The Relationship Between Personal Hygiene, Environmental Sanitation, and the Nutritional Status of Toddlers Age 12-59 Months in the Settlements Wetlands

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Abstract— Underweight among toddlers is a chronic problem in wetland settlements. The objective of this research, therefore, was to analyze the association between a toddler's personal hygiene and environmental sanitation with nutritional status. The focus on this research was on children in Ogan Ilir Regency. Observational analytical research with a cross-sectional approach was used, along with multi stage cluster sampling, involving a total of 152 toddlers. Data was collected through interviews using questionnaires, and observations were made using a checklist. Data processing was performed using computer software. The data was then analyzed using a Chi-square test at 0.05 level of significance. The results showed that there was a significant association between personal hygiene with a toddler's nutritional status (p=0.02). Also, a previous history of disease and infection significantly correlated with nutritional status (p=0.032), as did the physical quality of available water (p=0,002). It was also found that sewer wastewater quality (p=0,879), latrine quality (p=0,120), the presence of smokers in the home (p = 0.880), and chemical exposure (p=1,000) were not strongly associated with nutritional status. Therefore, it can be concluded that personal hygiene and the physical quality of clean water are determinant factors of a child's nutritional status.
Keywords: nutritional status, personal hygiene, history of infectious disease, physical quality of clean water, toddler

I. INTRODUCTION

Malnutrition is one of the most significant causes of toddler mortality in Indonesia, having reached up to 45% [1]. As such, both moderate underweight and severe underweight are problems that require immediate attention. Recent studies have revealed that 5.7% of Indonesian toddlers have a poor nutritional status, while 13.9% can be described as malnourished [2]. While there was a decrease in nutritional problems of up to 1.8% in 2018, 17.7% of toddlers remained at risk, with 3.9% suffering severe underweight and 13.8% suffering from moderate underweight [3]. Underweight in toddlers is the direct result of consuming an unbalanced diet and the presence of infectious diseases. This is indirectly influenced by sociodemography, environmental sanitation, and health services [4]. Infectious diseases such as diarrhea and acute respiratory infections (ARI) are common in young children due to their low body immunity [5]. These diseases also affect the ability of the child's body to absorb nutrients properly. Disorders of the digestive tract due to diarrhea also cause disruption of nutrient absorption and the utilization of carbohydrates, fats, and proteins [6] Furthermore, children suffering from infectious diseases often experience a decrease in appetite. In turn, their bodies may experience a decrease in the production of antibodies and enzymes, which can facilitate the entry of germs [7].

Poor hygiene and bad environmental sanitation conditions often lead toddlers to experience health problems and can dramatically affect their nutritional status [8]. Previous studies showed that environmental sanitation correlated to underweight among toddlers [9],[10]. Result of previous study state that environmental factors (water purified in past 24 h (p=0,07), type of latrine (p<0,001), hand washing with soap and water in the previous 24 hours (p=0,06)) were correlated with underweight of children aged under five years [11]. Also, source of drinking water associated to nutritional status of children [12]. As a group, toddlers are particularly vulnerable to microorganisms and various infectious agents. This is because they often come into contact with bacteria while playing. Furthermore, the quality of accessible water is a particularly significant factor affecting the transmission of waterborne disease, including diarrhea. Sewerage drains that do not fulfill the proper requirements for cleanliness often pollute both underground water and surface water. Households then use this raw water for drinking, washing food, cleaning household equipment, and cooking. Similarly, latrines that do not fulfill sanitation requirements can also contaminate both surface water and underground water.

The result of "Nutrition Status Monitoring" of toddlers, according to the National Weight/Age index of 2016, found that 17.8% of Indonesian children experienced nutritional status problems, with 3.4% suffering from severe underweight and 14.4% suffering moderate underweight. In South Sumatra, 11.2% of children this age range were underweight, with the highest number of cases occurring in Ogan Ilir District (23.3%) [13]. In 2017, the NSM revealed that 17.8% of Indonesian toddlers continued to suffer from nutrition problems, with 3.8% of them suffering from severe underweight and 14.0% suffering from moderate underweight. Meanwhile, for the Province of South Sumatra, the prevalence of underweight toddlers increased to 12.3%. At the same time, in Ogan Ilir, it decreased to 17.7%

and has not yet reached the national target [14].

Many settlements in Ogan Ilir Regency are located in wetlands, namely swamps, peat, and watersheds. These locations often lead to poor environmental sanitation conditions. The availability of clean drinking water, clean house water, sewage disposal, the use of latrines, and proper household waste management are common problems in wetland settlements. Poor environmental sanitation conditions are known as an indirect contributor to underweight. As such, it is necessary to research environmental factors related to the nutritional status of children under five year in the wetland settlements at Ogan Ilir Regency.

