The source of potential pollution and diarrhea on toddlers at populous area (a study at Johar Baru Subdistrict, Central Jakarta)

Ika Syiami Fitri[1*], *Haryoto* Kusnoputranto[2], and *Tri Edhi Budhi* Soesilo[1]

[1]Environmental Science, School of Environmental Science, Universitas Indonesia
[2]Department of Environmental Health, Faculty of Public Health, Universitas Indonesia

Abstract. Indonesia still faces some challenges in the field of water, sanitation, and hygiene (WASH) especially in Jakarta. Environmental disease such as diarrhea becomes the cause of death on toddlers in Indonesia. The region with the most cases of diarrhea is Johar Baru Subdistrict with proportion 17% of all Subdistricts in Central Jakarta area and becomes the region with the most populous place in Jakarta. This analysis aims to determine the source of potential pollution of diarrhea in Johar Baru Subdistrict. The research method used was cross sectional study design. The research results show that mothers' education, the habit of washing the hand by using soap, family income, type of clean water sources, facility of waste disposal, and risk of clean water source pollution influence the occurance of diarrhea on toddlers. The dominant factor of diarrhea case on toddlers is the risk of clean water source pollution and the habit of washing the hand by using soap. The effort of diarrhea prevention is such as conducting city water security at slums of the city with high populous and makes washing the hand with soap as the habit in the society completed with the facility of hand washing.

1 Introduction

Indonesia is one of the developing countries that still face several challenges, especially in the field of water, sanitation, and hygiene (WASH). WASH problem especially in Jakarta experiencing environmental pollution at fast pace especially in residential area [1-3]. This has an impact on the emergence of environmental based diseases that until now the occurrence is still developing is diarrhea. Gastrointestinal infections including diarrhea are considered still the most important health problem in urban slums [4]. Nationally in Indonesia, Case Fatality Rate (CFR) on Extraordinary Conditions (KLB) diarrhea has increased. It proves that diarrhea is still a problem of public health in Indonesia. Based on the Indonesian health profile Data of 2018, CFR case of diarrhea when KLB increased compared to the previous year, which is in 2018 by 4.76%, year 2017 of 1.97%, 2016% for 3.03%, year 2015 of 2.47%, year 2014 1.14% while the target CFR on KLB case of diarrhea is expected to reach <1%. This proves the CFR on the occurrence of KLB diarrhea

* Corresponding author: ikasyiami@gmail.com

has not reached the target program. Rapid Survey of diarrhea in 2015 also proves that the case of diarrhea all ages nationally is 270/1000 inhabitants. The achievement of this diarrhea case is higher than the target of 220/1000 inhabitants.

Based on a surveillance report conducted by the health office in all areas of central Jakarta, the area that has the highest diarrhoea case of the toddler Group is Johar Baru Subdistrict with a proportion of 17% of all Subdistricts in Central Jakarta area. The observed trend also showed that from January 2012 to December 2018 Johar Baru Subdistrict became an area with the case of diarrhea in the highest toddler in Central Jakarta. Cases of diarrhea that occurred on toddlers in the Johar Baru Subdistrict in 2017 as many as 1349 cases found and obtained diarrhea pain number per 1000 inhabitants reach 159.8%.

Case of diarrhea in DKI Jakarta can potentially continue to increase considering the prevalence of diarrhea closely related to the population density in DKI Jakarta. Population density becomes one of the residential factors that can affect the transfer and transmission of diseases from one person to another [5]. The emergence of poorly planned settlements raises the sanitation system not well-coordinated. The quality of clean water or drinking water especially the quality of bacteriologist that is accessed by the people in Indonesia can be said to be less good [6]. Poor sanitation is easily a container of water-transmitted diseases such as diarrhea (24.9%), intestinal worms (12.6%), hepatitis A (1.7%), and leptospirosis (0.7%) [7]. Another important point is the increase in the number of wells that exceed the quality standard in the coliform parameters that occur in the areas of central Jakarta, East Jakarta, and North Jakarta, which amounted to 63% in June increased to 67% in the month Oct 2004. The contamination of coli and fecal coli in the wells or groundwater has a greater percentage compared to heavy metals in the dry season and the main one is the rainy season [8]. During the rainy season, the outbreak of water borne diseases will be very high due to the high levels of microbial contamination and improper water treatment [9].

