

Food Safety Analysis Based on Halal Food with The Use of Water as a Food Need in Indonesia

Abdillah Akmal Karami, Sarita Oktorina*

Environmental Engineering Department, Islamic State University of Sunan Ampel, Surabaya, Indonesia

**sarita@uinsa.ac.id*

Keywords: Drinking Water, Food Need, Food Safety, Water.

Abstract: Halal food security in Indonesia is a complex issue viewed from a religious perspective, especially in water processing. This article examines the public's understanding of the water treatment process, whether halal or non-halal. This research also examines the risks from the views of people with this understanding. The method used uses a literature study consisting of several pieces of literature that are reviewed and analyzed descriptively to understand the existing problems properly. The results of this research answered this understanding with an analysis of environmental, technical, social, financial, security, and institutional risks, as well as a comparison with regulations and hadith. The water treatment process carried out by water management institutions follows the rules and is considered to duplicate natural processes, namely the water cycle. This perspective is also supported by several regulations in Indonesia, which indicate that food safety, especially water, can be adequately implemented. This study shows that there is always involvement between officeholders, service providers, and the community in maintaining the safety of water sources.

1 INTRODUCTION

Food safety in the context of halal food in Indonesia is a complex issue involving religious beliefs. As the country with the largest Muslim population, Indonesia is experiencing increasing demand for halal products, which has strongly emphasized halal certification to ensure compliance with Islamic food laws (Anggarkasih and Resma, 2022). This focus on halal certification is essential to meet domestic demand and expand export opportunities, especially to Organization of Islamic Cooperation countries that mandate halal guarantees for imported goods (Anggarkasih and Resma, 2022). The importance of halal certification is increasingly highlighted by the close relationship between halal and haram food choices and the sense of comfort and security it provides to Muslim consumers in Indonesia (Mutmainah et al., 2022). Water is vital in ensuring food safety and security and is essential in food production. Reviewing water resource management policies, especially those related to irrigation for sustainable agriculture, is very important to support food security efforts in Indonesia (Pambudi, 2021). Additionally, ensuring the authenticity of food

products, including consideration of halal compliance, is critical to upholding consumer trust and confidence, particularly in Muslim communities (Guntarti et al., 2020). Aspects such as food safety, halal certification, and compliance with quality standards such as the Indonesian National Standard (SNI) label significantly influence consumers' food purchasing decisions (Catur Nugroho et al., 2023).

Water treatment in Indonesia involves various aspects, such as reusing water and community habits regarding water treatment. Conventional water treatment plants (IPA) in Indonesia generally apply coagulation processes (Salsabila et al., 2023), flocculation (Barakwan et al., 2019), membrane bioreactors, reverse osmosis, and filtration (Yudhantoro et al., 2020) to treat surface water. Turbid and produces clean and safe water. In addition, community habits such as boiling drinking water often occur in urban areas such as Kampung Salo District in Kendari, Indonesia, driven by concerns about microbiological contaminants in drinking water (Prasetya et al., 2019). This means that

people's perceptions of river water quality and related risks significantly shape their behavior toward water management (Tarannum et al., 2018). Concerns regarding pollution originating from municipal and industrial waste disposal and water runoff from indirect sources such as agricultural land have raised significant concerns among the public (Ray, 2011).

Studies on halal products show that religiosity and adherence to halal principles have a significant effect on consumer attitudes and behavior (Sudarsono et al., 2024). Perceptions of halal certification and haram (forbidden) ingredients in products can influence consumer decisions, reflecting the importance of religious beliefs in product choices (Ahmad, 2022). Individuals prioritizing halal practices may also be more concerned about water sources (Loussaief et al., 2024). Suppose someone considers river water treatment inconsistent with halal principles due to contamination, pollution, or other factors. In that case, their attitude towards the use of that water may be influenced by religious considerations. The presence of impurities or substances considered haram in water processing can cause reluctance to use river water for various purposes (Hussain et al., 2024).

For this reason, it is essential to carry out literature research to analyze the subjectivity of people's views on water use for daily purposes. However, they still need to decide whether what they do is halal or non-halal. This aims to provide an understanding of a new perspective in facing the challenges of food security in Indonesia, especially in using water for daily life (Pusparani, 2021). Therefore, the convergence of halal food, water requirements in food production, and food safety in Indonesia underscores the balance between religious principles and regulations. By addressing these interconnected aspects, Indonesia can further strengthen its position as a global leader in the halal food industry while maintaining the security and integrity of its food supply chain, especially in water processing.

