Analysis Of Differences In Well Water Quality Tests In The Highlands And Lowlands Of Rantauprapat City

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Abstract.
The existence of clean water is very important considering the very dynamic activities of people's lives. Therefore, the quality and quantity must be considered. Clean water that meets health requirements must be free from pollution and must meet quality standards: one of them is physical requirements because drinking water that does not meet quality standards can cause health problems. The topography of an area can affect groundwater in that area. This study aims to analyze differences in the quality of well water in the highlands of Rantauprapat City and the lowlands of Rantauprapat City based on physical parameters. The research was conducted at the BTKL Physics Laboratory in Medan in October 2022. The method in this research was observational analytic with a cross-sectional approach. The sample was determined by purposive sampling which amounted to 50 samples. Data were analyzed using SPSS 21 and the Mann Whitney-U Test. The results showed that there was no significant difference in water quality in the parameters of taste, temperature, odor and turbidity with a p value > 0.05, while there were significant differences in the parameters TDS and DHL with a p value <0.05. Conclusion: There are no significant differences in water quality in the parameters of taste, temperature, odor and turbidity, while in the TDS and DHL parameters there are significant differences in water quality with a p value <0.05. 0.05 while the TDS and DHL parameters are significantly different with a p value <0.05. Conclusion: There are no significant differences in water quality in the parameters of taste, temperature, odor and turbidity, while in the TDS and DHL parameters there are significant differences in water quality with a p value <0.05. 0.05 while the TDS and DHL parameters are significantly different with a p value <0.05. Conclusion: There are no significant differences in water quality in the parameters of taste, temperature, odor and turbidity, while in the TDS and DHL parameters there are significant differences in water quality with a p value <0.05.

Keywords: *Water quality, highlands and lowlands.*

I. INTRODUCTION

Water is a necessary natural resource For life person Lots,even by all living things. Therefore, the quality and quantity must be considered. Clean water that meets health requirements must be free from pollution (Ali A, et al, 2013; 13:265-274). Meanwhile, drinking water must meet standards, namely physical, chemical and biological requirements, because drinking water that does not meet quality standards can cause health problems (Boekoesoe L, 2010;7:ISSN 1693-9034).Currently, the process of producing clean drinking water has become a global concern to meet the increasing population and demand for clean water that exceeds the supply of conventional drinking water sources. More than 1 billion people live without a clean water supply and around 2.3 billion people (41% of the world's population) live in areas experiencing water crisis. 3 In addition, around 10,000 people in developing countries die every day from diseases caused by a lack of water. clean and sanitary environment. More than 100 million Indonesians lack access to clean water (Parera MJ, Supit W, Rumampuk JF. 2013;1:466-472).Based on the 2013 Basic Health Research data, the results show that the types of water sources for all household needs in Indonesia are generally protected dug wells (29.2%), pumping wells (24.1%), and PDAM (19.7%). In urban areas, more households use water from bore/pump wells (32.9%) and tap water/PDAM (28.6%), while in rural areas more use protected dug wells (32.7%). For sources of drinking water, households in Indonesia use bottled water, refilled water/drinking water depots, tap water either from PDAM or purchased retail, drilled/pumped wells, protected wells, springs (both protected and unprotected), water reservoirs. rain and river/irrigation water (Health Research and Development Agency. Basic Health Research (RISKESDAS) 2013).

