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Trends in public health emergencies in the WHO African Region: an analysis of the past two decades public health events from 2001 to 2022

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ABSTRACT

The African Region reports the heaviest burden of public health emergencies globally. This paper presents an exploratory analysis of public health events data collected the past 22 years in the WHO Africa region, to explore patterns and trends that can inform public health strategies, policy changes and develop appropriate tools to improve disease surveillance, preparedness and response to public health emergencies. A suite of exploratory data analysis methods combining time series analysis, summary statistics, temporal visualisations, geographic information system (GIS) mapping, trend analysis and statistical tests were used to derive patterns and trends from the data. An in-depth analysis of zoonotic disease outbreaks by geography and time was explored. The analysis also focused on whether these outbreaks were viral haemorrhagic related or had other characteristics. Results reveal that between 2001 and 2022, a total of 2234 public health events have been recorded in the WHO African Region of which 1886 events (84.4%) were substantiated. The paper confirms an average of 102 public health events reported yearly during the last 22 years time frame. The large majority (92%) of the substantiated events were infectious diseases (n=1730), 30% (n=566) are zoonoses and 5% (n=95) are humanitarian crises such as disaster events and conflicts. The number of zoonotic disease outbreaks has significantly increased (by 87%) between the past two decades, from 2003 to 2012 period (M=18.6, SD=4.8) and 2013–2022 period (M=34.7, SD=14); t(18) = 3.4, p=0.0032. This analysis shows growing challenges faced in the Africa region every year. One-health approach and its coordination across multiple sectors, disciplines and communities is critical to achieve the objectives.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ A suite of exploratory data analysis (EDA) methods combining time series analysis, summary statistics, temporal visualizations, GIS mapping, trend analysis, and statistical tests were used to derive patterns and trends of disease outbreaks in the African Region

WHAT THIS STUDY ADDS

⇒ Results reveal that between 2001 and 2022, a total of 2,234 public health events have been recorded in the WHO African Region of which 1,886 events (84.3%) were substantiated.

⇒ The large majority (92%) of the events were infectious diseases (n=1,730), 30% (n=566) are zoonoses and 5% (n=95) are humanitarian crises such as disaster events and conflicts.

⇒ The number of zoonotic disease outbreaks has significantly increased (by 87%) between the past two decades, from 2003-2012 period 2003-2012 (M =18.6, SD = 4.8) and 2013-2022 period (M = 34.7, SD = 14); t(9) = 3.46, p = .0011.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This analysis shows growing challenges faced in the Africa region every year. One-Health approach and its coordination across multiple sectors, disciplines, and communities is critical to achieve the objectives.

INTRODUCTION

The African Region reports the heaviest burden of public health emergencies globally, with more than 100 major public health events taking place annually.[1] Many of these diseases such as Diphtheria, Haemophilus influenzae serotype b infection, measles, meningitis, mumps, pertussis, poliomyelitis, rubella, tetanus, tuberculosis and yellow fever are preventable or controllable with proven public health interventions, but still account for a large proportion of outbreaks reported. This is largely due to the low vaccination coverage coupled with a weak health system and capacity gaps in surveillance systems.[2] After-action reviews of outbreaks in the African Region have consistently underscored the need to build surveillance capacities for public health emergencies.[3]

On the other hand, new studies suggest that climate change is exacerbating even more the infectious diseases by bringing people and

