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Spotlight on Zoonotic Diseases in South Africa

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If we don't change the way we interact with animals and nature, it is a matter of time when the next pandemic will happen. But how can the way we treat animals and nature help to prevent the next one?

After the COVID-19 pandemic, scientists have reiterated their warnings of the ongoing risk of outbreaks with pandemic potential and are calling on governments to take serious steps to stop the next one from happening. A key concern is that most diseases, like COVID-19, originate in animals (zoonoses)[1]. With up to 75% of emerging infectious diseases classed as zoonotic[2], they pose a major threat to the health of humans, domestic animals, and wildlife, as seen during the COVID-19 pandemic[3].

A zoonotic disease or zoonosis is an infectious disease that can jump from a non-human animal to humans, and these can be bacterial, viral, or parasitic or may involve another unconventional agent such as through food[4]. Inter-species transmission is facilitated by many anthropogenic factors such as encroachment into wildlife habitats, land use change driven by intensive farming systems, deforestation, wildlife trafficking and even climate change, all of which set ideal scenarios that can trigger the next pandemic[5].

These conditions along with the suffering caused by COVID-19, make it more important than ever for governments to establish an international pandemic instrument[6] and national One Health strategies that advance prevention measures which address the root causes of zoonotic pathogen (re)emergence, spread, and mutation – at source.

South Africa and zoonoses – a situation analysis

In the study: *Research Priorities for Control of Zoonoses in South Africa,*[4] experts found that South Africa is one of the most biologically diverse countries in the world. The country's sustainable-use wildlife economy and conservation model[7] has led to an intimate human–livestock–wildlife interface and opportunities for zoonotic transmission[8].

South Africa is not known internationally for high standards of animal welfare and performed poorly in World Animal Protection's Animal Protection Index.[9] With the exception of recent case law,[10]South Africa's animal-related legal framework does not statutorily recognise animal sentience nor intrinsic value. Enforcement of current legislation is furthermore problematic, and the legal framework aimed at protecting animals is not sufficiently robust. A real-world example is the well-established captive lion breeding industry that has received international criticism and which the Department for Forestry, Fisheries and the Environment is now inviting captive breeding facilities to voluntarily exit from[11].

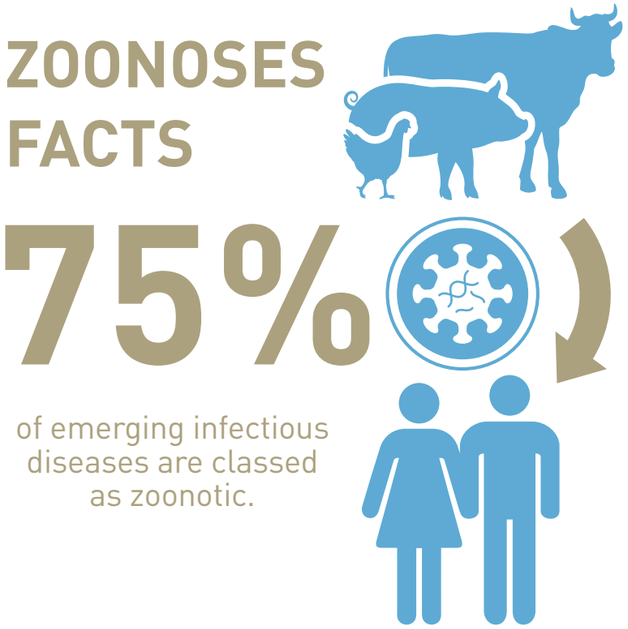
South Africa has also seen an increase in animals being farmed for food and for other purposes (such as for use in textiles) resulting from increased demand for these products. This growing demand is the largest contributor to a shift away from traditional farming methods to industrialised methods requiring a drastic increase in the number of animals being farmed, in a quicker timespan, with devasting impacts on the welfare of animals, humans and the planet[12]. Furthermore, industrial animal production and consumption can be attributed to a wide variety of adverse environmental impacts including the risk of zoonotic disease outbreaks[13].

