



The Relationship of Educational Level With Knowledge About the Fitness of Drinking Water Sources in Gempol Village, Karanganom Subdistrict, Klaten District

Arvita Ningtyas¹, Rezania Asyifiradayati¹

¹Public Health Faculty, Univeristas Muhammadiyah Surakarta

Email Correspondence: ra123@ums.ac.id

<p>Track Record Article</p> <p>Accepted: 22 January 2024 Revised: 25 January 2024 Published: 16 March 2024</p> <p>How to cite : Ningtyas, A., & Asyifiradayati, R. (2024). The Relationship of Educational Level With Knowledge About the Fitness of Drinking Water Sources in Gempol Village, Karanganom Subdistrict, Klaten District. <i>Contagion: Scientific Periodical Journal of Public Health and Coastal Health</i>, 6(1), 273–284.</p>	<p style="text-align: center;">Abstract</p> <p><i>Water is a necessity of life, such as washing clothes, washing vehicles, bathing, defecating, cooking, drinking, purifying, ablutions, watering yard plants, providing water for livestock and pets, and other needs. Poor water quality has an impact on health and can even be life-threatening. This study aims to determine the relationship between education about the suitability of drinking water sources and the level of knowledge in Gempol Village, Karanganom District, Klaten Regency. This study is a quantitative study with a research design and a cross-sectional approach. The research was conducted in Gempol Village, Karanganom District, Klaten Regency, from October to November 2023. The study population included residents of Gempol Village, consisting of 18 neighbourhood associations with 800 family cards. A total of 116 respondents, who were selected through proportional sampling calculations, were involved in this study. Data were collected through questionnaires and observation sheets. Bivariate data analysis with Fisher exact test processed using SPSS version 26. The results showed a relationship between education level and knowledge about the feasibility of drinking water sources ($p\text{-value} = <0.0001 < 0.05$). It is recommended that the Gempol village government implement an ongoing educational program to increase community awareness about the importance of clean water and how to ensure the suitability of drinking water sources. This program can include counselling, workshops, seminars, and public campaign. It is suggested that health workers provide accurate advice and information to the community on how to choose safe drinking water sources to increase community knowledge about the quality of drinking water sources that meet health requirements.</i></p> <p>Keywords: <i>Drinking Water, Education, Suitability of Drinking Water Source, Knowledge</i></p>
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INTRODUCTION

Water is necessary for life, such as washing clothes, washing vehicles, bathing, defecating, cooking, drinking, purifying oneself or ablution, watering house plants, giving water to livestock and pets or not for livestock purposes, and other needs. All creatures need water in their lives, so there can be no life (Triarmadja, 2019).

The level of water use per person varies greatly between regions due to several factors, for example, climate, living standards, activities in society, social and economic levels, and patterns and habits in society (Assembly, 2021). Water must have an acceptable taste and meet the quality requirements for drinking, cooking, and use for daily needs without causing health problems (Rahman et al., 2020).

Poor water quality impacts health and can even threaten life (Sugiester et al., 2021). Based on WHO data, in 2023, as many as 296 million people collect water from unprotected

wells and springs, and 115 million people collect untreated surface water from lakes, ponds, rivers and small streams. In 2021, more than 251.4 million people required preventive treatment for schistosomiasis – an acute and chronic disease caused by parasitic worms contracted through exposure to infested water. WHO further stated that high death rates and high rates of sick people are endemic and often occur in places where environmental hygiene and sanitation are poor. Healthy environmental hygiene and sanitation can be formed with the support of good knowledge from the community, including the quality of clean water sources used daily (WHO, 2023).

Research conducted by Asyfiradayati et al. (2023) in Krajan Village, showed that the presence of bacteriological contamination in clean water after testing well water and general reservoir water revealed up to 294 E. coli colonies which could cause waterborne disease. *Water-borne diseases* occur due to consuming water-containing organisms that cause enteric disorders, such as species that cause typhoid, hepatitis and cholera (Zuhriyah et al., 2021). Research conducted by Ronald et al., (2023), in Merauke Regency shows that public perception influences the health and cleanliness of drinking water as well as diseases caused by drinking water consumption. Other research in Sukajadi Village shows the influence of knowledge and skills in techniques and methods for processing unsuitable water into water suitable for household use (Pulungan et al., 2021).

