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WASTE BANK APPLICATION AS INFORMATION TECHNOLOGY IN SUPPORT OF ENVIRONMENT-BASED DISEASE CONTROL

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ABSTRACT:

Introduction: The problem of waste is a classic problem faced by society. Because every activity we do in our daily lives produces waste, the increase in daily waste needs to be handled properly so that there is no accumulation of waste in the following year. Apart from the government, the community is also involved in solving this problem. With appropriate management methods and processing techniques, the entire waste-handling process is expected not to affect the environment, interfere with health, and preserve environmental functions. The solution that can be offered is the existence of a waste bank application that will benefit the community, managers, and collectors and has a paperless nature and educational value. **Materials and Methods:** The research method is observational cross-sectional research with direct observation in the field. Data was collected using a Likert scale questionnaire. The questionnaires that have been collected will be analyzed using SmartPLS 4 software to test the influence between research variables. **Results:** The outer model results show the loading factor value> 0.6 and the AVE value> 0.5, so it can measure the variables. The results of the inner model show the R Square value of 38.3% with a t-statistic value of 10.138 has a significant effect on disease risk. Zero warehouse waste bank applications can influence disease risk factors by 65%. **Conclusion:** The zero warehouse waste bank application positively and significantly affects disease risk. Increased use of the zero warehouse waste bank application will reduce the risk of environmental-based diseases caused by waste.

Keywords: *Disease, Environment, Information technology, Waste bank, Waste Bank Application*

Introduction

The waste problem is one of the problems that continues to develop solutions as the amount of waste increases (Paradita LI, 2018). The waste problem is a classic problem faced by society. Because almost every activity we do in our daily lives almost always produces waste. Starting from grocery packages and food to products that are no longer used. Solving the waste problem requires all parties to participate and take an active role in handling it. All waste problems are inseparable from everyone's awareness of proper waste disposal and processing. Apart from the government, the community is also involved in efforts to solve this problem (Meyrena SD dan Amelia R, 2020). This requires the cooperation of all parties, including the community, government, and third parties as supporters (Elamin MZ et al., 2018). Some of this waste comes from domestic waste, such as in residential neighbourhoods.

Based on data from the Ministry of Environment and Forestry, the data input results conducted by 213 districts/cities throughout Indonesia in 2023 showed that annual waste generation reached 19,517,172,98.55 tonnes. Meanwhile, only 50.12% of waste handling has been carried out, only 16.69% of waste reduction has been achieved, and 33.18% of waste is not managed properly (KLHK SIPSN, 2023). Waste in 2023 decreased compared to 2022 and 2021, reaching 37,571,666.40 tonnes/year and 30,844,795.04 tonnes/year, respectively.

The increase in daily waste generation needs to be handled appropriately so that there is no accumulation of waste in the following year. According to the direction of the National Policy and Strategy for the Management of Household Waste and Waste, similar to Household Waste (Jakstranas), the Indonesia Clean Waste 2025 target is to reduce waste by 30% and handle waste by 70% by 2025. Based on data from the National Waste Management Information System (SIPSN) published by the Ministry of Environment and Forestry (KLHK), the amount of waste generated in Indonesia in 2022 reached 19.45 million tonnes. This number has decreased by 37.52% since 2021 to 31.13 million tonnes (Rahmawati LD dan Ilman GM, 2023).

The composition of household domestic waste, such as organic and inorganic waste, requires different management treatments. Globally, most waste is currently disposed of in landfills. About 37% of waste is disposed of in landfills, of which 8% is disposed of in sanitary landfills with landfill gas collection systems. Open dumping accounts for about 31% of waste, 19% is recovered through recycling and composting, and 11% is incinerated for final disposal. An alternative that has been implemented in several villages in Sidoarjo to overcome the problem of waste management is the existence of waste banks. With waste banks, people can utilise their household waste in such a way that it has a good value that contributes to the surrounding community's economy (Rajasa BR, 2024).

In many areas, efforts to reduce waste have been made to protect the environment from waste pollution. With the existence of appropriate management methods and processing techniques, it is expected that the entire waste-handling process does not have a negative impact on the environment, does not interfere with health, and certainly does not interfere with the preservation of environmental functions (Agus B et al., 2024). Community characteristics will affect how environmental management is carried out, how efforts are made to manage inorganic waste generation, how behaviour is related to waste management, and community participation, especially in waste bank applications. So, the solution that can be offered is the existence of a waste bank application that will benefit the community, managers, and collectors and has a paperless nature and educational value.

This application was created and is expected to be a container to make the environment clean and beautiful and implement good and correct waste management. In the rapid development of technology, information technology has become one of the fulfilment of needs that have become the basic needs of every human being. More than 82 million Indonesians are active internet users, and most of them are smartphone users (Andriyanto LD dan Wansen T, 2020). The design of this automatic trash can utilises the concept of the Internet of Things (IoT) as a means of sorting waste. Indonesia has great potential to implement IoT in all social aspects, not just limited to business. Most of Indonesia's population are internet users, so it is not difficult to implement IoT in all elements (Sardjono W et al., 2021). By utilising technology, the knowledge management system is a driving force that is useful for supporting operational activities and becoming a competitive advantage ((Sardjono W et al., 2020).

