

Template for Impact Case Studies

Submission Title of the Impact Case Study: Research with reach: How the study on antiretroviral drugs in South Africa's water influenced policy and public awareness.

Submitting university: North-West University

Summary of the impact:

Human Immunodeficiency Virus (HIV) is a retrovirus that attacks the body's CD4 cells, a key part of the immune system responsible for fighting infections and diseases. Over time, untreated HIV can lead to acquired immunodeficiency syndrome (AIDS). People living with HIV/AIDS (PLWHA) rely on antiretroviral (ARV) medication to manage the virus, reduce its impact, and prolong life. With access to effective treatment and proper care, HIV is now considered a manageable chronic condition, though strict adherence to prescribed therapy remains essential. In South Africa, an estimated 8 million people are living with HIV/AIDS. However, ARV medications can also enter the water system. This study, funded by the Water Research Commission (WRC), investigated the extent of ARV residues in South African waters.

The findings of this research on HIV ARVs detected in water sources in South Africa extended beyond academic circles, generating substantial unintended public interest and widespread media coverage. This visibility shaped public discourse on water quality, medicine residues, and environmental health, highlighting its relevance to societal and environmental well-being. Importantly, the study's outcomes informed government action, leading to a national awareness campaign by the Department of Water and Sanitation. This demonstrates this research's influence on science, policy development, and public engagement, contributing to increased awareness, knowledge dissemination, and making a difference.

Underpinning academic work:

Pharmaceuticals used to treat people living with HIV/AIDS were detected in surface waters across South Africa. Samples collected monthly over five months (2017–2018) from 72 sites in the Gauteng and North-West provinces revealed quantifiable levels of antiretroviral drugs (ARVs), including lopinavir, efavirenz, and nevirapine, in both surface and drinking water. Pharmaceuticals, such as ARVs, enter South Africa's rivers primarily through human excretion, since a portion of the medication passes through the body unmetabolized and is flushed into the sewage system. Wastewater treatment plants are not designed to fully remove chemicals like ARVs, so residual amounts are discharged into the rivers. In areas without proper sanitation infrastructure, waste is often disposed of in pit latrines or directly into the environment, where it can leach into surface water, especially during heavy rains. Improper disposal of expired or unused medication further contributes to pharmaceutical contamination. While the detected levels were not high enough to cause immediate harm to people, the potential ecological impacts on fish, aquatic insects, and the microbial diversity of rivers raised serious concerns.

The project was led by the [Unit of Environmental Sciences and Management](#) and the [Africa Unit for Transdisciplinary Health Research](#) at the North-West University (NWU) and covers the fields of Natural Sciences and Medical and Health Sciences. The researchers involved were Profs Hindrik Bouwman, Suranie Horn, Rialet Pieters, Carlos Bezuidenhout, and Petra Bester, as well

as postgraduate students. Their collective initiative brought together diverse knowledge from environmental, health, and social science disciplines to undertake this newfound challenge.

The WRC project K5/2594, titled “*Quantification, Fate, and Hazard Assessment of HIV-ARVs in Water Resources*”, was published in 2020. The report comprised two volumes: Volume 1 focused on analytical and biological assessments, and Volume 2 explored social dimensions- both edited by Bianca Vogt (See page 3). The research was also formally communicated to the South African Department of Water and Sanitation, Department of Health, and Department of Environmental Affairs and Fisheries through a Ministerial Briefing Note on ‘HIV-ARVs in Water Resources’ (See page 3).

Narrative description of the impact:

This research (WRC Project K5/2594) created a benchmark for investigating environmental risks that may also influence public health, positioning the NWU at the forefront of water quality research and societal health outcomes (See page 3). The teams’ research has explicitly brought ARV pollution of water sources into the national conversation, but only in 2025, when a brief report on the major findings became available to national news outlets. When the study was finalised in 2020, its findings were formally communicated to the South African government departments of Water and Sanitation, Health, and Environmental Affairs through a Ministerial Briefing Note on ‘HIV-ARVs in Water Resources’ (See page 3). Whether it had any influence on the policy makers was not visible to the public.

