PAPER NAME

4. Development of Prediction Model for Childhood Diarrhea Based on Maternal C are Variables, Characte

AUTHOR

samsul bakri

WORD COUNT

8726 Words

CHARACTER COUNT

44344 Characters

PAGE COUNT

12 Pages

FILE SIZE

1.3MB

SUBMISSION DATE

Jan 16, 2023 8:09 AM GMT+7

REPORT DATE

Jan 16, 2023 8:09 AM GMT+7

● 6% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

- 2% Internet database
- Crossref database
- 5% Submitted Works database

- 2% Publications database
- Crossref Posted Content database

● Excluded from Similarity Report

- Bibliographic material
- Cited material
- Manually excluded sources

- Quoted material
- Small Matches (Less then 10 words)

Development of Prediction Model for Childhood Diarrhea Based on Maternal Care Variables, Characteristics of Children, Demography and Sanitation in Study Environment Tulang Bawang Barat Regency

Anjar Sriyani, Khairun Nisa Berawi, Samsul Bakri, Hari Kaskoyo

Multidisciplinary Faculty of Master Program of Environmental Sciences,

Postgraduate - University of Lampung

Abstract – The problem in this study is a diarrheal disease which is the second cause of death in children under five years and has killed around 760,000 children every year. The cause of diarrhea is influenced by several factors, such as the characteristics of children under five (age, sex, body weight, weight growth), habits or behaviour of care and family, basic sanitation, and the condition of the home environment. This study aims to develop a model and conduct public policy analysis to reduce the incidence of diarrhea through the development of models of maternal care, maternal demographics, characteristics of children under five and environmental sanitation of the incidence of diarrhea in children under five in Tulang Bawang Barat Regency. Samples taken were 300 children under five. Data collection techniques using secondary data sourced from data from the District Health Office of Tulang Bawang Barat, and questionnaires. This study uses a causal relationship approach that is linear. The postulated model chosen was Linear Log with the response variable using a binary scale, i.e diarrhea versus no diarrhea. Given a score of 1 if a sample has diarrhea and if not given a score of zero. The results show that: This model can be used to predict the incidence of diarrhea against 20 predictor variables which include demographic variables, maternal care variables, and environmental sanitation variables which significantly influence the incidence of diarrhea. Forms of programs that can be proposed 1) Nutrition Counseling; 2) provision of food assistance & Fortification of extension sources; 3) Procurement of communal toilets; and 4) Counseling of composting proposed funding sources through the village budget, APBD/APBN budget.

Keywords – Characteristics of Children Under Five, Maternal, Demographic and Environmental Sanitation, The Incidence of Diarrhea.

I. INTRODUCTION

According to Woods (1990), diarrhea is an abnormal discharge characterized by an increase in the volume and dilution of faeces and the frequency of defecating more than 3 times a day, in toddlers, it is usually found more than 4 times a day without mucus. In toddlers, it will cause dehydration and waste of food substances needed by the body so that it can interfere with growth.

Diarrheal disease is the second leading cause of death in children under five years and kills approximately 760,000 children each year. Diarrhea occurs worldwide and causes 4% of all deaths and 5% of losses due to health disabilities. Based on the percentage distribution of mortality rates in the world, the number of children under five is 15%. Most of the diarrhea cases that died were due to dehydration or loss of

fluids in large quantities, and 80 million people do not have access to drinking water and 2.5 billion lack of sanitation.

According to KEMENKES (2015) More than 1.3 billion disease incidents in children under five, 3.2 million deaths each year in Indonesia are caused by diarrhea with an average of 3.3 times or 80% and according to the KEMENKES (2018) in research conducted by mortality studies and basic health research and (KTR) Household Health Survey, it is known that one of the main causes of death in children under five is diarrhea. RISKESDAS (2013) states that the prevalence period of diarrhea is 3.5% and the age group under five is the group that suffers the highest from diarrhea in Indonesia. Until now, the national data still shows that children under five who die are caused by diarrhea. So it can be concluded that 273 toddlers die every day, 11 toddlers die every hour or 1 toddler dies every 5.5 minutes due to diarrhea (Riskesdas, 2013). The prevalence of diarrhea in Lampung province, in 2016 the prevalence of diarrhea was 123 per 10,000 population (17.23%). In 2017 the prevalence of diarrhea was 646 per 10,000 population (18.59%) and in 2018 435 per 10,000 population (12.3%). The prevalence of diarrhea sufferers circulating in the period from January to December was 508 cases (DINKES of Lampung Province, 2017).

Data from the Health Office of Tulang Bawang Barat Regency in 2016 was 1108 with a prevalence of 11.2%, in 2017 there was a prevalence of 3807 (96%), in 2018 the prevalence was 869 (95%). In 2019 it was 1301 with a prevalence (98%)) the number of children under five in Tulang Bawang Barat was 26926 (Health Office of Tulang Bawang Barat Regency, 2019). The cause of diarrhea is caused by several factors such as the characteristics of children under five which consist of (age, sex, exclusive breastfeeding), habits or behaviour of care and family, basic sanitation, and the condition of the home environment. Clinically the causes of diarrhea can be grouped into the top six, i.e due to infection, absorption, poisoning, immunodeficiency and other causes, but what is often found in the field or clinically is diarrhea caused by infection and poisoning (Ministry of Health, 2015). The condition of the environment is one of the basic problems that cause diarrhea, especially sanitation and clean water facilities. one of the programs for the provision of clean water (pamsimas) which can be interpreted as a community-based drinking water supply and sanitation program (Dirjen P2PL, 2007).

According to Soemirat (2007), the supporting factors that cause diarrhea are environmental factors, demographic factors, and child characteristics factors. The main factor is the environmental factor. Behavioural factors greatly affect the environment, in which diarrhea disease is an environmentally based disease which is also influenced by the condition of personal hygiene and cleanliness of the home environment. Good sanitation and personal hygiene will reduce the risk of disease, including diarrhea. It can happen to someone who does not pay attention to environmental cleanliness and perceives it as a trivial matter. Environmental cleanliness is an environmental condition that can have a positive influence on good health status. The scope of environmental cleanliness includes the environment of the house, disposal of human waste (latrines), sources of clean water supply and landfills, as well as sewerage facilities (SPAL).

