rise in both communicable and non-communicable diseases (NCDs), significantly impacting global health and well-being. Historically, factors such as migration, conflict, and trade contributed to the widespread dissemination of infectious diseases (IDs) with devastating consequences.[5]

Emerging infectious diseases are newly identified infections or previously existing diseases that have recently increased in prevalence or have the potential to rapidly spread in the near future. This category encompasses both newly identified diseases and existing diseases with altered characteristics. More than thirty new infectious agents have been identified worldwide in the last 30 years. A significant portion, 60%, are zoonotic, and over two-thirds of these zoonotic diseases originated from wildlife.[6,7] A comprehensive overview of communicable diseases at global and national levels is essential for effectively addressing Kerala's public health challenges.

Global Scenario

Emerging and re-emerging infections often trigger widespread epidemics or pandemics, causing immense loss of life and generating global fears and anxiety as they rapidly spread across borders. While medical science has made significant strides and improved public health, communicable diseases continue to pose a substantial challenge in the 21st century. In 2019, CDs claimed 3 million young lives globally, and an additional 30 million years of healthy life were lost due to disabilities caused by these diseases. This accounted for 57.3% of the total CD burden across all age groups, equating to 288.4 million disability-adjusted life years (DALYs).[8] Among the 85 pathogens studied, bacterial infections were the leading cause of disease burden, responsible for 415 million of the total 704 million DALYs. Viral, parasitic, and fungal infections contributed 178 million, 172 million, and 18.5 million DALYs, respectively. Tuberculosis (65.1 million DALYs), malaria (53.6 million), and HIV or AIDS (52.1 million) were the most impactful pathogenic diseases observed, with malaria being the primary cause of disease burden in children under five, accounting for 37.2 million DALYs.[9]

Approximately 39.9 million people were living with HIV at the end of 2023 globally. This included approximately 38.6 million (34.9 – 43.1 million) adults aged at least 15 years, while the remaining 1.4 million (1.1–1.7 million) were children.[10] In 2023, the number of new HIV infections worldwide decreased to 1.3 million from 2.1 million in 2010, a 39% decline. However, the AIDS-related death toll remained high at 630,000. Women and girls bore a disproportionate burden, representing 44% of all new infections.[11]

Approximately 10.6 million (9.9–11.4 million) individuals worldwide were newly diagnosed with tuberculosis in 2022. The demographic consists of 55% men, 33% women, and 12% children aged below fifteen. The number of people diagnosed with and treated for TB recovered significantly in 2022, following a sharp decline attributed to COVID-19 disruptions in 2020.[12]

Among the vector-borne diseases, malaria is one of the leading causes of morbidity and mortality globally. An estimated 249 million (225–278 million) people contracted malaria in 85 affected countries in 2022, resulting in approximately 6,31,000 deaths.[13] The World Health Organization (WHO) has recently added the routine use of malaria vaccines to its malaria prevention strategy for children living in regions where the disease is prevalent.

Bangladesh made history in 2023 by becoming the first nation to successfully eradicate visceral leishmaniasis, also called kala-azar, as a significant public health threat. Joining Maldives, Sri Lanka and Thailand.[14] Bangladesh became the fourth country in the WHO South-East Asia Region to eradicate Lymphatic filariasis as a public health concern in 2023.

Poliomyelitis (polio) is a highly contagious viral disease that usually affects children under 5 years of age. Nevertheless, people of all ages who are not vaccinated can contract the disease. In a positive development, no cases of poliovirus were reported outside of Afghanistan and Pakistan in 2023, where a total of 12 cases were identified.[15]

A total of 304 million individuals were affected by chronic

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

hepatitis globally in 2022, with 254 million cases of hepatitis B and 50 million cases of hepatitis C. There was a decrease in new viral hepatitis B and C infections, dropping from 2.5 million cases in 2019 to 2.2 million cases in 2022. Africa was the epicentre of the global hepatitis B outbreak in 2022, contributing to 63% of the estimated 771,000 new cases worldwide.[16] South-East Asia and the Eastern Mediterranean region showed the highest number of new hepatitis C infections in 2022, with 225,000 and 183,000 cases, respectively.

Indian Scenario

The prevalence of infectious diseases is significantly higher in developing nations such as India, exacerbated by a complex interplay of environmental, socio-economic and demographic factors. India faces a heightened risk of CDs due to prevalent factors such as poor sanitation, hygiene, and access to clean drinking water.[17] Despite decades of national programmes combating CDs, India continues to grapple with a significant burden of these illnesses, even as it undergoes both population and disease pattern shifts. India's public health initiatives have achieved significant milestones, including the complete eradication of smallpox in 1980 and India was declared polio-free by the WHO in 2014. In addition to this, India was declared yaws-free by the WHO in 2016 and eliminated Maternal and Neonatal tetanus in 2015. India was declared guinea worm disease-free in 2000. India achieved the WHO's target of less than one Leprosy case per 10,000 population in 2005. The Government aims to eradicate TB by 2025 through its National TB Elimination Programme (NTEP). The government of India has implemented a phased plan, the National Framework for Malaria Elimination (NFME), to completely eradicate malaria in India by 2030. The programme aims to achieve zero indigenous malaria cases by 2027. A major step towards eliminating Lymphatic filariasis (LF) as a public health issue by 2030 is the implementation of the National Programme to Eliminate Lymphatic filariasis (NPELF).[18] The important CDs are given in Table 1.

Table 1.Communicable Diseases

Water-Borne/ Food-Borne	Acute diarrhoeal disease
	Cholera
	Typhoid
	Hepatitis A*
	Hepatitis E
	Poliomyelitis
	Shigellosis*
	Astro virus
Air-Borne	Chickenpox
	Measles
	Mumps
	Influenza
	Diphtheria
	Whooping cough
	Acute respiratory infections
	Tuberculosis
	H1N1
	Leprosy[@]
	COVID-19
Vector-Borne	Malaria
	Lymphatic filariasis (LF)
	Dengue
	Chikungunya
	Zika
	Japanese encephalitis (JE)
	West Nile (WN)
	Kyasanur Forest Disease (KFD)
	Scrub typhus
	Kala-azar
	Chandipura
Animal-Borne	Leptospirosis
	Rabies
	Plague
	Nipah
	Monkeypox*
Food-borne	Noroviruses
	Salmonellosis
Sexually transmitted	HIV/ AIDS
	Hepatitis B
	Syphilis
	Gonococcal infection
Blood-borne	Hepatitis C
	Hepatitis D

*Diseases such as Hepatitis A, hepatitis C, shigella, and monkeypox can be sexually transmitted.

[@]Likely transmitted through airborne droplets when an infected person coughs or sneezes.

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

Among the communicable diseases, vector-borne diseases (VBDs) continue to be a significant public health concern in India. Malaria is a widespread public health issue in India, affecting predominantly the 95% of the population residing in endemic areas. Notably, 80% of the country's malaria cases are concentrated in just 20% of the population living in remote, tribal, hilly, and inaccessible regions. Malaria poses a substantial health threat to India, causing significant morbidity and mortality.[19] India reported 24,18,848 malaria cases and 723 deaths from 2017 to May 31, 2024. The year-wise malaria cases and deaths reported in India are shown in Figure 1.

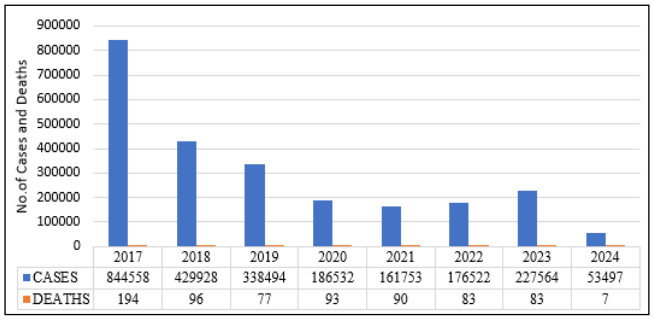


Figure 1.Malaria Cases and Deaths Reported in India (2017–May 31, 2024)

Dengue is the world's most common vector-borne disease, affecting approximately 100–400 million people annually. Nearly half of the global population is at risk of infection.[20] West Bengal, Uttar Pradesh, Punjab, Haryana, Delhi, Gujarat, Kerala, Karnataka and Tamil Nadu are Indian states heavily affected by dengue. A total of 13,10,544 dengue fever cases and 2,008 deaths were reported from 2017 to June 30, 2024, in India.[21] The year-wise dengue fever cases and deaths recorded in India are shown in Figure 2.

