



Access of Clean Water and Sanitation with The Incidence of Environmental-Based Diseases in The Working Area of The Oesapa Sub-District

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Abstract: Sanitation is an effort to prevent disease that focuses on environmental health efforts for human life. The purpose of this study was to determine access to clean water and the condition of basic sanitation facilities in the Oesapa Village, Kupang City. Sources of clean water used by the people of Oesapa Sub District consist of 72% dug wells, 15% PDAM, and 12% tank water. Ownership of clean sir facilities: 78% use privately owned SAB and 22% use neighbor-owned (shared use). The condition of clean water facilities with a high-risk level of 53%, moderate 32%, high 13% and very high 2%. Condition of family latrines 38% high-risk level, 61% low-risk level. SPAL conditions have a low-risk level of 91%, a medium of 5% and a high 4%. There is a relationship between the condition of clean water facilities and the incidence of environmental diseases in the Oesapa sub-district and there is no relationship between the condition of the sanitation facilities (latrines and SPAL) and the incidence of environmental-based diseases in the Oesapa sub-district.

Keywords: Clean Water; Environmental-Based Diseases; Sanitation; Working Area

Introduction

Sanitation is an effort to prevent disease that focuses on environmental health efforts for human life. Poor sanitary conditions can cause environmental pollution, cause disease and also have an impact on economic conditions (Daulay et al., 2021). Environmental health problems in Indonesia still require serious attention from the government (Maruf, 2021; Pambudi, 2019), one of the efforts being made to deal with increasing environmental-based diseases is the community-based total sanitation program, which is an approach to changing hygiene and sanitation behaviour through community empowerment with the triggering method.

The problem with clean water and proper sanitation in the community is access to clean water and proper sanitation services (Adam, 2023; Puspita et al., 2023; Raimi et al., 2019; Vitriyana & Budiono, 2018). The availability of clean water is a critical issue because it has

implications for the level of people's quality of life (Kusumawardani & Astuti, 2018; Rohmaningsih et al., 2017).

The problem of access to clean water and proper sanitation is currently not only faced by rural communities but has also become a separate problem in urban areas (Saputra, 2022; Tortajada, 2020). The density of population in big cities that is not comparable with residential land has caused many slum settlements to emerge in urban areas (Liu & Zhang, 2020). In the City of Kupang itself the need for clean water is getting bigger and bigger, this is due to the less open space which causes fewer and fewer sources of clean water, coupled with the problem of the population of the City of Kupang which is increasing everyday. So it is not uncommon for the clean water supply in Kupang City to be increasingly unable to meet the demand for clean water in the region.

Sanitation is an important study because around the world at least five million children die due to the

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difficulty of getting adequate bathing, washing, toilet (MCK) facilities and hygiene (Kamila & Salami, 2022; Wiwin Setyari et al., 2022). The poor in rural and urban areas have low access to sanitation, while the use of polluted surface water continues. More than 30 years, access to sanitation in rural areas has not changed (Ngambut & Takesan, 2021).

The challenges faced by Indonesia related to drinking water, hygiene and sanitation are still very large. Riskesdas 2018, shows that the behaviour of defecating in latrines in residents > 10 years has reached 88.2%, while for toddlers the proportion of using latrines only reaches 40.6%. This low proportion is due to the lack of knowledge from the community about hygiene and sanitation and there is still a view from the community that they think that building latrines that meet health requirements requires expensive costs. The purpose of this study was to determine access to clean water and the condition of basic sanitation facilities in the Oesapa Village, Kupang City.

Method

This type of research is descriptive-analytic research using a survey method to describe access to clean water and the condition of sanitation facilities as well as the incidence of disease based on the environment (Arsyaf et al., 2023; Kriswanto et al., 2021). The collected data is then presented in the form of tables and graphs and statistically analyzed using the Chi-Square test (Osarfo et al., 2023; Yang et al., 2020). The research concept framework is described as Figure 1.

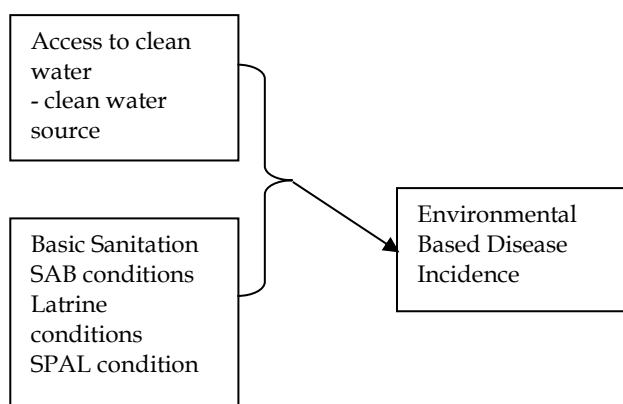


Figure 1. Stages of the Research Process

Result and Discussion

The number of residents whose houses were sampled was 553 people with 268 men (48.5%) and 285 women (51.1%).