Materials and Methods

Study Design

This study is an observational cross-sectional study because the data were obtained by direct observation in the field. This research is located in RW IX of Larangan Village, Candi Subdistrict, Sidoarjo Regency. The study population was all heads of families in RW 9 of Larangan Village, Candi Subdistrict, Sidoarjo Regency, totalling 367 families. The research sample in this study is the head of the family in the neighbourhood of RW 9 Larangan Village, Candi Subdistrict, Sidoarjo Regency, selected through a random sampling system. Data were collected using a Google Form questionnaire, field observations, interview guides, Focus Group Discussions with stakeholders (informants), and measurement of daily waste generation among respondents. Data was collected using a Likert scale questionnaire and distributed to respondents using forms.

Statistical Analysis

The PLS-SEM method analyses the relationship of waste reduction efforts, waste handling, and sub-system components to the sustainability of waste management. The questionnaires that have been collected will be analysed using SmartPLS 4 software to test the influence between research variables. Testing with this model was chosen because it can estimate samples even in small numbers (Hair JF et al., 2021). Evaluation of the measurement model is called good if the loading factor (outer loading) is above 0.70 (Hair JF et al., 2021) or at least 0.60 (Chin WW, 1998), with convergent validity with an AVE size above 0.50.

RESULT

Outer Model Evaluation

Measurement model evaluation is a stage for evaluating a construct's validity and reliability. It consists of Construct Validity and Construct Reliability Evaluation, which will be explained below.

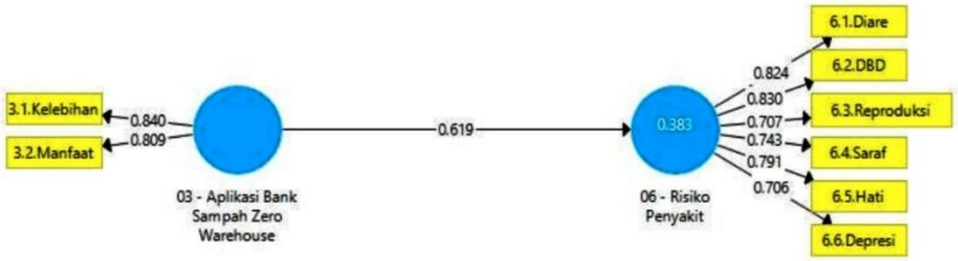

Figure 1: Outer Model Construct Image of Zero Warehouse Waste Bank Application Against Disease Risk

Evaluation of construct validity is done by calculating convergent validity. Convergent validity is known through the loading factor value and Average Variance Extracted (AVE). An instrument is said to fulfil convergent validity testing if it has a loading factor and Average Variance Extracted (AVE) above 0.5. The results of convergent validity testing are presented in the following table.

Table I. Table of Loading Factor Test Results for Zero Warehouse Waste Bank Applications Against Disease Risk

Code	Indicators	Loading Factor	AVE
Pros	Zero Warehouse waste bank application is a solution to the waste problem and is paperless and has educational value	0,840	0,680
Benefits	Benefits of Zero Warehouse waste bank for the community, managers, and collectors	0,809	

Diarrhoea	Risk of diarrhoeal disease	0,824	0,590
DBD	Risk of Dengue Fever disease	0,830	
Reproduction	Risk of reproductive system disorders	0,707	
Nerve	Risk of nervous system disorders	0,743	
Heart	Risk of liver disease	0,791	
Depression	Risk of depressive illness	0,706	

The table above shows that all indicators produce a loading factor value greater than 0.6. Thus, based on convergent validity, all indicators are declared valid to measure their variables. Then, all indicators produce an Average Variance Extracted (AVE) value greater than 0.5. Thus, based on convergent validity, all of these indicators are declared valid to measure their variables.

Table 2. Convergent Validity Ranking Table Effect of Zero Warehouse Waste Bank Application on Disease Risk

No.	**Environmental Management**		**No.**	**Disease Risk**	
	Indicators	**Loading Factor**		**Indicators**	**Loading Factor**
1.	Pros	84,0%	1.	DBD	83,0%
2.	Benefits	80,9%	2.	Diarrhoea	82,4%
			3.	Impaired Liver Function	79,1%
			4.	Nervous System Disorders	74,3%
			5.	Reproductive Disorders	70,7%
			6.	Depression	70,6%

Based on Table 2, in the comparison of the Convergent Validity value of the effect of the Zero Warehouse waste bank application on disease risk, the largest size is in the Zero Warehouse waste bank application indicator, being a solution to the inorganic waste problem. It is paperless and has an educational value of 83.0%, while the highest disease risk that can occur is dengue fever, with a loading factor value of 83.0%.

Inner Model Evaluation

Evaluation of the structural or inner model is a stage to evaluate the goodness of fit, including the coefficient of determination and hypothesis testing. Each will be explained as follows:

Coefficient of Determination (R)2

The Coefficient of Determination (R^2) is used to determine the ability of endogenous variables to explain the diversity of exogenous variables, or in other words, to determine the contribution of exogenous variables to endogenous variables. The results of R2 can be seen in Table 3.