The risk of pandemics decreases if we improve animal welfare as a central aspect of pandemic prevention plans. A paradigm shift is needed in which we transition away from our unsustainable relationship with animals and nature as an essential step in not only protecting animals and the environment, but also human health.

There are several endemic zoonotic viral infections that occur in South Africa that have far reaching effects on the country and its economy[14]. Endemic and cross boundary diseases that have a significant potential to adversely affect human, animal, and environmental health both locally and globally. Among the diseases which prevail in South Africa are Foot & Mouth Disease (FMD), Rabies, Bird Flu and Bovine Tuberculosis (bTB).

The majority of emerging and re-emerging diseases are zoonotic in nature.
These diseases are newly recognised, newly evolved, or have occurred previously, but have recently increased in incidence or have expanded into a new geographical location[15]. This makes it the responsibility of human and animal health role players, as well as industry, to put in place effective preventive measures.

Globally, there is an increase in many infectious diseases, reflecting the combined impacts of rapid demographic, environmental, social, technological, and other lifestyle changes[16].
The interconnectedness between the health and wellbeing of humans, animals and ecosystems is a rapidly growing focus of research. A multidisciplinary approach is needed to attain optimal health and foster wellbeing in all three areas[17]

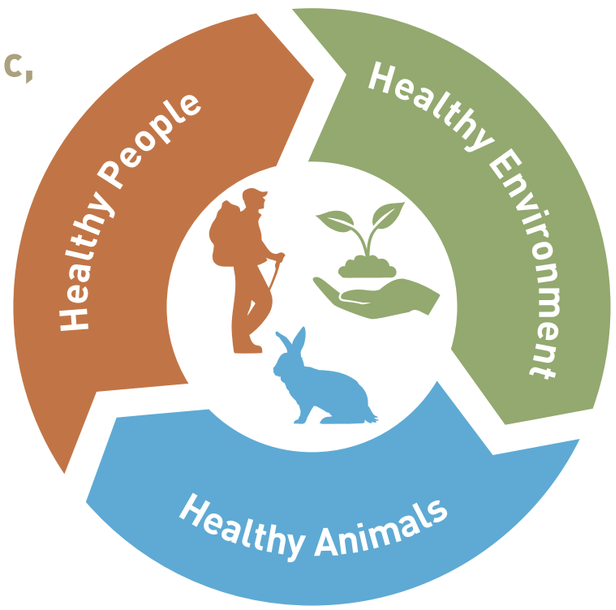


1. Preventing the spillover of pathogens by improving animal welfare and protecting the environment, saves lives, avoids suffering & negative social impacts and costs a fraction of preparedness and response!
2. A holistic, collaborative One Health approach to tackling pandemics requires measures that strengthen prevention at source as well as preparedness and response.

Prevention via a One Health Approach

Human health cannot be protected in isolation. A major driver of emerging infectious diseases which can turn into pandemics is and remains human "use" and consumption of animals and nature. When animals are stressed and suffer due to being overbred, raised, and kept in intensive husbandry and farming systems, crammed together with other species in cages under unhygienic conditions on live animal markets or being traded globally, their immune systems are weakened, and they are more susceptible to diseases. This creates the perfect conditions for highly transmissible diseases to spread between animals. These pathogens can mutate and develop the ability to jump to humans, in some cases with dangerous consequences, just like we are seeing with COVID-19[18].

To prevent the next pandemic, we need to acknowledge the link between animal welfare and increasing pandemic risk and follow a One Health approach on national, regional and international level.



Animal Welfare to prevent future pandemics

South Africa and the rest of the world must commit to ending animal suffering to stop future pandemics. COVID-[19] shows the dangers of ignoring the impact of animal cruelty. The way we treat animals and encroach on wildlife habitats brings pathogens closer to humans. High-risk practices which drive the risk of zoonotic outbreaks are the commercial wildlife trade, live animal markets, factory farming and fur farming. FOUR PAWS calls for animal welfare to be prioritized in pandemic prevention strategies and legislations.

Did you know?