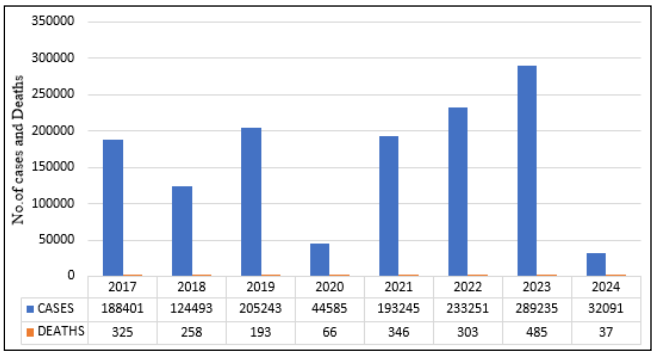


Figure 2.Dengue Fever Cases and Deaths Reported in India (2017–June 30, 2024)

Chikungunya is a mosquito-borne viral illness that causes severe, often disabling symptoms resembling dengue fever, but unlike dengue, it is not fatal.[22] Since its re-emergence in 2006, chikungunya has become a significant global health concern. In 2021, the maximum number of chikungunya cases was reported from Karnataka (38,557), followed by Gujarat (32,351). Chikungunya has witnessed a striking surge in recent years, escalating from 67,769 cases in 2017 to 2,00,064 cases in 2023 and during the last eight years (2017 to June 30, 2024), a total of 7,88,036 chikungunya cases were reported from India.[23]

Lymphatic filariasis (LF) disrupts the lymphatic system, causing painful, abnormal swelling of body parts, severe disability, and social stigma. LF threatens over 882 million people in 44 countries.[24] LF is classified as a neglected tropical disease (NTD) due to its devastating impact on impoverished communities, causing widespread disability and illness. These communities often lack essential resources such as healthcare and sanitation, exacerbating the disease's burden.

In India, LF cases have been recorded from Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Jharkhand, Karnataka, Gujrat, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal, Pondicherry, Andaman & Nicobar Islands, Daman & Diu, Dadra & Nagar Haveli and Lakshadweep. Indigenous cases have been reported from about 339 districts in 20 states/ UTs. As of 2023, 6.19 lakhs of lymphedema and 1.26 lakhs of hydrocele cases were reported from India.[25]

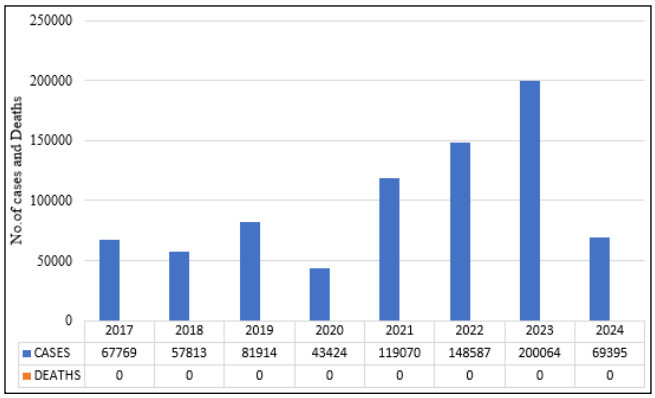


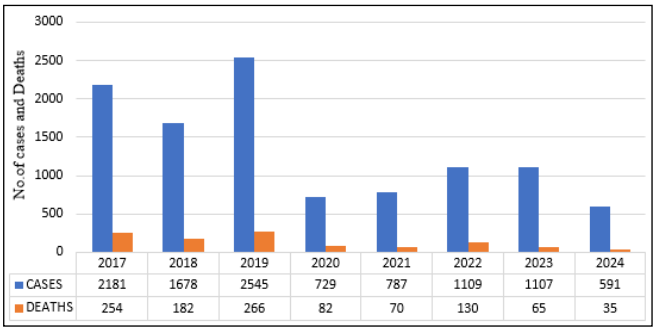
Figure 3.Chikungunya Cases and Deaths Reported in India (2017–June 30, 2024)

LF is a priority disease slated for eradication by 2027, and India has adopted a five-pronged approach: Mission mode MDA, Morbidity Management and Disability Prevention (MMDP), Vector Surveillance and Management, High-level advocacy, and Innovative approaches for the elimination of LF.[26]

Japanese encephalitis (JE) is a serious mosquito-borne viral disease that can cause severe neurological complications and death, primarily affecting children.[27] JE situation analysis indicated that a total of 10,727 cases and 1,084 deaths (CFR: 10.11%) were reported in India from 2017 to July 31, 2024. In 2023, Assam reported 525 cases with 34 deaths (CFR: 6.48%), followed by Uttar Pradesh - 92 cases and 3 deaths (CFR: 3.26%), Meghalaya with 89 cases

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

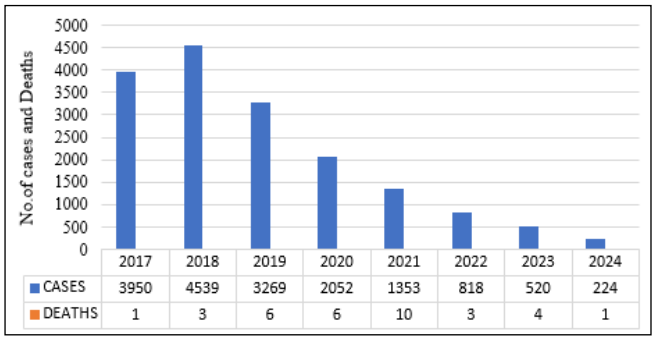
and Bihar - 70 cases and 15 deaths (CFR: 21.43%). This indicates that unlike other mosquito-borne diseases, the case fatality rate is more for JE. However, there has been a general decline in JE cases in India over the years due to increased awareness, vaccination programmes and improved healthcare infrastructure. The year-wise JE cases and deaths are shown in Figure 4.



	2017	2018	2019	2020	2021	2022	2023	2024
CASES	2181	1678	2545	729	787	1109	1107	591
DEATHS	254	182	266	82	70	130	65	35

Figure 4.Japanese Encephalitis Cases and Deaths in India (2017–July 31, 2024)

Visceral leishmaniasis (VL), commonly known as kala-azar, is a parasitic infection transmitted by sandflies. Kala-azar has been a persistent health problem in India, especially affecting the states of Bihar, Jharkhand, West Bengal and Uttar Pradesh. A total of 18,725 cases and 34 deaths were reported in India from 2017 to June 30, 2024.[28] India has made significant progress in combating kala-azar, with cases plummeting from 44,533 in 2007 to just 520 in 2023. The year-wise kala-azar cases and deaths reported in India since 2017 are shown in Figure 5. There was a significant reduction in HIV-VL coinfection cases reported in India, falling from 5,950 in 2017 to just 595 by 2023. India reported a substantial decline in Post-Kala-Azar Dermal Leishmaniasis (PKDL) cases, from 1982 in 2017 to just 314 in 2023.[28]

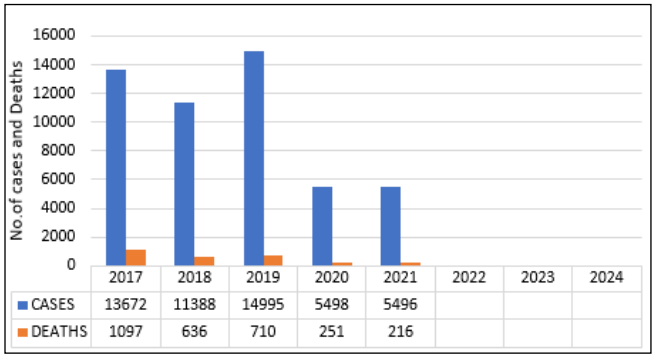


	2017	2018	2019	2020	2021	2022	2023	2024
CASES	3950	4539	3269	2052	1353	818	520	224
DEATHS	1	3	6	6	10	3	4	1

Figure 5.Kala-Azar Cases and Deaths in India (2017–June 30, 2024)

Acute encephalitis syndrome (AES), characterised by fever, abdominal pain, recurrent vomiting, lethargy, convulsions, and loss of consciousness, is a major public health concern in India. The National Vector Borne Disease Control Programme (NVBDCP) recorded a range of 10,867 to 13,672 AES cases each year during the period 2014 to 2017. Most of the AES cases were reported from Assam, Uttar Pradesh, West Bengal, Odissa, Tamil Nadu, Karnataka, Manipur and Tripura. A total of 51,499 AES cases and 2,910 deaths (CFR: 5.65%) were reported from India from 2017 to 2021.[29] The year-wise AES cases and deaths reported in India from 2017 to 2021 are given in Figure 6.

As of August 1, 2024, a rise in AES cases has affected children below the age of 15 years in Gujarat and neighbouring states, resulting in 59 fatalities among 148 reported cases (140 from 24 districts of Gujarat, 4 from Madhya Pradesh, 3 from Rajasthan and 01 from Maharashtra). Chandipura virus (CHPV) has been confirmed in 51 cases.[30]



	2017	2018	2019	2020	2021	2022	2023	2024
CASES	13672	11388	14995	5498	5496			
DEATHS	1097	636	710	251	216			

Figure 6.Acute Encephalitis Syndrome (AES) Cases and Deaths Reported in India (2017–2021)

Among the water-borne diseases, Acute Diarrhoeal Disease (ADD) remains a significant public health issue in India, particularly affecting children below five. Lack of access to clean water and proper sanitation facilities contributes to the spread of diarrhoea-causing pathogens. The prevalence of acute diarrhoea has been declining over the years due to increased awareness, improved sanitation, etc. The widespread availability and use of Oral Rehydration Solution (ORS) has significantly reduced diarrhoea-related deaths. In India, a total of 1,32,48,991 ADD cases and 3,245 deaths were reported during 2020 and 2021.[31]

Cholera is a global health concern that can lead to epidemics in India. This disease disproportionately affects impoverished communities heavily reliant on contaminated water sources for essential activities like drinking, cooking, and personal hygiene. India's extensive coastlines, coupled with poor sanitation, contaminated drinking water, overcrowding, and a conducive climate, make it highly susceptible to cholera outbreaks.[32] The disease is caused by Vibrio cholerae 01 or 0139. Substantial investments in water supply and sanitation infrastructure are essential for effectively controlling cholera and other diarrhoeal diseases.[33] A total of 966 cholera cases and 08 deaths were reported in India during 2020 and 2021.[31]

Typhoid fever, also known as enteric fever, is caused by Salmonella bacteria. The disease is endemic in India and has

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

been a growing concern in recent years. Children are at the greatest risk of typhoid, particularly in communities lacking access to clean water and proper sanitation. Urbanisation and climate change are fueling the global spread of typhoid, particularly in areas lacking clean water and sanitation. The increasing ineffectiveness of antibiotics is exacerbating the problem.[34] In 2020, India reported 11,97,455 typhoid cases and 144 deaths. In 2021, the number of typhoid cases increased to 13,80,882 and 229 deaths.[31]

The Ministry of Health and Family Welfare (MoH&FW), Govt. of India initiated a two-phase 'Stop Diarrhoea' campaign in 2024. A preparatory phase ran from 14th to 30th June 2024, followed by the main campaign period from July 1 to August 31, 2024.[35]

Diphtheria is a severe bacterial infection primarily affecting the nose and throat. During 2001–2015, India contributed to half of the diphtheria cases reported globally.[36] A total of 5,263 diphtheria cases and 71 deaths were reported in India during 2020 and 2021 (Table 2).

