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The Impact Of Environmental Sanitation On Diarrhea In Toddlers

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Abstract

Diarrhea is still a health problem and a cause of death in children under five. Unfavorable environmental sanitation can lead to a high incidence of diarrhea. The purpose of this study was to determine the relationship between environmental sanitation and the incidence of diarrhea in children under five in the work area of the Nogosari Community Health Center, Boyolali Regency. This research method uses an observational design with a cross sectional approach. The

subjects of this study were housewives who had toddlers and had suffered from diarrhea in the period June - December 2020 with a population of 328 people. The sample selection by simple random sampling resulted in a sample of 60 people. Test statistics using Chi Square with the help of computer software. The results showed that there was a relationship between the source of drinking water ($p=0.001$), latrine ownership ($p=0.018$), type of house floor ($p=0.036$) and the incidence of diarrhea in children under five and there was no relationship between the physical quality of clean water ($p=0.307$) with the incidence of diarrhea in infants.

Keywords: incidence of diarrhea, toddlers, environmental sanitation

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INTRODUCTION

Diarrhea is still one of the main causes of morbidity and mortality. Almost all geographic areas of the world and all age groups are attacked by diarrhea, but severe disease with high mortality is mainly found in infants and children under five. In North America, children suffer from diarrhea more than 12 times per year (Pitono et al, 2006) while according to Zubir et al (2006) diarrhea causes death by 15-34% of all deaths, approximately 300 deaths per year. Based on the results of research by Ratnawati et al (2009) showed that 35% of all under-five deaths were caused by acute diarrhea.

In Indonesia, the diarrhea morbidity rate in 2002 was 6.7 per 1,000 population, while in 2003 it increased to 10.6 per 1,000 population. The death rate from diarrhea is still quite high. The National Health Survey shows that diarrhea is the second leading cause of death, namely 23.0% in infants and number three, which is 11.4% in infants (Zubir et al, 2006).

The coverage of diarrhea finding in Central Java has increased from 2005 to 2007 although it is still below the expected (100%) which is 80%. This is because the discovery of diarrhea sufferers has not been maximized by cadres, Community Health Centers, private and government hospitals. The number of cases of diarrhea in children under five every year on average is above 40% of the total coverage of diarrhea sufferers, namely in 2006 it was 40.6% and in 2007 it was 48.1% (Central Java Health Office, 2007). Based on data from the Boyolali District Health Office in 2007, the number of diarrhea sufferers was 16,489 cases, for diarrhea in toddlers it was 4,259 cases.

Diarrhea is a disease characterized by an increase in the frequency of defecation more than usual (> 3 times / day) accompanied by changes in the consistency of the stool (to liquid), with or without blood or mucus (Suraatmaja, 2007). According to WHO (2008), diarrhea is defined as loose stools three or more times a day and night. Based on the time of attack is divided into two, namely acute diarrhea (< 2 weeks) and chronic diarrhea (> 2 weeks) (Widoyono, 2008).

Diarrhea is an environment-based disease. Several factors related to the incidence of diarrhea are inadequate supply of clean water, water contaminated with feces, lack of hygiene facilities (unhygienic disposal of feces), poor personal and environmental hygiene, undercooked food preparation and storage of cooked food at room temperature that is not should be (Sander, 2005). Many factors are directly or indirectly driving the occurrence of diarrhea, namely agent, host, environmental and behavioral factors. Environmental factors are the most dominant factors, namely the means of providing clean water and disposal of feces, both factors interact with human behavior. If environmental factors are not healthy because they are contaminated with diarrhea germs and accumulate with unhealthy human behavior, then diarrhea transmission can easily occur (Zubir et al, 2006).

Distribution of diarrheal disease by person (age) about 80% of diarrhea deaths occur in children under the age of 2 years. Data from 2018 shows that from around 125 million



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children aged 0-11 months, and 450 million children aged 1-4 years living in developing countries, the total episodes of diarrhea in children under five are around 1.4 billion times per year. Of these, the total episodes of diarrhea in infants aged under 0-11 months were 475 million and children aged 1-4 years around 925 million times per year (Amiruddin, 2007).

METHOD

This research is an observational survey with a cross-sectional approach, which is a study conducted by observing for a moment or within a certain time period and each study subject only made one observation during the study (Machfoedz, 2007).

The subjects of this study were all houses in which there were toddlers and had suffered from diarrhea in the work area of the Nogosari Community Health Center, Boyolali Regency.

