# Plan Overview

*A Data Management Plan created using DMPonline*

**Title:** Occupational Health and Environmental Risks associated with faecal sludge management in humanitarian settings: A case of Imvepi refugee settlement, Uganda and Cox's Bazar refugee camp in Bangladesh

**Creator:**Aisha Nalugya

**Principal Investigator:** Aisha Nalugya

**Affiliation:** Delft University of Technology

**Template:** TU Delft Data Management Plan template (2025)

**Project abstract:**

**Introduction:** Faecal sludge management (FSM) in humanitarian settings remains a significant public and environmental health challenge, particularly in refugee camps and settlements where non-sewered onsite sanitation systems are predominantly used. Inadequate containment, unsafe emptying and transportation, and poorly functioning treatment plants expose sanitation workers and the community to hazards and contribute to environmental degradation. Despite efforts to improve FSM, limited attention has been paid to the health and environmental risks associated with faecal sludge management in refugee contexts.

**Objectives:** This study aims to: (1) assess occupational health risks among sanitation workers across the sanitation value chain using the sanitation safety planning approach; (2) To assess the contribution of individual FSTP units to the reduction of health and environmental risks by analyzing their pollutant removal performance and comparing it across seasons; (3) evaluate the environmental risks associated with discharges from FSTPs using an Environmental Risk Assessment (ERA) framework; and (4) examine the appropriateness and effectiveness of the SSP and ERA frameworks in identifying, assessing, and managing sanitation-related risks in humanitarian contexts.

**Methods:** A sequential exploratory mixed-methods design will be employed in Imvepi refugee settlement (Uganda) and Cox's Bazar refugee camp (Bangladesh). The study will apply the SSP tool to identify, assess, and manage risks across the SVC. The study will describe the sanitations system; perform structured observations, photovoice and key informant interviews to identify hazards and hazardous events and exposure pathways across the SVC; and semi-quantitative risk assessment (SQRA) and quantitative microbial risk assessment (QMRA) to ascertain occupational risk. A mass balance approach will be used to ascertain the contribution of individual FSTP units to the reduction of health and environmental risks and examine the overall treatment efficiency of the 5 selected FSTPs during wet and dry seasons. The study will apply both the Risk Quotient (RQ) and Synthetical Risk Factor (SRF) frameworks to determine ecological risks posed by physicochemical pollutants and heavy metals in effluent and sludge samples. A Delphi study involving sanitation practitioners will be conducted to evaluate the appropriateness of the SSP and ERA frameworks for humanitarian contexts. Findings from qualitative and quantitative methods will be analyzed independently, then integrated through comparison to identify convergence, complementarity, or divergence across objectives.

**Expected outcomes:** The study will generate evidence on occupational and environmental risks associated with FSM in refugee contexts, treatment performance during wet and dry

seasons, and the applicability of risk-based planning tools. The outcomes of this study will feed into the overall aim of the RISK-WASH project, which is to improve WASH decision-making and provisions in humanitarian settings by collaboratively developing a health-risk impact framework.

**ID:** 181555

**Start date:** 16-05-2025

**End date:** 15-05-2029

**Last modified:** 04-11-2025

**Grant number / URL:** DUPC3 (2021-2027)

**Copyright information:**

# Occupational Health and Environmental Risks associated with faecal sludge management in humanitarian settings: A case of Imvepi refugee settlement, Uganda and Cox’s Bazar refugee camp in Bangladesh

## 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.**

Question not answered.

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

- No – please provide details of the lead institution below and TU Delft's role in the project

IHE Delft Institue for Water Education is the lead institution for the project. TU Delft participates as a partner through academic staff involved in supervision of PhD students, methodological development, and participatory research components. TU Delft’s contribution is mainly linked to tool adaptation, data analysis, and co-supervision of PhD research. TU Delft therefore only manage and store the data and code that they directly generate or process during these activities, in line with TU Delft policies.

