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Global updates on COVID-19 and other diseases
Sarawak Infectious Disease Centre (SIDC)

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- KP.3.1.1 has a higher reproduction rate, infectivity, and neutralisation resistance compared to its immediate predecessor, KP.3.
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- The One Health approach is needed to investigate possible spillover of mpox from humans to animals.
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- Singapore and Malaysia will not be vaccinating the masses against mpox.
- Pakistan confirmed another mpox case.
- The first batch of mpox vaccines has arrived in the Democratic Republic of the Congo (DRC).

- Cambodia's laboratory confirmed a case of human infection with avian influenza A(H5N1) virus (clade 2.3.2.1c).
- The latest human case of H5N1 in the US has no association with animals or outbreak areas.

- The human gut can serve as a reservoir for chlamydia.
- Backyard rearing/unlicensed rearing of animals can serve as a reservoir for potentially important pathogens.
- A new Orthonairovirus, the Wetland virus (WELV), has been described in China.
- There has been a global surge of *Acinetobacter* species carrying multiple carbapenem-resistance genes.

- Exposure to radiofrequency electromagnetic fields from cell phones likely does not increase brain cancer risk.
- Investors have a crucial role in addressing antimicrobial resistance.
- Low HPV vaccination rates among young people in Texas is associated with high incidences of HPV-related cancers.

1.0 Situational summary: COVID-19 cases and related issues

1.1 Asia-Pacific and Southeast Asia

Japan

Many people suffering from long-COVID have been forced to quit their jobs or take sick leave due to their weakened health. The findings were based on a recent survey of patients who visited Okayama University Hospital for long-COVID from 2021 to 2023.[1]

Of the 545 patients who had been working, 220 (40.4%) had to take sick leave from their jobs and 53 (9.7%) had to resign.

The reason for quitting was attributed mainly to the uncertainty about when they would recover and a lack of understanding at their workplace; patients were under mental strain as their superiors kept denying the existence of the condition with remarks such as "there's no such thing as long-COVID" and others resigned because they did not want to inconvenience anyone, as they did not know when they could return to work.

Experts continue to urge companies to show consideration for people with long-COVID. An in-house consultation service should be established to ensure employees have a place to go to to talk about their health concerns and also to create awareness about the condition.

1.2 The Americas

The US

COVID-19 activity remains high, with transmission rates increasing across all regions. The incidence of KP.3.1.1 infections has sharply risen to 42.2%, an increase from 29.5% in the fortnight ending 17 August 2024. The national test positivity rate stands at 17%, showing a slight decrease from the previous week. Positivity rates are notably higher in Texas, surrounding states, and the lower Midwestern states compared to other regions. Emergency department (ED) visits have decreased from the previous week. However, they remained highest in the South and Southeast. Nationally, hospitalisations have notably decreased to 3.1 per 100,000 people. The South has surpassed the West in wastewater concentration, while the Midwest and Northeast continue to show increases (**Figure 1**). [2,3]

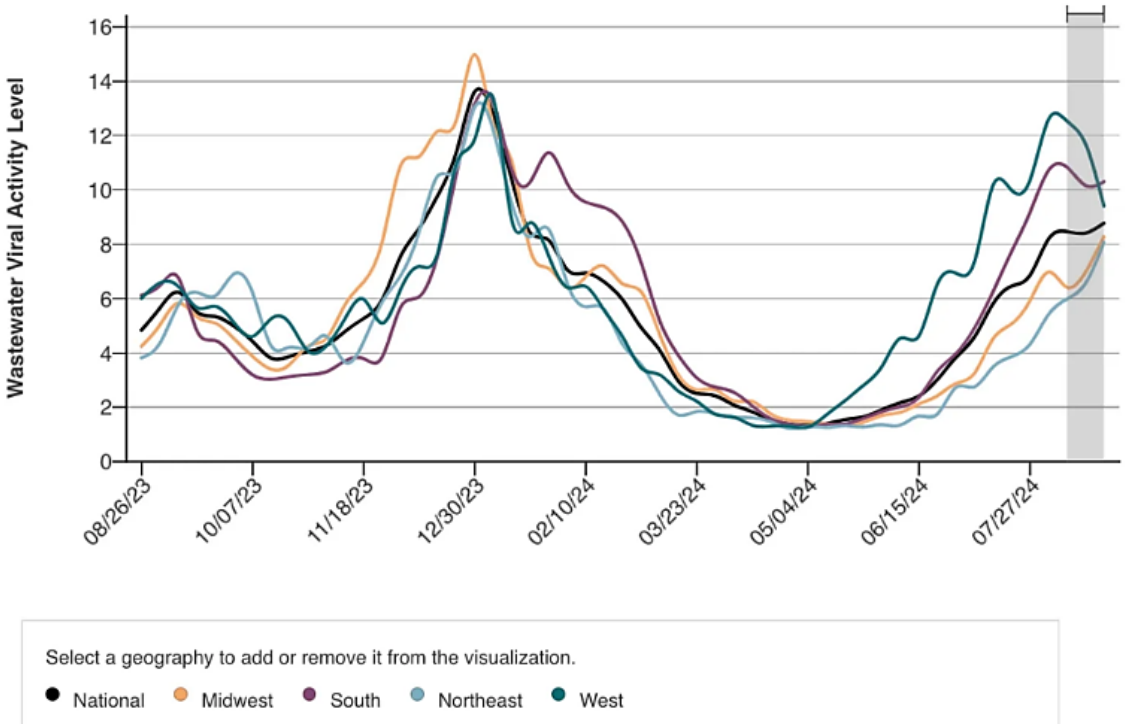

Figure 1. National and regional trends of SARS-COV-2 viral activity levels in wastewater in the US as of 29 August 2024. The grey bar shows the latest levels from 10 -24 August 2024. The chart was modified from the CDC's Wastewater COVID-19 National and Regional Trends dashboard at https://www.cdc.gov/nwss/rv/COVID19-nationaltrend.html.

2.0 Variants

KP.3.1.1

The KP.3.1.1 variant has recently spread widely in the US, along with other variants like KP.2 and KP.3, which originated from JN1. KP.3.1.1 contains specific mutations that enhance its infectiousness and ability to evade antibodies from previous infections and COVID-19 vaccines. Pemivibart (Permagard/VYD222), a treatment approved by the US Food and Drug Administration (FDA) to prevent COVID-19 in immunocompromised individuals, appears to be less effective against KP.3.1.1 compared to earlier variants. JN.1 subvariants, including KP.3.1.1 (JN.1.11.1.3.1.1), have developed additional mutations, such as the deletion of Serine at position 31 in the spike protein (S). [4,5]

Experts have indicated that the reproduction number (R_e) of KP.3.1.1 is over 1.2-fold higher than that of JN.1. In Spain, it exceeds the R_e of KP.2, KP.3, LB.1, and KP.2.3. The virological properties of KP.3.1.1 were assessed using pseudoviruses. The pseudovirus of KP.3.1.1 exhibits significantly higher infectivity than KP.3. The 50% neutralisation titre (NT50) against

KP.3.1.1 was significantly lower than KP.3 (1.4–1.6-fold) in groups of convalescent sera tested as follows:

i) convalescent sera after breakthrough infection (BTI) with XBB.1.5 or EG.5,
ii) convalescent sera after the infection with HK.3 or JN.1, and
iii) sera after monovalent XBB.1.5 vaccination.

KP.3.1.1 showed stronger resistance with a 1.3-fold lower NT50 with statistical significance to the convalescent sera infected with EG.5 and HK.3 than KP.2.3. [6]

In conclusion, KP.3.1.1 has a higher reproduction rate, infectivity, and neutralisation resistance compared to KP.3. These findings are consistent with their recent report that JN.1 subvariants with the S mutation demonstrate enhanced transmission and immune evasion, highlighting the evolutionary significance of this mutation in the JN.1 lineage. [7]

3.0 Vaccines and vaccinations

COVID-19 vaccine misinformation, the US

The Annenberg Science and Public Health (ASAPH) found in a survey of nearly 1,500 US adults that more Americans are believing misinformation about COVID-19 vaccines, and their willingness to get vaccinated or recommend vaccination has decreased compared to the past. The COVID-19 Vaccine Misinformation Acceptance as of July 2024 is summarised in **Table 1**. [8,9]

Table 1. The latest proportions of Americans, reported in percentage, who hold certain misconceptions about COVID-19 vaccines, compared to earlier data. These beliefs are linked to increased reluctance to get vaccinated.

Misinformation Belief	As of July 2024	Earlier Data
COVID-19 vaccines responsible for thousands of deaths	28%	22% (June 2021)
Safer to get COVID-19 infection than the vaccine	22%	10% (April 2021)
COVID-19 vaccine changes people's DNA	15%	8% (April 2021)

The ASAPH surveys from the policy centre also showed the following (paraphrased):

- Worry about COVID-19:
  20% (as of July 2024) were somewhat or very worried about contracting COVID-19, declining further from 25% in February 2024 and 35% in October 2023.
- Interest in annual COVID-19 vaccination:
  44% of those surveyed in February 2024 were somewhat or very likely to get a yearly COVID-19 vaccine if recommended by the CDC, declining from 52% in June 2023.
- Benefits vs. Risks:

Approximately 66% (as of July 2024) believed that the benefits of COVID-19 vaccines outweigh the risks.
However, this is lower than the belief for other vaccines such as mpox (70%), respiratory syncytial virus (RSV) for adults >60 (74%), and MMR (measles, mumps, rubella) (89%).

- Perception of vaccine safety and effectiveness:
  As of October 2023, fewer people viewed COVID-19 vaccines as safe (66%) and effective (65%) compared to other vaccines like MMR, flu, shingles, and pneumonia.
- Hypothetical trivalent vaccine:
  In July 2024, less than half, 49%, would likely take a combined mRNA vaccine for flu, RSV and COVID-19, if recommended by the CDC, while 27% would be "not at all likely" to take it.

