

# The priorities for tackling infectious diseases in Africa

In this interview, public health specialist Dr Wilfred Alexander Chalamira Nkhoma from the World Health Organization (WHO) Office for the Africa Region speaks to us about the priorities for tackling infectious diseases in Africa, with a particular focus on Tuberculosis (TB) and viral hepatitis

**O**n the priorities for tackling infectious diseases in Africa, with a particular focus on Tuberculosis (TB), Dr Wilfred Nkhoma from the World Health Organization (WHO) Office for the Africa Region explains that the traditional way to treat and control communicable diseases revolves around the three standard domains of public health.

The first domain is primary prevention which is about what actions are taken by the health system or the individual to protect themselves from or to prevent diseases. Actions here include improving living conditions or immunisation, for example. The second domain is secondary prevention, that revolves around the identification of infection or active disease and taking actions to modify what one finds. Here, ordinarily, you identify what diseases you are dealing with and when you do find something, you should link people to the appropriate treatment that works, Dr Nkhoma underlines.

The third domain is tertiary prevention, which means you are dealing with somebody who already has a disease and they have developed complications but you want to maintain and improve their quality of life. The same principles apply to diseases such as Tuberculosis (TB), Dr Nkhoma tell us, which people can pick up when they are exposed to TB causing germs in community settings where they live or in households where they are in close proximity to somebody who already has this infection. Therefore, people need to take steps to improve their own health and governments need to deliberately invest in improving the social economic status and living conditions of their people, Dr Nkhoma argues. He goes on to detail additional priorities to tackle infectious diseases, in his own words.

“The prevalence and incidence of TB and other infectious diseases are very high, so there must be universal access to quality diagnosis and uninterrupted supply of effective quality-assured medicines for timely treatment close to where the people live. We should also have programmes and systems that support those patients in the event that they develop complications and disabilities from that infectious disease, so their quality of life does not become unbearable.”

While people infected with TB bacteria have a 10% lifetime risk of falling ill with it, Dr Nkhoma proceeds to explain how this affects those with compromised immune systems, such as people who are living with The AIDS virus or use tobacco, for example. He tells us that the natural progression of TB means that bacteria can get inside a person and infect them. That the individual can either get rid of the infection or contain it within the body system for a long time or go on to develop the acute disease. He goes on to explain more about the negative role immune system lowering conditions, including HIV and AIDS, cancer and diabetes, that stay with a person for life, play in increasing the likelihood of the infection progressing to active or recurrent disease.

“If you are of normal immunity, the proportion of those who will keep a disease, contain it or get rid of it will be much larger. When you have low immunity, however, for example through HIV infection, diabetes, cancer, smoking or other immune-reducing events then your probability of progressing to active disease after getting infected by bacteria increases substantially.

“When you are HIV-infected, you remain in that state for life. The difference between these other immune lowering conditions compared to HIV is that it depends



on how much damage you have incurred in your lungs where smoking is concerned. If you stop smoking before your lung systems are destroyed, you limit the chances and extent to which the TB bacteria can take advantage and proliferate.

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Dr Nkhoma then details the extent to which TB is one of the leading causes of death worldwide and the most single infectious agent, ranking even above HIV/AIDS. We know that there has been an analysis of the impact of these described conditions and also hepatitis. The world has now woken up to the fact that there are more people today living with hepatitis than those with HIV, TB or malaria, Dr Nkhoma emphasises.

“The analysis from 2000-2015 looked at the extent to which these conditions resulted in deaths and it shows that since 2000, the mortality rate of those with HIV was going up significantly but by 2005, when antiretroviral

therapies (ART) became widely available, that trend has declined significantly to such an extent that by 2015, hepatitis has taken over HIV, malaria and TB. And viral hepatitis is the one infection among these conditions whose mortality rate has continued to increase.

“So, the one other communicable condition that the world should now be taking notice of is viral hepatitis. After this comes TB and by 2015 it was killing close to 1.3 million people. In the same year, hepatitis resulted in the death of 1.5 million people. HIV had slightly declined to around 1.2 million people. The high mortality burden from HIV/AIDS and TB were still there, but the significant observation to make is that the decline in mortality from HIV/AIDS is much deeper and faster, while that from TB is steady but slower compared to that from HIV/AIDS. By the time we get to 2030, if we leave things the way they are then HIV deaths will be much lower and TB deaths will be higher than HIV deaths alone.”

Dr Nkhoma adds that in the African region, the early increase in deaths of people with TB was because of the immune debilitating effect of HIV/AIDS, but this has hugely been and continues to be positively impacted on by the successful rollout of ART's in communities. However, the mortality rate of those with TB that does not come from HIV co-infection requires continued aggressive actions to find and treat active TB cases in a timely manner. He then details his thoughts on malaria, where analysis shows that around 500,000

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# Antimicrobial resistance (AMR) at the Southern Africa Centre for Infectious Disease Surveillance

Mecky Isaac Matee, Leader of the SACIDS AMR CoP profiles the excellent antimicrobial resistance (AMR) research taking place at the Southern Africa Centre for Infectious Disease Surveillance (SACIDS)

**A**ntimicrobial research activities in the Southern Africa Centre for Infectious Disease Surveillance (SACIDS) is led by the antimicrobial resistance (AMR) Community of Practice (AMR CoP). This CoP was formed five years ago to address the burden of AMR in the southern African region and therefore, contributes to the global effort.