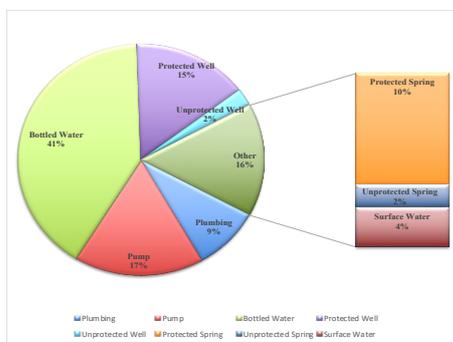


Figure 1: Percentage Distribution of Households According to Drinking Water

2 METHODS

The library research method, also known as literature study or literature review, is a systematic approach to reviewing and synthesizing existing knowledge, theories, and findings regarding a particular topic or research question. This method involves reviewing and analyzing various academic sources, including books, journal articles, conference papers, reports, theories, laws, postulates, principles, or ideas to understand the subject matter comprehensively. The nature of library research methods is characterized by its emphasis on critical evaluation and synthesis of existing literature to identify trends, gaps, and inconsistencies in the current body of knowledge. This research uses descriptive analysis, namely the regular breakdown of the data obtained, and then understanding and explanation are provided so the reader can understand it well (Wakimoto, 2013)

3 RESULTS

Drinking Water in Indonesia

Figure 1 shows that as many as 41% of households in Indonesia use bottled water to meet their drinking water needs. This figure is higher than other drinking water sources such as pumps, pipes, springs, wells, and surface water. Half of households in Indonesia still use natural sources without processing. This includes 33% of the original groundwater and 26% using the help of piped equipment. Figure 1 is also related to Figure 2. Indonesia has adequate drinking water sources based on household usage, namely 91.72% in 2023. This figure has continued to rise since 2021, which aligns with the data shown in Figure 1

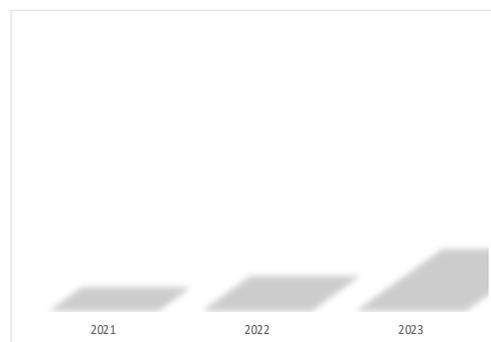


Figure 2: Percentage of Households that have an Improper Source of Drinking Water in 2021-2023.

Source: Indonesian Central Statistics Agency (BPS, 2024)

Literature Review

This research used database searches to analyze ten articles. Table 1 shows the results of the literature review.