With COVID-19 still a threat and an updated vaccine available, it is crucial to increase awareness of the importance of vaccination and the risks of contracting the disease.

4.0 Drugs and pharmaceuticals, and non-pharmaceuticals

Semaglutide lowers COVID-19 mortality

The SELECT (Semaglutide Effects on Cardiovascular Outcomes in Patients with Overweight or Obesity) trial evaluated the impact of semaglutide (2.4 mg) on all-cause mortality, cardiovascular (CV) mortality, and non-CV mortality, including specific categories of death and fatalities related to COVID-19, in a study involving over 17,000 participants. The findings are summarised in **Table 2**. [10]

Compared to placebo, patients treated with semaglutide (2.4 mg) experienced lower rates of all-cause mortality, with reductions seen in both CV and non-CV deaths. The decrease in non-CV deaths was primarily due to fewer deaths from infections. These findings showed the impact of semaglutide on reducing mortality in a diverse population of patients with cardiovascular disease and obesity.

Note:
Semaglutide is a GLP-1 receptor agonist that mimics a hormone that helps control blood sugar by increasing insulin production and reducing appetite. It comes in three FDA-approved forms: Ozempic injection and Rybelsus tablets, both for lowering blood sugar in adults with type 2 diabetes, with Ozempic also reducing heart attack, stroke, or death risk in those with heart disease; and Wegovy injection, which helps adults and children ≥12 years old with obesity or excess weight related health problems lose weight and maintain it, in addition to diet and exercise. [11,12]

Table 2. Comparisons of the effects of semaglutide versus placebo on all-cause, CV, and non-CV deaths, including common causes of death and COVID-19 outcomes.

Category	Measure	Semaglutide Group	Placebo Group	Hazard Ratio, HR [95% Confidence Interval, CI]
Total Deaths	CV Deaths	485 (58%)		
	Non-CV Deaths	348 (42%)		
Semaglutide vs. Placebo	All-Cause Deaths	Lower		HR: 0.81 [0.71-0.93]
	CV Deaths	Slightly lower		HR: 0.85 [0.71-1.01]
	Non-CV Deaths	Lower		HR: 0.77 [0.62-0.95]
Common Causes of CV Death	Sudden Cardiac Death	98	109	HR: 0.89 [0.68-1.17]
	Undetermined Death	77	90	HR: 0.85 [0.63-1.15]
Non-CV Death	Infection (Most Common Cause)	62	87	HR: 0.71 [0.51-0.98]
COVID-19 Outcomes	Incidence of COVID-19	No reduction		
	COVID-19 Serious Adverse Events	232	277	P = 0.04
	COVID-19 Deaths	43	65	HR: 0.66 [0.44-0.96]

5.0 Outcome

5.1 Fewer heart complications post-vaccine

Data from the French National Health Data System, which included 4,635 residents aged 12-49 hospitalised for myocarditis (inflammation of the heart muscle) between December 2020 and June 2022, indicated that young men, who were predominantly healthy before hospitalisation, experienced significantly fewer cardiovascular complications 18 months after developing myocarditis following a COVID-19 mRNA vaccination compared to myocarditis after a COVID-19 infection. [13,14]

The study revealed the following findings:

- Of the groups studied:
  - Post-vaccination myocarditis (within 1 week of COVID-19 mRNA vaccination): 12% of patients
  - Post-COVID myocarditis (within 30 days of infection): 6% of patients

- Conventional myocarditis: 82% of patients

- Demographics:
  - Post-vaccine myocarditis patients were younger (mean age: 25.9 years) than post-COVID (31.0 years) and conventional myocarditis patients (28.3 years).
  - Men were more frequent in post-vaccine myocarditis (84%), compared to post-COVID (67%) and conventional myocarditis (79%).
- Clinical Outcomes:
  - Lower incidence of composite clinical outcomes in post-vaccine myocarditis compared to conventional myocarditis (32/558 vs. 497/3779 events; HR: 0.55).
  - Similar outcomes for post-COVID myocarditis (36/298 events; HR: 1.04).
- Medical Management:
  - Similar trends in the standardised frequency of medical procedures and drug prescriptions across the 18 months following hospital discharge for both post-vaccine and post-COVID myocarditis compared to conventional myocarditis.

Patients with myocarditis following COVID-19 mRNA vaccination, unlike those with myocarditis after a COVID-19 infection, experienced fewer cardiovascular complications than those with conventional myocarditis at 18 months. However, these patients, particularly healthy young men, may still require extended medical care for several months post-hospitalisation.

5.2 Obesity and the risk of COVID-19

Large-scale studies have highlighted the negative impact of COVID-19 on individuals with obesity, showing a higher risk of severe outcomes and increased mortality.[15]

A case-control study utilised data from Massachusetts General Brigham Hospital electronic medical records, encompassing 687,813 patients, to investigate whether obesity at any age raises the likelihood of SARS-CoV-2 infection. The study analysed PCR results from 72,613 individuals who either tested positive for COVID-19 or reported exposure to the virus, regardless of their test results. Susceptibility was defined as the likelihood of testing positive following suspected exposure.

The findings showed that obese individuals exposed to SARS-CoV-2 were more likely to test positive compared to their non-obese counterparts, with an adjusted odds ratio of 1.34 (95% Confidence Interval, CI: 1.29 - 1.39). Temporal analysis demonstrated a consistently higher susceptibility among obese individuals throughout the pandemic in Massachusetts.

The findings indicated that obesity not only exacerbates the severity of COVID-19 outcomes, it also increases the risk of infection upon exposure. Early identification of such high-risk populations is critical for controlling the spread of the virus.

5.3 Long-COVID Studies, the UK

Two UK studies highlighted the prevalence, severity, and impact of long-COVID symptoms among healthcare workers (HCWs) and individuals referred to a National Health Service (NHS) post-COVID clinic.

The first study, conducted through the SARS-CoV-2 Immunity and Reinfection Evaluation (SIREN) study – a large prospective cohort study of UK HCWs undergoing regular polymerase chain reaction (PCR) and antibody testing for SARS-CoV-2 since June 2020 – included an electronic survey listing 35 symptoms. The survey gathered information on the severity of the infection, number of infections, prevalence of persistent symptoms lasting more than 12 weeks, and vaccination status (**Table 3**). [16]

Table 3. Summary of participant data and symptom prevalence by infection, variant, and vaccination status.

Category	Details
Participants eligible	16,599
Respondents	6,677
Included in final analysis	5,053 (median age: 49 years; 84.3% female; 90.7% White)
Prevalence of persistent symptoms by infection episode	• First Infection: 32.7% • Second Infection: 21.6% • Third Infection: 21.6% continued
Most frequently reported symptoms	• Fatigue and tiredness • Shortness of breath • Difficulty concentrating
Prevalence of persistent symptoms by variant period	• Wild-Type: 52.9% • Omicron VOC: 20.9% • Symptoms less prevalent from Wild-Type to Delta VOC to Omicron periods
Prevalence by vaccination status	• Unvaccinated: 38.1% • Vaccinated: 22.0% •
Odds of persistent symptoms post-vaccination	• Alpha/Delta VOC *aOR: 0.66 (95% CI: 0.51 to 0.87) • Omicron aOR: 0.07 (95% CI: 0.01 to 0.65)

*adjusted odds ratio: aOR

Among those with persistent symptoms, 51.8% and 42.1% reported impacts on daily and work-related activities, respectively, with 24.0% and 14.4% noting significant effects. 8.9% reduced their working hours, and 13.9% adjusted their work patterns. The median number of days off

work was 14. Persistent symptoms in many HCWs affected both personal and work life, highlighting the need for workforce planning and supportive return-to-work policies.

The second study analysed data from over 1,000 individuals in England and Wales who recorded their symptoms on an application between November 2020 and March 2022. The goal was to assess the prevalence of self-reported symptoms and examine the relationship between demographic factors and symptom intensity (**Table 4**). [17,18]

Table 4. Summary of symptom reporting, prevalence, and intensity factors in long-COVID participants.

Category	Details
Symptom Reporting Frequency	• 77% reported symptoms multiple times • 23% reported symptoms only once
Total Unique Symptoms	1,604
Symptom Categories	109
Most Prevalent Symptoms	• Pain: 26.5% (headache, joint pain, stomach pain) • Neuropsychological issues: 18.4% • Fatigue: 14.3% • Dyspnoea (shortness of breath): 7.4%
Symptom Intensity	Increased by 3.3% on average per month since participants registered on the application.
	continued
Factors Associated with Symptom Intensity	• Age: Participants aged 68-77 experienced 32.8% higher intensity, and those aged 78-87 experienced 86% higher intensity than ages 18-27. • Gender: Women reported 9.2% more intense symptoms than men. • Ethnicity: Non-White individuals reported 23.5% more intense symptoms than White individuals. • Education: Higher education levels were associated with less intense symptoms compared to those with lower education levels. • Deprivation level: Less intense symptoms were reported by people in less deprived areas, however, the number of symptoms did not vary by deprivation level.

The study highlighted ‘pain’ as a leading self-reported symptom of long-COVID. It also showed the significant influence of demographic factors on symptom severity. As COVID-19

continues to spread, the risk of increasing long-COVID cases remains a major concern. These findings can inform targeted interventions and support strategies for those at higher risk.

