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The Relationship between Sanitation and Diarrhea in Kabupaten Pidie, Aceh (Used Validity Inference)

Yeggi Darnas[1] and Riska Yolanda[2]

[1]Islamic State University of Ar-Raniry, Departement Sains and Technology, Jl. Syeikh Abdul Rauf, Kopelma-Darussalam, Banda Aceh, Indonesia
[2]Postgraduate Student Faculty of Public Health, Universitas Indonesia, Depok, Indonesia

Abstract

According to World Health Organization (WHO), the world most prevalent issues are illness and death caused by environmental factors such as water, land, and air. The causes contribute to premature death of millions of people, especially infants and children every year. This issue mostly experienced by developing country, including Indonesia, approximately four million infants and children die from diarrhea due to contaminated water and food. Unavailability of solid waste management and domestic wastewater service in the region causes poor sanitation, it results in the high incidence of contaminated water. This study would analyze the relationship between sanitation and diarrhea in Kabupaten Pidie, Aceh using validity inference. Validity refers to the approximate truth of an inference. Valid meant the extent to which relevant evidence supports that inference as bring true or correct. Usually, that evidence comes from both empirical findings and the consistency of these findings with other sources of knowledge, including past finding and theories. Assessing validity always entails fallible human judgments. Validity is not absolute; various degrees of validity can be invoked. In this study from table distribution F, we got F table 3.95 with probability α (5%), df-numerator [(k – 1) = 1] and df-denominator [k(N-1) = 90] and F arithmetic is 5.95269E-09. It means F arithmetic < F table so that, Hypothesis null (Ho) accepted and sanitation have significant effect on diarrhea.

Keywords: Diarrhea; inference; Kabupaten Pidie; sanitation; validity

Corresponding Author:
Yeggi Darnas
darnasjunior@ar-raniry.ac.id

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1. Introduction

The Indonesia Ministry of Health uses the infant, child, and maternal mortality rate, also morbidity figures of some diseases to asses the health degree. The degree of health status is influenced by several factors, including health factors, availability of health infrastructure, economic, education, social environment, heredity, and sanitation that is always forgotten by the Indonesian goverment.

If a city or village does not have good sanitation system, the environment will be polluted and public health will be disturbed so that the disease will be coming. The poor sanitation condition will potentially lead to increasing cases ofdiarrhea, malaria, dengue fever, and filariasis. In this study, the author will discuss the relationship between sanitation and diarrhea, because diarrhea is the direct impact of poor sanitary condition while malaria, dengue fever and filariasis indirect cause of poor sanitation which are mediated by mosquitos as the vector disease.

Diarrhea is endemic. The potential disease outbreak of diarrhea is often accompanied by death.. The cause of diarrhea in the community is the poor health behavior, poor waste management, and contaminated drinking water. There were 201,671 of diarrhea patient's cases in Aceh and only 89,447 patients that were treated. There were only 44.25% of this incidence that could be treated by Dinas Kesehatan Provinsi Aceh in 2015.

Kabupaten Pidie through sanitation working group began thinking to improve sanitation plan, develop, implementation, supervise and monitor the future development of sanitation. The government of Pidie realized that sanitation infrastructure was poor, indicated by the high incidence of diarrhea in Pidie by the third number after Northern Aceh and Bieuren based on Aceh health profile. The current domestic wastewater coverage in Pidie can be seen in Table 1 while the risked area and sanitation problems can be seen in Figure 1 (PPSP 2015).

2. Methods

Validity refers to the approximate truth of an inference. Valid is the extentto which relevant evidence supports that inference as bring true or correct. Usually, that evidence comes from both empirical findings and the consistency of these findings with other sources of knowledge, including past finding and theories. Assessing validity always entails fallible human judgments. Validity is not absolute; various degrees of validity can be invoked. As a result, when we use prefaced by approximant or tentatively (Shadish et al. 2002).

In this study, validity inference was assessed using Null Hypothesis (Ho) and the Alternative Hypothesis (H1) with F test. F test know as test model/Anova test, that test to see how of independent variables (x) the influence the dependent variables (y), or to test the regression model that we make good and significant or not good and not significant. In this study, we have to of the independent variable, there are Number of families who defecation (x_1) and Number of families who have unsafe latrines (x_j). And the dependent variable is diarrhea (y). F test can be done by comparing the F arithmetic

TABLE 1: Domestic Wastewater Service Coverage Current In Pidie.