The Data of the Central Statistic Agency (BPS) in 2018 showed that Jakarta's population density was 15,663 people/km^2. The density figures make Jakarta the province of Indonesia with the highest population density and even exceeds the standard number of 9,600 people/km^2. The influence of population density on the number of diarrhea cases in Jakarta is also supported by the statement of Bates et al. [10] that the case of higher diarrhea occurred at a higher population density. Johar Baru Subdistrict is one of the administrative areas located in the province of DKI Jakarta with the highest population density. The population density in Johar Baru Subdistrict in 2017 has reached 60,433 inhabitants/km^2. The high density figures exceed the population density of DKI Jakarta and even greater six times the standard population density stipulated by WHO. The high population density according to Semret & Haraoui [11] is a conducive place for the transmission of the bacteria AMR (Antimicrobial Resistance).

The importance of better infrastructure especially in cities with high population density can improve the quality of health and participatory approaches are needed in the framework of disaster recovery programs [12-14]. Recovery programs related to WASH have an important role to play in improving public health, especially related to infectious diseases. Infectious diseases such as diarrhea are still a problem, especially in developing countries due to the declining quality of the living environment. The importance of understanding the path of diarrhea transmission so that it becomes the basis for environmental management to reduce the burden of diarrhea, especially in urban slums and densely populated areas. Therefore, this study aims to determine the potential sources of pollution of diarrhea in urban slums, especially areas with the highest population density, Johar Baru Subdistrict, Central Jakarta.

2 Method

This research was conducted in Johar Baru Subdistrict, Central Jakarta. Johar Baru Subdistrict is the most populous region in Jakarta Province with the most cases of diarrhea with the number of proportion of 17%. The research method used was cross-sectional study design and a quantitative approach, a population-based survey conducted on 158 toddlers under the age of five 0-59 months. Data about diarrhea, mother's education, the habit of washing the hand by using soap, hygiene of food and beverage sanitation, family income, type of clean water sources, facility of feces disposal, facility of waste disposal, and risk of clean water source pollution is measured at the same time through interviews with the questionnaire. Research locations can be seen in Figure 1.

