



SHORT COMMUNICATION

Global Infectious Diseases in August of 2022: Monthly Analysis

Qi Xiang^{1,#}, Taihan Li^{1,#}, Jiazhen Zou¹, Guodan Li¹, Yi Luo¹, Shiping He^{1,*} and Dayong Gu^{1,*}

Abstract

Infectious diseases have greatly affected the development of human history, owing to their unpredictable zoonotic characteristics. The recording of infectious diseases epidemic data provides information on disease transmission trends, and enables research on the risk of penitential epidemics and the mechanisms of transmission of infectious diseases. Recent years have seen a significant increase in the number of confirmed and fatal cases of COVID-19 since it became a pandemic in late 2019. Monkeypox also has potential for global transmission, because the World Health Organization (WHO) [1] reported cases of MPXV in at least 12 Countries that are not endemic for monkeypox virus. Africa and Southeast Asia appear to be the main regions where mosquito-borne diseases are epidemic, possibly because of the rainy weather in these regions in the past month. Tracking disease incidence and epidemic tendency remains imperative in these areas, although most infectious diseases appear to be dispersed and transmitted in only several areas at the moment.

Key words: infectious disease, transmission, COVID-19, monkeypox

*Corresponding authors:

E-mail: ericheshi@163.com,
Tel: +86-13538047813 (SH),
wanhood@163.com,
Tel: +86-13602601597 (DG)

¹Department of Laboratory Medicine, Shenzhen Second People's Hospital, The First Affiliated Hospital of Shenzhen University, Health Science Center, Shenzhen, China

#Qi Xiang and Taihan Li have contributed equally to this work.

Received: August 15 2022
Revised: September 8 2022
Accepted: September 15 2022
Published Online: October 07 2022

INTRODUCTION

Infectious diseases have distinct characteristics from other diseases, such as unpredictable zoonotic and evolutionary advantages over human hosts [2]. Human society, industry, commerce, and cultural exchange have been greatly affected by the spread of infectious diseases. For years, many infectious diseases were able to be controlled on a small scale through public health education, and vaccination and eradication efforts [3]. Despite the development of globalization and the threat of bioterrorism in recent decades, emerging and re-emerging infectious diseases continue to threaten the global public health system [4]. Influenza persists in many countries, particularly in developing countries, as exemplified by the H1N1 virus, which first emerged in 2009 [5]. Other factors, such as global environmental changes and widespread

long distance travel, may also increase epidemic risk [6,7]. In 2019, SARS-CoV-2 induced Coronavirus Disease 2019 (COVID-19) became a global pandemic. Monkeypox was first reported in the UK in 2022. Other infectious pathogens, mainly mosquito-borne infectious diseases, have emerged, thus expanding regional and global disease spread (Fig 1).

Although some pathogens have not yet been identified, infectious diseases usually have clear pathogens [8]. Without treatment, infectious diseases often cause rapid death or self-healing via the host's immunity. Additionally, most infectious diseases are transmitted by direct or indirect contact, bodily fluid, or airborne or waterborne means. These transmission modes can easily be prevented by medical and public health interventions in early stages. Infectious disease reporting and increasing awareness of suspected pathogens during early transmission play