The main environmental factors in the spread of diarrhea disease among children under five are the disposal of faeces (latrines) and sources of drinking water. According to Suparmin (2001), neglected management of faeces will result in accelerating the spread of disease, through faeces such as diarrhea, which is an environmentally based infectious disease. Even latrines that do not have health requirements can provide opportunities for the breeding of insects, flies, rats, contaminating drinking water sources, polluting the environment, and it will be easy to spread agents of diarrheal diseases, so, faeces disposal must meet health requirements. The third factor is the characteristic factors of toddlers that can affect the age of children under five, according to Tarigan (2003), diarrhea cases often occur in toddlers. diarrhea can cause children to have no appetite, resulting in insufficient intake of drinks and food that enter the body which can result in malnutrition or children below the red line (KEMENKES, 2017).

Based on the description above, the problems that need to be studied through this research are variable variables related to maternal care and maternal demographics, toddler characteristics and environmental sanitation that affect the incidence of diarrhea in children under five in Tulang Bawang Barat Regency to build a diarrhea prediction model. The purpose of this study is to develop a model of maternal care, maternal demographics, toddler characteristics, and environmental sanitation of the living environment against the incidence of diarrhea in children under five in Tulang Bawang Barat Regency and to conduct public policy analysis to reduce the incidence of diarrhea through developing models of maternal care, maternal demographics, characteristics of children under five, and sanitation of the living environment on the incidence of diarrhea in children under five in West Tulang Bawang Regency.

II. RESEARCH METHODS

Collecting data using secondary data sourced from demographic survey data and the Health Office of Tulang Bawang Barat Regency, the sample is representative of the population to be studied, this study consists of two samples, i.e cases and controls: 1) Case sample, in this case, children under five who came to the health centre diagnosed with diarrhea by health workers (doctors and paramedics); and 2) Control sample is a toddler who comes to the Puskesmas or a neighbouring toddler from a case diagnosed as not having diarrhea by health personnel (doctors and paramedics) during the study period. The data collection techniques used were questionnaire techniques for the variable (X) environmental sanitation (drinking water facilities, sewage channels, family toilet facilities, garbage disposal facilities, house floors, occupancy density, the density of flies, maternal factors and toddler characteristics), while the observation technique (Y) Incidence of Diarrhea.

This study uses a causal relationship approach that is linear. The postulated model chosen was Linear Log with the response variable using a binary scale, i.e diarrhea versus no diarrhea. Given a score of 1 if a sample has diarrhea and if not given a score of zero. The two possible events (1 versus 0) are theorized as a result of each independent variable which includes demographic variables, variables of maternal care, and variables of environmental sanitation. Mathematically, the postulate of the model to be applied can be expressed as follows:

$$\text{Ln } \frac{(p[Diare\quad]i)}{(1-p[Diare=1]i)} = \alpha_0 + \alpha_1[AGE\_BABY]_i + \alpha_2[GEND\_BABY]_i + \alpha_3[WIGHT]_i + \alpha_4[WIGT\_ST]_i + \alpha_5[L\_ASI]_i + \alpha_6[AGE\_MTR]_i + \alpha_7[D1\_FARM]_i + \alpha_8[D1\_TEACHR]_i + \alpha_9[D1\_ASN]_i + \alpha_{10}[D2\_SD]_i + \alpha_{11}[D2\_SMP]_i + \alpha_{12}[D2\_SLA]_i + \alpha_{13}[D2\_BSC]_i + \alpha_{14}[WTR\_SC]_i + \alpha_{15}[SEPTC]_i + \alpha_{16}[SPAL]_i + \alpha_{17}[WASTE]_i + \alpha_8[FLOOR]_i + \alpha_{19}[DST]_i + \alpha_{20}[DST\_FLY]_i + \xi_i$$

III. RESULT AND DISCUSSIONS

The results of the research and analysis carried out obtained the results of a survey covering environmental sanitation factors affecting drinking water facilities, family toilet facilities, SPAL facilities, garbage dumps, house floors, occupancy density, fly density). Maternal factors (mother) caregivers (mother's age, education, employment status, breastfeeding). Toddler characteristics (age, sex, body weight, weight growth). Each independent variable will be associated with the dependent variable, i.e the incidence of diarrhea in children under five. The magnitude of each relationship between the two variables can be determined by the odds ratio (Or), degree of confidence (95% CI) and p-value.
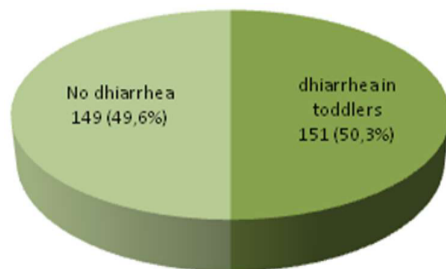

Fig 1. Diarrhea incidence based on children's condition

The Fig of the incidence of diarrhea based on the condition of children under five in the field shows that the number of diarrhea sufferers in children under five with a response rate of 151 children under five with a percentage of 50.3%, while for children under five with no diarrhea with a response rate of 149 under five, the percentage is 49.6%. The total incidence of diarrhea and children without diarrhea (healthy) with the number of responses was 300, the percentage of 100%.
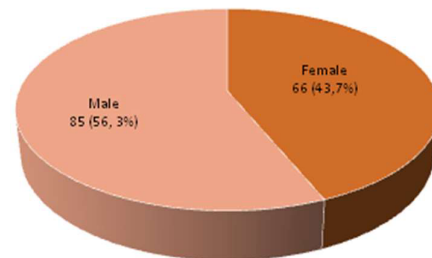

Fig 2. Diarrhea incidence based on Gender

The Fig of the incidence of diarrhea based on sex, the number of cases of diarrhea by female sex was 66 with a percentage of 43.7% of children under five, in boys the number of incidents of diarrhea was 85 with a percentage of 56.3%, from the sex data the incidence of diarrhea was more men than women with a total incidence of diarrhea 151 and a percentage of 100%.
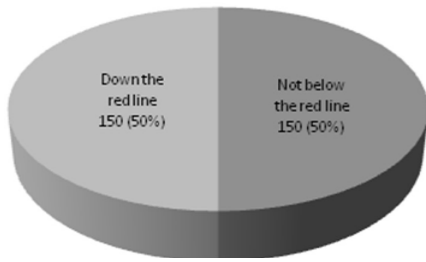
Fig 3. Diarrhea incidence based on weighing results

The Fig of the incidence of diarrhea based on the results of weighing under five under the red line and the number of children under the weight of 150 under five, the percentage is 50% and the results of weighing 150 children under the red line are 50 %, the total number of under-fives weighed is 300 toddlers get a percentage of 100%.
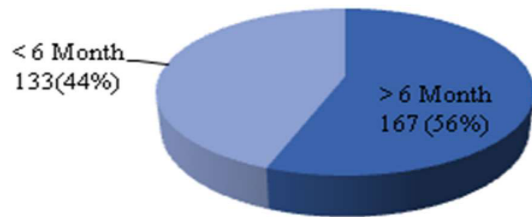