RESEARCH RESULT

1. Characteristics of Respondents

This study aims to determine the relationship between environmental sanitation and the incidence of diarrhea in children under five in the work area of the Nogosari Community Health Center, Boyolali Regency. The number of research respondents was 60 people. The discussion on the characteristics of respondents is used to find out the general description of respondents based on age, occupation, education, age of toddlers and gender of toddlers.

a. Age

Characteristics of respondents based on the age of 60 respondents were grouped into 3 parts, namely less than 20 years, 20-35 years and age more than 35 years. The age group results are shown in Table 1.

Table 1. Frequency Distribution of Respondents by Age Group in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

AGE	f	RESPONDENTS
< 20 years	1	1,7
20-35 years old	54	90,0
35 years old	5	8,3
Total	60	100

Based on Table 1, it is known that the majority of respondents are aged between 20-35 years, as many as 54 respondents (90%), and the minimum age is less than 20 years, namely one respondent (1.7%).



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b. Type of work

Characteristics of respondents based on the type of work of the respondents are shown in Table 2.

Table 2. Frequency Distribution of Respondents by Type of Work in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020.

PROFESSION	F	RESPONDENTS
1. PNS	1	1,7
2. Entrepreneur	7	11,7
3. Private	12	18,3
4. Farmer	4	6,7
5. Housewife	34	56,7
6. Labor	2	3,3
Total	60	100

Based on Table 2, it is known that the type of work of the respondents is mostly housewives, as many as 34 respondents (56.7%) and the least is working as civil servants, namely one respondent (1.7%).

c. Education

Characteristics of respondents based on respondents' education are shown in Table 3.

Table 3. Frequency Distribution of Respondents Based on Education Level in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

EDUCATION	F	RESPONDENTS
1. Elementary School	8	13,3
2. Junior High School	16	26,7
3. High School	34	56,7



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4. Bachelor	2	3,3
Total	60	100

Based on Table 3, it is known that the education level of the most respondents is SMA, which is 34 respondents (56.7%) and the least is undergraduate education, which is as many as two respondents (3.3%).

d. Toddler age

Characteristics of respondents based on the age of the respondents are shown in Table 4.
Table 4. Frequency Distribution of Respondents by Age of Toddler in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

Toddler AGE	F	RESPONDENTS
0.5-1.5 years	30	50
1.6-3.5 years	24	40
3.5 years	6	10
Total	60	100

Based on Table 4, it is known that the most respondents have children aged 0.5-1.5 years, as many as 30 respondents (50%), and at least the age of toddlers is above 3.5 years, as many as six respondents (10%) .

e. Toddler gender

Characteristics of respondents based on the gender of the respondents under five are shown in Table 5.

Table 5. Frequency Distribution of Respondents by Gender of Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

GENDER	F	RESPONDENTS
1. Boys	28	46,7
2. Girls	32	53,3
Total	60	100

Based on Table 5. it is known that the most respondents have female children under five, as many as 32 respondents (53.3%) and at least male sex, as many as 28 respondents (46.7%).

1. Univariate Analysis



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a. Source of drinking water

The results of research on drinking water sources are shown in Table 6.

Table 6. Frequency Distribution of Respondents Drinking Water Sources in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

DRINKING WATER SOURCES	F	RESPONDENTS
1. Protected	16	26,7
2. Unprotected	44	73,3
Total	60	100

Based on Table 6, it is known that the respondents' drinking water sources are mostly obtained from unprotected springs, which is 73.3% and the least is obtained from protected springs, which is 26.7%.

b. Physical quality of clean water

The results of research on the physical quality of clean water are shown in Table 7.

Table 7. Frequency Distribution of Respondents' Clean Water Physical Quality in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

PHYSICAL QUALITY OF CLEAN WATER	F	RESPONDENTS
1. Eligible	29	48,3
2. Not eligible	31	51,7
Total	60	100

Based on Table 7. it is known that the physical quality of clean water in most respondents has not met the requirements, namely 51.7% and at least has met the new requirements, which is 48.3%.

Table 8. Physical Frequency Distribution of Respondents' Clean Water in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

PHYSICAL CLEAN WATER	F	RESPONDENTS
1. Smelly water	5	8.3%
2. Flavored water	5	8.3%
3. Colored water	6	10%



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4. Cloudy water	30	50%
Total	46	76.6%

Based on Table 8. it is known that the most clean water in the respondents is cloudy water, which is as much as 50% and the water has the least smell and taste, which is 8.3%.

c. latrine ownership

The results of the research on latrine ownership are shown in Table 9.

