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Socio Demographic Profile of Clean Water Community a Case of Anggori County, Manokwari-West Papua

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A B S T R A C T

The availability of clean water is a crucial factor in supporting the health and well-being of communities, particularly in rural areas that still face limited basic infrastructure. This study aims to identify and analyze the socio-demographic profile of clean water users in Kampung Anggori, Manokwari Regency, West Papua. The approach used is quantitative descriptive with data collection through surveys and interviews with heads of households as the main respondents. The socio-demographic variables analyzed include age, gender, education level, occupation, family size, and income level. The results show that the majority of the population is from the productive age group, with relatively midle education levels and a dominance of employment in the informal sector. The main sources of clean water used are springs and rivers, with usage patterns depending on the season and geographical conditions. These findings highlight the urgent need for policy interventions in clean water provision that take into account the local social and demographic conditions. This study is expected to serve as a basis for decision-making by local governments and stakeholders in designing sustainable and equitable clean water provision programs

INTRODUCTION

Kampung Anggori is one of the villages in the Manokwari Regency that continues to face various development challenges, particularly in terms of basic infrastructure such as access to clean water. Geographical conditions, limited technology, and socio-cultural factors are significant elements that affect access to and usage of clean water in this area (Garcia et al. 2013; Figueroa and Kincaid 2010).

The socio-demographic profile of the community—such as age, education, occupation, and household size—plays a critical role in influencing behavior and patterns of clean water consumption (Matos et al. 2014a, 2014b; García-Betancourt et al. 2015). Therefore, a comprehensive understanding of these demographic characteristics is essential as a foundation for designing targeted and sustainable policy interventions. According to BPS (Statistics Indonesia) data in 2022 (BPS Manokwari 2022), only around 65% of households in West Papua have access to proper clean water sources. Condition in Kampung Anggori based on preliminary observations and reports from the local district government, residents of Kampung Anggori still rely on natural water sources such as springs and rivers, which have not been hygienically standardized. Education and economic level of the majority of the population in Kampung Anggori works in the informal sector and traditional agriculture, with primary education being the highest level of schooling attained by most. Waterborne diseases such as diarrhea and skin infections still frequently occur, indicating a possible connection to the quality and availability of clean water (García-Betancourt et al. 2015; Daniel et al. 2021).

This study is essential to provide an objective overview of the social and demographic conditions of clean water users in Kampung Anggori. It provides empirical data to support decision-making by local governments and non-governmental organizations in designing clean water provision programs (García-Betancourt et al. 2015; Cahyadi, Kusumaningrum, and Prasetyoputra 2022; Ramsey, Berglund, and Goyal 2017). Additionally, it serves as a preliminary reference for further studies related to community-based health interventions and clean water infrastructure in the West Papua region.

Based on the background and existing facts, the research problems formulated in this study are what are the socio-demographic characteristics of clean water users in Kampung Anggori?, What are the sources and patterns of clean water usage among the community in Kampung Anggori?, and What challenges are faced by the community in obtaining and using clean water?. Research aims are to identify the socio-demographic profile of clean water users in Kampung Anggori, to describe the sources and patterns of clean water usage in the community, and to analyze the issues related to clean water availability and accessibility. Research Significance are contributing to the academic reference base on socio-demographic studies and environmental health in rural Indonesia. Provides input to local governments, NGOs, and other stakeholders in planning clean water programs that align with the characteristics of the local community.

LITERATURE REVIEW

Water and Basic Need

Water is an essential basic need that is inseparable from the daily life of all living creatures on Earth. Water is vital for all living organisms, including animals, plants, and humans. All living beings require water, and without it, life would not be possible. Similarly, humans may survive for several days without food, but they cannot survive for several days without drinking. For humans, the need for water is crucial, as the majority of the human body is made up of water, approximately 73% of the body without fat tissue. If the body does not receive enough water or loses 5% of its body weight (in children and adults), it can lead to severe dehydration. A loss of 15% of body weight due to water loss can lead to death. Therefore, adults need to drink between five to two liters of water per day, or approximately 2,200 grams daily (Soemirat 2000).

In maintaining human survival, humans strive to obtain enough water. However, much of the water used does not always meet health standards, as it often contains microorganisms or substances that can cause diseases, which may jeopardize human life. In daily life, humans are highly dependent on water, as it is used for activities such as washing, cleaning, bathing, and others. Other benefits of water include its use for power generation, irrigation, transportation, and similar purposes. As society advances culturally, water usage tends to increase.