Fig 4. Diarrhea incidence based on breastfeeding (breast milk)

The Fig of the incidence of diarrhea based on breastfeeding (breast milk) which is exclusively breastfed for over 6 months and the number of toddlers who are breastfed is 167 children with a percentage of 55.6%, while under-fives who are less than 6 months old, the number of toddlers who are breastfed is 133 toddlers with a percentage of 44.3%, the total number of children under five who were breastfed over 6 months and less than six months, the total number of children under five who were breastfed was 300 with a percentage of 100%.
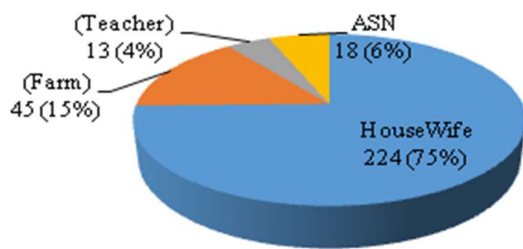

Fig 5. Diarrhea incidence based on the mother's occupation

The Fig of the incidence of diarrhea based on the work of mothers who work as housewives is 224 people with a percentage of 75%, mothers who work as farmers (farm) are

45 per cent 15%, mothers who work as teachers are 13 per cent 4%, mothers who work as teachers 18 people work as civil servants a percentage of 6%, of the total work mothers are 300 people with a percentage of 100%.
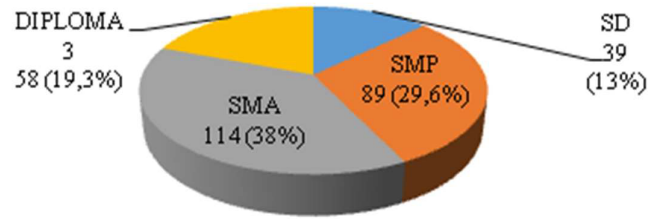

Fig 6. Diarrhea incidence based on the mother's education level

The Fig of the incidence of diarrhea based on the mother's education level, primary education level is 39 people with a percentage of 13%, junior high school education level is 89 people a percentage of 29.6%, high school education level is 114 people a percentage of 38%, diploma 3 level is 58 people a percentage of 19.3 %, the total number of mothers who have an education level of 300 people with a percentage of 100%.

Fig 7. Incidence of diarrhea based on clean water facilities

The Fig of the incidence of diarrhea based on clean water facilities consisting of drilled wells, the number of clean water facilities is 50 units and a percentage of 16.7% and dug wells, the number of clean water facilities is 250 units, a percentage of 83.3%, the total clean water facilities are 300 units with a percentage of 100%.
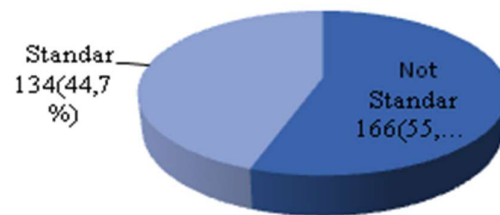

Fig 8. Diarrhea incidence based on family latrine facilities

The Fig of the incidence of diarrhea based on non-standard family latrine facilities is 166 percent 55.3% and standard family latrine facilities with a total of 134

percentages 44.7%, the total number of latrine facilities is 300 with a percentage of 100%.
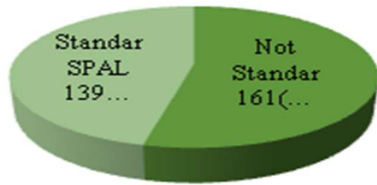

Fig 9. Incidence of diarrhea based on SPAL facilities (sewerage sewer)

The Fig of the incidence of diarrhea based on non-standard SPAL facilities (sewerage channels) total 161 percent 53.7% and standard SPAL facilities 139 SPAL percentage 46.3%, the total number of SPAL overall 300 pieces and a percentage of 100%.
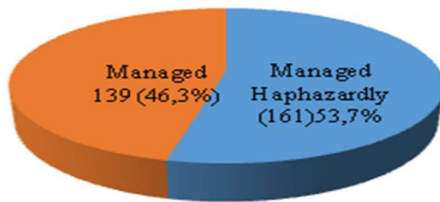

Fig 10. Diarrhea incidence by landfill

The Fig of the incidence of diarrhea based on the landfill, where the landfill dumped carelessly is 161 percentage 53.7% and the managed waste disposal facilities are 139 with a percentage of 46.3%, the total number of waste disposal facilities is 300 with a percentage of 100%.
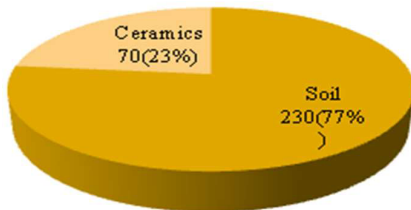

Fig 11. Diarrhea incidence based on the house floor

The Fig of the incidence of diarrhea based on the floor of the house which has two criteria for dirt floors is 230 percent 77%, the criteria for ceramic floors are 70 percent 23%, the total number of house floors in the data is 300 percent 100%.
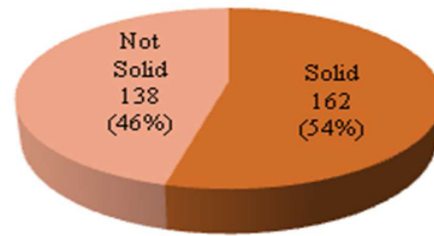

Fig 12. Diarrhea incidence based on occupancy density (person/household)

The Fig of the incidence of diarrhea based on occupancy density (person/family) is divided into two solid criteria with a total of 162 families, 54% percentage, the non-dense criterion has a total occupancy density of 138 families, a percentage of 46%, the total density in the data is 300 samples per 100%.

Fig 13. Diarrhea incidence based on fly density

The Fig of diarrhea incidence based on fly density is divided into two low criteria with the number 145 with a percentage of 48.3%, the solid criterion has a total density of 155 with a percentage of 51.7%, the total fly density in the data is 300 samples per 100%. The Fig of diarrhea incidence based on fly density is divided into two low criteria with the number 145 with a percentage of 48.3%, the solid criterion has a total density of 155 with a percentage of 51.7%, the total fly density in the data is 300 samples per 100%.

