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The Impact of River Water Quality on Women's Health in Blankahan Village: Physico-Chemical Analysis and Social Health Analysis

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ABSTRACT
River water plays an important role in human life. Along with the increasing population and waste problems generated from human activities, climate change is a factor that also affects river water quality. Blankahan Village is located in Langkat District, with 3 interconnected rivers, Palma River, Pekan Kuala, and Dosi Valley. This program examines the impact of river water quality on public health in Blankahan Village, with a focus on physico-chemical and social health analysis to support the achievement of SDGs points 3 and 6. It was found to be in a fairly poor and murky condition according to the classification according to Government Regulation Number 22 of 2021. Furthermore, based on statistical tests and One Way ANOVA Tests indicated that there was no statistically significant difference in the mean perception among the age groups. Some indicated women's health problems due to river water use such as dermatitis, skin diseases, and diarrhea continue to increase. River water sources are still used by some communities to fulfill household needs during the dry season despite many negative perceptions that river water quality is poor, dirty and polluted with waste. River water quality is influenced by seasonal factors and pollution, namely the difference in river water quality during the rainy and dry seasons, and is also caused by domestic waste, livestock waste, and industrial waste entering the water.

Keyword: Health, Physico-Chemical, Quality River Water, Statistical Test

1. Introduction

Water is a natural resource that is very important for human survival [1]. According to [2], inland waterways and rivers provide various human needs, such as fish and other river biota as food sources, irrigation functions, mobility, recreation, and for drinking, washing, and sanitation. Blankahan Village located in Langkat Regency, North Sumatra has 3 rivers that connect with several other villages in Kuala District, namely Palma River, Pekan Kuala River, and Dosi Valley River. The three rivers are one of the water sources used by the community there for their daily needs. However, river water pollution is inevitable as the population increases [3,4]. The decline in river water quality is due to deforestation, climate change and anthropogenic activities. Water pollution occurs when waste discharges cannot be treated properly. Waste discharged into river systems often includes sewage, domestic garbage, agricultural waste and other discharges.

Utilization of rural rivers in developing countries is strongly influenced by residents' perceptions of risk factors associated with the use of river water [5]. Based on the type of river water use, water quality is closely related to the health of its users [6]. Research by Gupta et al. revealed that women often spend more time and energy to take care of households related to water utilization such as rivers. Women's vulnerability to poor river water

quality has a central influence in household water management and are forced to deal directly with the health risks of contaminated water. Studies by [7] show that women in areas lacking access to clean water are more vulnerable to waterborne diseases, such as diarrhea, urinary tract infections, and other reproductive health complications [8,9]. These impacts are exacerbated when women are pregnant, as they are vulnerable to infections that can affect fetal development and increase the risk of maternal and infant mortality. This creates an already limited health burden in developing countries [10].

Based on Government Regulation No. 22 of 2021 states that water quality standards are determined based on the classification of water functions such as rivers which are classified into certain classes according to their uses [11]. Physical-chemical analysis is one of the important evaluation methods in determining river water quality [12]. Physical parameters such as temperature, color, turbidity, river flow discharge, and microplastics are analyzed to provide a more comprehensive picture of water quality by natural factors such as seasons or by human activities. Chemical parameters such as pH, total dissolved solid (TDS), and electrical conductivity (EC) are analyzed to measure water quality, especially to detect pollution loads due to domestic, industrial, and agricultural waste [13,14].

To realize Sustainable Development Goals (SDGs) points 3 and 6, “The Impact of River Water Quality on Women's Health in Blankahan Village: Physics-Chemistry and Social Health Analysis,” through the identification of public health, especially women who are vulnerable to polluted water with the hope of being aware of water quality and the importance of proper sanitation. The physico-chemical analysis was conducted on the river flow in the Blangkahan village area, then the social health analysis was obtained using the results of questionnaire data and interviews conducted with the surrounding community. It is hoped that this program can be the first step in normalizing the condition of the river.