Village Area	Bad Sanitation		Sanitation with septic tank					
	Without Toilet* (family)		System Onsite		System Offsite			
		Cubluk***, without septic tank** (family)	Toilet with septic tank (family)	MCK	With Communal System			Scale
				/Toilet communal				Area/
				(family)				Offside
					Toilet Communal**** (family)	Septic tank communal 1 > 10 KK (family)	Wastewater Treat-ment Plant Communal (family)	Offsite treatment (family)
1	2	3	4	5	6	7	8	9
Village Areas								
Kec. Batee	4.887	471	331	72	45	-	-	-
Kec. Delima	4.899	2.938	882	96	84	-	-	-
Kec. Geumpang	1.821	463	45	17	12	-	-	-
Kec. Glumpang Baro	2.426	1.355	520	43	42	-	-	-
Kec. Glumpang Tiga	4.586	3.467	435	83	56	-	-	-
Kec. Grong-Grong	1.626	1.155	62	200	21	-	-	-
Kec. Indra Jaya	5.977	4.326	429	96	91	-	-	-
Kec. Kembang Tanjong	5.060	3.009	960	89	90	-	-	-
Kec. Keumala	2.342	1.141	312	41	41	-	-	-

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Village Area	Bad Sanitation		Sanitation with septic tank					
	Without Toilet* (family)		System Onsite		System Offsite			
		Cubluk***, without septic tank** (family)	Toilet with septic tank (family)	MCK	With Communal System			Scale
				/Toilet communal				Area/
				(family)				Offside
					Toilet Communal**** (family)	Septic tank communal 1 > 10 KK (family)	Wastewater Treat-ment Plant Communal (family)	Offsite treatment (family)
Kec. Mane	2.000	653	61	15	12	-	-	-
Kec. Mila	2.423	1.619	232	44	42	-	-	-
Kec. Muara Tiga	4.626	2.601	304	59	47	-	-	-
Kec. Padang Tiji	5.176	2.770	858	126	130	-	-	-
Kec. Peukan Baro	4.796	3.136	348	105	111	-	-	-
Kec. Sakti	4.913	3.249	397	108	110	-	-	-
Kec. Simpang Tiga	5.314	1.095	3,232	86	110	-	-	-
Kec. Tangse	6.205	2.733	399	75	113	-	-	-
Kec. Tiro/Truseb	1.866	1.492	104	38	24	-	-	-
Kec. Titeu	1.796	1.445	93	19	25	-	-	-
Urban Areas								
Kec. Kota Sigli	4.987	3.310	816	42	44	-	-	-
Kecamatan Mutiara	4.808	3.023	887	68	65	-	-	-
Kecamatan Mutiara Timur	8.120	4.814	1,736	117	123	-	-	-
Kecamatan Pidie	10.588	4.868	3,943	139	147	-	-	-

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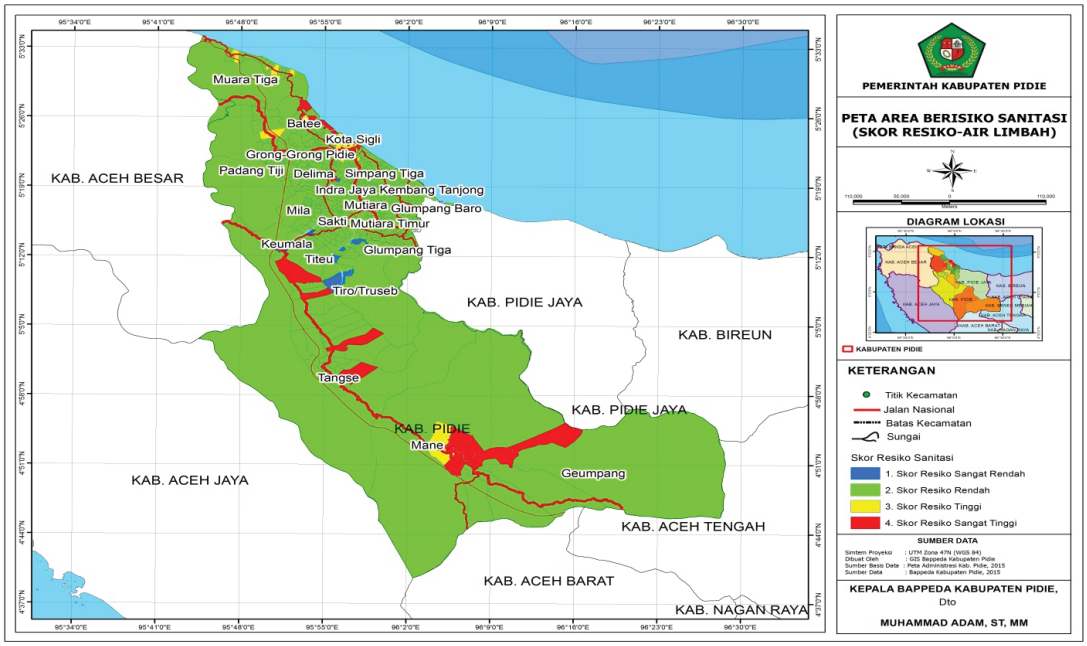

Figure 1: Risk areas and sanitation problems.

with F table, where if F arithmetic > F table (Ho rejected and H1 accepted) and where if F arithmetic < F table (Ho accepted and H1 rejected).

