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Assessing the Social, Health, and Welfare Impacts of Bowong Reservoir Utilization by Local Households

Yanu Endar prasetyo [a,1*], C Yudilastiantoro [a,2], Syahmida Arsyad [a,3], Septi Nurhayati [a,4], Ruth Meilianna [a,5], Yanti Purba [a,6], Nawawi [a,7]

aNational Research and Innovation Agency, Gedung B.J. Habibie, Jl. M.H. Thamrin No. 8, 103401, Daerah Khusus Ibu Kota Jakarta

* corresponding author: yanu005@brin.go.id

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ABSTRACT

Background: This study explores the access to and utilization of the Bowong Reservoir by surrounding households, with a focus on social, health, and welfare perspectives. The research aims to understand the significance of the reservoir in the daily lives of the local community and to identify challenges related to water access and overall well-being.

Method: A survey was conducted with 40 residents through face-to-face interviews. A quantitative approach was employed, utilizing descriptive analysis as a baseline for further studies.

Results: The findings indicate that many respondents are elderly, with most being native residents who have lived in the area since birth. The majority are farmers, and the reservoir plays a crucial role in supporting agricultural activities and household needs. However, many respondents still need to purchase additional clean water during the dry season, reflecting challenges in stable access to clean water. Most respondents possess assets such as livestock and motorcycles, indicating a moderate level of economic security.

Conclusion: The study underscores the importance of the Bowong Reservoir in the daily lives of the community while highlighting the need for further interventions to improve water access quality and overall community welfare. These findings serve as a foundation for more in-depth research on the social and health impacts of reservoir utilization in this community.

1. Introduction

Water resources play a vital role in the sustenance and development of rural communities (1), particularly in agricultural regions (2). In many parts of Indonesia, reservoirs, or embung, serve as critical infrastructure for water storage (3), supporting both agricultural activities and household needs. The Bowong Reservoir is one such resource that has become an essential part of daily life for the local community surrounding it. However, as with many rural water systems, access and utilization can vary significantly (4), influencing not only the economic activities but also the health and welfare of the households that depend on it (5).

This study focuses on understanding the access to and utilization of the Bowong Reservoir by households in its vicinity, with a particular emphasis on the social, health, and welfare impacts. Preliminary observations suggest that while the reservoir is a key resource for agricultural practices, especially for most of the population who are farmers, there remain significant challenges in ensuring stable and sufficient access to clean water, particularly during the dry season (6). These challenges may have broader implications on the well-being and economic security of the community (7).

The research conducted aims to explore these dynamics through a comprehensive survey of 40 residents, employing a quantitative approach with descriptive analysis to provide a baseline understanding (8). By examining factors such as demographic characteristics, occupational roles,

household assets, and water usage patterns (9), this study seeks to shed light on the extent to which the Bowong Reservoir meets the needs of the community and the areas where further interventions may be necessary.

This study contributes to the broader discourse on rural water resource management in Indonesia (10), offering insights that could inform policy decisions aimed at improving water access and enhancing the overall welfare of rural communities (11). The findings presented in this paper highlight both the significance of the Bowong Reservoir in the lives of local residents and the critical areas where improvements are needed to support sustainable development and well-being (12).

2. Method

This study employed descriptive statistics to explore patterns in the responses collected from the structured questionnaire (13). Variables such as household demographic characteristics, water usage patterns, and the perceived impact of the Bowong Reservoir on health and welfare were analyzed using frequency distributions and percentages. The study was conducted in Wonogiri, Central Java, Indonesia, during September-October 2023. The specific setting of this research is the community living around the Bowong Reservoir, where water resources play a crucial role in their daily lives. The population of the study comprised all households residing in the vicinity of the Bowong Reservoir. From this population, a purposive sample of 40 households was selected to participate in the study. The sample was chosen to represent a broad spectrum of demographic characteristics, ensuring the inclusion of households with varying ages, occupations, and economic statuses (13). The primary data sources were the household members who provided information through face-to-face interviews (14).

Data collection was conducted using a structured questionnaire, which was administered directly to the respondents(15). The questionnaire was designed to capture detailed information on several key variables (16). These included demographic variables (age, gender, education, occupation), household characteristics (number of household members, ownership of assets), water usage patterns (sources of water, purposes of using the reservoir, frequency of water purchase during the dry season), and the perceived impact of the reservoir on health and welfare (17).