5.4 Europe's COVID-19 response audited

European Court of Auditors (ECA) found that the European Medicines Agency (EMA) and the European Centre for Disease Prevention and Control (ECDC) responded well to the COVID-19 pandemic. It also found some weaknesses that need to be addressed with a view to a future health crisis.[19,20]

The audit was done to analyse their response to the pre-pandemic strategies that were in place and the initiatives born out of the crisis. Both agencies had to adapt their work, reallocate resources and coordinate with 27 member states on their response to an unprecedented threat of a magnitude none of the agencies were ready to handle.[21]

EU auditors identified that although the preparedness plans both agencies had in place were not ready for such a "severe and protracted pandemic, they responded as soon as its extent became clear."

One of the main barriers identified by the ECA is the lack of quality data member states shared with the EU agencies which hindered their response by making it impossible to compare information such as the number of cases or causes of death.

At the beginning of the pandemic, ECDC's monitoring was mainly based on the number of infections, hospitalisations and deaths reported by member states. However, data collection became challenging at the peak of the pandemic as member states' data systems were not harmonised. With the underreporting of infections and deaths and a total lack of reporting additional variables, these inconsistencies were due to the lack of any integration between national and EU systems, and the increased workload on national and regional health systems.

The biggest challenge for the EMA was the authorisation and licensing of the COVID-19 vaccines. Due to time constraints, all vaccines and most treatments in the EU had to be approved under a centralised procedure, meaning that the EMA was responsible for the broad approval of the bloc – allowing for the process of granting conditional marketing authorisations sped up based on assessments made under a rolling review procedure that allowed the agency to use data from ongoing trials.

Both agencies and the European Commission (EC) need to improve coordination between themselves and with member states to facilitate information exchange and avoid work duplication.

The ECDC noted that several improvements have already begun as part of its reinforced mandate adopted in 2022 and at its own initiative. The agency reviewed its public health emergency plan, which included better preparation for future protracted pandemics, and it is also supporting member states to improve the automation and digitalisation of their surveillance systems.

The EMA will be reviewing the criteria and processes for the implementation of rolling reviews in future public health emergencies to ensure that resources will be used as efficiently as possible, given that the COVID-19 pandemic placed a significant pressure on the network's resources. The agency is committed to make its information more accessible to a wider audience, in particular for medicines of high interest during future public health emergencies.

As the EC and the agencies (EMA and ECDC) are currently implementing the lessons learnt from the pandemic, the report concluded that "it is too early to tell whether this will be sufficient to prepare the agencies adequately for future public health emergencies."

6.0 Planning

6.1 Antibiotic pollution, guidance

The World Health Organization (WHO) has published its first-ever guidance on antibiotic pollution from manufacturing.[22,23]

The new guidance on wastewater and solid waste management for antibiotic manufacturing sheds light on this important though neglected challenge ahead of the United Nations General Assembly (UNGA) High-Level Meeting on antimicrobial resistance (AMR) that will be taking place on 26 September 2024.

The emergence and spread of AMR caused by antibiotic pollution could undermine the effectiveness of antibiotics globally, including the medicines produced at the manufacturing sites responsible for the pollution.

The guidance is an important harmonisation toward good antibiotic stewardship.

High antibiotic pollution levels are being widely documented. However, the issue is largely unregulated and quality assurance criteria typically do not address environmental emissions. Globally, there is a lack of accessible information on the environmental damage caused by the manufacturing of medicines (pharmaceutical waste).

In addition, once distributed, there is a lack of information provided to consumers on how to dispose of antibiotics when they are not used, for example, when they expire or when there is still antibiotic left over when a course is finished.

The guidance was developed in close collaboration with a diverse group of international experts representing academia, regulators, inspectors, international organisations such as the United Nations Environment Program (UNEP), and other sectors.

Having undergone public consultation, it also received valuable input from industry and other stakeholders. Industry has also taken up this challenge, through a voluntary industry-led initiative which can be updated in some areas to align with the new guidance.

Antimicrobial resistance (AMR) remains a major global public health problem despite concerted surveillance, prevention, and control efforts. Its emergence can happen anytime and anywhere, affecting countries in all regions and at all income levels, exacerbated by poverty and inequality, with low- and middle-income countries (LMIC) being mostly affected.

6.2 Role of investors in addressing AMR

Antimicrobial resistance (AMR) has been impacting global public health and the economy significantly. [24] Health risks posed by drug-resistant pathogens are already well known. The findings of a study published in 2022 estimated that AMR was directly responsible for 1.27 million deaths, and contributed to an additional 3.7 million deaths, in 2019 – more than the number of deaths caused by HIV/AIDS, malaria, and many cancers. [25]

A report by The Farm Animal Investment Risk & Return (FAIRR) initiative, the MSCI Sustainability Institute, and Investor Action on AMR highlighted the significant financial costs of AMR. World Bank estimates mentioned that unchecked drug resistance could cause annual gross domestic product losses ranging from USD1 trillion to USD3.4 trillion by 2030, driven by increased human and veterinary healthcare costs, reduced productivity, and declines in global livestock production. Those losses could rise to USD100 trillion by 2050 if the weak pipeline for new antibiotics continues to falter. [26]

Investors play an important role in mitigating AMR by including "AMR lenses" when making investment decisions. This includes recognising companies that take initiatives to address AMR. Investors play an important role in propelling research and development of new antibiotics, diagnostics and alternative treatments. They can do so by providing the necessary funding, investors can help accelerate the pace of innovation and commercialisation of solutions to AMR. Investors should collaborate with companies involved in livestock to reduce inappropriate antibiotic use and use other treatment methods.

Furthermore, additional ways of incorporating AMR in making investment decisions include global AMR surveillance systems and healthcare companies that use tools and databases to evaluate the appropriate use of antibiotics.

7.0 Mpox

7.1 Mpox and pets, updates from the CDC

According to a report from the CDC, 12% of swabs taken from the fur, abdomen, mouth, anorectal area and/or lesions of 34 pets from 21 households with an mpox patient tested positive for mpox virus DNA. However, there were no signs of a viable virus based on viral cultures.[27]

The study was conducted from July 2022 to March 2023 in Minnesota, Tennessee, Virginia, and Washington, DC. The pets were swabbed within 21 days of direct contact with the patient and again 3 or 4 months later, where possible. The samples were collected from 24 dogs, 9 cats, and 1 rabbit as well as from animal beds, toys, and dishes. The animals' blood was tested and cultured; the sera was evaluated for orthopoxvirus antibodies. Mpox patients were surveyed about the pet, household, and contact with the pet or other animals.[28]

The results showed that:

- A total of 22 of 191 (12%) animal swabs and 14 of 56 (25%) of environmental samples from four households tested positive for mpox DNA.

- Of the mpox-positive swabs, 82% from the pets and 93% from the environment suggested DNA contamination from infected humans.
- Blood samples from the four dogs and one cat showed no viable mpox or orthopoxvirus antibodies that would indicate previous infection.

The study concluded that given the high likelihood of exposure among most of these animals, the lack of evidence indicating infection might indicate resistance to infection. Mpox patients were urged to avoid contact with animals until their lesions had fully healed. Public health authorities were encouraged to take a One Health approach to investigate the potential spillback of human infections to animals.

7.2 Country updates

7.2.1 Malaysia

Malaysia will receive the antiviral drug tecovirimat (TPOXX) and the modified vaccinia virus Ankara vaccine (MVA-BN or Jynneos; Bavarian Nordic) for mpox through the COVID-19 ASEAN Response Fund.[29]

Tecovirimat will be used to treat mpox, particularly for patients with severe infections or those with weakened immune systems. The vaccine will only be administered based on examination and evaluation by medical experts. It will be reserved for high-risk groups, including healthcare workers and close contacts of confirmed cases.[30,31]

There will not be any general (mass) vaccinations.

Kementerian Kesihatan Malaysia (KKM) stated that there have not been any suspected mpox cases detected among the estimated 2.64 million travellers screened at the country's international entry points since 16 August 2024. All 34 suspected cases reported in August 2024 have been found negative for the mpox virus (MPXV).

Regarding preparedness, entry points at international airports will be manned 24 hours to scan inbound travellers returning from "high risk" areas. In addition to two government-owned laboratories (Institute for Medical Research [IMR]/National Institute of Health [NIH] and Malaysian Genome and Vaccine Institute [MGVI]), laboratories from 8 public universities will be able to sequence and determine the clade or MPXV: Universiti Kebangsaan Malaysia (UKM), Universiti Institut Teknologi MARA (UiTM), Universiti Malaya (UM), Universiti Putra Malaysia (UPM), Universiti Sains Malaysia (USM), Universiti Malaysia Sabah (UMS), Universiti Malaysia Sarawak (UNIMAS) and the International Islamic University Malaysia (IIUM).[31]

The following was taken from an article published online recently about the public's concern and perception about mpox:[32]

- While there is currently no widespread concern for mpox, people are hoping that the government will increase awareness and implement preventive measures to curb its spread locally.
- Some have suggested enforcing "preventive measures" in schools and public spaces such as restaurants and shopping malls.

- Some individuals have heard the virus could be transmitted through direct contact.
- Staff at some restaurants made efforts to encourage customers to maintain physical distancing while queuing outside while some do not. Tables at these restaurants were sanitised after each use and thorough cleaning was conducted weekly.
- Some people have been taking precautions, such as regular hand washing and avoiding crowded places.
- Expecting mothers are concerned about mpox and hygiene.
- Government officials have been urging local and foreign tourists to be vigilant whenever they are out in public; high-risk individuals who experience symptoms of mpox should seek medical attention.

7.2.2 Singapore

Singapore continues to update the public with the latest management strategies for mpox.[33,34]

The mpox vaccine, Jynneos, is limited to healthcare workers who are at the highest risk of exposure to the disease, such as those working at the National Centre for Infectious Diseases (NCID), and close contacts of confirmed cases. For the latter, the Expert Committee on Immunisation has recommended a single dose of the vaccine within 14 days of exposure, to be administered while they are in quarantine. The quarantine period is currently set at 21 days, which is the incubation period observed in Africa.