Table 1. Research optimization results effect of characteristics of children under five on diarrhea disease

Predictor	Symbol	Coef.	SE Coef	Z	P	Odds Ratio	95% CI Lower	Upper
Constant		-0.0048992	0.545831	-0.01	0.993			
Toddler Characteristics								
Toddler gender (0 = male)	[GEND]	α_1 -0.123935	0.100396	-1.23	0.217	0.88	0.73	1.08

Toddler age (Month) [AGE_BABY]	α_2 0.0184992	0.0048987	3.78	**0.000**	1.02	1.01	1.03
Toddler Weight (kg) [WGHT]	α_3 0.178347	0.0210687	8.47	**0.000**	1.20	1.15	1.25
Perth. Heavy (0 = Under Red Line) [WGHT_ST]	α_4 -1.42029	0.117716	-12.07	**0.000**	0.24	0.19	0.30

Based on the results of the model parameter optimization, it was found that the α_1 parameter was negative with Odd ratio = 0.88 and P = 0.217. This finding means that if other variables are constant, then female children have a lower chance of getting diarrhea than male children, which is only 0.88 times compared to men. However, the decrease in opportunities was not significantly different at the 10% level as indicated by P = 0.217 (or 21.7%). This means that the odds are the same whether or not it is. This study is in line with previous studies which stated [16] that there was a relationship between the sex of children and the incidence of diarrhea. According to Selamet (2016), the incidence of various types of diseases generally varies between genders. [8] Boys tend to be more active than girls, with a stronger physical status allowing boys to move more with a wider range.

Another demographic factor that can influence the incidence of diarrhea is age. The results of the optimization of the model parameters obtained that the α_2 parameter is positive with Odd ratio = 1.02 with P = 0.000. This means that if the other variables remain the same, toddlers who are 1 month older, their susceptibility to diarrhea will increase to 1.02 times before. This increase was very significant as shown by P = 0.000 (= 0.04% <1%). Low body resistance makes the incidence of diarrhea high. According to the assumption of researchers, dehydration caused by diarrheal disease is influenced by age. This is supported by Andriani and Defita research (2015) which states that toddlers aged 1-3 years are more sensitive to changes in water and mineral content. According to Wulandari (2013), dehydration is not only a condition of lack of body fluids but also loss of body minerals.

The optimization results of the model parameters also produce a positive α_3 parameter with Odd ratio = 1.20 and P = 0.000. This means that if other variables remain the same, under five who gain weight every 1kg, the susceptibility to diarrhea will increase to 1.20 times before. This increase was very significant as shown by P = 0.000 (= 0.04% <1%). The higher the toddler's body weight has a significant effect on diarrhea disease, where the under-fives weight is caused by many factors, lack of food intake, infection, and poor parenting, especially eating so that it can affect the condition of the toddler's weight. According to Badriul (2012); Alhadi *et al* (2020); Hermon *et al* (2020); Erianjoni *et al* (2020) children or toddlers have low body resistance compared to adults so that the risk of diarrhea is more vulnerable. Diarrhea occurs at the age of fewer than 5 years with symptoms of nausea, fever, abdominal pain and dehydration. The dehydration factor in the incidence of diarrhea is usually determined by the aetiology, this aetiology will greatly affect the frequency of diarrhea and the consistency of diarrhea, the frequency of diarrhea can later determine the degree of dehydration, one of which can be seen with weight loss. Diarrhea is an event that is influenced by many factors, it can get worse, mother's knowledge of diarrhea disease, many mothers think diarrhea is not a serious problem so that children become slow to get proper treatment before they become sick. Handling diarrhea aims to prevent or overcome dehydration.

The results of the optimization of the model parameters obtained the α_4 parameter which is positive with Odd ratio = 0.24 with P = 0.000. This means that if the other variables remain the same, under five who pass the red line, then the susceptibility to diarrhea will only decrease to 0.24 times than the toddler who does not pass the red line. This reduction in vulnerability was very significant as shown by P = 0.000 (= 0.04% <1%). that children under five who suffer from diarrhea tend to experience weight loss due to reduced appetite. Decreased appetite which continues to decrease will cause nutritional problems in children under five, i.e body weight is below the red line. This is also by the results of research by Dini (2015), that there is a relationship between infectious diseases and the nutritional status of children under five or bodyweight is below the red line, where children under five who suffer from infectious diseases have a greater risk of experiencing problematic nutritional status compared to healthy ones. Likewise with the research of Hadiana (2013), that children under five who suffer from infectious diseases tend to have less nutritional status than children under five who have good nutritional status.

Table 2. Results of research optimization on the effect of maternal care for toddlers on diarrhea

Predictor	Symbol	Coef.	SE Coef	Z	P	Odds Ratio	95% Lower	CI Upper
Maternal Care								
Breastfeeding (0 = less 6 months)	[L_ASI]	α_5 -.0797488	0.100599	-0.79	0.428	0.92	0.76	1.12
Mother's age								
Mother's occupation (0 = housekeeper)	[AGE_MTR]	α_6 -.0155070	0.0103456	-1.50	0.134	0.98	0.96	1.00
Farmer	[D1_FARMR]	α_7 0.369346	0.147394	2.51	**0.012**	1.45	1.08	1.93
Teacher	[D1_TEACH]	α_8 0.613857	0.245514	2.50	**0.012**	1.85	1.14	2.99
ASN	[D1_ASN]	α_9 0.945465	0.212031	4.46	**0.000**	2.57	1.70	3.90
Mother's education (0 = no school)								
Graduated from elementary school	[D2_SD]	α_{10} 1.11335	0.456941	2.44	**0.015**	3.04	1.24	7.46
Graduated from junior high school	[D2_SMP]	α_{11} 0.467936	0.445052	1.05	0.293	1.60	0.67	3.82
Graduated from high school	[D2_SLTA]	α_{12} 0.981013	0.440853	2.23	**0.026**	2.67	1.12	6.33
Passed Diploma 3	[D2_BSC]	α_{13} 0.894223	0.461873	1.94	**0.053**	2.45	0.99	6.05

Optimization of model parameters resulted in negative α_5 with Odd ratio = 0.92 and P = 0.428. This means that if other variables remain the same, then pregnant women who are breastfed for more than 6 months, the susceptibility to diarrhea will decrease to only 0.92 times than those who are breastfed for less than 6 months. However, this vulnerability reduction was not significantly different as shown by P = 0.428 (42.8%> 10%). This means that whether you get 6 months of breast milk or less than 6% in the face of diarrhea attacks. According to Yunita (2017), the number of working mothers whose breastfeeding is still sufficient at the age of 6 months is less than mothers at home, the relationship is very strong between the level of diarrhea prevention behaviour in children and mother's education. Giving exclusive breast milk (ASI) and the habit of washing hands are behavioural factors that influence the spread of enteric germs and reduce the risk of diarrhea. There is a relationship between exclusive breastfeeding and diarrhea in infants under 3 years. Babies who are not exclusively breastfed suffer from diarrhea, while babies who are exclusively breastfed do not suffer from diarrhea. Apart from breastfeeding, there is also personal hygiene, which is a person's efforts to maintain their hygiene and health to obtain physical and psychological health.