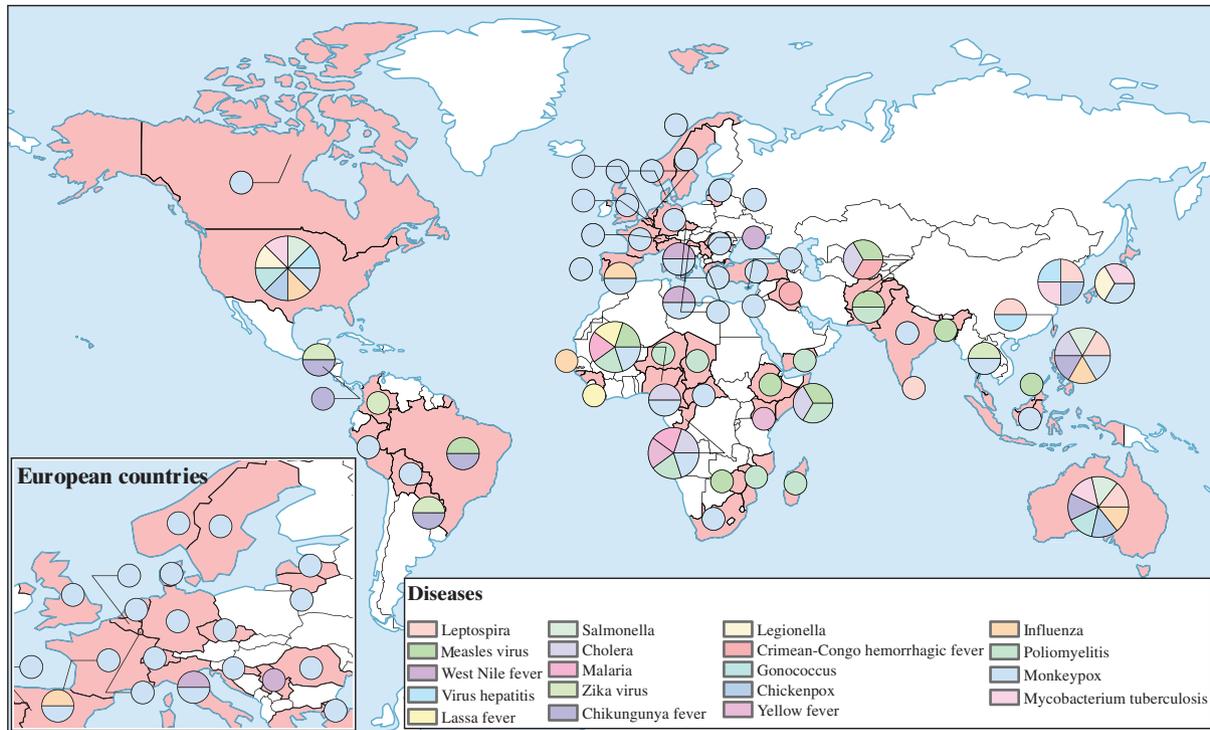


FIGURE 1 | Global distribution of infectious diseases in August of 2022.

important roles in warning of early stages of an epidemic and controlling the infection range of those pathogens to curb disease spread.

Infectious diseases are closely associated with human social and economic activities. We collected partial data on infectious diseases posted in the past week worldwide by using Shusi Tech's Global Epidemic Information Monitoring System. Herein, we summarize the epidemiology of infectious diseases reported throughout the world.

COVID-19

COVID-19, which is caused by the SARS-CoV-2 virus, emerged in late 2019 and spread rapidly throughout the world [9,10]. As indicated by the World Health Organization (WHO) epidemic report, approximately 220 countries or regions in six continents recorded 575,887,049 confirmed COVID-19 cases, which resulted in 6,389,412 deaths. In China, the WHO has reported 5,846,696 confirmed cases of COVID-19 with 24,055 deaths from January 1, 2020 to August 23, 2022. Currently, most outbreaks in China have sporadic distribution or occur in small-scale aggregations, whereas few show extensive inter-provincial transmission. Fig 2 shows the number of new cases worldwide in the past month, including the details of new cases reported in China.

MONKEYPOX

The monkeypox virus is a type of orthopoxvirus that replicates in the host's cytoplasm as a double-stranded DNA virus. The monkeypox virus is a zoonotic virus that can

be transmitted in several ways: from an animal to another animal, through respiratory droplets, through contact with bodily fluids, through contamination of the environment and objects, and through skin damage in humans [11]. In 1959, monkeypox virus was discovered in monkeys in Denmark. The first human case was detected in the Republic of Congo in 1970. Subsequently, thousands of cases of monkeypox have been reported worldwide [12]. A rapid increase in monkeypox virus transmission has been observed in many regions, including Europe, United States, and Asia in 2022 (Table 1).

MOSQUITO-BORNE INFECTIOUS DISEASES

Dengue

Dengue fever is considered the most prevalent and rapidly spreading mosquito-borne viral disease in humans, which causes a series of illnesses ranging from mild fever to severe disease including plasma leakage and shock [13,14]. The dengue epidemic report worldwide in the past month is shown in Table 2.

Chikungunya

Chikungunya virus (CHIKV) is transmitted by the mosquitoes *Aedes aegypti* and *Aedes albopictus* [15]. First reported in 1952 in patients on the Makonde Plateau, manifestations of CHIKV infection exhibits dengue-like symptoms, with a febrile illness with rash and arthralgia [16]. In 2004, a large-scale CHIKV epidemic swept through Kenya, India, Southeast Asia, and China [17]. CHIKV outbreaks have occurred occasionally in Africa since 2005, and Asia and

America have also experienced high infection rates [18]. The CHIKV epidemic report worldwide in the past month is shown in Table 3.

Yellow fever

The yellow fever virus, which is mainly endemic in Africa and South America, belongs to the genus *Flavivirus* [19]. It is maintained in nature through transmission by non-human primates and blood-feeding mosquitoes, as well as

inter-human transmission by *Aedes aegypti* [20]. Table 4 displays the yellow fever epidemic report worldwide in the past month.

Zika virus disease

Zika virus (ZIKV) is a flavivirus belonging to the same genus as the viruses that cause dengue and yellow fever [21,22]. The ZIKV epidemic report worldwide in the past month is shown in Table 5.