- **Live Animal Markets:** Different species of animals captured and transported from a multitude of different and unknown sources to unhygienic markets are a dangerous breeding ground for viruses and their spread to humans.
- **Factory Farming:** Big farms with high stocking density of animals bred for high productivity traits and uniform genetic identity, form systems and breeding conditions that cause stress and a suppressed immune response. These systems offer pathogens ideal conditions to spread and mutate into dangerous variants for animals and potentially humans.
- **Fur farming:** The keeping and killing of animals for fur cultivation is a cruel practice. As we have seen with COVID and Highly Pathogenic Avian Influenza spillover into mink, wild animals kept in caged systems and farmed for their fur are highly susceptible to infection and transmission. intensive husbandry conditions of caged animals – are a source for pathogen mutations and transmission.
- **Climate Change:** The destruction of ecosystems, deforestation, loss of biodiversity by intensive animal agriculture, and the use of wild and farmed animals for food.

Scientific studies indicate that COVID-19 had its origins in the live wildlife trade with a live animal market as the epicentre of the pandemic.19 Later, the virus was introduced in mink farms by humans leading to direct and indirect transmission among mink via droplets or contaminated dust and reinfecting humans[20 21].
The report "Preventing the Next Pandemic: Zoonotic Diseases and How to Break the Chain of Transmission" by UNEP and the International Livestock Research Institute (ILRI) identified relevant anthropogenic sources and trends driving the emergence of zoonoses[5]. Research clearly shows that animals are not the main cause of pathogen transmission, but human behaviour towards animals and nature, human use and consumption of animals, the increased demand for animal protein, intensification and expansion of agriculture, intensive farming systems, encroachment into wildlife habitat, wildlife hunting, faming and trade and deforestation are to blame for enabling pathogens to transmit to human populations, especially humans in vulnerable situations at the human-animal-environment interface[22 23].

Human, animal, and environmental health are interconnected, which emphasizes the importance of ensuring good animal health and high animal welfare in order to prevent spillover events from happening. Preventing pandemics at source is THE key pillar of pandemic prevention, preparedness, and response. Policy makers must adopt pandemic prevention strategies following a holistic One Health approach and seek to end practices that increase the risk of zoonotic disease (re)emergence and spread, like the commercial wildlife trade, live animal markets, factory farming, [18 24].
The One Health approach as defined by the One Health High Level Expert Panel (OHHLEP) and supported by the Quadripartite (World Health Organisation (WHO), World Organisation for Animal Health (WOAH), Food and Agriculture Organisation of the United Nations (FAO) and United Nations Environment Programme (UNEP)) promotes the link between the health and welfare of humans, animals, and ecosystems[25]:

"One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development[26]."

The One Health Joint Plan of Action (OHJPA) proposes measures tied to supporting and expanding capacity for emerging and re-emerging zoonotic epidemics, endemic zoonotic, neglected tropical and vector-borne diseases because a holistic collaborative approach that begins with preventing outbreaks is the most effective way to save millions of lives, avoid suffering and isolation and prevent immense economic loss[26].

South Africa initiated a "One Health Program" bringing together relevant human and animal health stakeholders such as the National Department of Health (NDoH), the Department of Agriculture Forestry and Fisheries (DAFF), health institutes, researchers, physicians, and veterinarians[24 27]. While we welcome this important step in order to strengthen capacities for surveillance, disease detection and response, the program must not miss the opportunity to include tackling the root causes of zoonotic outbreaks and spill over events which pose a day-to-day threat to the South African population via direct contact with livestock or wildlife in a poor welfare state.

The paper *One Health in South Africa?* published in the *South African Journal of Infectious Diseases* highlights investing in interdisciplinary approaches, including One Health, as one of ten recommendations to prevent as well as respond to zoonotic disease outbreaks and pandemics[24].

It is estimated that annual global investments of around 20 billion US dollars would already suffice for prevention, which tackles the root causes of animal-to-human pathogen transmission from the outset. To contrast, the expected economic losses from the COVID-19 pandemic are estimated at nearly $14 trillion by 2024[28]. Prevention would cost around 5% of the yearly value of lives lost from emerging infectious diseases[22].