Table 3. Determination Coefficient Results (R^2) Zero Warehouse Waste Bank Application Against Disease Risk

Variables	**R. Square**
Disease Risk	0.383

The table above shows the R-squares result: 0.383, or 38.3%. This indicates that the zero warehouse waste bank application variable can affect the disease risk by 38.3%. Other variables outside the study influence the remaining 61.7%.

Hypothesis Testing

Significance testing is used to test whether exogenous variables affect endogenous variables. The test criteria state that if the T-statistics value ≥ T-table (1.96) or the P-value < significant alpha 5% or 0.05, it is stated that there is a significant effect of exogenous variables on endogenous variables. The results of significance testing and models can be seen in Figures 2 and Table 4.

Influence	Coefficient	T statistics (|O/STDEV|)	P-Values
Waste Bank Zero App Warehouse -> Disease Risk	0,619	10,138	0,000

Based on the table above, it can be explained that there is an influence of exogenous variables on endogenous in each hypothesis. The test results in the table above show that the T-statistic value of behavioural effects on disease risk is 10.138 with a p-value of 0.000 <0.05. This means the zero warehouse waste bank application positively affects disease risk.

DISCUSSION

Waste Bank App

Waste is a consequence of human activity. As the population increases and the economy grows in Indonesia today, waste management is still a problem that is difficult to control. The government has implemented the 3R system for a long time, but not everyone knows about it. Waste reduction is an effort to reduce waste generation at its source and can be done before waste is generated. All resources can be made more efficient by changing consumer behaviour to reduce waste. Reusing something in its original form (Fitri NR, 2024). In addition, waste management activities include sorting waste by type, amount, and shape, collecting waste in the remaining processing area, moving waste from waste processing facilities to landfills, and processing waste by changing the nature, composition, and quantity. The final process is a safe return of waste and residues from previous processing to the environment (Weli M, 2023).

Garbage is closely related to public health because from this garbage will live various microorganisms that cause disease (bacterial pathogens) and insect animals that transfer / spread disease (vectors). Garbage is dumped everywhere that this application is made, and it is expected to be a container that can make the environment clean and beautiful and implement good and correct waste management. In the rapid development of technology, information technology has become one of the fulfilment of needs that have become the basic needs of every human being. More than 82 million Indonesians are active internet users, and most of them are smartphone users (Andriyanto LD dan Wansen T, 2020).

In this era of globalization, waste banks are no longer done manually but through an application system. Developing increasingly sophisticated technology will facilitate waste bank applications (Silfiah RI et al., 2021). An information system combines two or more connected components to achieve a common goal (Utami K, 2022). The android-based waste bank application is an android mobile application that is one of the solutions to the waste problem in the community, and indirectly, this application has educational value towards environmental awareness so that it can create a clean and waste-free environment and improve the economy for the community. Based on the implementation results, this waste bank application is easy to use, so it does not require much time to learn the features. With this waste bank application, it is hoped that the community can easily participate directly in environmental issues and economically make this application an additional income (Andriyanto LD dan Wansen T, 2020). The following are the goals, benefits, and steps in operating the zero warehouse waste bank application.

The purpose of the Zero Warehouse Waste Bank Application for the community, among others:

1. Make it easier for waste bank administrators to recapitulate the amount and type of inorganic waste
2. Avoiding writing errors because it is known directly to both parties, customers and administrators
3. Paperless and customer transaction data is recorded (can be called at any time)
4. Attracting new members to become more active in inorganic waste activities (3R efforts)

The benefits of the Zero Warehouse Waste Bank Application in the community include:

1. Can help with local waste management
2. Sensitising the surrounding community to the importance of environmental cleanliness
3. Make the environment cleaner and prevent the occurrence of a disease
4. Increase the economic value of discarded items
5. Improving the community economy

The waste bank application for the manager (admin) and the application for users/customers can be operated via Android mobile. The Zero Warehouse Waste Bank manager will manage the waste bank application manager, which can be operated by other waste bank managers/managers who want to cooperate.

The features presented in the waste bank application include history, savings, withdrawals, and general information. Waste bank customers download the application and fill in personal data such as name, complete address, and location of the intended waste bank as an account profile. When the customer wants to deposit waste with the manager, the manager will fill in the waste deposit data deposited by the customer. The manager will select the organic or non-organic waste in kilograms and then click deposit.

Data on customers who have made waste deposits to the waste bank manager will be recorded in the monthly savings data. In the history feature, you can see the history of transactions that customers have made. This waste bank application is not only a savings application. Other features presented are general information about events organised by the waste bank manager or information related to environmental issues. Currently, transactions using the cash withdrawal feature cannot be used with the m-banking application or other non-cash payments. The following is intended to reduce operating system errors, and the waste bank administrator/manager will fully accommodate cash withdrawal activities. Furthermore, customers are given the convenience of directly contacting the manager through the chat feature.