II. METHOD

This research was conducted as an analytic survey with a cross-sectional approach. The population is all toddlers aged 12-59 months living in Ogan Ilir Regency. The sample size was calculated based on the hypothesis formula of two different populations, which found 152 children in the specified age range. The sampling technique used was Multi-Stage Cluster, with the following procedures:

1. Picking three random sub-districts from Ogan Ilir Regency, namely Indralaya District, Tanjung Batu District, and Pemulutan Barat District.
2. Randomly picking two villages from each selected district. These were Muara Penimbung Ulu Village and Tanjung Seteko Village for Indralaya District, Tanjung Batu Village and Tanjung Batu Timur Village for Tanjung Batu District, and Talang Pangeran Village for West Pemulutan District.
3. Randomly choosing children aged 12-59 months from each selected village. This included 52 children from Indralaya, 50 from Tanjung Batu, and 50 from West Pemulutan. The exclusion criteria for the sample were those children with a healthy nutritional status.

There are three anthropometric parameters can be used to investigate malnutrition status : height for age, weight for height and weight for age. Weight for age is the WHO-recommended indicator to determine whether the child is underweight or not [15].

The collection of dependent variable data (nutritional status) was achieved through weight measurements and then calculated based on the Body Weight/Age Index, which includes the following categories:

1. Severe underweight (<-3 SD)
2. Moderate underweight(-3 SD to <-2 SD)
3. Normal (-2 SD to 2 SD)
4. Overweight (>2 SD)

In the bivariate and multivariate analysis, nutritional status is divided into two categories, namely underweight (severe underweight and moderate underweight) and normal. Data collection regarding independent variables such as the history of infectious diseases, personal hygiene, physical quality of clean water, latrine quality, sewerage quality, and the presence of family members smoking in the house was conducted through interviews. These interviews utilized a questionnaire, while observations were made using a checklist. Previously, the questionnaire was tested for validity and reliability using the Pearson Product Moment Test at α = 0.05. A history of infectious diseases is considered present if a child has experienced one infectious disease (diarrhea, ARI, helminthiasis) in the six months prior to data collection. The

physical quality of water is determined based on smell, taste, and color. Water is classified as clean if it has no discernible smell, taste, or color. Personal hygiene is evaluated through questions asked of the children's mothers. Variables such as latrine quality, SPAL quality, and personal hygiene are defined based on scoring. High quality conditions receive a score of "1," while low quality conditions receive a score of "0." When the scores for all of the variables are added up, the value of each median is calculated. If the total score is < the median, the evaluation is said to be ineligible. If it is > than the median, it is said to be eligible.

Data analysis was carried out univariately in order to properly distribute the proportions of each dependent and independent variable. Bivariate analysis was performed using a Chi-square test at α = 0.05. Multivariate analysis was performed using Logistic Regression in order to determine the dominant variables affecting the nutritional status of toddlers in the region.

III. RESULTS

TABLE I

Distribution of children aged 12-59 months by backgroud characteristics

Variables	Total (n)	Percent
Nutritional status		
Severe underweight	11	7.2
Moderate underweight	38	25
Normal	103	67.8
History of infectious diseases		
Yes	123	80.9
No	29	19.1
The presence of family members smoking in the house		
There is	99	65.1
There is none	53	34.9
Personal hygiene		
Not good	56	36.8
Good	96	63.2
The main source of drinking water		
Refill water	74	48.7
Well water	63	41.4
River water	15	9.9
Water source for cooking		
Well water	72	47.4
River water	80	52.6
Physical quality of clean water		
Not eligible	70	46.1
Qualify	82	53.9
Use of latrines		
Do not ude	15	9.9
Use	137	90.1
Latrine quality		
Not eligible	54	39.4
Qualify	83	60.6
Sewerage ownership		
There is none	78	51.3
There is	74	48.7
Sewerage quality		
Not eligible	32	43.2
Qualify	42	56.8

Source: Primary Data, 2019

Table 1 shows the proportion of children aged 12-59 months suffering from severe underweight to be 7.2%. In addition, 25% were suffering from moderate underweight, while 67.8% had normal. Of the children sampled, 80.9% had experienced infectious diseases such as diarrhea, ARI, and worms in the last three months. Alternately, 65.1% of children had family members that smoked in the house. Furthermore, 36.8% of the children sampled had poor personal hygiene. For most respondents, the main sources of drinking water were refill water (48.7%) and well water (41.4%), whereas more

respondents used river water for cooking (52.6%) than well water (47.4 %). Based on the physical quality of water, 53.9% did not fulfill cleanliness requirements, while 46.1% did. Furthermore, most of the respondents used latrines (90.1%), but 9.9% of locals still defecate in rivers (9.9%). Regarding the quality of the latrines, 60.6% fulfilled the cleanliness requirements. Alternately, 51.3% of respondents had families with sewerage, with 56.8% of those fulfilling the cleanliness requirements.