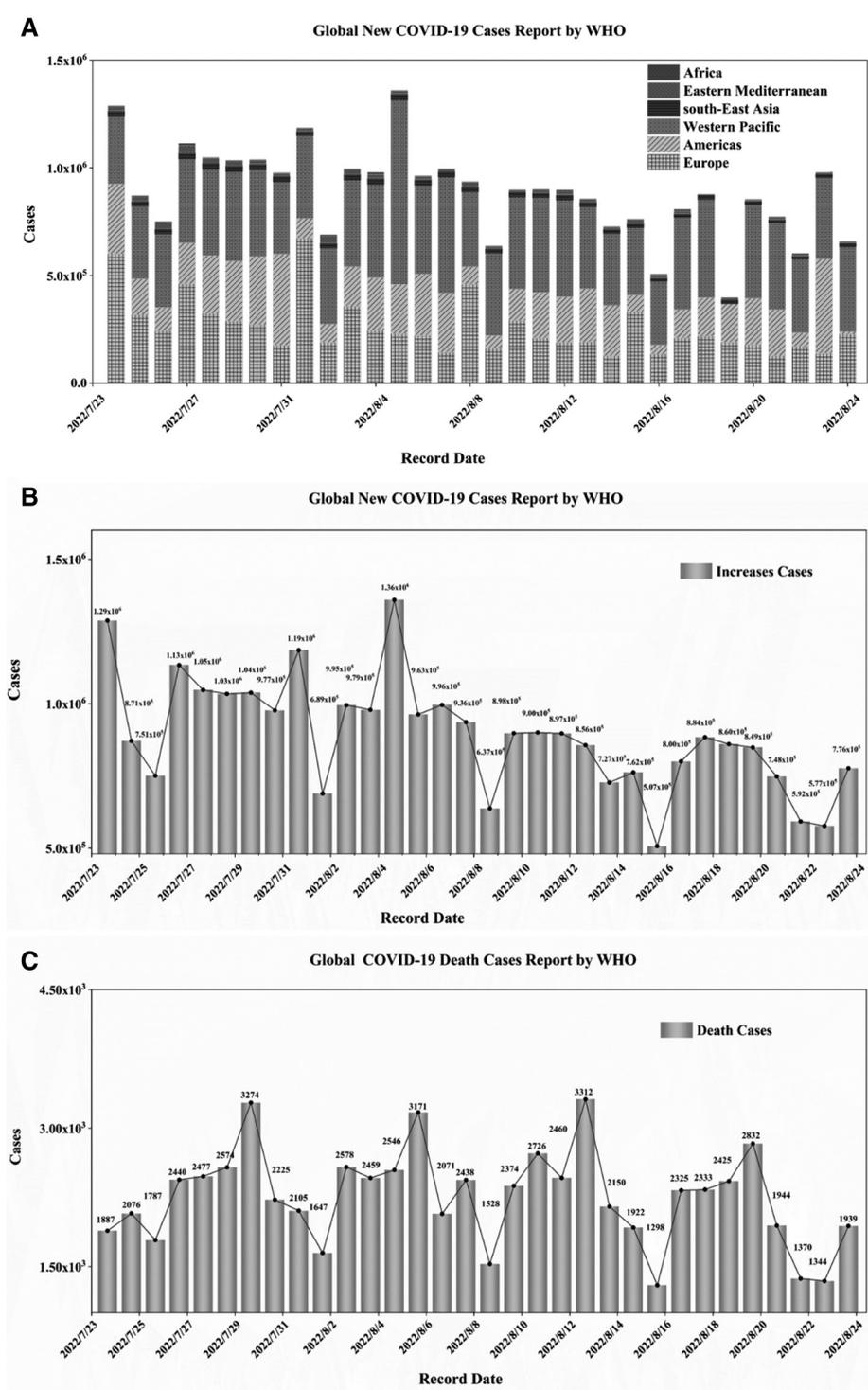


FIGURE 2 | Continued

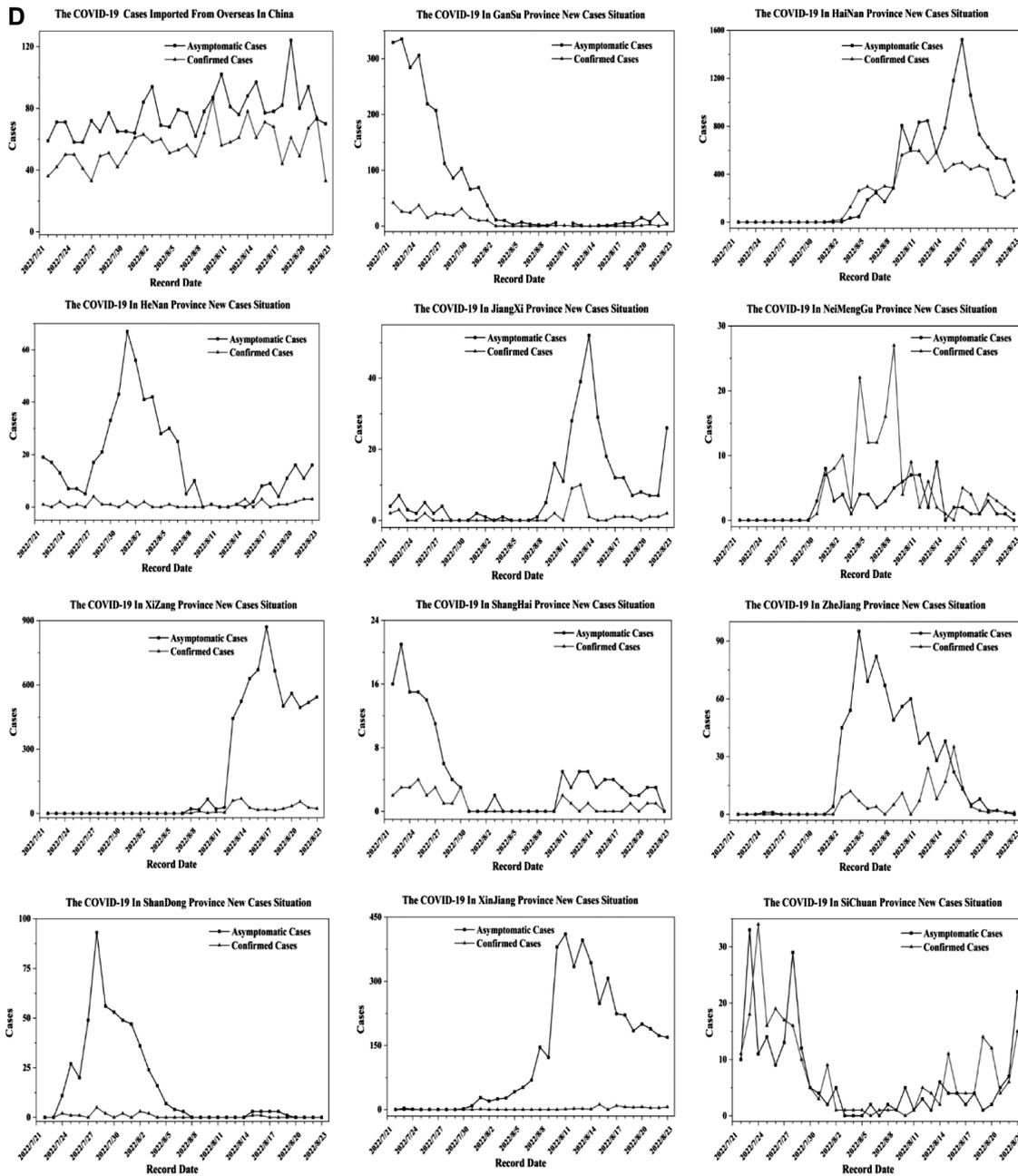


FIGURE 2 | Daily statistics of new confirmed cases worldwide. A: New daily confirmed cases worldwide (distribution map for each continent). B: New daily confirmed cases worldwide. C: New daily death cases reported worldwide (July 23, 2022–August 23, 2022; data obtained from the World Health Organization website: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019> as of August 23, 2022). D: New daily confirmed cases all in China (daily confirmed cases in each province, July 23, 2022–August 23, 2022; data obtained from the National Health Commission of the People’s Republic of China website: <http://www.nhc.gov.cn/> as of August 23, 2022).

MEASLES

Measles is a highly contagious disease caused by the measles virus. Data in the following table indicate the recent measles cases reported worldwide. The measles epidemic report worldwide in the past month is shown in Table 6.

MALARIA

Currently, medical protozoan infections continue to be reported globally, and malaria, the most severe disease on the African continent, is considered a class B infectious

disease by the Chinese Center for Disease Control and Prevention. Malaria is a pathogen transmitted by mosquito bites or through transfusion of blood from individuals infected with *Plasmodium*. The malaria epidemic report worldwide in the past month is shown in Table 7.