The most effective measure South Africa can take is to invest in preventing zoonotic outbreaks before they occur. The government of South Africa, through the National One Health Steering Committee and National One Health Forum, has taken critical first steps and established a One Health program in 2014 to coordinate disease surveillance, prevention and control and epidemic preparedness to tackle antimicrobial resistance and zoonoses. The University of Pretoria, part of this forum, supports national efforts. This is specifically demonstrated through their strength in zoonotic disease research and prevention of spillover as well as the establishment of a One Health Research Chair at the Future Africa Platform. This platform promotes transdisciplinary research and dialogue.

Professor Markotter, the chairholder and also OHHLEP co-chair, has stated, "We need to recognise the importance of preventing zoonotic spillover and not just responding when there is an outbreak or a pandemic. A One Health approach is essential to address this, and this should include integrated surveillance, addressing anthropocentric drivers of disease emergence, understanding infection dynamics in the natural host and environment, and developing and implementing risk reduction activities. We cannot afford another pandemic and need to do things differently and not in silos."

Implementing a holistic approach in line with the OHHLEP definition of One Health and following the One Health Joint Plan of Action (OHJPA) will offer a more comprehensive frame via which governments can work together with local communities at the human-animal-environment interface as well as with other relevant stakeholders. By identifying hotspots and high-risk activities that can drive zoonotic outbreaks (such as live animal markets or commercial wildlife trade), outlining strategies to phase them out together with affected communities and supporting them in transitioning away from such practices, we can enable communities to protect themselves. This approach, as captured within the OHJPA, can help achieve equity because for communities at the human-animal-environment interface, equity can be best achieved by preventing outbreaks in animals and thereby humans. The international legal instrument on pandemic prevention, preparedness and response which is currently being drafted and negotiated by WHO Member States is an important step towards building a more resilient health architecture if it is built on One Health, follows a whole-of-society and whole-of-government approach, and acknowledges the vital role of pandemic prevention. Protecting human health relies on improving animal health and welfare and protecting our nature as well as ensuring collaboration among legal instruments, institutions, and stakeholders essential for effective pandemic prevention. Establishing a legal framework with this holistic scope will provide WHO member states with the needed support and tools to protect human health.