Based on the Republic of Indonesia Minister of Health Regulation Number 492/Menkes/IV/2010, drinking water suitable for consumption must meet chemical, biological and physical requirements. Physical requirements suitable for consumption include clear, tasteless and colourless water. Chemical requirements include low hardness, neutral pH, and not containing dangerous toxic materials. Meanwhile, the biological requirement is that it does not contain *Escherichia coli* bacteria (Adam, 2019).

The level of education can influence knowledge because it can shape people's behaviour that supports health (Oka et al., 2022). Top of Form Research conducted in Padaidi Village shows a relationship between knowledge about clean water and management (Rosmalah et al., 2023). In line with the research by Aziza et al., (2020), In Sidoasih Village, there is an influence of knowledge about clean and healthy living behaviour in using clean water, which has an impact on household hygiene and health. The results of other research in Haurpugur Village show that community knowledge about the importance of clean water impacts maintaining clean water facilities (Kurniawati et al., 2020).

One of the factors that influences the suitability of drinking water sources according to Adzura et al., (2021) is the minimum distance between the water source and the pollutant

source is at least 10 meters. According to Dappa et al. (2023), sources of pollution such as livestock pens, septic tanks, rubbish pits, latrines and wastewater management systems. Several sources of drinking water used by Indonesian people, according to Riskesdas 2018 include tap water (14.2%), drinking water depot water (13.8%), protected dug wells (24.7%), and drilled or pumped wells (14.0%) (Anamevia et al., 2023). Other factors that influence the suitability of drinking water sources are the construction of walls, lips and floors of dug wells, wastewater disposal systems, infiltration holes, and distance to sources of pollution such as livestock pens, septic tanks, rubbish pits, latrines (Dappa et al., 2023).

The Central Bureau of Statistics states that national household access to drinking water in 2020 is still below 50%, which is around 44.94%. This means that more than half of households in Indonesia, around 55.06%, need optimal access to drinking water. Based on a survey of 10 respondents in Gempol Village, Karanganom Subdistrict, Klaten, it was found that 7 of them needed to learn the eligibility parameters of drinking water sources. In building drinking water sources such as dug wells, the community needs to pay attention to health requirements, such as the distance between septic tanks, latrines, livestock pens, and dug wells less than 10 meters.

This is the basis for researchers to conduct research to determine the description of knowledge about the suitability of drinking water sources in the area. This study aims to determine the relationship between education and knowledge about the suitability of drinking water sources in Gempol Village, Karanganom District, Klaten Regency.

METHODS

This quantitative study uses a descriptive observational research design with a cross-sectional approach. The research was conducted in Gempol Village, Karanganom District, Klaten Regency. The research was conducted from October to November 2023. The study population included all residents of Gempol Village, divided into 11 Dukuh, with 18 neighborhood associations and 800 family heads. The research sample was 116 respondents using a proportional sampling technique.

The inclusion sample criteria in this study were residents of Gempol village, residents who had dug wells and residents who had a source of drinking water from dug wells. The exclusion criteria of this study are uncooperative occupants and residents who are not willing to fill out questionnaires and be interviewed because they have busy activity schedules.

Data collection techniques in this study used a knowledge questionnaire regarding the suitability of drinking water sources and observations of the community's living environment,

which included wells, springs, regional drinking water companies, latrines, septic tanks, livestock pens and sewerage. The questionnaire used has passed the validity and reliability test and is declared valid and reliable. The validity and reliability tests were carried out on the questionnaire to be used validly and reliably.

The data source of this research is primary data sourced from interviews and observations, while secondary data is sourced from journals, the internet, and the local Gempol village office. The independent variable of this research is the level of education, and the dependent variable is the level of knowledge. The bivariate data analysis used was the Fisher exact test. The data obtained from the research were processed and analyzed using the SPSS (Statistical Package for the Social Sciences) computer application program version 26. This study has obtained a research ethics permit from the Dr.Moewardi Health Research Ethics Commission Number 2.141/XII/HREC/2023.

RESULTS

The respondents in this study were 116 people selected by administering questionnaires directly from house to house. The demographic description of research respondents includes the variables age, gender and level of education. Detailed information regarding respondent demographics can be found in Table 1.