CRIMEAN-CONGO HEMORRHAGIC FEVER

Crimean-Congo hemorrhagic fever is a widespread disease caused by a tick-borne virus of the Bunyviridae family [23]. Crimean-Congo hemorrhagic fever virus

TABLE 1 | Monkeypox global reports from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	Cases newly on the latest date	Cumulative cases during the year	Data source
23/07	Liberia	1		WHO Regional Office for Africa
	Japan	1		Outbreak News Today
28/07	Republic of Congo		2266	WHO Regional Office for Africa
31/07	Republic of Congo		8	
02/08	India	2	8	CCTV News
	Turkey	5		
03/08	Lithuania	1		Xinhuanet
05/08	Singapore	2	15	China News
	Cameroon		34	WHO Regional Office for Africa
10/08	Japan	1		CCTV News
	Bolivia	6		
11/08	Australia	70		United Nations Office for the Coordination of Humanitarian Affairs
15/08	Thailand	1	5	CCTV News
	South Africa	1	4	
19/08	Peru	85	1022	Outbreak News Today
	Philippines	2	3	
20/08	Indonesia	1		CCTV News
16/05–19/08	Italy	689		European CDC
	Greece	50		
	Cyprus	1		
	Sweden	141		
	Norway	74		
	Malta	31		
	Romania	34		
	Luxembourg	45		
	Latvia	1		
	Croatia	22		
	Czechoslovakia	39		
	Netherlands	1090		
	Germany	3242		
	Denmark	158		
	Belgium	624		
	Austria	218		
	Ireland	113		
04/03–31/07	Central African Republic	5		WHO Regional Office for Africa
18/05–22/08	USA	15909		ProMED-mail
19/05–17/08	Canada	1112		ProMED-mail
19/05–23/08	Spain	6284		the Xinhua News Agency
20/05–16/08	France	2749		ProMED-mail
21/05–17/08	Switzerland	416		

