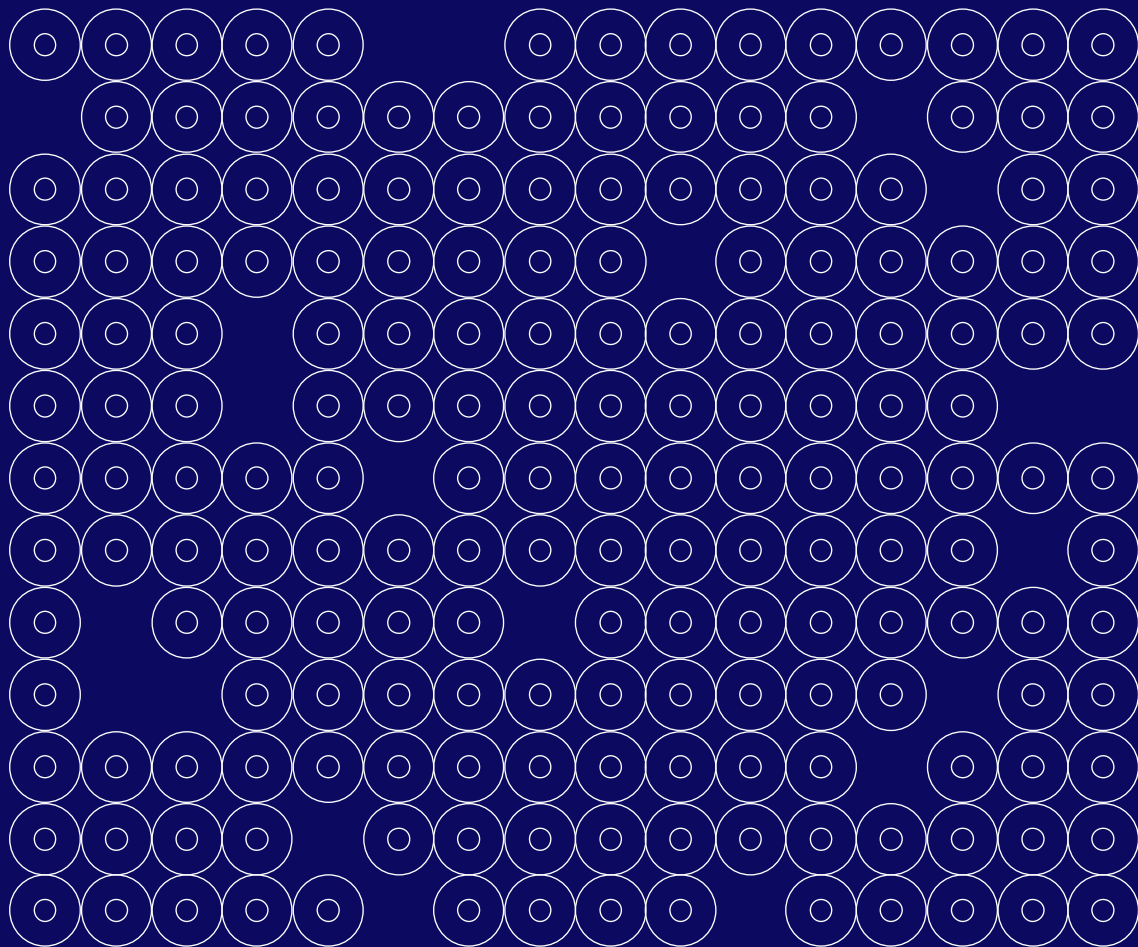


# African Perspectives on AMR Surveillance and Wastewater Management

Online workshop 9 December 2021



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## Background and workshop objectives

The Joint Programming Initiative on Antibiotic Resistance (JPIAMR) is an international collaborative platform that coordinates national research funding, multi-dimensional AMR research and funding on a global scale and supports collaborative action for filling knowledge gaps on AMR with a One Health perspective. It brings together 29 member countries and the European Commission. The JPIAMR aims at unifying research efforts globally in order to answer this public health priority issue, avoiding fragmentation and scattering of resources.

This international exchange event aimed to showcase wastewater surveillance research with a focus on the prevention and spread of pathogens and antimicrobial resistance. This half a day workshop targeted the funders and researchers with the aim to explore opportunities for putting together global experience and sharing resources and achievements in order to find partners for tackling AMR in Africa Region. Speakers from different African and European countries shared their experiences to increase awareness of current wastewater monitoring programs and build networks for future research in wastewater based surveillance

The workshop was hosted online via Zoom on the 9<sup>th</sup> of December 2021 and organised by JPIAMR and the South African Medical Research Council (SAMRC).