Table 9. Frequency Distribution of Respondents' Toilet Ownership in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

OWNERSHIP OF JAMBAN	F	RESPONDENTS
a. Have	35	58,3
b. Do not have	25	41,7
Total	60	100

Based on Table 9. it is known that the majority of respondents own latrine ownership, namely 58.3% and at least do not have a latrine, which is 41.7%.

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d. Type of house floor

The results of the research on the types of house floors are shown in Table 10.

Table 10. Frequency Distribution of House Floor Types on Respondents in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020.

TYPES OF HOUSE FLOOR	F	RESPONDENTS
a. Water proof	33	55
b. Not waterproof	27	45
Total	60	100



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Based on Table 10, it is known that the type of floor of the respondent's house at most has a waterproof floor, which is as much as 55% and at least has a floor that is not waterproof, as much as 45%.

e. The incidence of diarrhea in toddlers

The results of the study on the incidence of diarrhea are shown in Table 11.

Table 11. Distribution of the Frequency of Diarrhea in Toddler Respondents in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

EVENT OF DIARRHEA	F	RESPONDENTS
1. Diarrhea	43	71,7
2. No diarrhea	17	28,3
Total	60	100

Based on Table 11. it is known that the incidence of diarrhea in respondents, namely as many as 43 toddlers (71.7%) and who did not experience diarrhea, as many as 28.3%.

1. Bivariate Analysis

Bivariate analysis aims to determine the relationship between the independent variable and the dependent variable using the Chi square (X^2) test. The existence of a relationship with the incidence of diarrhea in children under five was indicated by the p value < 0.05 .

a. The relationship between drinking water sources and the incidence of diarrhea in children under five in the work area of the Nogosari Community Health Center in 2020

Statistical testing between drinking water sources and the incidence of diarrhea in toddlers in the work area of the Nogosari Community Health Center, Boyolali Regency in 2020 is shown in Table 12.

Table 13. Results of the Relationship between Drinking Water Sources and the Incidence of Diarrhea in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020.

DRINKING WATER SOURCES	EVENT OF DIARRHEA				Total		P
	DIARRHEA		NO DIARRHEA				
	f	%	f	%	f	%	
Protected	6	10	10	16,6	16	26,7	0,001



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Unprotected	37	61,7	7	11,7	44	73,3
Total	43	71,7	17	28,3	60	100

Based on Table 12, it is known that the source of drinking water that is not protected in respondents with diarrhea in children under five is 44 respondents (73.3%). The results of statistical analysis showed that the $p\text{-value} = 0.001$ 0.05 means that it is concluded that there is a relationship between the source of drinking water consumed and the incidence of diarrhea in children under five in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020.

b. The relationship between the physical quality of clean water and the incidence of diarrhea in toddlers in the work area of the Nogosari Community Health Center in 2020

Testing the relationship between the physical quality of clean water and the incidence of diarrhea in toddlers in the work area of the Nogosari Community Health Center, Boyolali Regency in 2020. The complete results can be explained in Table 13.

Table 13. Results of the Relationship between Physical Quality of Clean Water and the Incidence of Diarrhea in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

DRINKING WATER SOURCES	EVENT OF DIARRHEA				Total		P
	DIARRHEA		DIARRHEA				
	F	%	F	%	F	%	
Protected	19	31,7	10	16,6	29	48,3	0,307
Unprotected	24	40	7	11,7	31	51,7	
Total	43	71,7	17	28,3	60	100	

Based on Table 13, it is known that the physical quality of clean water that meets the requirements of respondents with diarrhea is 29 people (48.3%) and 31 people who do not meet the requirements (51.7%). Statistical results show $p\text{-value} = 0.307$ 0.05 , meaning that the conclusion drawn is that there is no relationship between the physical quality of clean water and the incidence of diarrhea in children under five in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020.



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c. The relationship between latrine ownership and the incidence of diarrhea in children under five in the work area of the Nogosari Community Health Center in 2020

The statistical test between latrine ownership and the incidence of diarrhea in children under five at the Nogosari Community Health Center, Boyolali Regency in 2020 is shown in Table

Table 14. Results of the Relationship between Toilet Ownership and Diarrhea Incidence in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

OWNERSHIP OF JAMBAN	EVENT OF DIARRHEA				TOTAL		P
	DIARRHEA		NO DIARRHEA				
	f	%	f	%	f	%	
Have	21	35	14	23,3	35	58,3	0,018
Do not have	22	36,7	3	5	25	41,7	
Total	43	71,7	17	28,3	60	100	

Based on Table 14, it is known that 35 respondents (58.3%) had more latrines than those who did not have a latrine, 25 (41.7%). The test results with Chi Square showed a p-value = 0.018 0.05, which means that the conclusion is that there is a relationship between latrine ownership and the incidence of diarrhea in children under five in the Work area of the Nogosari Community Health Center, Boyolali Regency in 2020.

d. The relationship between the type of floor of the house and the incidence of diarrhea in toddlers in the work area of the Nogosari Community Health Center in 2020

Statistical testing regarding the relationship between the type of floor of the house and the incidence of diarrhea in children under five in the Work area of the Nogosari Community Health Center, Boyolali Regency in 2020 is shown in Table 15.