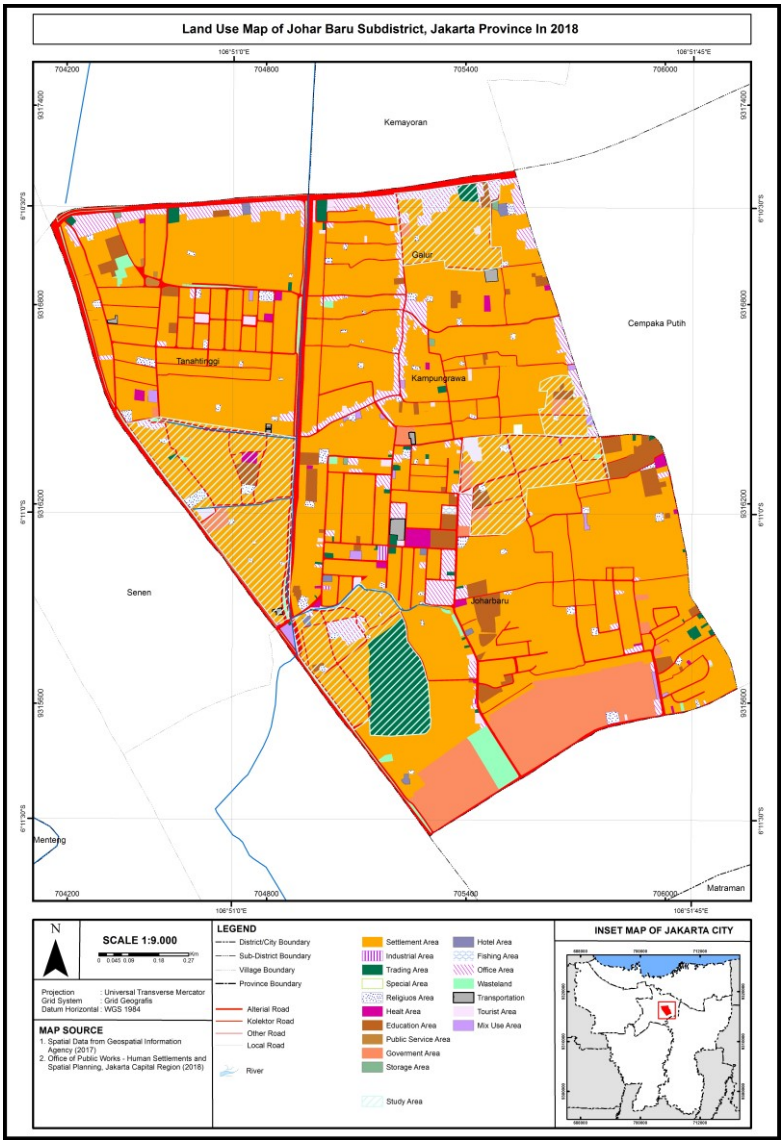

Fig. 1. Research locations

The research conducted for five months from March to July 2019. The collection of data in the community adjusts to the time provided by RW cadre because the interview was conducted accompanied by RW cadre. The sample size in this study using a formula derived from the calculation of sample size by Lemeshow can be seen in the formula (1), in order to get a minimum sample of 144 toddlers. Furthermore, in order to anticipate the occurrence of drop out, then the sample size was enlarged by adding 10% of the minimum sample in order to obtain a sample of 158 toddlers.

$$n = \frac{Z_{1-\frac{a^2}{2}}\ p\ q\ N}{d^2\ (N-1)+Z_{1-\frac{a^2}{2}}\ p\ (1-p)} \quad (1)$$

In addition, the stages of analysis carried out include univariate analysis, which is to look at the frequency distribution of each variable type of pollution source in Johar Baru Subdistrict. Desciptive analysis to see the proportion of diarrhea, mother's education, the habit of washing the hand by using soap, hygiene of food and beverage sanitation, family income, type of clean water sources, facility of feces disposal, facility of waste disposal, and risk of clean water source pollution. Furthermore, bivariate analysis is a cross table analysis of two variables are independent variable and the dependent variable according to the conceptual framework. The chi-square statistic is commonly used for testing relationships on categorial variables, and the chi-square test using SPSS 16.0 application with a 95% confidence level (a=0.05) to find out a significant relationship between each independent variable and the dependent variable.

Lastly, the bivariate analysis at this stage the variables included as candidates in multivariate analysis are variables that have a value of $p<0.25$ of bivariate analysis, or suspected to be closely related to the dependent variable then entered into the candidate multivariate model with logistic regression analysis. Logistic regression analysis is a systematic model approach to identify the most dominant risk factors in the case of diarrhea. Modeling analysis is carried out by the Backward method that is preceded by selecting variable candidates that will be entered into the multivariate analysis, then spending the variables one by one which has the largest *p*. The stage of multivariate analysis for determining the dominant factors affecting the case of diarrhea on toddlers in Johar Baru Subdistrict. The importance of understanding about dominant factor becomes the basis of environmental management for decreasing diarrhea. This analysis aims to determine the source of potential pollution of diarrhea in Johar Baru Subdistrict. The results of the analysis obtained from data processing are presented in tabular and narrative form. Presentation with tabular and narrative to make it easier to read and understand related to the research objectives.

3 Results and Discussion

The results of data analysis and discussion can be seen as follows:

3.1 Univariate Analysis Results

The case of diarrhea experienced by toddlers in Johar Baru Subdistrict in the last six months was 61 toddlers (38.6%) While not experiencing diarrhea in the last six months as much as 97 toddlers (61.4%). Thus, the prevalence of diarrhea on toddlers in Johar Baru Subdistrict was obtained in the research of 38.6% (61 from 158). Data from DKI 2008 Jakarta Health Office shows the prevalence of diarrhea on toddlers in DKI Jakarta Province

in 2007, which is 29.02%. This indicates that the prevalence of diarrhea in the Subdistrict of Johar Baru is greater than the prevalence of diarrhea on toddlers in DKI Jakarta Province in 2007. According to Julian [15], the transmission of diarrheal disease is from an infected person to a susceptible person through various ways, namely flies, fomites, fingers, fluids, fields, and food. The factors that influence the most important routes of transmission for diarrheal diseases are complex, including etiology of endemic diseases; and water, sanitation, and hygiene (WASH) infrastructure and practices.

Problems in Johar Baru Subdistrict are not only a populous area but also vulnerable to flooding. Vulnerability to flooding is caused by the river that much covered by garbage. Johar Baru Subdistrict is flowed by a river that is large enough, Sentiong River. Sentiong creek also passes a tightly packed residential house in an alley. Not only that, there are several home industries and most of the tofu and tempeh crafters are located on the edge of Sentiong River. Houses and narrow road conditions are generally seen clustered with indeterminate distances. The irregular development of settlements is due to the higher population density that occurs in Johar Baru Subdistrict. Rapid development causes at least water catchment areas, whereas water catchment areas have many benefits, one of which is to prevent flooding. Urbanization in cities also causes concentration of population in disaster-prone areas or in areas that have disaster risk in urban areas, both in big cities and in small cities. The following is a table of the frequency distribution of diarrhea on toddlers in Johar Baru Subdistrict.