Table 1: Literature Review Summary

No	Author	Summary
1	(Ikhsan et al., 2022)	Consumption of bottled drinking water in Indonesia increased by 1.24% every year from 2000 to 2020. By 2026, 50% of Indonesia's population is estimated to consume bottled water. Increased use of bottled water is linked to the country's economic growth, as shown by gross domestic product and urban population figures. Factors influencing household consumption of bottled water include the age of the head of household, education level of both parents, index wealth, type of residence, region, and type of toilet facilities. The young generation in urban areas is predicted to be Indonesia's primary bottled drinking water consumers. Previous studies have highlighted that bottled drinking water in Indonesia is often contaminated, emphasizing the importance of improving quality and safety to reduce negative impacts on health.
2	(Kurniawan et al., 2024)	Indonesia faces significant water quality challenges due to increasing pollution, population growth, and industrial activity, with only 35% of water economically viable for reuse and 67% of water needs met by 2021. The country's water supply deficit is estimated at 5,5 hm ³ /year, which shows a gap between water demand and supply that cannot be closed simply by increasing water supply. Only 10% of rainfall seeps into groundwater, and around 70% of Indonesia's rivers are polluted by domestic waste, indicating severe water quality problems.
3	(Ramadhan et al., 2024)	36.4% of Refill Drinking Water samples did not meet total coliform standards. 93.9% of Refill Drinking Water Depot operators know hygiene measures well. 69.7% of operators have good personal hygiene practices. There is a significant relationship between operator cleanliness and the quality of total coliform refill drinking water (p=0.016; OR=8.4). The study concluded that operator hygiene is essential in meeting the bacteriological quality standards of Refillable Drinking Water. This research recommends increasing awareness among Refill Drinking Water Depot operators to maintain cleanliness while working consistently.
4	(Katili et al., 2023)	The research found that biological parameters showed contamination by Escherichia coli and coliform bacteria with a specific average score. The quality of drinking water is relatively good in terms of temperature, turbidity, aroma, taste, colour, arsenic, fluoride, nitrite, nitrate, iron, pH, and manganese. Total Dissolved Solids (TDS) were found to be high at 1,525 mg/L, and chromium and cadmium levels were recorded to be above standard limits, which is a cause for concern. This study highlights the need for interventions to improve drinking water quality and control water pollution in Lekobalo Village, Gorontalo City, Indonesia.
5	(Daniel et al., 2023)	Although most households regularly treat their drinking water in rural Indonesia, only some are treated. Psychological factors such as risk, attitudes, norms, abilities, and self-regulation are high in society, indicating that these factors influence routine water treatment. The study revealed that action planning, a sub-factor of psychological factors, had the most significant relationship with the frequency of drinking treated water. Even though most drinking water is stored safely, the environment around where the water is stored is less hygienic. Overall, this research highlights the importance of always promoting treated drinking water and ensuring that it is stored in a safe and hygienic environment to maximize the health benefits of household water treatment in regions where this is commonplace.
6	(Irianti et al., 2023)	Drinking water that is managed safely is essential for maintaining public health. This study looked at drinking water quality monitoring and household water management practices in four provinces in Indonesia. Drinking water quality monitoring needs to fully comply with Minister of Health Decree No. 736/2010 due to issues such as sample size and comprehensive reporting. Household drinking water sources vary, most commonly piped water, followed by protected dug wells, boreholes, and rechargeable water. Only around 43% of household water sources are free of dangerous Escherichia coli bacteria. Most households meet chemical quality standards for water. About 36% of households manage drinking water safely, a higher percentage than the national average. This study highlights the need to improve drinking water monitoring by implementing water safety plans.
7	(Priadi et al., 2024)	This research identified that existing regulations must be implemented and enforced effectively, resulting in uncertainty in monitoring the quality of self-supplied drinking water. It has been observed that local government agencies responsible for water supply need help in coordinating and managing independent water supply systems efficiently. There is a need for better coordination between stakeholders, improved communication strategies, and empowerment of local communities

No	Author	Summary
		in effectively managing independent drinking water systems. Other findings indicate a clear need for capacity-building programs to improve individuals' technical skills and knowledge in self-sufficient drinking water management. This study emphasizes the importance of establishing clear guidelines, standard practices, and effective monitoring systems to mitigate the risks associated with self-sufficient drinking water services in urban areas in Indonesia.
8	(Sadidan et al., 2024)	Research revealed that many water samples exceeded class 1 standards for chemical parameters. The pH level is within acceptable limits. Factors such as Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and dissolved iron (Fe) were observed to be higher than class 1 standards at several sample points. The Citarum River in West Java, known as one of the most polluted rivers globally, is an essential agricultural and drinking water source. The study identified that the river faces pollution challenges due to industrial and population growth in the area. This pollution affects water quality with visible changes in color and odor, indicating direct discharge of chemical waste into rivers.
9	(Yudied Agung Mirasa et al., 2024)	This research analyzes the risk quotient of exposure to hazardous chemicals in drinking water in 25 cities in East Java Province. Parameters such as NO ₃ , NO ₂ , and Mg were found to have risk quotient values greater than 1, indicating unsafe levels for human consumption. The highest concentrations of specific parameters were identified in drinking water samples, such as NO ₃ , NO ₂ , Fe, Mg, and Zn. The risk quotient values for NO ₃ , NO ₂ , and Mg indicate that these substances pose health risks to individuals consuming the water. These findings indicate that immediate action is needed to address and control NO ₃ , NO ₂ , and Mg levels in drinking water to ensure public safety.
10	(Corsita et al., 2024)	This study highlights that community involvement is critical to the success and sustainability of projects, ensuring that the solutions implemented align with community needs. Overall, the research results show that the PAR method is effective in fostering cooperation between various parties and creating solutions that impact increasing the drinking water supply in the village. The positive results in Kameyakha Village suggest that PAR can be a valuable approach to address similar challenges in other indigenous communities, encouraging community-based development and sustainable solutions to water supply problems. The findings of this research support the idea that involving local communities in decision-making processes can produce more effective and long-term solutions to improve essential services such as the drinking water supply.

4 DISCUSSIONS

In many countries, including Indonesia, there are problems with people's concerns about processing water as a daily need (Katili et al., 2023). This problem makes it difficult to provide safe drinking water for the community. When good drinking water treatment is insufficient, and no one is monitoring it, it will create various risks in distributing clean water to homes (Foster et al., 2021). This is a big problem because many people rely on this way of getting water. All these risks must be discussed carefully by looking at the findings in other studies. This helps show where we need to focus our attention to make things better in the future.