Based on current evidence on how MPXV spreads, there is no need for mask-wearing measures for people who are well. Population-wide mpox vaccination is not recommended for now as the clade I MPXV is "far less transmissible" compared to respiratory viruses such as influenza or COVID-19. Furthermore, up until 1983, smallpox vaccination was required for every Singaporean, therefore, a segment of the population would have some protection against the MPXV.

These measures including others introduced by MOH (**Figure 2**) may change over time as the situation evolves including knowledge about the virus.

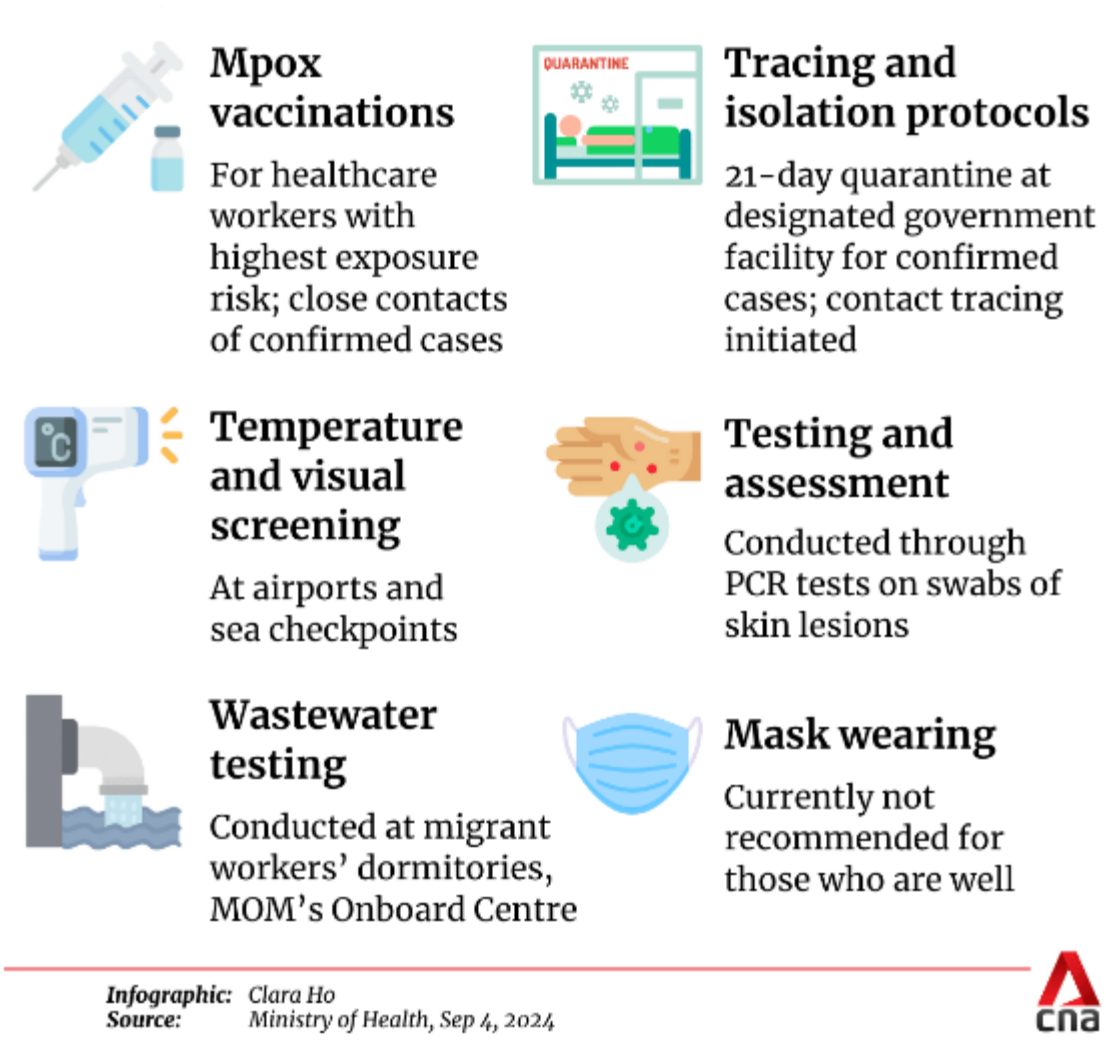

Figure 2. Measures taken in Singapore for mpox. The chart was obtained from [Mpox vaccine to be offered to healthcare workers at highest risk and close contacts of confirmed cases - CNA (channelnewsasia.com)]

According to the Ministry of Health (MOH), Singapore has not detected any clade I MPXV infection to date. All 14 mpox cases in the country so far this year were from clade II.

7.2.3 Pakistan

Pakistan reported its third case with another suspected case placed under surveillance. Both were on the same flight from Jeddah, Saudi Arabia.[35]

They had presented with symptoms similar to mpox and were detected by medical personnel at Bacha Khan International Airport in Peshawar. The confirmed case is a 51-year-old man from Orakzai who is currently in stable condition and undergoing treatment. Samples from the other case, a 47-year-old man, have been sent for confirmation.

According to officials, there are no locally transmitted cases of mpox in Pakistan to date. The first mpox case involved clade II MPXV. The second case that was reported last week was also identified at the airport in Peshawar.

7.3 Vaccines and therapeutics

The United Arab Emirates (UAE) will be dispatching vaccines to 5 countries in Africa in support of their efforts to control the mpox outbreak there. The countries are the Democratic Republic of the Congo (DRC), Nigeria, South Africa, Cote d'Ivoire and Cameroon. [36]

The first batch of 100,000 mpox vaccines from the European Union (EU) was to arrive in the DRC – the first for the country plagued by the clade Ib MPXV – on 5 September 2024 with the second delivery expected in soon after. This consignment of the Jynneos vaccine is part of the EU's commitment to tackle the mpox outbreak in the African continent. The EU continues to support affected African countries. This includes strengthening the health systems, securing pharmaceutical supply chains, and developing local manufacturing. A €9.4 million (USD10.4 million) grant is also planned to expand access to diagnostics and sequencing by early autumn. [37]

7.4 Air travel and MPXV

Contact tracing of > 100 aeroplane passengers with clade II mpox did not show any events of transmission. [38]

This conclusion was made based on an investigation initiated by the CDC. During the 2021-2022 mpox outbreak, contact investigations were conducted after the agency received reports of persons with probable or confirmed disease (infectious period). Data were collected in two instances: during 2021, when two isolated clade II mpox cases not linked to an outbreak were imported into the US by international travellers, and for flights arriving in or travelling within the US from 30 April to 2 August 2022, after the global clade II mpox outbreak was detected in May 2022.

One-hundred-and-three (113) persons travelled on commercial flights while they were infectious with clade II mpox. Among the 1,046 traveller contacts followed by the US public health agencies, the CDC did not identify any secondary cases. For individuals and contacts who have left the US, their details were shared with health authorities in the country of their destinations for the necessary investigations.

These findings suggested that travelling on a flight with a person with mpox does not appear to constitute an exposure risk or warrant routine contact tracing activities. Nonetheless, the CDC recommends that persons with mpox isolate and delay travel until they are no longer infectious.

8.0 Others

8.1 Influenza H5N1

8.1.1 Outbreak response, the US

The CDC and the Colorado Department of Public Health (CDPH) have released details of their investigation and response to H5N1 avian flu infections among poultry cullers in Colorado. Following two H5N1 outbreaks at large layer farms in Weld County in July 2024, teams of mostly Spanish-speaking migrant workers were hired as contractors to manage the culling process.[39,40]

The first outbreak was confirmed on 8 July 2024, and a team of 250 workers began culling the next day. Shortly after, several workers reported feeling sick, which prompted testing and treatment with the antiviral oseltamivir, along with the distribution of PPE. Another outbreak was detected on 14 July 2024, and 400 more workers started culling the following day. The CDPH provided masks and goggles and continued to offer oseltamivir and routine screenings.[Footnote1]

Across both farms, 663 workers were screened, including 109 (16.4%) with symptoms. Of those, 9 (8.3%) tested positive for H5N1 and had mild symptoms, such as conjunctivitis, while 19 (17.4%) tested positive for COVID-19. This was the first recorded cluster of H5N1 human cases in the US linked to poultry exposure.

The report emphasises the ongoing risk H5N1 poses to those working closely with infected animals. Early intervention with multilingual and multidisciplinary teams was key to managing the situation. As H5N1 cases rise, US health agencies need to be ready to respond quickly, especially for workers with limited healthcare access.

8.1.2 PPE and safety measures for farm workers, the US

Concerns are growing regarding infections among farmworkers due to insufficient testing and safety measures. The CDC recommends that all poultry workers use personal protective equipment (PPE), such as respirators and goggles or face shields, regardless of whether they are handling sick animals.[41,42]

As infected cows may not always display symptoms, workers could unconsciously come into contact with contagious animals.[43] Recent heat waves have caused some workers to neglect PPE, resulting in at least six cases of bird flu among workers. [Footnote2] The CDPH and the Colorado Department of Agriculture have been offering a free month's supply of PPE to any producers who request it. However, by late August 2024, fewer than 13% of the state's dairies had requested and received this PPE. Workers who become ill can access flu tests and medication by contacting the Colorado Department of Public Health. Authorities continue to make considerable efforts to ensure worker protection.[44]

[1] Report 2024-R28, Section 5.1.
[2] Report 2024-R29, Section 6.1.1.1.

It is essential for all stakeholders, including producers, to enhance awareness and take responsibility in promoting safety among workers. Strengthened safety protocols and increased PPE distribution are vital for safeguarding farmworkers from infections and ensuring prompt access to medical care.