Table 1. Frequency Distribution of Diarrhea on Toddlers

Variable	Frequency (n)	Percentage (%)
Case of Diarrhea on Toddlers a. Diarrhea b. No Diarrhea	 61 97	 38,6 61,4
Total	158	100,0

Furthermore, based on table 2, it is known that most of the respondents have higher education (high school-higher education) of 60.1% and have a low education (primary school-middle school) of 39.9%; More than half the total respondent has good hand washing habit of 62.0% and poor category is 38.0%; Most of the respondents have a good hygiene of food and beverage sanitation of 71.5% and poor is 28.5%; Respondents seen from the magnitude of the family income are largely in the category of poor which is 54.4% and in good category of 45.6%.

Not all people of Johar Baru Subdistrict use clean water from the piping system (PP) and most of the family of toddlers use the type of water source of the pumping wells (SPT/SPM) is 58.2%, while the use of clean water in the form of the new piping system reached 37.3%, and the use of digging wells amounted to 4.4%; The facility of feces disposal in good category is 72.2% and 27.8% have a means of disposal of ungood stools; Most of the respondents have a good means of waste disposal of 72.8% and 27.8% have means of poor waste disposal; and most of the respondents have risk of pollution of clean water in low category (60.1%) and the remainder (39.9%) have a risk of pollution of water in high category.

Table 2. Frequency Distribution of Risk Factor of Diarrhea on Toddlers

Variable	Frequency (n)	Percentage (%)
Mother's Education		
a. Low (Primary-Middle School)	63	39,9
b. High (High School-Higher Education)	95	60,1
The Habit of Washing the Hand by Using Soap		
a. Poor	60	38,0
b. Good	98	62,0
Hygiene of Food and Beverage Sanitation		
a. Poor	45	28,5
b. Good	113	71,5
Family Income		
a. Poor	86	54,4
b. Good	72	45,6
Type of Clean Water Sources		
a. Digging Wells	7	4,4
b. Pumping Wells	92	58,2
c. Piping System	59	37,3
Facility of Feces Disposal		
a. Poor	44	27,8
b. Good	114	72,2
Facility of Waste Disposal		
a. Poor	44	27,8
b. Good	114	72,2
Risk of Clean Water Source Pollution		
a. High	63	39,9
b. Low	95	60,1

3.2 Bivariate Anaysis Results

Based on table 3 it can be seen that from 8 variables, 6 variables have a significant relationship with the case of diarrhea on toddlers in Johar Baru Subdistrict. Variables that have a significant relationship are mother's education, the habit of washing the hand by using soap, family income, type of clean water sources, facility of waste disposal, and risk of clean water source pollution. The importance of education owned by a mother can increase awareness about household health and hygiene such as transmission and prevention of diarrhea [16]. Mother's education is a risk factor for the occurrence of diarrhea on toddlers in Johar Baru Subdistrict. This is in line with the statement of Yilgwan & Okolo [17], mothers who have low education are more likely to experience diarrhea than mothers who have higher education and also research conducted by Mshida et al. [18] that low education is a factor influencing the case of infectious diseases such as diarrhea. Middle to lower social status indicates low education and makes it difficult for mothers understand child and family care.

Based on table 3 can also be noted that toddlers from mothers who have a habit of handwashing are not good without using soap have a chance 64.278 times greater experience diarrhea than toddlers from mothers who have a habit of good handwashing. Tao et al. [19] responded that the biggest determinant of cleanliness in good handwashing behavior is the level of education and the level of community knowledge. The main

problem is the lack of adherence to good handwashing behavior due to the lack of education and public knowledge. The results of the same study conducted by Oloruntoba et al. [20] which is washing hands without soap before preparing food and after defecating is a major risk factor for diarrhea among children less than five years old. Flushing hands using only water according to Philips et al. [21] still often encountered in developing countries such as Indonesia, even though it has the risk of transmitting infectious diseases such as diarrhea. Therefore, washing the hand by using soap could be one of strategy to prevent diarrhea. Washing hands after defecation and other activities can reduce the risk of diarrhea. Washing hands with soap according to WHO has been proven to reduce the case of diarrhea by about 40%.