The rapid development of information technology requires an application system that helps the administrative process in waste banks and allows customers to access transaction data and information from waste banks easily and in real-time. This is the advantage of the Zero Warehouse Waste Bank application. This waste bank application and Android technology will increase the number of waste bank customers because its use covers a wide area, not only for residents of Larangan, Candi, and Sidoarjo. This can be seen from many studies conducted, such as the first study, Implementation of Android-Based Waste Bank Application in Villa Dagu, South Tangerang, conducted by Arfan Sansprayada and Kartika Mariskhana in 2020. This Android-based waste bank application aims to help waste management in Villa Dagu Housing (Sansprayada A dan Mariskhana K., 2020).

This application will be socialised in line with the socialisation of community awareness of the environment through inorganic waste management. The waste bank application makes it easier for managers to book manual waste savings transactions. Customers can also view their savings at any time (real-time) with their respective electronic devices.

Waste has the potential for other problems that follow, including health problems such as leptospirosis, zika, chikungunya, diarrhoea, dengue fever, plague, and even to rabies and Covid-19 (Krystosik A et al., 2020), (Cruvinel VRN et al., 2020) (Mol MPG, 2020), (Di Maria F et al., 2020), (Febriani CA et al., 2022) (Endawati A et al., 2021), (Maywati S et al., 2023), (Oktavianisya N et al., 2023), (Aolina D et al., 2020) (Table 5). Environment-based disease problems are generally caused by external factors such as garbage, rats, poultry, pets, and livestock, apart from disease-carrying vectors; they are also caused by environmental factors around the place of residence, conditions in the house, and health conditions of the community (Dhaningtyas SA et al., 2024), (Eldysta E et al., 2022), (Dompas BE et al., 2020). Likewise with human life, if the home and family environment

can be protected, human life will be much better. Quality of life requires good health, mind, and body (Melvani RP, 2024).

The environment is often impacted by human behaviour. Therefore, humans have adapted to health and environmental problems since they lived on Earth. Lack of cleanliness in the environment around the house can be feared to cause disease to humans carried by vector animals. One of the environmental risk factors in waste management is managing waste by minimising the goods or materials used and choosing items that can be reused. Avoiding the use of items that are only used once, items that are no longer useful can be recycled, paying attention to items used daily, making the environment green around the home environment, offices, shops, vacant land, and others. Diseases caused by waste are very extensive and can be in the form of infectious diseases, non-communicable diseases, fires, poisoning, and others. In addition, waste can also cause an increase in vector-borne diseases such as bacteria, fungi, viruses, parasites, worms, and chemicals. Diseases caused by the impact of an unhealthy environment are referred to as environment-based diseases. Such diseases often encountered are ARI, diarrhoeal, filariasis, dengue fever, malaria, and TBS (Darmawan A A et al., 2023), (Bachtiar E et al., 2021). Potential health hazards that can be caused are:

1. Diseases caused by viruses or bacteria/germs, such as diarrhoea, typhoid fever, vomiting, cholera, and dysentery (Arivia N et al., 2021), (Nurjanah S, 2023).
2. Health problems through arthropod vectors and rodents such as (flies, mosquitoes, ants, cockroaches, rats).
3. Diseases due to fungal and parasitic infections, such as scabies, ringworm, tinea versicolor, Soil Transmited Helminths (STH) infections (Isyafa FR et al., 2020), (Astuti RDI et al., 2020), (Janah TK & Putri NE, 2023), (Ngwese MM, 2020), and so on.
4. Psychosomatic disorders & injuries, e.g., insomnia, shortness of breath, stress, injuries by sharp objects, etc.
5. By-products of poor waste management, such as dioxins and leachate (Vinti G et al., 2021)

In addition, one of the causes of transmission of typhoid fever and diarrhoea is poor environmental sanitation, such as the lack of household waste management. People's habits that pay less attention to waste disposal can cause disease vectors such as flies to gather. The spread rate of typhoid fever will be higher than in environments with more organised waste disposal sites (Pangestu D et al., 2023). Therefore, properly processing waste to avoid waste-related diseases is very important. The results showed that Dengue Fever is an environmental disease in Larangan village, Candi, Sidoarjo. In this study, the largest loading factor on the Waste-Caused Disease variable is diarrhoeal disease, with a value of 0.819. Then, it was followed by dengue fever, which had a value of 0.805. Diarrhoea and dengue fever are diseases that are closely related to environmental health because both can be transmitted through vectors that can develop from a poor environment, such as the presence of garbage that holds water, creating puddles (Syamsul M, 2019), (Utari E et al., 2022), (LestarI DD et al., 2024). In addition, the accumulation of organic waste can also potentially serve as a medium for developing vectors that cause dengue hemorrhagic fever (DHF) and bacteria that cause diarrhoea. In the case of diarrhoea, the main cause of the spread of the disease may be poor waste management. Community assistance in environment-based disease prevention efforts can also increase knowledge related to the source of the disease experienced. In addition to educational efforts, another step that can be taken is to encourage government policies in government management (Wijayanti Y & Widyastari H, 2018), (Said S et al., 2023). Therefore, continuous efforts to increase public awareness, the use of environmentally friendly technology, and the active role of the government and private sector are essential to reduce the risk of diarrhoea and improve the community's quality of life (Saputra Ipba, 2024).