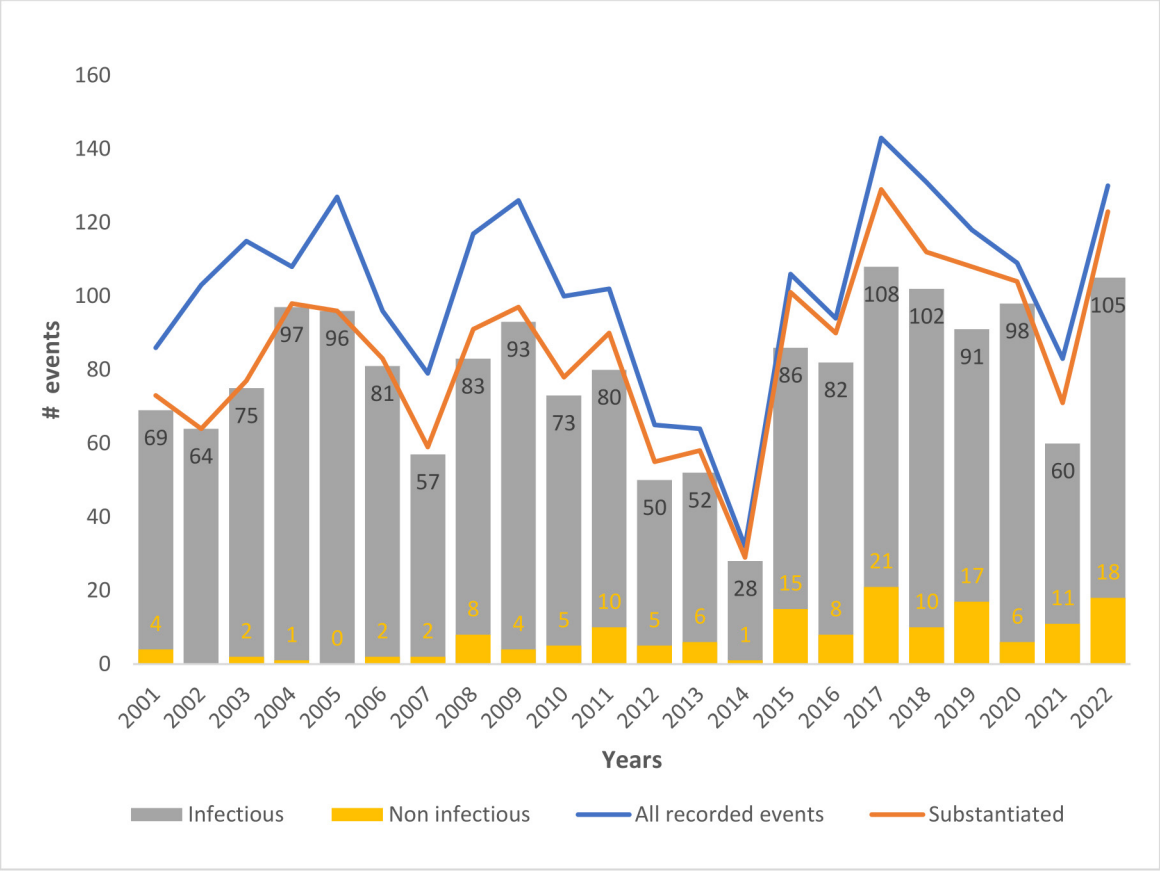

Figure 1 Trends in the number of events in the WHO African Region, 2001–2022.

disease-causing organisms closer together. This is the case for almost two-thirds of pathogenic diseases affecting humans,[4] leading to a rise in number of cases and making some conditions more severe and affect how well people fight off infections with the effect of global warming.[5] These studies on the associations between climate change and disease have focused on pathogens, transmission methods or the effects of extreme weather and identified rising of temperatures as one of the greatest threats to disease outbreaks.[5] For example, Patz *et al* investigated how 10 climate-change-induced hazards, including surging temperatures, sea level rise and droughts have affected all documented infectious diseases, spread or triggered by bacteria, viruses, animals, fungi and plants.[6] Heatwaves, droughts, floods and storms push up the number of cases, make diseases more severe and hamper people's ability to cope. The authors found that increases in temperature and rainfall, for instance, have expanded the range of mosquitoes and contributed to outbreaks of dengue fever, chikungunya and malaria; heatwaves draw more people to water-related activities, leading to a rise in cases of waterborne illnesses; storms, sea level rise and floods force people to move and have been implicated in outbreaks of Lassa fever, cholera and typhoid fever.[7 8] Furthermore, a comprehensive literature review reveals that over 58% of human pathogenic diseases are aggravated by climatic hazards that are sensitive to greenhouse gas emissions.[6]

The above findings from recent research are prompting more concerns for the Africa region. With one of the fastest growing population, Africa is seeing a high urbanisation rate, a growing demand for food and other agricultural products. The expansion of settlements and related infrastructures is moving people closer to wildlife areas and connecting remote rural villages to urban centres with roads, rails or boats links. As a result, animals and humans are increasingly living closer and closer together, increasing the risk of zoonotic disease outbreaks. The recent Ebola outbreak in West Africa in 2014, Lassa fever in Nigeria from 2015 to 2022, the ongoing monkeypox outbreaks in many countries in the region, and the recent Ebola outbreak in Uganda and Marburg in Equatorial Guinea are potential results of the ongoing ecosystems alterations in the region.

This paper presents an exploratory analysis of public health events data collected the past 22 years in the region, to explore patterns and trends that can inform public health strategies, policy changes and guide the development of appropriate tools to improve disease surveillance, preparedness and response to public health emergencies.

METHODS

Data source

The data consist of a collection of public health events from 2001 to 2022 captured in WHO Event Management

Table 1 Independent sample t-test for public health events during the past two decades 2003–2012 and 2013–2022, group of 13 zoonotic diseases with highest number of outbreaks the past two decades, and individual zoonotic diseases (N=10)

	2001–2022	2003–2012			2013–2022			Difference calculations		95% CI		T test statistics		
	Sum	Sum	Mean	SD	Sum	Mean	SD	Mean	SE	Lower	Upper	*t*	*df*	P value (2 tailed)
All recorded events	2234	1035	103.5	19.9	1010	101	34.0	2.5	12.4	28.64	23.64	0.201	18	0.8408
Substantiated	1886	824	82.4	15.3	925	92.5	31.2	10.1	11.0	13.02	33.22	0.918	18	0.3709
Infectious	1730	785	78.5	15.6	812	81.2	26	2.7	9.7	17.67	23.07	0.279	18	0.7838
Non infectious	156	39	3.9	3.2	113	11.3	6.3	7.4	2.2	2.70	12.10	3.306	18	0.0039*
Zoonotic	566	186	18.6	4.8	347	34.7	14	16.1	4.7	6.16	26.05	3.401	18	0.0032*
Non Zoonotic	1164	599	59.9	14.8	465	46.5	15.9	13	6.9	27.81	1.01	1.953	18	0.0665
Group of 13 prevailing zoonotic disease outbreaks*	541	182	18.2	4.7	327	32.7	13.5	14.5	4.5	4.95	24.05	3.191	18	0.0051*
Yellow Fever	118	57	5.7	3.1	49	4.9	3.5	0.8	1.5	3.91	2.308	0.541	18	0.5953
Dengue fever	61	12	1.2	1.5	49	4.9	3	3.7	1.1	1.48	5.920	3.501	18	0.0025*
Lassa Fever	59	20	2	0.7	39	3.9	2.2	1.9	0.7	0.38	3.417	2.632	18	0.0169*
CCHF	55	9	0.9	1.0	44	4.4	3.2	3.5	1.1	1.25	5.751	3.267	18	0.0042*
RVF	47	14	1.4	1.0	31	3.1	1.5	1.7	0.6	0.50	2.899	2.98	18	0.0080*
Mpox	43	8	0.8	0.9	28	2.8	3.2	1.68	0.9	0.34	3.696	1.852	18	0.0755
Anthrax	43	12	1.2	0.8	29	2.9	2.7	1.7	0.9	0.19	3.586	1.894	18	0.0744
Plague	40	24	2.4	1.6	12	1.2	1	1.2	0.6	2.49	0.091	1.952	18	0.0666
Ebola	32	12	1.2	1.3	18	1.8	2.1	0.6	0.8	1.05	2.245	0.766	18	0.4535
Chikungunya	22	9	0.9	0.9	13	1.3	1.1	0.4	0.4	0.51	1.313	0.92	18	0.3695
Marburg	8	4	0.4	0.7	4	0.4	0.7	0	0.3	0.66	0.657	0	18	1
Zika	7	0	0	0.0	7	0.7	1.3	0.7	0.4	0.19	1.589	1.655	18	0.1152
Rabies	6	1	0.1	0.3	4	0.4	0.7	0.3	0.2	0.21	0.810	1.236	18	0.2322