8.1.3 Country updates

8.1.3.1 The US

8.1.3.1.1 HPAI in California Dairy Herds

The California Department of Food and Agriculture (CDFA) has confirmed that a dairy herd in the Central Valley has tested positive for highly pathogenic avian influenza (HPAI) H5N1. The herd began showing clinical signs consistent with HPAI H5N1 on 25 August 2024. Preliminary testing [Footnote3] was conducted by the California Animal Health and Food Safety (CAHFS) laboratory network, and samples were subsequently sent to the National Veterinary Services Laboratory (NVSL), where the test results were confirmed on 30 August 2024.[45]

No confirmed human cases have been related to this incident. The California Department of Public Health (CDPH) is collaborating with the CDFA and will coordinate with local health departments to monitor individuals who may have been exposed to infected animals. The CDPH will also confirm any human cases associated with this incident if they arise.

8.1.3.1.2 Human case, Missouri

On 6 September 2024, the Missouri Department of Health (MDH) identified a case of H5N1 in a adult who was hospitalised in August 2024. Initially, the flu subtype was not identified. However, additional testing revealed it to be the same subtype as what has caused outbreaks in wild birds, farmed poultry and dairy cattle. The individual did not report exposure to animals. Of the handful of human cases of H5N1 reported, all had direct contact with infected dairy herds, poultry flocks, or other known exposures. This case cumulates to 15 human cases of H5N1 since 2022 and 14 since April 2024.[46]

The person's hospitalisation is of concern as severe outcomes are more alarming than mild illness. The lack of animal exposure is also of concern as it suggests the infection could have come from another person, indicating possible human-to-human transmission (which would be highly alarming), or from an unnoticed animal source. The authorities are currently investigating the case.

Note:

Johns Hopkins Bloomberg School of Public Health has developed a frequently updated risk assessment to analyse possible future scenarios. With continued evidence of human infections,

[3] Report 2024-R34, Section 6.1.1.3.

both linked and unlinked to known sources of the virus, intensified disease surveillance should be continued to track how and where these infections are occurring. [47]

According to the University's Center for Outbreak Response Innovation (CORI), the ongoing outbreak remains within Scenario 3; the virus continues to infect multiple animal species which facilitates the mixing and spread of the virus. This increases the likelihood of the virus reassorting with other influenza viruses and adaptation to humans. However, there is still no or very limited, human-to-human transmission. Both the CDC and CORI have maintained that currently, the general risk to the public remains low.[48]

8.1.3.2 Cambodia's human case, the WHO

On 20 August 2024, the WHO was notified by the country's International Health Regulations (IHR) National Focal Point (NFP) of a laboratory-confirmed case of human infection with avian influenza A(H5N1) virus (clade 2.3.2.1c) in a 15-year-old child. [49]

This case is one of 10 human cases of influenza A(H5N1) infection reported in Cambodia in 2024. From 2003 to the present, 72 cases of human infection with influenza A(H5N1), including 43 deaths (case fatality ratio, CFR, 59.7%), have been reported in the country.

According to the IHR (2005), a human infection caused by a novel influenza A virus subtype is an event that has the potential for high public health impact and must be notified to the WHO. However, based on currently available information, the WHO assesses the current risk to the general population posed by this virus as low.

8.2 Tuberculosis

8.2.1 Detection by bioacoustics, Google-India

Google has revealed a system that can potentially detect early signs of tuberculosis (TB) by analysing audio signals using artificial intelligence.[50] The technology is part of Google's Health Acoustic Representations (HeAR) project. The company has partnered with Salcit Technologies, an Indian respiratory healthcare AI startup, to integrate this technology into smartphones, making it accessible to high-risk populations in underserved and/or remote areas that have limited healthcare resources, significantly enhancing screening capabilities, and potentially saving countless lives through early intervention.[51]

The AI model was trained on 300 million audio samples including coughs, sniffles, and breathing patterns aimed to identify diseases such as TB through subtle acoustic cues – for TB, it was trained on 100 million cough sounds.

Salcit Technologies is leveraging Google's AI model to improve its own machine learning system, Swaasa, which has already received approval from India's device regulator. The Swaasa app allows users to upload a 10-second cough sample for disease screening, boasting a 94% accuracy rate.

Challenges remain for this promising tool. These include acceptance from medical practitioners, getting a clear audio sample (not marred with other noises) and familiarity with technology in rural areas.

TB claims approximately 0.25 million lives annually in India, underscoring the urgent need for early detection methods.

8.2.2 New drug regimen, India

To eliminate the country of TB by 2025, 5 years ahead of the global target for eliminating the disease under the Sustainable Developmental Goals, the Union Ministry of Health and Family Welfare (MoHFW) has approved the introduction of the BPaLM regimen. The treatment is for managing multi-drug resistant tuberculosis (MDR-TB) under its National TB Elimination Programme (NTEP), as a highly effective method and a shorter treatment option. BPaLM consists of the following combination: Pretomanid (Pa; an anti-TB drug) with bedaquiline (Bdq) and linezolid (LzD) with/without moxifloxacin (Mfx). Pretomanid has earlier been approved and licenced for use in India by the Central Drugs Standard Control Organisation (CDSCO). [52]

Traditional MDR-TB treatments normally last up to 20 months with severe side effects; this new regimen takes 6 months, with a "high success rate". The shorter duration is an attractive option. Overall, the treatment is safe and cost-effective.

A country-wide time-bound rollout plan of the BPaLM regimen is being prepared by the Central TB Division within the ministry in consultation with corresponding authorities in individual states, which includes capacity building for health professionals for the safe administration of the new regimen.

Note:

The WHO recommended the use of Pa (also known as PA-824) for MDR or rifampicin-resistant TB (RR-TB) in the 2022 update to the agency's Global TB Programme's consolidated guidelines.[53,54] Results from the TB-PRACTECAL trial indicated that the regimen is shorter while preserving efficacy, and safer than the previous standard of care.[55]

In a rapid communication in August 2024, the WHO cautioned the use of Mfx in the BPaLM regimen in case of documented resistance to fluoroquinolones. Otherwise, this regimen is the preferred treatment for all eligible patients with MDR-/RR-TB.[56,57]

8.3 Leprosy campaign, India

An intensive Leprosy Case Detection Campaign has begun in Delhi, India. It runs from 2 September through to 15 September 2024. The initiative is part of the country's ongoing mission to eradicate leprosy and prevent the disabilities often associated with the disease. Catching the disease early allows for more effective disease management. It is also hoped these campaigns will reduce the burden of the disease nationally and regionally.[58]

The campaign involves healthcare professionals and trained medical teams conducting house-to-house visits across the city to screen people with symptoms. The public was urged to cooperate with the visiting medical teams and take advantage of the free screening services provided during the campaign.

The authorities have introduced a self-examination tool accessible via a QR code that people can use to perform a preliminary self-assessment for leprosy symptoms and seek immediate medical advice if required.

8.4 Vector-borne disease

8.4.1 Dengue, India

As of 2 September 2024, Tamil Nadu (southeast of India) has reported 11,743 cases of dengue including 4 deaths. Almost half of these, 5,278, were reported within July. According to data, 58% of the total cases were reported from 10 districts (Chennai, Coimbatore, Krishnagiri, Tirupur, Tiruvallur, Theni, Madurai, Tirunelveli, Thanjavur and Trichy).[59]

The increased cases are also because of increased surveillance. All dengue cases are uploaded by government and private hospitals on the Integrated Health Information portal; the state networks have >4,000 hospitals for registry on dengue. All hospitals are to upload information about suspected dengue cases and follow them up with tests. Private laboratories report cases to the district or city health officers, who will then verify the information for duplication before uploading them to the portal. Smaller healthcare facilities that use rapid tests or card tests for immediate results are required to follow up these cases with (more accurate) “detailed tests”.

Larval indices are used to estimate the population of dengue-causing *Aedes* mosquitoes. These mosquitoes are also used for virus analysis to determine the pool that carries *Aedes* mosquitoes that have the dengue virus. There were 13,220 mosquito pools in 2023, 514 of them were positive for dengue. In 2024, of 8,302 mosquito pools identified so far, 349 of them were positive for dengue.

The necessary disease management measures will continue to be deployed based on the results of these surveillance tools. As with dengue, the state has also initiated measures for the prevention and early diagnosis of other diseases including acute gastroenteritis, cholera, jaundice, leptospirosis and scrub typhus.

8.4.2 West Nile virus, St. Louis encephalitis, and eastern equine encephalitis: a unique case from the US

A New Hampshire man tested positive for three mosquito-borne viruses – West Nile virus (WNV), St. Louis encephalitis, and eastern equine encephalitis (EEE) – since being hospitalised in August 2024. The patient, initially warded in the intensive care unit (ICU) has shown signs of progress and has been moved to the progressive care unit. [60]

It is worth noting that the *Culex* mosquito can transmit all three viruses.

According to the CDC, as of 3 September 2024, there have been a total of 377 human cases of WNV reported across 38 states in the US. It included 255 cases of WNV neuroinvasive disease.[61] A total of 6 cases of EEE have been reported up to 3 September 2024; all with neuroinvasive disease, from 5 states in the US. [61]

8.4.3 Lyme disease test kit, the US

A new Lyme disease test kit has been granted approval by the US Food and Drug Administration (FDA). The *iDart Lyme IgG ImmunoBlot Kit* developed by ID-Fish Technology, Inc. detects Lyme-specific immunoglobulin G antibodies (IgG) which includes 31 Lyme antigen bands that will improve the sensitivity of diagnosis. Approximately 475,000 people are diagnosed with Lyme disease annually in the US, caused by the bacteria *Borrelia burgdorferi.* Some symptoms of the disease include fever, headache, fatigue, chills, joint and muscle pain, and, in some instances, the presence of a rash.[62,63]

8.5 Measles, the US

Oregon reported 31 cases so far, as of 29 August 2024,[64] mirroring the increasing trend nationally.[Footnote4] In the last outbreak in 2019, 28 cases were reported. According to the Oregon Health Authority, all of those infected during the outbreak were unvaccinated people; two people were hospitalised. The outbreak is the largest reported in Oregon since measles was declared eliminated in the United States in 2000.