Whooping cough, or pertussis, is a highly contagious respiratory illness caused by the *Bordetella pertussis* bacteria. Spread through respiratory droplets, it can infect anyone, but infants, young children, pregnant women, and the elderly are particularly vulnerable. Vaccination is crucial for prevention, as whooping cough can lead to severe complications like pneumonia, brain damage, and even death.

Measles is highly contagious, with each individual capable of spreading it to 9–18 others. Symptoms like fever, cough, runny nose, and rash typically emerge 10–12 days after exposure.[37]

Hepatitis is a liver inflammation caused by various infectious and non-infectious factors, potentially leading to severe and even fatal health issues. Hepatitis A, B, C, D and E are five distinct viruses that cause liver disease. They vary significantly in terms of how they spread, the severity of illness they cause, their geographic prevalence, and the methods used to prevent them. India had the second-highest global burden of hepatitis B and C infections, surpassed only by China. The National Viral Hepatitis Control Programme (NVHCP) aims to reduce the prevalence and impact of these diseases.[38]

Pneumonia is a lung infection caused by various germs, including bacteria, viruses, and fungi. Common symptoms include fever, cough, breathing difficulties, loss of appetite, headache and confusion. India reported a significant increase in pneumonia cases and deaths between 2020 and 2021. The number of cases jumped from 4,23,144 in 2020 to 4,72,789 in 2021, while deaths rose from 4,393 to 14,198 during the same period (Table 2).

Meningococcal disease is a deadly infection caused by the bacteria *Neisseria meningitidis*. It can lead to dangerous inflammation of the protective membranes surrounding the brain and spinal cord, known as meninges. It can occur both in epidemic and endemic forms in India. In 2020, 28,682 meningococcal meningitis cases and 47 deaths were reported in India. However, in 2021, meningococcal meningitis cases and deaths were reduced to 2,153 and 35, respectively (Table 2).

Leprosy, also called Hansen's disease, is an acute bacterial infection caused by *Mycobacterium leprae*. It is a major public health concern and is endemic in some states and union territories of India. The National Leprosy Eradication Programme (NLEP) focuses on early detection, free treatment, medical rehabilitation, and reducing stigma. Despite the challenges posed by COVID-19 to healthcare services during 2020–2021, India identified and provided free treatment to 65,147 new cases of leprosy. In March 2021, a total of 79,898 patients were undergoing free multidrug therapy (MDT) treatment for leprosy across the country.[39]

Syphilis is a highly contagious sexually transmitted infection (STI) caused by the bacteria, *Treponema pallidum*. It primarily transmits through vaginal, oral, and anal sex. Early symptoms include sores, rashes, and other potential signs. India is grappling with a resurgence of syphilis, primarily due to shifts in sexual behaviour, misconceptions, and social stigma surrounding STIs, combined with improved diagnostic tools and heightened public awareness. To curb this trend, promoting education about safe sexual practices and contraception is crucial.

Gonococcal infection (Gonorrhea) a STI caused by *Neisseria gonorrhoeae*, is a significant contributor to health problems among sexually active individuals. In 2020, a total of 27,128 gonococcal infections and 6 deaths were reported in India. However, in 2021, the number of gonococcal infections rose to 3,59,880 with no deaths (Table 2).

India bears the heaviest global burden of tuberculosis (TB), accounting for approximately one-fifth of all cases worldwide. Although the number of detected cases decreased from 2,404,815 in 2019 to 1,805,670 in 2020, it rebounded to 2,135,830 in 2021. The National Strategic Plan (NSP) for TB in India aims to eliminate TB by 2025 through a comprehensive approach that includes innovative strategies and interventions. This plan focuses on adopting new drugs, regimens, and diagnostics, expanding the use of information and communication technology, and implementing health financing technologies to strengthen India's efforts to combat TB.[40]

Pandemic influenza (H1N1) 2009 began in Mexico and the United States in early 2009. While initially referred to as

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

"swine flu", it was later discovered to be a new reassorting strain of H1N1 that had not been previously seen in pigs.[41] A total of 86,405 H1N1 cases and 7,422 deaths were reported in India during 2017 to 2021.[31]

The incubation period of an infectious disease, the time between exposure to the causative agent and the onset of symptoms, is crucial during outbreaks. It helps to determine when infected individuals will become symptomatic and contagious. The incubation period of a disease can provide clues about its severity and duration. The incubation period can also suggest potential treatment options. The details regarding the incubation period and expected day of closing the outbreak of infectious diseases are shown in Table 3.

Table 2.Communicable Diseases Reported in India during 2020 and 2021[31]

Diseases	2020		2021	
	Cases	Deaths	Cases	Deaths
Acute Diarrhoeal Diseases (ADD)	67,60,129	1,870	64,88,862	1,375
Cholera	130	2	836	6
Typhoid (enteric fever)	11,97,455	144	13,80,882	229
Acute Respiratory Infections (ARI)	2,33,73,520	6,229	1,73,95,275	9,872
Diphtheria	1,586	24	3,677	47
Whooping cough	11,007	50	3,47,681	3
Measles	8,533	3	5,170	2
Viral hepatitis (all causes)	1,05,617	420	88,571	361
Pneumonia (all causes)	4,23,144	4,393	4,72,789	14,198
Meningococcal meningitis	28,682	47	2,153	35
Rabies	733	15	47,291	55
Syphilis	20,212	23	28,867	1
Gonococcal infection	27,128	6	3,59,880	0

Table 3.Communicable Diseases - Incubation Period and Outbreak Closure Period

S. No.	Diseases	Incubation Period (Median) (in Days)	Expected Day of Closing the Outbreak* (in Days)
1	Anthrax	1–7	14
2	Brucellosis	14–28	56
3	Chandipura virus fever	1–2	4
4	Chickenpox	10–21	42
5	Chikungunya	4–8	16
6	Cholera	1–5	10
7	Crimean–Congo Haemorrhagic fever	5–6	12
8	Dengue	4–10	20
9	Diphtheria	2–5	10
10	Ebola	2–21	42
11	Hepatitis A	15–45 (30 days)	60
12	Hepatitis E	14–70 (40 days)	80
13	Human rabies	2–3 months (1 week to 1 year)	-
14	Japanese encephalitis	4–14	28
15	Influenza	1–2	4
16	COVID-19	5–14	28
17	Kyasanur forest disease	3–8	16

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

18	Leptospirosis	5–14	28
19	MERS CoV	2–14	28
20	Monkeypox	6–13	26
21	Malaria	7–30	60
22	Measles	7–21	42
23	Mumps	14–28	56
24	Meningococcal meningitis	1–10	20
25	Nipah virus	21	42
26	Pertussis	9–10	20
27	Poliomyelitis	7–10	20
28	Rubella	12–23 (14)	46
29	Scrub Typus	6–21	42
30	Shigellosis	1–3	6
31	Typhoid (enteric fever)	7–14	28
32	West Nile fever	2–14	28
33	Yellow fever	1–7	14
34	Zika virus	3–14	28
35	Lyme disease	3–30	60
36	Toxoplasmosis	5–23	46

*Twice the incubation period since the last case reported

India's remarkable achievement in public health is evident in its ability to eradicate several fatal diseases, despite facing challenges such as limited resources, insufficient trained personnel, and inadequate infrastructure. The nation is now determined to eliminate communicable diseases that cause significant morbidity and mortality. India has successfully eradicated smallpox in 1977, plague (1994), guinea worm in 2000, leprosy (2005), polio (2014), neonatal tetanus (2015) and yaws (2016).[42] The diseases such as malaria, lymphatic filariasis and kala-azar are targeted for elimination within six years (Table 4).