The habit of not washing hands with soap after defecating is a habit that can harm the child, especially when the mother cooks food and feeds her child, the food can be contaminated with germs which can cause diarrhea. The behaviour that can reduce the risk of diarrhea is washing vegetables and fruit before consumption because one of the spreads of diarrhea is through serving raw or undercooked food. In patients with diarrhea, food substances that are still needed by the body will be wasted along with dehydration. The growth of children will be disturbed if they often experience diarrhea (KEMENKES, 2017).

Optimization of the model parameters also resulted in a negative α_6 parameter with Odd ratio = 0.98 and P = 13.4. This finding means that if other variables are constant, then babies whose mothers age by one year will decrease their susceptibility to diarrhea to 0.98 compared to before. As the mother grows older, the process of caring for children and the experience of caring for children will increase in the teenage years and accompanied by a decrease in one's memory. This will certainly happen to mothers as the spearhead of their children's health so that it will affect the attitudes and actions given to their children. This age group of mothers is the age group most at risk. the lower the mother's age, the higher the risk of children under five experiencing diarrhea. The age of the mother determines the health status of her child, with the knowledge and experience in caring for the child, it will make the child care more optimal so that the child's health is better maintained (Notoatmodjo, 2007).

As can be checked in Table 1 above, all children under five whose mothers work are more prone to diarrhea than their mothers who do not work (only as housewives). Optimization of the model parameters gave the parameters α_7, α_8, and α_9 respectively positive with the Odd ratio [P-value] respectively 1.45 [P = 0.012], 1.85 [0.012], and 2.57 [0.000]. This finding means that if the mother works as a farmer, teacher, and ASN respectively, then the baby's susceptibility to diarrhea will be greater, 1.45, 1.85, and 2.57 times, respectively, compared to babies whose mothers do not work. All of these differences are real or very real as shown by the respective P-values which are below 5% or even below 1%. According to Wulandari *et al* (2009) activities or work performed by mothers outside the home make activities to care for and care for toddlers limited and allow toddlers to be cared for by grandmothers and caregivers. Parenting patterns that are carried out to toddlers apart from the mothers of the toddlers will make changes to the parenting patterns given to toddlers. This is because working mothers have a high level of education so that it will influence mothers in making the best decisions for their children, including the actions they take before going to work for their children and choosing a caregiver for their children. If the mother works in the formal sector, the mother tends to get information from her co-workers including health information so that the working mother can reduce the incidence of diarrhea in children under five.

It turns out that the role of maternal education becomes very interesting if it is observed in Table 4 that except for the junior high school level, it turns out that if the mother's education level is elementary school or higher (SMP, SLTA, and BSC) then the toddler is more susceptible to diarrhea

attacks with the Odd ratio [and P-value. =] respectively 3.04 [0.015], 1.60 [0.293], 2.67 [0.026], and 2.45 [0.53]. These findings give meaning, if the other variables are the same, successively each toddler's mother has an elementary, junior high, high school education, and BSC, the susceptibility to diarrhea increased respectively by 3.04, 1.60, 2.67, and 2.45 times the vulnerability of toddlers whose mothers did not graduate from SD.

Mothers who have higher education will better know how to take precautions in certain matters, health knowledge will be better. Mothers play a very important role in the care of toddlers, if mothers have higher education, they will have sufficient insight into knowledge. to take care of their child's health. A person's education level is directly proportional to the level of knowledge he has. Mothers with a high level of education will have more knowledge and information received, including in the health sector. Then the application of the knowledge possessed will be conveyed properly.

This is by the opinion of Suhardjo (2003) which states that maternal education determines the ease and understanding of a toddler's growth problem that is obtained. Mother's formal education will affect the growth of children under five. The higher the mother's education the higher the mother's ability to know practical knowledge and non-formal education, especially through television, newspapers, radio, and others. It is also in line with the opinion of Sudiyanto and Sekartini (2018) that the quality of caregivers is determined by education and health status. Mothers who have lower education, the level of knowledge about diarrhea is limited compared to mothers with higher education. The higher the education one has, the better the diarrhea prevention behaviour will be.

Table 3. Results of research optimization on the effect of environmental sanitation on diarrhea

Predictor	Symbol	Coef.	SE Coef	Z	P	Odds Ratio	95% CI Lower	Upper
Environment sanitation								
Septic tank quality (0 = poor)	[SEPT]	α_{14}-1.63086	0.120261	-13.56	**0.000**	0.20	0.15	0.25
Source of Drinking Water (0 = ground well)	[WTR_SCR]	α_{15}-0236473	0.130758	-0.18	0.856	0.98	0.76	1.26
Sewerage Condition (0 = ground)	[SPAL]	α_{16}-1.95618	0.12290	-15.92	**0.000**	0.14	0.11	0.18
Trash Can (0 = none)	[WASTE]	α_{17}-1.38136	0.116157	-11.89	**0.000**	0.25	0.20	0.32
House Floor (0 = ground)	[FLOOR]	α_{18}-0.749102	0.157584	-4.75	**0.000**	0.47	0.35	0.64
Kepadatan Hunian (jiwa/KK)	[DST]	α_{19}0.602322	0.0952089	6.33	**0.000**	1.83	1.52	2.20

| Kepadata lalat (0=rendah) | [DST_FLY] α_{20} 1.94188 | 0.102469 | 18.95 | **0.000** | 6.97 | 5.70 | 8.52 |

Log-Likelihood = -77.565, Test that all slopes are zero: G = 260.749, DF = 20, P-Value = 0.000

The results of this study can be explained that α14 is negative with Odd ratio = 0.2 (P = 0.000), meaning that if the other variables are constant, families who have septic tank are in a good category, then the chances of their children getting diarrhea decreased to only 0.20 compared to families with the bad septic tank. The decrease in the chance of getting diarrhea was very real as shown by the P = 0.000. The condition of the family latrine affects the incidence of diarrhea in children under five. This is by Suratman (2002) epidemiological triangle concept which explains that disease arises from interactions with one another, i.e the environment, agents and hosts. Changes in the environment that are not good can cause the development of disease and infection in humans.