## 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?** |
|---|---|---|---|---|---|
| Quantitative survey data | .csv | Collected using structured questionnaires via KoboToolbox, exported to Excel/CSV | To assess exposure, frequency, and risk perceptions along the sanitation value chain | RISK-WASH project data repository | Access restricted to authorised project members |
| Laboratory data | .csv | Re-used from partner labs in Uganda and Bangladesh under MoUs and data-sharing agreements | To quantify pathogen concentrations for QMRA | RISK-WASH project data repository | Access restricted to authorised RISK-WASH project members |
| Qualitative data (audios and transcripts) | .docx<br>.pdf<br>.mp3 | Collected through audio recordings, transcribed and anonymized | To understand the exposure risks and facilitators and barriers to treatment efficiency | RISK-WASH project data repository | Access restricted to authorised RISK-WASH project members |
| Photos | .jpeg,<br>.png,<br>.docx | Generated through photovoice activities | To visually document worker activities and risk behaviors | RISK-WASH project data repository | Access restricted to the PI, and 2 supervisors |
| Informed consent forms | PDF | Informed consent forms signed physicall | To obtain and document informed consent. | RISK-WASH project data repository | Access restricted to authorised RISK-WASH project members |

## II. Storage and backup during the research process

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

- < 250 GB

### 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
- SURFdrive

The RISK-WASH consortium has an existing SURFdrive project folder, which will be used only for

sharing anonymised datasets, protocols, training materials, and tools across partners.
All identifiable data (e.g., audio recordings, consent forms, and raw transcripts) will be stored exclusively on the TU Delft Project Data Storage (U: drive). TU Delft OneDrive will only be used for internal working files and non-sensitive drafts

## III. Data/code documentation

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

- Procedure – A description of data processing procedure(s) (such as laboratory setup, simulation workflows).
- 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

The study will collect primary data from sanitation workers, faecal sludge treatment plant (FSTP) operators, and other stakeholders in humanitarian settings (Imvepi Refugee Settlement in Uganda and Cox’s Bazar in Bangladesh). Data will be collected through interviews, focus group discussions, photovoice, and structured observations. Participants will provide informed consent, and ethical approval will be obtained from the relevant Institutional Review Boards (IRBs) in both Uganda and Bangladesh, as well as from TU Delft’s Human Research Ethics Committee (HREC). I have not yet applied for ethical approval but intend to do 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 research will collect information from identified or potentially identifiable individuals through interviews, surveys, and participatory methods. This includes data such as occupation, work location, photographs, and qualitative narratives that may reveal personal or sensitive information. All data will be anonymized or pseudonymized before analysis. Personal identifiers will be removed or coded to

protect participant confidentiality, and all data will be stored securely in encrypted and access-controlled systems, in compliance with GDPR and institutional data protection policies.

**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

**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 ownership of data and intellectual property rights is governed by the RISK-WASH consortium agreement between IHE Delft (lead institution), TU Delft, Makerere University School of Public Health, icddr,b, BRAC, TREND, URCS, NLRC, UNC, and the advisory partners. IHE Delft is the overall data controller for the project. TU Delft is responsible only for the data it directly collects or generates within its assigned work packages (WP1, WP2, WP3).

Intellectual property rights (IPR) arising from TU Delft's contributions follow TU Delft's Research Data Framework Policy and the terms of the consortium agreement, which allocate ownership based on data origin. TU Delft retains ownership of data and code generated by TU Delft researchers, while jointly produced data are subject to shared ownership as outlined in the agreement. No commercial exploitation is anticipated.

Access to project data will follow the access conditions described in the consortium agreement. During the project, access is restricted to authorised consortium partners and governed by the RISK-WASH data-sharing structure (U:drive, SURFdrive, and institutional storages). After the project, anonymised or derived datasets may be shared under agreed licences, while identifiable or sensitive data will remain restricted. No third-party data may be reused outside the scope permitted in the agreement.

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

- Audio recordings
- Proof of consent (such as signed consent materials which contain name and signature)
- Photographs
- Job title and/or employer
- Gender
- Names and/or geolocation information as part of research data
- Names as contact details for administrative purposes

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

**Categories of data subjects**

- Sanitation workers (e.g., emptiers, transporters, treatment plant workers)
- Health and WASH officers (e.g., from NGOs like BRAC, Uganda redcross society)
- Camp and plant managers
- Humanitarian practitioners globally

**Geographical locations:**

- Imvepi Refugee Settlement, Terego District, Uganda
- Cox’s Bazar Refugee Camp, Bangladesh

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

- No

Personal data will be collected from participants (e.g., consent forms, photographs, and audio recordings). However, this data will only be shared with project partners within the consortium (IHE Delft, Makerere University, icddr,b, BRAC, TREND, URCS, NLRC, UNC) and will be handled in compliance with data protection laws (e.g., GDPR) and TU Delft’s data protection policies.