*13 prevailing Zoonotic diseases based on outbreak counts (96% of counts): CCHF, Dengue fever, Monkeypox (Mpox), Anthrax, RVF, Lassa Fever, Chikungunya virus disease, Rabies, Ebola virus disease, Marburg virus disease, Yellow Fever, Plague, Zika virus disease.
.CCHF, Crimean-Congo Haemorrhagic Fever; RVF, Rift Valley fever.

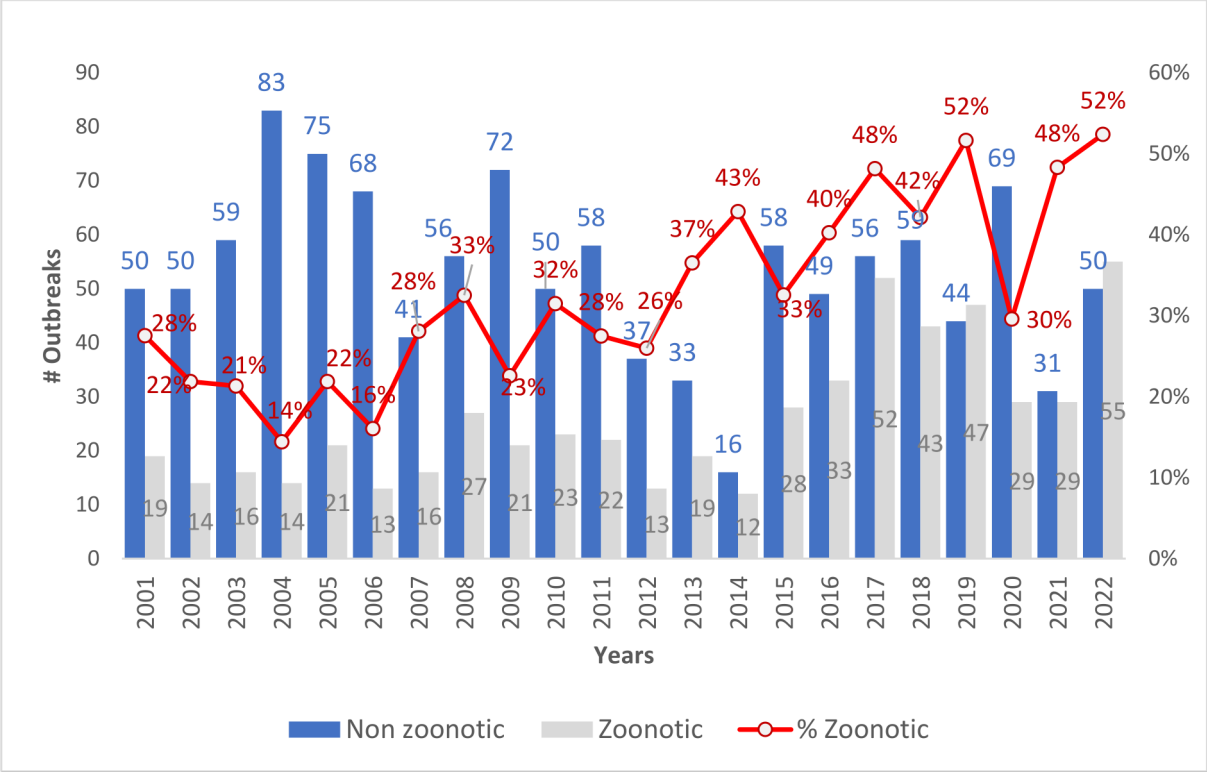

Figure 2 Trends in zoonic versus non-zoonotic disease outbreaks in WHO African Region by year.

System (EMS), the public health events database maintained by the WHO Health Emergencies Programme at the Regional Office for Africa. This database captures public health events being verified through epidemic intelligence activities as well as confirmed events for which a formal notification has been issued by public health authorities in the region. These public health events include disease outbreaks, humanitarian and other health emergencies. Variables contained in the database include the event ID, event name, description of events, country name, subregion (Central, West, Eastern or Southern African), type of hazard, type of syndrome, source of the information, severity, the status of the event, date of creation of the event, date of onset of the event,