This research is in line with research conducted by Ayuandira *et al* (2018), there is a relationship between the availability of family latrines and the incidence of diarrhea in toddlers, latrines are very useful for humans and are part of human life because latrines can prevent diseases caused by human waste that can be reckless. cause contamination of water, soil, or become a source of infection, for health.

The availability of family latrines has a big impact on reducing the risk of diarrhea disease, families that do not have healthy latrines are at risk of developing diarrhea. Every family should have their latrine, so they don't throw faeces just anywhere. If faeces are disposed of in any place, insects can carry germs and land on food, so they can transmit diseases such as diarrhea.

According to WHO (1993), all people are required to use the latrine when defecating (BAB), therefore toddlers who are not able to use the latrine should be thrown directly into the latrine. This is consistent with research conducted by Wardhana (2004), which states that the low use of latrines will affect the high rate of diarrhea morbidity.

The results of the analysis show that α15 is negative with Odd ratio = 0.98 (P = 0.865) which means that, if the other variables are constant, then families who use drinking water from wells that have been cemented with cement or boreholes have the chance of their toddler getting diarrhea decreased to only 0, 98 times compared to toddlers whose families use water from wells that are cooled only from the ground or drilled wells. However, this reduction in opportunities is not significant, as indicated by the P-value = 0.856. In other words, there is no significant difference or the same as the

chances of children getting diarrhea. According to Cha *et al* (2017), the main source of drinking water is one of the sanitation facilities related to the incidence of diarrhea. diarrhea is transmitted by the faecal-oral route.

The results of this study are also in line with Soemirat's (2014) statement which states that one of the environmental factors associated with diarrhea is water and food. Water that can cause and transmit diarrheal diseases is water that is contaminated by germs that cause diarrhea. Environmental health problems are one of the various health problems that need to get priority because they can become a medium for disease germs. Diarrhea often causes outbreaks that can be dangerous for sufferers and the people around them who live in areas where environmental sanitation does not meet health requirements.

The provision of clean water facilities is very necessary for the community because it is one of the main needs. Therefore, it is hoped that the community and related parties (District Health Office/Puskesmas) cooperate and support each other in efforts to improve environmental sanitation, especially clean water facilities.

Based on the results obtained, research conducted that α16 is negative with Odd ratio = 0.14 (P = 0.000). This finding means that if other variables remain, in families whose drainage channels (SPAL) have been cemented, the chances of their children getting diarrhea are decreased to only 0.14 times compared to toddlers from families whose SPAL is made of soil or has not been cemented. Research conducted by Falasifa (2015) and Yarmaliza (2017) shows that there is a relationship between waste management and the incidence of diarrhea in under-fives channelling wastewater into rivers with diarrhea disease in children under five.

According to the Indonesian Ministry of Health (2014), the principle is that the handling and safeguarding of household liquid waste must be managed properly so as not to cause a breeding ground for disease, from this it can be done to handle wastewater channels with the following criteria: Wastewater from bathrooms and kitchens should not be mixed with water from the latrine, must not cause odour, there should be no stagnation of water that makes the floor slippery and prone to accidents, connected to public sewerage/sewers or absorption wells.

The availability of a household wastewater disposal system is still lacking, families who have children under five and do not have a wastewater disposal system have a risk of diarrhea because wastewater that is only channelled anywhere will interfere with activity and public health. A house that does not have sewerage will result in an unhealthy environment around the house, as a result, it becomes dirty, and causes unpleasant odours and can disturb the view and can become a breeding ground for diseases.

Based on the results of research conducted that negative α17 means that the chance of getting diarrhea has decreased to 0.25 times for landfills. Piles of garbage due to activities that are not managed properly can become a breeding ground for disease vectors. Besides being able to interfere with the health and comfort of the community, garbage piles can also be a source of disease transmission.

The results of the research conducted showed that negative α18 means that the chance of getting diarrhea has decreased to 0.47 times the floor of the house. According to Notoatmodjo (2010), what fulfils the requirements for a healthy home is that the floor is clean and dust-free, not flooded in the rainy season, based on the results of this study, it is known that there are still people who have houses of this type (soil, wood/bamboo). With the existence of a community or family that has a dirt floor and is not waterproof, it can allow the floor to cause diarrhea in toddlers. Activities carried out by toddlers who play on the floor of the house can cause contact with the toddler's body. So that this situation raises various germs that stick to the toddler's body. This can cause diarrhea in toddlers. The type of floor is not waterproof, i.e the type of floor of the house that is still from the ground, and the type of floor of the house that is waterproof, i.e the type of floor made of ceramic.

According to Notoatmodjo (2011), a family will have a meaningful influence on its residents and can hurt health. With a greater number of family members, it will cause direct contact between family members so that it will affect the transmission of infectious diseases. The occupancy density of> 4 people in the household greatly affects the susceptibility of children under five to experience diarrhea because diarrhea is an infectious disease that does not only occur in toddlers but also occurs in adults. If adults in the household experience diarrhea, children under five who live in the same household have a risk of experiencing diarrhea.

The results of the optimization of the model parameters show that the α20 parameter is positive. This finding means that, if other variables remain, under five who come from a household with a large fly density, then the chance of getting diarrhea will increase to 6.97 times compared to toddlers who come from families with low fly density. The findings of this study are in line with the results of Wijayanti (2010) study regarding the relationship between fly density and the incidence of diarrhea in children under five, that the density of flies has a significant relationship with the incidence of diarrhea.

According to research by Van Huis (2013), fly breeding often occurs in solid waste dumps which have composting sections, which are suitable places for foraging, laying eggs and developmental sites for fly larvae. The lifestyle of flies that enjoy wet places, organic objects, faeces, and animal waste. Also, garbage piles are a favourite place for flies as a place to nest and breed.

Eradication of flies and calculation of fly density using a fly grill, recommendation control number for category> 5 is included in the fly population and it is necessary to eradicate the breeding of flies (piles of garbage, animal waste, etc.). By reducing or eliminating the breeding places for flies, improving hygiene and environmental sanitation around the house or increasing public awareness of the need for a clean environment, healthy housing arrangements.