TABLE II

Relationship between of Personal Hygiene and Environmental sanitation with Toddlers Nutrition Status

Variables	Nutritional status		P Value	PR (95% CI)
	Underweight n (%)	Normal n (%)		
History of infectious disease				
There is	45 (36,6)	78 (63,4)	0,032	2,652
There is no	4 (13,8)	25 (86,2)		(1,037-6,785)
The presence of family members smoking in the house				
There is	31(31,3)	68(68,7)	0,880	0,992
There is no	18(34,0)	35(66,0)		(0,573-1,483)
Personal Hygiene				
Not good	25 (44,6)	31 (55,4)	0,020	1,786
Well	24 (25,0)	72 (75)		(1,135-2,809)
Physical quality of clean water				
Not eligible	32 (45,7)	38 (54,3)	0,002	2,205
Qualify	17 (20,7)	65 (79,3)		(1,345-3,615)
Latrine quality				
Not eligible	22 (40,7)	32 (59,3)	0,120	1,573
Qualify	22 (26,5)	61 (73,5)		(0,950-2,488)
Sewerage quality				
Not eligible	9 (28,1)	23 (71,9)	0,879	1,181
Qualify	10 (23,8)	32 (76,2)		(0,545-2,562)

Table 2 shows the presence of several variables related to the nutritional status of toddlers. These variables include a history of infectious diseases (p = 0.032). Those children that had a history of infectious disease had a greater risk of (2.652) of being classified as underweight, compared to those that had no history of infectious disease (PR = 2,652; 95% CI = 1,037-6,785). A toddler's hygiene was also significantly related to their nutritional status (p = 0.020). Children that had bad personal hygiene had a greater risk (1.786) of being underweight compared to those who's hygiene was sufficient (PR = 1,786; 95% CI = 1,135-2,809). The physical quality of clean water, including color, odor, and taste, has a significant impact on the children's nutritional status as well (p = 0.002). Those subjects without sufficiently clean water were at a 2.205 greater risk of being underweight compared to children with water that fulfills the requirements (PR = 2015; 95% CI = 1,345-3,615). Some variables not significantly related to the nutritional status of children include the presence of family members that smoke in the house (p = 0.880), the quality of latrines (p = 0.120), and the quality of sewerage (p = 0.879).

TABLE III

Result of Multivariate Analysis of Logistic Regression Final Models

Variables	p-value	RP$_{Adjusted}$	95% CI
Personal hygiene	0.011	5.540	1.469-20.893
History of infectious diseases	0.385	2.720	0.284-26.062
Physical quality of clean water	0.017	4.906	1.322-18.209
Latrine quality	0.302	2.201	0.532-7.684
The presence of family members smoking in the house	0.120	0.326	0.079-1.337

Table 3 shows the variables that are significantly related to nutritional status in children in the area. The main variables include personal hygiene and the physical quality of clean water. Other variables included disease history, latrine quality,

and the presence of family members smoking in the house. The most dominant variable influencing the nutritional status of the subjects was personal hygiene. The personal hygiene variable (PR = 5,540; 95% CI = 1,469-20,893) indicates that children with bad personal hygiene are at a much higher risk (5,540) of being underweight. This is compared to those with good personal hygiene, after adjusting for variables such as the history of disease, clean water quality, quality of latrines, and the presence of smoking family members. The water quality variable is another factor that influences the nutritional status of toddlers, with a PR value = 4.906; 95% CI = 1,322-18,209. This means that those without access to clean water are at greater risk (4.906) of becoming underweight. This is compared to those with access to suitably clean water after being adjusted for variables such as personal hygiene, history of disease, quality of latrines, and the presence of family members smoking in the house.

IV. DISCUSSION

The results showed that a history of infectious diseases was significantly related to the nutritional status of toddlers. The infectious diseases present in subjects in the three months leading up to the study included diarrhea, acute respiratory infections, and helminthiasis. Infectious diseases are a direct cause of malnutrition in toddlers, along with the lack of food consumption [4] Infectious diseases cause a decrease in children's appetite. Therefore, children often refuse to eat, resulting in a lack of nutrients being taken in and resulting in moderate underweigt or even underweight..