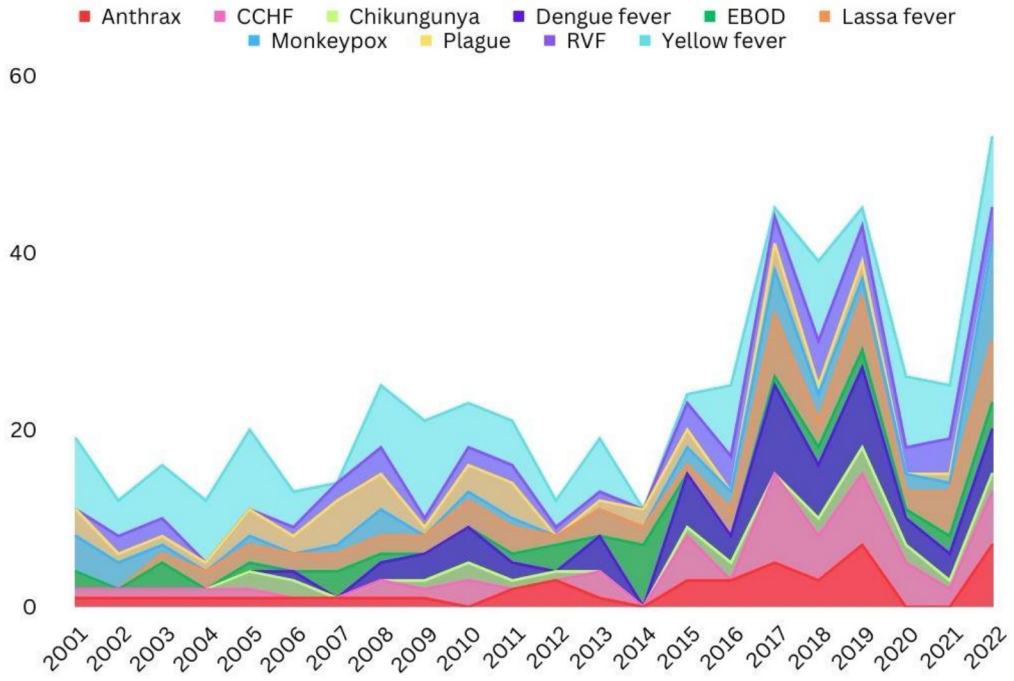

Figure 3 Trends in zoonotic disease outbreaks in the WHO African Region, 2001–2022.

Table 2 Most recurrent zoonotic diseases (2001–2022) and 2003–2012 and 2013–2022 variations

Disease	2001–2022	%	2003–2012	2013–2022	Diff	Variation
Yellow fever	118	20.80	57	49	8	14
Dengue fever	61	10.80	12	49	37	308
Lassa fever	59	10.40	20	39	19	95
Crimean-Congo haemorrhagic fever	55	9.70	9	44	35	389
Rift Valley fever	47	8.30	14	31	17	121
Mpox	43	7.60	8	28	20	250
Anthrax	43	7.60	12	29	17	142
Plague	40	7.10	24	12	12	50
Ebola virus disease	32	5.70	14	18	4	29
Chikungunya virus disease	22	3.90	9	13	4	44
Marburg virus disease	8	1.40	4	4	0	0
Zika virus disease	7	1.20	0	7	7	
Rabies	6	1.10	2	4	2	100
Leptospirosis	4	0.70	3	1	2	67
Leishmaniasis, visceral (Kala-azar)	4	0.70	0	4	4	
Dracunculiasis	4	0.70	0	4	4	
West Nile fever	3	0.50	0	3	3	
Brucellosis	1	0.20	0	1	1	
Other viral haemorrhagic fever	9	1.60	2	7	5	
Total	566					

date of detection, date of notification to WHO, verification date, laboratory confirmation date, event aetiology, total number of cases and deaths, date of end of the event and other information related to rapid risk assessments and grading level.

Categorisation of public health events

Key data elements contained in the database explored in this paper were used to categorise the public health events. These elements include hazard type, syndrome, the disease or condition and aetiology. The categorisation was based on similarity in mode of transmission, type of aetiological agent, or diseases or condition type.

Data analysis

A data cleaning process was conducted on the original dataset to better differentiate hazard types such as infectious and zoonotic hazards. The cleaning addressed missing information on the disease categorisation entered in the database by assigning the right categorisation based on other data elements such as similarity in mode of transmission, type of aetiological agent or diseases requiring the same type of public health intervention. Other missing data such as dates were completed using secondary information sources, including the WHO EMS for all globally reported events that may constitute a public health risk, risk assessment reports, the integrated disease surveillance and response (IDSR) weekly bulletins produced by member states in the African Region, outbreak investigation and situation reports submitted to WHO.

A suite of exploratory data analysis methods combining time series analysis, summary statistics, temporal visualisations, GIS mapping, trend analysis and statistical tests were used to derive patterns and trends from the data. An in-depth analysis of zoonotic outbreaks by geography and time was explored. The analysis also focused on whether these outbreaks were viral haemorrhagic related or had other characteristics.

Tools used to conduct the data analysis include geographic information system (GIS) tools (ArcGIS), R scripts, Microsoft Excel, statistical t-test tool and other freely available data visualisation tools.

For analysis, we considered three different time periods: the entire 2001–2022 period (22 years), and the last two decades 2003–2012 and 2013–2022 separately for comparative analysis. At the first stage of the analysis, all the public health events recorded in the WHO Africa region were explored to understand the landscape of public health events in the region. In subsequent phases of the analysis, a focus was put on disease outbreaks and infectious diseases, and an in-depth analysis of zoonotic disease outbreaks as key component of the challenges faced in the region considering new evidence from the literature on the impact of climate, environment and ecosystem changes as described in the introduction.