TABLE 1 | Continued

Occurrence (in 2022)	Location	Cases newly on the latest date	Cumulative cases during the year	Data source
03/05–10/08	Portugal	770		
06/05–16/08	UK	3081		
26/06–17/08	Peru	891		
08/06–22/08	Brazil	3788		
18/07–31/07	Nigeria	43	413	Nigeria CDC
19/08–22/08	Israel	11		the Xinhua News Agency

TABLE 2 | Dengue virus reported worldwide between 7/23/2022 and 08/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
01/01–25/07	Vietnam		124000	Outbreak News Today
15/04–25/07	Sao Tome and Principe	891		WHO Regional Office for Africa
29/05–04/06	Puerto Rico	6	156	WHO Regional Office for the Americas
29/05–04/06	Guatemala	227	1895	
05/06–11/06	Jamaica	3	31	
12/06–25/06	Nicaragua	3341	21156	
	Salvador	1045	9285	
	Mexico		11722	
26/06–02/07	Bolivia	155	8190	
	Panama	411	2518	
03/07–09/07	Paraguay	141	4419	
17/07–23/07	Nicaragua	1296	28136	
	Panama	309	3665	
	Taiwan, China	2	11	The Taiwan Disease Control Agency
	Paraguay	35	4562	Paraguay Ministry of Health
	Japan	3		Japan CDC
23/07–29/07	Sri Lanka	1290	36174	Sri Lankan Ministry of Health
17/07–29/07	Singapore	2168	22427	Singapore Ministry of Health
24/07–30/07	Paraguay	2	175	Paraguay Ministry of Health
	Laos	2296	13621	US CDC
	USA	8	185	
	Columbia	1542	21281	WHO Regional Office for the Americas
	Mexico	939		
25/07–31/07	Nepal	109		United Nations Office for the Coordination of Humanitarian Affairs
01/07–31/07	Thailand	5783	10988	Thailand's Ministry of Health
31/07–06/08	Paraguay	128		United Nations Office for the Coordination of Humanitarian Affairs
	Singapore	938	23382	Singapore Environment Agency
	Vietnam	8800	145536	Outbreak News Today
	Republic of Korea	2	20	Korean CDC

TABLE 2 | Continued

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
	Japan	3	23	National Institute of Infectious Diseases, Japan
	Malaysia	1394		Malaysian Ministry of Health
01/08–07/08	Nepal	147		United Nations Office for the Coordination of Humanitarian Affairs
08/08	Singapore	204		Singapore Environment Agency
09/08		46		
11/08		191		
14/08		56		
16/08		100		
19/08		110		
31/07–06/08	Afghanistan	13		Paraguay Ministry of Health
31/07–13/08	Sri Lanka	949		Sri Lankan Ministry of Health
06/08–13/08	Taiwan, China	5		Outbreak News Today
01/08–15/08	Laos	4200	17892	Outbreak News Today
14/08	Malaysia	169		Malaysian Ministry of Health
22/08	Malaysia	199		United Nations Office for the Coordination of Humanitarian Affairs

TABLE 3 | Chikungunya virus reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
25/07–07/08	Australia	1	12	Australian Department of Health
01/01–23/07	Paraguay	5	678	Ministry of Health, Paraguay
01/01–30/07	Philippines	372		Philippine Department of Health
	Guatemala	1297		WHO Regional Office for the Americas
	Brazil	84877		WHO Regional Office for the Americas
01/01–06/08	Salvador	109		WHO Regional Office for the Americas

TABLE 4 | Yellow fever virus reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	Case of occurrence time	Cases during the year	Data source
04/07–10/07	People's Republic of Congo	12	533	United Nations Office for the Coordination of Humanitarian Affairs
12/01–23/07	Kenya	117		WHO Regional Office for Africa

TABLE 5 | Zika virus reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year
24/7–06/08	Paraguay	148	Ministry of Health, Paraguay
01/01–30/7	Guatemala	1461	WHO Regional Office for the Americas
01/01–06/08	Columbia	108	WHO Regional Office for the Americas
01/07–31/07	Thailand	47	Thailand Ministry of Health

