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MORALITY BEFORE KNOWLEDGE

Socio-economic determinants of willingness to pay for safe and sustainable water supply in coastal urban areas

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ABSTRACT

Background: In many urban developing countries, the main obstacle to expanding and providing piped water supply is the cost to consumers. The coastal area of Bandar Lampung City is a slum seaside area that has a poor piped clean water supply system that requires improvements to various aspects of the system. So it is important to estimate the Willingness to Pay of the community to improve the quality of sustainable clean water which is determined by their socio-economic characteristics. The purpose of this study is to identify the amount of willingness of the residents of the coastal area of Bandar Lampung City to improve the quality of clean water. **Methods:** The analytical method used is descriptive quantitative with Willingness calculations and binary logistic regression. This study will take a sample of 100 families living in Teluk Betung Selatan District, Teluk Betung Timur, Bumi Waras District, and Panjang District as areas that are in direct contact with the coastal area of Bandar Lampung City. **Finding:** The results of this study indicate that the average willingness of PDAM customers to pay to improve the quality of clean water is IDR 99,000 with gender and number of family members. Meanwhile, for residents who are prospective PDAM customers, the average willingness to pay is IDR 130,283 and the influencing factors are age and type of work. **Conclusion:** It can be seen that the willingness of the community to improve the quality of drinking water is quite high. The results of this study are as a reference for relevant stakeholders to improve the quality of clean water due to the high willingness of the community to pay in the coastal area of Bandar Lampung City. **Novelty/Originality of this article:** The novelty of this study lies in its contextual analysis of community willingness to pay for clean water improvement in coastal urban slum areas, an aspect rarely examined in previous research on water economics in Indonesia.

KEYWORDS: willingness to pay; clean water; coastal area.

1. Introduction

It is widely acknowledged that access to clean water and proper sanitation constitutes the sixth goal of the Sustainable Development Goals (SDGs) and is a fundamental component of sustainable urban ecosystem services (Wood et al., 2018). A prediction indicated that by 2015, there would be a global water shortage amounting to 3 trillion liters per year, with the most severe impacts expected to occur in developing countries across Asia (Hanjra & Qureshi, 2010). This water crisis is further exacerbated by rapid urbanization and population growth (Bao & He, 2015). Therefore, water management efforts are essential as part of basic ecosystem services to mitigate the potential disaster of water scarcity and to support sustainable development.

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Several approaches have been undertaken in urban water management, including the actual assessment of urban water consumption or demand in major cities around the world, such as in the United States (Gursel et al., 2020). In addition to consumption-based approaches, other studies have focused on urban water resource availability or supply (Sun & Kato, 2021). These studies collectively suggest that ecosystem services related to water in urban areas tend to improve in line with increases in regional per capita income, water availability, and the types of water sources (urban water resources/urban water supply). However, a comprehensive and integrative assessment of ecosystem services must consider three aspects simultaneously: availability (supply), necessity (demand), and flow, in order to develop effective and efficient management plans (Yang et al., 2020).

Ensuring the fulfillment of basic water services presents a significant challenge in sustainable urban management due to high risks, substantial costs, and limited raw water resources (Ahsan et al., 2021). In Indonesia, water security is a sensitive issue, as urban development affects both water availability and demand. Despite Indonesia's relatively long rainy season, uneven distribution of water sources and population density have made access to water a persistent problem (Hasan & Ridwan, 2021). Currently, information regarding urban water availability and consumption in Indonesia remains limited and is primarily focused on cities in Java, such as Bandung (Hasbiah & Kurniasih, 2019), with research aimed at addressing existing water crisis issues. The improved water sources identified in this research include household connections to private piped systems typically represented by a single outdoor tap and rainwater harvesting setups installed at the household level. Although these sources are classified as "improved," the water they supply often varies in quality. Moreover, water treatment practices are not uniformly implemented, either within the broader infrastructure or by individual households (Orgill, 2013). In Banda Aceh for example, households exhibit different patterns of water usage for drinking and non-drinking needs. The fact that many residents choose to purchase refilled water from kiosks rather than using tap water for drinking suggests either concerns about the tap water's quality or a lack of adequate information and awareness regarding its safety (Jiang & Rohendi, A. 2018).

