

Clean and Healthy Living Behavior of Communities Living in Landfill a Mixed-Method Study

Annastasia Sintia Lamonge^{1,*}, Febiola Pangemanan², Andries Prisilia³, Yanubi Yulita⁴
^{1,2,3,4}Universitas Katolik De La Salle Manado, Sulawesi Utara, Indonesia

Abstract

People living in landfills face a high risk of health problems, making Clean and Healthy Living Behavior (PHBS) essential for their well-being. This study aimed to (1) explore the PHBS practices among landfill residents, (2) examine the relationship between knowledge and PHBS behavior, and (3) assess the effectiveness of a family-based PHBS education program. The research used a multistage mixed-method design, beginning with qualitative data collection through in-depth interviews, followed by quantitative surveys, and finally, the development and testing of an educational intervention. The study involved six participants in interviews, 82 respondents for the questionnaire, and 32 participants in the education program. Thematic analysis of qualitative data identified four key themes, while statistical analysis using the Spearman rho test revealed a significant correlation between knowledge and PHBS (p -value: 0.001). Additionally, a paired t -test demonstrated that the family-based education program significantly improved participants' PHBS knowledge (p -value: 0.000). These findings highlight the need for proactive efforts from the government and health workers to provide PHBS family-based education, sanitation facilities, and healthcare services to landfill communities.

Keywords: PHBS; Landfills; Family-Based Intervention; Health Behavior

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*) Corresponding author: Annastasia Sintia Lamonge
E-mail: @mail.ugm.ac.id

1. Introduction

Clean and Healthy Living Behavior (PHBS) represents a crucial set of health practices essential for disease prevention and health promotion (Kaminsky et al., 2022; Faghy et al., 2023). These behaviors encompass ten key household indicators, ranging from proper maternal and child health practices to environmental sanitation and healthy lifestyle choices (Kemenkes, 2018). Despite their recognized importance, inadequate PHBS implementation remains a significant global health challenge, particularly in vulnerable communities. The World Health Organization (2023) identifies soil-transmitted infections (STH) as one of the most prevalent PHBS-related health issues, affecting approximately 24% of the global population, with Southeast Asia - including Indonesia - being among the most affected regions (WHO, 2023). In Indonesia, PHBS implementation remains suboptimal, with only 55.6% of households meeting basic standards, falling short of the national 65% target (Wulan & Pardede, 2024).

This low adherence to PHBS contributes to persistent health problems among vulnerable

populations, particularly landfill communities who frequently experience preventable illnesses such as respiratory infections, skin diseases, and diarrhea (Arif, 2020). In Manado City, the highest diarrhea incidence occurs in sub-districts including Tuminting, where the Sumompo landfill is located (BPS, 2022). Our preliminary survey identified 33 households (82 individuals) living in this landfill area, a population that has not been specifically studied regarding their PHBS practices despite their evident health vulnerabilities. To address this research gap, our study aims to: (1) investigate PHBS practices among Sumompo landfill residents, (2) examine the relationship between health knowledge and PHBS behaviors, and (3) evaluate the effectiveness of family-based education programs in improving PHBS implementation in this underserved community.

2. Method

This study employed a multistage mixed-methods design. The first stage involved qualitative data collection through in-depth interviews, followed by data analysis, which served as the

foundation for developing an educational program. The second stage tested the effectiveness of the program in increasing community knowledge about Clean and Healthy Living Behavior (PHBS) using a pre-test and post-test design without a control group. The study population consisted of residents living near the Sumompo landfill. A total of 6 participants were interviewed, 82 completed the questionnaire, and 32 took part in the educational program.

Qualitative data were analyzed thematically, while quantitative data were analyzed using descriptive and comparative methods. Inclusion criteria included individuals aged over 18 years who had lived in the Sumompo landfill area for more than one year and could communicate verbally. Those who had lived in the area for one year or less, or had difficulty with verbal communication, were excluded.

The primary instrument for qualitative data collection was the researcher, supported by guiding questions. For quantitative data, the household PHBS questionnaire, developed by Sutriko, 2017 (Cronbach's alpha 0.981), was used to assess knowledge and behavior related to PHBS. The questionnaire consists of seven domains: use of clean water, hand washing, toilet sanitation,

mosquito larvae eradication, consumption of vegetables and fruits, physical activity, and smoking cessation. Educational interventions were delivered using a family-based approach, utilizing a booklet and a flip chart. This study protocol was approved by the Faculty of Nursing, Unika De La Salle Manado.

