Plan Overview

A Data Management Plan created using DMPonline

Title: Human exposure to antimicrobial resistance through water in Africa (Nigeria) as related to sanitation

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Template: TU Delft Data Management Plan template (2025)

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 and West Africa. The research will address four interconnected chapters: *1. State of AMR in relation to water in Africa (systematic review); 2. Impact of Human Activities and related sanitation practices on Water Pollution and the spread of AMR in Northwest Nigeria; 3. Septic System Proximity to Drinking Water; & 4. Effectiveness of Interventions and Sensitization on sanitation and AMR. Goal:* This research aims to provide a holistic understanding of the links between water, sanitation, and AMR, offering evidence-based recommendations for improving public health and water management policies in Africa.

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as they would like in their own plans, and customise it as necessary. You do not need to credit the creator(s) as the source of the language used, but using any of the plan's text does not imply that the creator(s) endorse, or have any relationship to, your project or proposal

Human exposure to antimicrobial resistance through water in Africa (Nigeria) as related to sanitation

0. Adminstrative 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

I. 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?** *For re-used data/code: what are the sources and terms of use?*	**Purpose of processing**	**Storage location**	**Who will have access to the data/code?**
Bacterial Isolate Metadata	CSV excel		Required to address the research question	TU Delft Research Drive for secure institutional storage	The Research team (Ismail Rabiu, Heike Schmitt, Mark van Loosdrecht)
Phenotypic AMR Test Results	CSV excel, 100 MB		Required to address the research question	Cloud storage (OneDrive, TUD solutions "incl. MS products") for accessibility	The Research team
Genotypic AMR Data	FASTQ, FASTA,, 5-50GB		Required to address the research question	External hard drives (1TB SSD) for offline backup of large files	The Research team
Whole Genome Sequencing (WGS) Data	FASTQ, BAM, VCF, 5-200B		Required to address the research question	External hard drives (1TB SSD) for offline backup of large files	The Research team
Quantitative interview/survey data		MS Teams, or Whisper Transcription software	Required to address the research question	TU Delft Research Drive for secure institutional storage	My supervisor and I
Personally Identifiable Information			For administrative purposes: obtaining consent and communicating with participants.	External hard drives (1TB SSD) for offline backup of large files	My supervisor and I
Physical samples (waste water, stool and urine).	N/A		Required to address the research question		The Research team

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.)

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

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

Bodily materials/faeces. Urine and a questionnaire will be collected. This is part of a research study focused on understanding AMR patterns, drivers, and public awareness. It aims to collect data from farmers, households, professionals, and the general public on the use of antibiotics, as well as knowledge about AMR and factors that might promote AMR spread. The information gathered will

support efforts to develop more effective AMR containment strategies and public health interventions.

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, but have not yet done so.

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

The questionnaire will involve personal information such as names, address and phone numbers.

Data Protection and GDPR Compliance:

This research questionnaire complies with the General Data Protection Regulation (GDPR). All data collected will be processed lawfully, fairly, and transparently, and will be used solely for academic research purposes. No personally identifiable information will be collected without explicit consent. All responses will be anonymized, securely stored, and only accessible to the research team. Participants have the right to withdraw their data at any time without penalty. By completing this questionnaire, you acknowledge that you understand and agree to these terms.

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., soil, water, wastewater), microorganisms, antibiotic-resistant genes, or local ecological knowledge, or leads to publication, or data sharing.

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 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.

Access to the data may be granted to:

- **Nigerian partner institutions** involved in the study
- **Collaborating with supervisors or research advisors**
- **Relevant government agencies** (e.g., the Ministry of Environment or Health) upon request
- **Open-access repositories** post-analysis (with de-identified data only)

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

General Data Protection Regulation (GDPR) Compliance will strictly be observed.

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

Category of Data Subjects	Description	Geographical Location
General Public	Residents in selected communities where open defecation and waste pollution occur	Rural and peri-urban areas of Kano, Kaduna, and Jigawa States
Traditional Rulers and Community Leaders	Gatekeepers and informants on cultural and sanitation practices	Local government areas in Kano, Kaduna, and Jigawa
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	State Environmental Protection Agencies (e.g., KASEPA, KEPA, JISEPA)
Researchers and Academic Collaborators	Nigerian institutional collaborators providing technical input	Universities, research centres and Agency within 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

The primary legal ground for processing personal data in this research is **informed consent, following the GDPR Guidelines**. All participants will be fully informed of the study's purpose, the nature of the data to be collected, their rights, and how their data will be used, stored, and protected. Consent will be obtained **voluntarily**, in writing (or verbally where literacy is a barrier), and participants will have the right to withdraw at any stage without consequence.

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 research team will explain the study to participants in clear language (including Hausa for local communities where needed), 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.