Richard Gordon, Executive Director of the Grants, Innovation and Product Development groups at SAMRC and member of the JPIAMR Steering Committee did the welcoming.



## **Organising committee**

- Richard Gordon, South African Medical Research Council (SAMRC) and JPIAMR
- Suranie Horn, South African Medical Research Council (SAMRC)
- Akin Akkoyun, Deutsches Zentrum für Luft- und Raumfahrt (DLR)
- Laura Marin, JPIAMR
- Patriq Fagerstedt, JPIAMR
- Anders Bjers, JPIAMR

## Moderator and speakers

### *Workshop moderator*

#### **Roelof Coertze, Department of Infectious Diseases, University of Gothenburg, Sweden**

Roelof has experience in the fields of Molecular Biology and Bioinformatics. His PhD focussed on the prevalence and diversity of ampC beta-lactamase genes from aquatic environments. His first Postdoctoral fellowship at the University of the Free State was focussed on the characterization of double stranded RNA viruses, which included the Rota- and Picobirnavirus. Roelof is now part of a research team in Sweden as a Postdoctoral researcher. Currently, he is a member of the Center of Antibiotic Research (CARE) where his projects are focussed on aspects of Bioinformatics for the characterization of antibiotic resistance in the environment, software development, synthetic biology and the engineering of laboratory equipment.

### *Speakers*

#### **Kayla Barnes, Broad Institute and Harvard School of Public Health, UK**

Kayla Barnes is a NIH fellow at the Harvard School of Public Health and the Malawi-Liverpool Wellcome Trust. Kayla uses genomics to understand viral pathogen dynamics and the host/pathogen interaction.

#### **Carlos Bezuidenhout, Director of the Unit for Environmental Sciences and Management, North-West University, South Africa**

Carlos Bezuidenhout is employed at the North-West University as a Professor in Microbiology and is currently the Research Director in the Unit for Environmental Sciences and Management. His post PhD career has focused on various aspects of aquatic microbiology, including surface and groundwater quality, as well as aspects of water treatment. He has over 22 years of experience, has supervised a large number of postgraduate students that are active in the water sector and has published numerous peer-reviewed publications in this field. Carlos is also a member of the Ground Water Division and a Fellow of WISA.

#### **Vincent Chigor, Department of Microbiology, Faculty of Biological Sciences, University of Nigeria, Nsukka, Nigeria**

His PhD research assessed the water quality, incidence of enteric viruses and microbial risks in the Buffalo River in the Eastern Cape Province of South Africa. Prof Chigor's research into microbial freshwater pollution and the associated risks is continuing. He has demonstrated the survival and persistence of multidrug-resistant *Escherichia coli* O157 in surface waters used for fresh produce irrigation. Comparative molecular analysis of environmental viral/bacterial pathogens versus clinical strains will shed light on molecular epidemiology and the dispersion of virulence/antibiotic resistance genes. Prof Chigor's research also focuses on natural products with antimicrobial activity, especially from plants, as a solution to the enduring problem of microbial resistance to antibiotics and the growing emergence of multidrug resistant strains of pathogens.

**William Gaze, European Centre for Environment and Human Health, part of the University of Exeter Medical School, UK**

Professor of Microbiology at The European Centre for Environment and Human Health, part of the University of Exeter Medical School. I lead a large research group focusing on the environmental dimension of antimicrobial resistance (AMR) with recent and current funding of £4M with over 20 group members. We research the evolution of resistance in complex microbial communities found in human, animal and environmental microbiomes. We also study the dissemination of AMR at a landscape scale and human exposure and transmission in aquatic environments.

**Wejdene Mansour, Department of Microbiology, Faculty of Medicine Ibn Al Jazzar, University of Sousse Tunisia**

Her research interests span the general area of antimicrobial resistance with an emphasis on a one health perspective analysis. In her working group, they work towards guidelines and method protocols for surveillance of AMR in a one-health context. Such guidelines and protocols need to be practicable, comparable, simple and cost-effective so they can be applied. Their objective is to find a way to perform global surveillance of AMR and to contribute with their experiences on the research of antimicrobial resistance profiles and detection of antimicrobial resistance genes in clinical and animal strains and environmental bacteria isolated from soil and water.