Water Needs in Terms of Quantity

Directly or indirectly, pollution will affect water quality. In line with the basic considerations for determining drinking water quality, water management efforts for water used by humans as drinking water refer to water quality standards, especially in assessing the drinking water products it produces, as well as in planning the systems and processes to be carried out on water resources (Trisna 2018).

Groundwater quality is influenced by several factors, including climate, lithology, time, and human activities. As described below a. Climate includes rainfall and temperature. Temperature changes affect the dissolution of gases. The lower the temperature, the more gases remain dissolved. Rainfall that falls on the earth's surface will dissolve chemical elements such as oxygen, carbon dioxide, nitrogen, and other elements. b. Lithology refers to the type of soil and rock where water will dissolve solid elements from the rock. c. Time: The longer groundwater stays in one place, the more elements will dissolve into it. d. Human Activities: Population density negatively affects groundwater when human activities disregard environmental concerns, such as improper waste disposal and human waste (Suparmin 2000).

METHODOLOGY

This research was conducted over a period of three (3) months, from March 15, 2023, to June 15, 2023. The study was carried out in Kampung Anggori, Manokwari, with the village boundaries defined as follows to the East, it borders the Manokwari Timur District with a length of 1.5 km. To the West, it borders RT 01 A1 of the Unipa Amban/Anggori Faculty Housing with a length of 1 km. To

the North, it borders Petrus Kafiyar, Amban Beach with a length of 2.5 km. To the South, it borders Insifuri Village, Gunung Meja, and the Amban Protected Forest with a length of 2.5 km.

Figure 1. Field Research Sites

The tools used in this research included a camera, writing instruments, voice recorder, and measuring tape. The material used was a questionnaire, which was prepared and utilized during direct interviews. This research is a descriptive study using observation techniques, aimed at generally explaining and describing the activities of the community in utilizing clean water and the efforts made to provide it. The total sample was drawn from the population of Kampung Anggori, consisting of 159 households (HHs) and 636 individuals. Due to the relatively large population size, sampling was conducted. The number of samples in this study was determined using the Slovin's formula as proposed by Sumartono and Astria (2019). Formula: $n = \frac{N}{1+Ne^2}$ where n = number of samples, N = total population (159 households), and e = margin of error (12%).

Based on this formula, the sample size was calculated to be 49.68, rounded up to 50 respondents. The selected respondents were the heads of households or individuals who are the main decision-makers in household water provision. According to Creswell (2014), and Snedecor and Cochran (1989), a sample size between 30 and 500 is considered appropriate for most research. The methods of data collection used in this study include direct observation of the research objects to gather data, direct interviews with community members regarding the research variables, supported by a questionnaire. Reference to relevant books and theoretical foundations related to the study.

Qualitative Data includes descriptive statements that explain and describe the patterns of water consumption and clean water procurement by the community. Quantitative Data includes numerical data related to clean water consumption, monetary sacrifices made by the community to obtain clean water, factors influencing water consumption, and factors affecting the willingness of the community to participate in water provision. Data Sources obtained through direct interviews with clean water users in Kampung Anggori using a

questionnaire. Secondary Data obtained through the review of documents, books, and reports related to the general conditions of the research area.

Observation Variables

Domestic Water Needs refer to the daily household needs such as bathing, washing, cooking, drinking, sanitation (toilets), and other activities like mopping, washing vehicles, watering plants, and drinking water for livestock. To estimate domestic water needs, the study uses the average daily water consumption per person along with the total population.

Table 1. Identification of Clean Water Procurement Efforts

No	Description	Unit of Measurement
1	Proportion of usage in one month	Liters
2	Value of expenditure (evaluated in Rupiah)	Rupiah
3	Volume of water storage owned	Liters
4	Water Source	Rainwater, Spring Water, Tank Water

The average is determined through daily usage data and secondary data collected via interviews with Kampung Anggori residents. Respondents in this study are heads of households. The formula used to calculate domestic water needs is as follows: Domestic Water Needs $= \frac{\text{Water Needs per Household per Day}}{\text{Number of Individuals per Household (people)}}$ Efforts Made by the Community in Providing Clean Water identified using Table 1.

Data Analysis

Data related to the characteristics of the Anggori Village community, the volume of clean water consumption, and the types of community participation in clean water provision were analyzed descriptively using tabulation techniques (Matos et al. 2014a; Daniel, Pande, and Rietveld 2021).

RESULTS AND DISCUSSION

Characteristics of Water Users in Anggori Village

The characteristics of the water-using community in Anggori Village are examined from the aspects of education, age, type of occupation, and sources of water used. These are presented in the following table. In terms of education, the highest number of respondents were those with a senior high school education level.