Some studies show a significant relationship between infectious diseases in toddlers with nutritional status [16]. Those children suffering from diarrheal diseases have a greater risk (2.21) of experiencing underweight than those that do not [17]. Toddler who suffer from infectious disese have a 2,25 greater risk of underweight than children do not have infectious disease [18]. Children aged 6-59 months who did not experience any illness in the last two weeks before the survey had a 91% decreased chance of being underweight than those who were ill. [19] Alternately, children who suffer from diarrhea have a 14.37 greater risk of nutrition problems than children who do not have diarrhea [20]. There was also a significant relationship between children who had diarrhea and nutritional status based on weight /age (p = 0.001). Therefore, those who often experience diarrhea will be at a 1.23 times greater risk of suffering from underweight than those who do not. In addition to diarrhea, ARI is also related to the nutritional status of children based on body weight/age (p = 0.001). Therefore, children suffering from ARI have a 1.01 times greater risk of becoming malnourished than children that do not suffer from ARI [9]. Diarrhea often occurs in toddlers due to the use of river water or well water that does not fulfill the requirements for cleanliness. In many cases, the river water used by most of the population has been polluted by household waste and by bathing, washing, and even defecating.

A toddler's personal hygiene is also significantly related to their nutritional status. This is also the dominant variable related to nutritional status in toddlers. Personal hygiene is an indirect factor contributing to underweight problems, and it also contributes to infection by diseases like diarrhea and helminthiasis. To maintain proper personal hygiene, a child must bath bathing at least twice a day, wash their hands with soap after defecation, cut their nails, and avoid cigarette smoke. The results in Table 1 showed that there are still many toddlers with poor personal hygiene, which can be a cause of infectious disease.

Base on the result of previous studies showed there was significant relationship between personal hygiene with nutritional status of children under five years of age [8]. Hand washed with soap and water previous 24 hours was correlated with underweight among toddlers (p=0,06) [11].

The physical quality of water is the dominant variable affecting the nutritional status of toddlers, as water that does not fulfill cleanliness requirements is a potential source of diarrheal transmission and can contribute to weight loss and underweight nutritional status. Toddlers that do not have access to safe water tend to be rated in poor status repeatedly. Furthermore, Rina explained that the type of clean water facilities was significantly related to nutritional status (p <0.001). The distance between the well and the latrine is also significantly associated with the nutritional status of children (p = 0.004). Underweight in children with a distance of wells with latrines of <10 meters was 7.03 higher than children with a distance of wells with latrines >10 meters [21]. Use of contaminated surface water for domestic purposes associated to underweight among under five children (p=0,000) [22]. The results showed that there were still toddlers and families defecating in the river because they did not have a toilet. Even in cases where the village had a public toilet available, the families often did not want to use it. Out of 152 respondents, only 137 defecated in the toilet. Still, the quality of latrines did not appear to be significantly related to the nutritional status of toddlers. Even so, the quality of both private and public latrines did not fulfill many requirements for cleanliness, which causes the pollution of rivers and wells used by the community as a source of clean water every day. Toilets that do not fulfill cleanliness requirements can become nests for disease vectors such as flies and cockroaches, which can contaminate food or drinks. All of these conditions contribute to diarrhea and other infectious diseases.

In general, households in Muara Penimbung Ulu Village and Tanjung Seteko Village, Indralaya District and Talang Pangeran Village, Pemulutan Barat District, do not yet have sewerage. In contrast, in Tanjung Batu Village, Tanjung Batu District, most households do have sewerage. Those children whose households had sewerage made up 74 out of the 152 respondents. Despite the presence of sewerage systems, many did not fulfill the requirements for cleanliness. In this study, the quality of household sewerage was not significantly related to the nutritional status of the subjects. However, based on the cross-tabulation in Table 2, there is a tendency for children with poor sewerage quality to experience underweight nutritional status while those with satisfactory sewerage quality tend to be healthier. Noor Edi stated that there is a higher rate of children with underweight status were sewerage systems are not of satisfactory cleanliness. In this case, the condition of the sewerage was significantly related to the nutritional status of children based on the Weight/Height index (p = 0,000) [23].

The results of this research indicated that smoking habits in the household did not significantly correlate with the nutritional status of the children present. The research result supported by previous studi which state that the smoking habits in the household did not significantly correlate with the nutritional status of children aged 6-59 months (p = 0.3250) [10]. In this research, the majority of children had family members smoking in the house, suggesting there is no relationship between the presence of smoke with the nutritional status of toddlers. However, the chemicals contained in cigarettes can cause acute respiratory infections (ARI) in toddlers

V. CONCLUSION

Personal hygiene is the most dominant factor influencing the nutritional status of the toddlers studied. The findings state that those children that have poor personal hygiene have a 5,540 greater risk of being underweight than those who have good personal hygiene. The physical quality of clean water is another significant factor influencing the nutritional status of toddlers, where those with no access to clean water have a 4,906 greater risk of being underweight compared to those with access to water that meets the criteria

VI. ACKNOWLEDGMENT

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