**Karl Pederson, National Veterinary Institute, Sweden**

He has extensive research experience in antibiotic resistance, microbiome studies, bacterial infections in animals and bacterial zoonoses. Research and diagnostics in antibiotic resistance have included monitoring and surveillance of resistance in animal pathogenic and zoonotic bacteria. Studies on bacterial infections have included a long array of animals, including production animals, aquaculture fish, companion animals and wildlife, while studies on zoonotic bacteria have mainly been focused on Salmonella, Campylobacter and MRSA. The research has included resistance epidemiological studies, among other things based on whole genome sequencing. Research in microbiome has included mapping of the intestinal microbiota in broilers, and how the composition is affected by different feeds or by an infection. Other microbiome studies have analysed the composition of the microbiota on skin and nose in pigs, as well as the effect of antibiotic treatment on the microbiome and resistome in pigs, treated or not with antibiotics.

**Claudia Stange, TZW: DVGW-Technologiezentrum Wasser (German Water Center), Department Water Microbiology**

Graduated with diploma in engineering at the University of Applied Sciences Mannheim, Germany, in 2005. Since that time, she was part of “Water Microbiology” at the TZW: DVGW-Technologiezentrum Wasser - the German Water Center – as project scientist. Research topics include significance of antibiotic resistance for raw water quality, elimination of antibiotic resistance during water treatment, use of molecular biological methods to detect pathogenic bacteria and viruses in water, microbial source tracking and SARS-CoV-2 wastewater surveillance.

**Renee Street, South African Medical Research Council, Environment and Health Research Unit, South Africa**

Dr Street is a Specialist Scientist and Deputy Director at the Environment & Health Research Unit of the South African Medical Research Council (SAMRC). She leads the persistent toxic substance Programme. Over the past decade, Dr Streets research has focused on various aspects of heavy metal exposure and the impact on human health. Dr Street has a keen interest in public health issues and policy development. As a response to the COVID-19 pandemic, Dr Street has been instrumental in setting up the SAMRC wastewater surveillance and research Programme to monitor SARS-CoV-2 RNA trends.

*Workshop 9 December 2021*  
**African Perspectives on AMR Surveillance and Wastewater Management**

**Moderator:**  
**Roelof Coertze**  
Department of Infectious Diseases,  
University of Gothenburg, Sweden

**Plenary:**

**Carlos Bezuidenhout**  
North-West University, SA

**Renee Street**  
South African Medical  
Research Council, SA

**Speakers:**

**William Gaze**  
European Centre for  
Environment and Human  
Health, UK

**Wejdene Mansour**  
University of Sousse,  
Tunisia

**Karl Pederson**  
National Veterinary  
Institute, Uppsala

**Vincent Chigor**  
University of Nigeria,  
Nsukka, Nigeria

**Claudia Stange**  
TZW: DVGW-  
Technologiezentrum  
Wasser, Germany

**Kayla Barnes**  
Broad Institute and Harvard  
School of Public Health, UK

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# Workshop program

Moderator: R Coertze

12:00	12:15	Welcome & introductions – Richard Gordon	
<b>Topic 1: Antimicrobial resistance (AMR) risk assessment</b>			
12:15	12:35	Plenary: Prof Carlos Bezuidenhout (North-West University, South Africa)	Antimicrobial resistance (AMR) in drinking water and risk assessment
12:35	12:55	Prof William Gaze (University of Exeter, European Centre for Environment and Human Health, UK)	The environmental dimension of antimicrobial resistance: the need for environmental surveillance.
12:55	13:05	Coffee break/bio break	
13:05	13:25	Vincent Chigor (University of Nigeria, Nsukka, Nigeria)	Antimicrobial Resistance of Vibrio cholerae: Assessing the Role of Aquatic Environments in an Increasing Challenge in Nigeria
13:25	13:45	Dr Karl Pederson (National Veterinary Institute, Sweden)	Monitoring of antimicrobial resistance in a one-health perspective
13:45	14:00	Q & A (panel discussion)	

<b>Topic 2: Pathogen surveillance in wastewater</b>			
14:10	14:30	Plenary: Dr. Renee Street (South African Medical Research Council, South Africa)	Towards wastewater-based AMR research: building on the SAMRC SARS-CoV-2 RNA surveillance and research programme
14:30	14:50	Dr. Claudia Stange (TZW: DVGW-Technologiezentrum Wasser (German Water Center), Department Water Microbiology)	SARS-CoV-2 wastewater surveillance in Germany: Long-term PCR monitoring and comparison of primer/probe systems
14:50	15:00	Coffee break/ bio break	
15:00	15:20	Dr. Kayla Barnes (Broad Institute and Harvard School of Public Health)	Detection of Salmonella Typhi and SARS-CoV-2 in urban river systems in Malawi
15:20	15:40	Prof Wejdene Mansour (Department of Microbiology; Faculty of Medicine Ibn Al Jazzar, University of Sousse Tunisia)	Thwart the dissemination of antimicrobial resistance in Tunisia: Major challenges to overcome and awareness of stakeholders
15:40	15:50	Q & A (panel discussion)	
15:50	16:00	Closing and thanks	



## Participants

There were a total of 235 registrations from over 20 different countries including Uganda, Nigeria, Kenya, South Africa, Somalia, United States, United Kingdom and Japan.