The variables included in the study were: (1) Demographic: Age, gender, education level, and marital status of household members; (2) Household Characteristics: Number of people living in the household, number of families within the same household, type of housing ownership, role in the household (e.g., head of household, breadwinner)(18); (3) Economic: Main occupation of the household members, average monthly household income, and ownership of assets (e.g., livestock, motorcycles, gold) (19); (4) Water Usage: Main sources of water (well, protected or unprotected springs, purchased water), usage of the Bowong Reservoir (for drinking, washing, irrigation, etc.), and water access challenges (particularly during the dry season); (5) Health and Welfare: Frequency of meals per day, type of food consumed, and perceived impact of water access on health and household welfare (20).

3. Result

Data analysis was performed using descriptive statistical methods (21). The analysis focused on summarizing and describing the main features of the data collected from the respondents. Descriptive statistics such as frequencies, percentages, and means were used to present the data, providing a comprehensive overview of the access and utilization of the Bowong Reservoir among the sample households. The analysis was structured to address the primary research questions regarding the extent of reservoir usage, the demographic and economic characteristics of the households, and the implications for health and welfare.

The results from the descriptive analysis served as a baseline for identifying key trends and patterns, which could inform future studies or interventions aimed at improving water access and enhancing community welfare (22). The findings of this study provide a comprehensive view of the role of the Bowong Reservoir in the daily lives of the surrounding households, emphasizing its significance in supporting agricultural activities and addressing basic household needs (23). However, the data also

reveal several challenges that underscore the complexity of water resource management in rural communities like those in Wonogiri.

Table 1.Some data and variables collected in the household survey (N=40)

Dimensions	Variables		Count	%
Demographic	Gender	Male	36	90
		Female	4	10
	Marital status	Married	37	92,5
		Widowed/divorced	3	7,5
	Education	Did not complete elementary school	6	15
		Completed elementary school	18	45
		Completed junior high school/equivalent	8	20
		Completed high school/equivalent	5	12,5
		Completed associate degree (2-year)	1	2,5
		Completed bachelor's degree/equivalent	2	5
Household Characteristics	Housing ownership	Own house	30	75
		House owned by parents/extended family, shared use	10	25
	Breadwinner	Head of household and primary breadwinner	33	82,5
		Head of household but not primary breadwinner	4	10
		Not head of household, but primary breadwinner	3	7,5
Economic	Monthly income (average)	< IDR. 1.000.000	7	17,5
		IDR. 1.000.001- 2.000.000	14	35
		IDR. 2.000.001- 3.000.000	9	22,5
		IDR. 3.000.000- 4.000.001	6	15
		IDR 5.000.001- 6.000.000	2	5
		IDR 7.000.001- 8.000.000	1	2,5
		IDR 8.000.001- 9.000.000	1	2,5
Water usage	Using Bowong reservoir?	Yes	38	95
		No	2	5
	Usage of the Bowong Reservoir	Livestock drinking	8	21,5
		Livestock drinking; Bathing	1	2,63
		Livestock drinking; Bathing; Washing	9	23,68
		Livestock drinking; Bathing; Washing; Defecation	6	15,79
		Livestock drinking; Washing	7	18,42
		Livestock drinking; Washing; Defecation	1	2,63
		Livestock drinking; Defecation	1	2,63
		Bathing	1	2,63
		Bathing; Washing	4	10,53

Source: Authors (2023)

The survey results reveal significant insights into the socioeconomic characteristics and water usage patterns of the community surrounding the Bowong reservoir. A substantial majority of respondents (75%) reported owning their homes, which potentially indicates a high level of economic and social stability within the community. This stability may facilitate improved access to and utilization of the reservoir's resources. The demographic data further indicates that 82.5% of respondents identified as heads of households and primary breadwinners. This finding suggests that most survey participants hold primary decision-making roles within their families, which could significantly influence household choices regarding reservoir usage for various domestic needs (24).

In terms of economic status, the modal income bracket (35% of respondents) fell between IDR 1,000,001 and IDR 2,000,000 per month (see table 1). This relatively low household income level may constrain families' ability to purchase clean water or invest in improved water access infrastructure when necessary. The Bowong reservoir emerges as a critical resource for the community, with an overwhelming 95% of respondents reporting its use. This high utilization rate underscores the reservoir's importance as a key water source for the local population (25). The reservoir serves multiple crucial functions, primarily supporting livestock watering, bathing, laundry, and sanitation needs. This multifaceted role highlights the reservoir's integral position in supporting daily household activities and agricultural livelihoods (26).