There are currently 236 measles cases reported by 29 jurisdictions across the US, 40% occurring in children <5 years old. [65]

8.6 Chlamydia, human gut as an alternative reservoir

A study has suggested that the human gut could be a possible reservoir for *Chlamydia trachomatis* which explains the reinfection in patients with the same (identical) strains (**Figure 3**).[66]

[4] Report 2024-R34, Section 6.13: 227 cases across 29 jurisdictions with 115 cases involved in 13 outbreaks.

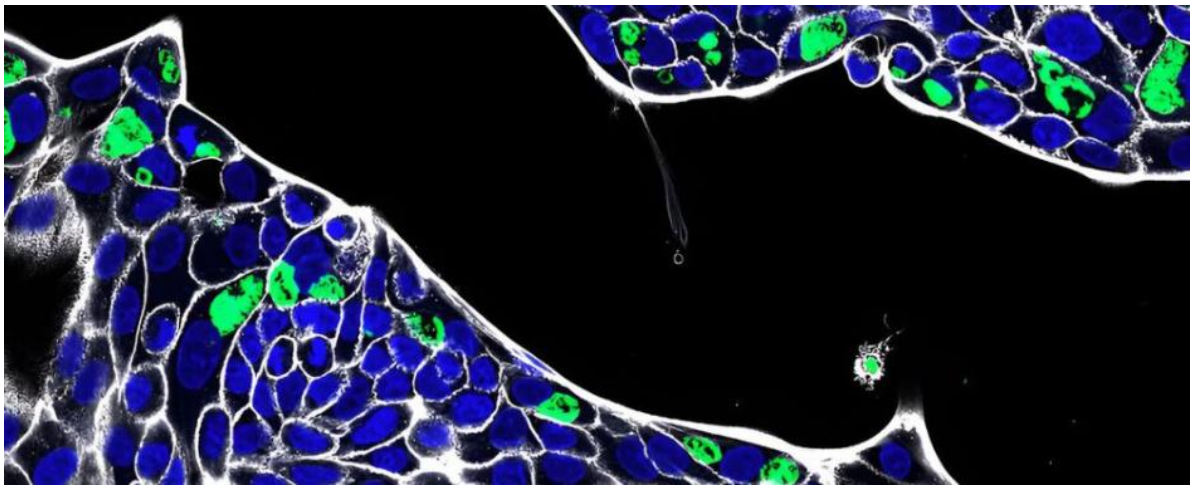

Figure 3. Gastrointestinal cells infected with chlamydia (stained green). The image was obtained from Scientists Find a Possible Secret Hiding Spot For Chlamydia : ScienceAlert

The revelation addresses the possibilities of growing antibiotic resistance if such a phenomenon exists. When inoculated with human-specific chlamydia in murine models, the bacteria cross the gastrointestinal barrier and colonises the large intestine. When treated with antibiotics or under stressful events, it is capable of staying in its dormant stage and reactivating again when conditions are suitable. It was proposed that chlamydia can infect the gut more easily via the blood compared to via the intestinal lining.[67]

These studies have suggested that the infection can penetrate deeper into other body parts than expected. The longer the presence of the infection in the body, the higher the risk of infertility issues and ovarian cancer.

8.7 Polio

8.7.1 Gaza

The campaign to vaccinate children against polio was successful amid limited pauses of fighting; approximately 187,000 have so far been vaccinated. Health officials aim to reach 640,000 Gaza children for vaccination in the campaign. It was launched after the discovery of a case of a one-year-old baby who was partially paralysed.[68]

8.7.2 Pakistan

The Regional Reference Laboratory for Polio at the National Institutes of Health confirmed a wild poliovirus type 1 (WPV1) case in a child on 6 September 2024 – the first in 16 years reported there. This case cumulates to a total of 17 cases of polio so far reported in 2024; 12 cases were reported from Balochistan, three from Sindh, and one each from Punjab and Islamabad. The finding is a setback to the national efforts aimed at eradicating the disease. In 2021, only one infection was reported. [69]

As a response, the authorities have initiated plans to improve eradication activities through a polio campaign. The house-to-house campaign started on 9 September intending to vaccinate > 33 million children < 5 years old in 115 districts across the country. Though not always welcomed by parents and caregivers, the authorities have encouraged them to get their children vaccinated against this vaccine-preventable disease.

8.8 Global cholera deaths rise sharply, the WHO

The WHO updated the 2023 global statistics for cholera.

There was a 13% increase in cases and a 71% increase in deaths in 2023 compared to 2022 – over 4,000 deaths were recorded. Forty-five countries reported cases, increasing from 44 in 2022 and 35 in 2021; 38% were among children <5 years old. [70,71]

There was a geographic shift in the locations of the cases reported. The Middle East and Asia experienced 32% fewer cases, while Africa experienced an increase of 125%. Countries with high incidences included Afghanistan, the DRC, Malawi, and Somalia. Factors which contributed to the spike in cases were due to conflict, climate change, and inadequate safe water and sanitation.

A high percentage of deaths occurred in the communities outside the hospital setting. Of 13 reporting countries, over a third of deaths occurred in the community, highlighting the gaps in access to treatment and the need to strengthen the response here.

Preliminary data showed that the global cholera crisis continues into 2024. Currently, 22 countries are reporting active outbreaks. Although the number of cases reported so far in 2024 is lower compared to the same period last year, >340,000 cases and 2,400 deaths have already been reported to the WHO across all continents as of 22 August 2024.

Despite a record of 35 million doses of vaccine being distributed in 2023, there was still a shortage of oral cholera vaccine (OCV). Since 2022, the International Coordinating Group (ICG) has suspended the two-dose vaccination regimen and adopted a single-dose approach instead so that more people can be given (better coverage) the vaccine amid the limited supply. Likewise, shortages of other essential medications, rehydration salts and intravenous fluids, continue to pose challenges to control this preventable disease.

The WHO considers the current global risk from cholera as very high and continues to respond to it with urgency to reduce deaths and contain outbreaks in countries around the world.

8.9 Waterborne disease, Bangladesh

Authorities are bracing for the spread of waterborne diseases as the floods begin to recede. The race is on to ensure the supply of drinking water is sufficient for everyone affected. Many people have remained stranded and in urgent need of food, clean water, medicine and dry clothes, especially those in remote areas where access is hampered (blocked roads). The conditions could persist if the rains continue as water levels have been receding very slowly.

Within the 24 hours of 1 September 2024, approximately 3,000 people have been hospitalised due to waterborne diseases in flood-affected areas.[72]

8.10 Rabies

8.10.1 Rabies test, Zanzibar

Many countries are working to improve their rabies surveillance programs and, as a result, the reported use of lateral flow devices (LFDs) is increasing.

The Global Alliance for Rabies Control (GARC) recently published promising findings from the field-tested lateral flow device (LFD) used as part of its toolkit, *Rapid In-Field Diagnosis and Epidemiology of Rabies' (RAIDER)*, to diagnose rabies in Zanzibar.[73]

The field test was conducted from 2022 to 2023 using mammal brain samples (**Figure 4**). The LFDs were used in tandem with the procedures recommended by the World Organisation for Animal Health (WOAH). [74]

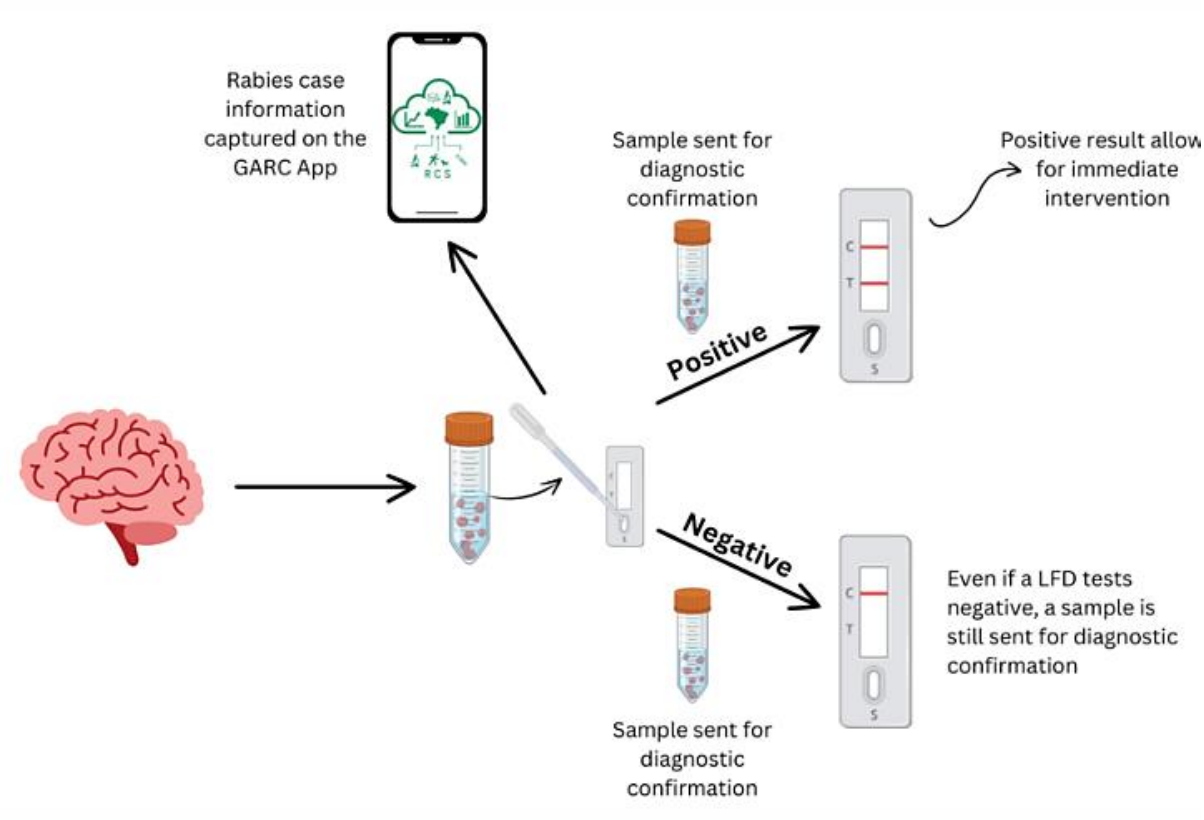

Figure 4. The RAIDER toolkit consists of a series of steps to guide users through the brain sample collection procedure, using the LFD, capturing the sample information (including the GPS coordinates) using the GARC Rabies Case Surveillance (RCS) tool, and how to submit a field sample for confirmation to the nearest diagnostic laboratory capable of performing a