The existence of clean water is very important considering the very dynamic activities of people's lives. The topography of an area can affect groundwater in that area. Lowland areas, which are areas that tend to develop faster than areas that have higher topography, so the frequency groundwater is relatively large because in this area population growth is growing rapidly. While the highlands, this area is located on the slopes at the foot of a mountain. In this area land use is still dominated by forest and there has been no significant land change so that groundwater seeps rather than flows. In Regulation of the Minister of Health of the Republic of Indonesia (Permenkes RI) No. 492/Menkes/Per/IV/2010 concerning Quality of Drinking Water states that drinking water must meet physical, chemical and microbiological health requirements. The drinking water consumed is categorized as good if it meets the physical quality requirements; namely not cloudy, colorless, tasteless, not foamy and odorless (Putranto TT, Kusuma KI. 2009).Central Bureau of Statistics data for 2015 shows that for North Sumatra Province there are 20.50% who do not have access to clean water (Central Statistics Agency for Medan City, 2012). The city of Rantauprapat with a population of 351,172 people uses PDAM customer services totaling 324,540 and the rest still use well water for drinking, bathing and washing needs which barely meet health standards (North Sulawesi Health Office, 2008). while for the City of Tomohon with a population of 69,127 people, because the distributed water does not flow every day, many residents turn to drilled/pumped wells (Central Bureau of Statistics 2014).Based on the description above, the researcher is interested in conducting research on "Analysis of Differences in Well Water Quality Tests in the Highlands of Rantauprapat City and the Lowlands of Rantauprapat City Based on Physical Parameters"

II. METHODS

This research is an observational study using an analytic cross-sectional design. The research was conducted at the Medan BTKL physics laboratory in October 2022. The samples were determined by purposive sampling, totaling 45 samples.In this study, the dependent variable was the quality of well water while the independent variable was the physics parameter test. The research procedure was to group well water located in the highlands and 30 samples were taken in the lowlands. Then the well water samples were taken and the samples were taken to the laboratory.The tools and materials used for examination include Turbidimeters, Thermometers, Total Dissolved Solids (TDS), Conductivityimeters and writing instruments. The data analysis technique used in this study was in the form of univariate and bivariate analysis. Univariate analysis was carried out to see the frequency distribution of the dependent variable and the independent variable. Bivariate analysis was carried out to find out the results of the differences between the two independent variables. Bivariate analysis was analyzed using the Mann Whitney U test.

III. RESEARCH RESULT

Table 1. Statistical Results of Highland and Lowland Temperature Values

Variable Temperature	min	max	mean	std. deviation
PlainsTall	23.0	25,3	23.102	,0667
Plains Low	23.0	25,2	23,120	,0607

Table 2. Statistical Results of Turbidity Values in the Highlands and Lowlands

Turbidity Variable	min	max	mean	std. deviation
Plains Tall	,05	2,10	,7940	,73028
Plains Low	,05	4.00	,8720	,80533

Table 3. Statistical Results of TDS Values in the Highlands and Lowlands

Variable TDS	min	max	mean	std. deviation
PlainsTall	78	174	142,16	17,975
PlainsLow	92	230	129,20	32,931

Table 4. Statistical Results of Electrical Conductivity Values in the Highlands and Lowlands

Variable DHL	min	max	mean	std. deviation
PlainsTall	,2	,4	,208	.0400
Plains Low	,2	,5	,284	.0850

Table 5. Analysis of Differences in Well Water Quality Tests in the Highlands of Tomohon City and the Lowlands of Medan City

Method	Temperature	Turbidity	TDS	DHL	Flavor	Smell
Mann Whitney UZ	303	304.5	141	130.5	312.5	312.5
Sig.	-0.204	-0.167	-3,409	-4,236	0.000	0.000
	0.839	0.868	0.001	0.000	1,000	1,000

IV. DISCUSSION

Based on the results of the statistical test research, the univariate analysis showed that there were 25 (50%) well locations in the Tomohon highlands and 25 (50%) well locations in the lowland areas of Medan.The results of the analysis show that the significance value of the temperature variable is p = 0.839. When compared with the use of α of 5% (0.05), the probability value is p = 0.839 > 0.05, so that it can be said that there is no difference in the well water quality test in the form of temperature in the highlands of Tomohon and the lowlands of Medan city. The turbidity variable obtained p value = 0.868. When compared with the use of α of 5% (0.05), the probability value is p = 0.868 > 0.05, so that it can be said that there is no difference in the well water quality test in the form of turbidity level in the highlands of Tomohon and the lowlands of Medan city. According to research conducted by Nujumuddin in his thesis, turbidity occurs due to pollutant sources in the environment in the form of latrines, animal waste, garbage, rice fields,In the TDS variable, the value of p = 0.001 is obtained. When compared with the use of α of 5% (0.05), the probability value is p = 0.001 <0.05, so that it can be said that there are differences in the well water quality test in the form of TDS levels in the highlands of Tomohon and the lowlands of Medan city. In the DHL variable, the value of p = 0.000 is obtained. When compared with the use of α of 5% (0.05), then the probability value of p = 0.000 <0.05, so that it can be said that there are differences in the well water quality test in the form of DHL levels in the highlands of Tomohon and the lowlands of Medan city.