The total number of participants in the live event was 114. In addition to the live event, a recording was sent to all the participants that registered and the video was also uploaded to JPIAMR YouTube channel.

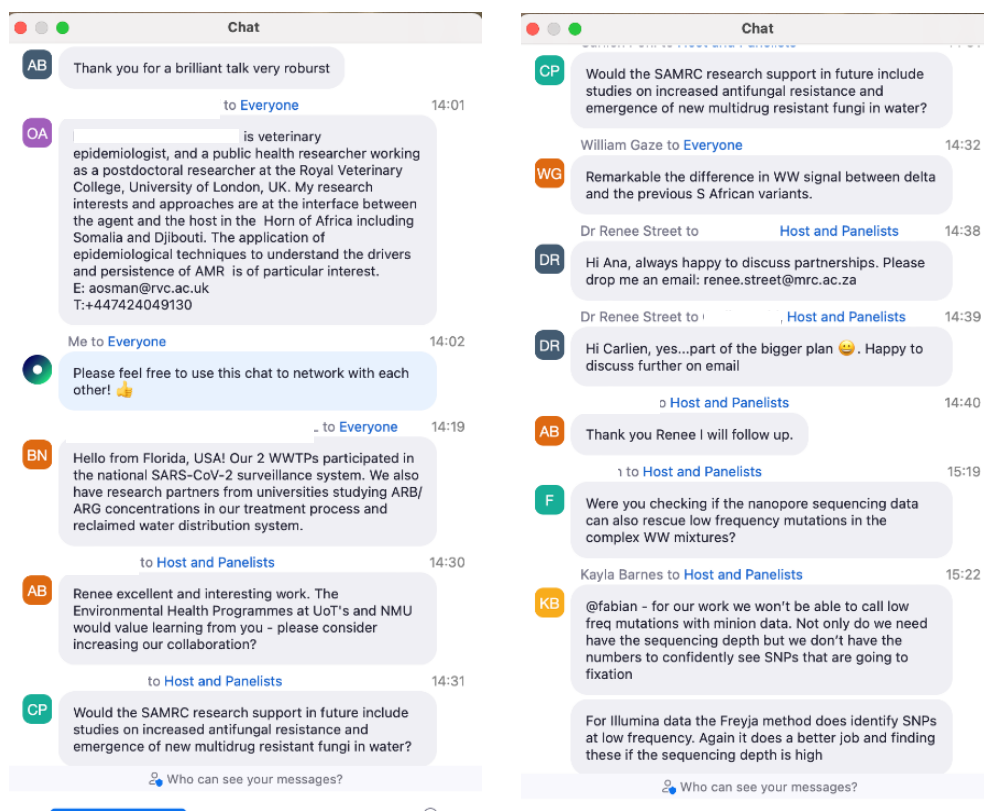
Participant profiles:

- Scientists: Wastewater surveillance/wastewater based epidemiology
- Scientists: Antimicrobial resistance
- Scientists: Pathogens in wastewater
- Public
- Government departments – Environmental affairs, water and sanitation
- Potential funders
- Media

## Workshop summary

The workshop had excellent results in terms of the subjects and impact on national, regional and global AMR networks and groups. The programme was divided into two main topics: AMR risk assessment in the environment and pathogen surveillance. The wastewater surveillance topic highlighted the programme and projects established due to COVID-19, which can now also be adopted to advance AMR research from wastewater or environmental water. Half of the speakers presented on research conducted in Africa and others on experiences from Europe. Existing knowledge and experiences between European and African countries were, therefore, exchanged during the panellist presentations.

This event facilitated networking between panellists and participants in the chat function. Contact details were also exchanged.



**Figure 3.** Screenshots from the workshop Zoom chat.

This event showcased research done in Africa and Europe and how the perspectives are different based on the challenges research have.

Cooperation from stakeholders in science, industry and government is needed for the international exchange of knowledge and resources working towards protecting public health against antimicrobial resistance.