WOAH-accredited assay. Regardless of the sample testing positive or negative, the toolkit requires each sample to be submitted for diagnostic confirmation using a WOAH-approved and recommended diagnostic assay. The chart was obtained from Boosting Rabies Surveillance: Zanzibar's Success Story with Rapid Diagnostic Kits | Global Alliance for Rabies Control (rabiesalliance.org)

Eighty-three (83) samples were field-tested throughout the study with only one false-negative result detected. The results also indicated that the routine use of LFDs as a diagnostic screening tool resulted in a four-fold increase in the number of samples subjected to rabies diagnosis per month and a three-fold increase in the number of wards (districts) where samples were collected per year.

Typically, resource-limited rabies-endemic countries utilise passive surveillance systems that rely on the evaluation and testing of suspected rabid animals involved in human exposures, limiting this type of surveillance to specific geographical settings with high human populations and established public health infrastructures (urban and peri-urban).

The findings suggested that LFDs could play a noteworthy role in improving the robustness of surveillance systems by increasing the number of samples tested and promoting diagnostic screening in areas distant from laboratories such as those in rural areas.

Coupled with the real-time reporting on the GARC App enabled a significant increase in both active and passive surveillance across the island of Zanzibar, facilitating rapid outbreak responses, such as targeted and strategic vaccinations to rapidly break cycles of transmission before rabies can spread and affect more animals and people.

This study highlighted the importance of the RAIDER toolkit which improved overall surveillance and facilitated rapid outbreak response to facilitate efforts of progress towards achieving rabies elimination.

Their implementation would, however, need to be carefully controlled through standardised protocols that align with the international best practices to ensure their judicious use.

8.10.2 Dog and cat management to control rabies

The International Companion Animal Management Coalition (ICAM) recently hosted the fifth international conference on humane dog and cat population management. This 5-day virtual conference was well-supported by 1,733 registrants from 121 countries worldwide.[75]

The conference presentations revolved on 7 main themes:

- Evolving population management,
- One Health,
- Urban development and government leadership,
- Rehoming and cat population management and
- Human behaviour measurement and change.

The discussions on animal population management highlighted its role in the successful management of rabies. The link between dog population management (DPM) and rabies was apparent in many sessions as DPM can support rabies vaccination efforts by reducing the number of newly born puppies that would need to be vaccinated every year.

When delivered through a sustainable program, DPM can help vaccinators achieve the desired 70% vaccination coverage of the at-risk dog population each year. Several presentations highlighted how DPM can also contribute to human and community health, including reducing dog bites and assisting in overcoming the hurdles that are hampering achieving the goal of canine rabies elimination by 2030.

The initiative, Communities Against Rabies, showcased by the Global Alliance for Rabies Control (GARC) has made progress in sustainable rabies control through improved animal welfare where a united civil society is involved. The program is aimed to build capacity in local organisations that have started the work, providing them with key resources, tools, knowledge (such as free GARC educational courses and resources), and expertise to ensure a sustainable and standardised approach that aligns with international best practices and standards.

Concerns over roaming dog and cat welfare, the population numbers, and the risks they may pose are high on the agenda of many urban areas. As cities develop, ensuring safe access to all public spaces includes management of dog and cat populations. The success stories from Eastern Europe and Brazil showed that DPM programs are most impactful when municipalities join forces with local non-profit organisations (NGOs) already operating in the area - similar to the objective for GARC's CAR initiative.

Interest in dog and cat population management and welfare is growing. It is bolstered by strong programmatic activities for improved dog and cat population management globally. The ties and benefits to rabies control and elimination remain important for rabies elimination efforts and also for building the One Health capacity of stakeholders, community-led initiatives, and national programs. The health and welfare of communities remains reliant on the health of all members, including animals - something especially true for dogs and cats as they live close to people.

8.11 Novel bat coronavirus and others with spillover potential, China

Novel and potentially dangerous viruses, including coronaviruses and influenza, are harboured in farmed and studied animals; these include animals raised for their fur, (raccoon dogs, foxes, mink, and muskrat) in China. They may be an important reservoir and transmission hub for emerging viruses, including those at high risk for spillover into people, wild animals, and livestock. Though some of these animals may be less intensely farmed, they remain commonplace in smaller backyard farms across China and have rarely been the subject of disease surveillance efforts.[76,77]

The findings were based on the analysis of metagenomic mRNA in 697 intestinal, lung, and liver samples from 461 animals (412 from fur and/or livestock farms and 49 from wild settings) found dead, likely due to infectious diseases, across China. The investigations were led by researchers from the Shanghai Institute of Infectious Disease and Biosecurity.

The results are summarised as follows:

- 125 viral species were identified, including (paraphrased): [76]
  - 36 novel viruses (never been characterised) and
  - 39 at potentially high risk for cross-species transmission, including spillover into people:
    - 11 viruses already seen in people,
    - 15 viruses not seen in people though observed in at least two mammalian orders, and
    - 13 potentially novel high-risk viruses.
  - Most fur-farmed animals hosted 2 to 23 vertebrate-linked viral species.
- 60% of viruses led to an expansion in known host range, including 7 species of coronaviruses found in 66 fur-farmed animals.
  - Most notably, the transmission of a novel canine respiratory coronavirus to raccoon dogs and the spread of bat HKU5-like coronaviruses (CoV) to mink, which they harboured in abundance in the lungs.
- Three subtypes of IAV (H1N2, H5N6 and H6N2) were detected in the lungs of guinea pigs, minks, and muskrats, respectively.
- Most (n = 29) potentially high-risk viruses were sampled from east China, with a detection rate of 40.5.
- 19 potentially high-risk viruses were detected in Shandong province, which contains many fur animal farms.

Of all studied animals, raccoon dogs and mink carried the most potentially high-risk viruses, followed by guinea pigs, rabbits and Arctic foxes. Multiple animal species were commonly infected with Coronaviridae, Paramyxoviridae, and Sedoreoviridae viruses.

Guinea pigs also carried multiple zoonotic viruses—those capable of spread between animals and people—such as Japanese encephalitis (JE) virus and mammalian orthoreovirus.

Most concerning was the identification of *Pipistrellus* bat coronavirus HKU5-like viruses (subgenus Merbecovirus) in the lungs and intestines of two farmed mink. The mink HKU5-like CoVs form a lineage that is relatively closely related to viruses that have so far been reported only in bats, in which they have a history of recombination.[78]

There was no mention of finding the SARS-CoV-2 virus in the animals as the focus of the study was not on finding the origin of the virus.[79]

The finding reiterated the risk posed by small scale fur farms, which continue to proliferate in China and Southeast Asia; it revealed potential virus transmission between farmed animals and wild animals, and from humans to farmed animals, indicating that fur farming represents an important transmission hub for viral zoonoses.

More extensive and regular monitoring of fur-farmed animals is required to identify potential viral transmission routes between species and flag viruses that could jump to people, wild animals, and livestock. These current findings are based on a small sample size with a focus on dead animals; furthermore, it did not identify viruses from other tissues.

8.12 New Orthonairovirus associated with human febrile illness

A novel strain of Orthonairovirus, named Wetland virus (WELV), was identified in a man who was bitten by a tick at a wetland park in Inner Mongolia in China in 2019. He developed symptoms including fever and multiple organ dysfunction 5 days after a tick bite.[80,81]

The initial symptoms of WELV were non-specific and required differential diagnosis from other tick-borne diseases. Seventeen other patients from China had non-specific symptoms such as fever, dizziness, headache, malaise, muscle pain, arthritis, pain, petechiae, localised lymph node swelling and neurological symptoms. The virus was detected using RT-PCR. Some of the common laboratory results include leukopenia, thrombocytopenia, and higher levels of d-dimer and lactate dehydrogenase.

The WELV RNA was detected in 5 tick species (*Haemaphysalis concinna*, *Ha. japonica*, *Ha. longicornis*, *Ixodes persulcatus* and *Dermacentor silvarum*) and other animals such as sheep, horses, pigs and Transbaikal zokors (a species of rodent, of the family *Spalacidae* that is found in China, Mongolia and Russia) all of which were sampled in northeastern China. Improving surveillance and detection of emerging Orthonairoviruses will allow a better understanding of the effect that these viruses have on human health.

Note:
WELV is a member of the Orthonairovirus genus in the *Nairoviridae* family. It is most closely related to the tick-borne Hazara Orthonairovirus genogroup, which includes the Crimean-Congo haemorrhagic fever (CCHF) virus.