TABLE 6 | Measles virus reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
01/01–24/07	Somalia	276		WHO Regional Office for the Eastern Mediterranean Sea
01/01–30/07	Brazil	44		WHO Regional Office for the Americas
24/07–30/07	Afghanistan	870	3025	WHO Regional Office for the Eastern Mediterranean Sea
25/07–31/07	Zimbabwe	2056		WHO
01/01–10/08	Pakistan	10988		
	Indonesia	5202		

TABLE 7 | Malaria reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Data source
25/07–07/08	Borno State, Nigeria	35176	UN Office for the Coordination of Humanitarian Affairs
03/01–07/31	Borno State, Nigeria	490343	UN Office for the Coordination of Humanitarian Affairs
03/01–07/31	Democratic Republic of Congo	7585777	UN Office for the Coordination of Humanitarian Affairs
25/07–07/08	Democratic Republic of Congo	580149	UN Office for the Coordination of Humanitarian Affairs
01/07–12/08	Hong Kong, China	97	Center for Health Protection, Hong Kong, China

TABLE 8 | Crimean-Congo hemorrhagic fever reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year
01/01–13/08	Afghanistan	250	WHO Regional Office for the Eastern Mediterranean
01/01–10/08	Iraq	289	ProMED-mail

TABLE 9 | Tuberculosis reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
11/07–24/07	Australia	41	620	Australian Department of Health
13/07–13/08	Korea	717	10805	Korean CDC
08/08–14/08	Japan	172	8916	National Institute of Infectious Diseases, Japan
	America	53	2841	US CDC

TABLE 10 | Cholera reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
19/06–28/07	Iraq	548		ProMED-mail
01/07–30/07	Philippines	2632		Philippine Department of Health
01/01–31/07/	Somalia	8506		UN Office for the Coordination of Humanitarian Affairs
25/07–3/08	Cameroon	172		WHO Regional Office for Africa
01/08–07/08	Democratic Republic of Congo	156	8191	UN Office for the Coordination of Humanitarian Affairs
01/05–13/08	Afghanistan	118837		WHO Regional Office for the Eastern Mediterranean

TABLE 11 | Poliomyelitis reported worldwide from 7/23/2022 to 8/23/2022.

Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
27/07	Pakistan	1	14	ProMED-mail
20/07–26/07	Mozambique	3		Global Polio Website
	Madagascar	3		
	Congo	1		
	Chad	1		
3/8–10/8	Mozambique	2		
	Congo	9	73	
3/8–23/8	Yemen	38	82	
10/8–16/8	Nigeria	3		
	Niger	2		
17/8–23/8	Mozambique	1		
	Somalia	2		
	Chad	5		

TABLE 12 | Sporadic infectious diseases reported worldwide from 7/23/2022 to 8/23/2022.

Salmonella reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
11/07–24/07	Australia	263	6541	Australian Department of Health
24/07–30/07	America	631		US CDC
01/01–30/07	Philippines	7147		Philippine Department of Health
01/01–08/08	Fiji	204		UN Office for the Coordination of Humanitarian Affairs
31/07–06/08	Singapore	21	854	Singapore Ministry of Health
07/08–13/08	America	457	22060	US CDC
Legionella reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	Reported number on the day	Cumulative cases during the year	Data source
24/07–30/07	America	56	2664	US CDC
08/08–14/08	Japan	44	1195	National Institute of Infectious Diseases, Japan
14/08–20/08	Hong Kong, China	3	43	Center for Health Protection, Hong Kong, China
Gonococcus reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
25/07–07/08	Australia	1076	18276	Australian Department of Health
31/07–06/08	America	6599	315194	US CDC
Viral hepatitis reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
24/07–31/07	Republic of Korea	243	1331	Korean CDC
	Taiwan, China	31	257	Taiwan CDC, China
31/07–06/08	Taiwan, China	12	269	Taiwan CDC, China
	USA	1969		US CDC

TABLE 12 | Continued

Siro fever reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
07/07–17/08	Greece	59		European CDC
	Italy	228		
14/07–17/08	Serbia	53		
28/07–03/08	Greece	12		
Leptospira reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
10/07–16/07	Korea	3	49	Korean CDC
10/07–16/07	Singapore	2	25	Singapore Ministry of Health
27/06–10/07	Australia	17	116	Australian Department of Health
23/07–05/08	Sri Lanka	187	3218	Sri Lankan Ministry of Health
01/01–30/07	Philippines		1400	Philippine Ministry of Health
24/07–06/08	Korea	8	60	Korean CDC
31/07–06/08	Taiwan, China	2		Outbreak News Today
01/01–08/08	Fiji		3803	United Nations Office for the Coordination of Humanitarian Affairs
Chickenpox reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	Case of occurrence time	Cases during the year	Data source
27/06–10/07	Australia	46	633	Australian Department of Health
24/07–13/08	South of Korea	818	11,502	Korean CDC
31/07–06/08	USA	34	2,069	US CDC
Influenza reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	Cases newly on the latest date	Cases during the year	Data source
03/07–09/07	Philippines	168		Philippine Ministry of Health
18/07–31/07	Australia	7312	212573	Australian Department of Health
21/07–13/08	USA	484	131975	US CDC
03/01–31/07	Portugal	8650		WHO
	Spain	8245		
Lassa fever reported worldwide from 7/23/2022 to 8/23/2022				
Occurrence (in 2022)	Location	No. reported on the day	Cumulative cases during the year	Data source
25/07–07/08	Nigeria	200	880	Nigeria CDC
10/08–12/08	Guinea	6		WHO Regional Office for Africa