IV. CONCLUSION

Research on the development of a predictive model for toddler diarrhea based on maternal care variables, toddler characteristics, demographics and environmental sanitation in the West Tulang Bawang Regency study can be concluded that 1) Characteristics of toddlers _ Gender is negative with Odd Ratio = 0.88 with P = 0.217, meaning that if other variables are constant, then female toddlers have a lower chance of getting diarrhea than male toddlers, which is only 0.88 times compared to men. However, the decrease in opportunities was not significantly different at the 10% level as indicated by P = 0.217 (or 21.7%). meaning that the odds are the same whether or not it is_ age is positive with Odd Ratio = 1.02 with P = 0.000. This means that if the other variables remain the same, toddlers who are 1 month older, their susceptibility to diarrhea will increase to 1.02 times before. This increase was very significant as shown by P = 0.000 (= 0.04% <1%). Low body resistance makes the incidence of diarrhea high_ Bodyweight is positive with Odd Ratio = 1.20 with P = 0.000. This means that if other variables remain the same, under five who gain weight every 1kg, the susceptibility to diarrhea will increase to 1.20 times before. This increase was very significant as shown by P = 0.000 (= 0.04% <1%). The higher the toddler's weight has a significant

effect on diarrhea disease_ Weight growth is positive with Odd Ratio = 0.24 with P = 0.000. This means that if the other variables remain the same, under five who pass the red line, then the susceptibility to diarrhea will only decrease to 0.24 times than the toddler who does not pass the red line. This reduction in vulnerability was very significant as shown by P = 0.000 (= 0.04% <1%); 2) Influence of the maternal (mother) caregiver _ Breastfeeding is negative with Odd Ratio = 0.92 and P = 0.428. This means that if other variables remain the same, then pregnant women who are breastfed for more than 6 months, their susceptibility to diarrhea will decrease, to only 0.92 times than those who were breastfed for less than 6 months. However, this vulnerability reduction was not significantly different as shown by P = 0.428 (42.8%> 10%). This means that whether you get 6 months of breast milk or less than 6% in the face of diarrhea attacks_Maternal age, negative sign with Odd Ratio = 0.98 with P = 13.4. This finding means that if other variables are constant, then babies whose mothers age by one year will decrease their susceptibility to diarrhea to 0.98 compared to before. The mother's age in the process of caring for the development of toddlers is getting better, but at a certain age the mental development process in caring is not as fast as when someone is a teenager and is accompanied by a decrease in one's memory_Maternal occupation was positive with Odd Ratio [P value] of 1.45 [P = 0.012], 1.85 [0.012], and 2.57 [0.000], respectively. This finding means that if the mother works as a farmer, teacher, and ASN respectively, then the baby's susceptibility to diarrhea will be greater, 1.45, 1.85, and 2.57 times, respectively, compared to babies whose mothers do not work. All of these differences are real or very real as shown by the respective P values which are below 5% or even below 1%_Mother's education If the mother's education level is SD or higher (SMP, SLTA, and BSC) then the toddler is more susceptible to diarrhea attacks with the Odd Ratio [and P-value =] respectively 3.04 [0.015], 1.60 [0.293], 2.67 [0.026], and 2.45 [0.53]. These findings suggest that if the other variables are the same, each toddler whose mother has elementary, middle, high school and BSC education, respectively, the susceptibility to diarrhea increases by 3.04, 1.60, 2.67, and 2.45 times the vulnerability of children under five whose mothers did not graduate from SD Except for those whose mothers graduated from junior high school, the increase in vulnerability was significantly different; and 3) Environmental sanitation_The family latrine facility is negative with Odd Ratio = 0.2 (P = 0.000) meaning that if the other variables are constant, the family with a septic tank is in a good category, then the chances of their toddler getting diarrhea will decrease to only 0.20 compared to families with

the poor septic tank. The decrease in the chance of getting diarrhea was very real as shown by the P = 0.000. The condition of the family latrine affects the incidence of diarrhea in children under five_The source of drinking water is negative with Odd Ratio = 0.98 (P = 0.865) which means that, if the other variables are constant, then families who use drinking water from wells that have been poured with cement or boreholes have the chance of their children getting diarrhea to decrease to only 0.98 times compared to toddlers whose families use water from wells whose walls are only from the ground or bore wells. However, this reduction in opportunities is not significant, as indicated by the P-value = 0.856. In other words, there is no significant difference or the same as the chances of children getting diarrhea_The condition of the sewerage (SPAL) is negative with Odd Ratio = 0.14 (P = 0.000). This finding means that if other variables remain, in families whose drainage channels (SPAL) have been cemented, the chances of their children getting diarrhea are decreased to only 0.14 times compared to toddlers from families whose SPAL is made of soil or has not been cemented_Landfills marked negative to mean that the chance of getting diarrhea has decreased to 0.25 times for landfills. The decline is real_The house floor which is marked negative means that the chance of getting diarrhea has decreased to 0.47 times on the floor of the house. The decline is real_The occupancy density with a positive sign means that the chance of getting diarrhea is increased, if other variables are constant, when the density of a household increases by 1 person, the chance of children getting diarrhea will be 1.83. The increase in occupancy density is significant.

REFERENCES

[1] Alhadi, Z., Muchtar, B., Khaidir, A., Khairoza, A and Putra, A. (2020). Effectiveness Of The Basarnas Padang'S Performance In Carrying Out Search And Rescue Operations. *Journal of Talent Development and Excellence*, *12*(1), 5023-5028.

[2] Andriani, M and Defita, A. P. (2015). Hubungan Pengetahuan Dan Sikap Ibuterhadap Kejadian ISPA Pada Balita Di Wilayah Kerja Puskesmas Tigo Baleh Bukittinggi Tahun 2014. *'AFIYAH*, *2*(1)

[3] Ayuandira, F. P., Sakka, A and Jumakil, J. (2018). Implementasi Sistem Rujukan Di Rumah Sakit Bhayangakara Kota Kendari Tahun 2018. (Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat), *3*(2)

[4] Badriul Hegar Ketua Ikatan Dokter Anak Indonesia (IDAI) (2012), dalam bukunya pedoman pelayanan medis ikatan Dokter Anak Indonesia jilid I. Jakarta

[5] Cha, S., Mankadi, P. M., Elhag, M. S., Lee, Y and Jin, Y. (2017). Trends of improved water and sanitation coverage around the globe between 1990 and 2010: inequality among countries and performance of official development assistance. Global health action, 10(1), 1327170

[6] Dinkes Lampung. (2017). Profil Dinas Kesehatan Provinsi Lampung

[7] Dini, F., Machmud, R., & Rasyid, R. (2015). Hubungan faktor lingkungan dengan kejadian diare balita di wilayah kerja Puskesmas Kambang Kecamatan Lengayang Kabupaten pesisir selatan tahun 2013. Jurnal Kesehatan Andalas, 4(2)

[8] Dirjen P2PL. Modul Pelatihan Bagi Pengelola Program Pengendalian Penyakit DBD di Indonesia. Jakarta : Depkes RI; 2007. http://www.depkes.go.id

[9] Erianjoni., Hermon, D., I, Dewata and Putra, A. (2020). A Survival and Adaptation of the Community in Potentially Disaster Area of Sinabung Volcano Eruption in Karo Regency-Indonesia. *Journal of Talent Development and Excellence*, *12*(3s), 2134-2140.