Table 4.Status of Communicable Diseases in India: Past and Present

Disease	No. of Cases (Year)	Present Status
Polio	1,556 cases (2002)[43,44]	India completes 12 polio-free years as of January 2023
Yaws	3571 cases (1996)[45,46]	Based on the recommendations of the International Verification Team (IVT), WHO declared India free of Yaws on May 5, 2016.
Leprosy	0.47 million cases (1989–1990)[47,48]	Eliminate by the year 2005. The GoI has initiated the National Strategic Plan (NSP) and Roadmap for leprosy on January 30, 2023, to attain zero transmission of leprosy by 2027
Tuberculosis	8.5 million (1955–1958 ICMR National Survey)[49,50]	28,20,000 cases and 3,31,000 deaths (2022)
HIV/ AIDS	HIV was first detected in Chennai, India in 1986.[51,52]	2.5 million people living with HIV/ AIDS (2022)
Lymphatic filariasis	119 million people (2000)[53,54]	Targeted to eliminate LF by 2027 (2023)
Malaria	20,31,790 cases and 932 deaths (2000)[55,56]	Targeted to be free of malaria by 2027 and eliminate the disease by 2030
Kala-azar	22625 cases and 277 deaths (1995)[57,58]	Reported only 520 cases of kala-azar (2023) meeting WHO's elimination norm

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

Kerala Scenario

The epidemiological characteristics provide critical astuteness into public health needs, enabling effective programme planning and governance. Accurate and reliable health data is essential for making well-versed decisions about such an exercise. Accurate analysis and interpretation of local data are crucial for developing effective disease prevention and control strategies. To anticipate and mitigate disease outbreaks, we have gathered and analysed health data to determine their underlying causes and develop effective prevention methods.

Kerala, a state in southwestern India, occupies 38,863 square kilometres. Its geography is defined by the Arabian Sea to the west and the Western Ghats to the east. Geographically, Kerala is divided into three distinct zones: the highlands, the midlands, and the lowlands. Kerala lies between northern latitudes $8^0.17'.30''$ N and $12^0.47'.40''$ and east longitudes $74^0.27'.47''$ E and $77^0.37'.12''$ E.

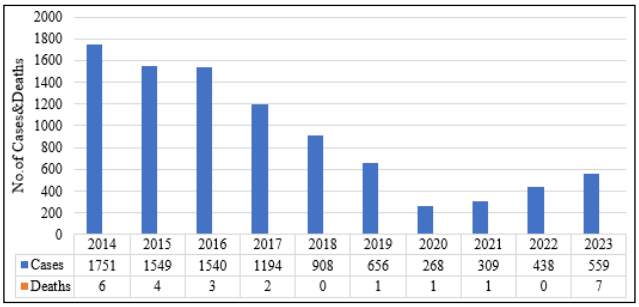
Kerala's administrative structure includes 14 districts, further divided into 152 community development blocks and 1364 villages. [59] With a population density of 859 per square kilometre, Kerala is considerably denser than the national average of 312. This high density is due to its population of 33.8 million. The high population density of Kerala, coupled with rapid urbanisation that has blurred the urban-rural distinction, has led to peculiar socio-environmental, sanitation, and health challenges. Developmental activities, characteristic consumeristic culture with modernised lifestyles involving rampant spread of pavement eateries, throwaway wastes, and littering the environment, perpetually unresolved waste management problems, increased vehicle density, and high carbon emissions have all contributed to these issues.

Due to its unique geographic, metrological, demographic, and socio-economic conditions, Kerala is particularly vulnerable to environmental degradation and health hazards. Despite its relatively strong healthcare infrastructure, high literacy and education status, and other advanced developmental indicators like high life expectancy, the state remains susceptible to various environmental disasters.

The general health of the Kerala population, regardless of age or socio-economic status, is compromised due to the region's environmental and climatic conditions. As a result, the population is exposed to a variety of communicable and non-communicable diseases. The population is also increasingly affected by lifestyle-related and degenerative diseases such as obesity, hypertension, various malignancies, and disorders resulting from malfunctioning vital organs and systems. Several diseases that were once thought to have been eradicated or effectively contained have recently resurfaced with greater virulence and spread. These include water-borne illnesses such as diarrhoea, cholera, typhoid, and epidemics of vector-borne diseases such as malaria, dengue, and chikungunya. Kerala has also become victim to the maiden epidemic attack of the Zika virus in 2021, which occurred in the capital city of Thiruvananthapuram.

The State Action Plan for Climate Change and Human Health in Kerala, developed by the National Centre for Disease Control (NCDC), warns that Kerala will likely experience a shift in infectious disease patterns due to climatic factors in the coming years.[60] It is also astonishing that people residing in coastal areas, waterlogged regions, and hilly areas are particularly susceptible to mosquito-borne diseases. According to reports, individuals from the central and southern regions of Kerala are more likely to experience viral fevers and require hospitalisation. This is attributed to their heightened vulnerability to climatic conditions such as increased rainfall, greater fluctuations in daily temperatures, and higher atmospheric humidity.[61] Among the sensitive diseases, water-borne diseases are prioritised, followed by viral, vector-borne, zoonotic, food-borne, heat-induced, nutritional, allergic, and cardiovascular diseases.

Malaria, which was once thought to be eradicated in Kerala by the early 1970s, has recently resurfaced in the region. A total of 9,172 malaria cases and 25 deaths were reported in Kerala during the last ten years (2014–2023). The year-wise malaria cases and deaths reported in Kerala during the past ten years are given in Figure 7. The number of malaria cases in Kerala significantly decreased from 2130 in 2006 to 559 in 2023. Although the number of deaths slightly increased from six to seven.[62]



	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Cases	1751	1549	1540	1194	908	656	268	309	438	559
Deaths	6	4	3	2	0	1	1	1	0	7

Figure 7.Malaria Cases and Deaths Reported in Kerala (2014–2023)

Although lymphatic filariasis has been brought under control in many of the traditionally endemic areas like Alappuzha and Ernakulam, it still persists at low levels in various regions of Kerala, including Palakkad and Malappuram districts.

For decades, Kerala has faced significant public health challenges due to recurring outbreaks of Aedes mosquito-borne diseases like dengue and chikungunya, resulting in substantial loss of life and resources, and strain on

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

the healthcare system. Dengue is the most severe Aedes-borne disease, characterised by high case prevalence, mortality, morbidity, and resulting suffering. The state of Kerala experienced a significant number of dengue fever cases over the past decade. Between 2014 and 2023, there were 71,741 confirmed cases of dengue, resulting in 436 deaths. Additionally, 1,762 cases of chikungunya were reported in the same timeframe (Fig 9). The recent first appearance of the Zika virus has worsened the situation.[63,64] Between 2021 and 2023, Kerala reported a total of 117 laboratory-confirmed Zika cases. The majority of cases were concentrated in Thiruvananthapuram district, with additional cases identified in Kollam, Kottayam, Ernakulam, and Kannur districts.[62] Although dengue and other Aedes-borne diseases have become widespread and endemic in most parts of Kerala, Thiruvananthapuram district continues to be the most severely affected.

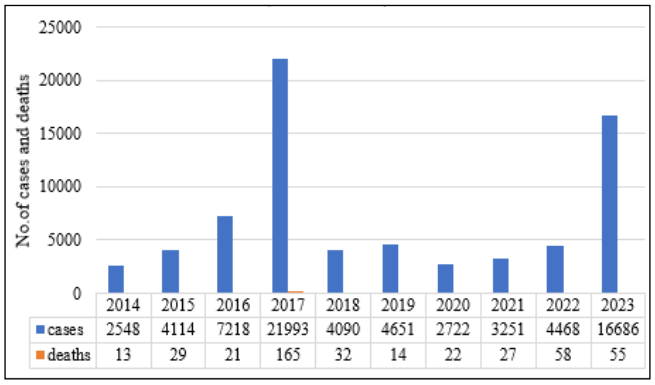


Figure 8.Dengue Fever Cases and Deaths Reported in Kerala (2014–2023)

The number of dengue fever cases in Kerala increased from 1,019 in 2006 to 16,686 in 2023, a 16-fold increase in 16 years. Similarly, the number of deaths due to dengue fever increased from 5 in 2006 to 55 in 2023, a staggering 11-fold rise over the same period.[62] The dengue fever cases and deaths reported in Kerala from 2014 to 2023 are given in Figure 8.

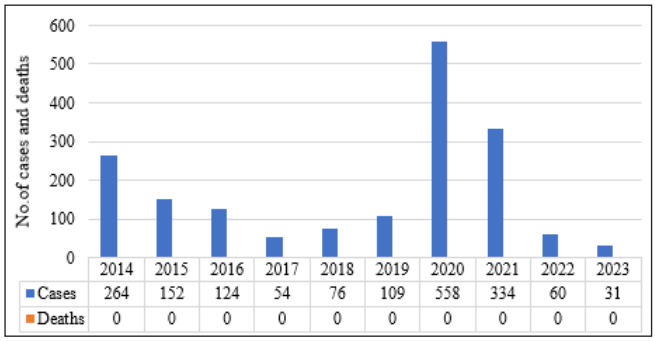


Figure 9.Chikungunya Cases and Deaths Reported in Kerala (2014–2023)

The number of clinically suspected chikungunya cases in Kerala drastically decreased from 70,731 in 2006 to 31 in 2023. Additionally, all laboratory-confirmed chikungunya cases in 2006 (54) were absent in 2023.[62] The observed decrease in chikungunya cases can be attributed, in part, to herd immunity developing within the population previously affected by the illness. A total of 1,768 cases of chikungunya were reported in Kerala from 2014 to 2023 (Table 5). There were no deaths from chikungunya reported in the state so far. The number of chikungunya cases reported from 2014 to 2023 is shown in Figure 9.