Environmental Risks (Surface water and Groundwater Resources)

Groundwater and surface water are essential water sources that people in Indonesia widely use for drinking and other daily activities. There are risks to groundwater, such as water quality worsening because of too much water withdrawal or pollution

(Irianti et al., 2022). In addition, around 70% of rivers in Indonesia are polluted by domestic and industrial waste, indicating severe water quality problems (Kurniawan et al., 2024). These risks can make the water unhealthy to drink. In some areas, people dig deeper wells and use more substantial pumps to get more water (Irianti et al., 2022) (Sadidan et al., 2024). This may seem beneficial, but it can worsen groundwater quality long-term and increase environmental risks. Other problems, such as saltwater intrusion, where salt water enters groundwater, and water shortages during the dry season, can affect the quality and availability of groundwater (UNESCO, 2022).

To better manage these risks, reasonable regulations and plans need to be in place to protect groundwater and surface water resources and ensure everyone has access to safe drinking water. By applying existing regulations and involving everyone who uses water sources, we can work together to reduce risks and protect these important water sources for the future (Priadi et al., 2024).

Technical Risk

Service providers such as PDAMs, well diggers, and pump technicians can be trained and certified to build better water treatment facilities that protect water sources. This helps ensure that the water remains clean and safe to use daily. Having regulations, certifications, and permits for these service providers is essential. This ensures they follow regulations and build water treatment facilities correctly, as in Tanzania (Sutton and Butterworth, 2021) and Tangerang, as shown in Figure 3 (Ramadhan et al., 2019). Apart from that, the government can also monitor water sources. They can

check records to ensure everything is done correctly, as in Queensland, Australia (Queensland Government, 2020).

Having good standards and regulations for building water treatment facilities is very important. This can help avoid problems such as the location of water sources too close to dirty water sources, making the water unsafe to use for daily needs. By implementing regulations and carrying out apparent supervision, we can improve the quality of drinking water supplied by ourselves and the public. This is important because it can increase the security and reliability of water supply for communities that depend on independent and public water supply systems (Priadi et al., 2024).

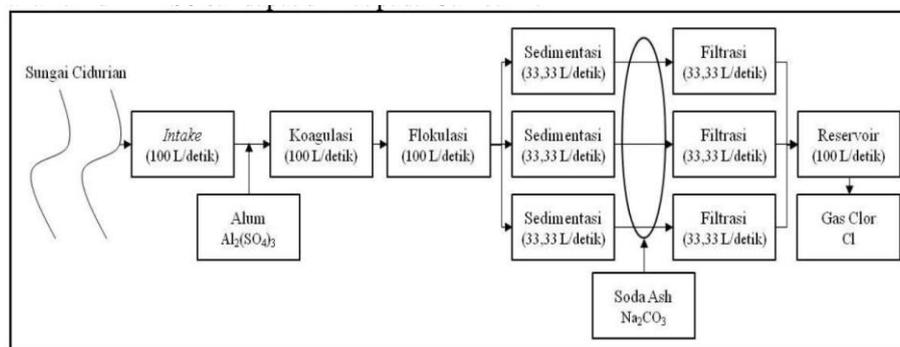


Figure 3: Water Treatment Process at The Solear IPA, Tangerang Regency
Source: Ramadhan et al, 2019

Social and Financial Risks

Many people who manage their water supplies face social risks, such as contamination, due to not knowing how to treat or store water safely (Irianti et al., 2022). This lack of knowledge can lead to health problems and possibly non-compliance with local regulations (Daniel et al., 2023). This makes many people prefer bottled drinking water and refillable drinking water to meet their needs, per Figure 1. Sometimes bottled and refillable drinking water is still contaminated with certain substances, making many people worried about their contents (Ikhsan et al., 2022)(Ramadhan et al., 2024).

Financial risks also arise for users who rely on self-supplied water. Some households need bottled or refillable water in addition to the water they purchase, which can be expensive and increase financial vulnerability. Households with low incomes are vulnerable to the economic impact of using self-supplied water because they are more dependent on additional water sources and face increased financial risks (Corsita et al., 2024).

To address these risks, government intervention is needed to reduce water access and affordability disparities. This can help reduce the financial burden on vulnerable groups and improve overall water security (Priadi et al., 2024). Education and behavior change initiatives are critical in mitigating social risks among independent households. By increasing awareness and promoting safe water treatment practices, we can improve the quality of our drinking water and reduce health risks (Corsita et al., 2024).