CONCLUSION

1. The Zero Warehouse waste bank application has an outer model value that meets the validity and reliability requirements with a loading factor value> 0.6 and an AVE value> 0.5, so it can be used to measure its variables. The influence of the Zero Warehouse waste bank application through the R Square value is 38.3%, with a t-statistic value of 10.138 or has a significant influence on disease risk.

2. The zero warehouse waste bank application can influence disease risk factors by 65%. Other variables outside the study affect the remaining 35%. All variables have a significant influence when the PLS-SEM bootstrapping test is carried out.
3. The operational guidelines for the Zero Warehouse Waste Bank Application are presented and illustrated using a Data Flow Diagram (DFD) and Entity Relationship Diagram (ERD) with nine main business models needed in preparing an Android-based waste bank application.

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ETHICAL APPROVAL

This study was approved by the Health Research Ethics Committee of the Faculty of Public Health, Universitas Airlangga No: 56/EA/KEPK/2023. All authors were also approved before the study.

REFERENCES

1. Paradita LI. 2018. Pemilahan Sampah: Satu Tahap Menuju Masyarakat Mandiri Dalam Pengelolaan Sampah. BERDIKARI : Jurnal Inovasi dan Penerapan Ipteks.;6(2). https://journal.umy.ac.id/index.php/berdikari/article/view/6245
2. Meyrena SD, Amelia R. 2020. Analisis Pendayagunaan Limbah Plastik Menjadi Ecopaving Sebagai Upaya Pengurangan Sampah. Indonesian Journal of Conservation. Dec 29;9(2):96–100. https://journal.unnes.ac.id/nju/ijc/article/download/27549/11183
3. Elamin MZ, Ilmi KN, Tahrirah T, Zarnuzi YA, Suci YC, Rahmawati DR, et al. 2018. Analysis of Waste Management in the Village of Disanah, District of Sreseh Sampang, Madura. JURNAL KESEHATAN LINGKUNGAN. Dec 4;10(4):368. https://garuda.kemdikbud.go.id/documents/detail/2272112
4. Kementerian Lingkungan Hidup dan Kehutanan. SIPSN - Sistem Informasi Pengelolaan Sampah Nasional [Internet]. 2023. sipsn.menlhk.go.id. Available from: https://sipsn.menlhk.go.id/sipsn/
5. Rahmawati LD, Ilman GM. 2023. Proses Collaborative Governance Dalam Program Pengurangan Sampah Di TPA Jabon, Kabupaten Sidoarjo. Jurnal Media Administrasi [Internet]. Oct 31;8(2):29–42. Available from: https://jurnal2.untagsmg.ac.id/index.php/jma/article/view/1164
6. Rajasa BR, Sejati RRHP. 2024. Rancang Bangun Sistem Aplikasi Bank Sampah Online Berbasis Android Di Bank Sampah Lintas Winongo. Jurnal Teknologi Dan Sistem Informasi Bisnis [Internet]. Apr 5;6(2):400–9. Available from: https://jurnal.unidha.ac.id/index.php/jteksis/article/download/1315/767
7. AGUS B, ARJITA IPD, SYUHADA I, Adnyana IGA. 2024. HUBUNGAN PENGELOLAAN SAMPAH DENGAN KEJADIAN DIARE DI DESA PANDANAN. Ganec Swara [Internet]. Mar 4;18(1):77–7. Available from: http://journal.unmasmataram.ac.id/index.php/GARA/article/view/736
8. Andriyanto LD, Wansen T. 2020. RANCANG BANGUN APLIKASI BANK SAMPAH BERBASIS ANDROID. IT for Society. Aug 19;4(2). http://repository.president.ac.id/handle/123456789/3593
9. Sardjono W, Selviyanti E, Hobri, Azizah R. 2021. The Relationship between Internet Growth and Implementation of the Internet of Things. Journal of Physics: Conference Series. Mar 1;1836(1):012030. https://iopscience.iop.org/article/10.1088/1742-6596/1836/1/012030/meta
10. Sardjono W, Retnowardhani A, Azizah R, Maryani. 2020. Analysis of Application of Zachman Framework For Knowledge Management Systems Success Optimization [Internet]. IEEE Xplore. 2020 [cited Dec 9]. p. 277–82. Available from: https://ieeexplore.ieee.org/document/9211110
11. Hair JF, Hult GTM, Ringle CM, Sarstedt M, Danks NP, Ray S. 2021. Partial least squares structural equation modeling (PLS-SEM) using R : a workbook. Cham, Switzerland: Springer;
12. Chin WW. 1998. The Partial Least Squares Approach to Structural Equation Modeling [Internet]. Marcoulides G, editor. Mahwah, New Jersey: Lawrence Erlbaum Associates Publisher;.Availablefrom: https://www.researchgate.net/publication/311766005_The_Partial_Least_Squares_Approach_to_Structural_Equation_Modeling
13. Fitri NR, Himawan AS, Fadillah AS, Dahayu HP, Marwenny E. 2024. Mengulas Regulasi Terkait Mekanisme Pengelolaan Sampah Melalui Bank Sampah Di Kota Padang. Jurnal Kajian Hukum Dan Kebijakan Publik [Internet].;2(1):38–42. Available from: https://jurnal.kopusindo.com/index.php/jkhkp/article/download/252/253
14. Weli M. 2023. Upaya Pemberdayaan Masyarakat Melalui Bank Sampah Untuk Mewujudkan Kebersihan Lingkungan Dipekon Balai Kencana Kecamatan Krui Selatan Kabupaten Pesisir Barat [Internet] [Thesis]. [UIN Raden Intan Lampung];. Available from: http://repository.radenintan.ac.id/23142/1/SKRIPSI%20PERPUSTAKAAN.pdf
15. Silfiah RI, Mohtarom A, Ulum KM. 2021. Digitalisasi Bank Sampah Dengan Penerapan Sistem Aplikasi Resik di Desa Karangsono Kecamatan Sukorejo Kabupaten Pasuruan. Soliditas [Internet]. Sep 18;4(2):143–3. Available from: https://www.academia.edu/download/81121218/1571.pdf
16. Utami K, Rialmi Z, Nugraheni R. 2022. Analisis Perencanaan Aplikasi Bank Sampah Digital Studi Kasus Pada Bank Sampah Solusi Hijau. Jurnal Penelitian Manajemen Terapan (PENATARAN) [Internet].;7(1):34–49. Available from: https://journal.stieken.ac.id/index.php/penataran/article/download/594/618
17. Sansprayada A, Mariskhana K. 2020. Implementasi Aplikasi Bank Sampah Berbasis Android Studi Kasus Perumahan Vila Dago Tangerang Selatan. Jurnal Inovasi Informatika [Internet]. Mar 25;5(1):24–34. Available from: https://jurnal.pradita.ac.id/index.php/jii/article/download/30/11

