

CONCEPT DOCUMENT

NSTF Discussion Forum on: Preparedness for potential epidemics in South Africa - human and animal

1. Background

Disease outbreaks are usually caused by an infection, transmitted through person-to-person contact, animal-to-person contact, animal-to-animal contact or from the environment or other media. The traditional epidemiologic triad model holds that infectious diseases result from the interaction of agent, host, and environment. More specifically, transmission occurs when the agent leaves its reservoir or host through a portal of exit, is conveyed by some mode of transmission, and enters through an appropriate portal of entry to infect a susceptible host. This sequence is sometimes called the chain of infection. There are four main types of disease: infectious diseases, deficiency diseases, hereditary diseases (including both genetic diseases and non-genetic hereditary diseases), and physiological diseases. Diseases can also be classified in other ways, such as communicable and non-communicable diseases. Communicable diseases, also known as infectious diseases or transmissible diseases, are illnesses that result from the infection, presence and growth of pathogenic (capable of causing disease) biologic agents in an individual human or other animal host. Infections may range in severity from asymptomatic (without symptoms) to severe and fatal. The term infection does not have the same meaning as infectious disease because some infections do not cause illness in a host. Water, sanitation, food and air quality are vital elements in the transmission of communicable diseases and in the spread of diseases prone to cause epidemics. A number of environmental factors influence the spread of communicable diseases that are prone to cause epidemics. The most important of these are:

- water supply
- sanitation facilities
- food
- climate

A lack of safe water, inadequate excreta disposal facilities, poor hygiene, poor living conditions and unsafe food can all cause diarrhoeal diseases. These diseases are a major cause of suffering and death in an emergency situation.

Climate can affect disease transmission in a variety of ways. The distribution and population size of disease vectors can be heavily affected by local climate. Flooding after heavy rains can result in sewage overflow and widespread water contamination. In addition, there is some evidence to suggest that pathogens can be spread from one region to another along air streams or by wind.

Disease causing biologic agents include viruses, bacteria, fungi, protozoa, multicellular parasites, and aberrant proteins known as prions. Transmission of these biologic agents can occur in a variety of ways, including direct physical contact with an infectious person, consuming contaminated foods or beverages, contact with contaminated body fluids, contact with contaminated inanimate objects, airborne (inhalation), or being bitten by an infected insect or tick. Some disease agents can be transmitted from animals to humans, and some of these agents can be transmitted in more than one way.

2. Purpose and Objective

The committee of the Science Councils and Statutory Bodies membership sector of the National Science and Technology Forum (NSTF) is instrumental in promoting science, engineering, technology (SET) and innovation by creating platforms to share insights and express the views of scientists and other professionals in its member organisations. The objective of the discussion forum is to facilitate exchanges and solution driven deliberations around the preparedness for animal and human disease epidemics particularly around issues that Covid-19 exposed to have nonconformities/noncompliance like the health care system, housing, water and sanitation as well as regulation of transport and science advancement in South Africa, which are all contributors if we were to be prepared for the next pandemic. In this discussion forum we aim to give insight on policies and regulations when dealing with the outbreak of diseases.

3. Issues that might be considered in relation to preparedness for potential epidemics:

- Climate change

Climate Change indirectly affects all aspects of pandemics and containment, from water supply to food security and the weather conditions. Although there is no definite fix or solution to the problem we should address what we can do to limit the impact on future pandemics.

- Drug prescription habits in public and private health facilities in South Africa.

Poor counselling of patients when giving prescriptions leads to a lot of inappropriate use of medication. Pharmacists and doctors should play their role in educating the community clearly about the pros and cons of certain treatment when, how and why they should take treatment in a certain manner and which medication they can keep or should dispose of after treatment to avoid self-diagnosis and a further increase in Antimicrobial Resistance (AMR) which could potentially destroy all the revolutionary efforts made in the drug industry. More direction can be given to people as to which over the counter medication they can use before a cure is found. Improving our healthcare can be a major contribution to avoiding self-diagnosis which can later harm the entire world. As Covid-19 revealed people with medical aid could get access to prescriptions to assist their bodies to fight against the virus that the average South African couldn't and they were then left to social media to try find a way to assist them to beat the virus.

- Drug development

More encouragement is needed in this field for professionals to join and students to study. More awareness needs to be raised about the careers available and steps needed to attain qualifications and be part of this field. It needs to be more transparent to the public as well on the procedures that take place before a product is made available on the pharmacy shelves and how trials work and how study groups are chosen.

- Food Security

In the times we live in now food security is a never ending discussion and because it is a vital need and it requires a huge workforce that needs to work to supply the need and be safe from future pandemics. Looking at the agriculture industry and working conditions in the industry what changes can be made? And can we increase the supply of food in the country amidst the challenges we face against climate change and politics?

- Housing, water and sanitation

Covid-19 has exposed many of the cracks that we had within our housing, water and sanitation departments which turned out to be a huge factor when it came down to containing the spread of the disease. And it has affected our education system and created inequality leading to some learners missing out on school due to no infrastructure for water and sanitation. For containing the spread of any disease the first go-to point is hygiene which we cannot achieve without proper housing, water and sanitation infrastructure. Awareness of concepts of saving water should be preached to every one of all ages to reach every person on platforms they use.

