ANALYSIS OF DOMESTIC DRINKING WATER USE BEKASI CITY, WEST JAVA, INDONESIA

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ABSTRACT

The purpose of this study is to determine the latest average value of domestic drinking water usage in Bekasi City and analyze the factors that influence changes in the average use of domestic drinking water in Bekasi City. This type of research is quantitative research with linear regression analysis. Data collection was carried out by distributing questionnaires and interviews. The population of Bekasi City is 3,075,690 people, with a sample size of 320 respondents. The results showed that the Income variable had an effect on the Domestic Drinking Water Use variable in Bekasi City, with a significance value of 0.00 <0.05 and a calculated t value of 6.144 <12.71. The Higher Education Level variable affects the Domestic Drinking Water Use variable in Bekasi City, with a significance value of 0.021> 0.05 and a calculated t-value of 2.357 < 12.71. The Decent Housing variable affects the Domestic Drinking Water Use variable in Bekasi City, with a significance value of 0.022 <0.05 and a calculated t-value of 3.180 <12.71. The average value of domestic drinking water usage in the latest Bekasi City is 243.093 liters/person/day in 2024.

Keywords: *Drinking Water Usage, Income, Education Lavel, Decent Housing*.

1. INTRODUCTION

Since water is the source of life for all living creatures on Earth, water is necessary for all living things to exist. Given that water makes up 70% of a living thing's body, humans greatly rely on it (Wardini, 2023). It might be lethal if the human body's water content drops. All life on Earth, including people, animals, and plants, depends on water. Actually, water is the source of all life.

One of the necessities for all living things, including humans, is clean water, which is required constantly. Sea water, made possible by technological advancement, may be used by people, as can runoff, rainfall, and groundwater. Groundwater, lakes, and rivers are the significant water sources on land. Water for irrigation, domestic usage, and industrial uses is obtained from this source (Zulhimi *et al*. 2019). According to Martila (2020), clean water is defined as water that satisfies all physical, chemical, biological, and radiological requirements and is suitable for daily use without producing any negative consequences when eaten. Water is essential to daily life and is required for several purposes, including homes, workplaces, small and big businesses, and places of worship (Boli *et al*., 2021).

Everyone has a different type and frequency of water needs depending on their lifestyle and activities. Considering that the intensity and diversity of people's water requirements are growing, in addition to population growth, people's need for water can occasionally increase (Maliangkay *et al*., 2022). Naturally, various regions have distinct needs when it comes to clean water. The need for clean water services and supplies is occasionally growing, but service capacity isn't always keeping up with the demand. This increase in demand is due to factors such as population growth, improved living standards, urbanization, development of service areas and cities, and initiatives aimed at improving people's socioeconomic status, all of which are combined with an increase in per capita water consumption. Theoretically, the volume or amount of water on Earth does not increase or decrease (Alkatiri *et al*., 2019). Stated differently, the Earth's water volume is constant. There are around 1.4 billion cubic kilometers of water on Earth, of which 97.3% is salt water and 2.7% is fresh water. Water vapor in the Earth's atmosphere (0.04%), lake and marsh water (0.35%), groundwater absorption (22.4%), and ice caps on mountains and glaciers

(77.3%) are the forms that fresh water on land takes. The amount of water available for drinking is only a tiny portion of the water resource on Earth, yet it is enough to suit human requirements.

The SNI in 2002 and the Department of Settlement and Regional Infrastructure in 2003 have home water needs requirements. It is displayed in the table below.

Tabel 1. Household Water Demand Standard by City Type and Population

Total Population	City Type	Total Water Requirement (liters/person/day)
> 2.000.000	Metropolitan	> 210
1.000.000-2.000.000	Metropolitan	150-210
500.000-1.000.000	Large	120-150
100.000-500.000	Large	100-150
20.000-100.000	Medium	90-100
3.000-20.000	Small	60-100

At 26, Bekasi City transformed into a metropolitan city; as a result, it falls within the Metropolitan City category (Dewi, 2024). A comparatively big city in terms of territory, population, and social and economic activity is referred to as a metropolitan region. Metropolitan areas are either core urban regions with surrounding or stand-alone urban areas under Law Number 26 of 2007 Governing Spatial Planning (Rifai, 2019).

The researcher suspects that there are variations in the standard value of drinking water needs that could potentially be caused by specific factors because there is a year difference that is too great between the time of issuance of the Department of Settlement and Regional Infrastructure standards in 2003 and SNI in 2002 with the current period. Several elements, such as money, greater education levels, and quality housing, seem to be encouraging changes in the value of drinking water consumption, according to the researchers' references. Researchers decided to look more closely at the variables influencing variations in Bekasi City's value of drinking water use. The researcher named this study "Analysis of Domestic Drinking Water Use in Bekasi City" in response to this phenomenon.