3. Results and Discussion

This study will be used One – Way Anova Method, where Ho is sanitation have a significant effect on diarrhea; H1 is no significant effect of sanitation on diarrhea and analysis data with confidence level 95% and 5% error. The amount data is number of families who defecation (x_1) and the number of families who have unsafe latrines (x_2) on 23 subdistricts in Pidie (number of data 46) and the dependent variable (y) is diarrhea.

TABLE 2: Analysis data.

Number of families who defecation (x_1)	xij^2	Number of families who have unsafe latrines (x_j)	xij^2
4.887	23.882.769	471	221841
4.899	24.000.201	2.938	8631844
1.821	3.316.041	463	214369
2.426	5.885.476	1.355	1836025
4.586	21.031.396	3.467	12020089
1.626	2.643.876	1.155	1334025
5.977	35.724.529	4.326	18714276
5.060	25.603.600	3.009	9054081

Number of families who defecation (x_1)	xij^2	Number of families who have unsafe latrines (x_j)	xij^2
2.342	5.484.964	1.141	1301881
2.000	4.000.000	653	426409
2.423	5.870.929	1.619	2621161
4.626	21.399.876	2.601	6765201
5.176	26.790.976	2.770	7672900
4.796	23.001.616	3.136	9834496
4.913	24.137.569	3.249	10556001
5.314	28.238.596	1.095	1199025
6.205	38.502.025	2.733	7469289
1.866	3.481.956	1.492	2226064
1.796	3.225.616	1.445	2088025
4.987	24.870.169	3.310	10956100
4.808	23.116.864	3.023	9138529
8.120	65.934.400	4.814	23174596
10.588	112.105.744	4.868	23697424
101.242	552.249.188	55.133	171.153.651

$$\text{Total (T)} = 101.242 + 55.133 = 156.375 \quad (1)$$

$$\Sigma Ti^2 = 101.242^2 + 55.133^2 = 13.289.590.253 \quad (2)$$

$$\Sigma xij^2 = 552.249.188 + 171.153.651 = 723.402.839 \quad (3)$$

Where : k = 2; N = 46

$$\text{And then: } k(N-1) = 2(46-1) = 90 \quad (4)$$

$$Nk - 1 = 46(2) - 1 = 91 \quad (5)$$

$$k - 1 = 2 - 1 = 1 \quad (6)$$

Correction (C)

$$C = \frac{T^2}{k.n} = \frac{156.375^2}{2 \times 46} = 265.795.006 \quad (7)$$

The sum of squares between sample (SSTr)

$$SSTr = \left[\frac{\sum Ti^2}{N}\right] - C = \left[\frac{13.289.590.253}{46}\right] - 266.795.006 = 22.109.129 \quad (8)$$

Sum of squares total (SST)

$$SST = \sum xij^2 - C = 334.272.737.897.289.000 - 265.795.006 = 334.272.737.621.493.994$$

Sum of squares of error sample (SSE)

$$SSE = SST - SSTr = 334.272.737.621.493.994 - 22.109.129 = 334.272.737.599.384.865$$

TABLE 3: The Formula of Recapitulation analysis of variance.

Variation	Degrees of dependent	Sum of squares	Mean of squares	RKf
	df			
Treatment	k - 1	SSTr	Ms(Tr)=SSTr/(k-1)	MSTr/MSE
Error	k (N -1)	SSE	MSE=SSE/k(n-1)	
Sum	Nk - 1	SST		

Then:

TABLE 4: Recapitulation analysis of variance.

Variation	Degrees of dependent	Sum of squares	Mean of squares	RKf
	df			
Treatment	1	22.109.129	22.109.129	5.95269E-09
Error	90	334.272.737.559.384.865	3.714.141.528.882.040	
Sum	91	334.272.737.621.493.994		

With see F table with probability α (5%), df-numerator [(k – 1) = 1] and df-denominator [k(N-1) = 90] with data from the limit value of the F distribution table is 3.95 (F table) and F arithmetic is 5.95269E-09. It means F arithmetic < F table so that, Ho accepted and sanitation have significant effect on diarrhea.

4. Conclusions

As discussed, this study proved that sanitation had a significant effect on diarrhea. In this study from table distribution F, we got F table 3.95 with probability α (5%), df-numerator

[(k – 1) = 1] and df-denominator [k(N-1) = 90] and F arithmetic is 5.95269E-09. It means F arithmetic < F table so that, Hypothesis nul (Ho) accepted and sanitation have significant effect on diarrhea.

To solve the current problem, we must build the good sanitation management in the urban area. The government needs to build an integrated system with universal access for safe and hygienic water and sanitation in the urban area. If it can be realized, the public health status can be increased.

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