
Plan Overview

A Data Management Plan created using DMPonline

Title: Human Exposure to Antimicrobial resistance Through Water in Africa (Nigeria) as Related to Sanitation

Creator: Ismail Rabiu

Principal Investigator: Prof. Heike Schmitt

Data Manager: Ismail Rabiu

Project Administrator: Ismail Rabiu

Contributor: Prof. Mark C M van Loosdrecht

Affiliation: Delft University of Technology

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ORCID iD: 0000-0002-0139-1934

Project abstract:

This study titled (Human exposure to antimicrobial resistance through water in Africa (Nigeria) as related to sanitation) will comprehensively investigate the relationship between water, sanitation, and antimicrobial resistance (AMR) in Africa, focusing on Nigeria. The purpose of this research is to examine how sanitation system proximity and well depth influence groundwater contamination, to inform sanitation planning, groundwater protection, & AMR risk reduction. Poor siting of sanitation facilities can introduce AMR bacteria & genes into groundwater, yet routine water quality monitoring in Nigeria rarely assesses AMR, creating knowledge gaps. It also aims to evaluate AMR contamination in surface waters and links it to household-level exposure using WHO SaniPath & microbial source tracking. The study will identify water-use behaviors, ingestion pathways, and the sources of fecal contamination, providing critical insights to reduce AMR exposure risks. Fecal sludge (1g), and drinking water samples (500ml) will be collected, and a structured interview will be used to capture information to understand the role of sanitation system like pit latrines in groundwater contamination, and household-level exposure. This research is part of the GROW Project, which aims to recruit individuals with African backgrounds to contribute to solving Sustainable Development Goal (SDG) challenges across Africa. Households and participants will be recruited with the help of Community heads, following obtaining prior informed consent form. Preliminary research analysis for water and fecal sludge will be done in Nigeria at KIRCT (affiliated to one of my supervisor/advisory committee) and advanced analysis will be carried out in TU Delft, following obtaining Nagoya/Material transfer agreement with the Nigerian authorities. No research material will be transferred to the local institution (KIRCT or Bayero University, or RUWASSA or UNICEF Kano). Only the description of the protocol will be discussed for their inputs in shaping the research. For KIRCT, only the research protocol description will be shared to support the ethics process.

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Human Exposure to Antimicrobial resistance Through Water in Africa (Nigeria) as Related to Sanitation

0. Administrative questions

1. Provide the name of the data management support staff consulted during the preparation of this plan and the date of consultation. Please also mention if you consulted any other support staff.

Sophie Tschirpke: Data Steward at the Faculty of Applied Science. She provided valuable feedback dated, 30/04/2025.

2. Is TU Delft the lead institution for this project?

- Yes, the only institution involved

1. Data/code description and collection or re-use

3. Provide a general description of the types of data/code you will be working with, including any re-used data/code.

Type of data/code	File format(s)	How will data/code be collected/generated? <i>For re-used data/code: what are the sources and terms of use?</i>	Purpose of processing	Storage location	Who will have access to the data/code?
Bacterial Isolate Metadata	CSV excel	questionnaire for sample source and lab analysis for isolate meta data	Required to address the research question	Project drive - for secure institutional storage	My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)
Phenotypic AMR Test Results	CSV excel, 100 MB	Microbiological analysis	Required to address the research question	Cloud storage (OneDrive, TUD solutions "incl. MS products") for accessibility	My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)

Genotypic AMR Data	FASTQ, FASTA,, 5-50GB	Microbiological analysis	Required to address the research question	Cloud storage (OneDrive, TUD solutions "incl. MS products") for accessibility	My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)
Whole Genome Sequencing (WGS) Data	FASTQ, BAM, VCF, 5-200B	Sequencing and Bioinformatics analysis	Required to address the research question	Project drive My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)	My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)
Quantitative interview/survey data	CSV excel	MS Teams, or Whisper Transcription software	Required to address the research question	Project drive- for secure institutional storage	My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)
Personally Identifiable Information	Excel file	Questionnaires	For administrative purposes: obtaining consent and communicating with participants.	Project drive	My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)
Physical samples (fecal sludge, household drinking water "well & borehole water" and surface water).	Physical samples taken in the units of ml for water and gram for fecal sludge	Sampling	Required to address the research question	One drive for sampling data and KIRCT Lab Kano, Nigeria for physical samples	My supervisors: Heike Schmitt, Mark van Loosdrecht and I (Ismail Rabiou)