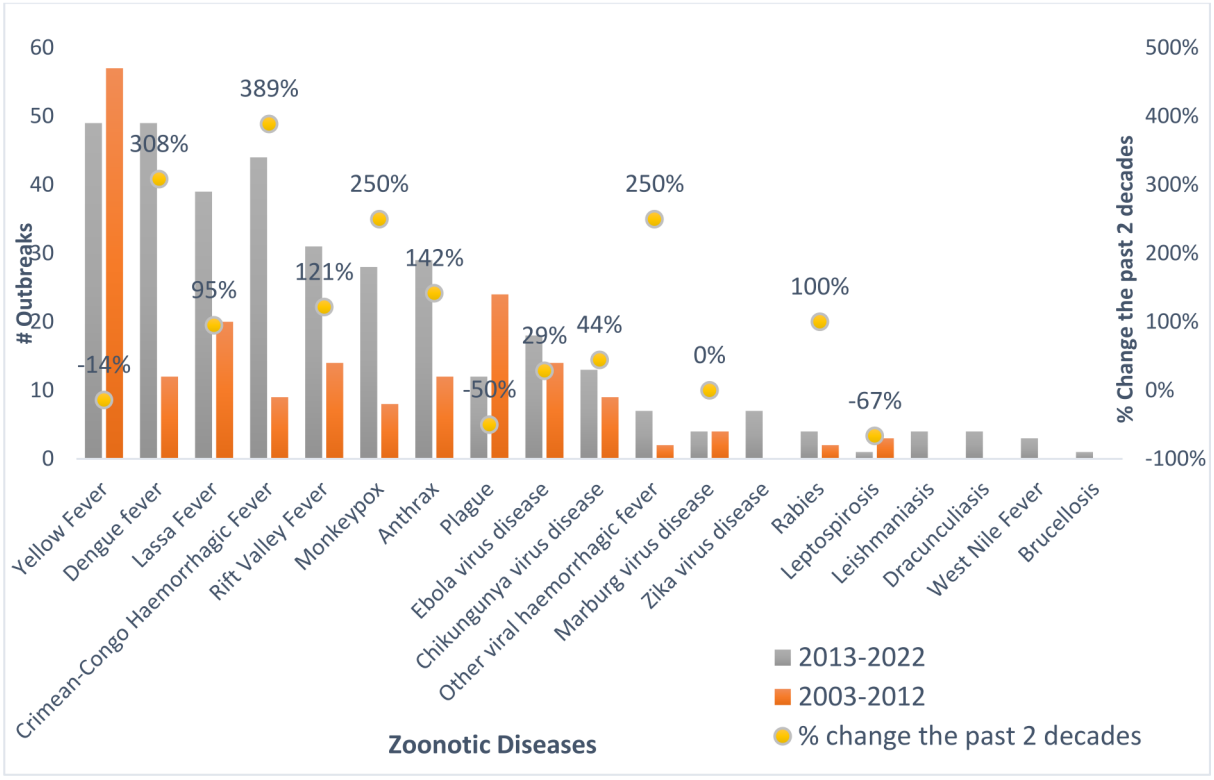

Figure 4 Zoonotic outbreaks in the Africa Region: Comparison of the past two decades (2003–20012/2013–2022).

RESULTS

General trend in public health and humanitarian events in Africa region the past 22 years (2001–2022)

Between 2001 and 2022, a total of 2234 public health events and humanitarian crises have been recorded in the WHO African Region, of which 1886 events (84.4%) were substantiated and about 15% (15.6%) turned out to be unverifiable, discarded or not an actual event.

As presented in figure 1, the number of events increased between 2015 and 2019, perhaps partly explained by an improvement in reporting and data capture systems. On the other hand, the lower numbers of events reported in 2014 and 2021 could be explained by the pressures on the health systems, and a large focus of reporting of surveillance data on the West-African Ebola virus disease and COVID-19 outbreaks.

On average, 102 events have been reported yearly the last 22 years between 2001 and 2022 (figure 1) with the lowest number of events reported in 2014 (n=32) and the highest in 2017 (143). The substantiated events during the same period 2001–2022 presents the same trend. The large majority (92%) of the events were infectious diseases (n=1730), 30% (n=566) are zoonoses and 5% (n=95) are humanitarian crises such as disaster events and conflicts.

Public health events during the past two decades 2003–2012 and 2013–2022

The remaining parts of the analysis focus on substantiated public health events only, comparing the past two decades 2003–2012 and 2013–2022. During the past two decades (2003–2022), 1749 substantiated outbreak events were recorded, 824 during the 2003–2012 period and 925 during the last decade going from 2013 to 2022. This represents a 12% increase in the number of outbreak events recorded between 2003–2012 (n=824) and 2013–2022 (n=925). Overall, the volume of outbreaks reported during the past decade is greater than those recorded the decade before. An independent sample t-test was performed to compare the variations in the number of substantiated events during the periods 2003–2012 and 2013–2022 based on the recorded events each year to evaluate if the change is significant (table 1). There was no significant difference in number of substantiated events recorded during the period 2003–2012 (M=82.4, SD=15.3) and the period 2013–2022 (M=92.5, SD=31.2); t(18) = 0.918, p=0.841. Similar results were obtained for all recorded events (table 1).

Similarly, there was no significant difference between the infectious disease outbreaks between the two decades 2003–2012 (M=78.5, SD=15.6) and 2013–2022 (M=81.2, SD=26.4); t(18) = 0.279, p=0.783 (table 1). On the other hand, although not high volume in total numbers, non-infectious disease outbreaks increased from 39 during 2003–2012 (M=3.9, SD=3.2) to 113 during 2013–2022 (M=11.3, SD=6.3), demonstrating in a significant increase, t(18)= 3.31, p=0.0039.