8.13 Antimicrobial stewardship

8.13.1 Antimicrobial resistance reduction efforts lagging in LMICs countries

A survey done on public health experts from 138 low- and middle-income countries (LMICs) found that there might be a gap in implementing and enforcing laws on managing antimicrobial resistance (AMR). The survey, The Global Survey of Experts on Antimicrobial Resistance (GSEAR), was created by the Swiss Tropical and Public Health Institute (STPHI) and University of Basel, which aims to assess countries efforts in tackling AMR. [82]

Topics accessed were:

- Existence of AMR national action plans (NAPs)
- Antibiotic prescribing practices
- Current antibiotic use
- AMR awareness
- Collection and reporting of surveillance data
- Policies and interventions to restrict the sale and consumption of antibiotics

A total of 352 surveys were obtained from 118 LMICs and analysed. The results were compared with the 2020-21 WHO-organised Tripartite AMR Country Self-Assessment Survey (TrACSS). The TrACSS assessment was filled by government officials instead of public health experts.

It was found that there was an overestimation of policy coverage on AMR (**Table 5**). [82,83]

Table 5. Comparison of AMR management efforts based on survey data obtained from GSEAR and TrACSS. GSEAR was conducted by STPHI and University of Basel in 2024, and TrACC was a WHO-oranised survey conducted in 2021-2022.

Topics assessed	Percentage, %	
	118 LMICs tested (GSEAR)	113 LMICs tested (TrACSS)
National action plans (NAPs).	67%	86%
Legislative policies on antimicrobial use.	64%	86%
National training programs for health professionals.	58%	-
National monitoring systems for antimicrobials.	10%	-
Targeted policies: limit sale/ use of protected/ reserve antibiotics.	51%	-
Prescription requirements for accessing antibiotics.	72%	-

8.13.2 Rise of multiple carbapenem-resistant gene in *Acinetobacter* sp. strains, China

A study conducted by Chinese researchers found that there is a global surge of *Acinetobacter* species carrying multiple carbapenem-resistance genes.

A total of 30,713 *Acinetobacter* genomes from the NCBI Pathogen Detection Database from 1997 to 2023 were analysed. It found that as much as 1,409 (5.1%) of 27,487 *A. baumannii* isolates and 216 (6.7%) of 3,226 non-baumannii *Acinetobacter* sp. (nAB) isolates co-harbored at least two carbapenemases, with significant increases from 2018 to 2023. [84,85]

These carbapenem-resistant microbes were detected in 61 countries spanning 6 continents, with the highest prevalence found in the US (33.7%), India (13.3%), and China (8.6%). Carbapenem-resistant *A. baumannii* has been declared an urgent public health threat by the WHO and the US CDC due to the high level of difficulty in treatment.

In addition, further discovery of the co-existence of metallo-beta-lactamase and tetracycline-inactivating genes continues to hamper the use of approved beta-lactam/beta-lactamase inhibitor combinations of antibiotic treatments in treating carbapenem-resistant *A. baumannii* infections.

Both increasing carbapenem-resistant *Acinetobacter* sp. and novel combinations of carbapenemases and their coexistence with Tet(X) enzymes demand further investigation into the topic. Furthermore, the global emergence of carbapenem-resistant *Acinetobacter* species

from different sources highlights the importance of the One Health approach for investigating and controlling its spread.

8.14 Cell phones and cancer, the WHO

A systematic review of 63 studies from 1994-2022, assessed by 11 investigators from 10 countries, including the Australian government's radiation protection authority, and commissioned by the WHO concluded that exposure to radiofrequency electromagnetic fields from cell phones likely does not increase brain cancer risk.[86,87]

Despite the huge rise in the use of wireless technology, there has not been a corresponding increase in the incidence of brain cancers. This applies even to people who make long phone calls or those who have used mobile phones for over a decade.

The review looked at cancers of the brain in adults and children, as well as cancer of the pituitary gland, salivary glands and leukaemia, and risks linked to mobile phone use, base stations, or transmitters, as well as occupational exposure. Other cancer types will be reported separately.

This review follows another conducted in 2011. The WHO and other international health bodies have found no definitive evidence of adverse health effects from the radiation used by mobile phones. It did call for more research.[88]

Radiofrequency electromagnetic fields are currently classified as "possibly carcinogenic", or class 2B, by the International Agency for Research on Cancer (IARC), a category used when the agency cannot rule out a potential link. The IARC's classification is to be re-evaluated as soon as possible given the new data since its last assessment in 2011. The WHO's evaluation will be released in the first quarter of 2025.

8.15 HPV: low vaccination – high cancer rate, the US

In a study published in *JAMA Network OPEN* recently, Texas was reported to be the state with the highest rate of HPV-related cancer while having the lowest vaccination rate compared to other states. [89]

The statement was based on the findings from a population-based cross-sectional study that used data from the Texas Immunization Registry, the National Cancer Institute's Surveillance, Epidemiology, and End Results Program database, and Texas Department of State Health Services annual population counts from 2006 to 2022.

The study was aimed at determining health disparities associated with HPV vaccination. A summary highlighting the statistics from the paper is as follows.

In Texas, an estimated 83% of HPV-related cancers are due to HPV infection. The state ranks 48th in HPV vaccination series completion and 44th in HPV vaccine series initiation. The vaccination status of 32.3 million children and teenagers aged 9–17 years old (65.8% girls and 34.2% boys) was compared with cancer rates in 22.5 million people aged $\geq$20 years old (50.7% women and 49.3% men) from 2006 to 2022.

According to the National Immunization Survey–Teen in 2022, the estimated HPV vaccination coverage among teenagers aged 13-17 years in Texas was 58.5%, below the national estimate of 62.6% for the same age group.

Results showed that county-level vaccination up-to-date estimates were generally lower compared to those of initiation estimates and ranged from 1.6% to 30.4% for females and from 2.1% to 34.8% for male children and teenagers as shown in **Table 6**.

Table 6. Comparison of up-to-date vaccination status estimate and vaccination initiation estimates in Texas. The information was extracted from Human Papillomavirus Vaccination and Human Papillomavirus–Related Cancer Rates - PMC (nih.gov)

Children and teenagers study subjects	Up-to-date vaccination estimate	Initiation estimate
Female	1.6%	30.4%
Male	2.1%	34.8%

The yearly mean age-adjusted HPV-related cancer incidence rate (IR) for 2016 to 2020 was 22.1 per 100,000 women and 14.3 per 100,000 men. Approximately 29 counties had high HPV-related cancer incidence for both male (16.4 to 64.9 per 100,000) and female (23.8 to 154.2 per 100,000) individuals simultaneously.

Disparities in HPV vaccination and HPV-related cancer incidence also exist within areas of Texas. Between 2013 and 2017, 3,200 incident cases of HPV-related cancers were diagnosed annually, with higher IRs in rural than urban regions (13.0 vs 11.7 per 100 000, respectively).

Higher HPV-related cancer burden in certain lower socio-economic regions raises concern, as this may indicate the continued widening of existing health disparities between these areas and other regions.

9.0 Implications for Sarawak based on the views of SIDC

❁With two agencies which performed well (delivered) during the acute phase of the COVID-19 pandemic, Europe still had gaps in its management during the public health emergency. Taking stock of what happened, and defining what worked and what did not is part of the learning process of how to do better in operational readiness to be prepared for the next health emergency.[90]

It would also need an element to address vaccine hesitancy and vaccine misinformation. Equally as important is the role of the community in addressing health-related issues, including restoring trust in vaccines, and preventing and the management of health emergencies.

❁Disease surveillance relies on quality data to make the necessary connections/links/ inferences regarding a disease: patterns of spread, control and therapeutics and public health interventions, among the few. Quality data needs for harmonisation.

For diseases that are vaccine preventable, such as measles, polio and cholera, it will be a shame and a waste of previous efforts and resources to have them re-emerge and continue to be a burden to individuals, families, society, the healthcare system and the economy. The advocation about vaccines should be continuous; questions and concerns from the public need to be answered.

❁The report on public perception of mpox gives us a clue that there is still a gap in their understanding of the pathogen and transmission of the MPXV. The WHO and the CDC have clarified that MPXV is primarily transmitted by close, interpersonal contact and sharing of items contaminated by the virus. Unlike COVID-19, respiratory transmission can occur when a person is close enough to a lesion to breathe it in. Good hygiene and following the correct protocol if presenting mpox-like symptoms while seeking medical help are important.

More importantly, the perception of people in 'high-risk groups' should not be just about sexual preference (for example, gay, bisexual, men who have sex with men and sex workers). Those with lower immunity, those not vaccinated against smallpox and pregnant mothers and their unborn babies are at higher risk of the disease if infected.

In hindsight, disinfecting, sanitising or cleaning tables after each customer is a must for all eateries/establishments, and not just during a health emergency.

❁The report on a human case of H5N1 without contact with animals is concerning. Backward and forward contact tracing or history-taking is important to determine if there has been human-to-human transmission. While investigations are ongoing, we should remain vigilant of cases of avian influenza.

❁The extent of AMR in Sarawak is unknown. The healthcare services, agriculture industry (animal husbandry) and the general population use antimicrobials. The spread of AMR organisms or pathogens is of concern as there are too few antimicrobials in development. Taking out a page of the One Health approach, environmental surveillance or wastewater surveillance (WWS) should be able to inform us of the type of AMR present as well as the extent of the spread of the genes related to AMR (antimicrobial resistance gene, ARG). [91]

❁Novel viruses (or other organisms) with disease potential should be tracked. Vectors with the potential to act as a 'carrier' of pathogens should also be tracked. The report of the discovery of novel viruses from China warrants caution – that there is a likelihood that the virus is already circulating naturally is highly possible.

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