II. Storage and backup during the research process

4. How much data/code storage will you require during the project lifetime?

- 250 GB – 5 TB

5. Where will the data/code be stored and backed-up during the project lifetime? (Select all that apply.)

- TU Delft OneDrive
- Project Data Storage (U:) drive at TU Delft

III. Data/code documentation

6. What documentation will accompany data/code? (Select all that apply.)

- Metadata – I will adhere to the metadata standards used by the data repository where the data will be shared (see section V)
- Metadata – I will adhere to disciplinary metadata standards - please explain below which standards are used
- Procedure – Documentation of research method in an Electronic Lab Notebook
- Procedure – A description of data processing procedure(s) (such as laboratory setup, simulation workflows).
- Data – README file or other documentation explaining how data are organised
- Data – Data dictionary explaining the variables used
- Data – Codebook describing the contents, structure, layout, and variable definitions of the data
- Data – Methodology of data collection

IV. Legal and ethical requirements, code of conducts

7. Does your research involve human subjects or third-party datasets collected from human participants?

If you are working with a human subject(s), you will need to obtain the HREC approval for your research project.

- Yes – please provide details in the additional information box below

Yes, data will be collected from human subjects through structured interviews about water use, sanitation systems, and household-level exposure. Additionally, it involves collecting fecal sludge and drinking water samples linked to participant households, which are used to assess groundwater contamination and antimicrobial resistance (AMR) exposure pathways. These activities involve personal and household-level data derived from human participants.

All responses will be treated with strict confidentiality and used solely for academic and scientific purposes. Participation is voluntary, and informed consent will be obtained from all participants. Ethical considerations, including data privacy, cultural sensitivity, and non-coercion, are carefully

integrated into the questionnaire design to ensure compliance with institutional and international research ethics standards.

I intend to apply for ethical approval from the Human Research Ethics Committee.

8. Will you work with personal data? (This is information about an identified or identifiable natural person, either for research or project administration purposes.)

- Yes

9. Will you work with any other types of confidential or classified data or code as listed below? (Select all that apply and provide additional details below.)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- No, I will not work with any other types of confidential or classified data/code

Since the proposed research entails working with environmental and microbial samples within Nigeria, the Nagoya Protocol must be observed. The National Environmental Standards and Regulations Enforcement Agency (NESREA) and National Biodiversity ABS Committee (NBAC) under the Federal Ministry of Environment (FME) are key regulatory bodies.

The Nagoya Protocol on Access and Benefit-Sharing (ABS) is a supplementary agreement to the Convention on Biological Diversity (CBD). It aims to ensure fair and equitable sharing of benefits arising from the use of genetic resources and traditional knowledge. Research must comply with Nigeria's ABS regulations under the Nagoya Protocol if it involves environmental samples (e.g., water, fecal sludge), microorganisms, antibiotic-resistant genes, or local ecological knowledge, or leads to publication, or data sharing.

Things that will be done include: Material transfer agreement (MTA), Mutually agreed terms (MAT), and submission of Prior informed consent (PIC).

10. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your [Faculty Contract Manager](#) when answering this question.

The principal investigator (Heike Schmitt and Marrk van Loosdrecht) will serve as the **data controller**, overseeing access and use of all collected data. Apart from **personally identifiable documents**, which will remain confidential and protected, **all other research data will become publicly available** for transparency and scientific advancement.

As there is no collaboration document/agreement in place no research material will be transferred to the local university/research center (Bayero University kano/ KIRCT). Only the description of the protocol will be shared with the institution to support the ethics process, All data use will follow ethical standards, data protection laws, and benefit-sharing terms under the Nagoya Protocol.

11. Which personal data or data from human participants do you work with? (Select all that apply.)

- Free text fields (for instance, in questionnaires) in which participants could unintentionally share personal data
- Proof of consent (such as signed consent materials which contain name and signature)
- Telephone number, email addresses and/or other addresses as contact details for administrative purposes
- Names and/or geolocation information as part of research data
- Date of birth and/or age
- Gender
- Names as contact details for administrative purposes

12. Please list the categories of data subjects and their geographical location.

Category of Data Subjects	Description	Geographical Location
Households Residents	Residents in selected communities located near surface water in selected rural communities	Rural areas of Kano state in Nigeria
Traditional Rulers and Community Leaders	Gatekeepers and informants on cultural and sanitation practices	Rural areas Kano state in Nigeria
Environmental Protection Officials and Public Health Officers	Local or state-level stakeholders involved in waste and water management, and Professionals with insights on AMR, sanitation, and outbreak reporting	RUWASSA-Kano, Nigeria
Researchers and Academic Collaborators	Nigerian institutional collaborators providing technical input	Kano and Ibadan, Nigeria

13. Will you be receiving personal data from or transferring personal data to third parties (groups of individuals or organisations)?