Zoonotic outbreak events the past two decades 2003–2012 and 2013–2022

For this study the following list of diseases were categorised as zoonotic: Anthrax, Brucellosis, Chikungunya,

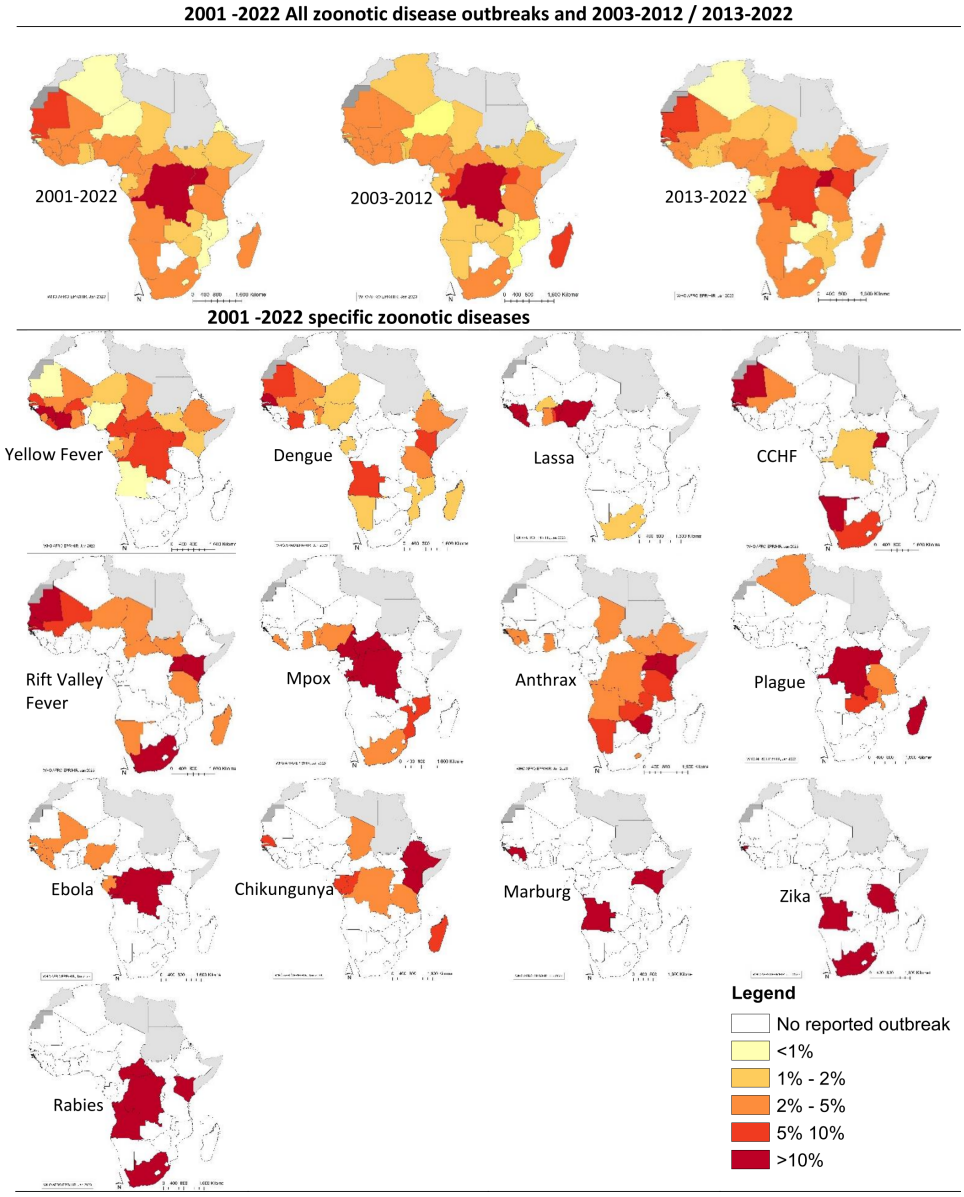

Figure 5 Geographical patterns of zoonotic disease outbreak in the Africa Region from 2001 to 2022.

Crimean-Congo haemorrhagic fever (CCHF), Dengue fever, Dracunculiasis, Ebola virus disease, Lassa fever, Leishmaniasis, Leptospirosis, Marburg, Mpox, Plague, Rabies, Rift Valley fever (RVF), West Nile fever, yellow fever and Zika virus disease.

With this classification, 566 zoonotic disease outbreaks were reported between 2001 and 2022, which represents one-third of infectious diseases (33%) and one-third (30%) of substantiated outbreak events. In 2019 and 2022, zoonotic disease outbreaks represented more than 50% (52%) of all infectious emergencies (figure 2).

When comparing the past two decades, there was 87% increase in the number of zoonotic disease outbreaks between 2003–2012 (n=186) and 2013–2022 (n=347). Figure 3 depicts that variation in the volume of zoonotic disease outbreaks between the two time periods. This is a significant increase during the two decades as described in the independent sample t-test results presented in table 1, comparing the two periods (M=18.6, SD=4.8) and (M=34.7, SD=14.2), respectively; t(18) = 3.401, p=0.0032.

The average number of zoonotic disease outbreaks recorded annually during the past two decades is 26 (figure 2), with the highest number recorded in 2022 (n=55). The spike in zoonotic disease outbreaks over the past decade can be partly attributed to improve surveillance and reporting systems but may also be an indirect reflection of climate change effects across the region as discussed above in the literature[6] and calls to reinforce the One Health approach in disease surveillance across Africa.