2. METHODS

The research employs a quantitative approach because this methodology has distinct components from the outset, including objectives, subjects, concrete and comprehensive data sources, the use of samples, clarity in the research, and data analysis following the collection of all data (Arikuntoro, 2006). In Bekasi City, West Java, Indonesia, research is being conducted. The place of the research will be chosen with purpose, meaning that specific factors that are known to be in line with the researcher's goals will be taken into account. The population of Bekasi City is the subject of this research. According to information from the West Java Statistics Agency, the city will have 3,075,690 residents in 2020. The Slovin sampling approach with an error rate of 5% or 0.05 was utilized to determine the number of samples used in this investigation. The amount of household drinking water utilized in Bekasi City per capita per day is the dependent variable employed in this study. In this study, the three independent variables are the factors that determine income, higher education level, and decent housing.

Direct observation and the distribution of Gform-based questionnaires containing research-related comments are the main sources of data utilized in research projects. The secondary data used in this study was gathered from previously published research findings, journals, papers, websites, and government organizations involved in the original research. Software from SPSS is used to help with this analysis and this analysis technique. The data analysis technique employed for data testing was derived from the questionnaire responses provided by participants in compliance with the study's requirements.This study employs simple linear regression analysis because it investigates the link between a single independent variable and a dependent variable. In order to determine the direction of the functional or causal link between the variables of income, higher education level, and decent housing on domestic drinking water usage in Bekasi City, a simple linear regression analysis was employed in this study.

3. RESULTS AND DISCUSSION

3.1 The Effect of Income, Higher Education Level, and Unemployment Level on Changes in Average Domestic Drinking Water Use in Bekasi City

With a population of over 2 million, Bekasi City is part of a metropolitan area with a daily drinking water demand of 210 liters per person. Data about Bekasi City's average use of potable water for home usage needs to be updated. Some information on drinking water usage over the previous several years is required to determine the average use of household drinking water in Bekasi City.

Average use of domestic drinking water in Bekasi City in 2011:

Total Water Use in 2011
= 250.795.000 m³
Total Water Use Per Year in 2011
= 250.795.000 m³ / 12
= 20,899,583 m³
Total Water Use Per Day in 2011
= 20,899,583 m³ / 30
= 696,652 m³
Total Water Usage Per Household (SR)
= 696,652 m³ / 600.093
= 1,160 m³/SR
Total Water Use Per Person
(Assumption 1 residential house consists of 5 people)
= 1,160 m³ / 5
= 232 m³/SR
= 232 ℓ

Average domestic drinking water usage in Bekasi City in 2021
Total Water Use in 2021
= 252,453,449m³
Total Water Use Per Year in 2021

= 252,453,449m³ / 12
= 21,037,787 m³

Total Water Use Per Day in 2021
= 21,037,787 m³ / 30
= 701,259 m³
Total Water Use Per Household (SR)
= 701,259 m³ / 618,445
= 1.133 m³/SR
Total Water Usage Per Person
(Assumption 1 residential house consists of 5 people)
= 1,133 m³ / 5
= 226 m³/SR
= 226 ℓ

3.2 Income Factor

The income variable was utilized as the independent variable, and the domestic drinking water consumption variable in Bekasi City was the dependent variable. The Enter technique was employed in the linear regression test, which produced the following findings.

Tabel 2. Variables Entered/Removed Income Factors

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Income[b]	.	Enter

Tabel 3. Results of the Income Factor Summary Model Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.928[a]	.861	.856	.26982

a. Predictors: (Constant), Income

b. Dependent Variable: Water Usage

The correlation or connection (R) value of 0.928 may be explained by looking at the Model Summary table. Additionally, a coefficient of determination (R2) of 0.861 is found, indicating an 86.1% influence of the independent variable (income) on the dependent variable (domestic drinking water use) in Bekasi City.

Tabel 4. ANOVA Test Results - Income Factor

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	245.563	4	61.390	77.158	.000[b]
	Residual	15.237	2	7.618		
	Total	260.800	6			

As can be seen from the Anova table above, the estimated F value = 77.158 with a significance level of 0.000 <0.05 indicates that the income variable in Bekasi City has an impact on the domestic drinking water usage variable.

Tabel 5. *Coefficients* Variable Income Factor

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.639	2.523		.649	.519
	Income	.729	.072	.528	6.144	.000

The constant value (a) in the coefficients table above is 1.639, and the income value (b / regression coefficient) is 0.729. These values allow us to write the regression equation as Y = a + Bx, Y = 1.639 + 0.729X. Thus, this equation may be understood as follows: (1) The constant value of 1.639 denotes that the Drinking Water User variable's consistency value is 1.639. (2) The regression coefficient X yields a positive result of 0.729, meaning that a one-unit rise in the income variable would result in a 0.729 increase in the drinking water user, providing that all other variables stay the same. A positive relationship exists between the income variable and the variable drinking water consumption. Therefore, the number of households using drinking water at home increases with per capita income.