3. Results and Discussion

Participant Characteristics

Table 1 contains demographic characteristics based on age, gender, and last education of the participants involved in the interview stage, at the questionnaire filling stage, and at the education program implementation stage. At the interview stage, the majority of participants were Pre-Elderly 50-59 years old (50.0%), female (83.3%), and with the last education of elementary school (50%). At the questionnaire-filling stage, the majority of participants were Adults 20-49 years old (72.0%), male (65.9%), and with the last education of elementary school (56.1%). At the education program delivery stage, the majority of participants were Adults 20-49 years old (44.8%), Male (62.5%), and with the last education of elementary school (53%).

Table 1. Participant Characteristics

Participant Characteristics	Interview		Questionnaires		Education Program	
	f	%	f	%	f	%
Age						
Teenagers (10-19 years)	0	0.0	1	1.2	7	24.0
Adults (20-49 years)	1	16.7	59	72.0	15	44.8
Pre-elderly (50-59 years)	3	50.0	12	14.6	6	18.7
Elderly (>60 years)	2	33.3	10	12.2	4	12.5
Gender						
Female	5	83.3	28	34.1	12	37.5
Male	1	16.7	54	65.9	20	62.5
Educational Level						
Not in School	0	0.0	0	0.0	1	3.0
Elementary School	3	50.0	46	56.1	17	53.0
Junior High School	1	16.7	19	23.2	5	16.0
Senior High School	2	33.3	17	20.7	9	28.0
Total	6	100	82	100	32	100

Age, education level, and gender are 3 factors that greatly influence PHBS. As an individual's age increases, ideally the mindset and behavior of the community will improve (Fleck et al., 2024; Wang et al., 2024; Maurer et al., 2023). Likewise, the educational background will shape a person's mindset, decision-making, and behavior (Zhao et al., 2023; Ulva, Siregar, et al., 2024). Based on gender, women tend to have better PHBS than men (Rehman et al., 2018; Su et al., 2022; Zendels et al., 2021).

Clean and Healthy Living Behavior of the Community (PHBS)

Table 2 is the result of the thematic analysis from the interview results. The interview results obtained 4 themes and 10 sub-themes. 3 themes are maternal and child health, personal and environmental hygiene, and community lifestyle.

The results of thematic analysis 1 are related to maternal and child health, which include: childbirth not assisted by health workers, providing exclusive breastfeeding, and weighing toddlers every month. In this study, information was

obtained that there were childbirths that were not assisted by health workers. In terms of providing exclusive breastfeeding, mothers have provided exclusive breastfeeding to their babies, especially 0-6 months and mothers have brought their children to the health center to weigh their children every month has been done properly.

Table 2. Results of Thematic Analysis of Qualitative Data

Themes	Sub-themes
Maternal and child health	<ol style="list-style-type: none"> 1. Childbirth assisted by health workers 2. Exclusive breastfeeding 3. Weighing toddlers every month
Personal and environmental hygiene	<ol style="list-style-type: none"> 1. Using clean water 2. Washing hands with soap 3. Using healthy toilets 4. Eradicating mosquito larvae
Community lifestyle	<ol style="list-style-type: none"> 1. Consuming vegetables and fruits 2. Doing physical activity 3. Smoking habits

Researchers assume that factors of access to sanitary and health services, the availability of health insurance, financial income, and level of knowledge are the dominant factors influencing health-seeking behavior and behavior. This assumption is supported by various previous studies where health insurance status influences health-seeking behavior, especially in rural communities (Kumah et al., 2024). The Family's financial burden is a factor that determines health-seeking (Ito et al., 2022). Educational background and knowledge related to health as determinants of behavior (Apuleni et al., 2021). In addition, researchers assume that providing exclusive breastfeeding is not solely due to the mother's understanding of the importance of exclusive breastfeeding, but is influenced by financial limitations to buy formula milk so that mothers optimally utilize the existing exclusive breastfeeding. This is in line with previous research which stated that financial limitations and mothers' understanding of the importance of exclusive breastfeeding are factors that influence mothers' motivation to provide exclusive breastfeeding (Bengough et al., 2022). Responsibility factors and parental love for their children make mothers take their children to the health center to monitor their children's growth and development (Frosch et al., 2021; Gandini et al., 2024).