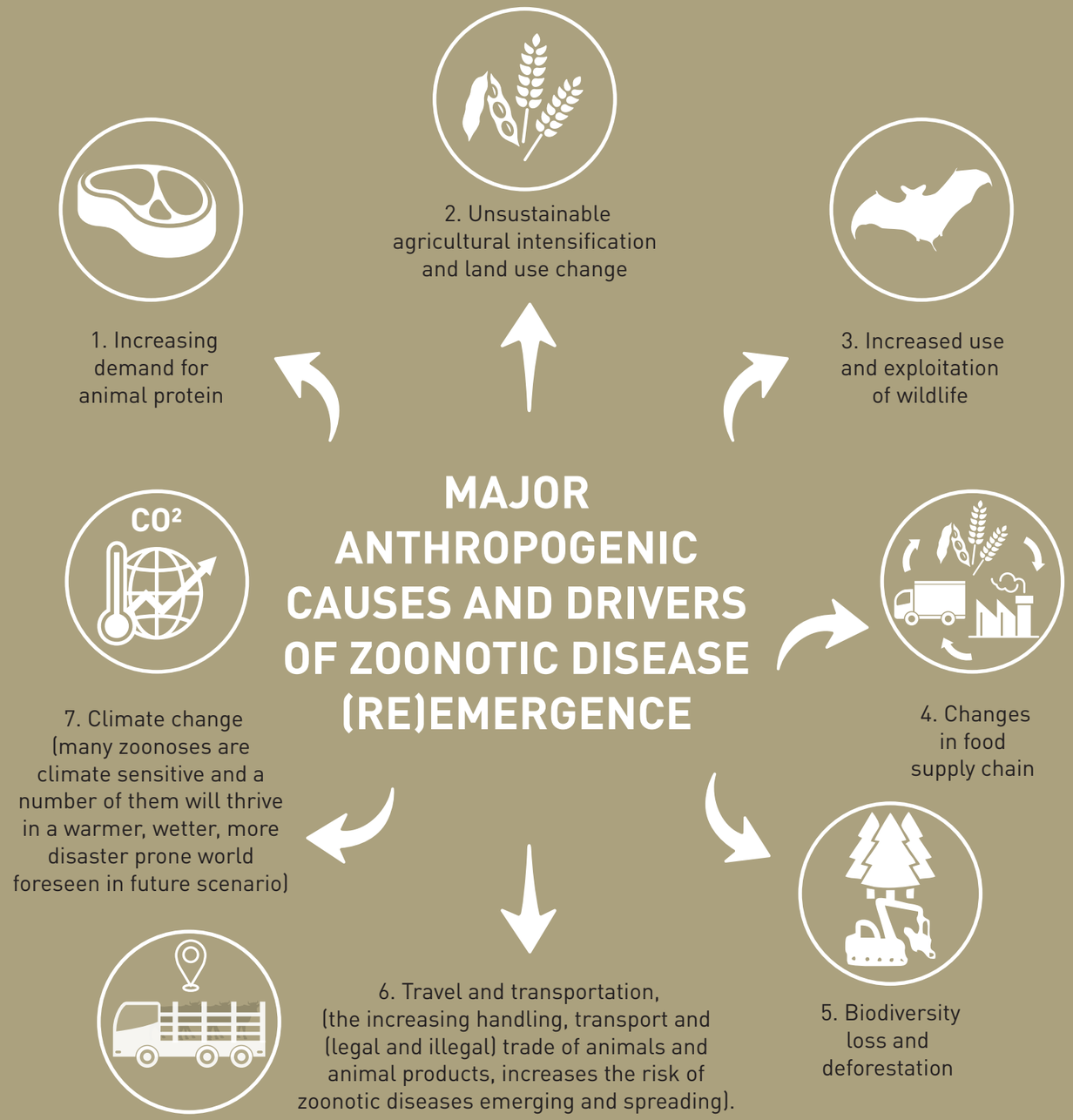
Detection and Containment

Diagnostic and research services in South Africa for Rabies, FMD, Bird Flu and bTB need to be strengthened as these tests are critical to ensure effective surveillance and timely detection of infectious diseases in animals before spillover to humans with a view to certify the disease-free status of South Africa[29].
Key health partners in South Africa must contribute to the development of the country's diagnostic capacity for detection and surveillance of key zoonotic diseases to identify the drivers of outbreaks in animals and take steps to limit and phase out activities that trigger such outbreaks, as well as to take measures to contain disease emergence in a timely manner.

The detection of diseases that can spillover and their drivers is just the first step towards developing effective national and local prevention strategies[30]. A multidisciplinary One Health approach enables a more comprehensive analysis of diseases at the human-animal-environment interface, investigating the hotspots and activities as well as interactions and transmission over space and time[31 8 2].

Research including regular fieldwork in South Africa by interdisciplinary teams would be essential to understanding the possible routes of transmission to humans and other animals.

As a first step in preventing (re)emerging infectious disease outbreaks of animal origin in humans, it is important for South Africa to develop a strategy focused on spillover prevention and to assess the level of support systems already in place. Due to multiple factors such as poor funding, a lack of veterinary and clinical cooperation, and disease misdiagnosis, the real burden of zoonoses is often ill measured. This resource gap means there is a lack of reliable evidence for governments and policy makers when implementing legislation at both local and national levels[5 4].
Control and preventive measures are often undertaken in isolation, which makes them less effective than when key players specialised in the health and wellbeing of humans, animals and the environment come together, to strengthen country-specific pandemic prevention, preparedness, and response. Developing joint strategies and efforts through a whole-of-government, whole-of-society approach must become the focus for governments and health, environmental, and animal welfare organisations.



South Africa's zoonotic disease prevention efforts should be enabled by the presence of 'functional multisectoral, multidisciplinary mechanisms, policies, systems, and practices to minimize the incidence zoonotic diseases and transmission from animals to human populations[32] [24]. South Africa has been reporting the dual problem of established and emerging zoonoses, and this means that we need a robust response system when it comes to zoonotic disease focused both on prevention and preparedness. For greater cooperation between the animal, human and the environmental health sectors, stakeholders must embrace a multifactorial, and multisectoral approach to gain the maximum benefit out of these improvements[33]. Zoonotic outbreaks must be recognised as a One Health problem for greater cooperation between departments and disciplines[34].