Most recurrent zoonotic diseases

Considering the past 22 years (2001–2002) data, 13 zoonotic diseases represent more than 95% of the total zoonotic outbreaks, with at least 1% of the share of outbreaks each (table 2). Yellow fever (n=118; 20.8%),

Table 3 Analysis of severity of the outbreaks over time from 2017 to 2022

	2017		2018		2019		2020		2021		2022	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Yellow fever	29	0	26	14	13	22	72	22	219	60	14	14
Dengue fever	3925	6	851	2	7382	0	34	0	2097	4	1244	12
Lassa fever	42	29	35	22	66	6	14	6	728	142	97	32
CCHF	12	5	19	7	10	7	13	7	3	0	29	10
Rift Valley fever	16	9	25	10	20	32	72	32	13	3	61	26
Mpox	191	13	42	4	453	1	6	1	39	4	1002	14
Anthrax	17	2	12	1	141	0	88	0	0	0	27	7
Plague	682	268	31	9	617	0	0	0	19	8	0	0
Ebola	5	4	3355	2320	4	55	119	55	35	27	147	83
Chikungunya	50	0	431	0	100	1	143	1	6	1	439	0
Marburg	3	3	0	0	0	0	0	0	1	1	3	2
Zika virus disease	0	0										
Rabies			32	26								
Leptospirosis											15	3
Leishmaniasis	362	7	0	0	2051	16	13	16	0	0	0	0
Dracunculiasis	0	0	4	0	0	0	7	0	0	0	0	0
West Nile fever						0	6	0	1	0	1	0
Brucellosis									64	0		
Other HF	0	0	0	0	0	24	297	24	7	1	0	0

CCHF, Crimean-Congo haemorrhagic fever; HF, haemorrhagic fever.

Dengue fever (n=61; 10.8%), Lassa fever (n=59; 10.4%), CCHF (n=55; 9.7%), RVF (n=47; 8.3%), Anthrax (n=43; 8%), Mpox (n=43; 7.6%), Plague (n=40; 7.1%), Ebola virus disease (n=32, 5.7%), Chikungunya(n=22, 3.9%), Marburg virus disease (MVD) (n=8, 1.4%), Zika virus disease (n=7, 1.2%) and Rabies (n=6, 1.1%) were the prevailing zoonotic disease outbreaks recorded (table 2 and figure 4). Independent sample t-test performed on this group of 13 zoonotic diseases for the two past decades showed a significant increase in the number of outbreaks, with M=18.2, SD=4.7 for the period 2003–2012 and M=32.7, SD=13.7 for the period 2013–2022; t(18) = 3.19, p=0.0051.

Viral haemorrhagic fevers constituted nearly 70% (n=399, 70.5%) of these outbreaks. Table 2 shows that outbreaks of Dengue, Lassa fever, CCHF, RVF, Anthrax, Ebola and Chikungunya virus disease are on the rise over recent years. The statistical test results (table 1) confirm significant increase in the number of outbreaks for four zoonotic diseases: Dengue fever (p=0.0025), Lassa fever (p=0.0169) and CCHF (p=0.0042), RVF (p=0.0080). As depicted in table 2, seven zoonotic diseases have the largest increase in absolute number of outbreaks captured in the region (Yellow fever, Dengue fever, Lassa fever, CCHF, RVF, Mpox, Anthrax and Zika virus disease). Two zoonotic diseases recorded high number of outbreaks in recent years: Mpox (11 outbreaks in 2022 compared with 1 in the previous year) and Yellow Fever (8 outbreaks in 2022, 6 in 2021, 8 in 2020).

Geographical patterns

An analysis of the zoonotic disease outbreaks by pathogen, country, year and month was performed based on a compiled outbreak distribution datasheet, which is provided as online supplemental material.

During the study period 2001–2022 (last 22 years), a total number of 566 zoonotic disease outbreaks were recorded in 43 of the 47 Member States. Uganda (n=49; 8.7%), Democratice Republic of Congo (DRC) (n=48; 8.5%) are the top two countries with the highest number of zoonotic disease outbreaks during that period. Twenty-one countries cumulate 80% of all the zoonotic disease outbreaks. They include beside Uganda and DRC, Senegal (n=35; 6.2%), Mauritania (n=33; 5.8%), Kenya (n=27; 4.8%), Guinea (n=23; 4.1%), Madagascar (n=21; 3.7%), Congo (n=18; 3.2%), Côte d'Ivoire (n=18; 3.2%), Nigeria (n=18; 3.2%), Cameroon (n=17; 3%), Sierra Leone (n=17; 3%) and Mali, CAR, Namibia, South Africa, Tanzania, Angola, Benin and Burkina Faso between 2.1% and 2.8%.

The maps presented in figure 5 show the geographical footprint of zoonotic outbreaks overall between 2001 and 2022, a comparison of 2003–2012 and 2013–2022 periods,

and the geographical concentration of outbreaks for each zoonotic disease.

As described above, the statistical tests confirmed significant increase for four zoonotic diseases in the region between the past two decades: Dengue fever, Lassa fever, CCHF and RVF. The geographical pattern of zoonotic disease outbreaks is described below:

Dengue fever A fourfold increase (table 2) in the number of dengue fever outbreaks between 2003–2012 (n=12) and 2013–2022 (n=49). In 2017 alone, a total of 10 outbreaks were reported. Senegal 11.5% (n=7), Mauritania 9.8% (n=6) and Kenya and Cote d'Ivoire 8.2% (n=5), Seychelles and Angola 6.6% (n=4), Mali, Cape Verde, Mauritius, Ethiopia, Tanzania 4.9% (n=3) are the countries that reported the highest numbers of dengue outbreaks during the period 2001–2022.

Lassa fever An increasing trend in the number of Lassa fever outbreaks over time in the region (table 2). For instance, the number of these outbreaks doubled between 2003–2012 (n=20) and 2013–2022 (n=39). Most of these outbreaks were reported in West African countries: Liberia 20.3% (n=12), Nigeria 20.3% (n=12), Sierra Leone 18.5% (n=11), Benin 15.3% (n=9), Guinea 11.9% n=7) and Togo 6.8% (n=4).