Based on the significant value of the coefficient table, the value of 0.000 <0.05 is obtained, which shows that the income variable has an influence on the variable use of domestic drinking water in Bekasi City. This is the conclusion drawn from the simple linear regression test results. (2) The variable use of domestic drinking water in Bekasi City is not influenced by the income variable, this can be seen from the t value which shows that the tcount value is 6.144 < 12.71 (t table).

3.3 Higher Education Level Factor

Tabel 6. Variables Entered/Removed Higher Education Level Factor

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Higher Education Level [b]	.	Enter

Tabel 7. Results of the Higher Education Level Factor Summary Model Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.888[a]	.788	.780	4.142

a. Predictors: (Constant), Higher Education

b. Dependent Variable: Water Usage

Based on the Model Summary table, it explains the value of the correlation / relationship (R) which is 0.888. And obtained the coefficient of determination (R2) of 0.788 which means that the influence of the independent variable Education Level on the dependent variable Domestic Drinking Water Use is 78.8%.

Tabel 8. ANOVA Test Results - Higher Education Level Factor

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	612.530	4	153.132	16.50	.000[b]
	Residual	208.035	2	104.017		
	Total	820.565	6			

Based on the Anova table above, it can be seen that the value of F count = 16.50 with a significance level of 0.000 <0.05, which means that there is an influence of the Income variable

on the Domestic Drinking Water Usage variable in Bekasi City.

Tabel 9. *Coefficients* Variable Higher Education Level Factor

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	4.523	3.735		4.359	.000
Higher Education Level	.388	.075	.453	2.337	.021

Based on the coefficients table above, it can be seen that the constant value (a) is 4.523, while the value of the Higher Education Level (b / regression coefficient) is 0.388, so the regression equation is Y = a + Bx, Y = 4.523 + 0.388X. From this equation it can be interpreted that (1) The constant value of 4.523 indicates that the consistency value of the Drinking Water User variable is 4.523. (2) The regression coefficient X shows a positive result of 0.388, this indicates that if the value of the education level variable increases by one unit assuming other variables remain, it will increase drinking water users by 0.388. It can be concluded that the variable level of education on the variable use of drinking water is positive. So, the higher the per-capita education level, the higher the domestic drinking water users.

Decision making in the simple regression test, namely 1) Based on the significance value of the coefficient table, a value of 0.021 <0.05 is obtained, meaning that the education level variable has an effect on the Domestic Drinking Water Usage variable in Bekasi City. 2) Based on the t value, it can be seen that the tcount value is 2.357 < 12.71 (t table), so it can be concluded that the education level variable has no effect on the Domestic Drinking Water Usage variable in Bekasi City.

3.4 Affordable Housing Factor

Tabel 10. Variables Entered/Removed Affordable Housing Factor

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Affordable Housing Factor[b]	.	*Enter*

Tabel 11. Results of the Affordable Housing Factor Summary Model Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.863[a]	.745	.733	1.54094

a. Predictors: (Constant), Affordable Housing

b. Dependent Variable: Water Usage

Based on the Model Summary table, it explains the value of the correlation / relationship (R) which is 0.863. And the coefficient of determination (R2) of 0.745 is obtained, which means that the effect of the independent variable of decent housing (unemployment rate) on the dependent variable of Domestic Drinking Water Use is 74.5%.

Tabel 12. ANOVA Test Results - Affordable Housing Factor

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	450.266	4	153.132	63.209	.000[b]
	Residual	154.342	2	104.017		
	Total	604.609	6			

Based on the Anova table above, it can be seen that the value of F count = 63.209 with a significance level of 0.000 <0.05, which means that there is an influence of the variable unemployment rate on the variable Domestic Drinking Water Use in Bekasi City.

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Tabel 13. *Coefficients* Affordable Housing Factor

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	2.841	1.269		2.238	.029
Affordable Housing	.353	.111	.353	3.180	.002

Based on the coefficients table above, it can be seen that the constant value (a) is 2.841, while the value of Decent Housing (Unemployment Rate) (b/ regression coefficient) is 0.353, so the regression equation is Y = a + Bx, Y = 2.841 + 0.353X. The regression equation can be interpreted as (1) The constant value of 2,841 shows that the consistency value of the Drinking Water User variable is 2,841. (2) The regression coefficient X shows a positive result of 0.353, which indicates that if the value of the decent housing variable increases by one unit with the assumption that other variables remain, drinking water users will increase by 0.353. It can be concluded that the decent housing variable on the variable use of drinking water is buoyant. So, the higher the level of decent housing per capita, the higher the number of domestic drinking water users.