Hygiene of food and beverage sanitation is not a risk factor for the occurrence of diarrhea on toddlers in Johar Baru Subdistrict. The findings in this study are not in accordance with some previous studies conducted by Rahman et al. [22] which states a significant relationship between the case of diarrhea on toddlers and hygiene food and beverage sanitation. On the other hand, the results of the same study conducted by Nugraheni [23] shown that hygiene of food and beverage sanitation was not related to the case of diarrhea on toddlers. Due to the food and beverage consumed by her respondent was cooked until its ripe, this cooking method played an important role in reducing bacteria levels on food and beverage.

Furthermore, family income is a risk factor for the case of diarrhea on toddlers. This research is in line with the research conducted by Gedefaw et al. [24], that there is a link between revenues and the case of diarrhea that has a chance of 2.27 times greater diarrhea than toddlers with families have good income. Public awareness about health can be hampered due to the low income of the community. This will have an impact on one's ability to maintain health status. Another study conducted by Kabhele et al. [25], shown the prevalence of diarrhea on toddlers in Tanzania was 20.4% while the study in Ethiopia was conducted by Alebel et al. [26] there is a prevalence of 22% on toddlers. According to the World Bank, the two countries, Tanzania and Ethiopoa, are included in the group of low-income countries. This show that low-income countries need more focus in overcoming the case of diarrhea on toddlers, given the socioeconomic status is very influential on health status of children under five.

In this study, toddlers from families using water wells to get clean water had a chance of 13.959 times greater diarrhea than other toddlers. The results of an examination of water wells conducted in Lesotho, South Africa by Gwimbi [27], showing that most of the water wells used by the population proved to be positive for *Escherichia coli* (*E. coli*) bacteria. The results of this study are also in line with research by Kumarijati et al. [28] which proves that there is a significant relationship between water wells and the case of diarrhea ($p = 0.029$). Issahaku et al. [29] argues that infectious diseases such as diarrhea are caused by *coliform* bacteria and *E. coli* that exceed the standard quality standards of a water wells and springs especially at the populous area that might be contaminated by unsafe waste disposal. Population could be a very important factor for establishing good water quality in Indonesia. This means that it is closely related to population density at the study site in Johar Baru Subdistrict, Central Jakarta, reaching 60,433 people/km^2, even though the area owned by Johar Baru Subdistrict only reaches 2.37 km.

The facility of feces disposal in the study did not have a significant relationship with the case of diarrhea. This result is not following previous studies conducted by Cronin et al. [30] that there is a relationship between unsafe disposal of feces and the case of diarrhea. On the other hand, facility of waste disposal in this study has a significant relationship with the case of diarrhea. According to Fletcher [31], poor hygiene and lack of adherence to infection prevention and control measures have contributed to the spread of resistant

bacterial strains. Research conducted by Rego et al. [32] in Salvador, Brazil showed that exposure to waste in the environment was the most important factor related to diarrhea.

Lastly, the risk of clean water source pollution becomes a risk factor for the case of diarrhea on Toddlers in Johar Baru Subdistrict. The results showed that the use of clean water sources with a high risk of pollution has a significant association with the case of diarrhea on toddlers. Sutiknowati [33] found that soil contamination resulted in contamination of clean water sources into a good growth medium for the bacteria *E. coli* as well as the increasing concentration of *E. coli* bacteria in the soil and if it spreads to the system or other organs of the body will be the caused of infection. Poor sanitation is a cause of various waterborne outbreaks due to the low quality of water for household use. Therefore continuous monitoring of *E. coli* is needed in order to determine the bacteriological quality of water [34-36].

Table 3. The Relation between Risk Factor and Diarrhea on Toddlers.

Variable	Case		N	OR	*p* value	95% CI
	Diarrhea (%)	No Diarrhea (%)				
Mother's Education	36	27 (42,9)	63	3,733	0,000	1,898–
a. Low (Primary-Middle	(57,1)	70 (73,7)	95			7,343
School)	25					
b. High (High School-	(26,3)					
Higher Education)						
The Habit of Washing the		8 (13,3)	60	64,278	0,000	23,366-
Hand by Using Soap		89 (90,8)	98			176,826
a. Poor	52					
b. Good	(86,7)					
Hygiene of Food and	9 (9,2)	30 (66,7)	45	0,728	0,390	0,353-
Beverage Sanitation		67 (59,3)	113			1,503
a. Poor						
b. Good	15	43 (50,0)	86	3,000	0,002	1,519-
Family Income	(33,3)	54 (75,0)	72			5,925
a. Poor	46					
b. Good	(40,7)	2 (28,6)	7	13,959	0,000	5,287-
Type of Clean Water Sources		39 (42,4)	92			36,856
a. Digging Wells	43	56 (94,9)	59			
b. Pumping Wells	(50,0)					
c. Piping System	18	31 (70,0)	44	0,577	0,146	0,273-
Facility of Feces Disposal	(25,0)	66 (57,9)	114			1,217
a. Poor						
b. Good	5 (71,4)	16 (36,4)	44	4,295	0,000	2,058-
Facility of Waste Disposal	53	81 (71,1)	114			8,964
a. Poor	(57,6)					
b. Good	3 (5,1)					
Risk of Clean Water Source		14 (22,2)	63	24,208	0,000	10,367-
Pollution	13	83 (87,4)	95			56,529
a. High	(30,0)					
b. Low	48					
	(42,1)					