Health and Water Security Risks

Drinking water from unprotected wells or boreholes can produce more impurities than piped water. It can make people sick if they drink it. When the rainy season arrives, the risk of contracting disease due to contaminated water increases (Kurniawan et al., 2024). This happens because more bad ingredients may be mixed into the water during that time. Parameters such as NO₃, NO₂, and Mg were found in drinking water at levels above the threshold, indicating unsafe levels for human consumption (Mirasa et al., 2024). Communities with their water

sources may face health risks because their groundwater may need to be cleaner. This can happen if too many people use the water if wells are not built properly, or if people need to be careful (Irianti et al., 2022).

Monitoring water quality is essential to keep everyone safe. We need to check the water regularly and also ensure that the place where the water comes from is clean. This way, we can find out if there are risks and manage them so that the water remains safe to drink. By improving how we monitor water quality, inspecting wells, and ensuring everyone knows how to keep our water clean, we can reduce the risk of illness from drinking water. This will help ensure that everyone can access safe and healthy drinking water.

Institutional Risk

The government must decide who can use water sources when many people need them. This is important to avoid conflict and ensure everyone has enough clean water. Managing sanitation and water resources is essential in places where many people live close together (Fischer et al., 2020). Proper construction and monitoring of these facilities are necessary to keep the water safe. The government must identify areas at high risk of pollution and water scarcity (Priadi et al., 2024).

More people can access safe drinking water by prioritizing these areas for expanded piped water services. Government agencies play an important role in managing the use of water resources among various users (Ardhianie et al., 2022). These institutions must regulate water withdrawals, prioritize water for basic human needs, and ensure equitable distribution of water. By strengthening institutional functions related to water source management, the risk of contamination and depletion of water sources can be better addressed.

Implementation

The Indonesian State's efforts to treat water as a human need have been deemed fulfilled based on Figure 2. Nearly 91.72% of households in Indonesia have adequate drinking water. This also requires support from the community, government, and water management institutions (PDAM). People often still feel worried about the results of water treatment by PDAM. With a majority Muslim community, this problem is often linked to whether PDAM-processed products are categorized as halal or non-halal. Based

on MUI Fatwa No.02 of 2010 concerning Recycled Water, recycled water is water that is processed (technologically engineered) from water that has been used, has been unclean, or has changed one of its properties, namely taste, color, and smell so that it can be utilized. Then there are provisions for this, namely:

1. Drain the water affected by contaminants so that what remains is water that is safe from contaminants.
2. Adding holy water purifies the water affected by contaminants until it reaches a volume of at least two kullah; the contaminant elements and all the properties that cause the water to change are lost.
3. Change water that is contaminated or has changed its properties by using tools that can restore the water's original properties to make it pure and purifying, provided that the volume of water is two kullah and the tools used must be pure.

This provision is in line with the principles of water management institutions (PDAM), namely that the results of recycled water must comply with the Republic of Indonesia Government Regulation No. 21 of 2021 concerning the Implementation of Environmental Protection and Management in Appendix VI concerning National Water Quality Standards. This regulation states that the water content must be managed under applicable regulations. Apart from that, there are also regulations for halal guarantees, namely in the Decree of the Head of the Halal Product Guarantee Organizing Agency Number 20 of 2023 concerning Criteria for the Halal Product Guarantee System, Sanitation Standard Operating Procedure (SSOP) by BPOM, and Regulation of the Minister of Industry of the Republic of Indonesia No. 75/M-IND/PER/7/2010 Concerning Guidelines for Good Manufacturing Practices, it has guidelines on how to process raw materials for daily needs so that they are guaranteed halal and healthy.

Community concerns can also be explained by the water cycle in Figure 4. This image shows the journey of the water that we use every day. Interestingly, there are similarities in the process between Figure 3 and Figure 4, where each image depicts the process of recycling water. The only difference is how to process water sources. Figure 3 Processing water sources using technology. Then, Figure 4 processes water sources using natural compositions naturally and comprehensively. The recycling process used by PDAM is a form of implication of natural processes with the help of existing technology. Therefore, PDAM's processed products can be used for daily

needs without worrying about the process they go through. There may need to be thorough monitoring of the content of the recycled water until it reaches people's homes. As long as the water does not change, namely the taste, smell, and color, based on the

Hadith of the Prophet, "Water is holy, unless its smell, taste or color changes due to unclean objects that come into contact with it" (HR al-Baihaqi) then the water can be used properly.