The 2025 news article published on the NWU [website](#) started a wave in the local media with 193 media stories across broadcast, online, and print, and a potential reach exceeding 51 million people. The research generated extensive societal awareness of increasing ARV drug concentrations in waters (period: 10 July–10 September 2025). The overwhelmingly constructive response emphasises the reliability of the NWU’s contribution, positioning the report as a trusted source influencing public discourse on water safety and health policy. The research has therefore raised ARV contamination from a largely unknown risk to a matter of national interest, prompting dialogue among the public, policymakers, and water authorities. In addition to widespread favourable media coverage and interviews with one of the authors, [a national debate](#) was sparked with the Department of Water and Sanitation. This demonstrates that the research moved beyond academic publication into public engagement, having a direct policy-level impact. The Department of Water and Sanitation used the study’s findings to raise public awareness about pharmaceutical pollution. One outcome was the creation of posters on the responsible disposal of medicines and how our daily choices affect water quality.

The combined impact of broad public engagement and ministerial-level policy communication underscores the significance of the team’s research. It has raised awareness about ARV contamination in water sources and provided a foundation for integrating this issue into national water monitoring and treatment protocols, supporting both public health and environmental protection. The research has delivered benefits across multiple sectors: government agencies such as the Department of Water and Sanitation have gained evidence for policy discussions; water management authorities have been guided on priority monitoring areas; the general public has become more informed about water safety through national media coverage; and the research community now has a valuable reference dataset for future environmental and public health studies.

Evidence and sources to corroborate the impact:

2 Volumes of WRC Project K5/2594:

- <https://www.wrc.org.za/wp-content/uploads/mdocs/2594%20-%20Volume%201.pdf>
- <https://www.wrc.org.za/wp-content/uploads/mdocs/2594%20-%20Volume%202.pdf>

Ministerial brief: 2020



Departments of Water and Sanitation, Environmental Affairs and Health

His honourable Mr. Gugile Nkwinti, Her Honourable Ms. Nomvula Mokonyane, and His Honourable Dr. Pakishe Aaron Motsoaledi

Purpose

The purpose of this brief is to inform the Ministers about an ongoing study titled: *Risk assessment, quantification, and fate of HIV-ARVs in water resources*. HIV-ARVs belong to the group known as Contaminants of Emerging Concern (CECs), which are compounds that currently do not have regulation associated with them and therefore are not monitored. However, due to their continuous production, lack of appropriate disposal, constant input into the environment and presence in water resources albeit in small concentrations, there is sufficient imperative to understand the possible negative effects on the environment and human health. CECs also present a unique challenge as they cut across both water, environment and health spheres and highlight the necessary integration in those three spheres in order to design relevant policy for their effective management.

Current situation

By July 2019 the *Risk assessment, quantification, and fate of HIV-ARVs in water resources* report will be published by the Water Research Commission. It is anticipated that the media will focus on the following findings in this report:

- Levels of ARVs in water sources.
- ARV drug resistance and compliance.
- (Im)proper ARV discarding compliance.
- Insufficient wastewater treatment.

Background

The therapeutic benefits of antiretroviral therapy (ART) against the human immunodeficiency virus (HIV), as well as its side effects, has been well researched and documented. However, a more recent public health concern that is presenting itself for urgent attention and research is the possibility of large amounts of antiretroviral drugs (ARVs) that enters water resources through surface runoff as well as wastewater treatment plant effluents.

South Africa (SA) has one of the largest HIV epidemics globally (about 18.8% adult HIV prevalence; 7.2 million people living with HIV (PLWH) in 2017). SA supports 90% of PLWH to receive sustained ART by 2022. This implies scaled-up access to ART through decentralised uninterrupted antiretroviral (ARV) supplies, supplying large quantities to resource-poor communities.

The South African programme has been benchmarked as the largest global ART treatment programme, providing ART to 20% of the global population of PLWH. It is expected that the vastness and success of these programs will increase in the years to come, due to the fact that the World Health Organization (WHO) recommends that any person diagnosed with HIV be put on an ART regime, immediately, regardless of their CD4 count. Furthermore, UNAIDS has proposed the 90x90x90 strategy/goal for 2020. This goal aims to ensure that 90% of all PLWH will:

- i) know their status;
- ii) are receiving sustained ART; and,
- iii) those who are receiving therapy, will have a viral suppression.