	28 (63,6) 33 (28,9) 49 (77,8) 12 (12,6)					

3.3 Multivariate Analysis Results

Multivariate analysis was used in this study to determine the dominant factors affecting the case of diarrhea on toddlers in Johar Baru Subdistrict. Each independent variable that has been carried out bivariate analysis with the dependent variable, then selected to find out which variables meet the entry requirements for multivariate analysis. If the results of bivariate analysis produce *p* value<0.25, then the variable is entered in the multivariate analysis stage.

The results of the candidate selection variables that qualify for multivariate modeling with a *p* value<0.25 are variables of mother's education, the habit of washing the hand by using soap, family income, type of clean water sources, facility of feces disposal, facility of waste disposal, and risk of clean water source pollution. Variables that met the requirements of the bivariate analysis were included in the multivariate analysis using multiple logistic regression. Furthermore, one by one the variables are issued based on the largest *p* value so that the multivariate analysis model results are obtained as shown in Table 4 below.

Table 4. Model of Multivariate Analysis

Variable	B	Wald	OR	(95% CI)	*p* value
The Habit of Washing the Hand by Using Soap		39,603		0,009 – 0,086	0,000*
Poor	-3,561		0,028		
Risk of Clean Water Source Pollution		17,952			0,000*
High	-2,387		0,092	0,030 – 0,277	

Based on Table 4 above it can be seen that the variables that have a significant relationship with the case of diarrhea on toddlers is a variable risk of clean water source pollution, and variable the habit of washing the hand by using soap. Furthermore, to determine the variable with the greatest effect on the risk of diarrhea cases on toddlers, it can be seen from the Exponent B value on the significant variable. Based on the results of the above analysis it can be seen that risk of clean water source pollution variable has the highest Exponent B value, then habit of washing the hand by using soap variable ranks second. This means that risk of clean water source pollution is the dominant variable that has the biggest effect on the risk of diarrhea on toddlers.

Vulnerable populations such as those living in Johar Baru Subdistrict often have poorer health. Problems in Johar Baru Subdistrict are not only densely populated but also vulnerable to flooding. Vulnerability to flooding in Johar Baru Subdistrict is partly due to the flow of the river which is mostly covered by rubbish and there is also a Sentiong creek who passes a dense residential house in the alley. Solid waste which is disposed of and is not managed properly, will become a problem for public health. Piles of household waste left alone will bring insects and mice that will carry germs and live off food scraps and multiply in the trash. The amount of rubbish found on the road also obstructs the waterways in Johar Baru Subdistrict so that the water does not move. This disaster can leave a water supply contaminated and endanger millions of children. Water that has been contaminated and come into contact with humans is a major cause of infectious diseases, such as diarrhea [37].

High population density in Johar Baru Subdistrict has a consequence of a decrease in the quality of the living environment, so the risk of outbreaks of various water borne diseases. According to Kumpel & Nelson [38] & Hlaing et al. [39] when facing challenges in providing high quality water services in the environment, one approach is to educate households about the importance of treating water before they consume the water and the risks involved with various water storage practices. However, safe storage and water treatment are difficult for low-income households because of limited costs, especially in urban slums. Grigg [40] added that in order to meet the needs of low-income people one approach was needed to meet the Sustainable Development Goals, namely Integrated Water Resources Management.

Population growth that continues to increase and difficult to handle as well as high population density, especially in Johar Baru Subdistrict, has become a serious problem that impacts on the high risk of pollution of clean water sources. Urbanization replaces natural cover with water-resistant surfaces that can affect groundwater quality. Buildings such as roads, sidewalks, parking lots built from asphalt and concrete prevent water from seeping into the ground. Land changes and excessive density can increase the vulnerability of disasters and endanger public health. Urban construction contributes to the flow of water over a waterproof landscape that can exacerbate flooding and spread pollutants [41].

