



Difficulty Accessing Drinking Water during COVID-19 Pandemic in Indonesia

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Abstract: The problem of the availability of clean and safe water in Indonesia has increased during global climate change. The conditions of the COVID-19 pandemic also have an impact on increasing domestic water use. This study aims to assess drinking water access in household during COVID-19 pandemic. This study using data of National Household of Drinking Water Quality Survey. The survey conducted in 2020 of 21,829 household in Indonesia. Many households have increased water consumption, households for hand washing (49.6% HH), personal hygiene (37.2% HH), clean house (29.2% HH), and washing (33.9% HH). There are only 1.6% of HH have difficulty accessing drinking water source, 1.3% in urban area and 2.0% in rural area. The cause is 76.1% because of decreased water flow and 42.1% because of economic problems. Drinking water sources used by household who has difficulty accessing drinking water are piped water (26.8%), refill water (16.8%), and bore hole (13.6%). Only few of household difficult to access drinking water during COVID-19 pandemic, meanwhile there are increasingly of drinking water needs. It is suggested that the municipal government form a public-private partnership (PPP) to invest in immediate and long-term water infrastructure in order to strengthen the resilience of drinking water systems against future pandemics.

Keywords: Accessibility; COVID-19; Drinking water access

Introduction

In 2015, Indonesia together with other members of the United Nations (UN) adopted agenda 2030 as the agreed framework for sustainable development by 2030 and set out 17 sustainable development goals (SDGs). The relevant objectives of SDG 6 were to "ensure availability and sustainable management of water and sanitation for all". Globally, in 2020 there are 2 billion people (26% of the global population) lacked safely managed drinking water, including 1.2 billion people with basic services, 282 million with limited services, 367 million using unimproved sources, and 122 million drinking surface water (WHO/UNICEF, 2021). In Indonesia, about 6.3% of household, or 17 million people drink unimproved drinking water and surface water (NIHRD, 2020).

Lack of access to safe drinking water can cause many public health problems. Contaminated water is linked to the transmission of diseases like diarrhea, cholera, typhoid, and hepatitis A (WHO, 2022). The

population-attributable fraction (PAF) of diarrheal disease due to risk factors such as inadequate drinking water, sanitation, and hygiene is more than 25% (WHO, 2022). Infants in households with improper management of liquid waste and hand-washing practices are at a greater risk of getting diarrhea-related infant death (Mebrahtom et al., 2022). Other studies reported about enhanced access to improved drinking water is associated with lower diarrhea prevalence, improved nutrition, and lower mortality in children under five years of age (Pickering et al., 2015). A study in Indonesia reported that 21,58% of the stunting burden among U-5 children residing in rural areas is preventable through the provision of access to an improved drinking water source and better household solid waste management (Irianti et al., 2019). A new intervention study proved that water, sanitation and hygiene interventions reduced risk of diarrhea in children in low middle income countries (Wolf et al., 2022).

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Provision of water, sanitation and hygiene facility can protect human health of all of infectious diseases, including COVID-19. Adequate drinking water and sanitation management applies to the COVID outbreak. WHO also was reported that the COVID-19 outbreak has raised attention to the critical necessity for everyone to have access to adequate hand washing hygiene. Three out of ten individuals worldwide were unable to wash their hands with soap and water in their homes at the early of the pandemic (WHO, 2020). This then has an impact on increasing water needs during the pandemic. In addition, out over course of COVID-19, the frequent washing of hands is one of the pandemic measures identified and implemented worldwide by the World Health Organization (WHO). Despite, Indonesia has achieved significant national progress during the MDG period (2000-2015) but geographical variations in access to improved drinking water and sanitation have remained reported (Arianto, 2015). Persistent with the previous study in 2015 revealed there were inequalities in access to improved drinking water and sanitation by subnational region in Indonesia (Afifah et al., 2018). Moreover, in a pandemic situation, this study aimed to assess drinking water access in household during COVID-19 pandemic.

Method

Data for the study were drawn from the National Household of Drinking Water Quality Survey in 2020. NHDWQS 2020 is the first of national drinking water survey conducted by National Institute of Health Research and Development, Ministry of Health, Republic of Indonesia. NHDWQS 2020 are representative of 97% of the Indonesian population spread across all of province. Detailed sampling procedures can be seen elsewhere (NIHRD, 2020). This research involved the sanitarian staff from Health Center Offices, as an enumerator. The enumerator visit households, and collect household data using questionnaire. NHDWQS 2020 comprises of 21,829 households. The data collection held in November-December 2020, in which that time still has COVID-19 pandemic in all of province in Indonesia. The first time announced the case of COVID-19 was in March 2020, and this pandemic still happened until these days. This study analyzed about difficulty of accessing drinking water (as dependent variable) in household during November-December 2020. The population are households who have difficulty of drinking water access. Descriptive analysis was carried out to the independent variables i.e., type of drinking water source, the reason of that difficulty and the increasing of water consumption. But before, we also analyzed the increasing of water consumption in all population.