18. Putra DP, Masra F, Prianto N. 2022. PENERAPAN PENGELOLAAN SAMPAH DAN AIR LIMBAH RUMAH TANGGA DAN KEJADIAN PENYAKIT DIARE DI KELURAHAN KALIAWI PERSADA KOTA BANDAR LAMPUNG. Ruwa Jurai: Jurnal Kesehatan Lingkungan [Internet]. Dec 2 [cited 2023 Jan 26];16(2):108. Available from: https://www.ejurnal.poltekkes-tjk.ac.id/index.php/JKESLING/article/view/Dito%20Pratama%20Putra;%20Ferizal%20Masra;%20Nawan%20Prianto
19. Hidayah NN, Prabamurti PN, Handayani N. 2021. Determinan Penyebab Perilaku Pengelolaan Sampah Rumah Tangga dalam Pencegahan DBD oleh Ibu Rumah Tangga di Kelurahan Sendangmulyo. Media Kesehatan Masyarakat Indonesia [Internet]. Jul 28;20(4):229–39. Available from: https://ejournal.undip.ac.id/index.php/mkmi/article/view/38065
20. Ahyanti M. 2020. Sanitasi Pemukiman Pada Masyarakat Dengan Riwayat Penyakit Berbasis Lingkungan. Jurnal Kesehatan [Internet]. May 27;11(1):44. Available from: https://www.ejurnal.poltekkes-tjk.ac.id/index.php/JK/article/view/1697
21. Rosmala F, Rosidah I. 2024. HUBUNGAN FAKTOR RESIKO KESEHATAN LINGKUNGAN DALAM PENGELOLAAN SAMPAH PADAT DENGAN KEJADIAN DEMAM BERDARAH DENGUE DI KELURAHAN HEGARSARI KECAMATAN PATARUMAN KOTA BANJAR. Jurnal Kesehatan Komunitas Indonesia [Internet]. 2019 Oct 22 [cited 2024 Apr 23];15(1). Available from: https://jurnal.unsil.ac.id/index.php/jkki/article/view/986
22. Widiastuti VA, Yuniastuti A. 2024 Analisis Hubungan Sikap Perilaku Pengelolaan Sampah Dengan Gejala Penyakit Pada Masyarakat Di TPI Kota Tegal. Public Health Perspective Journal [Internet]. 2017 Dec 14 [cited Aug 28];2(3). Available from: https://journal.unnes.ac.id/nju/phpj/article/view/13783
23. Krystosik A, Njoroge G, Odhiambo L, Forsyth JE, Mutuku F, LaBeaud AD. 2020. Solid Wastes Provide Breeding Sites, Burrows, and Food for Biological Disease Vectors, and Urban Zoonotic Reservoirs: A Call to Action for Solutions-Based Research. Frontiers in Public Health [Internet]. Jan 17;7(405). Available from: https://doi.org/10.3389/fpubh.2019.00405
24. Cruvinel VRN, Zolnikov TR, Takashi Obara M, Oliveira VTL de, Vianna EN, Santos FSG do, et al. 2020. Vector-borne diseases in waste pickers in Brasilia, Brazil. Waste Management [Internet]. Mar;105:223–32. Available from: https://doi.org/10.1016/j.wasman.2020.02.001
25. Mol MPG, Caldas S. 2020. Can the Human Coronavirus Epidemic Also Spread through Solid waste? Waste Management and Research [Internet].;38(5):485–6. Available from: https://doi.org/10.1177/0734242X20918312
26. Di Maria F, Beccaloni E, Bonadonna L, Cini C, Confalonieri E, La Rosa G, et al. 2020. Minimization of spreading of SARS-CoV-2 via household waste produced by subjects affected by COVID-19 or in quarantine. Science of The Total Environment [Internet]. Nov 15;743:140803. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0048969720343278
27. AR S, Febriani CA, Hermawan D. 2022. Faktor Determinan yang Berhubungan dengan Partisipasi Masyarakat Usia ≥ 12 Tahun dalam Melakukan Vaksin COVID-19. Jurnal Kesehatan Komunitas (Journal of Community health) [Internet]. Dec 15;8(3):463–71. Available from: https://doi.org/10.25311/keskom.vol8.iss3.1317
28. Endawati A, Sitorus RJ, Listiono H. 2021. Hubungan Sanitasi Dasar dengan Kejadian Diare pada Balita Di Wilayah Kerja Puskesmas Pembina Kota Palembang. Jurnal Ilmiah Universitas Batanghari Jambi [Internet]. Feb 8;21(1):253. Available from: https://doi.org/10.33087/jiubj.v21i1.1143
29. Maywati S, Gustaman RA, Riyanti R. 2023. SANITASI LINGKUNGAN SEBAGAI DETERMINAN KEJADIAN PENYAKIT DIARE PADA BALITA DI PUSKESMAS BANTAR KOTA TASIKMALAYA. Journal Health & Science : Gorontalo Journal Health and Science Community [Internet].;7(2):219–29. Available from: https://ejurnal.ung.ac.id/index.php/gojhes/article/view/17841
30. Oktavianisya N, Yasin Z, Aliftitah S. 2023. Kejadian Diare pada Balita dan Faktor Risikonya. Jurnal Ilmiah STIKES Yarsi Mataram [Internet]. Aug 7;13(2):66–75. Available from: http://journal.stikesyarsimataram.ac.id/index.php/jik
31. Aolina D, Sriagustini I, Supriyani T. 2020. Hubungan antara Faktor Lingkungan dengan Kejadian Diare pada Masyarakat di Desa Cintaraja Kecamatan Singaparna Kabupaten Tasikmalaya Pada Tahun 2018. Jurnal Penelitian dan Pengembangan Kesehatan Masyarakat Indonesia [Internet]. Oct 14;1(1):38–47. Available from: https://journal.unnes.ac.id/sju/index.php/jppkmiURL:https://journal.unnes.ac.id/sju/index.php/jppkmi/article/view/41425/17340
32. Dhaningtyas SA, Pusparini DMR, Pratiwi MA, Febriyanti LA, Fitria ID, Hidayah AN, et al. 2024. Program GERPIS (Gerakan Pemilahan Sampah) Dan Pencegahan Penyakit Berbasis Lingkungan. Jurnal