Table 1. Data on the Number of Residents whose Homes were Used as Research Samples Based on Gender in the Oesapa Sub-District, Kupang City in 2021

Gender	Amount	Percentage (%)
Man	268	48.5
Woman	285	51.5
Amount	553	100

Univariate Analysis Results

Clean Water Source

The results of a survey conducted on 100 houses of residents who live in the Oesapa Village area show that the majority of the community uses clean water sourced from dug wells. Details can be seen in Table 2.

Table 2. Sources of clean water based on the type of facilities used by the community in the Oesapa sub-district Kota Kupang in 2021

Clean Water Source	Amount	Percentage (%)
Dig Well	72	72
PDAM	15	15
Water Tank	12	12
Hand Pump Well	1	1
Amount	100	100

Table 2 shows that of the 100 houses respondents, 72% used dug wells as a source of clean water, 15% PDAM water; 12% used tanks and 1% used Hand Pump Wells.

Ownership of Clean Water Source

Ownership of a clean water facility describes a condition which states that the clean water facility used is privately owned or owned by neighbours who are used jointly (Sembiring & Safithri, 2023). The full results can be seen in Table 3.

Table 3 shows that out of 100 respondents, 78% have private clean water facilities and 22% do not have clean water facilities or use clean water facilities owned by neighbors.

Condition of Clean Water Facilities

The condition of the clean water facility used by the respondent illustrates the level of risk of contamination that may occur due to the physical condition of the clean water facility which allows contamination to occur. An overview of the condition of the facilities based on the risk level can be seen in Table 4.

Table 3. Ownership of Clean Water Source Used by the Community in the Oesapa Sub-District, Kupang City in 2021

Ownership	Amount	%
Private Property	78	78
Neighbor-Owned (Shared use)	22	22
Water Tank	100	100

Table 4. Types and Conditions of Clean Water Facilities Used by the Community Based on Risk Levels in Oesapa Village, Kupang City in 2021

Type of Facility	Risk Level (%)				Amount
	High	High	Moderate	Low	
Dig Well	2 (100)	12 (92.3)	32 (100)	26 (49.1)	72 (72)
PDAM	0 (0)	1 (7.7)	0 (0)	14 (26.4)	15 (15)
Water Tank	0 (0)	0 (0)	0 (0)	12 (22.6)	12 (12)
Hand Pump Well	0 (0)	0 (0)	0 (0)	1 (1.9)	1 (1)
Amount	2 (2)	13 (13)	32 (32)	53 (53)	100 (100)

Table 4 shows that of the 100 clean water facilities examined, 53% of the clean water facilities with a low level of risk; with most types of facilities being dug wells as many as 26 facilities (49.1%). Thirty-two per cent of facilities with medium risk levels, 13% of facilities with high-risk level and 2% of facilities with very high-risk levels.

Condition of Latrine Facility

The condition of the toilet facilities used by the respondent illustrates the level of risk of contamination that might occur due to the condition of the latrines that do not meet the requirements. An overview of the condition of the latrine facilities based on the level of risk can be seen in Table 5.

Table 5. Condition of Latrine Facilities Based on Risk Level in Oesapa Village, Kupang City in 2021

Risk Level	Amount	Percentage (%)
High	38	38
Moderate	1	1
Low	61	61
Amount	100	100

Table 5 shows that of the 100 respondent's houses observed for toilet facilities, it can be seen that 61% of the latrines have a low-risk level, 38% have a high-risk level, and 1% have a low-risk level.

SPAL condition

SPAL or sewerage channels also play a role in the occurrence of environmental pollution and diseases. The condition of the SPAL used by the community can be seen in table 6 below:

Table 6. Conditions of Waste Water Sewers Based on Risk Level in Oesapa Village, Kupang City in 2021

Risk Level	Amount	Percentage %
High	4	4
Moderate	5	5
Low	91	91
Amount	100	100

Table 6 shows that of the 100 respondent's houses observed for the condition of the SPAL, it can be seen that 91% of the SPAL have a low risk level, 5% have a moderate risk level, and 4% have a high-risk level.

Results of Bivariate Analysis

Bivariate analysis was performed using the chi-square test (Prakoeswa et al., 2020). This analysis intends to look at the relationship between access to clean water and the incidence of environment-based diseases and conditions of sanitation facilities and the incidence of environment-based diseases.

The Relationship Between Conditions of Clean Water Facilities and Environmental-Based Disease Incidence

The results of the bivariate analysis between the Condition of Clean Water Facilities and the Occurrence of Environment-Based Diseases are shown in the following table

Table 7. The Relationship between SAB Conditions and Environmental-Based Disease Occurrence in Oesapa Village Kupang City in 2021

Clean Water Source Condition	Incidence Rate		P
	Sick	Healthy	
Not Eligible	7 (28%)	9 (12%)	0.049
Eligible	18 (72%)	66 (38%)	
<i>OR = 2,856</i>		<i>95% CI = 0,933 - 8,713</i>	

Table 7 shows that the value of $\rho = 0.049$ OR is 2.856 with a 95% confidence interval (CI): 0.933 - 8.713. because the value of $\rho < 0.05$, it can be stated that there is a relationship between the condition of clean water facilities and the incidence of environmental-based diseases in the Oesapa sub-district, Kupang City.