South African Government media statement by the Department of Water and Sanitation and Water Research Commission: “Findings of Traces of ARVs in Water Resources and Drinking Water” (July 18, 2025): <https://www.gov.za/news/media-statements/water-and-sanitation-findings-traces-arvs-water-resources-and-drinking-water#:~:text=The%20presence%20of%20ARV%20residues,result%20in%20people%20contracting%20HIV.>

Horn, S., Vogt, T., Gerber, E., Vogt, B., Bouwman, H. and Pieters, R. 2022. HIV-antiretrovirals in river water from Gauteng, South Africa: Mixed messages of wastewater inflows as source. *Science of The Total Environment*, 806:150346.

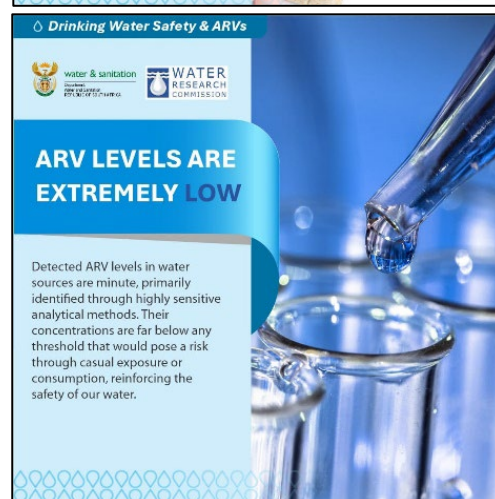
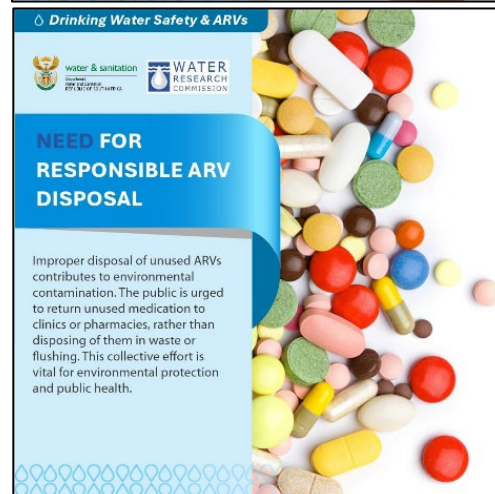
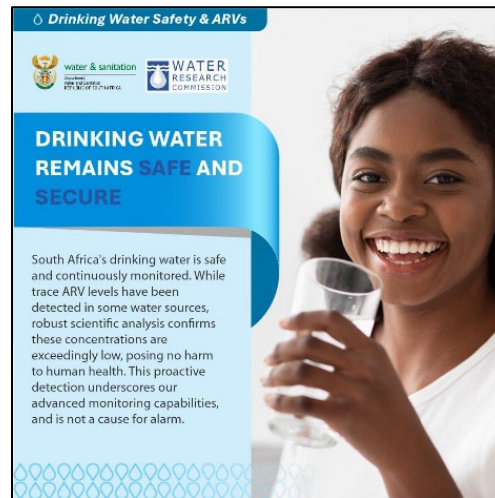
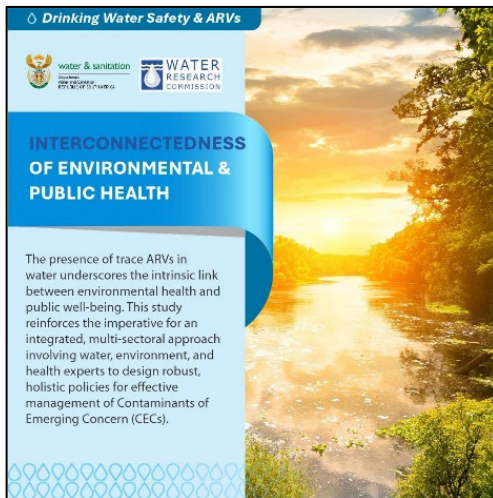
Summary of media coverage and full list of media reports:
[Market IQ - Electronic Market Intelligence](#)