While most respondents reported access to protected wells or springs, many still face water scarcity issues (27), particularly during the dry season when they must resort to purchasing additional water (26). This seasonal dependence on purchased water indicates limitations in year-round access to clean water sources, which could have significant implications for household health and well-being. The survey also explored asset ownership among respondents, revealing that motorcycles, gold, and livestock were common possessions. The ownership of assets such as livestock and gold may provide a form of economic security, potentially enabling households to better cope with emergency situations like droughts (27). These findings paint a complex picture of a community with relatively stable housing situations but facing economic constraints and seasonal water access challenges. The Bowong reservoir plays a vital role in supporting various aspects of daily life, underscoring the need for sustainable management of this crucial resource to ensure long-term water security for the community (28).

4. Discussion

The findings from the household survey underscore the critical role that the Bowong Reservoir plays in the daily lives of the local community, especially in light of the socioeconomic and demographic characteristics of the respondents (29). The data indicate that 95% of households utilize the Bowong Reservoir for various purposes (See table 1). This high dependency demonstrates the reservoir’s multifaceted role in supporting both agricultural activities and essential household needs (30). Most of the households use the reservoir for livestock watering, washing, bathing, and in some cases, even for defecation. The reservoir’s use for livestock drinking is particularly notable, as 21.5% of households rely on it for this purpose, which is vital for supporting the agricultural economy of the region, given that 70% of the respondents are farmers. The significance of the reservoir extends beyond agricultural use, as it is integral to basic sanitation needs, further illustrating the close link between water access and health outcomes in this rural community(31). The strong dependence on the reservoir suggests that any disruption in its availability could have significant consequences for the community’s economic stability and food security (32).

Despite the reservoir's importance, the study reveals notable challenges in water access, especially during the dry season. Many households, even those with access to the reservoir, reported the need to purchase additional water during periods of drought (33). This reliance on external water sources indicates that the reservoir alone is insufficient to meet the community's needs year-round. Such seasonal shortages could exacerbate vulnerabilities, particularly among the elderly population, which constitutes a significant portion of the community (34). These findings suggest that improving water storage and distribution infrastructure could be critical in enhancing the reliability of water access in this region (35).

The survey shows that 75% of respondents own their homes, which suggests a degree of economic stability in the community. Furthermore, 82.5% of respondents are both heads of households and primary breadwinners, indicating strong decision-making autonomy within families. However, despite this apparent stability, the financial data paint a more nuanced picture. A significant proportion of households (35%) earn a monthly income between IDR 1,000,001 and IDR 2,000,000, which is relatively low and likely limits their ability to invest in better water access solutions or other improvements to household infrastructure. The added expense of purchasing water during dry periods further strains household budgets, potentially undermining long-term economic security.

The study also sheds light on the broader health and welfare implications of water access in the community (36). Although the majority of households reported eating three meals a day, the quality of water and its availability directly impact household hygiene and health (37). The reliance on the reservoir for basic sanitation needs, such as washing and bathing, coupled with the need to purchase water during the dry season, raises concerns about water quality and its implications for public health (38). Poor water quality or limited access to clean water can lead to waterborne diseases, which are particularly risky for the elderly and young children. Therefore, there is a clear need for interventions aimed at improving water quality and ensuring consistent access throughout the year (39).

The study's findings regarding asset ownership, such as livestock and motorcycles, suggest a moderate level of economic security among the households. However, this economic stability is closely tied to the availability of water, which is essential for maintaining livestock and supporting agricultural productivity. The need to purchase water during the dry season represents an additional financial burden on households, potentially diminishing their economic security (40). This underscores the importance of developing sustainable water management strategies that can reduce the economic impact of water scarcity on rural households (41).

5. Conclusion

The results of this study have significant implications for policy and future research. First, there is a clear need for improved water management strategies that can address the seasonal variability in water availability. Enhancing the storage capacity of the reservoir, expanding access to alternative water sources, and investing in water purification technologies could help mitigate the risks associated with water scarcity. Second, the strong dependence on the reservoir for multiple uses highlights the need for integrated water resource management approaches that consider the diverse needs of the community. Policymakers should consider developing programs that educate residents on efficient water use practices and promote the adoption of sustainable agricultural techniques that reduce water dependency. Finally, the findings of this study should serve as a foundation for further research into the long-term health and economic impacts of water access in rural communities. Future studies could explore the effectiveness of specific interventions in improving water access and their impact on community welfare.

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