The results of thematic analysis 2, namely personal and environmental hygiene, include: using clean water, washing hands with soap, using healthy toilets, and eradicating mosquito larvae. In

this study, it was found that all areas in the landfills had difficulty in getting clean water because the poor soil conditions filled with garbage made it difficult for them to access clean water and most people living in the landfills did not have toilets and media to eradicate mosquito larvae. In addition, to get clean water, people need to buy it from the nearest water seller from the landfills. This condition also causes hand washing behavior to be less than optimal and without using soap. In addition, most people do not use toilets when defecating but use plastic bags and just throw them away. In eradicating larvae and mosquitoes, people often use smoke by burning used egg trays, using mosquito repellent, and cleaning water reservoirs.

Researchers assume that the knowledge and socioeconomic factors of the community, access to clean water and sanitation facilities, government support, and health workers are the dominant factors that influence. Indeed, Landfills are not a residential location for the community, so clean water and toilet facilities are not available. However, the social conditions of the community who work in landfills prefer to live in landfills to make their work easier. This assumption is supported by the theory that states that public awareness to avoid diseases caused by unclean water makes people try by all means to obtain clean water (Mustafa et al., 2022). In addition, people seem to understand that washing hands is important but do not comprehensively understand the essence of washing hands and how important soap is as a disinfectant to kill germs. The researcher's assumption is supported by previous research which states that knowledge, sanitation, and availability of infrastructure influence people's hand-washing behavior (Osa Hayunggi et al., 2024). Another assumption is the socioeconomic conditions of people who depend on their livelihoods from scavenging for garbage so workers prefer to live in locations that are separated from their workplace: landfills. This assumption is supported by previous studies which state that the factors influencing the implementation of PHBS, especially in using healthy toilets, are cultural, social, economic, and infrastructure factors (Chen et al., 2022). Therefore, local governments and health workers need to facilitate the community with clean infrastructure, cleanliness, and education so that PHBS can be implemented by the community. (Cipta et al., 2024; Dodd et al., 2021).

In terms of eradicating larvae and avoiding mosquito bites, the community has used existing resources to eradicate larvae and mosquitoes, but the use of mosquito nets to avoid mosquito bites has not been carried out due to the unavailability of mosquito nets. This researcher's assumption is

supported by previous studies which state that support factors from the government and health workers to educate and provide abate powder and mosquito nets need to be carried out for the community (Marha et al., 2020).

The results of thematic analysis 3 are the lifestyle of the community which includes: consuming vegetables and fruits every day, doing physical activities, and smoking habits. The results of the study showed that the lifestyle of the community in the landfills is still not good, this was explained by the informant that consuming vegetables and fruits every day is still rarely done due to limited funds. In terms of regular exercise, the community believes that doing their daily work is also part of exercise. In addition, people tend to smoke both inside and outside the house.

From these findings, researchers assume that awareness of the importance of maintaining a lifestyle, especially in consuming vegetables and fruits, doing regular exercise and not smoking is important to prevent disease. However, it is undeniable that in addition to knowledge factors, financial limitations are also a consideration for the community so that they cannot meet the needs of vegetable and fruit consumption. This researcher's assumption is supported by several previous researchers who stated that the most dominant factor in consuming fruits and vegetables is knowledge of nutrition can influence behavior and financial ability to buy them (Irwan al., 2024; Stadlmayr et al., 2023; Fastring et al., 2021; Semagn & Abubakari, 2023). Therefore, adopting a healthy lifestyle is important to prevent people from various health problems

Relationship between Knowledge and Community Clean and Healthy Living Behavior (PHBS)

Table 3 is the result of a descriptive analysis of Community Knowledge and PHBS. The majority of the community has insufficient knowledge (53.7%) and inadequate PHBS (63.4%). The researcher assumes that the lack of community knowledge about PHBS is influenced by the lack of exposure of the community to education from health workers and the lack of community involvement in seeking health information. This assumption is supported by previous research which states that the implementation of PHBS is influenced by a person's knowledge and attitude, because the higher and broader the knowledge possessed, the better the quality and PHBS in the household (Nurhanifah et al., 2024; Sianturi et al., 2024).