Decision-making in the simple regression test is (1) Based on the significance value from the coefficient table, a value of 0.022 <0.05 is obtained, meaning that the decent housing level variable affects the Domestic Drinking Water Use variable in Bekasi City. (2) Based on the t value, it can be seen that the tcount value is 3,180 < 12.71 (t table), so it can be concluded that the education level variable does not affect the variable Domestic Drinking Water Use in Bekasi City.

3.5 Questionnaire Statistics

Based on research conducted by researchers on 320 respondents, researchers get the results in the form of group data as follows.

Tabel 14. Questionnaire Result Group Data

No	Water Usage Range	Total
1	151-160	4
2	161-170	3
3	171-180	8
4	181-190	13
5	191-200	5
6	201-210	27
7	211-220	3
8	221-230	52
9	231-240	43
10	241-250	36
11	251-260	17
12	261-270	19
13	271-280	31
14	281-290	43
15	291-300	10
16	301-310	6
Total		320

Mean

Tabel 15. Mean Data

Value	f_i	x_i	$f_i \cdot x_i$
151-160	4	155.5	622
161-170	3	165.5	496.5
171-180	8	175.5	1404
181-190	13	185.5	2411.5
191-200	5	195.5	977.5
201-210	27	205.5	5548.5
211-220	3	215.5	646.5
221-230	52	225.5	11726
231-240	43	235.5	10126.5
241-250	36	245.5	8838
251-260	17	255.5	4343.5
261-270	19	265.5	5044.5
271-280	31	275.5	8540.5
281-290	43	285.5	12276.5
291-300	10	295.5	2955
301-310	6	305.5	1833
	$\Sigma f_i = 320$		**$\Sigma f_i \cdot x_i = 77790$**

Formula $\bar{x} = \frac{\Sigma fi.xi}{\Sigma fi}$.

Then, the mean value can be obtained, namely.

$\bar{x} = \frac{\Sigma fi.xi}{\Sigma fi}$

$\bar{x}$ = 77790

320

$\bar{x}$ = 243.093 liters/person/day

Median

Tabel 16. Median Value

Value	Frequency	Fk
151-160	4	4
161-170	4	7
171-180	3	15
181-190	8	28
191-200	13	33
201-210	5	60
211-220	27	63
221-230	3	115
231-240	52	158
241-250	43	194
251-260	36	211
261-270	17	230
271-280	19	261
281-290	31	304
291-300	43	314
301-310	10	320
	n = 320	

Me = tb + $\left\{\frac{\left(\frac{1}{2}n - \Sigma fk\right)}{fme}\right\} c$

Then, the median value can be obtained, namely.

Me=tb+{(1/2n− Σfk)/fme} c

Me=155.5+{(1/2(320)− 4)/4} 10

Me=155.5+{156/4} 10

Me=155.5+{39} 10

Me= 405,5 liters/person/day

Modus

Tabel 17. Modus Value

Value	Frequency
151-160	4
161-170	4
171-180	3
181-190	8
191-200	13
201-210	5
211-220	27
221-230	3
231-240	52
241-250	43
251-260	36
261-270	17
271-280	19
281-290	31
291-300	43
301-310	10
151-160	4

$Mo = tb + \left(\frac{d1}{d1+d2}\right) c$

$Mo = Tb + \left(\frac{d1}{d1 + d2}\right) c$

Mo = 155.5 + (4/4+0) 10

Mo = 155.5 + (1) 10

Mo = 155.5 + 10

Mo = 165,5 liters/person/day.

Based on the statistical data, it can be concluded that the study of domestic drinking water use in Bekasi City has an average (mean) value of 243.093 liters/person/day, then has a median value of 405.5 liters/person/day, then has a mode value of 165.5 liters/person/day.

4. CONCLUSION

Based on the results of the analysis of factors that affect changes in the average use of domestic drinking water in Bekasi City, namely income factors, higher education levels, and unemployment rates. The income factor affects the variable Domestic Drinking Water Use in Bekasi City because the significance value of the coefficients table obtained a significance value of 0.00 <0.05, and the t value can be known as the calculated t value of 6.144 <12.71. The education level factor affects the variable of drinking water usage because the significance value of the coefficients table is 0.021 < 0.05, and the count value is 2,357 < 12.71. The decent housing factor affects the

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water usage variable because the significance value of the coefficients table is 0.022 < 0.05, and the t value is 3.180 < 12.71. Based on the results of the questionnaire answers obtained from 320 respondents in Bekasi City, the results show that the study of domestic drinking water use in Bekasi City has an average (mean) value of 243.093 liters/person/day, then has a median value of 405.5 liters/person/day, then has a mode value of 165.5 liters/person/day.

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