Links to selected media reports:

- [Are there HIV meds in the water? Here's what the science says](#)
- <https://www.msn.com/en-za/news/other/arvs-in-the-water-department-of-health-calls-for-serious-action/ar-AA1ld8N?ocid=Peregrine>
- [How 'churnalism' fuelled misinformation about HIV medication in South Africa's water system - Bhekisisa](#)
- https://broadcastmedia7.marketiq.co.za/view/index.php?id=2000000000007950591&filename=Metro_FM_478b27fbaa6bde49c8f42c4589b45f4f.mp3&server=3
- <https://www.citizen.co.za/sedibeng-ster/news/news-news/2025/07/18/nwu-research-reveals-alarming-water-contamination/>
- <https://www.jacarandafm.com/news/news/traces-arvs-found-water-no-health-risk-say-authorities/>
- <https://www.sapeople.com/news/arvs-in-our-water-where-is-wastewater-treatment-falling-short/>
- <https://www.capetownetc.com/health/study-reveals-concerning-levels-of-antiretroviral-drugs-in-sas-water-sources/>
- https://broadcastmedia7.marketiq.co.za/view/index.php?id=2000000000007951177&filename=Power_98_7_246c9fd49e734fa1d4c96af6f8ff2739.mp3&server=3
- <https://newsnote.co.za/arvs-discovered-in-south-africas-water-raise-health-concerns-and-highlight-treatment-responsibilities/>
- <https://www.citizen.co.za/news/heres-governments-plan-for-south-africas-arv-contaminated-water/>
- https://broadcastmedia7.marketiq.co.za/view/index.php?id=2000000000007963764&filename=OFM_c022908627ff6ab7d553d4d4aecffbf2.mp3&server=3

Any other information considered relevant:

The Department of Water and Sanitation (DWS) responded to the findings of the study, using them as a springboard to raise public awareness about pharmaceutical pollution. One outcome was the creation of posters on the responsible disposal of medicines and how our daily choices affect water quality.



Summary of impact: Return on involvement

Return on Involvement (RoI) – WRC project K5/2594

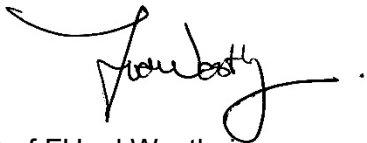
Quantification, fate, and hazard assessment of HIV-ARVs in water resources

This one-pager outlines the quantifiable impacts and return on involvement (RoI) for the North-West University (NWU) through its leadership and participation in the WRC-funded project on HIV-ARVs in water resources.

Impact area	Quantifiable outcomes
Research outputs	- 2 WRC volumes published (2020) - 1 peer-reviewed publication (2022) [IF=9.8; Q1] - Multidisciplinary research team (5 professors + postgraduates) - Strengthened NWU profile in environmental & health sciences
Capacity development	- Training & mentoring of postgraduate students (6 honours and 4 MSc graduates) - Development of next-generation researchers in water & health sciences
Policy influence	- Ministerial briefing note to DWS, DoH and DEFF - Evidence-based input to national policy awareness campaign on ARV contamination
Societal & environmental impact	- Largest national project on quantification of HIV-ARVs in water - Public health awareness on contamination pathways - Addressed risks for human & ecosystem health
Institutional & strategic impact	- Alignment with NWU APP goal 3 & SDGs (3,6,12,17) - Secured national funding (WRC K5/2594) - Strengthened NWU's science-policy relevance
Reputation & recognition	- Increased NWU visibility - Recognition of researchers as experts in emerging contaminants - Boosted global partnership opportunities

Summary: NWU delivered cutting-edge research, trained future scientists, shaped national policy, and strengthened its societal relevance—demonstrating measurable return on involvement across research, capacity, policy, and SDGs.

Signed off on behalf of the University by (Name, position and email address):



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