Table 15. Results of the Relationship between Types of House Floors and the Incidence of Diarrhea in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

TYPES OF HOUSE FLOOR	EVENT OF DIARRHEA				TOTAL		P
	DIARRHEA		DIARRHEA				
	f	%	f	%	f	%	



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Water proof	20	33,3	13	21,7	33	55	0,036
Not waterproof	23	38,4	4	6,6	27	45	
Total	43	71,7	17	28,3	60	100	

Based on Table 15, it is known that the type of floor of the house in the respondents that is waterproof is 55% and that is not waterproof as much as 45%. Statistical results show $p\text{-value} = 0.036$ 0.05 , meaning that the conclusion is that there is a relationship between the type of floor of the house and the incidence of diarrhea in children under five in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020.

1. DISCUSSION

a. Characteristics of Respondents

This study aims to determine the relationship between environmental sanitation and the incidence of diarrhea in children under five in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020. The results show that the age of respondents is divided into 3 groups, namely less than 20 years old, between 20-35 years old and age 20-35 years old. respondents who are more than 35 years old. Data regarding the age of the majority of respondents between the ages of 20-35 years as much as 90%.

In the type of work, it shows that of the 60 research respondents, most of them are housewives with a total of 56.7%. Most of these housewife respondents have more opportunities in caring for their toddlers from illness, including diarrhea.

Judging from the level of education, it shows that there are still many respondents who have high school education, which is 56.7%. Education is a human effort to grow and develop innate potential both physically and spiritually in accordance with the values that exist in society and culture. Efforts are made to instill these values and norms and pass them on to the next generation to be developed in life and life that occurs in a life process (Ihsan, 2003).

According to Notoatmodjo (2003), health education is essentially an activity or effort to convey health messages to the public, groups or individuals with the hope that with this message the community, group or individual can gain knowledge about better health. Finally, this knowledge is expected to influence changes in behavior.



b. The Relationship between Drinking Water Sources and the Incidence of Diarrhea in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

The results of statistical data analysis showed that the source of drinking water consumed was related to the incidence of diarrhea in children under five in the Nogosari Community Health Center Work area, Boyolali Regency in 2020 where the p value = 0.001. Data on sources of drinking water consumed by respondents is still classified as unprotected drinking water sources as much as 73.3%. From 60 research respondents, the presence of unprotected water sources causes diarrhea in 37 respondents.

The results of this study are strengthened by the research of Irianto et al (1994) which concluded that the provision of drinking water is associated with the incidence of diarrhea in children under five and is a risk factor for the incidence of diarrhea and as many as 87.5% use unprotected drinking water sources.

The main source of drinking water is one of the sanitation facilities that is no less important related to the incidence of diarrhea. Some infectious germs that cause diarrhea are transmitted through the faecal-oral route. They can be transmitted by inserting into the mouth liquids or objects contaminated with feces, for example drinking water, fingers, and food prepared in a pot that is washed with polluted water (Depkes RI, 2000).

Based on the results of Sutomo's research (1987) it was concluded that there was a relationship between the source of drinking water consumed in homes in rural areas and respondents who used clean water had a lower tendency to suffer from diarrhea. On the other hand, respondents who do not use clean water have a tendency to suffer from diarrhea.

The results of another similar study were Zubir (2006) research on the risk factors for the incidence of acute diarrhea in children 0-35 months (Batita) in Bantul Regency. The results showed that the source of drinking water used was associated with the occurrence of acute diarrhea with a p value of <0.05 and a prevalence ratio of 3.10.