Urbanization can reduce the availability of good quality water and over-exploitation of groundwater and surface water damaging its ecosystem and services. Brears [42] added that several key elements to achieve urban water security include: (1) access to safe and adequate drinking water at affordable costs to meet basic needs including sanitation and hygiene as well as maintaining health and well-being; (2) protection of livelihoods, human rights, cultural values, and recreation; (3) conservation and protection of ecosystems in water allocation and management systems to maintain their health and maintain ecosystem service functions; (4) water for socio-economic development; (5) wastewater treatment to protect humans and nature from pollution; (6) collaborative management of water resources to promote sustainability; (7) dealing with uncertainties and risks related to water such as floods, drought, and pollution and; (8) good governance. Furthermore, washing hands with soap can significantly reduce the case of diarrhea which causes the number two cause of death among children under five years. Research conducted by Curtis & Cairncross [43] shows that regular handwashing with soap at critical times can reduce the number of diarrhea attacks by almost 50%. The construction of handwashing facilities is equipped with soap, especially in public areas such as parks in order to familiarize themselves with the behavior of washing hands with soap to the community accompanied by the installation of handwashing posters with soap.

The high risk of contamination of clean water sources is the first factor affecting the case of diarrhea on toddlers in Johar Baru Subdistrict, Central Jakarta. Jakarta is the capital city of Indonesia, but a sustainable city does not only emphasize physical infrastructure but

also needs to balance the economic, environmental and social pillars. On this basis, the need for sustainable sanitation, one of which is water quality for the poor must be centrally integrated in the context of sustainable city development. Cities that want to achieve sustainable water services need to consider the social, economic, and environmental conditions themselves.

Regarding to Kuswartojo [44] that sustainable development emerged as a concept that combines the interests of economic, social, and the environment in any efforts directed and controlled to achieve change or achieve better conditions to meet the needs of present and future. Salim [45] explained that the basic concept of sustainability has developed into sustainable development. Sustainable development is a new development paradigm with an integrated approach that combines economic, social and environmental development. Sustainable development is a major goal of all countries in the world to realize SDGs with the target of achievement in 2030 with the three pillars of development interconnected and interacting with each other.

4 Conclusion

The prevalence of diarrhea on toddlers in Johar Baru Subdistrict is 38,6%. There is a statistically significant relationship on the six variables studied with the case of diarrhea on toddlers are mother's education (OR = 3.733; 95% CI 1.898 to 7.343), the habit of washing the hand by using soap (OR = 64.278; 95% CI 23.366 to 176.826), family income (OR = 3.000; 95% CI 1.519 to 5.925), type of clean water sources (OR = 13.959; 95% CI 5.287 to 36.856), facility of waste disposal (OR = 4.295; 95% CI 2.058 to 8.964), and risk of clean water source pollution (OR = 24.208; 95% CI 10.367 to 56.529). The source of potential pollution that affects the case of diarrhea on toddlers in Johar Baru Subdistrict variables studied were the risk of clean water source pollution of contamination of water resources, and the habit of washing the hand by using soap. The effort of diarrhea prevention is such as conducting city water security at slums of the city with high populous and makes washing the hand with soap as the habit in the society completed with the facility of handwashing.

References

1. J. Wolf, A. Prüss-Ustün, O. Cumming, J. Bartram, S. Bonjour, S. Cairncross, Tropical Medicine and International Health **19** (2014)
2. S.Y.I. Sari, D.K. Sunjaya, H. Shimizu-Furusawa, C. Watanabe, A.S. Raksanagara, Journal of Environmental and Public Health (2018)
3. P.M.C. Huijbers, H. Blaak, M.C.M. de Jong, E.A.M. Graat, C.M.J.E. Vandenbroucke-Grauls, M. de Roda Husman, Environmental Science Technology **49** (2015)
4. R.E. Saxton, F. Yeasmin, M. Alam, A. Al-Masud, N.C. Dutta, D. Yeasmin, Tropical Medicine and International Health **22** (2019)
5. S. Reis, G. Morris, L.E. Flemming, S. Beck, T. Taylor, M. White, *Public Health* **129** (2015)
6. G. Fink, I. Günther, K. Hill, Demography **15**, 1175 (2014)
7. V.R.N. Cruvinel, T.R. Zolnikov, M. Bashash, C.P. Marques, J.A. Scott, *Waste Management* **99**, 71 (2019)
8. S.I. Sachoemar, H.D. Wahjono, Jurnal Air Indonesia **3** (2007)
9. G. Cissé, *Acta Tropica* **194**, 181 (2019)