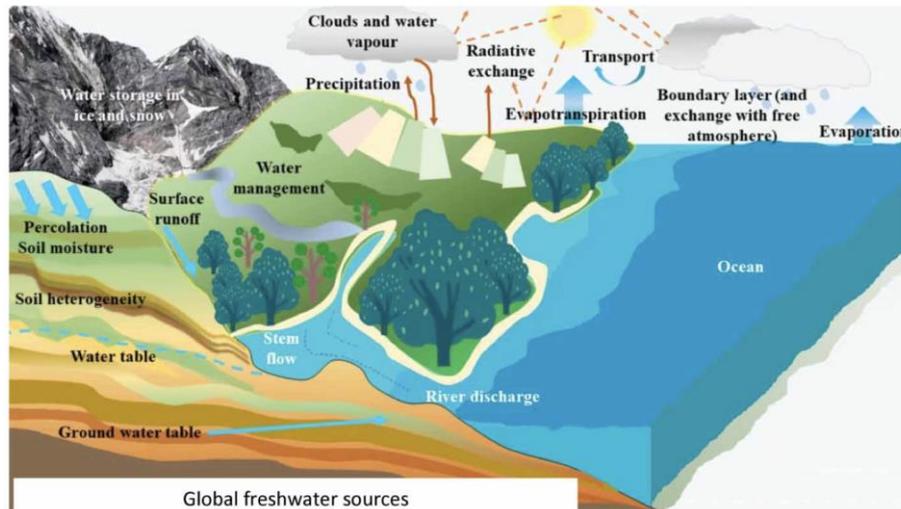


Figure 4. Water Cycle
Source: Ramadhan et al, 2024

Implications and Limitation of This Work: Future Research

This research is based on a single case study in Indonesia, so it cannot necessarily represent other regions with different conditions. It does not provide a detailed quantitative assessment of the impacts of climate change on water quality and sanitation metrics. Interactions between water quality and other sectors, such as energy or agriculture, have not been fully explored, which could impact the resilience of water systems.

The scientific evidence obtained can assist policymakers in reducing urban and rural water pollution in Indonesia through better water management practices. By understanding the consequences of changing societal conditions, this research can contribute to formulating national adaptation plans to address local impacts effectively. Collaboration among water professionals can produce innovative solutions to address future water risks and improve water technology globally.

Future research could involve multiple case studies to provide a more comprehensive understanding of the global impact of changing societal attitudes on water quality and sanitation. Incorporating quantitative

assessments and considering the linkages between water quality and other sectors will strengthen research results. Encouraging ongoing collaboration among stakeholders and professionals will encourage the development of effective and sustainable solutions to address water challenges in the face of significant changes in societal attitudes.

5 CONCLUSIONS

Food safety in Indonesia, especially in water processing, has been described in depth and comprehensively using literature studies from previous research. The provision of drinking water by water management institutions (PDAM) as a daily need for the community is a concern so that the quality of the processed water can be maintained in terms of halalness and safety. People often think that PDAM products are categorized as halal or non-halal. This perception was finally answered through this research by combining several environmental, technical, social, financial, security, and institutional risk aspects, which resulted in a new perspective that all water recycling processes from water sources have the same conditions as natural conditions, namely the water cycle. This underlines the need to always care

for and maintain water sources so no contaminants enter them. There is a need to transform Indonesia's water self-sufficiency system to manage the risks associated with water services effectively. This emphasizes that all parties involved in providing drinking water, both independent and commercial, have rights and responsibilities towards sustainability and risk reduction.

The provision of drinking water through water sources in Indonesia is currently adequately regulated, so there needs to be clear roles and responsibilities for the government, community, and service providers. These findings also show that although infrastructure design standards already exist, their implementation still needs improvement, potentially creating risks of non-standard construction and contamination. In addition, without proper governance and application of regulations, there are increased risks in terms of decreasing the quality and quantity of water sources, inadequate infrastructure, low awareness of water treatment and storage, additional costs for water sources, health and water safety problems, and fragmentation of water resources.