Japanese encephalitis (JE) and West Nile (WN) infections frequently occur in different regions of Kerala, resulting in a significant number of fatalities across the state's districts.[65,66] The number of JE/ AES cases in Kerala increased from 14 in 2006 to 56 in 2023, with a corresponding rise in deaths from 1 to 22.[62]

The emergence of scrub typhus as a significant public health threat in Kerala since 2012 has raised serious concerns about communicable diseases in the state. Kerala has reported a total of 5,725 scrub typhus cases and 97 deaths over the past decade (Table 5). The number of scrub typhus cases and associated deaths is presented in Figure 10.

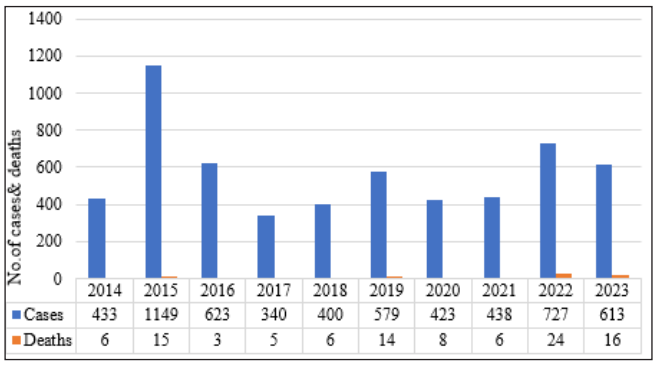


Figure 10.Scrub Typhus Cases and Deaths Reported in Kerala (2014–2023)

Acute diarrhoeal diseases (ADD) remain a major public health concern in Kerala. Over the past decade, Kerala reported a total of 43,92,315 ADD cases and 58 deaths (Table 5). Figure 11 illustrates the number of ADD cases and deaths reported in Kerala from 2014 to 2023.

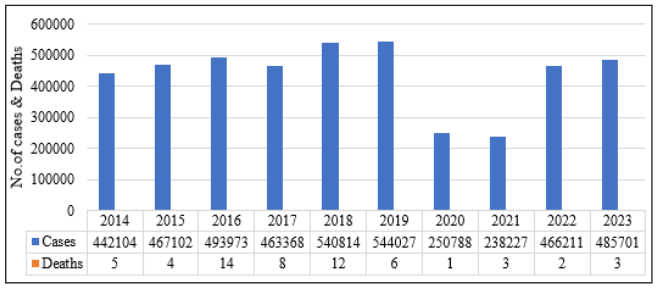


Figure 11.Acute Diarrhoeal Disease (ADD) Cases and Deaths Reported in Kerala (2014–2023)

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

Among other water-borne diseases, typhoid continues to pose a substantial challenge to Kerala's public health initiatives aimed at preventing and controlling communicable diseases. Typhoid cases in Kerala experienced a dramatic decline from 5,417in 2006 to 102 in 2023. The implementation of effective disease prevention and treatment strategies in Kerala is credited with this significant reduction, resulting in zero typhoid deaths in 2023.[62] The typhoid cases and deaths reported in Kerala over the period of 2014 to 2023 are given in Figure 12.

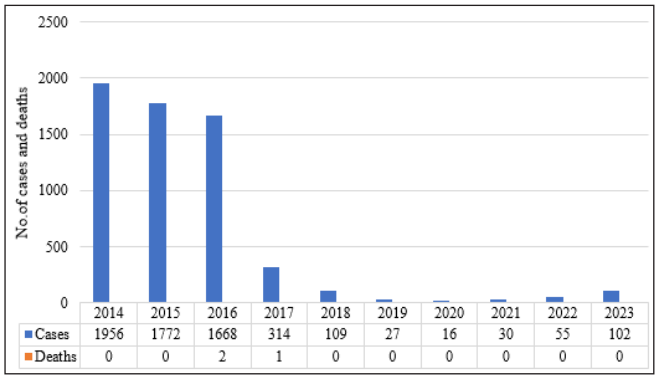


Figure 12.Typhoid Cases and Deaths Reported in Kerala (2014–2023)

The mortality rate of cholera, despite a significant increase in cases from 12 in 2006 to 26 in 2023, remains below 3%.[62] It is noteworthy that between 2014 and 2023, there were only 74 reported cases of cholera, resulting in just 2 deaths (Table 5). Kerala's disease prevention efforts have been highly successful, as evidenced by the low mortality rate associated with typhoid. In the past ten years, only three deaths were reported out of a total of 6,049 typhoid cases (Table 5).

The incidence of leptospirosis, a disease often referred to as 'rat fever', has significantly increased in recent years across the state, with numerous cases resulting in both deaths and long-term health complications. While sporadic cases were reported prior to the 1980s, the disease has now become a frequent occurrence.

The number of leptospirosis cases in Kerala increased from 1,821 in 2006 to 2,391 in 2023, while the number of deaths associated with the disease remained relatively stable at 104 and 103, respectively.[62] In Kerala, there were 16,238 reported cases of leptospirosis and 726 associated deaths between 2014 and 2023 (Table 5). The year-wise leptospirosis cases and deaths reported in Kerala (2014–2023) are given in Figure 13.

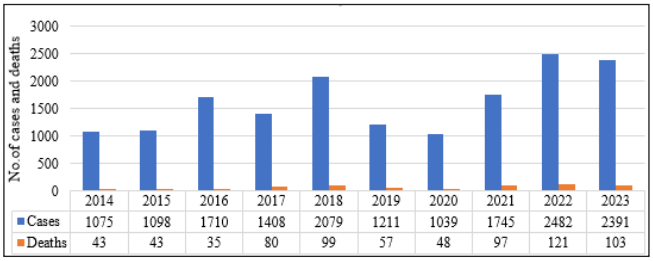


Figure 13.Leptospirosis Cases and Deaths Reported in Kerala (2014–2023)

Table 5.Communicable Diseases in Kerala – Total Number of Cases and Deaths from 2014 to 2023

Type of Disease	Name of Disease	Total Cases	Total Deaths
Vector-borne	Dengue	71,741	436
	Malaria	9,172	25
	Chikungunya	1,768	Nil
	Zika[1]	118	Nil
	Japanese encephalitis	29	5
	West Nile[2]	16	3
	Scrub typhus	5,725	97
Water-borne	Acute diarrhoeal diseases	43,92,315	58
	Cholera	74	2
	Typhoid	6,049	3
Zoonotic	Leptospirosis	16,238	726
Viral	Hepatitis A	12,027	73
	Hepatitis B	9,089	85
	Hepatitis C[3]	1,080	10
	Hepatitis E[4]	15	1
	H1N1	4,266	241

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

Viral	HFMD[5]	1,064	Nil
	Chickenpox[6]	84,288	49
	Monkeypox[7]	17	1
	Rabies[8]	46	46
	Nipah[9]	20	18
Bacterial	Diphtheria	207	10
	Shigella[8]	266	9
Protozoan	Primary Amoebic Meningoencephalitis (PAM)[10]	23	20
Bacteria, parasites, viruses	Food poisons[11]	5,767	4

The prevalence of hepatitis A and B in Kerala has increased significantly over the past decade, highlighting the urgent need for effective prevention strategies to combat the spread of these diseases. The predominant viral hepatitis reported in Kerala during the past decade are hepatitis A and B. The number of reported cases of hepatitis A in Kerala from 2014 to 2023 was 12,027, resulting in 73 deaths (Table 5). The year-wise hepatitis A cases and deaths reported in Kerala (2014–2023) are shown in Figure 14.

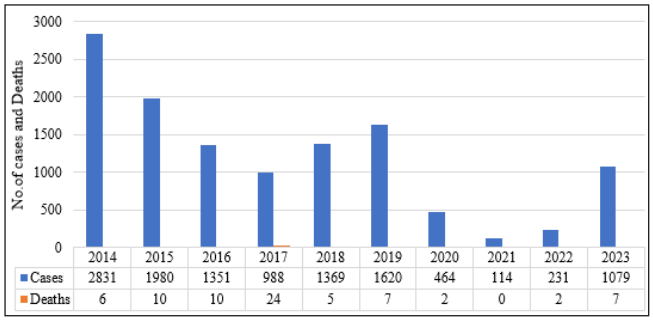


Figure 14.Hepatitis A Cases and Deaths Reported in Kerala (2014–2023)

Hepatitis B is a deadly liver infection caused by the Hepatitis B virus (HBV). Despite concerted efforts to contain hepatitis B outbreaks in Kerala, sporadic cases continue to emerge. Kerala's healthcare system has significantly reduced the of hepatitis B.[67] Kerala reported 9,089 hepatitis B cases and 85 deaths over the past decade (Table 5). The year-wise hepatitis B cases and deaths are shown in Figure 15.

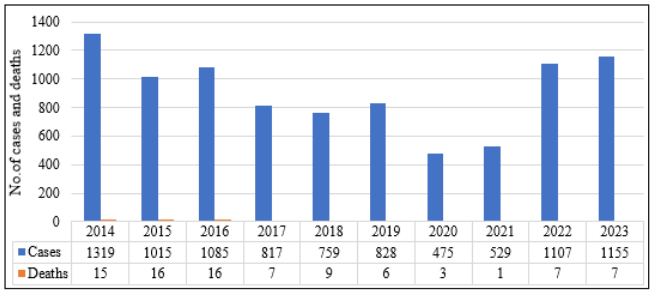


Figure 15.Hepatitis B Cases and Deaths Reported in Kerala (2014–2023)

The influenza virus, circulating as a human pathogen since at least the 16th century, is notorious for its recurrent epidemics and global pandemics.[68] Kerala's public health administration has been grappling with the ongoing threat of H1N1, which has resulted in 4,266 cases and 241 deaths in the last ten years (Table 5). The H1N1 cases and deaths reported in Kerala from 2017 to 2023 are presented in Figure 16.