10. S.J. Bates, J.Trostle, W.T. Cevallos, A. Hubbard, J.N.S. Eisenberg, American Journal of Epidemiology **166**, 1088 (2007)
11. M. Semret, LP. Haraoui, Infectious Disease Clinics of North America **33**, 231 (2019)
12. M.A. Beenackers, J.O. Groeniger, C.B.M. Kamphuis, F.J.V. Lenthe, Health and Place **53**, 79 (2018)
13. S. Krishnan, International Journal of Disaster Risk Reduction **35** (2019)
14. T. Afifah, M.T. Nuryetty, Cahyorini, D.A. Musadad, A. Schlotheuber, N. Bergen, R. Johnston, Global Health Action **11** (2018)
15. T.R. Julian, Environmental Sciences Process and Impacts **8**, 944 (2016)
16. W. Woldu, B.D. Bitew, Z. Gizaw, Tropical Medicine and Health **44** (2016)
17. C.S. Yilgwan, S.N. Okolo, Annals of African Medicine **11**, 217 (2012)
18. H.A. Mshida, N. Kassim, M.E. Kimanya, E. Mpolya, Journal of Environmental and Public Health (2017)
19. S.Y. Tao, Y.L. Cheng, Y. Lu, Y.H. Hu, D.F. Chen, Public Health **127**, 620 (2013)
20. E.O. Oloruntoba, T.B. Folarin, A.I. Ayede, African Health Sciences **14**, 1001 (2014)
21. R.M. Phillips, J. Vujcic, A. Boscoe, T. Handzel, Conflict and Health **9** (2015)
22. H.F. Rahman, S. Widoyo, H. Siswanto, Biantoro, NurseLine Journal **1**, 24 (2016)
23. D. Nugraheni, Jurnal Kesehatan Masyarakat **1**, 922 (2012)
24. M. Gedefaw, M. Takele, M. Aychiluhem, M. Tarakegn, Open Journal of Epidemiology **5**, 89 (2015)
25. S. Kabhele, M. New-Aaron, S. Kibusl, A.P. Gesase, Journal of Tropical Pediatrics **64**, 523 (2018)
26. A. Alebel, C. Tesema, B. Temesgen, A. Gebrie, P. Petrucka, G.D. Kibret, Plos One **13**, e0199684 (2018)
27. P. Gwimbi, African Health Sciences **11**, 474 (2011)
28. E.N. Kumarijati, H. Suyudi, S. Keman, Jurnal Kesehatan Lingkungan **3**, 1 (2006)
29. A. Issahaku, B. Ampadu, M.M Braimah, *Environmental Quality Management* **26**, 17 (2017)
30. A.A. Cronin, S.K. Sebayang, H. Torlesse, R. Nandy, International Journal of Environmental Research and Public Health **13**, 310 (2016)
31. S. Fletcher, Environmental Health and Preventive Medicine **20**, 243 (2015)
32. R.F. Rego, L.R.S Moraes, I. Dourado, Transactions of the Royal Society of Tropical Medicine and Hygiene **99**, 48 (2005)
33. L.I. Sutiknowati, Oseana **XLI**, 63 (2016)
34. S.T. Odonkor, J.K. Ampofo, Microbiology Research **4**, e2 (2013)
35. A.B. Nienie, P. Sivalingam, A. Laffite, P. Ngelinkoto, JP. Otamonga, A. Matand, International Journal of Hygiene and Environmental Health **220**, 820 (2017)
36. L. Andrade, J. O'Dwyer, E. O'Neil, P. Hynds, Environmental Pollution **236**, 540 (2018)
37. J. Hodge, H.H. Chang, S. Boisson, S.M. Collin, R. Peletz, T. Clasen, *Environmental Health Perspectives* **124**, 1560 (2016)
38. E. Kumpel, K.L. Nelson, *Environmental Science & Technology* **50**, 542 (2016)
39. Z.H. Hlaing, A. Mongkoichati, C. Rattanapan, *EnvironmentAsia* **9**, 91 (2016)
40. N.S. Grigg, *International Journal of Water Resources Development* **35**, 181 (2019)

41. C.N. Godsmark, J. Irlam, F. van der Merwe, M. New, HA. Rother, *Environment International* **122**, 31 (2019)
42. R.C. Brears, UK: John Wiley & Sons (2017)
43. V. Curtis, S. Cairncross, *The Lancet Infectious Diseases* **3**, 275 (2003)
44. K. Kuswartojo, Bandung: ITB (2010)
45. E. Salim, Jakarta: Gramedia (2010)