Based on the results of the analysis of PHBS in the community living in the Sumompo landfills, it was found that most respondents did not behave PHBS well. The researcher assumes that this is due

to the lack of education and knowledge of the community about clean and healthy living, as well as the lack of community activity in following or seeking information about PHBS behavior. This researcher's assumption is also supported by the results of interviews and data collection conducted by the researcher and is in line with previous studies which found that people living in landfills generally behave poorly in PHBS. This is influenced by limited knowledge and education regarding clean and healthy living behavior in daily life activities (Nurhanifah et al., 2024).

Table 3. Results of Descriptive Analysis

Variables	Category	f	%
Knowledge of PHBS	Good	38	46.3
	Poor	44	53.7
Clean and Healthy Living Behavior (PHBS)	Good	30	36.6
	Poor	52	63.4
	Total	82	100

Table 4 shows the results of the correlation analysis where there is a significant relationship between knowledge and PHBS (p. value 0.001). Based on the results of the statistical test, it is concluded that knowledge has a significant relationship with PHBS. The results of this study are also in line with previous studies where knowledge is a predisposing factor to community behavior where the better the community's knowledge, the more it will form the mindset, awareness, attitude, decision-making, and behavior of the community itself (Tabrizi et al., 2024; Kim et al., 2022 ; Ayaz-Alkaya & Kulakçi-Altıntaş, 2024). Therefore, providing education becomes the gateway to awareness of the importance of maintaining health and changing behavior (Axmalia & Mulasari, 2020)

Table 4. Results of Correlation Analysis

Variables	f	Spearman Correlation	ρ Value
Knowledge and Clean and Healthy Living Behavior (PHBS)	82	0.369	0.001

Family-Based Education Program to Improve PHBS

Table 5 is the result of comparative test analysis before and after education was given. The test results show that family-based education programs are significantly able to improve community PHBS (p. value 0.000). The results of this study are in line with previous studies which found that education programs are effective in

improving PHBS behavior (Li et al., 2023); Sasmitha et al., 2020; Nurhanifah et al., 2024).

Education aims to increase public knowledge, understanding, and awareness of PHBS in households to achieve the highest possible health services (Rahmawati et al, 2022). Researchers assume that the success of this educational program is influenced by the educational program including the scope of materials, methods, and educational media used.

Table 5. Results of Comparative Analysis

Variables	f	Mean	t	p Value
Pre-test (PHBS)	32	66.28	24.951	0.000
Post-test (PHBS)	32	114.00		

The scope of educational materials is complete covering all PHBS indicators in the household environment, including: 1). Medical personnel who assist in childbirth, 2). Breastfeeding babies exclusively, 3). Weighing babies and toddlers, 4). Washing hands with clean water and soap, 5). Use clean water, 6). Using a healthy toilet, 7). Eliminating germs in the house, 8). Eat vegetables and fruits every day, 8). Physical activity every day, 10). Do not smoke indoors.

The educational method used is family-based where this method can involve all family members and can adjust the emphasis of educational content according to family conditions. Family-based educational programs are empowerment efforts to strengthen the role of the family in improving the health of its (Lamonge et al., 2024; Lamonge & Baua, 2023). Family-based educational programs also can change healthy living behaviors by educating individuals and families about health so that they can manage, control, or prevent complications in family members (Santos et al., 2023).

In this research, we use booklet media and flip charts as tools to carry out educational activities from house to house (door to door). The advantage of this booklet and flip chart is that it has a unique and unique design, contains the essence of documents resulting from research or other sources, and images are more dominant and more flexible to take anywhere because of their small size (Simanungkalit et al., 2024).

4. Conclusions and Suggestions

This study enhances the understanding of behavioral determinants influencing PHBS in vulnerable landfill communities. The findings indicate that the implementation of PHBS at the household level within the Sumompo landfill

community remains inadequate, primarily due to key determinant factors such as limited knowledge, financial constraints, restricted access to sanitation and healthcare facilities, and insufficient support from both the government and health workers. Education and knowledge enhancement serve as fundamental drivers of behavioral change. Family-based education programs have demonstrated effectiveness in improving community PHBS. The government and local health workers need to adopt a more proactive role in community education by conducting regular family-based counseling sessions and providing portable sanitation facilities in residential areas, thereby fostering sustainable behavioral improvements.

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