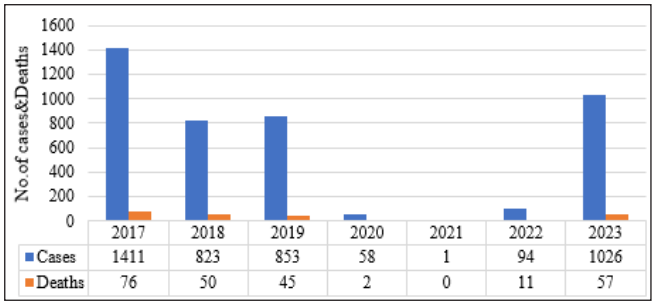


Figure 16.H1N1 Cases and Deaths Reported in Kerala (2017–2023)

The recent occurrences of monkeypox (MPX) and amoebic meningoencephalitis in Kerala have raised significant concerns. A total of 41 laboratory-confirmed amoebic meningoencephalitis cases have been reported in Kerala since 2016. The infection is mainly due to the free-living amoebae such as *Naegleria fowleri, Acanthamoeba and Vermamoeba vermiformis*. The case fatality rate for amoebic meningoencephalitis is extremely high, possibly exceeding 90%.[69] India's initial monkeypox case was identified in a 35-year-old man from Kerala who had recently travelled back from the United Arab Emirates on July 12, 2022[70] and since then Kerala has reported 17 confirmed cases of monkeypox. The state is also grappling with a concerning rise in food-borne diseases, posing a substantial threat to public health. Table 6 provides information on the morbidity and mortality rates of certain significant communicable diseases, based on national and state-level data.

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

Table 6.Comparative Data on Communicable Diseases Reported in India and Kerala in 2023

	India			Kerala		
Diseases	**Cases**	**Deaths**	**CFR (%)**	**Cases**	**Deaths**	**CFR (%)**
Malaria	227564	83	0.04	559	07	1.25
Dengue	289235	485	0.17	16686	55	0.33
Chikungunya	200064	Nil	Nil	31	Nil	Nil
Japanese encephalitis	1107	65	5.87	06	01	16.67
Kala-azar	520	04	7.70	13	Nil	Nil
H1N1	8125	129	1.59	1026	57	5.56

The case fatality rate of Japanese encephalitis (JE) was relatively higher than other communicable diseases, particularly at the state level. The seemingly high fatality rate of JE in the state might be ambiguous due to the limited number of reported cases and deaths. Caution should be exercised while drawing conclusions based on such data. Despite the potential limitations of the data, numerous reports suggest that the case fatality rate of JE remains high.[71,72]

COVID-19 is another devastating viral disease that has caused significant concern. The pandemic has resulted in a large number of illnesses and deaths. This disease is characterised by symptoms like fever, chills, and sore throat, among others. The data shows that globally there were 704,753,890 confirmed COVID-19 cases and 7,010,681 deaths. India reported a total of 45,035,393 cases and 533,570 deaths.[73] However, the actual number of cases and deaths is likely higher.

A 75-year-old man from Kerala recently got affected by Murine typhus, a rare bacterial disease. He had been travelling in Southeast Asia, specifically Vietnam and Cambodia, and experienced severe symptoms upon his return. This is the first recorded instance of Murine typhus in Kerala.[74]

Many researchers emphasise the importance of ecological considerations as a foundational element in infectious disease research and public health intervention planning. This approach provides a holistic perspective and research direction that benefits all stakeholders involved.

We urgently need to implement healthcare solutions that are both practical and inclusive. Community involvement is crucial for the success and long-term viability of national programmes. To effectively address public health issues like vector-borne diseases (VBDs), a participatory approach is crucial. This involves actively engaging individuals, community groups, and stakeholders at various levels to control and prevent the spread of these diseases. Multilevel community engagement is essential to ensuring ongoing participation in primary public health prevention efforts.

Community-based health education programmes should be implemented to promote positive behavioural changes in personal hygiene, sanitation practices, and environmental management. Field health staff and workers in Local Self-Governments (LSGs) should have their duties expanded to prioritise disease prevention and control activities, with sufficient time allocated in their schedules.

Many health functionaries feel that there is a lack of monitoring and supervision at all levels of the healthcare system, from the state's top level to the subcenter. The severity and urgency of health disasters and public health crises are often overlooked or neglected due to various factors.

There is often little information to support the health professional's repeated warnings about impending disease outbreaks, for example, the public anticipates leptospirosis, a zoonotic disease and Aedes-borne diseases such as dengue, chikungunya, and Zika outbreaks following the onset of the rainy season. Without any more inspection or monitoring, the health officials issue these warnings once a year. In addition to underreporting illnesses, this activity seems to be an attempt to evade inspection from superiors and exacerbates the public health system's decline. In the end, this exacerbates the spread of numerous infectious diseases throughout the region. Any degree of hostility can seriously impede the accomplishment of public health goals and objectives.

The health department should implement a robust system for collecting, recording, and reporting actual field conditions, cases, and severities of communicable diseases (CDs). This system would enable early prediction of disease epidemics, timely alerts, and adequate infrastructural preparedness.

Conclusion

Kerala has been grappling with the ongoing threat of communicable diseases (CDs), which have seen a resurgence in recent times. The interplay between climate change and

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

human behaviour is contributing to the rise and recurrence of CDs. Despite having state- and national-level disease control programmes, only a handful of diseases have been eliminated or eradicated. This is mainly because of ecological changes, human demographics and behaviour, microbial adaptation and change, technology and health care, travel, trade and industry, disruption in public health measures, susceptibility to infection, etc. The effective management of public health challenges in any locality requires timely intervention, prompt investigation of disease outbreaks, meticulous data collection on diseases, and thorough assessment of disease prevention and control activities. Priority diseases must be identified and a public-private partnership should be formed to accelerate disease control efforts with a sense of urgency. These efforts should continue until the goal of disease eradication or elimination is achieved.

Acknowledgement: We gratefully acknowledge the support received from the Director of Health Services, Kerala state. We also thank Shri R Anantha Krishna, former data analyst at Nielsen IQ, Chennai, Tamil Nadu for assisting in the preparation of the article.

Conflict of Interest: None

Source of Funding: None

Authors' Contribution: RR- Conceptualization and wrote original draft, SBA- Data Analysis, MSS– Assisted in draft writing DSD– edited the draft, KR– Reviewed the manuscript.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process: None

References

1. Edemekong PF, Huang B. Epidemiology of prevention of communicable diseases. StatPearls [Internet]. Treasure Islands (FL): StatPearls Publishing; 2024 Jan 24. Available from: [PubMed] [Google Scholar] https://www.ncbi.nlm.nih.gov/books/NBK470303/ Accessed on 20 May 2024
2. Correll R. Infectious diseases. Difference between communicable and infectious diseases. It's more than just semantics [Internet]. Very well health; 2023 Sep 5. Available from: https://www.verywellhealth.com/the-difference-between-communicable-and-infectious-diseases-4151985 - Accessed on 20 May 2024
3. Tulchinsky TH, Varavikova EA. Communicable diseases. The new public health. 3rd ed. Academic Press; 2024. p. 149-236. [Google Scholar]
4. Carpenter A, Waltenberg MA, Hall A, Kile J, Killerby M, Knust B, Negron M, Nichols M, Wallace RM, Behravesh CB, McQuiston JH; The Vaccine Preventable Zoonotic Disease Working Group. Vaccine preventable zoonotic diseases: challenges and opportunities for public health progress. Vaccines (Basel). 2022 Jul;10(7):993. [PubMed] [Google Scholar]
5. Baker RE, Mahmud AS, Miller IF, Rajiv M, Rasambainarivo F, Rice BL, Takahashi S, Tatem AJ, Wagner CE, Wang LF, Wesolowski A, Metcalf CJ. Infectious disease in an era of global change. Nat Rev Microbiol. 2022;20(4):193-205. [PubMed] [Google Scholar]
6. Bhatia R, Narain JP, Plianbangchang S. Emerging infectious diseases in East and South-East Asia. In: Detels R, Sullivan SG, Tan CC, editors. Public health in East and South-East Asia. Berkely, USA: University of California Press; 2012. p. 43-78.
7. World Health Organization (WHO). Combating emerging infectious diseases in the South-East Asia Region. WHO Regional Office for South-East Asia Region; 2005. [Google Scholar]
8. GBD 2019 Child and Adolescent Communicable Disease Collaborators. The unfinished agenda of communicable diseases among children and adolescents before the COVID-19 Pandemic, 1990-2019: a systematic analysis of the Global Burden of Disease Study 2019. Lancet. 2023;402(10398):313-35. [PubMed] [Google Scholar]
9. Dall C. Study highlights heavy global burden of infectious diseases. CIDRAP; 2024.
10. World Health Organization [Internet]. HIV statistics, globally and by WHO region, 2024. Epidemiological fact sheet-2024 July 22; [cited 2024 Aug 11]. Available from: https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/j0482-who-ias-hiv-statistics_aw-1_final_ys.pdf?sfvrsn=61d39578_3#:~:text=Source%3A%20UNAIDS%2FWHO%20estimates%2C%202024.&text=Approximately%2039.9%20million%20%5B36.1%E2%80%9344.6,(15%2B%20years%20old). Accessed on 20 May 2024.
11. UNAIDS [Internet]. Global HIV& AIDS statistics-Fact Sheet 2024; [cited 2024 Aug 11]. Available from: https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf Accessed on 13 June 2024
12. World Health Organization. Global Tuberculosis report 2023 [Internet]. WHO 2023 Nov. 7/ Global report. License: CC BY-NC-SA 3.0 IGO; [cited 2024 Aug 12]. Available from: https://www.who.int/teams/global-tuberculosis-programme/tb-reports/global-tuberculosis-report-2023 .Accessed on 8 August 2024
13. World Health Organization [Internet]. World Malaria Report 2023; 2023 Nov 30 [cited 2024 Aug 15]. Available from: https://www.who.int/teams/global-malaria-programme/reports/world-malaria-report-2023 Accessed on 5 August 2024
14. World Health Organization (WHO). Process of validation of elimination of kala-azar as a public health problem in South-East Asia [Internet]. WHO Regional Office