Information on urban water supply-demand conditions in Indonesian cities is still scarce. This is evidenced by the prioritization of the preparation of the Master Plan for Drinking Water Supply Systems/*Rencana Induk Pengembangan Sistem Penyediaan Air Minum* (RISPAM) in the 2022 Government Work Plan Update, which regulates aspects of urban water availability and demand (KARYA, 2019). The limited number of districts/cities with RISPAM documents indirectly hinders the achievement of the SDGs. Furthermore, in efforts to meet urban water consumption needs, the Indonesian government currently refers to a standard of 60 to 150 liters per person per day, based on guidelines established by the Directorate General of Human Settlements in 1965. However, questions arise regarding the relevance of this standard today, especially considering it is over 50 years old. Therefore, a comprehensive and up-to-date understanding of urban water availability and consumption is crucial to addressing water scarcity issues and ensuring the realization of sustainable urban development.

Sumatra Island, one of the major islands in Indonesia, is currently experiencing rapid development, partly driven by the extensive construction of toll road infrastructure, notably the Trans-Sumatra Toll Road. This toll road, which runs along the eastern part of Sumatra, has the potential to boost economic income in major cities across the provinces it traverses, such as Lampung, South Sumatra, Jambi, Riau, North Sumatra, and Aceh (Berawi et al., 2015). This development is likely to impact basic services, particularly water supply, in the southern region of Sumatra.

Bandar Lampung, a coastal city located in the southern part of Sumatra Island, is expected to be affected by these changes. The coastal area of Bandar Lampung is characterized by slum conditions and suffers from a poor piped drinking water supply system (Ilmi et al., 2020), necessitating improvements across various aspects of the system. Therefore, it is essential to assess the willingness of the coastal community in Bandar

Lampung to pay for clean water, as this is a crucial factor in addressing water scarcity issues and ensuring the implementation of sustainable urban development.

In the context of sustainable urban development, the integration of water-related ecosystem services into planning and policy frameworks is increasingly recognized as a critical necessity. Urban water systems are not only essential for human health and well-being but also play a pivotal role in maintaining ecological balance and supporting economic activities. As cities expand and transform, the pressure on water resources intensifies, necessitating innovative and adaptive management strategies that are both socially inclusive and environmentally sound.

One of the key challenges in urban water management is the disparity between water availability and accessibility. While some regions may possess abundant water resources, infrastructural limitations and socio-economic inequalities often hinder equitable distribution. This issue is particularly pronounced in coastal and peri-urban areas, where informal settlements frequently lack access to reliable and safe water sources. In such contexts, the concept of willingness to pay (WTP) for improved water services becomes a valuable tool for understanding community priorities and guiding investment decisions. WTP studies can reveal the perceived value of clean water among residents and help policymakers design cost-effective and socially acceptable interventions.

Bandar Lampung, as a rapidly urbanizing coastal city, exemplifies the complex interplay between infrastructure development, environmental constraints, and socio-economic dynamics. The city's strategic location and its role as a gateway to Sumatra make it a focal point for regional development initiatives, including the Trans-Sumatra Toll Road. However, this growth also brings challenges, particularly in ensuring that basic services such as water supply keep pace with urban expansion. The coastal slum areas of Bandar Lampung are especially vulnerable, facing issues such as saline intrusion, inadequate sanitation, and limited access to piped water. These conditions not only compromise public health but also hinder efforts to achieve sustainable urban development.

Moreover, climate change adds another layer of complexity to urban water management. Rising temperatures, shifting rainfall patterns, and extreme weather events can disrupt water supply systems and exacerbate existing vulnerabilities. In Indonesia, where many cities are located in low-lying coastal zones, the risks associated with climate-induced water stress are particularly acute. Therefore, resilience-building measures such as rainwater harvesting, decentralized water treatment, and community-based water management must be integrated into urban planning processes. These approaches can enhance adaptive capacity and ensure that water services remain reliable and inclusive, even under changing environmental conditions.

In addition to technical and infrastructural solutions, institutional and governance frameworks play a crucial role in shaping water management outcomes. Effective coordination among government agencies, private sector actors, and civil society organizations is essential for aligning policies, mobilizing resources, and fostering public trust. In Indonesia, the decentralization of water governance has created opportunities for local innovation but also posed challenges in terms of capacity and accountability. Strengthening local institutions and enhancing data availability particularly regarding water supply and demand can support evidence-based decision-making and improve service delivery.