"Zoonotic viral infections are of public health concern globally.

There are numerous examples throughout human history of zoonotic infections causing considerable morbidity and mortality"[32]. The source of zoonotic infections may be wild animals, pets, or farmed animals and, with the latter set to increase as the human population expands and consumption of animal derived products increases, **zoonotic viral infections will always be a public health concern**. It is important that human, animal and environmental experts and practitioners' study local zoonotic viral infections and their drivers, to allow for appropriate prevention and management of these diseases, most of which are often neglected[25]. The One Health Program established in 2014 encourages strengthening the coordination of activities around the human - animal - environment interface and expanding zoonotic disease surveillance across sectors[27].

Recommendations

1. South Africa statutorily acknowledges the interconnections between human, animal and environmental health and wellbeing and establishes national coordination efforts on surveillance, prevention, control, and preparedness for AMR and zoonoses. Academic institutions are able to support with zoonotic disease research and spillover prevention. The next step would be to identify priority hotspots and activities that must be prioritized and implement national One Health strategies and prevention measures in which they are tackled. The scope of the strategies should be aligned with OHHLEP iteration of One Health and guidance on prevention of spillover as well as the One Health Joint Plan of Action.
2. A highly effective strategic focus governments can consider is implementing policies that not only ensure food sovereignty and security but also enable a transition to sustainable, healthy, and diverse food systems that are predominantly plant-based, by leveraging agroecology and high biodiversity practices for food and agriculture[35].
3. A precautionary approach when trading, farming, or marketing any wild animals, must be prioritized, assessing the risks to animal and human health before such activities occur, in order to avoid high risk practices that can trigger outbreaks.
4. South Africa has been working with the concept of One Health nationally. Lobbying for the inclusion of the One Health approach and acknowledging the crucial role of animal welfare for human health in the international instrument on pandemic, prevention, preparedness, and response accord[36], will facilitate international technical, expert, and financial collaboration and support for the implementation of One Health strategies.

Conclusion

With 75% of emerging infectious diseases originating in animals, it is important that we implement measures to protect animals, the environment and the communities that come into daily contact with pathogens, in order to achieve equity and prevent pandemics.[37] Tackling the root causes of zoonotic disease emergence and preventing the next pandemic to safeguard public health is the most sustainable and cost-effective investment we can make while simultaneously supporting global health and development outcomes.
Unsustainable human activities are increasing the frequency of pathogenic microorganisms that jump from other animals to people.[33] Pandemics such as COVID-19 are predictable, and its lessons can prevent the next pandemic, if we are willing to listen and learn.