Result and Discussion

Drinking Water Access

About 1.6 percent of household has difficulty accessing of drinking water source during COVID-19 pandemic, in which rural areas (2.0%) higher than urban areas (1.3%). The majority of household that has difficulty accessing of drinking water source occurs in Nusa Tenggara (7.7%), followed by Papua (4.9%) and Sulawesi (2.8%) (Table 1).

Table 1. Proportion of Household by Difficulty Accessing Drinking Water during COVID-19 Pandemic (N=21,829)

Region	% (95%CI)	n
National	1.6 (1.3-2.0)	439
Urban	1.3 (1.0-1.8)	141
Rural	2.0 (1.5-2.6)	298
Region:		
- Sumatera	1.0 (0.7-1.3)	76
- Java Bali	1.3 (1.0-1.8)	118
- Nusa Tenggara	7.7 (4.4-13.1)	126
- Kalimantan	1.1 (0.6-1.9)	17
- Sulawesi	2.8 (1.5-5.1)	71
- Maluku	1.0 (0.5-2.2)	5
- Papua	4.9 (2.6-9.2)	26

Lack access of drinking water still major problems in development countries, especially in dry season or in special condition according to climate change. In Indonesia, in 2020 about 6.3 percent of households still using unimproved drinking water sources (unprotected well and unprotected spring) and 0.6 percent of household has no access because using surface water for drinking purpose. Lack of access of improved drinking water sources in rural areas was so real because about 13% of rural household using unimproved drinking water, much more than urban (2.4%) (NIHRD, 2020). People live in developing regions without sustainable access to safe drinking water, remain highly vulnerable of COVID-19 (World Health Organisation, 2020). Provision of WASH services influence COVID-19. Sustainability and continuity of WASH services are important thing in mitigate of COVID-19 pandemic (Desye, 2021).

There are two usage of drinking water, which are used for drinking and for domestic purpose like bathing, personal hygiene, cooking, washing and others. For drinking, the type of drinking water sources that used by households which has difficulty of access, consist of piped water (26.5%), refill water (16.8%), bore hole (13.6%), protected well (11.7%), and others (see table 2). Almost 10% of household using unimproved sources (unprotected well and unprotected springs) and 3.3% has no access (surface water). For other purpose beside drinking, the type of drinking water source that used by household, consist of piped water (30.2%), bore hole

(19.6%), protected well (17.8%), and others. Almost 20% of household using unimproved sources and no access.

Table 2: Proportion of Household by Type of Drinking Water Sources (N=439)

Type of Drinking Water Sources	Used for drinking		Used for Others	
	%	n	%	n
Bottle water	4.4	11		
Refill water	16.8	76	0.2	1
Piped water	26.5	111	30.2	130
Borehole	13.6	36	19.6	60
Protected well	11.7	43	17.8	61
Protected spring	3.1	18	3.5	17
Rainwater collection	4.1	30	5.8	34
Water hydrant	2.8	19	1.8	14
Water terminal	0.6	3	0.9	5
Cart with small tank	3.4	24	1.3	16
Unprotected well	3.9	16	7.1	32
Unprotected spring	5.8	25	6.2	30
Surface water	3.3	27	5.6	39

Cause of Water Access Difficulties

The cause of the difficulty of drinking water access mostly because of decrease of water flow (76%), and because of cost of water (42.1%). There is only few different between urban and rural area (table 3).

Table 3. Proportion of Household by Cause of Difficulty Accessing Drinking Water (N=439)

Variables	% (95%CI)	n
Decrease of Water Flow		
-National	76.1 (70.7-80.8)	314
-Urban	77.4 (69.1-84.0)	109
-Rural	75.0 (67.7-81.2)	205
Economic problem		
-National	42.1 (38.0-46.3)	198
-Urban	44.2 (40.6-47.8)	57
-Rural	40.3 (33.3-47.7)	141

Increase of Water Consumption

In the COVID-19 pandemic situation, analysis of the increase in water consumption for hand washing, cleaning the house or floor, cleaning clothes and for personal hygiene, has been done for total population and sub population (household with difficulty accessing drinking water) (see table 4). It shows that less than 50 percent of household has increase in water consumption, such as for hand washing (49.6%), clean the house (29%), clean the clothes (34%) and personal hygiene (37%). In sub population, proportion of household with increase in water consumption during COVID-19 pandemic was higher than total population for all of activities. Meanwhile, there are different proportion between urban and rural, in both populations.