6 REFERENCES

- Ahmad, M., 2022. Developing halal vaccine production in Indonesia: challenges and future opportunities. *El-Hayah* 9, 18–30.
- Anggarkasih, M.G., Resma, P.S., 2022. The importance of Halal certification for the processed food by SMEs to increase export opportunities, in: *E3S Web of Conferences*. EDP Sciences, p. 00039.
- Ardhianie, N., Daniel, D., Purwanto, P., Kismartini, K., 2022. Jakarta water supply provision strategy based on supply and demand analysis. *H2Open Journal* 5, 221–233.
- Barakwan, R.A., Trihadiningrum, Y., Bagastyo, A.Y., 2019. Characterization of alum sludge from Surabaya water treatment plant, Indonesia. *Journal of Ecological Engineering* 20.
- BPS, 2024. *Statistical Yearbook of Indonesia*. BPS-Statistics Indonesia.
- Catur Nugroho, K., Dwiningrum, S.I.A., Mahjudinc, Desembrianita, E., Suhermawan, D., Rinawatie, H.S., Mauliyda, F.D., 2023. The Impact of Differences in Consumer Knowledge about Food Products from the Aspects of Food Quality, Food Safety, Halal, and SNI on Purchase Decisions (Study on Food and Beverage Consumers in Indonesia). *IJAEMR* 08, 100–128. <https://doi.org/10.51505/ijaemr.2023.8408>
- Corsita, L., Marganingrum, D., Iriyanto, S.M., 2024. Participatory action research method of drinking water supply framework innovation for local indigenous community in Indonesia. *E3S Web of Conf.* 485, 04014. <https://doi.org/10.1051/e3sconf/202448504014>
- Daniel, D., Qaimamunazzala, H., Siantoro, A., Sirait, M., Tanaboleng, Y.B., Padmawati, R.S., 2023. Household drinking water treatment in rural Indonesia: actual practice, determinants, and drinking water quality. *Journal of Water, Sanitation and Hygiene for Development* 13, 208–217. <https://doi.org/10.2166/washdev.2023.215>
- Fischer, A., Hope, R., Manandhar, A., Hoque, S., Foster, T., Hakim, A., Islam, M.S., Bradley, D., 2020. Risky responsibilities for rural drinking water institutions: The case of unregulated self-supply in Bangladesh. *Global Environmental Change* 65, 102152.
- Guntarti, A., Gandjar, I.G., Jannah, N.M., 2020. Authentication of Wistar rat fats with gas chromatography mass spectrometry combined by chemometrics.
- Hussain, K., Fayyaz, M.S., Shamim, A., Abbasi, A.Z., Malik, S.J., Abid, M.F., 2024. Attitude, repurchase intention and brand loyalty toward halal cosmetics. *Journal of Islamic Marketing* 15, 293–313.
- Ikhsan, A.N., Thohira, M.C., Daniel, D., 2022. Analysis of packaged drinking water use in Indonesia in the last decades: trends, socio-economic determinants, and safety aspect. *Water Policy* 24, 1287–1305. <https://doi.org/10.2166/wp.2022.048>
- Irianti, S., Yunianto, A., Dharmayanti, I., Hidayangsih, P.S., Zahra, Z., Mbarep, D.P.P., Sutapa, I.D.A., 2023. Implementation of drinking water quality surveillance and household water management practices in selected provinces in Indonesia. *IOP Conf. Ser.: Earth Environ. Sci.* 1201, 012106. <https://doi.org/10.1088/1755-1315/1201/1/012106>
- Katili, I., Baderan, D.W.K., Kumaji, S.S., 2023. Analysis of drinking water quality based on biological, physical and chemical parameters in Lekobalo Village, Gorontalo City, Indonesia. *Intl J Bonorowo Wetlands* 13. <https://doi.org/10.13057/bonorowo/w130104>
- Kurniawan, T.A., Bandala, E.R., Othman, M.H.D., Goh, H.H., Anouzla, A., Chew, K.W., Aziz, F., Al-Hazmi, H.E., Nisa'ul Khoir, A., 2024. Implications of climate change on water quality and sanitation in climate hotspot locations: A case study in Indonesia. *Water Supply* 24, 517–542. <https://doi.org/10.2166/ws.2024.008>
- Loussaief, A., Ying-Chao Lin, J., Phuc Dang, H., Bouslama, N., Cheng, J.M.-S., 2024. Eating halal: a serial mediation model for the effect of religiosity on the intention to purchase halal-certified food. *Asia Pacific Journal of Marketing and Logistics* 36, 167–184.
- Mutmainah, N., Hapidin, A., Ramdhani, M.A., Nuryadin, B.W., Muharir, M., Ahyani, H., 2022. Global awareness of halal products in Indonesia in Era 4.0. *Al-Amwal: Jurnal Ekonomi dan Perbankan Syari'ah* 14, 14–34.
- Pambudi, A.S., 2021. Overview and evaluation of the Indonesia's water resources management policies for food security. *Applied Environmental Studies* 84.