Table 2. Education Level of Water Users in Anggori Village

Education level	**Number**	**Proportion (%)**
Elemantary school	4	8
Junior high school	3	6
Senior high school	30	60
Diploma	1	2
Bachelor	12	24

Total	50	100

Sukartini (2016), Schröders et al. (2015), Hartarto (2021), and Cahyadi et al. (2022), in their study on Household Clean Water and Sanitation Provision in Indonesia, stated that the education level of the head of household is a significant factor influencing the availability of piped or pumped clean water in households, whether in poor or non-poor households living in urban or rural areas. Households led by heads with secondary education are more likely to have access to piped or pumped clean water compared to those headed by individuals with only elementary school education. Therefore, considering the high percentage of residents in Anggori Village who have completed senior high school and possess adequate literacy skills, it is expected that public education regarding public facilities and active participation in local institutions in Anggori Village can be effectively carried out.

Based on age characteristics, the largest age group of respondents in Anggori Village is between 41 and 50 years old, comprising 38% of the total respondents, followed by those aged 31 to 40. Thus, it can be said that the majority of the population in Anggori Village belongs to the productive age group.

Table 3. Age Groups of Water Users in Anggori Village

Age group	Sum	Proportion (%)
20 - 30	4	8
31 - 40	11	22
41 - 50	19	38
51 - 60	9	18
61 - 70	7	14
Total	50	100

Hartarto (2021) and Tanziha et al. (2023) stated that in relation to age, it was found that the age variable is generally significant in influencing the availability of water in households. Through the process of learning by doing, awareness of the importance of access to clean water increases with age. This is evidenced by examining the effect of the age of the household head on the availability of piped or pumped clean water in the household. It was found that age is generally a significant variable affecting the availability of piped or pumped water. Among poor and non-poor rural households, as well as non-poor urban households, the odds ratio for this variable in each of the three household categories was 1.006, 1.002, and 1.0143 respectively. This means that for poor rural, non-poor rural, and non-poor urban households, each additional year of age of the household head tends to increase the likelihood of having access to piped or pumped clean water by 1.006, 1.002, and 1.014 times respectively, compared to those who are younger.

The type of occupation indicates the daily activities performed by the respondents and also influences the level of income earned, all of which affect household consumption decisions. The types of occupations of water users in Anggori Village can be seen in the following Table 4.

Table 4. Types of Occupation and Income of the Anggori Village Community

No	Occupation Type	Number of People	Percentage (%)	Minimum Income (IDR)	Maximum Income (IDR)	Average Income (IDR)
1	Manual Laborer / Contract Worker	6	12	500,000	1,500,000	1,300,000
2	Farmer	18	36	500,000	4,000,000	1,050,882
3	Retired	3	6	1,500,000	4,500,000	2,500,000
4	Civil Servant	14	28	1,100,000	4,859,000	3,389,929
5	Private Sector Employee	9	18	500,000	3,500,000	1,900,000
	Total	50	100		Average	2,011,149

The most common occupation among respondents who use clean water in Anggori Village is farming/plantation work, accounting for 36%, followed by civil servants at 28%, including claning service and/or office boy. The average income for these groups is IDR1,050,882 and IDR3,389,929 respectively. According to Daniel et al. (2021), Garcia et al. (2013), García-Betancourt et al. (2015), and McDonald and Kayaga (2023), several variables are commonly used as indicators to measure socioeconomic status, including occupation, income, and education level, where a person's social status influences their consumption behavior. Communities with higher social status tend to be more aware of managing resources responsibly. The condition of the Anggori community in terms of the sources of clean water they commonly use can be seen in the following Table 5.

Table 5. Types of Water Sources and Number of Users in Anggori Village

No	Water Source Used	Number of People	Proportion (%)
1	UNIPA Water Pump Spring	18	36
2	Remusi Spring	9	18
3	Purchased Water (Profile Tank)	46	92
4	Rainwater	50	100

There are four types of water sources commonly used by the people of Anggori Village, with the highest usage being rainwater collection (100%). Not all residents have access to spring water at a low cost or for free.

Several studies conducted by the World Bank regarding the impact evaluation of increased access to clean water in several developing countries show that clean water access has a positive influence on community economic activities, environmental sanitation, health levels, and a reduction in infant mortality due to diarrhea (Sukartini 2016). Given the importance of clean water access for community life, it is essential to implement optimal and sustainable management of water sources.