for South-East Asia; 2016 [cited 2024 Aug 16]. Available from: https://iris.who.int/handle/10665/331974 [Google Scholar]
15. Global Polio Eradication Initiative [Internet]. About polio; [cited 2024 Aug 17]. Available from: https://polioeradication.org/polio-today
16. World Health Organization. Global hepatitis report 2024: action for access in low- and middle-income countries [Internet]. World Health Organization; 2024 [cited 2024 Aug 17]. Available from: https://iris.who.int/handle/10665/376461 [Google Scholar]
17. Dikid T, Jain SK, Sharma A, Kumar A, Narain JP. Emerging & re-emerging infections in India: an overview. Indian J Med Res. 2013;138(1):19-31. [PubMed] [Google Scholar]
18. Ministry of Health and Family Welfare, Government of India. Disease Eradication Programs under Union Health Ministry. Three diseases- malaria, filaria & kala-azar are under elimination program [Internet]. Delhi: PIB; 2021 Jul 23 [cited 2024 Aug 18]. Available from: https://www.pib.gov.in/PressReleasePage.aspx?PRID=1738154 Accessed on 11 August 2024.
19. Directorate of National Vector Borne Disease Control Program. The countrywide malaria situation, 2017 to May 2024 [Internet]. Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; [cited 2024 Aug 17]. Available from: https://ncvbdc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=420&lid=3699 Accessed on 11 July 2024.
20. World Health Organization. Dengue and severe dengue [Internet]. Key facts; 2024 Apr 23 [cited 2024 Aug 17]. Available from: https://www.who.int/news-room/fact-sheets/detail/dengue-and-severe-dengue Accessed on 10 August 2024
21. National Centre for Vector Borne Diseases Control (NCVBDC). Dengue situation in India [Internet]. NCVBDC, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; [cited 2024 Aug 15]. Available from: https://ncvbdc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=431&lid=3715 Accessed on 10 August 2024
22. Simon F, Savini H, Parola P. Chikungunya: a paradigm of emergence and globalization of vector-borne diseases. Med Clin North Am. 2008;92(6):1323-43. [PubMed] [Google Scholar]
23. National Centre for Vector Borne Diseases Control (NCVBDC). Chikungunya situation in India [Internet]. NCVBDC, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; [cited 2024 Aug 4]. Available from: https://ncvbdc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=486&lid=3765 Accessed on 18th July 2024.
24. World Health Organization. Lymphatic filariasis [Internet]. Key facts; 2023 Jun 1 [cited 2024 Oct 1]. Available from: https://www.who.int/news-room/fact-sheets/detail/lymphatic-filariasis Accessed on 11 August 2024.
25. National Centre for Vector Borne Diseases Control (NCVBDC). Lymphatic filariasis, magnitude of the disease in India [Internet]. NCVBDC, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; [cited 2024 Aug 15]. Available from: https://ncvbdc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=455&lid=3732 Accessed on 9 July 2024.
26. Ministry of Health and Family Welfare, Government of India. Launching of second phase of bi-annual MDA campaign 2024 to eliminate lymphatic filariasis [Internet]. Delhi: PIB; 2024 [cited 2024 Aug 26]. Available from: https://www.expresshealthcare.in/news/second-phase-of-nationwide-bi-annual-mda-campaign-2024-launched-to-eliminate-lymphatic-filariasis/445112/#:~:text=As%20part%20of%20the%20second,are%20conducting%20the%20MDA%20campaign. Accessed on 15 July 2024.
27. National Centre for Vector Borne Diseases Control (NCVBDC). Japanese encephalitis situation in India [Internet]. NCVBDC, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; [cited 2024 Aug 16]. Available from: https://ncvbdc.mohfw.gov.in/index1.php?lang=1&level=2&sublinkid=5918&lid=3753 . Accessed on 4 July 2024.
28. National Centre for Vector Borne Diseases Control (NCVBDC). Kala-azar situation in India [Internet]. NCVBDC, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; [cited 2024 Aug 18]. Available from: https://ncvbdc.mohfw.gov.in/index1.php?lang=1&level=2&sublinkid=5944&lid=4015 Accessed on 15 July 2024
29. National Centre for Vector Borne Diseases Control (NCVBDC). Acute Encephalitis Syndrome (AES) situation in India [Internet]. NCVBDC, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India; [cited 2024 Aug 16]. Available from: https://cbhidghs.mohfw.gov.in/WriteReadData/l892s/9420384676168051414 6.pdf 155- 156 pp. Accessed on 3 July 2024.
30. Ministry of Health and Family Welfare. Update on Chandipura outbreak in Gujrat [Internet]. Delhi: PIB; 2024 Aug 1 [cited 2024 Sep 2]. Available from: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2039935. Accessed on 3 July 2024.
31. Monthly Health Condition Reports from Directorate of Health Services of State/UT. 2017to2021. https://cbhidghs.mohfw.gov.in/WriteReadData/

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

l892s/94203846761680514146.pdf 164 -165 p. Accessed on 17 July 2024.
32. Ramamurthy T, Sharma NC. Cholera outbreaks in India. Curr Top Microbiol Immunol. 2014;379:49-85. [PubMed] [Google Scholar]
33. CD Alert [Internet]. Cholera: a continuing challenge to public health. 2008;12(2):1-8. Available from: https://ncdc.mohfw.gov.in/wp-content/uploads/2024/04/Cholera-A-continuing-challenge-to-Public-Health.pdf Accessed on 23 May 2024.
34. World Health Organization. Typhoid [Internet]. Key facts; 2023 Mar 30 [cited 2024 Aug 17]. Available from: https://www.who.int/news-room/fact-sheets/detail/typhoid Accessed on 6 June 2024.
35. Investing.com [Internet]. Health Ministry launches national STOP Diarrhea Campaign 2024; 2024 Jun 25 [cited 2024 Aug 27]. Available from: https://in.investing.com/news/general-news/health-ministry-launches-national-stop-diarrhoea-campaign-2024-4270571 Accessed on 25 July 2024.
36. Boghani S, Shah HD, Fancy M, Parmar T, Bansal S, Wanjari MB, Saxena D. A study on the characteristics and outcomes of reported diphtheria patients in a western state in India. Cureus. 2023;15(3):e35769. [PubMed] [Google Scholar]
37. World Health Organization. Measles and rubella [Internet]. South East Asia, India; [cited 2024 Aug 19]. Available from: https://www.who.int/southeastasia/activities/measles-and-rubella-elimination Accessed on 6 July 2024.
38. Health & Family Welfare Department, Government of West Bengal [Internet]. National Hepatitis Control Program (NVHCP); [cited 2024 Aug 20]. Available from: https://wbhealth.gov.in/NVHCP/contents/page/background Accessed on 22 July 2024.
39. World Health Organization. Supporting leprosy elimination in India [Internet]. South-East Asia, India; 2022 Feb 1 [cited 2024 Aug 27]. Available from: https://www.who.int/india/news/detail/01-02-2022-supporting-leprosy-elimination-in-india Accessed on 16 June 2024.
40. Singh S, Kumar S. Tuberculosis in India: road to elimination. Int J Prev Med. 2019;10:114. [PubMed] [Google Scholar]
41. CD Alert. Pandemic influenza (H1N1) 2009 [Internet]. Monthly Newsletter of National Center for Disease Control, Directorate General of Health Services, Government of India; 2009 Aug-Sep [cited 2024 Aug 28];13(2):1-8. Available from: https://ncdc.mohfw.gov.in/wp-content/uploads/2024/04/Pandemic-Influenza-H1N1-2009.pdf Accessed on 14 June 2024.
42. Narain,JP. Public Health Challenges in India: Seizing the Opportunities Indian J Community Med. 2016 Apr-Jun;41(2):85–88. doi: 10.4103/0970-0218.177507. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC4799645/ Accessed on 14 August 2024
43. Centers for Disease Control and Prevention (CDC). Progress toward poliomyelitis eradication--India, 2002. MMWR Morb Mortal Wkly Rep [Internet]. 2003 [cited 2024 Oct 1];52(9):172-5. Available from: [PubMed] [Google Scholar] Accessed on 30 August 2024
44. Global Polio Eradication Initiative (GPEI) [Internet]. Polio-free India: it seemed impossible until it was done. GPEI; 2023 [cited 2024 Oct 1]. Available from: https://polioeradication.org/news/polio-free-india-it-seemed-impossible-until-it-was-done-2/ Accessed on 27 August 2024.
45. Narain J P, Jain SK, Bora D, Venkatesh S. Eradicating successfully yaws from India: the strategy & global lessons. Indian J Med Res. 2015;141(5):608-13. [PubMed] [Google Scholar]
46. National Center for Disease Control. Yaws Eradication Program [Internet]. Yaws: the long challenging path towards eradication. NCDC, DGHS, Ministry of Health and Family Welfare, Government of India; 2024 Sep 30 [cited 2024 Oct 1]. Available from: https://ncdc.mohfw.gov.in/yaws-eradication-programme/ Accessed on 13August 2024
47. Mittal BN. The national leprosy eradication programme in India. World Health Stat Q [Internet]. 1991;44(1):23-9. Available from: [PubMed] [Google Scholar] Accessed on 4 July 2024.
48. Ministry of Health and Family Welfare, Government of India. Update on leprosy cases in the country. National Strategic Plan & Roadmap for Leprosy (2023-27) to achieve zero transmission of leprosy by 2027 [Internet]. Delhi: PIB; 2023 Mar 21 [cited 2024 Oct 1]. Available from: https://pib.gov.in/PressReleasePage.aspx?PRID=1909081 Accessed on 17 September 2024.
49. Indian Council of Medical Research (ICMR). Tuberculosis in India: a national sample survey: ICMR special report series No. 34, 1955-1958. New Delhi: ICMR; 1959.
50. Ministry of Health and Family Welfare, Government of India, Department of Health and Family Welfare [Internet]. Lok Sabha. Unstarred Question No. 760 (Prevalence of Tuberculosis) for answer on 26th July 2024; [cited 2024 Oct 1]. Available from: https://sansad.in/getFile/loksabhaquestions/annex/182/AU760_GlCPWn.pdf?source=pqals Accessed on 3 September 2024.
51. Ramachandran P. ICMR's tryst with HIV epidemic in India: 1986-1991. Indian J Med Res. 2012;136(1):13-21. [PubMed] [Google Scholar]
52. UNAIDS. India Country Slides 2024. HIV and AIDS Data Hub for the Asia-Pacific [Internet]. Evidence to action; [cited 2024 Oct 1]. Available from: https://www.aidsdatahub.org/resource/india-country-slides Accessed