We set out to address the AMR problem from the One Health perspective in humans, animals and the environment and, therefore, our research team combines expertise and experience from the three sectors. We realised that although AMR is a global issue, in low-income countries, it is compounded by (i) a lack of access to appropriate antimicrobial therapy, (ii) weak of regulation in the use of antibiotics for humans and animals, (iii) weak AMR surveillance and resistance levels, (iv) a lack of updated antibiotic use and treatment guidelines, (v) a lack of continuing medical and veterinary education on antibiotic use for prescribers, (vi) a weak regulatory framework for the use of antibiotics in animal production and aquaculture, (vii) a high degree of drugs abuse by livestock keepers through; (viii) a lack of basic knowledge on the concept of antibiotic resistance among livestock keepers (ix) unregulated disposal of

industrial waste and finally, (x) self-medication using antimicrobials.

## What is its composition?

The SACIDS AMR CoP, led by Professor Mecky Matee of the Muhimbili University of Health and Allied Sciences (MUHAS) also includes participating scientists from MUHAS, the Catholic University of Health and Allied Sciences, the Sokoine University of Agriculture, the National Institute for Medical Research, the Tanzania Veterinary Laboratory Agency, the Tanzania Wildlife Research Institute and the Kilimanjaro Clinical Research Institute.

Regionally, SACIDS member institutions are the University of Zambia, the University of Kinshasa, the Democratic Republic of Congo and the University of Eduardo Mondlane in Mozambique. SACIDS works in partnership with the London School of Hygiene and Tropical Medicine, the London International Development Council, the Royal Veterinary College, the Giessen University in Germany, the University of Bergen in Norway, the University of Virginia, U.S and the American Society of Microbiology.

## How do we operate?

In AMR, SACIDS utilises a multi-disciplinary and multi-sectoral OH approach that provides evidence-

based information and data to improve practices and inform decision-making processes. The core activities of the AMR CoP include training, research and the provision of technical expertise in different disciplines, namely clinical microbiology, molecular biology, disease surveillance, One Health analytical epidemiology and One Health molecular biology.

The CoP advocates a 2-Level OH approach to addressing AMR. Level 1 consists of phenotypic screening and surveys by national public health and veterinary laboratories. Level 2 consists of genomic surveillance by the SACIDS-Africa Centre of Excellence partnership and/or other specialised laboratories.

SACIDS has also designed and deployed digital disease surveillance tool packages under the AfyaData platform, utilising a participatory OH approach. AfyaData will be used to support surveillance on AMU and AMR at community and primary health care levels and enhance data linkage to WHONET.

## What do we aim to achieve?

SACIDS AMR CoP, working with other stakeholders, is aiming to attain a holistic understanding of the factors and nature of spread and persistence

of AMR to develop appropriate intervention models; the role of livestock production and animal health systems in the evolution and spread of AMR in Africa; the socio-cultural and economic determinants of AMR in Africa and role of food chains in spread of AMR in the southern African region. The overall expected outcome is a cost-effective, evidence-based policy that is relevant in health and agricultural systems in the region that will be adopted by policymakers to minimise the AMR problem and serve as a model for resource-limited countries.

**What is our working hypothesis?**

Our working hypothesis is that “human and animal activities and ecosystems complexity exacerbate the transmission of bacterial zoonoses, including the emergence, spread and persistence of antimicrobial resistance.

**Our research approach to addressing AMR**

Our AMR research is centred on examining the genomic epidemiology of AMR in the context of health systems and the analysis of the socio-economic and policy analysis approaches to define the scale and the impact of AMR in Tanzania and neighbouring countries and to define intervention policy solution that is locally relevant and feasible.

**Training and research strategies**

The SACIDS training and research programme provides evidence-based action for AMR in Eastern and Southern Africa. Currently, one postdoc and seven PhDs are working on various aspects of AMR in three compartments i.e. animal, human and the environment, i) including Genomic epidemiology of ESBL-producing Escherichia coli in hospital and environmental settings in Dar es Salaam,

Tanzania and ii) Genomic epidemiology of AMR in short-cycle food animals (poultry, pigs and fish) – (driven by AMR surveillance in animals, aquaculture and environment).

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**Provision of technical expertise and government engagement**

Over the years, SACIDS has provided support to different national technical working groups of the National One Health Coordination Desk under the Tanzania Prime Minister’s Office, the Ministry of Health, the Ministry of Livestock and Fisheries in addressing the burden of AMR in the country. SACIDS has also been involved in the formation of the Multi-Sectoral Coordination Committee, AMR technical working groups, the development of national action plan for AMR and in the development of guidelines and implementation of strategies for AMR. The established relationship provides unique opportunities for SACIDS AMR CoP to work, according to the national strategies, requirements and plans of the country.

**Beneficiaries of the SACIDS AMR research**

We target populations of AMR policy; healthcare professionals, professionals working in the animal sector, patients and community groups. Academics, including policy researchers and those focusing on AMR/One Health approaches, will also benefit from the research findings, as will international policy organisations that seek to shape policy responses to AMR, including the World Health Organization (WHO), the Food and Agriculture Organization of

the United Nations and World Organization of Animal Health.

The recently established Tanzania’s One Health Platform established through the Prime Minister’s Office is a specific group that will directly benefit from the research findings as they seek to identify how best to implement One Health principles with respect to controlling the spread of AMR. Private sector groups that continue to face impacts of AMR on business interests are also likely to benefit from this research.



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