Given the multifaceted nature of urban water issues, interdisciplinary research is needed to capture the full spectrum of challenges and opportunities. Studies that combine hydrological analysis with socio-economic assessments, policy reviews, and community engagement can provide holistic insights and inform integrated solutions. In the case of Bandar Lampung, assessing the willingness to pay for clean water among coastal residents offers a valuable entry point for understanding local needs and preferences. Such research can guide the design of targeted interventions that not only improve water access but also promote equity, sustainability, and resilience in urban development.

2. Methods

This study employed a purposive sampling technique, where 100 households were deliberately selected based on specific criteria relevant to the research objectives. The sample size of 100 is considered representative as it captures a diverse range of social, economic, and geographic characteristics within the study area. Households were chosen to reflect variations in water access, income levels, and residential locations (urban and rural), ensuring that the data collected provides a comprehensive overview of household water use behavior. This approach allows for targeted insights into the issues being studied, particularly in relation to drinking water preferences and infrastructure access.

This study covers the sub-districts of Teluk Betung Selatan, Teluk Betung Timur, Bumi Waras, and Panjang, which are directly adjacent to the coastal area of Bandar Lampung City. The following is a map of the research study location:

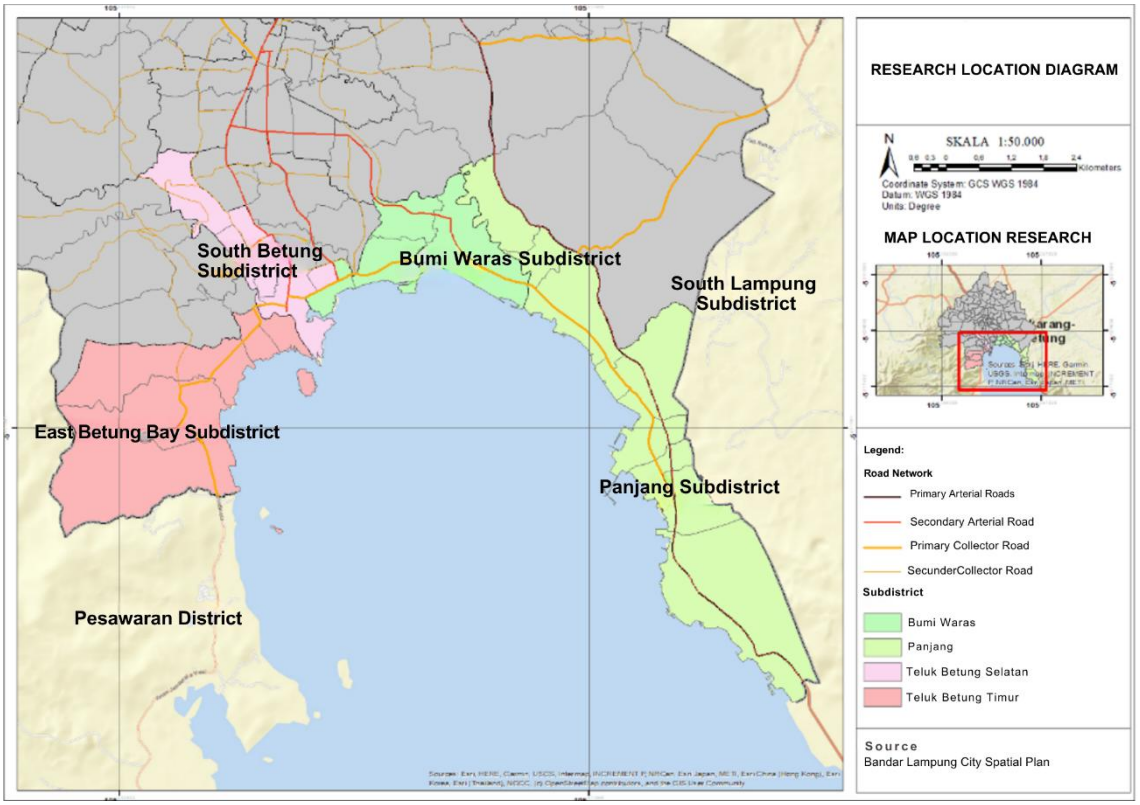

Fig. 1 Research study location

The sample size was determined using purposive sampling in conjunction with the Slovin formula. To apply the Slovin formula, a 90% confidence level was assumed (Tejada et al., 2012), with a margin of error set at 10%, as detailed below:

$$n = \frac{N}{1+Ne^2} \quad \text{(Eq. 1)}$$

The sample was calculated based on the population of Bandar Lampung City, which includes the sub-districts of Bumi Waras, Panjang, Teluk Betung Timur, and Teluk Betung Selatan. The calculation of total sample is as follows:

$$n = \frac{244619}{1+(244619\times 0.01)} \quad \text{(Eq. 2)}$$

n = 99.959 to be exact 100 sample

The calculation of Willingness to Pay (WTP) for improved clean water services in the coastal area of Bandar Lampung City was conducted using both direct and indirect valuation approaches. These methods are essential for capturing the economic value that households assign to non-market goods such as clean water, especially in areas where formal water infrastructure is limited or unreliable.