Based on Arthana's research, it is known that there is a relationship between TDS and Electrical Conductivity (DHL) where both have a linear relationship. The higher the TDS, the higher the DHL and vice versa. Total dissolved solids usually consist of organic matter, inorganic salts and dissolved gases. In addition, TDS is also related to the level of hardness where the higher the TDS, the higher the hardness (Desiandi M, et al. 2009).In the taste variable, the value of p = 1.000 is obtained. When compared with the use of α of 5% (0.05), then the probability value p = 1.000 > 0.05,so that it can be said that there is no difference in the quality test of well water in the form of taste in the highlands of Tomohon and the lowlands

of Medan city. The odor variable obtained a value of p = 1.000. When compared with the use of α of 5% (0.05), the probability value is p = 1.000 > 0.05, so that it can be said that there is no difference in the well water quality test in the form of odor in the highlands of Tomohon and the lowlands of Medan city. The results of Muhammad Desiandi's research show that the water in the Manunggal area is tasteless and odorless. Decree of the Minister of Health No. 907/2002 requires that water is tasteless and odorless so it is concluded that the water meets the requirements for drinking water quality. The smell referred to in the provisions of Kepmenkes No.907/2002 must be understood correctly by consumers. Some consumers think that the smell of chlorine in their water is an indicator of bad water, so they are afraid to use it. Actually, the water that smells like chlorine is due to residual chlorine in the water. Communities must know that with an odor like chlorine, the water they have is actually safe because it avoids bacteria (Desiandi M, et al. 2009).

Topography in an area can affect groundwater in that area. In the lowland areas, the frequency of groundwater extraction is relatively large because in this area the population is growing rapidly. Meanwhile, in the highlands, this area is located on the slopes at the foot of a mountain. This mountain slope area can function as a potential area, because in this area land use is still dominated by forests and there is no significant land change so that groundwater seeps more than flows (Putranto TT, et al, 2009).Suhartono in his thesis reports that sea level rise, land subsidence and groundwater withdrawal which are carried out continuously cause the advancement of seawater towards land, mainly occurring in deep aquifers, which will mix with groundwater and cause a decrease in the quality of the groundwater.Excessive withdrawal of groundwater causes a lot of empty space in the aquifer and results in a lower groundwater level than sea level. This difference in groundwater level and sea level causes seawater containing salt elements such as chloride (Cl) to seep into the aquifer. in groundwater causing groundwater pollution (Suhartono E, Purwanto, et al, 2013).Another causative factor of water quality can be viewed from the type of well. Dug wells provide water that comes from a shallow groundwater layer from an unsaturated zone, therefore it is easily contaminated through seepage, so that it has the potential to decrease water quality. The most common contamination is due to water runoff from human or animal waste disposal facilities, originating from septic tanks that are less permanent toilets. 13 Meanwhile, boreholes are made by drilling deeper layers of groundwater so they are less affected by contamination. So, it can be said that dug wells have poor water quality compared to drilled wells (Parera MJ, et al, 2013).

V. CONCLUSION

1. The water quality measured by physical parameters, namely taste, smell, temperature, turbidity in the highlands of the city of Tomohon and the lowlands of the city of Medan, there is no difference in the water quality test because the values obtained meet the maximum levels set by Kepmenkes No.492/Menkes/ Per/IV/2010.
2. Water quality measured by physical parameters, namely TDS and electrical conductivity in the highlands of the city of Tomohon and the lowlands of Medan city, there are differences in the water quality test because the values obtained do not meet the maximum levels set.It has been stipulated by Kepmenkes No.492/Menkes/Per/IV/2010.

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