may result in severe outbreaks of viral hemorrhagic fever with a mortality rate of 10%–40%. The virus is transmitted to humans primarily by ticks and domestic animals. The Table 8 shows cases of Crimean–Congo hemorrhagic fevers worldwide.

TUBERCULOSIS

Humans have been affected by tuberculosis (TB) from the beginning of recorded history. TB is associated with poverty, malnutrition, overcrowding, and immunosuppression [24]. TB is the leading cause of death due to

infectious disease among the top causes of ill health and death worldwide. Some TB epidemic reports worldwide in the past month are displayed in Table 9.

INFECTIOUS DISEASE OF DIGESTIVE TRACT

Cholera

Group O1 and O139 of *Vibrio Cholerae*, secrete cholera toxin and can cause epidemics of acute, watery diarrhea [25]. *Vibrio cholerae* is transmitted via the fecal-oral route, and a high dose of pathogenic bacteria is required to cause infection. The cholera epidemic report worldwide in the past month is show in Table 10.

Poliomyelitis

Poliomyelitis, commonly known as polio, is an acute infectious disease caused by poliovirus, a single stranded RNA enterovirus, which damages motor neurons of the spinal cord and brain stem [26]. The poliomyelitis epidemic report worldwide in the past month is shown in Table 11.

OTHER INFECTIOUS DISEASES

Some infectious diseases—such as those caused by *Salmonella*, *Legionella*, *Gonococcus*, *Leptospira* or hepatitis virus, as well as Siro fever, chickenpox, influenza, and Lassa fever—as reported globally in the past month, display sporadic transmission in certain continents or countries as shown in the Table 12.

CONCLUSION

The global COVID-19 epidemic is likely to decrease in severity in the future, but continued hospitalizations may place pressure on healthcare systems. In China, prevention and control measures for infectious diseases have been strengthened, and the new domestic epidemic shows new characteristics of multi-point dispersed multi-chain transmission under strong import pressure. To better prevent and control COVID-19, early big data monitoring of public health crises and warning mechanisms must first be established. Second, the public health and medical security system must be improved through construction of an emergency management system. Finally, the modernization of municipal social governance, Inflexible management, loss of workforce require substantial improvements. Currently mutated SARS-CoV-2 can evade most drugs to varying degrees, thus decreasing drug effectiveness or even causing treatment failure. Research is needed to develop long-lasting and broad-spectrum neutralizing drugs that can be used not only for patients with COVID-19 in general but also for older or immunocompromised patients unable to produce effective antibodies after vaccination or in whom vaccination is not suitable.

Other viruses such as monkeypox exhibit potential global transmission capability, and have already spread to six continents. The number of monkeypox cases among

Europeans and Americans continues to rise, and many WHO member states are already warning of the global epidemic risk. Researchers should pay more attention to viral infectious ability, including gene structure changes and receptor-ligand binding ability, because monkeypox has never been transmitted so rapidly and broadly since its discovery. Moreover, mosquito-borne infectious diseases (dengue, Chikungunya, epidemic encephalitis B, Zika, malaria, and leishmaniasis) as well as insect-borne infectious diseases (Crimean-Congo hemorrhagic fever and yellow fever) continue to be prevalent mainly within local areas, primarily in Africa and Southeast Asia, as a result of heavy rains. The prevention and control of vector-borne infectious diseases differ from other diseases. Blocking or eliminating transmission channels, and enhancing immunity to protect susceptible people are the most effective methods to suppress these diseases in early stages. To date, most virulent mosquito-borne viruses have no effective vaccines or targeted therapeutic drugs. The scientific community must study the basic principles of mosquito-borne viral epidemic transmission in nature, and develop new prevention and control strategies to interrupt large-scale viral spread. Measles, a respiratory disease, appears to have been prevalent in South Asia, the Middle East, and South America during the first half of the year. This phenomenon might be attributable to a shortage of vaccines, climate change, and continued deterioration of the public health environments in these regions. TB appears to have reemerged not only in developing countries but also in many developed countries in recent years, and must be taken more seriously by public health departments. The incidence and epidemic tendencies of other diseases, such as cholera, poliomyelitis, and bacillary dysentery, should continue to be recorded.