The direct methods employed in this study include the Contingent Valuation Method (CVM) and the Discrete Choice Method, both of which rely on structured surveys administered to residents in the study area. These surveys were designed to elicit respondents' preferences and monetary valuations for hypothetical improvements in water quality and supply. The CVM, in particular, is a widely used technique in environmental economics due to its flexibility and ability to estimate both use and non-use values. In this method, respondents are asked directly how much they would be willing to pay for a specific environmental improvement in this case, access to cleaner and safer drinking water. This approach allows researchers to capture individual utility values even if the respondents do not currently use the improved service, making it especially useful in assessing latent demand.

The Discrete Choice Method, on the other hand, presents respondents with a set of alternatives, each with varying attributes and associated costs. By analyzing the choices made, researchers can infer the relative importance of different service features and estimate WTP indirectly. This method complements CVM by providing insights into trade-offs that households are willing to make, such as paying more for better water quality or more reliable supply.

In addition to these direct methods, the study also utilized an indirect method known as the Water Management Cost Method. This approach estimates WTP based on actual expenditures and behaviors reported by respondents, such as the cost of purchasing bottled water, installing water filters, or maintaining private wells. By analyzing these costs, researchers can infer the implicit value that households place on clean water, even in the absence of formal pricing mechanisms.

To analyze the relationship between WTP and socio-economic variables, the study employed binomial logistic regression analysis. This statistical framework is suitable for modeling binary outcomes. In this case, whether a respondent is willing to pay or not based on one or more explanatory variables. Variables included in the model were age, gender, education level, occupation, household income, number of family members, and monthly expenditures. Logistic regression allows for the identification of significant predictors of WTP and helps quantify the strength of these relationships.

The survey instrument was carefully designed to ensure clarity and relevance, drawing on best practices from previous studies in similar contexts. For example, Richards et al. (2006) examined quality of life indicators in informal settlements in South Africa, highlighting the role of unemployment and socio-economic stressors in shaping household priorities. Similarly, Wekesa et al. (2011) emphasized the impact of poor housing conditions and overcrowding on urban health outcomes. These studies informed the inclusion of variables related to household structure and economic vulnerability in the present research.

Data collection was conducted through face-to-face interviews with randomly selected households in the coastal area of Bandar Lampung. Enumerators were trained to ensure consistency in survey administration and to minimize bias. The study area was mapped using secondary data sources, including population statistics and geographic information systems (GIS), to ensure representative sampling and spatial coverage.

Ethical considerations were also taken into account. Respondents were informed about the purpose of the study, and participation was voluntary. Confidentiality was maintained throughout the data collection and analysis process. Overall, the combination of direct and indirect valuation methods, supported by robust statistical analysis and contextual understanding, provides a comprehensive framework for estimating WTP and informing policy decisions related to urban water management in Bandar Lampung City.

Therefore, it is important to understand the socio-economic characteristics of the coastal communities in Bandar Lampung City. The data used in this analysis consists of: age, gender, highest level of education, type of occupation, household head's income, household head's education, household head's occupation, number of family members, monthly personal expenditure, monthly household expenditure, and price of water the community is willing to pay as primary data. Then for secondary data are map of the study area and population data of the study area.

To effectively address water scarcity and support sustainable urban development in Bandar Lampung City, it is essential to understand the socio-economic characteristics of its coastal communities. The collection of primary data including variables such as age, gender, education level, occupation, income, household size, and monthly expenditures provides critical insights into the financial capacity and behavioral tendencies of residents regarding water consumption. These factors directly influence the community's willingness to pay for clean water, which is a key indicator for designing equitable and feasible water service improvements. For instance, households with higher income or education levels may be more aware of the health risks associated with poor water quality and thus more willing to invest in improved services. Additionally, data on household expenditures helps assess affordability and prioritize interventions for vulnerable groups, such as large families or female-headed households. Secondary data, such as maps and population statistics, complements this analysis by enabling spatial assessments and demographic profiling, which are crucial for planning infrastructure and estimating future water demand. Together, these datasets form the foundation for evidence-based decision-making, allowing policymakers and stakeholders to develop targeted strategies that align with community needs, promote inclusivity, and contribute to the achievement of Sustainable Development Goal 6 (Clean Water and Sanitation). Ultimately, this comprehensive understanding is vital for ensuring that water management solutions are both socially responsive and environmentally sustainable.