2. Implemetation Methods

2.1. Tools and Materials

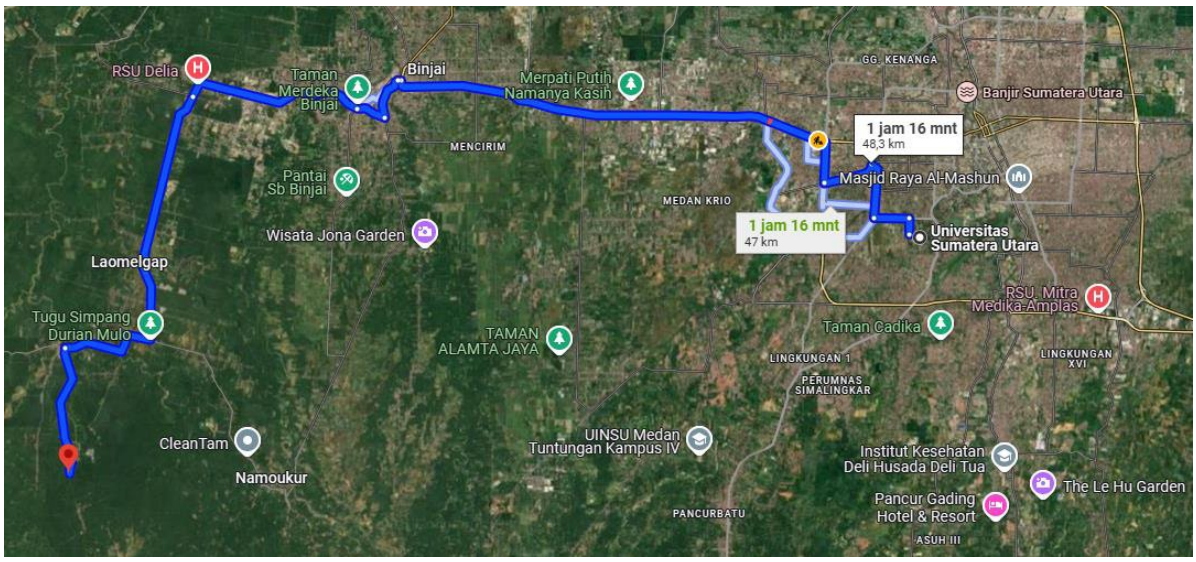
The tools used in sampling river flow conditions include Pyrex Beaker Glass, Digital Thermometer TP-101, Nikon Inverted Microscope TS2, TDS meter, EC meter, pH indicator, Dry Cell Battery D-Type, fiber meter, measuring ball, 2m wooden block, stopwatch, APD hazmat and latex gloves, label paper, and 2L vial bottles. These tools are very important to ensure the accuracy and success of obtaining values from river flow parameters.

Then a questionnaire was prepared using a Likert scale consisting of 5 pages, namely respondent identity, access to river water, perception of river water quality, health impacts, awareness and attitudes about river water quality and health. This was done to conduct a quantitative approach to examine women's perceptions of river water quality.

2.2. Community Service Location

This community service activity was carried out in Blankahan Village, Kuala District, Langkat Regency, North Sumatra Province, Indonesia, this location is located 49 km from the Universitas Sumatera Utara, with a travel time of approximately 90 min by car. Figure 1 illustrates the geographical location of the community service implementation.

This partnership location was chosen because it has three rivers that flank the village as the main water source for the community, which is in line with the objectives of the service and analysis of physico-chemical and social health, especially for women. This strategic collaboration aims to find out the current condition of the village community's main water source and increase community knowledge on the importance of maintaining health and the environment.



(a)

(b)

Figure 1. (a) Location map of the partner network of Universitas Sumatera Utara. (b) Blankahan Village, Kuala District, Langkat Regency, North Sumatra Province, Indonesia.

2.2. Implementation Process

The method of implementing national service activities with partners from blangkahan village, langkat is carried out through three main stages:

1. Socialization and discussion activities
   Socialization and discussion activities serve as basic knowledge about the condition of the surrounding river as the main water source for the village community and its effects. This phase was conducted by way of a general presentation and a two-way discussion to ensure participants understood the main basis and importance of addressing environmental issues.