Table 1 Characteristics of Research Respondents (n=116)

Characteristics	N	%
Age		
30 - 35 years old	8	6.9
36 - 40 years old	24	20.7
41 - 45 years old	25	21.6
46 - 50 years old	26	22.4
51 - 55 years old	23	19.8
> 56 years old	10	8.6
Gender		
Woman	46	39.7
Man	70	60.3
Last education		
College	2	1.7
Senior High School	83	71.6
Junior High School	0	0
Elementary School	31	26.7

Based on the results of the analysis in Table 1, it can be seen that the characteristics of the respondents show that the majority are in the 45 year age range. The lowest age is 31 years, while the oldest is 58 years. Most respondents were women (60.3%), and most had a high school graduate (71.6%).

Table 2 Frequency Distribution of Knowledge Level and Feasibility of Drinking Water Sources in Gempol Village, Karanganom District, Klaten (n=116)

Characteristics	Knowledge				Total
	Good		Enough		
	n	%	n	%	
Age					
30 - 35 years old	7	87.5	1	12.5	8
36 - 40 years old	24	100	0	0	24
41 - 45 years old	24	96	1	4	25
46 - 50 years old	25	96.2	1	3.8	26
51 - 55 years old	17	73.9	6	26.1	23
> 56 years old	4	40	6	60	10
Gender					
Woman	55	78.6	15	21.4	70
Man	46	100	0	0	46
Last education					
College	2	100	0	0	2
Senior High School	80	96.4	3	3.6	83
Elementary School	19	61.3	12	38.7	31

Based on Table 2, the frequency distribution data on the level of knowledge regarding the appropriateness of drinking water sources shows that 101 respondents (87.1%) were in a good category, and 15 respondents were in the sufficient category (12.9%). The distribution of the highest frequency of respondents' good knowledge level was 72.27% in the age group 36 years to 50 years out of 101 respondents in the good knowledge category. Meanwhile, the distribution of the highest frequency of sufficient knowledge levels is in the age group 51-55 years and >56 years, as the 101 respondents with a good level of knowledge consisted of 54.45% women and 45.54% men. Meanwhile, 12.93% of women had sufficient knowledge out of a total of 116 respondents. Respondents with a high school education level occupied the highest frequency distribution in the good knowledge category, namely 79.20% of the 101 respondents. Meanwhile, respondents with a final education level of elementary school had as much knowledge as 16.37% and sufficient knowledge as much as 10.34% of the total 116 respondents.

Table 3. Relationship between education level and knowledge about the suitability of drinking water sources in Gempol Village, Karanganom District, Klaten Regency (n=116)

Level of education	Knowledge				Total	p-value	Prevalence ratio (95% CI)
	Good		Enough				
	n	%	n	%			
Low	19	61.3	12	38.7	31	100	17.2
Tall	82	96.5	3	3.5	85	100	<0.0001 (4.4 – 67.2)

Based on the results of the analysis in Table 3, it was obtained that the p-value was <0.0001 (<0.05), meaning that there was a significant relationship between the level of education and knowledge about the suitability of drinking water sources in Gempol Village, Karanganom District, Klaten Regency.

DISCUSSION

Relationship between education level and knowledge about the feasibility of drinking water sources

One source of water for community life comes from groundwater. Klaten Regency is geographically located at an altitude of 75-160 meters above sea level, and its main water source comes from groundwater (Rasidi et al., 2023). Meeting the needs for drinking water, washing, cooking, bathing, and other needs of the Gempol Village, Karanganom District, Klaten Regency comes from dug wells, water supply companies and springs.

The results of research conducted by Carrard et al., (2019) of ten countries in Southeast Asia and the Pacific shows that in urban areas, the level of household dependence on groundwater is higher levels in Indonesia (90%), Myanmar (72%), Timor-Leste (93%), Laos (80%), Kiribati (90%), Vanuatu (86%), and lower in PNG (25%) and Cambodia (17%). In rural areas, the level of groundwater dependence is the highest level of dependence on the Micronesian atoll islands of Kiribati (95%) and the lower in Melanesian countries such as Vanuatu (34%), Solomon Islands (28%), and Papua New Guinea (22%). Case study countries in Southeast Asia, Myanmar (78%), Timor-Leste (81%), and Indonesia (92%), were also found to have high levels of household dependence on groundwater in rural areas.