3. Results and Discussion

The discussion of the research findings and the results of the analysis is presented in both theoretical and empirical terms, using qualitative and quantitative approaches. The study involved a total of 100 respondents, consisting of 40 individuals who are existing customers of the regional water utility/*Perusahaan Daerah Air Minum* (PDAM) and 60 individuals who are prospective customers. This sample composition was intentionally designed to capture a diverse range of perspectives regarding water access, usage patterns, and willingness to pay (WTP) for improved services. By including both current and potential PDAM users, the study was able to compare behavioral tendencies and socio-economic influences across different user groups. The inclusion of prospective customers many of whom rely on alternative water sources such as wells, boreholes, or rainwater harvesting provided valuable insights into the challenges faced by households outside the formal water supply network. Furthermore, the use of mixed methods allowed for a more nuanced understanding of the factors driving WTP, including demographic characteristics, perceived water quality, and household financial capacity. Quantitative data were analyzed using statistical tools such as Contingent Valuation Method (CVM) and the Discrete Choice Method to identify significant predictors of WTP, while qualitative responses helped contextualize the numerical findings and reveal underlying motivations and concerns. This comprehensive approach ensures that the study's conclusions are grounded in both measurable trends and lived experiences, thereby enhancing the relevance and applicability of the research to real-world policy and planning efforts.

Demographic factors such as gender and age play a significant role in shaping individuals' willingness to pay (WTP), particularly in the context of public services and consumer behavior. Gender differences in WTP can be attributed to variations in risk perception, spending priorities, and household roles. For instance, women, who often assume primary responsibility for household health and well-being, may exhibit a higher

WTP for services that directly impact family safety, such as clean drinking water or sanitation. Conversely, men may demonstrate higher WTP in areas associated with convenience, performance, or status, reflecting different value orientations.

These gendered patterns are further influenced by cultural norms and decision-making dynamics within households, which may affect how financial choices are made and reported. Age also significantly influences WTP, as it correlates with income stability, life stage, and future orientation. Younger individuals, typically in early career stages or still pursuing education, may have limited financial capacity and thus lower WTP, although they may prioritize services that align with their lifestyle preferences, such as digital access or mobility. Middle-aged individuals, often with greater financial resources and family responsibilities, tend to evaluate WTP based on long-term benefits and reliability. In contrast, older adults may have reduced WTP due to fixed incomes or conservative spending habits, yet they may be more willing to invest in services that enhance health, comfort, or safety. These demographic insights are essential for designing inclusive pricing strategies and service delivery models that reflect the diverse needs and constraints of target populations. By recognizing how gender and age influence WTP, planners and service providers can tailor interventions to improve accessibility, equity, and user satisfaction.

3.1 Socio-demographic characteristics of the community

Based on the table 1, the sample population has an average age of 49 years, predominantly male, with the highest level of education being senior high school. The average monthly personal expenditure of PDAM customers in the coastal area of Bandar Lampung City is IDR 496,500, while the average monthly household expenditure is IDR 2,126,250. The average monthly cost paid for clean water is IDR 99,000, with an average daily household water consumption of 517.25 liters, and an average of four family members per household. The table below outlines the identification of the socio-demographic characteristics of the coastal community in Bandar Lampung City.

Table 1. socio-demographic characteristics of the coastal community in Bandar Lampung City

Name of Variable	Unit of Meassurement	Mean	Standart od Deviation	Min	Max
Age	Number	45.28	14.92	19	77
Gender	Sex	Man	0.483	1	2
Highest level of education	Level of Education	Junior High School	1.102	1	4
Type of occupation	Type of jobs	Merchant	1.93	1	7
Number of family members	Number	4.05	1.61	1	8
Monthly personal expenditure	Rupiah (IDR)	496,500	502,499,139	50,000	2,100,000
Monthly household expenditure	Rupiah (IDR)	2,126250	1,091,105,503	0	4,200,000
Monthly Clean Water Tariff	Rupiah (IDR)	99,000	62,431,501	10,000	3,00,000
Daily Household Water Consumption	Liter (L)	517.25	196,234	140	1020