Crimean-Congo haemorrhagic fever A significant increase between the past two decades, going from 9 events reported between 2003 and 2012 to 44 events reported between 2013 and 2022. A peak was observed in 2017 with 10 outbreaks. CCHF seems to be endemic to Mauritania, with a total of 18 reported outbreaks during the study period 2001–2022 (32.7%), followed by Senegal 18.2% (n=10), Namibia 18.2% (n=10) and Uganda 16.4% (n=9).

Rift Valley fever An increasing trend in the number of RVF outbreaks (table 2) is observed during the study period. The number of outbreaks has doubled between 2003–2012 (n=14) and 2013–2022 (n=31). Countries with the highest reported outbreaks include Uganda 19.1% (n=9), Mauritania 17% (n=8), Kenya 10.6% (n=5), South Africa 10.6% (n=5), Senegal 10.6% (n=5) and Mali 8.5% (n=4).

The snapshot of the geographical pattern of other major zoonotic diseases is described below and visually depicted in figure 5.

Mpox

The large majority of Monkeypox outbreaks during the period 2001–2022 were reported in Central African countries: DRC, 38.5% (n=15), followed by CAR 15.4% (n=6), Cameroon 12.8% (n=5) and Congo 12.8% (n=5). In 2022, 11 Mpox outbreaks were reported, potentially due to the increased surveillance, as a result of the global Monkeypox awareness.

Anthrax

With a 2.5-fold increase (table 2) between 2003–2012 (n=12) and 2013–2022 (n=29). Countries most affected include Zimbabwe 16.3% (n=7) of total events, Kenya and Uganda11.6% (n=5) of the total events.

Chikungunya

A concentration of outbreaks in two countries, Kenya 18.2% (n=4) and Ethiopia 13.6% (n=3).

Ebola disease

Of the total of 32 Ebola outbreaks since 2001 in the Africa region, 23 occurred the last 10 years representing 71% of all Ebola outbreaks since 2001. One-third of these outbreaks (10 outbreaks) occurred the past 5 years. A total of seven outbreaks were reported in 2014, especially during the West African Ebola disease outbreaks. DRC appears with the highest number of Ebola disease outbreaks in Africa with 12 outbreaks reported between 2001–2022 (37.5%; n=12), followed by Uganda (25%; n=8) and Congo (15.6%;n=5).

Rabies

Rabies outbreaks were reported in DRC (n=2), Angola (n=1), CAR (n=1), Kenya (n=1) and South Africa (n=1).

Plague

The number of outbreaks has been on the decrease by 50% during the past two decades going from 24 events recorded between 2003 and 2012 to 12 events between 2013 and 2022 (table 2). Madagascar recorded the highest number of Plague outbreaks in the Region with 16 reported outbreaks (40%), followed by DRC with ten outbreaks (25%).

Yellow fever

Countries recording the highest numbers of yellow fever outbreaks are in West Africa: Côte d'Ivoire 11.2% (n=13), Guinea 10.3% (n=12), Cameroon 9.5% (n=11) and Burkina Faso 7.8% (n=9).

MVD: the number of MVD outbreaks remained the same (M=0.4, SD=0.699, p=1) between 2003–2012 (n=4) and 2013–2022 (n=4). Sixty-three per cent (n=5) of the events during the past 22 years were reported in Uganda.

Changes in time

More detail of the trend was explored by year, by month and by pathogen. For example, yellow fever outbreaks are persistent all over a given year (high number of outbreaks every month) whereas we can see more concentrations of Lassa fever outbreaks in the first quarter of the year, in January and February in particular. The geographical and temporal analysis of the outbreaks intends to provide a calendar of potential events over time based on the data, to take appropriate preparedness actions at each level of the health pyramid for detection and response to such events. This temporal analysis can be combined with modelling to develop a robust event forecasting tool and effective planning actions for preparedness and response to public health events.

Severity analysis

In addition to the number of outbreaks by pathogen type, geography and time, an analysis of the severity of the outbreaks was performed (table 3). The analysis was restricted to the period 2017–2022 for which validated data on severity (number of cases and deaths) was available in the WHO EMS. The data show no decreasing trend in the number of cases or deaths over time for zoonotic outbreaks. A triangulation of the severity data with the statistical analysis performed on zoonotic disease outbreaks trend suggest further evidence of the upward trend of zoonotic diseases outbreaks and their impact.

CONCLUSIONS

This analysis shows growing challenges faced in the Africa region every year. The trend in outbreak events is upward for zoonotic diseases and prompt for urgent actions to strengthen the capacity to prevent, detect earlyand respond effectively to public health events and limit their impact.

When comparing the past two decades, there was a significant increase (by 87%) in the number of zoonotic disease outbreaks between 2003–2012 and 2013–2022. The average number of zoonotic disease outbreaks recorded annually during the past two decades is 26, with the highest number recorded last year 2022 (n=55), twice the average number over the past 22 years. The spike in zoonotic disease outbreaks over the past decade may be linked to improvements in surveillance and detection systems, but can also be an indirect reflect of climate change effects across the region, as discussed in the literature and calls to reinforce the one-health approach in disease surveillance across Africa.

There is urgent need for adaptation strategies, informed public health strategies and policy changes, and the development of appropriate tools to improve routine disease surveillance information and response systems for both animal and human health. Community-based surveillance specifically should be prioritised and focused on the involvement of communities, to ensure buy-in on prevention measures, and adoption of adaptation strategies, as well as reinforcing participatory approaches, active contribution to reporting of events in the community and liaising with public health authorities. One-health approach and its coordination across multiple sectors, disciplines and communities is critical to achieve the objectives.

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