Water has a close relationship with health (Li & Wu, 2019). Water is the most essential thing for health, not only in production efforts but also for domestic consumption and its utilization (drinking, bathing, etc.) (Kusumawardani & Astuti, 2018). An increasing percentage of infectious diseases that can be fatal or

detrimental to health are transmitted through polluted water. Some water-related diseases are communicable, these diseases are generally classified according to various environmental aspects that can be intervened by humans (Sanropie, 1984; Tortajada & Biswas, 2018).

The magnitude of the risk factors for pollution of dug wells is because there is no fence to protect the well from contamination (Akber et al., 2020), the condition of the lead bucket and rope is dirty, there are cracks on the floor of the well, the condition of the SPAL is damaged, there are other sources of pollution around the well, the lip of the floor is < 1 meter, the wall of the well is cracked and not watertight, and the location of the dug well that is very close to the latrine pit, all of these conditions will cause pollution to the dug well water and ultimately lead to a decrease in the quality of the dug well water. To prevent contamination of the dug well water, immediately make improvements to the dug well facility (Brikké et al., 2003; Lutterodt et al., 2018; Rusdiana et al., 2015).

The Relationship Between Sanitation Facilities and Environmental-Based Disease Incidence

The results of the bivariate analysis between latrine conditions and Environmental Based Disease Occurrence are shown in Table 8.

Table 8. Correlation between Latrine Conditions and Environmental-Based Disease Occurrence in Oesapa Village Kupang City in 2021

Latrine conditions	Disease Incidence		P
	Sick	Healthy	
Not eligible	13(52%)	25 (33,3%)	0.096
Qualify	12 (48)	50 (66,7%)	
OR =2.167	95% CI = 0.864 - 5.436		

Table 8 shows that the value of $\rho = 0.096$, OR of 2.167 with a 95% confidence interval (CI): 0.864 - 5.436. because the value of $\rho > 0.05$, it can be stated that there is no relationship between latrine conditions and the incidence of environment-based diseases in the Oesapa sub-district, Kupang City.

Disposal of faeces that are not sanitary will cause various diseases including typhoid, cholera, dysentery, poliomyelitis, ascariasis, and so on. Human waste is solid waste which besides causing odour and polluting the environment, is also a medium for disease transmission in society. Therefore it is very necessary to maintain the cleanliness of latrines and bathrooms so that there is no transmission of diseases caused by feces (Waangsir & Dukabain, 2017).

In addition to the existence of healthy latrines, an unhealthy environment due to contamination with wastewater can also cause disruption to public health. Wastewater can be a breeding ground for pathogenic

microorganisms, mosquito larvae or other insects which can be a medium for disease transmission, especially diseases that are transmitted through polluted water such as cholera, typhoid fever, dysentery and so on. Results of bivariate analysis between SPAL conditions and environmental-based disease events are shown in Table 9.

Table 9. The Relationship between SPAL Conditions and Environmental-Based Disease Occurrence in Oesapa Village Kupang City in 2021

SPAL condition	Disease Incidence		P
	Sick	Sick	
Not eligible	3(12%)	6 (8%)	0.545
Qualify	22 (88)	69 (92%)	
OR =1.568	95% CI = 0.362 - 6.797		

Table 9 shows that the value of $\rho = 0.545$, OR of 1.568 with a 95% confidence interval (CI): 0.362 - 6.797. because the value of $\rho > 0.05$, it can be stated that there is no relationship between SPAL conditions and the incidence of environment-based diseases in the Oesapa sub-district, Kupang City.

Conditions of latrines and SPALs that do not meet the requirements need to be repaired, for example not leaving sewerage channels open, not disposing of waste in yards, and not allowing wastewater to stagnate around the home environment, because these conditions will allow disease vectors to multiply. For family latrines, it is best not to build latrines close to wells or community clean water sources, the toilet floors must be intact and watertight, water and soap are always available in the latrines and the latrines must be in a clean condition (Jiménez et al., 2019).

Conclusion

Sources of clean water used by the people of Oesapa Kelurahan consist of 72% dug wells, 15% PDAM, and 12% water tanks. Ownership of clean sir facilities: 78% use privately owned SAB and 22% use SAB with neighbours. The condition of clean water facilities with a high-risk level of 53%, moderate 32%, high 13% and very high 2%. Condition of family latrines 38% high-risk level, 61% low-risk level. SPAL conditions have a low-risk level of 91%, medium 5% and high 4%. There is a relationship between the condition of clean water facilities and the incidence of environmental diseases in the Oesapa sub-district and there is no relationship between the condition of the sanitation facilities (latrines and SPAL) and the incidence of environmental-based diseases in the Oesapa sub-district. Guidance and counselling and information about environmental health in general and about facilities for providing clean water, disposal of waste and human waste/family

latrines and maintaining the cleanliness of the environment so as to avoid various environment-based diseases

Author Contributions

Debora G. Suluh on duty proposal preparation, data processing and preparation of research reports; Ragu Theodolfi as a site survey and research data collection; Agustina as a qualitative preparation and monitoring of research implementation in the field; and Ferry WF Waangsir as a editing research reports and validating research data.

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Conflicts of Interest

The authors declare no conflict of interest.

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