[10] Hadiana, S. Y. M. (2013). Hubungan status gizi terhadap terjadinya infeksi saluran pernapasan akut (ISPA) Pada Balita di Puskesmas Pajang Surakarta (Doctoral dissertation, Universitas Muhammadiyah Surakarta)

[11] Kementrian Kesehatan (KEMENKES) RI. (2013).Riset Kesehatan Dasar; RISKESDAS. Jakarta:Balitbang Kemenkes RI

[12] Kementrian Kesehatan (KEMENKES) RI. (2015). Rencana Strategis Kementerian Kesehatan Tahun 2015-2019. Jakarta

[13] Kementrian Kesehatan (KEMENKES) RI. (2016). Profil Kesehatan Indonesia 2016. Keputusan Menteri kesehatan Republik Indonesia. Jakarta

[14] Kementrian Kesehatan (KEMENKES) RI. (2018). Profil Kesehatan Indonesia 2017. Jakarta: Kemenkes RI. Diakses pada tanggal 31 Januari 2019 dari http://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Profil-Kesehatan-Indonesia-tahun-2017.pdf

[15] Notoatmodjo, S. (2011). Kesehatan Masyarakat Ilmu dan Seni. Jakarta: Rineka Cipta

[16] Notoatmodjo, S. (2003). Pendidikan Dan Perilaku Kesehatan. Rineka. Cipta. Jakarta. 2. Bustan, M.N, 2007. Epidemiologi Penyakit.

[17] Soemirat. J. S. (2007). Kesehatan Lingkungan.Gajah Mada Universty Press.Yogyakarta

[18] Suparmin. 2001 Disposal of Feces and Liquid Waste, Book Medical Publishers EGC, Jakarta

[19] Suhardjo. 2003. Berbagai cara pendidikan gizi. Jakarta. Bumi Aksara

[20] Suratman S. 2002. Teori John Gordon Chapter: Chemical Agents. Universitas Jendral Sudirman. Purwokerto

[21] Sudiyanto, Sekartini, R. 2005. Manfaat Poster AKSI Kalender Bulanan Bayi dan Balita untuk Pemantauan Status Gizi, www.tempo.co.id/medika/arsip diakses pada 17 Desember 2010

[22] Van Huis, A., Van Itterbeeck, J., Klunder, H., Mertens, E., Halloran, A., Muir, G and Vantomme, P. (2013). Edible insects: prospects for food and feed security (No. 171). Food and Agriculture Organization of the United Nations

[23] Wardhana, W. A. (2004). Dampak Pencemaran Lingkungan (Edisi Revisi). Yogyakarta: Penerbit Andi

[24] Wijayanti, W. (2010). Hubungan antara pemberian asi eksklusif dengan angka kejadian diare pada bayi umur 0-6 bulan di puskesmas gilingan kecamatan Banjarsari Surakarta.

[25] Woods, T. A. (1990). Diarrhea. In Clinical Methods: The History, Physical, and Laboratory Examinations. 3rd edition. Butterworths

[26] Wulandari, A. P. (2009). Hubungan antara faktor lingkungan dan faktor sosiodemografi dengan kejadian diare pada balita di desa Blimbing Kecamatan Sambirejo Kabupaten Sragen Tahun 2009 (Doctoral dissertation, Universitas Muhammadiyah Surakarta)

[27] World Health Organization (WHO). Worldwide prevalence of anaemia 1993-2005. World Health Organization global database on anaemia. Atlanta, 2006.h. 1-39

[28] Yarmaliza, Y. (2017, November). Kajian Pengaruh Kultur Budaya Terhadap Kejadian Diabetes Melitus. In Prosiding SEMDI-UNAYA (Seminar Nasional Multi Disiplin Ilmu UNAYA) (Vol. 1, No. 1, pp. 136-145)

[29] Yunita, R. D. (2017). Dilema Ibu Bekerja. Indigenous: Jurnal Ilmiah Psikologi

● 6% Overall Similarity

Top sources found in the following databases:

- 2% Internet database
- Crossref database
- 5% Submitted Works database

- 2% Publications database
- Crossref Posted Content database

TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	**Universitas Airlangga on 2021-03-10** Submitted works	<1%
2	**Defense University on 2021-07-14** Submitted works	<1%
3	**ohiolink.edu** Internet	<1%
4	**Universitas Airlangga on 2021-01-16** Submitted works	<1%
5	**ijpsat.es** Internet	<1%
6	**pcijournal.org** Internet	<1%
7	**Badan PPSDM Kesehatan Kementerian Kesehatan on 2022-08-09** Submitted works	<1%
8	**Badan PPSDM Kesehatan Kementerian Kesehatan on 2022-03-16** Submitted works	<1%

9 Universitas Teuku Umar on 2020-11-12   <1%
Submitted works

10 Windha Widyastuti, Yuni Sandra Pratiwi, Nurul Aktifah, Isyti'aroh Isyti'a...   <1%
Crossref

11 Adtalem Global Education, Inc. on 2023-01-09   <1%
Submitted works

12 María Á. García-Valiñas, Josepa Miquel-Florensa. "Water service qualit...   <1%
Crossref

13 Samsia Winda, Ramadhan Tosepu, Devi Savitri Effendy. "Toddlers Diarr...   <1%
Crossref

14 Southern New Hampshire University - Continuing Education on 2017-0...   <1%
Submitted works

15 Badan PPSDM Kesehatan Kementerian Kesehatan on 2022-10-31   <1%
Submitted works

16 Salmulyati Wulandari, Ade Dita Puteri, Yusmardiansah Yusmardiansah....   <1%
Crossref

17 macsphere.mcmaster.ca   <1%
Internet

18 zombiedoc.com   <1%
Internet

19 Colorado Technical University on 2022-12-18   <1%
Submitted works

● **Excluded from Similarity Report**

- Bibliographic material
- Cited material
- Manually excluded sources

- Quoted material
- Small Matches (Less then 10 words)

EXCLUDED SOURCES

ijsht-journals.org
Internet
82%

repository.lppm.unila.ac.id
Internet
82%

ijpsat.ijsht-journals.org
Internet
10%