Decreased groundwater quality can increase vulnerability to groundwater pollution (Sari et al., 2021). The quality of drinking water is an important factor that influences human health. Poor water quality causes water-borne diseases (Lin et al., 2022). According to data from the Ministry of Health, 7 out of 10 households in Indonesia consume drinking water contaminated by *Escherichia coli* bacteria. The 2020 Household Drinking Water Quality Study findings in Indonesia show that 18.1% of households in Indonesia have access to safe drinking water judging from *Escherichia coli* parameters only. The proportion of access to safe drinking water in urban areas is 21.3%, much higher than in rural areas (14.4%) (Ministry of Health, 2020).

The results of bivariate data analysis obtained a p-value <0.0001 (<0.05), meaning that the level of education and knowledge about the suitability of drinking water sources in Gempol Village, Karanganom District, and Klaten Regency has a significant relationship. Previous research conducted by Damayanti et al., (2022), shows that there is a significant relationship between the level of education and knowledge of $\text{sig } 0.000$ (< 0.05) where the higher the level of education, the higher the knowledge possessed, and vice versa. The level of education determines a person's mindset and insight. Education has an important role in quality. Through education, humans are thought to gain knowledge (Siregar et al., 2020). Other research

conducted by Hildawati et al. (2021) in Pemurus Village shows that good knowledge influences behaviour in drinking water treatment. Research result in Duan et al. (2022), Drinking water perceptions, health literacy, economic and cultural levels, and drinking water consumption behaviour are important factors that influence the willingness of middle-aged and elderly residents to drink unboiled and filtered tap water.

The questionnaire distribution showed that 55 respondents gave incorrect answers to number 19, which stated that the presence of puddles on the floor around dug wells impacted the water quality of dug wells. The answers showed that 47.4% of respondents gave the wrong answer, even though the correct answer should be "correct". The results of the data analysis show that overall, community knowledge regarding the suitability of drinking water sources in Gempol Village, Karanganom District, and Klaten Regency is relatively good. A total of 101 respondents (87.1%) had good knowledge, while 15 respondents (12.9%) had sufficient knowledge. Based on the demographic characteristics of respondents, especially gender, it is known that 54.45% of female respondents and 45.54% of male respondents have good knowledge, and 12.93% of the total female respondents have sufficient knowledge. Gender is defined as a biological condition that differentiates women and men.

A person's behaviour and appearance correspond to their gender (Notoatmodjo, 2018; Sutrisno et al., 2023). Men tend to have better knowledge than women because they have better social skills, broader activities and knowledge, and greater opportunities to obtain information because of the activities accompanying them (Moekijat, 1998; Mufida et al., 2022).

Gempol Village residents demonstrate good knowledge regarding the suitability of drinking water sources. In acquiring knowledge, age has an important role because it influences a person's ability to understand new information. The respondents in this study ranged from 31 to 58 years. The frequency distribution shows that the level of good knowledge is dominated by the age group 36 to 50 years, reaching 72.27% of the total 101 respondents with good knowledge. On the other hand, sufficient levels of knowledge were more commonly found in the age group 51-55 years and over 56 years. This indicates that a person's experience and knowledge increases as they age. Capability to study an object and a person's thinking patterns are linear with increasing age (Budiman et al., 2013; Khairunnisa et al., 2021).

The demographics of respondents from 116 residents of Gempol Village, Karanganom District, Klaten Regency, based on their latest education, can be described as follows: 83 respondents (71.6%) had a high school educational background, 31 respondents (26.71%) graduated from elementary school, and 2 respondents (1.72%) were college graduates. Of the respondents with a high school education, 80 respondents (68.96%) showed a good level of

knowledge, while 3 respondents (2.58%) had sufficient knowledge. The frequency distribution shows that respondents with a high school education dominate in the good knowledge category, reaching 79.20% of the total 101 respondents who have good knowledge. 31 respondents attended elementary school, with 19 respondents (16.37%) having good knowledge and 12 respondents (10.34%) having sufficient knowledge. Meanwhile, 2 respondents with a tertiary education level (1.72%) were included in the good knowledge category.

Several factors influence a person's level of knowledge, namely internal and external factors. Internal factors include perception, education, and motivation. External factors include environmental, social, information and culture. The level of education cannot measure a person's knowledge but is also influenced by the information they obtain (Notoadmojo, 2007; Idamatussilmi et al., 2023). A high level of education only sometimes means high knowledge. A person's knowledge about an object also depends on the extent to which he is familiar with the positive and negative aspects of the object. Positive attitudes emerge as more and more positive aspects of the object are known (Wawan et al., 2017; Muliawati et al., 2022).

