論文 / 著書情報
Article / Book Information

題目(和文)	
Title(English)	Human Health Risk Assessment of Heavy Metals in Groundwater of Erdenet City, Mongolia
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出典(和文)	学位:博士(工学), 学位授与機関:東京工業大学, 報告番号:甲第12890号, 授与年月日:2024年9月20日, 学位の種別:課程博士, 審査員:村山 武彦,木内 豪,高橋 史武,江頭 竜一,錦澤 滋雄,青柳 みどり
Citation(English)	Degree:Doctor (Engineering), Conferring organization: Tokyo Institute of Technology, Report number:甲第12890号, Conferred date:2024/9/20, Degree Type:Course doctor, Examiner:,,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	要約
Type(English)	Outline

（博士課程）

Doctoral Program

THESIS OUTLINE

系・コース： Department of, Graduate major in	Transdisciplinary Science and Engineering GEDES	系 コース	
申請学位（専攻分野）： Academic Degree Requested	博士 Doctor of	（Engineering）	
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Title: Human Health Risk Assessment of Heavy Metals in Groundwater of Erdenet City, Mongolia

1.1 Research objective

The overall objective of this research is to investigate the concentration of heavy metals in groundwater of Erdenet city and assess the associated risks to human health. To fulfill research aim, the following research objectives are proposed:

1. Determine concentration and spatial distribution of heavy metals
2. Assess the potential risks posed by heavy metal contamination in groundwater to human health

1.2 Thesis structure

This thesis is divided into 5 chapters.
Chapter 1 introduces the study area and outlines the specific research objectives.

Chapter 2 presents the methodology, including field sampling, laboratory analysis, and risk assessment techniques, and provides a comprehensive review of the existing literature on heavy metal contamination in groundwater and the importance of groundwater quality assessment.

Chapter 3 analyzes the the differences between groundwater types, and the spatial distribution of heavy metal concentrations, such as lead, arsenic, manganese, chromium, copper, iron, and zinc. The results indicate that the levels of lead and arsenic frequently exceed the World Health Organization's (WHO) drinking water guidelines, posing significant health risks to the local population.

Chapter 4 evaluates the non-carcinogenic and carcinogenic health risks associated with heavy metal contamination, considering both adults.

Chapter 5 summarizes the key findings, presents the conclusions and recommends strategies for mitigating the health risks posed by heavy metal contamination in the study area.

1.3 Research problem

The key research problems are categorized and collectively emphasize the uniqueness and significance of this work.

Importance:

- Locates close to mine and
- Second biggest city of Mongolia
- Groundwater is a source of drinking water

Incompleteness:

- Human health risk from groundwater is less studied subject in the research area
- Insufficient monitoring

Demand:

- Water quality indices
- Health risk assessment

1.4 Research framework

This research was conducted according to the following research framework and steps.

1. Introduction

- **Background:** Begin by establishing the global significance of heavy metal contamination in groundwater due to mining activities. Highlight the adverse health effects associated with heavy metal exposure.
- **Research Gap:** Identify a specific gap in the existing literature that my research aims to address. For example, is there a lack of research on a particular geographical region, heavy metal, or health outcome?
- **Research Questions:** Clearly state the main questions guiding my research. For instance:
    - What are the concentrations of specific heavy metals in groundwater in Erdenet city, Mongolia?
    - What are the potential human health risks associated with these levels of contamination?
    - How to reduce this possible human health risk in this area to protect residents' health?
- **Significance:** Explain the broader implications of my research for protecting water resources and public health.

2. Literature Review

- **Heavy Metal Contamination and Mining:** Provide a comprehensive overview of the sources, pathways, and fate of heavy metals released from mining operations.

- **Health Effects of Heavy Metals:** Discuss the toxicological profile of the specific heavy metals relevant to my study, focusing on their impacts on human health.
- **Groundwater Contamination and Health Risk Assessment:** Review existing methods for assessing health risks associated with heavy metal contamination in groundwater.
- **Case Studies:** Analyze previous studies on similar topics, particularly those focusing on mining-related groundwater contamination and health risks in different geographical contexts.

3. Methodology

- **Study Area:** Provide a detailed description of my chosen study area, including its geological setting, mining history, and population characteristics.
- **Sampling and Analysis:** Describe my sampling strategy for collecting groundwater samples and the analytical techniques used to measure heavy metal concentrations and questionnaire survey.
- **Data Analysis:** Explain the statistical methods employed to analyze the data, such as spatial analysis, correlation analysis, and health risk assessment models.

4. Results

- **Heavy Metal Concentrations:** Present the findings on heavy metal concentrations in groundwater, using tables, graphs, and maps to illustrate spatial and temporal patterns.
- **Health Risk Assessment:** Quantify the potential health risks associated with the observed heavy metal levels, considering different exposure scenarios and vulnerable populations.

5. Discussion

- **Interpretation of Findings:** Discuss the implications of my results in the context of existing knowledge on heavy metal contamination and health risks.
- **Comparison with Other Studies:** Compare my findings with those from similar studies conducted in other regions.
- **Limitations:** Acknowledge any limitations of my study, such as sample size or data availability.

6. Conclusion

- **Summary of Key Findings:** Concisely summarize the major findings of your research.
- **Recommendations:** Provide specific recommendations for policymakers, health officials, or mining companies based on my findings.
- **Future Research:** Suggest avenues for future research to address remaining questions or expand upon your findings.