Sanitation scoping study: Outcomes of white literature analysis and selected highlights

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Aim and objectives of the sanitation scoping study

Protocol priority 2017-2019 & 2020-2022: Policy attention and technical efforts focus on sanitation

Aim:
- To inventory:
  - Types of sanitation facilities, collection and treatment systems used
  - What is known about (untreated) wastewater and its fate in the environment
  - In which circumstances in the region does wastewater reuse play a role and how
- To support the identification of gaps and priorities

Objectives:
- Exploration and mapping of the sanitation situation and its health impacts and environmental consequences, identifying and cluster challenges in sanitation management, for the pan-European region

Through:
- White literature review for pan-European Region - this presentation
- Grey literature review with a focus on 16 countries in the region
Method

- Peer-reviewed scientific literature review
- EMBASE database keyword search in July 2018 of publications 2007-2018
- Articles in English, screened by Title, Abstract, Methods section
- Predetermined inclusion/exclusion criteria:
  - Contamination linked to sanitation practices AND
  - In the pan-European region AND
  - Mentioned human health risk and/or environmental impact/risk
- Scientific literature text mining and validation by Pattern Matching in R [https://www.r-project.org/](https://www.r-project.org/)
- Descriptive analysis
Key word search

- Sanitation: broad terms
- Contamination: microbial and chemical
- Geographical selection criteria
- Refinement: Pathogens and specific chemicals (S&H Guidelines, Drinking water guidelines, Expert knowledge)

Sanitation:
Sanitation* OR sewage* OR sludge*
OR ‘water contamination’

Contamination:
‘water contamination’ OR ‘microbial contamination’ OR ‘wastewater treatment’ OR ‘effluent’ OR ‘water supply’ OR ‘water management’ OR ‘environmental sanitation’ OR ‘environmental monitoring’ OR ‘pollution monitoring’ OR ‘river basin’ OR ‘risk assessment’ OR ‘organic pollution’ OR ‘water pollution’ OR ‘river’ combined with latrine OR microbial* OR faecal* OR faecal* OR micropollutant* OR ‘water supply’ OR ‘future challenges’ OR monitoring* OR ‘organic contaminants’ OR wastewater* OR contamination* OR sewage* OR effluent* OR septic* OR sludge* OR (fate AND soil) OR ‘environmental risk assessment’

Country selection:
Ukraine OR Tajikistan OR Spain OR Serbia OR Slovakia OR Romania OR Netherlands OR Moldova OR Kyrgyzstan OR Italy OR Lithuania OR Georgia OR France OR Finland OR Malta OR Cyprus OR Bosnia and Herzegovina NOT ‘South and central America’ NOT ‘North America’ NOT ‘Australia and New Zealand’ NOT ‘Africa’

Pathogen selection (amongst others):
vibrio cholerae’ OR ‘salmonella’ OR ‘helicobacter pylori’ OR ‘enteroinvasive escherichia coli’ OR ‘campylobacter’ OR ‘enterovirus’ OR ‘hepatitis A virus’ OR ‘giardia’ OR ‘helminth’ OR ‘cryptosporidium’ OR ‘rotavirus’ OR ‘norovirus’ etc.
Inclusion/exclusion criteria (manual and matching)

Citation inspection

Is the study (partly) in the Pan-European region?
- NO
  - Exclude: Not in PER
- YES
  - Is sanitation mentioned as a source of contamination?
    - NO
      - Exclude: No source
    - YES
      - Are either health risks or environmental risks mentioned?
        - NO
          - Exclude: No risks
        - YES/UNCLEAR
          - Include
Results: 334 papers selected

Sanitation
Sanitation, sewage, sludge, water contamination

Contamination
e.g. microbial contamination, effluent, environmental monitoring, environmental risk assessment

Pathogen and chemical selection
e.g. vibrio cholerae, enterovirus, giardia, cryptosporidium, rotavirus, Escherichia coli, pharmaceuticals, micropollutants

Total of 1591 articles
Manual selection led to 334 articles
Validation: pattern matching in R
More papers on chemical than pathogen contaminants

- 49% on chemical; 24% on microbiological
- Most studies on environmental impact
- Less than 3% on outbreaks or AMR attributable to sanitation
- Understudied/underpublished, but reported in grey literature

Recommendations:
- Build capacity for monitoring and surveillance of microbial water-quality and AMR
- Advocate for implementation of surveillance of water-related infectious diseases and AMR
- Raise awareness to not overlook environmental aspects in outbreak investigation and surveillance
Publications found mostly from western and southern Europe*

- Most studies from Spain, Italy, Germany, and Finland
- Studies in these areas of work get higher priority than in other countries
- For other sub-regions, information is found in the grey literature including media reports
- No general consensus on what comprises tertiary and advanced treatment

Recommendations:
- Combine knowledge from different data sources to inform sanitation priorities
- Lessons learned from western and southern European studies could inform other location-specific situations

*Subregions according to Classification by UN Statistics Division
Re-use of wastewater covered in 2% of publications

Discussion: The grey literature and Amoah et al. (2018) suggest widespread re-use of (treated) wastewater. This could not be found in the selection of peer-reviewed studies under this white-literature search.

Recommendation:
Guidance tools on safe reuse of water exist: promote their use

• Potable reuse: Guidance for producing safe drinking water (WHO, 2017)
• WHO Guidelines for the safe use of wastewater, excreta and grey water (WHO 2006)
On-site sanitation widely used but links to its risks are sparsely published

Discussion:

Although 20% of the population in the region uses on-site sanitation according to the WHO/UNICEF Joint Monitoring Programme (JMP), links to human health risks and environmental impact were sparsely published (5% of all articles).

Recommendation:

• Raise awareness on possible health hazards from on-site sanitation
• Enhance the uptake of Sanitation Safety Planning and Water Safety Planning throughout the region, that will help controlling and maintaining the quality and quantity both of use and re-use of water.
Thank you for your attention