REFERENCES

1. World Health Organization (21 May 2022). Disease Outbreak News; Multi-country monkeypox outbreak in non-endemic countries. Available online: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON385>.
2. Fauci AS, Morens DM. The perpetual challenge of infectious diseases. *N Engl J Med*. 2012;366(5):454-461. doi: 10.1056/NEJMra1108296. Erratum in: *N Engl J Med*. 2012;366(9):868.
3. Procop GW, Wilson M. Infectious disease pathology. *Clin Infect Dis*. 2001;32(11):1589-1601.
4. Desselberger U. Emerging and re-emerging infectious diseases. *J Infect*. 2000;40(1):3-15.
5. McArthur DB. Emerging infectious diseases. *Nurs Clin North Am*. 2019;54(2):297-311.
6. Kumate J. Infectious diseases in the 21st century. *Arch Med Res*. 1997;28(2):155-161.
7. Kiska DL. Global climate change: an infectious disease perspective. *Clin Microbiol News*. 2000;22(11):81-86.
8. Parks T, Hill AV, Chapman SJ. The perpetual challenge of infectious diseases. *N Engl J Med*. 2012;367(1):90; author reply 90.
9. Aiello F, Gallo Afflitto G, Mancino R, Li JO, Cesareo M, Giannini C, et al. Coronavirus disease 2019 (SARS-CoV-2) and colonization of ocular tissues and secretions: a systematic review. *Eye (Lond)*. 2020;34(7):1206-1211.

10. Coronaviridae Study Group of the International Committee on Taxonomy of Viruses. The species Severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nat Microbiol.* 2020;5(4):536-544.
11. Jenewari FO. Monkey pox in nigeria: epidemiology and prevention. In *Proceedings of the Problems and Prospects for the Development of Modern Medicine*. Kharkiv, Ukrainian: GomSMU; 2–3 May 2019:194–195.
12. Monkeypox. Available online: https://www.who.int/health-topics/monkeypox/#tab=tab_1 Accessed on 19 October 2020.
13. Guzman MG, Harris E. Dengue. *Lancet.* 2015;385(9966):453-465.
14. Verhagen LM, de Groot R. Dengue in children. *J Infect.* 2014; 69(Suppl 1):S77-S86.
15. Sourisseau M, Schilte C, Casartelli N, Trouillet C, Guivel-Benhassine F, Rudnicka D, et al. Characterization of reemerging chikungunya virus. *Plos Pathog.* 2007;3(6):804-817.
16. Robinson MC. An epidemic of virus disease in Southern Province, Tanganyika Territory, in 1952-53. I. Clinical features. *Trans R Soc Trop Med Hyg.* 1955;49(1):28-32.
17. Kariuki Njenga M, Nderitu L, Ledermann JP, Ndirangu A, Logue CH, Kelly CHL, et al. Tracking epidemic chikungunya virus into the Indian Ocean from East Africa. *J Gen Virol.* 2008;89(Pt 11):2754-2760.
18. Zeller H, Van Bortel W, Sudre B. Chikungunya: its history in Africa and Asia and its spread to new regions in 2013-2014. *J Infect Dis.* 2016;214(suppl 5):S436-S440.
19. Jentes EJ, Pomeroy G, Gershman MD, Hill DR, Lemarchand J, Lewis RF, et al. The revised global yellow fever risk map and recommendations for vaccination, 2010: consensus of the Informal WHO Working Group on Geographic Risk for Yellow Fever. *Lancet Infect Dis.* 2011;11:622-632.
20. Monath TP, Vasconcelos PFC. Yellow fever. *J Clin Virol.* 2015;64:160-173.
21. Lowe R, Barcellos C, Brasil P, Cruz OG, Honório NA, Kuper H, et al. The Zika virus epidemic in Brazil: from discovery to future implications. *Int J Environ Res Public Health.* 2018; 15(1):96.
22. Weaver SC, Costa F, Garcia-Blanco MA, Ko AI, Ribeiro GS, Saade G, et al. Zika virus: history, emergence, biology, and prospects for control. *Antiviral Res.* 2016;130:69-80.
23. Monsalve-Arteaga L, Alonso-Sardón M, Muñoz Bellido JL, Vicente Santiago MB, Vieira Lista MC, López Abán J, et al. Seroprevalence of Crimean-Congo hemorrhagic fever in humans in the World Health Organization European region: a systematic review. *PLoS Negl Trop Dis.* 2020;14(3):e0008094.
24. Nathavitharana RR, Friedland JS. A tale of two global emergencies: tuberculosis control efforts can learn from the Ebola outbreak. *Eur Respir J.* 2015;46(2):293-296.
25. Clemens JD, Nair GB, Ahmed T, Qadri F, Holmgren J. Cholera. *Lancet.* 2017;390(10101):1539-1549.
26. De Jesus NH. Epidemics to eradication: the modern history of poliomyelitis. *Virol J.* 2007;4:70.