Table 4: Proportion of Household by Increase in Water Consumption

Increase in water consumption	Total Population (N=21,829)	Sub Population (N=439)
	%	%
Hand washing		
-National	49.6	73.3
-Urban	53.7	76.4
-Rural	44.3	70.6
Cleaning the house		
-National	29.2	45.7
-Urban	33.2	53.7
-Rural	23.9	38.7
Cleaning the clothes		
-National	33.9	58.3
-Urban	36.7	62.9
-Rural	30.2	54.3
Personal hygiene		
-National	37.2	62.5
-Urban	40.2	66.4
-Rural	33.3	59.2

In this study, the question about water consumption during COVID-19 pandemic also asked to total population of the survey, beside in sub population. Both have same pattern that the highest activity that made increase of water consumption was hand washing. The increase of water consumption because of any reason, always occurs in urban area more than rural area. Meanwhile, when we compare the difference of household percentage between two populations, we know that increasing of water consumption for all of activities is more happening at the sub population. In line with this study, the survey in Sub-Saharan Africa in 2021 concluded that there is significant effect of level of concern spread of COVID-19 to the frequency of hand washing (Amuakwa-Mensah et al., 2021). One of study in Zimbabwe conclude that the quantity of water for hand washing about extra than 4.5 liters per person per day, if they meet WHO standard. This study also concluded about vital importance of improved water access. The lack of household water access cause vulnerability to exposure of COVID-19 (Zvobgo & Do, 2020). Increase of water consumption for hand washing also occurs in India (Bauza et al., 2021).

Health Impact Issue and Policy Implication

COVID-19 pandemic analysis in this study related to changes in hygiene behavior, in line with World Health Organization recommendation to improve hand hygiene practices widely to help prevent the transmission of the COVID-19 virus. The recommendation also mentioned to improve access to hand hygiene facilities (WHO, 2021). The higher the frequency of hand washing, the better the effect on disease prevention (Xun et al., 2021). An online survey conducted in 2020 show that almost all of respondents realize that hand washing with water and soap can

prevent corona virus disease. This will make an increasing of water consumption for hand washing (Cahyorini et al., 2020). About frequency of hand washing, many studies have no advice regarding specific frequency, but one study found that hand washing more than four times per day, will be a protective factor in reducing health risk (Xun et al., 2021). The effectiveness of hand hygiene against the transmission or acquisition of SARS-CoV-1, SARS-CoV-2 or influenza viruses, explained by a systematic review. WHO also give the recommendation to countries, to provide universal access to public hand hygiene station (Gozdzielewska et al., 2022).

In terms of economic problem, it is clear that COVID-19 pandemic affects to the household's ability to buy refill water and also bottle water, because loss of job or reduction of income. In line with increasing of bottle water and refill water usage for drinking (41% household in 2020) (NIHRD, 2020), it can be assumed that household will has an alternative for drinking water sources, but some of them will have difficulty to access drinking water. This economic problem has indirect affect with the nutrition status of children, because poor economic condition will impact on the sanitation and cleanliness of the house. Other issue about water supply in terms health impact, was related with menstrual hygiene management. Insufficient water supply not recommended to wash sanitary napkins, because used sanitary napkins may contain a large number of bacteria (Hadi & Atiqa, 2021). The sanitary napkins must be disposed in a covered trash can, and therefore it raises other waste problems.

Analysis about policy implications, the biggest challenge for local government facing the difficulty of drinking water access during COVID-19 pandemic was to increase of quality water supply systems in order to climate change adaptation and disaster condition. To provide piped water system in small scale area collaboration with private sector or communities, was an alternative in order to meet drinking water access, especially for rural areas. Study in Sumba, a region in east Indonesia who regularly face water scarcity 7-8 months a year, indicate that poor households should be the main target group of WASH interventions (Daniel, 2021). In vulnerable communities in the Mekong Region, need combination of shorter-term and longer-term measures addressing water access, supply, and quality difficulties to improve provisioning of clean water in normal times, as well as during epidemics (Lebel et al., 2022).

Conclusions

Only few of household difficult to access drinking water during COVID-19 pandemic, meanwhile there are increasing of drinking water needs. It is suggested that

the municipal government form a public-private partnership (PPP) to invest in immediate and long-term water infrastructure in order to strengthen the resilience of drinking water systems against future pandemics.

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