- No

16. What are the legal grounds for personal data processing?

- Informed consent and other (multiple legal grounds for multiple experiments) – please see guidance and explain below

17. Please describe the informed consent procedure you will follow below.

Prior to data collection, all participants will be provided with a **detailed information sheet** explaining the purpose of the study, the types of data to be collected (including any personal data), potential risks and benefits, confidentiality measures, and their rights as participants.

The consent process will follow these steps:

1. **Verbal and Written Explanation** : The study will be explained to participants in Hausa language for local communities ensuring comprehension regardless of education level.
2. **Voluntary Participation**: Participants will be informed that their involvement is entirely voluntary, and they may refuse or withdraw at any point without penalty.
3. **Documentation of Consent** : Literate participants will sign a **written consent form** . For those that cannot read, a **verbal consent** will be recorded in the presence of a witness who will sign on their behalf.
4. **Confidentiality Assurance**: Participants will be assured that their personal information will be anonymized and securely stored. No identifiable data will be made public.
5. **Right to Withdraw**: It will be emphasized that participants can withdraw their data before or during analysis without needing to give a reason.

18. Where will you store the physical/digital signed consent forms or other types of proof of consent (such as recording of verbal consent)?

TU Delft Project Data Storage (U:) drive.

19. Does the processing of the personal data result in a high risk to the data subjects? (Select all that apply.)

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data in your research project.

If any category applies, please provide additional information in the box below. Likewise, if you collect other type of potentially sensitive data, or if you have any additional comments, include these in the box below.

If one or more options listed below apply, your project might need a DPIA. Please get in touch with the Privacy team (privacy-tud@tudelft.nl) to get advice as to whether DPIA is necessary.

- None of the above apply

None

23. What will happen with the personal data used in the research after the end of the research project?

- Anonymised or aggregated data will be shared with others

After the conclusion of the research project, **all personal data will be securely anonymised or aggregated** to remove any direct identifiers. The anonymised data may then be **shared with research collaborators, policy stakeholders, or deposited in open-access repositories** for transparency and future research use.

24. For how long will personal research data (including pseudonymised data) be stored?

- Personal data will be deleted at the end of the research project

Personally identifiable data will be **securely deleted or archived** in accordance with data protection policies and ethical guidelines.

25. How will your study participants be asked for their consent for data sharing?

- In the informed consent form: participants are informed that their personal data will be anonymised and that the anonymised dataset is shared publicly

Participants will be asked for their consent through the **informed consent form**, which will explicitly state that:

- Their **personal data will be anonymised** to remove any identifying information.
- The resulting **anonymised dataset may be shared publicly** (e.g., in academic publications, repositories, or with policy stakeholders).
- Participation is voluntary, and they can **opt out of data sharing** if they choose.

V. Data sharing and long term preservation

27. Apart from personal data mentioned in question 23, will any other data be publicly shared?

Please provide a list of data/code you are going to share under 'Additional Information'.

- All other non-personal data/code underlying published articles/reports/theses

Yes. **All other non-personal data**, including **research findings, environmental data, survey results (in anonymised form), and code or scripts** used for analysis and visualisation, will be publicly shared. These will be made available through **published articles, research reports, and academic theses**, and may also be deposited in open-access repositories in line with open science principles.

**29. How will you share research data/code, including those mentioned in question 23?
*Select all that apply and provide additional details below.***

- All anonymised or aggregated data, and/or all other non-personal data/code will be uploaded to 4TU.ResearchData with public access

30. How much of your data/code will be shared in a research data repository?

- 100 GB - 1 TB

31. When will the data/code be shared?

- As soon as corresponding results (papers, theses, reports) are published

32. Under what licence(s) will the data/code be released?

- CC BY

VI. Data management responsibilities and resources

33. If you leave TU Delft (or are unavailable), who is going to be responsible for the data/code resulting from this project?

My Supervisor, Pro. Heike Schmitt, Principal investigator, EBT, TU Delft.
Email: h.schmitt@tudelft.nl

34. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

The 4TU. ResearchData is able to archive 1TB of data/code per researcher per year free of charge for all TU Delft researchers. We do not expect to exceed this and therefore there are no additional costs of long term preservation.

35. Which faculty do you belong to?

- Faculty of Applied Sciences (AS)

Faculty of Applied Science, Department of Biotechnology, Environmental biotechnology (EBT) research group.