Reference List

1. Stopping the next one: What could the next pandemic be? [accessed 2023 Jun 19]. https://www.bbc.com/future/article/20210111-what-could-the-next-pandemic-be
2. Animal-to-human diseases on the rise in Africa, warns UN health agency | UN News. 2022 Jul 14 [accessed 2023 Jun 19]. https://news.un.org/en/story/2022/07/1122522
3. Zoonoses. [accessed 2023 Jun 19]. https://www.who.int/news-room/fact-sheets/detail/zoonoses
4. Simpson G, Quesada F, Chatterjee P, Kakkar M, Chersich MF, Thys S. Research priorities for control of zoonoses in South Africa. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2021;115(5):538–550. doi:10.1093/trstmh/trab039
5. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. UNEP - UN Environment Programme. 2020 May 15 [accessed 2023 Jun 19]. http://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and
6. The Pandemic Accord Explained: What Countries are Doing to Protect Against Future Global Health Emergencies. unfoundation.org. 2023 May 19 [accessed 2023 Jun 22]. https://unfoundation.org/blog/post/the-pandemic-accord-explained-what-countries-are-doing-to-protect-against-future-global-health-emergencies/
7. Biodiversity Economy | Department of Environmental Affairs. [accessed 2023 Jun 19]. https://www.dffe.gov.za/projectsprogrammes/biodiversityeconomy
8. Renwick AR, White PCL, Bengis RG. Bovine tuberculosis in southern African wildlife: a multi-species host-pathogen system. Epidemiology and Infection. 2007;135(4):529–540. doi:10.1017/S0950268806007205
9. South Africa | World Animal Protection. [accessed 2023 Jun 19]. https://api.worldanimalprotection.org/country/south-africa
10. National Society for the Prevention of Cruelty to Animals v Minister of Justice and Constitutional Development and Another (CCT1/16) [2016] ZACC 46; 2017 (1) SACR 284 (CC); 2017 (4) BCLR 517 (CC) (8 December 2016). [accessed 2023 Jun 22]. http://www.saflii.org/za/cases/ZACC/2016/46.html
11. Renewed call for registration of interest for voluntary exit from the captive lion industry | Department of Environmental Affairs. [accessed 2023 Jun 22]. https://www.dffe.gov.za/mediarelease/creecy_renewedcall_captivelionindusrtyexit
12. World Farm Animals Day: SA should ring in the reforms. FOUR PAWS in South Africa. [accessed 2023 Jun 19]. https://www.four-paws.org.za/campaigns-topics/topics/farm-animals/world-farm-animals-day-sa-should-ring-in-the-reforms
13. Origin of Pandemics. FOUR PAWS in South Africa. [accessed 2023 Jun 19]. https://www.four-paws.org.za/campaigns-topics/campaigns/live-kinder/origin-of-pandemics
14. Newmana H, Abrahamsb S. Zoonotic viral Infections in south africa: An overview. Research and Review Insights. 2018 [accessed 2023 Jun 19];2(2). https://www.oatext.com/zoonotic-viral-infections-in-south-africa-an-overview.php. doi:10.15761/RRI.1000136
15. Kruse H, Kirkemo A-M, Handeland K. Wildlife as Source of Zoonotic Infections. Emerging Infectious Diseases. 2004 [accessed 2023 Jun 19];10(12):2067–2072. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3323390/. doi:10.3201/eid1012.040707
16. Thomas MB. Epidemics on the move: Climate change and infectious disease. PLoS biology. 2020;18(11):e3001013. doi:10.1371/journal.pbio.3001013
17. Pinillos RG, Appleby MC, Manteca X, Scott-Park F, Smith C, Velarde A. One Welfare - a platform for improving human and animal welfare. Veterinary Record. 2016 [accessed 2023 Jun 19];179(16):412–413. http://doi.wiley.com/10.1136/vr.i5470. doi:10.1136/vr.i5470
18. Animal Welfare and Preventing Pandemics. FOUR PAWS in South Africa. [accessed 2023 Jun 19]. https://www.four-paws.org.za/get-involved/pandemics-and-animal-welfare/animal-welfare-and-preventing-pandemics
19. The Huanan Seafood Wholesale Market in Wuhan was the early epicenter of the COVID-19 pandemic. [accessed 2023 Jun 19]. https://www.science.org/doi/10.1126/science.abp8715. doi:10.1126/science.abp8715
20. Oreshkova N, Molenaar RJ, Vreman S, Harders F, Oude Munnink BB, Hakze-van der Honing RW, Gerhards N, Tolsma P, Bouwstra R, Sikkema RS, et al. SARS-CoV-2 infection in farmed minks, the Netherlands, April and May 2020. Eurosurveillance. 2020 [accessed 2023 Jun 19];25(23). https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2020.25.23.2001005. doi:10.2807/1560-7917.ES.2020.25.23.2001005