- Emerging diseases

There are many other emerging diseases that exist which should not be ignored in light of the Covid-19 pandemic. Special care and precaution should be taken not to increase the number of infections for diseases that have since declined. Pre-existing regulations should be maintained for every emerging disease to decrease the probability of dealing with more than one pandemic/epidemic.

4. Event objectives:

- To learn about South African research relevant to the sub-topics and questions below.
- To learn about the potential improvement of relevant measures to prevent, monitor and curtail disease outbreaks, and in the data that is collected.
- To learn about drug research and development
- Understanding how climate change might affect the probability of disease outbreaks and how disease vectors in the environment can be monitored and curtailed
- To identify research areas that require attention
- Making the above facts and insights available to the public
- Formulating recommendations to the Department of Health, the Department of Science and Innovation, and other relevant government departments, as well as to science councils and statutory bodies.

5. The discussion forum's topic and its scope:

This discussion forum will focus on infectious diseases that have caused, or can cause, epidemics to break out in the South African context. The main focus is on human infectious diseases, but a secondary focus will be on animal infectious diseases. Of special interest at this time are viral diseases. Also of particular interest are zoonotic diseases that emerge in a human population but originate from animals such as bats. Although the Covid-19 pandemic will be top of everyone's mind, we want to highlight the other ongoing epidemics in South Africa – namely HIV and tuberculosis (TB). These have been neglected during the past year due to the focus on Covid-19, but they are deadly diseases that continue to debilitate our people and our country. There are other viral diseases that would be interesting to touch on, e.g. those caused by the Ebola and Lyssa viruses. Infectious diseases can be water- or food-borne, and these should be included in the discussions on preparedness. See the **Concept Document** for background information (attached).

6. What does preparedness entail?

The country was, and is, unprepared for the Covid-19 pandemic and in many ways it has caught us off-guard, despite the excellent research that has been conducted by South African scientists in related areas for decades. The formation of the Ministerial Advisory Council (MAC) demonstrated that South Africa has the necessary expertise in some important areas, and the President and Minister of Health were sufficiently prepared to take some drastic action to curtail the spread of the novel coronavirus. However, parts of our health system are in shambles and it was too late to fix

those. Likewise, the challenges of the distribution and access to water have proven too dire to address systemically. The education system was unprepared due to the lateness of implementation of government decisions to complement classroom teaching with digital platforms. Also, no-one in the world was really prepared for the second (and subsequent) wave of the pandemic. The robustness, quality and sustainability of the SA health system will have to be steadily improved, or we will always be un- or under-prepared for health emergencies. Speakers at this discussion forum are not expected to address such issues, nor the preparedness of government, public service, and governance of various structures and institutions to any great extent – this is simply to limit the scope of the discussions, although mentioning or flagging such issues is of course relevant to the topic of preparedness.

The kinds of preparedness that should enjoy attention at this discussion forum are, for example:

- *Covid-19* - What have we as a country learnt from the Covid-19 pandemic so far? How can these lessons be applied to be better prepared for the next wave or the next new epidemic?
- *HIV and TB* - What have we learnt from years of research and innovative applications related to other epidemics (particularly HIV and TB)? Given these other disasters in our country, how can the public health system work smarter – e.g. doing ongoing screening, diagnosing, monitoring, and treating of HIV and TB patients, at the same time as doing so with Covid-19 patients?
- *Water and food* - How are water- and food-borne pathogens monitored? What measures are in place to prevent and curtail outbreaks of diseases caused by such pathogens? How can the monitoring of epidemics be done by monitoring of waste water?
- *Research* - What areas urgently need further research in order for SA to be better prepared?
- *Pharmacological research* – What initiatives should be supported to stimulate relevant pharmacological innovation in South Africa? What about research on indigenous plants to develop treatments and vaccines?
- *Zoonoses* – What measures should be in place to prevent people being infected by animals?
- *Animal diseases* – In both livestock and wildlife. What measures are in place to curtail the spread of infections in animals? Should these be improved?
- *Climate change* – How does (or can) climate change affect the frequency and nature of infectious disease outbreaks?
- *Communication* – What lessons have been learnt regarding public communication during the Covid-19 pandemic? How can we improve communication efforts and widen their reach? How can Traditional Healing Practitioners (THPs) be involved in the fight against the pandemic and epidemics in general? (How have they been involved?)
- *What studies and skills training* should be available to young people, in order to enable greater preparedness of our country?
- *Data management* – What should be done to improve the recording and management of data during the Covid-19 pandemic, and other epidemics, now and in the future?
- *Public health policy* – What is the quality of public health policy in various pieces of legislation? How can implementation be improved?

7. Sources:

Centers for Disease Control and Prevention. Principles of Epidemiology in Public Health Practice, Third Edition. An Introduction to Applied Epidemiology and Biostatistics:

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<https://www.ncbi.nlm.nih.gov/books/NBK209710/#:~:text=Infection%20occurs%20when%20viruses%2C%20bacteria,symptoms%20of%20an%20illness%20appear> Date of access: Nov. 2020