Good knowledge regarding the suitability of drinking water sources in Gempol Village positively impacts the use of dug well construction types that meet health sanitation requirements. Based on the researchers' observations, the height of the walls of the dug wells in Gempol Village reached 3 meters, the floor area around the dug wells was around 1 meter, and the height of the rims of the dug wells was ≥ 70 cm. The walls of the dug well and the floor area around the well are made of watertight cast cement. This situation makes it difficult for dug well water to be polluted by seepage that enters through soil pores. As a result, the dug well water remains clear, and its quality is maintained. This condition shows that the residents of Gempol Village have implemented dug well construction that meets health standards. These factors together protect against contamination of dug well water quality. The walls of dug wells made of cast cement have a low level of permeability, preventing the seepage of water and contaminants from the soil. Using concrete buisade as a barrier for the walls of dug wells also prevents the soil from collapsing into the well water. Apart from that, the characteristics of the soil in Gempol Village, which does not include mud or sand, also play a role in maintaining the clarity of dug well water. The presence of organic and inorganic particles influences turbidity in water. Organic particles can be detritus, microorganisms and plankton, while inorganic particles can be sand and mud.

Research result Yuliansari (2019), supports this statement that 54.55% of dug well construction in Jiken Hamlet, Rarang Tengah Village, does not meet health standards. Namely the dominant wall height of dug wells is < 3 meters, the majority of dug well floor areas are $<$

1 meter and are not waterproof and 63.64% height of the edge of the dug well < 70 cm. According to Minister of Health Regulation Number 3 of 2014 concerning Community-Based Total Sanitation, the minimum distance between a clean water source and a septic tank should be 10 meters. In the Gempol Village area, several drinking water sources (dug wells) have the potential for pollution originating from latrines, household waste disposal (septic tanks), and livestock pens, which are < 10 meters from drinking water sources. However, liquid pollutants originating from latrines, septic tanks and livestock pens do not affect drinking water quality because the walls and floors of dug wells are well constructed. This prevents liquid pollutants from mixing with dug well water. There is also no standing water around the wells dug by the residents of Gempol Village. The high population density in this village causes the land to be used intensively for settlement, causing the distance between houses to become closer and the house yards to narrower. This condition makes some residents build septic tanks near clean water wells in their yards. However, some residents with quite large yards have built latrines at an adequate distance from dug wells, namely around 15 meters, and septic tanks at around 24 meters.

Based on research results by Rahayu et al., (2019) In Jabungan Semarang, there is a correlation between several factors, such as the condition of the good floor, the distance between latrines, other sources of pollution, standing water on the floor and around the well, the condition of the wastewater disposal system, cracks in the good floor, placement of buckets and bucket ropes, condition the walls and rim of the well with the bacteriological quality of dug well water.

In line with research on household water handling carried out by Bekele et al., (2023) in Hawassa City, Ethiopia showed that of 19 (31.7%) household water samples contaminated with feces, 15 (25%) water samples were contaminated at the household level. Of the 7 (11.7%) cases reported from households whose tap water samples were negative but household water samples were positive for faecal coliform, 9 (15%) of them occurred in households whose tap water samples were positive for faecal coliforms, and 11 (18.3%) cases of abdominal discomfort.

In other research conducted by Porusia et al. (2021), houses in Mulyoharjo, which are not equipped with septic tanks and dispose of waste directly into the river, show lower levels of E.coli well water pollution compared to houses that have septic tanks. Even so, the condition of the river in Mulyoharjo still shows high levels of E.coli. The close distance between the septic tank and the well also increases the potential for well water contamination.

CONCLUSIONS

The results showed a relationship between education level and knowledge about the suitability of drinking water sources. Education is important in increasing knowledge about the suitability of drinking water sources. Through education, people can understand the importance of clean water for health and how to ensure the safety of drinking water, such as the need for cross-sectoral socialization in the community regarding good water treatment and proper hygiene practices. With better knowledge, communities can make better decisions in choosing safe drinking water sources and avoid health risks. The results of this study can be used as a reference for other researchers to conduct further research on the relationship between knowledge and variables related to the suitability of drinking water sources in Gempol Village.

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