ETAM [Internet]. ;4(2):126–32. Available from: https://ejurnal.polnes.ac.id/index.php/ETAM/article/download/736/718

33. Eldysta E, Ernawati K, Mardhiyah D, Arsyad A, Maulana I, Farizi F. 2022. Hubungan Perilaku Cuci Tangan Dan Faktor Risiko Lingkungan Terhadap Kejadian Penyakit Diare. Public Health and Safety International Journal [Internet]. Oct 20;2(02):131–9. Available from: https://doi.org/10.55642/phasij.v2i02.243
34. Dompas BE, Sumampouw OJ, Umboh JM. 2020. Apakah Faktor Lingkungan Fisik Rumah Berhubungan dengan Kejadian Demam Berdarah Dengue?. Indonesian Journal of Public Health and Community Medicine [Internet].;1(2):11–5. Available from: https://doi.org/10.35801/ijphcm.1.2.2020.28662
35. Melvani RP. 2024. Faktor Sanitasi Lingkungan Terhadap Kejadian Diare Balita Di Kelurahan Karyajaya Kota Palembang. Journal of Cross Knowledge [Internet].;2(1):267–73. Available from: https://edujavare.com/index.php/IJCK/article/download/302/245
36. Darmawan A A, Maria I I, Aurora WID W, Kusdiyah E E, Nuriyah N N. 2023. Jamban Sehat Dan Penyakit Berbasis Lingkungan di Muara Kumpe. Jambi Medical Journal: Jurnal Kedokteran dan Kesehatan [Internet].;11(1):26–31. Available from: https://online-journal.unja.ac.id/kedokteran/article/view/25102
37. Bachtiar E, Duwila A, Chaerul M, Affandy N, Makbul R, Tanjung R, et al. 2021. Pengetahuan Kebencanaan dan Lingkungan. Medan: Yayasan Kita Menulis;.
38. Arivia N, Ratnadi IA, Kartinawati KT. 2021. Faktor Risiko Tingginya Angka Kejadian Diare Pada Balita Di Puskesmas Kabupaten Gianyar, Bali. Aesculapius Medical Journal [Internet]. Oct;1(1):55–62. Available from: https://doi.org/10.22225/amj.1.1.2021.55-62
39. Nurjanah S, Priyatno AD, Rosalina S. 2023. Analisis Sanitasi Lingkungan terhadap Kejadian Diare pada Balita di Kelurahan Sekar Jaya Kabupaten OKU. Jurnal Kesehatan Saelmakers PERDANA [Internet]. Mar 6;6(1):89–98. Available from: https://journal.ukmc.ac.id/index.php/joh/article/view/810
40. Isyafa FR, Mahtuti EY, Faisal F. 2020. Pemeriksaan Soil Transmitted Helmints (STH) Pada Feses Petugas Pengangkut Sampah Di Desa Tawangsari Kabupaten Malang. Journal of Educational Innovation and Public Health [Internet]. 1(4):152–64. Available from: https://prin.or.id/index.php/Innovation/article/view/1867
41. Astuti RDI, Ismawati I, Rathomi HS. 2020. Soil-Transmitted Helminths Contamination on the Yard's Soil of the Public Elementary Schools in Bandung City. Global Medical & Health Communication (GMHC) [Internet]. Dec 30;8(3):193–8. Available from: https://ejournal.unisba.ac.id/index.php/gmhc/article/view/6596