The standard deviation value, which is higher than the average monthly expenditure, indicates a significant disparity in income among the respondents. Empirical findings from the table suggest that respondents generally experience disruptions in groundwater supply, which contributes to a relatively high willingness to pay for clean water on a monthly basis. Based on the table below, the average age of the respondents is 40 years, with the majority being male, and the highest level of education attained is senior high school. The average

monthly personal expenditure of prospective PDAM customers in the coastal area of Bandar Lampung City is IDR 496,500, while the average monthly household expenditure is IDR 2,560,833. The average monthly cost paid for clean water is IDR 130,283, with an average daily household water consumption of 505.33 liters, and an average of four family members per household. The relatively high standard deviation in monthly expenditure indicates a significant disparity in income among the respondents. Empirical findings from the table suggest that respondents generally experience disruptions in groundwater supply, which contributes to a relatively high willingness to pay for clean water on a monthly basis.

Table 2. Socio-demographic characteristics of prospective PDAM customers in the coastal area of Bandar Lampung City

Name of Variable	Unit of Meassurement	Mean	Standart od Deviation	Min	Max
Age	Number	40.00	13.320	17	68
Gender	Sex	Girl	0.497	1	2
Highest level of education	Level of Education	Junior High School	0.825	1	4
Type of occupation	Type of jobs	Private Sector Employee	2.09	1	7
Number of family members	Number	4.35	1.36	1	7
Monthly personal expenditure	Rupiah (IDR)	509,083.33	467,100,225	100,000	3,000,000
Monthly household expenditure	Rupiah (IDR)	2,560,833.33	1,680,977,613	250,000	10,000,000
Monthly Clean Water Tariff	Rupiah (IDR)	130,283.33	86,347,365	15,000	500,000
Daily Household Water Consumption	Liter (L)	505.33	159,006	100	920

3.2 Factor that affecting WTP's by respondent

This section discusses the factors influencing the amount of Willingness to Pay (WTP) among respondents residing in the coastal area of Bandar Lampung City, using binary logistic regression analysis. The analysis is divided into two sample groups: existing PDAM customers and prospective PDAM customers, as follows:

Table 3. Factors influencing the willingness to pay (WTP) of coastal community customers for PDAM Services in Bandar Lampung City.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age	-0.047	0.030	2.57	1	0.108	0.954
	Gender	1.11	0.954	1.35	1	0.244	3.04
	Highest level of education	-1.72	0.711	5.87	1	0.015	0.178
	Type of Occupation	-0.98	0.391	6.32	1	0.012	0.375
	Number of Family Member	1.83	1.048	3.05	1	0.080	6.24
	Daily Household Water Consumption	-0.017	0.009	4.17	1	0.041	0.983
	Constant	9.81	4.00	6.01	1	0.014	18310.30

Based on the results of the binary logistic regression analysis, it was found that age, gender, level of education, number of family members, household water usage, and type of occupation significantly influence the willingness of PDAM customers in the coastal area of

Bandar Lampung City to pay for clean water in order to improve its quality in the slum coastal regions.

As respondents' age increases, their willingness to pay (WTP) for clean water tends to decrease. Male respondents were found to be 3,040 times more likely to express willingness to pay for improved clean water quality in the coastal slum areas. Furthermore, households with a larger number of family members were 6,244 times more likely to be willing to pay for clean water improvements compared to those with fewer family members.

Table 4. Factors influencing the willingness to pay (WTP) of prospective PDAM customers in coastal communities of Bandar Lampung City

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age	-0.029	0.029	1.02	1	0.312	0.972
	Gender	-0.518	0.699	0.548	1	0.459	0.596
	Highest level of education	-0.708	0.530	1.78	1	0.181	0.493
	Type of Occupation	0.638	0.189	11.34	1	0.001	1.89
	Number of Family Member	0.170	0.459	0.137	1	0.711	1.18
	Daily Household Water Consumption	0.002	0.004	0.389	1	0.533	1.00
	Constant	-0.987	2.853	0.120	1	0.729	0.373

Based on the results of the binary logistic regression analysis, it was found that age, gender, level of education, number of family members, household water usage, and type of occupation significantly influence the willingness of prospective PDAM customers in the coastal area of Bandar Lampung City to pay for clean water in order to improve its quality in the slum coastal regions.