Clean Water Consumption and Influencing Factors

Clean water is a basic necessity of life. Almost all daily activities require clean water, including drinking, bathing, cooking, washing, and other tasks. The vital role of water in life means that the need for and availability of clean water must be carefully managed. The results of the survey and interviews on household water consumption and expenditures for water purchases in Anggori Village are shown in the following Table 6.

Table 6. Household Clean Water Consumption and Expenditures

Description	Minimum	Maximum	Average
Family Members (People)	1	9	5
Water Consumption (liters/month)	1,542	1,650	1,582.3
Water Consumption per Person per Day (liters)	5.78	52	15.20
Water Storage Capacity (liters)	1,200	4,800	2,695.2
Income (IDR/month)	500,000	4,859,000	1,884,163
Water Expenditure (IDR/month)	80,000	500,000	189,200

According to Suheri et al. (2019), water needs for human activities vary depending on the intensity of activities carried out by the community. Referring to UNESCO, the average human right to water is 60 liters per person per day. In addition, the Directorate General of Human Settlements of the Ministry of Public Works also categorizes clean water standards based on regional location (Kementerian Kesehatan 2017). These clean water needs are rural areas: 60 liters per capita per day, small towns: 90 liters per capita per day, medium-sized cities: 110 liters per capita per day, large cities: 130 liters per capita per day, and metropolitan areas: 150 liters per capita per day. Meanwhile, according to the Regulation of the Minister of Home Affairs Number 23 of 2006 on Technical Guidelines and Procedures for Clean Water Tariff Regulation at Regional Water Companies, the Standard Basic Water Requirement is defined as 10 cubic meters per household per month or 60 liters per person per day, or another volume unit as further determined by the Minister in charge of water resource affairs. Considering that the average clean water consumption in Anggori Village is only 15 liters per capita per day, it can be concluded that water usage is still far below the normal standard. Therefore, efforts are urgently needed to improve access to sufficient water for the residents of Anggori to meet basic needs. The standard daily clean water requirement per person according to the Indonesian National

Standard (SNI) is 120 liters/person/day. Meanwhile, the WHO standard is 50–100 liters/person/day (Kementerian Kesehatan 2017).

According to Mawardi (2014), the direct impact of inadequate water supply is poor sanitation. In relation to the global water crisis, poor sanitation is also a problem for around 2 billion people worldwide. Many diseases are caused by water scarcity and poor sanitation, such as cholera, typhoid, and dysentery, which continue to pose threats to parts of the global population. Based on a report by UNESCO (2012), about 2 million people, most of whom are children from poor and developing countries, die each year from these diseases and from water shortages. The water crisis can also disrupt regional and national economies.

The policy recommendation that addresses the key issues found in Anggori Village, i.e. Improve Rainwater Harvesting Systems. Provide technical and financial support to upgrade household rainwater collection systems e.g., installation of larger and safer storage tanks, first flush systems, and filtration units. Conduct training on proper rainwater harvesting, treatment, and maintenance practices. Develop Alternative and Sustainable Water Sources. Explore and invest in alternative clean water sources such as drilled wells or community-managed boreholes. Assess the potential for small-scale piped water systems or gravity-fed water supply systems from nearby springs or rivers. Subsidized Water Infrastructure for Low-Income Households. Introduce a subsidy program for the construction of household water storage facilities, especially for families with larger numbers of members or low income. Prioritize infrastructure support for vulnerable groups, such as elderly-led households and those without civil servant income. Water Conservation and Education Campaign Launch community-based awareness programs on water conservation, hygiene, and the efficient use of stored water. Engage local schools and religious institutions in promoting water-saving behavior. Data Collection and Monitoring System. Establish a regular monitoring system to track household water consumption and supply quality. Use data to continuously evaluate the effectiveness of implemented policies and adjust interventions accordingly.

CONCLUSIONS AND RECOMMENDATIONS

The characteristics of the respondents who use clean water in Anggori Village are dominated by residents aged between 40 and 50, with an average income of IDR 2,011,149 per month, having a high school education, and working as farmers or civil servants. The primary source of clean water used is rainwater collection.

The average water consumption in Anggori Village is 15.20 liters per person per day, with an average monthly water expenditure of IDR189,200. The water consumption, as reflected in the monthly water expenditure, is significantly influenced by the number of family members, access to water sources, and the water storage capacity owned by the households.

FURTHER STUDY

This study still has limitations, so further research is needed related to the topic of Socio-Demographic Profile of Clean Water Community a Case of Anggori County, Manokwari-West Papua in order to perfect this study and increase insight for readers.

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