42. Janah TK, Putri NE. 2023. Identifikasi Telur Cacing Ascaris lumbricoides dan Trichuris trichiura pada Kuku Petugas Pengangkut Sampah di TPA Piyungan Bantul Yogyakarta. Jurnal Pendidikan Tambusai [Internet]. Nov 24;7(3):26610–8. Available from: https://jptam.org/index.php/jptam/article/view/10902
43. Ngwese MM, Manouana GP, Moure PAN, Ramharter M, Esen M, Adégnika AA. 2020. Diagnostic Techniques of Soil-Transmitted Helminths: Impact on Control Measures. Tropical Medicine and Infectious Disease [Internet]. Jun 5;5(2):93. Available from: https://doi.org/10.3390/tropicalmed5020093
44. Vinti G, Bauza V, Clasen T, Medlicott K, Tudor T, Zurbrügg C, et al. 2021. Municipal Solid Waste Management and Adverse Health Outcomes: a Systematic Review. Int J Environ Res Public Health [Internet].;1(4):4331. Available from: https://doi.org/10.3390/ijerph18084331
45. Pangestu D, Marita Y, Candra E. 2023. HUBUNGAN KEBIASAAN MENCUCI TANGAN, SUMBER AIR BERSIH, DAN KONDISI TEMPAT SAMPAH DENGANKEJADIAN DEMAM TIFOID. Indonesian Journal of Health and Medical [Internet]. Oct 20;3(4):80–8. Available from: https://ijohm.rcipublisher.org/index.php/ijohm/article/view/237
46. Syamsul M. 2019. Environmental Factors Increase Incidence of Dengue Fever in South Sulawesi. Jurnal Ilmiah Kesehatan (JIKA) [Internet]. Aug 31;1(1):1–7. Available from: https://doi.org/10.36590/jika
47. Utari E, Mukrimah M, Zahranie LR, Hidayanti S, Valentini V. 2022. Analisis Diare dan Demam Berdarah Dengue Ditinjau dari Ketersediaan Tempat Pembuangan Sampah di Komplek Depag, Cipocok Jaya, Kota Serang. Jurnal Ilmiah IKIP Mataram [Internet]. Sep;9(2):69–76. Available from: https://e-journal.undikma.ac.id/index.php/jiim/article/view/5213
48. LestarI DD, Azizah R, Fatah MZ. 2024. Pengelolaan Sampah dan Kejadian Demam Berdarah Dengue. Jurnal Penelitian Kesehatan Suara Forikes [Internet]. Jan;15:35–8. Available from: https://www.forikes-ejournal.com/index.php/SF/article/view/sf15nk108/15nk108
49. Wijayanti Y, Widyastari H. 2018. Dasa Wisma Bebas Penyakit Berbasis Lingkungan Melalui Home Environmental Health and Safety. HIGEIA (Journal of Public Health Research and Development)

[Internet]. Apr 30;2(2):171–80. Available from: https://journal.unnes.ac.id/sju/higeia/article/download/18321/10975

50. Said S, Sulaiman Z, Ramlan P, Adri K, Febrianti D, Mardhatillah M, et al. 2023. Pendampingan Masyarakat Desa Dalam Upaya Pencegahan Penyakit Berbasis Lingkungan. Madaniya [Internet]. Feb 12;4(1):270–8. Available from: https://www.madaniya.biz.id/journals/contents/article/view/385
51. SAPUTRA IPBA, ARJITA IPD, SYUHADA I, ADNYANA IGA. 2024. HUBUNGAN PENGELOLAAN SAMPAH DENGAN KEJADIAN DIARE DI DESA PANDANAN. Jurnal Ganec Swara [Internet]. Mar;18(1):77–84. Available from: http://journal.unmasmataram.ac.id/index.php/GARA/article/view/736