As respondents' age increases, their willingness to pay (WTP) for clean water tends to decrease. The type of occupation was found to influence WTP by a factor of 1.892, indicating that certain job types are more likely to be associated with a higher willingness to pay for improved water quality. Additionally, households with a larger number of family members were 1,185 times more likely to be willing to pay for clean water improvements compared to those with fewer family members.

3.3 Disscussion

This study provides valuable insights into household preferences and financial readiness to support improvements in clean water infrastructure in the coastal area of Bandar Lampung City. By estimating monthly household Willingness to Pay (WTP) and analyzing initial revenue prospects, the research highlights both opportunities and challenges in implementing water service upgrades. The finding that 53% of respondents are willing to pay more for better drinking water quality, while 47% prefer to maintain the status quo, underscores a critical tension between demand and affordability. This split suggests that while there is a latent demand for improved services, nearly half of the population may be constrained by economic limitations or skeptical about the value proposition of such investments.

One of the most striking observations is that some respondents who initially expressed willingness to pay later opted out, indicating a shift in perception once cost implications became clearer. This behavioral shift reflects a common phenomenon in contingent valuation studies, where hypothetical willingness does not always translate into actual financial commitment. It also points to the importance of perceived benefit versus perceived cost, especially in low- to middle-income households. If the perceived improvement in

water quality is not substantial or immediate, households may deprioritize such expenditures in favor of more pressing needs.

The study identifies three key factors influencing WTP: general preference for improved water systems, household size, and gender. The first finding that both PDAM customers and users of alternative sources (e.g., boreholes, groundwater) prefer improved systems suggests dissatisfaction with current water services across the board. This dissatisfaction may stem from inconsistent supply, poor water quality, or lack of trust in existing infrastructure. It also indicates a potential market for expanded or upgraded services, provided that affordability and reliability can be ensured.

The second finding, that larger households exhibit higher WTP, aligns with established literature on water demand. Larger families naturally consume more water, and the risks associated with poor water quality such as illness, are magnified in such contexts. Therefore, these households may be more motivated to invest in safer and more reliable water sources. However, this also raises equity concerns: while larger households may be more willing to pay, they may also be more vulnerable to price increases, especially if income levels do not scale proportionally with household size.

The third finding, that male respondents show higher WTP than female respondents, invites a deeper exploration of gender dynamics in household decision-making. In many Indonesian households, men are traditionally viewed as financial decision-makers, which may explain their greater willingness to commit resources to infrastructure improvements. However, this interpretation risks oversimplifying the issue. Women, who often manage daily water use for cooking, cleaning, and childcare, may have a more intimate understanding of water-related challenges. Their lower WTP may reflect limited financial autonomy rather than a lack of concern. This highlights the need for gender-sensitive policy design, ensuring that women's voices and priorities are adequately represented in water planning processes.

Moreover, the study touches on the role of risk perception in shaping WTP. Despite the public health implications of poor water quality, not all respondents viewed it as a priority. This may be due to a lack of awareness about long-term health risks or a belief that current water sources are "good enough." Araral (2010) notes that demographic factors such as age, gender, and education are weak but significant predictors of risk perception. In this study, the majority of respondents were male (56%), which may partially explain the relatively low concern for water quality. This finding suggests that public education campaigns are essential to raise awareness about the health benefits of clean water and the risks of contamination. Without such efforts, even well-designed infrastructure projects may fail to gain public support.

From a policy perspective, the study's findings offer both encouragement and caution. The fact that over half of respondents are willing to pay for improved services provides a foundation for cost-recovery models, such as tiered pricing or public-private partnerships. However, the substantial proportion of households unwilling to pay highlights the need for targeted subsidies, especially for low-income and vulnerable populations. Policymakers must balance financial sustainability with social equity, ensuring that water services are accessible to all, regardless of income level.

In coastal areas like Bandar Lampung, where environmental risks and informal settlements are prevalent, infrastructure planning must also account for climate resilience and spatial equity. Water systems should be designed not only to meet current demand but also to withstand future challenges such as sea-level rise, flooding, and population growth. This requires integrated planning that combines technical solutions with community engagement, financial modeling, and environmental safeguards.

Critically, while the study provides a strong foundation for understanding household WTP, it could benefit from further methodological refinement. For instance, the use of purposive sampling while appropriate for exploratory research limits the generalizability of findings. Future studies should consider stratified random sampling to capture a broader range of socioeconomic conditions. Additionally, incorporating qualitative methods, such as

focus group discussions or in-depth interviews, could enrich the analysis by uncovering the motivations, fears, and expectations behind WTP decisions.