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

on 24 July 2024.
53. Ramaiah KD, Das PK, Michael E, Guyatt H. The economic burden of lymphatic filariasis in India. Parasitol Today. 2000;16(6):251-3. [PubMed] [Google Scholar]
54. Ministry of Health and Family Welfare. Government of India launches Sarva Dawa Sevan or Mass Drug Administration (MDA) campaign to eliminate Lymphatic Filariasis (LF) [Internet]. Delhi: PIB; 2023 Feb 10 [cited 2024 Oct 1]. Available from: https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1898092 Accessed on 14 September 2024
55. Ministry of Health and Family Welfare, Government of India. WHO World Malaria Report 2020: India continues to make impressive gains in reduction of malaria burden [Internet]. PIB Delhi; 2020 Dec 2 [cited 2024 Oct 1]. Available from: https://www.pib.gov.in/PressReleasePage.aspx?PRID=1677601 Accessed on 24 September 2024
56. World Health Organization [Internet]. India launches the National Framework to eliminate malaria; [cited 2024 Oct 1]. Available from: https://www.who.int/india/health-topics/malaria/india-launches-the-national-framework-to-eliminate-malaria Accessed on 24 September 2024.
57. National Vector Borne Disease Control Programme. Kala-azar Elimination Program [Internet]. National Center for Vector-borne Disease Control, DGHS, Ministry of Health and Family Welfare, Government of India; [cited 2024 Sep 29]. Available from: https://ncvbdc.mohfw.gov.in/index1.php?lang=1&level=2&sublinkid=5946&lid=3752. Accessed on 3 July 2024
58. Business Standard [Internet]. India achieves target to eliminate visceral leishmaniasis 'kala-azar'; 2024 Apr 5 [cited 2024 Oct 1]. Available from: https://www.business-standard.com/health/india-achieves-target-to-eliminate-visceral-leishmaniasis-kala-azar-124040500996_1.html Accessed on 11 August 2024.
59. Government of Kerala, Department of Health and Family Welfare And Arogyakeralam, Guidance document for the peoples' movement against Tuberculosis in Kerala, Kerala TB Elimination Mission Principles, Strategies and Activities, 2017 [Internet]. [cited 2024 Sep 29]. Available from: https://dhs.kerala.gov.in/wp-content/uploads/2021/01/KeralaTB-Elimination-Mission_Strategy-activity-plan-and-budget..pdf Accessed on 9 August 2024.
60. National Program on Climate Change and Human Health; National Centre for Disease Control, Government of India. State action plan on climate change and human health - Kerala. Ministry of Health & Family Welfare, Government of India; 2022.
61. Working Group on Climate Change and Disaster Management Report, Agriculture Division. Thirteenth Five-year plan, 2017-2022 [Internet]. State Planning Board, Government of Kerala; [cited 2024 Oct 3]. Available from: https://spb.kerala.gov.in/sites/default/files/2021-09/13PlanEng.pdf Accessed on 22 August 2024
62. Data on Communicable Diseases [Internet]. Directorate of Health Services, Government of Kerala; [cited 2024 Jul 21]. Available from: https://dhs.kerala.gov.in/en/data-on-communicable-diseases/ Accessed on 2 June 2024.
63. Sasi MS, Rajendran R, Meenakshy V, Kumar TD, Vardhanan S, Suresh T, Regu K, Sharma SN. Zika virus: an emerging mosquito-borne disease threat in Kerala. J Commun Dis. 2021;53(3):201-12. [Google Scholar]
64. Sasi MS, Rajendran R, Meenakshy V, Suresh T, Pillai RH, Kumar TD, Sugathan A, Regu K. Study on vector dynamics of Zika virus outbreak in Thiruvananthapuram, Kerala, India. Int J Curr Microbiol Appl Sci. 2021;10(12):54-71. [Google Scholar]
65. Balakrishnan A, Thekkekare RJ, Sapkal G, Tandale BV. Seroprevalence of Japanese encephalitis virus & West Nile virus in Alappuzha district, Kerala. Indian J Med Res. 2017;146(Suppl 1):S70-6. [PubMed] [Google Scholar]
66. Vanaja C, Sumodan PK. Mosquito-borne diseases in Kerala, India: an update. Int J Mosq Res. 2019;7(4):45-8. [Google Scholar]
67. Varghese SM, Sheeja AL, Johnson AK, Sushan A, Nandini CS, Chandy GM, Rakesh PS, Joseph MR, David A, Mathew G, Alexander P. Together let us confront it: an outbreak investigation of hepatitis B in Pathanamthitta district, Kerala. J Family Med Prim Care. 2021;10(6):2159-65. [PubMed] [Google Scholar]
68. CD Alert. Pandemic Influenza A (H1N1) 2009 [Internet]. National Centre for Disease Control (NCDC), Ministry of Health and Family Welfare, Government of India; 2015 Jan [cited 2024 Oct 6]. Available from: https://ncdc.mohfw.gov.in/wp-content/uploads/2024/04/Pandemic-Influenza-H1N1-2009.pdf Accessed on 24 September 2024.
69. The Hindu [Internet]. Kerala issues technical guidelines for diagnosis, management of amoebic meningoencephalitis; 2024 Jul 21 [cited 2024 Oct 8]. Available from: https://www.thehindu.com/news/national/kerala/kerala-issues-technical-guidelines-for-diagnosis-management-of-amoebic-meningoencephalitis/article68428939.ece Accessed on 3 August 2024.
70. Vasu M, Gopalakrishnan LG, Jaya AM, Ushakumai A, Yadav P, Kaur P, Ramamurthy S, Raju MK, Balakrishnan A, Murhekar M. Investigation and response to Monkeypox virus infection in Kerala, India, July 2022. Clin Epidemiol Glob Health. 2023;23:101345. [Google Scholar]

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522

71. World Health Organization. Japanese encephalitis [Internet]. Key facts; 2024 Aug 6 [cited 2024 Oct 8]. Available from: https://www.who.int/news-room/fact-sheets/detail/japanese-encephalitis Accessed on 14 July 2024.
72. European Centre for Disease Prevention and Control (ECDPC) [Internet]. Fact sheet for health professionals about Japanese encephalitis; Dec 15 2023 [cited 2024 Oct 8]. Available from: https://www.ecdc.europa.eu/en/japanese-encephalitis/facts Accessed on 23 July 2024.
73. Worldometer [Internet]. COVID-19 coronavirus pandemic; 2024 Apr 13 [cited 2024 Oct 10]. Available from: https://www.worldometers.info/coronavirus/ Accessed on 3 August 2024.
74. Hindustan Times [Internet]. Kerala man infected with murine typhus: all you need to know about this rare bacterial disease; 2024 [cited 2024 Oct 15]. Available from: https://www.hindustantimes.com/india-news/kerala-man-infected-with-murine-typhus-all-you-need-to-know-about-this-rare-bacterial-disease-101728908178140.html#:~:text=Murine%20typhus%20is%20a%20rare,or%20flea%2Dborne%20spotted%20fever. Accessed on 7 August 2024.

ISSN: 0019-5138
DOI: https://doi.org/10.24321/0019.5138.202522