From the results of this study, it turns out that as many as 26.7% have used PAM facilities and protected water sources as the family's main water source. From this analysis, it is known that as many as 73.3% of children under five and their families use unprotected water sources, but the percentage of diarrhea in children under five from families who use water from unprotected water sources is quite large, namely 61.7%. The results of other studies that are in line are the research of Wibowo et. al (2004) concluded that there was a significant relationship between the incidence of diarrhea and the type of drinking water source.



c. The Relationship between the Physical Quality of Clean Water and the Incidence of Diarrhea in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

The results of statistical tests showed that the physical quality of clean water was not associated with the incidence of diarrhea in children under five ($p = 0.307$). Based on observations in the field, it can be explained that the condition of water that does not meet health requirements is not directly consumed by respondents. This is because the water that will be used is first deposited in a storage area so that it is separated from dirt in the form of soil or mud. After that, just boil the water until it boils.

The physical quality of clean water in most of the respondents did not meet the requirements as much as 51.7%. Based on the results of this study, it is known that from 48.3% of respondents whose physical quality of clean water meets the requirements, as many as 31.7% have diarrhea and 16.6% do not experience diarrhea. Of the 51.7% respondents whose physical quality of clean water did not meet the requirements, 40% had diarrhea and 11.7% did not.

d. The Relationship between Toilet Ownership and Diarrhea in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020

The results of the statistical test showed that there was a relationship between family latrine ownership and the incidence of diarrhea in children under five in the work area of the Nogosari Community Health Center, Boyolali Regency in 2020 where the p value = 0.018. Research data shows that 58.3% of respondents who already have family latrines, meaning that 41.7% of respondents' families do not have latrines and 46.7% of respondents defecate in their gardens or yards. Therefore, of the 60 respondents in the study, there were 22 respondents who had diarrhea. By not having their own latrine, it can cause diarrhea in the respondents because the feces that are not buried tightly will attract flies and rats which will have an impact on environmental health.

According to Notoatmodjo (2003), the requirements for disposing of sewage that meet health regulations are not contaminating the surrounding soil surface, not contaminating the surrounding surface water, not contaminating the water in the surrounding soil, and manure should not be exposed so that it can be used as a vector for laying eggs and breeding.

The results of this study are in line with the results of research by Rahadi (2005) which concludes that there is a relationship between latrine ownership and the incidence of diarrhea in Panganjuran Village, Kudus Regency, as many as 68.7% of the population have family latrines. The incidence of diarrhea in toddlers is caused because as much as 22.1% of human feces is disposed of in the garden or yard of the house.



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Another study, namely Zubir et al. (2006) concluded that in addition to drinking water, the place for excreta disposal is also an important sanitation facility in influencing the incidence of diarrhea. Disposing of feces that do not meet sanitation requirements can pollute the residential environment, soil and water sources. From an environment contaminated with feces that accumulates with unhealthy human behavior, not washing hands properly after working or playing on the ground (children), through food and drink it can cause diarrhea.

The results of this study are also in line with the research of Wibowo et.al (2004) which concluded that there is a significant relationship between the incidence of diarrhea and the place of disposal of feces.

e. Relationship between Floor Type and Diarrhea in Toddlers in the Work Area of the Nogosari Community Health Center, Boyolali Regency in 2020.

The results of the statistical test showed that there was a relationship between the type of floor and the incidence of diarrhea in children under five in the work area of the Nogosari Community Health Center, Boyolali Regency in 2009 where the p value = 0.036.

There are 45% of research respondents whose type of floor is not waterproof. This kind of condition is very vulnerable to the health of toddlers. From the type of floor of the respondent's house that is not waterproof, there are 23 toddlers who experience diarrhea, while the type of floor that is waterproof there are 20 toddlers who experience diarrhea. This condition reflects that the type of floor can affect health.

Notoatmodjo (2003) states that the condition for a healthy house is the type of floor that is not dusty in the dry season and not wet in the rainy season. With many respondents who have floors of houses that are still not watertight, it is very possible for the floor to become a nest of germs, dust to be a trigger for diarrhea in toddlers. The activity of the respondent's toddler playing on the floor of the house causes contact between the non-waterproof floor of the house and the toddler's body. This situation raises various germs that stick to the body of toddlers. Unfavorable conditions can cause diarrhea in toddlers.

The results of this study are in line with the results of research by Rahadi (2005) which concluded that the type of floor is associated with the incidence of diarrhea. This is because there are still many floors made of soil which will cause the room to be dirty and become a nest of microorganisms and easily absorb water which may contain microorganisms.

CONCLUSION



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Although they have succeeded in proving the research hypothesis, the researcher feels that there are weaknesses in this study, namely in this study only the physical quality of the water was examined, while in the case of diarrhea, the microbiological quality of the water played a greater role. This is because microbiological examination is more expensive and time consuming.

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