**No personal data will be transferred to external third parties outside the consortium without explicit consent from participants.**

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

- Informed consent

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

The informed consent process will be conducted prior to any data collection to ensure that participants fully understand the purpose, procedures, risks, and benefits of the study. The investigator or trained assistant will provide an explanation in clear and simple language, using local translation where necessary, and participants will have the opportunity to ask questions before making a decision. Written consent will be obtained from literate participants by signing the consent form, while non-literate participants will provide a thumbprint in the presence of a neutral witness.

Participants will be reminded that their participation is entirely voluntary, that they may withdraw at any time without penalty, and that they may choose which activities to consent to (e.g., interviews, photographs, recordings). Confidentiality will be assured through anonymisation of data, secure storage of records, and avoidance of any identifying features in photographs or reports unless participants explicitly agree otherwise. Each participant will receive a copy of the signed consent form, and ongoing written confirmation of consent will be sought at the start of different study activities. For online Delphi participants (online survey), consent will be obtained electronically through a tick-box

confirmation after reviewing the information sheet.

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

All signed physical consent forms will be stored in a locked cabinet at the field research office in Uganda with access restricted to the principal investigator and designated research assistants. Digital copies and electronic records of consent (including scanned forms and online tick-box confirmations for the Delphi study) will be stored on a password-protected computer and backed up on an encrypted, access-controlled RISK-WASH project server.  Identifiable information will be kept separately from anonymised study data, and all records will be retained only for the duration required by institutional and ethical guidelines, after which they will be securely destroyed.

**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

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

- Other – please explain below

At the end of the research project, all personal data will be handled in accordance with institutional and ethical guidelines. Identifiable information (such as signed consent forms or contact details) will be stored securely and separately from anonymised study data and will not be shared outside the research team. Research data used for analysis and reporting will be anonymised to ensure that no individual can be identified. Photos will only be used in reports, presentations, or publications with explicit consent. Any images containing identifiable features (faces, names, locations) will either be anonymised (e.g., blurred) or excluded if participants request. Personal data will be retained only for the minimum period required by institutional and funder policies (e.g., up to 10 years after publication) and will then be securely destroyed through shredding of physical records and permanent deletion of digital files. Anonymised datasets may be archived for future academic use, but without

any personal identifiers.

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

- 10 years, in accordance with the TU Delft Research Data Framework Policy

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

- In the informed consent form: participants are asked to give their explicit consent for sharing their (pseudonymised) personal data with restricted access with specific recipients for specific purpose(s)

## 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 produced in the project

Yes, research data will be shared, but only in a form that respects ethical obligations and participant confidentiality. All anonymised or aggregated data, and/or all other non-personal data/code will be uploaded to 4TU.ResearchData with public access and the IHE Water Institute for Water Education Delft Data Repository

However, due to the sensitive nature of some qualitative materials such as interview transcripts, photovoice images, and audio recordings that may contain identifiable information, not all raw data can be made openly available. In such cases, metadata describing the existence of these datasets will be published in the repository, together with a data availability statement in related publications. This statement will explain what data exist, why access is restricted, and under what conditions (e.g., controlled access upon request and ethical approval) qualified researchers may be allowed to use them. In this way, the project will comply with both FAIR data principles and ethical standards regarding privacy and participant protection.

**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

**31. When will the data/code be shared?**

- At the end of the research project

**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 Prof.Dr. Damir Brdanovic, department of Environmental Biotechnology (D.Brdanovic@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)?**

Resources for data management have been included in the project budget and work plan. Financial resources will cover secure data storage solutions (including encrypted cloud storage), transcription and translation services, and software licenses for qualitative and quantitative data management (e.g., ATLAS.ti, Stata, Excel). Time has been allocated within the project schedule for proper documentation, coding, anonymisation, and preparation of metadata to ensure compliance with FAIR principles. Data will be systematically organised with clear file naming conventions and metadata standards to make them *Findable* and *Interoperable*. Access will be controlled and granted only to authorised team members during the project, while anonymised datasets will be archived in institutional repositories to make them *Accessible* and *Re-usable* for future academic purposes.

**35. Which faculty do you belong to?**

- Faculty of Applied Sciences (AS)