- Prasetya, F., Putri, L.A.R., Mayangsari, R., 2019. Urban Habit Inboiling Drinking Water: A Study Drom Kampung Salo Sub District, Kendari, Indonesia, in: ICEASD&ICCOSED 2019: International Conference on Environmental Awareness for Sustainable Development in Conjunction with International Conference on Challenge and Opportunities Sustainable Environmental Development, ICEASD & ICCOSED 2019, 1-2 April 2019, Kendari, Indonesia. European Alliance for Innovation, p. 275.
- Priadi, C.R., Suleeman, E., Darmajanti, L., Putri, G.L., Genter, F., Foster, T., Willetts, J., 2024. Policy and regulatory context for self-supplied drinking water services in two cities in Indonesia: Priorities for managing risks. *Environmental Development* 49, 100940.
- Pusparani, M., 2021. Faktor yang mempengaruhi kinerja pegawai (suatu kajian studi literatur manajemen sumber daya manusia). *Jurnal Ilmu Manajemen Terapan* 2, 534–543.
- Queensland Government, 2020. Bore Construction and Approvals.
- Ramadhan, F., Siami, L., Winarni, W., 2019. Optimalisasi Instalasi Pengolahan Air Minum Solear, PDAM Tirta Kerta Raharja-Kabupaten Tangerang, in: Seminar Nasional Pembangunan Wilayah Dan Kota Berkelanjutan.
- Ramadhan, S., Adriyani, R., Larasati, A.A., Husaini, A., 2024. RELATIONSHIP OPERATOR KNOWLEDGE AND HYGIENE WITH BACTERIOLOGICAL QUALITY OF REFILL DRINKING WATER IN BANYUWANGI, INDONESIA: A CROSS-SECTIONAL STUDY.
- Ray, C., 2011. Riverbank Filtration Concepts and Applicability to Desert Environments, in: Shamrukh, M. (Ed.), *Riverbank Filtration for Water Security in Desert Countries*, NATO Science for Peace and Security Series C: Environmental Security. Springer Netherlands, Dordrecht, pp. 1–4. https://doi.org/10.1007/978-94-007-0026-0_1
- Sadidan, I., Sari, G.L., Kasasiah, A., Utami, M.R., Amethysia, N.R., 2024. Study of Physical and Chemical Properties of Drinking Water Sources on the Citarum River Irrigation Area in Karawang, West Java, Indonesia. *E3S Web Conf.* 500, 02002. <https://doi.org/10.1051/e3sconf/202450002002>
- Salsabila, B.K., Nurhayati, E., Raditya, M., Shiddiqi, A.M., 2023. Neural Network Modelling for Prediction of Coagulant Dosage, in: *IOP Conference Series: Earth and Environmental Science*. IOP Publishing, p. 012011.
- Sudarsono, H., Ikawati, R., Kurnia, A., Azizah, S.N., Kholid, M.N., 2024. Effects of religiosity, halal knowledge and halal certification on the intention of Muslims to use the halal vaccine during Covid-19 pandemic. *Journal of Islamic Marketing* 15, 79–100.
- Sutton, S., Butterworth, J., 2021. Self-Supply. PRACTICAL ACTION PUBLISHING. <https://doi.org/10.3362/9781780448190>
- Tarannum, F., Kansal, A., Sharma, P., 2018. Understanding public perception, knowledge and behaviour for water quality management of the river Yamuna in India. *Water Policy* 20, 266–281.
- UNESCO, 2022. Groundwater: making the invisible visible. In: *The United Nations World Water Development Report 2022: Groundwater: Making the Invisible Visible*.
- Wakimoto, D.K., 2013. Ethnographic methods are becoming more popular in LIS research.
- Yudhantoro, W.A., Utomo, S.W., Martono, D.N., 2020. Water Reuse Planning for Fulfilment of Clean Water in Indonesia, in: *E3S Web of Conferences*. EDP Sciences, p. 03002.
- Yudied Agung Mirasa, Siti Nurhidayati, Wicaksono, R., Winarko, W., Kholifah Firsayanti Juwono, Zainul Amiruddin Zakaria, Khuliyah Candraning Diyanah, Aditya Sukma Pawitra, Moch. Sahri, 2024. Refill Drinking Water Depot Risk Assessment for Chemical Hazard Contaminant in 25 Cities of East Java Province, Indonesia. *JKL* 16, 166–172. <https://doi.org/10.20473/jkl.v16i2.2024.166-172>