2. Data collection and counseling activities
   Data collection and counseling activities are designed to get an initial picture of the participants' understanding of environmental conditions. This stage also serves to obtain information about the impacts and benefits of river water. Then at this stage counseling is carried out to correct and overcome problems arising from impacts and problems with river water.
3. Monitoring and mentoring activities
   Monitoring and mentoring activities are provided during the process of activities related to river water. At this stage, concrete actions are also taken to maintain the river water condition and follow the directions given correctly. Feedback is regularly collected to adapt and improve the sense of openness and impact during the process of the counseling implementation period.

In order for the community to understand more about the importance of the main water source used, two approaches were taken, namely:

1. Quantitative Approach
   This approach involves collecting data on the physical and chemical parameters of river water with several test instruments so as to display the latest condition data of the main water source for the community.
2. Qualitative Approach
   This approach involves distributing questionnaires and interviewing the community. This approach helps and ensures a deeper understanding of the practical aspects of the river conditions.

3. Result and Discussion

3.1. Preparation and Discussion

The preparation and discussion stage is carried out as the initial step to strategize the implementation of the community service program. During this stage, the service team held detailed discussions with partners to determine program objectives, targets to be achieved, assess available resources and specific needs in the field. The key aspect of this stage is valid data on the current condition of river water in Blangkahan village. Then socialization for further discussion on the causes of the problem of murky river conditions and contributions that can be made by every line of society in protecting the environment. Documentation during the discussion as shown in Figure 2.

Figure 2. Presenting and discussion about river

3.2. Data Collection of Physics and Chemical Parameters of River Water

The data collection phase of the physical and chemical parameters test on river water is designed to obtain data on the latest conditions of the river flow consisting of testing:

1. Temperature measurement using Digital Thermometer TP-101
2. Microplastic test using Nikon Inverted Microscope TS2 instrument

3. River flow discharge measurement
4. Direct color identification
5. pH measured using pH Test Strips Indicator
6. Total dissolved solid (TDS) using TDS Meter Hold
7. Electrical conductivity (EC) using EC Meter Hold

This data collection encourages the community to know the urgency and condition of river water. It is expected that the socialization and interview activities will get good feedback and concrete actions from the community. In accordance with Figure 3.

Figure 3. Illustrates the analytical process of collecting test data on physical and chemical parameters in the river flow

3.3. Questionnaire Filling and Interview Stage

This stage marked the culmination of efforts to discuss and collect data on physical and chemical parameters. The partners conducted questionnaires and in-person interviews aimed at furthering environmental concerns and providing direct action at this stage:

a) Questionnaire Filling
   The questionnaire was filled out by the community, especially women from the local community, this was done to obtain data, especially regarding social health conditions due to the influence of river flow as the main water source as shown in Figure 3a.
b) Socialization of River Flow Conditions
   Dissemination of river flow conditions to the village government and local communities for real action or sustainable activities to improve river flow conditions as shown in Figure 3b.
c) Interview stage
   The interview stage is carried out for thematization using a framework and coding regarding social health conditions due to the influence of river flow as the main water source as shown in Figure 3c.

This stage ensures that the condition of the identified streams is poor and murky. So it is hoped that real action from various parties can be taken on this problem. Collaboration between the University of North Sumatra and Blangkahan village can be enhanced. Further cooperation is encouraged to increase the efficiency and scalability of overcoming river water problems.

(a)

(b)

(c)

Figure 4. (a) The process of filling out the questionnaire; (b) The process of conducting socialization to the village government regarding the condition of the river; (c) interviews with the community regarding the condition of the river.

4. Conclusion

Data has been collected with physical and chemical test parameters on the river flow in blangkahan village which displays poor and turbid water conditions. Questionnaires and personal interviews have been conducted with the surrounding community regarding the impact of social health on quality of life. So that socialization and interactive discussions are carried out with all related parties to carry out sustainable activities to solve this problem. It is hoped that this program will be an opening activity in the prevention of adverse effects on the quality of life of the Blangkahan community.

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