In conclusion, this study underscores the importance of understanding community preferences and socio-economic conditions when planning urban water improvements. The willingness to pay for clean water is influenced by a complex interplay of household characteristics, gender roles, risk perception, and financial capacity. By addressing these factors through inclusive policies and community engagement, Bandar Lampung City can move toward a more sustainable and equitable urban water system.

4. Conclusions

This study set out to assess the willingness to pay (WTP) for improved clean water services among residents of the coastal area of Bandar Lampung City and to identify the socio-demographic factors that influence this willingness. The findings provide valuable insights into the economic behavior and preferences of households in a region facing significant challenges in water access and quality. The results indicate that existing PDAM customers are willing to pay an average of IDR 99,000 per month for improved water services, with gender and the number of family members emerging as significant influencing factors. Meanwhile, prospective PDAM customers or those relying on alternative water sources such as wells and groundwater reported a higher average monthly water expenditure of IDR 130,283, often bundled with electricity costs. Within this group, age and occupation type were found to be statistically significant, with older respondents showing lower WTP and certain occupations increasing the likelihood of willingness to pay by a factor of 1.892.

These findings suggest that while there is a clear demand for improved water services, the ability and willingness to pay vary across different segments of the population. Gender differences in WTP may reflect traditional household roles, where men, often acting as heads of households, are more likely to make financial decisions related to infrastructure investments. The influence of family size on WTP is also consistent with the notion that larger households have greater water needs and are therefore more motivated to secure reliable and safe water sources. On the other hand, the lower WTP among older respondents may be attributed to fixed incomes or a lower perceived need for change, especially if they have adapted to existing water sources over time.

It is important to acknowledge the limitations of this study. The sample size was relatively small due to safety concerns and time constraints, which may affect the generalizability of the results. The data collection was limited to specific coastal areas, and while efforts were made to ensure representativeness, broader studies covering more diverse geographic and socio-economic contexts would be beneficial. Despite these limitations, the study provides a foundational understanding of community preferences and economic behavior related to water services in Bandar Lampung City.

Given the limitations of this study particularly the relatively small sample size and the geographic concentration in specific coastal areas of Bandar Lampung future research should aim to expand both the scope and depth of analysis to enhance generalizability and policy relevance. A larger-scale study involving multiple districts or cities across different socio-economic and environmental contexts in Indonesia would provide a more comprehensive understanding of household willingness to pay (WTP) for clean water services. Another promising direction is to investigate the longitudinal aspects of WTP. Tracking changes in household attitudes and payment behavior over time, especially before and after infrastructure improvements would provide insights into how perceived value evolves and how trust in service providers affects willingness to invest. This could be complemented by experimental designs, such as randomized controlled trials (RCTs), to test the impact of different pricing models, public awareness campaigns, or service delivery mechanisms on WTP.

From a policy perspective, the findings offer several implications. First, the identified WTP levels can serve as a benchmark for designing tiered pricing models that reflect

household capacity and promote equity. Policymakers should consider implementing flexible payment schemes or subsidies for low-income and elderly households to ensure inclusive access to clean water. Second, the role of occupation and income in shaping WTP highlights the need for targeted outreach and education campaigns that emphasize the health and economic benefits of improved water services. These campaigns can help shift perceptions and increase community support for infrastructure investments.

Furthermore, the study underscores the importance of integrating socio-demographic data into urban water planning. Understanding the characteristics and preferences of different population groups enables more responsive and effective service delivery. For example, areas with high concentrations of large families or informal workers may require different infrastructure solutions than those with predominantly elderly or single-person households. By aligning water service improvements with community needs, local governments and service providers can enhance both efficiency and public satisfaction.

In conclusion, this research contributes to the growing body of literature on urban water management in developing countries by providing empirical evidence from a rapidly urbanizing coastal city in Indonesia. The willingness to pay for clean water among Bandar Lampung's coastal residents reflects both the urgency of the issue and the potential for community-driven solutions. Future studies should build on these findings by expanding the scope of data collection, incorporating longitudinal analysis, and exploring the impact of environmental factors such as climate change and coastal degradation. Ultimately, ensuring access to clean water is not only a matter of infrastructure but also of understanding and addressing the socio-economic realities of the communities it serves.

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