21. Leste-Lasserre C. Mutant coronaviruses found in mink spark massive culls and doom a Danish group's research. [accessed 2022 Aug 17]. https://www.science.org/content/article/mutant-coronaviruses-found-mink-spark-massive-culls-and-doom-danish-group-s-research
22. The costs and benefits of primary prevention of zoonotic pandemics. [accessed 2023 Jun 19]. https://www.science.org/doi/10.1126/sciadv.abl4183. doi:10.1126/sciadv.abl4183
23. Bernstein AS, Ando AW, Loch-Temzelides T, Vale MM, Li
24. Weyer J, Mulumba M. One Health in South Africa? Southern African Journal of Infectious Diseases. 2017 [accessed 2023 Jun 19];32(3):2. https://sajid.co.za/index.php/sajid/article/view/42. doi:10.4102/sajid.v32i3.42
25. World Health Organization, Programme UKD for IDAH, Nations F and AO of the U, Health WO for A. The control of neglected zoonotic diseases : a route to poverty alleviation : report of a joint WHO/DFID-AHP meeting, 20 and 21 September 2005, WHO Headquarters, Geneva, with the participation of FAO and OIE. World Health Organization; 2006. Report No.: WHO/SDE/FOS/2006.1. https://apps.who.int/iris/handle/10665/43485
26. One health joint plan of action (2022–2026): working together for the health of humans, animals, plants and the environment. [accessed 2023 Jun 19]. https://www.who.int/publications-detail-redirect/9789240059139
27. CDC Global Health - South Africa - One Health Program. 2019 Feb 22 [accessed 2023 Jun 19]. https://www.cdc.gov/globalhealth/countries/southafrica/what/one_health.htm
28. A Disrupted Global Recovery. IMF. 2022 Jan 25 [accessed 2023 Jun 20]. https://www.imf.org/en/Blogs/Articles/2022/01/25/blog-a-disrupted-global-recovery
29. Louw R. Strategy to regain South Africa's FMD-free status. AgriOrbit. 2022 [accessed 2023 Jun 20]. https://agriorbit.com/strategy-to-regain-south-africas-fmd-free-status/
30. Wang L-F, Crameri G. Emerging zoonotic viral diseases. Revue Scientifique Et Technique (International Office of Epizootics). 2014;33(2):569–581. doi:10.20506/rst.33.2.2311
31. Animal Production and Health Division (NSA). AnimalProdHealth. [accessed 2023 Jun 19]. http://www.fao.org/agriculture/animal-production-and-health/en
32. Elton L, Haider N, Kock R, Thomason MJ, Tembo J, Arruda LB, Ntoumi F, Zumla A, McHugh TD. Zoonotic disease preparedness in sub-Saharan African countries. One Health Outlook. 2021 [accessed 2023 Jun 19];3:5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7982296/. doi:10.1186/s42522-021-00037-8
33. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission | UNEP - UN Environment Programme. [accessed 2023 Jun 19]. https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and
34. Salyer SJ, Silver R, Simone K, Barton Behravesh C. Prioritizing Zoonoses for Global Health Capacity Building-Themes from One Health Zoonotic Disease Workshops in 7 Countries, 2014-2016. Emerging Infectious Diseases. 2017;23(13):S55-64. doi:10.3201/eid2313.170418
35. Convention on Biological Diversity, Subsidiary Body on Scientific Technical and Technological Advice. Biodiversity and health. 2021 Apr:35. https://www.cbd.int/doc/c/76f9/1b75/42e360ab3ae6e53d0762c449/sbstta-24-09-en.pdf
36. Pandemic prevention, preparedness and response accord. [accessed 2023 Jun 22]. https://www.who.int/news-room/questions-and-answers/item/pandemic-prevention--preparedness-and-response-accord
37. World Health Assembly Event Highlights How Governments are working with One Health to Prevent Future Pandemics - FOUR PAWS International - Animal Welfare Organisation. [accessed 2023 Jun 19]. https://www.four-paws.org/our-stories/press-releases/world-health-assembly-event-highlights-how-governments-are-working-with-one-health-to-prevent-future-pandemics

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About FOUR PAWS

FOUR PAWS is the global animal welfare organisation for animals under direct human influence, which reveals suffering, rescues animals in need and protects them. Founded by Heli Dungler and friends in Vienna in 1988, the organisation focuses on companion animals including stray dogs and cats, farm animals and wild animals kept in inappropriate conditions as well as in disaster and conflict zones. With sustainable campaigns and projects, such as its own sanctuaries, FOUR PAWS provides rapid help and long-term protection for suffering animals.

South Africa

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