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Planned Behavior Theory Approach to Waste Management Behavior in South Denpasar District

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ABSTRACT

***Background**: In Bali, waste generation is estimated at 10,266.4 m³ per day. Although promotion and public education about waste management have been carried out for a long time, community behavior related to waste management is still lacking. **Objective**: This study aims to better understand the factors influencing waste management behavior. Thus, the promotion strategy given to the community can be ideal. **Methods**: A cross-sectional study was conducted in 5 sub-districts in South Denpasar District. The accessible population was all households in South Denpasar District, with a total of 36,722 households. After calculation according to the formula, the sample size was 100 and was added 10% to make 110 samples to minimize invalid data or unwilling households. As for the exclusion criteria for respondents, they were those who have lived <6 months in the sub-district of South Denpasar. The sampling technique used was Probability Proportional to Size, then analyzed using the logistic regression. The questionnaire was used to help the data collection processes. **Results**: People with good behavior in managing waste amounted to 55.45%. The multivariate analysis results showed a significant relationship between knowledge (AOR=2.52; 95%CI= 1.08-5.85), attitude (AOR=3.06; 95%CI= 1.13-8.28), and perceived behavior control (AOR=3.00; 95%CI= 1.22-7.38) with waste management behavior in the community. **Conclusion**: Efforts are needed to increase knowledge through training and education programs managed by the government and local non-governmental organizations. In addition to more frequent programs to increase community participation, accompanied by more adequate facilities and infrastructure such as carrier services and waste banks.*

***Keywords**: Behavior; Denpasar; Planned Behavior; Promotion Strategy Waste Management*

INTRODUCTION

According to a book titled "What a Waste: A Global Review of Solid Waste Management" by Hoornweg and Bhada-Tata (2012), it is estimated that by 2025 the amount of waste produced globally will reach 2.2 billion tons yearly. This number will certainly increase along with the increase in population number each year. In Indonesia, as stated by the Ministry of Environment and Forestry, the waste produced by the Indonesian population is around 65 million tons per year. Research by Jambeck, et al (2015) in the Indonesian Environmental Statistics book (Badan Pusat Statistik, 2017) estimated that every resident in Indonesia can produce 0.52 kg of waste per day.

In Bali, based on the Environmental Status Report of Bali Province (Pemerintah Provinsi Bali, 2015), the waste generated reached 10,266.40 m³ daily. Most of the waste was produced by Denpasar City, at 2,865.96 m³. Data from Sarbagita Landfill showed that 5,000 m³ of waste went to the landfill every day in 2019. The waste mainly consisted of plant and wood (62%), plastics (16%), paper (10%), cloth, food, rubber, leather, and other waste (Dinas Lingkungan Hidup Pemerintah Provinsi Bali, 2020).

Waste that is not managed properly can disturb environmental aesthetics, cause unpleasant odors, and increase the risk of vector-borne diseases. To ensure that the waste produced is managed properly, the Government of Indonesia regulates it using the Statute Number 18 of 2008 about Waste Management. Waste management processes include waste reduction activities and waste handling. If the community follows, these activities will reduce waste production and utilize it to have economic value or be reused for

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other activities. Thus, the waste at the landfill can be minimized, and waste processing can run optimally (Kementerian Hukum dan HAM, 2008).

However, based on Susenas results quoted in Environmental Statistics of Indonesia 2018 (Badan Pusat Statistik, 2018b), 66.8% of the community managed their waste by burning it, and only 1.2% of the community sorted the waste they produced or better known as 3R. According to the 2018 Indonesia Environmental Indifference Behavior Index, which also cited the Susenas data, 53% of households in Indonesia used non-environmentally friendly methods when managing waste and only 1.1% of households managed their waste further by recycling, composting, or depositing into the waste bank (Badan Pusat Statistik, 2018a).

The theory of planned behavior is widely used to explain the psychological factors that influence various consumer behaviors and health behaviors, such as the determinants of buying behavior for organic food (Wijaya, 2017), environmentally friendly attitudes and behavior of consumers (Kusumo *et al.*, 2017), and consumer behavior of organic rice (Dewi and Yusalina, 2011).

Abroad, the theory is widely used to describe behaviors related to waste management which includes sorting, recycling, reusing, and further processing of household waste, including hazardous waste (Mahmud and Osman, 2010; Cabaniss, 2014; Strydom, 2018; Santoso and Farizal, 2019; Islam, 2021). However, this behavioral theory is rarely used to analyze waste management behavior, especially in Denpasar City.

The author had discovered a previous study titled "Community Behavior in Waste Management and Influencing Factors in East Denpasar District, Denpasar City, Bali Province" (Sukerti, 2017). In this study, the factors included internal factors such as knowledge, education, and household income, as well as external factors such as socialization, law enforcement, and facilities available to manage waste. For this reason, research using a different approach is necessary, namely the theory of planned behavior, to better understand the factors that influence behavior. Thus, the approach to promoting healthy behavior in the community can be ideal.

METHODS

A quantitative descriptive study with a cross-sectional design was conducted. The accessible population was all households in South Denpasar District, Denpasar City, with 36,722 households. After calculation according to the formula, the sample size was 100 and was added 10% to make 110 samples to minimize invalid data or unwilling households.

The sampling technique used in this study was Probability Proportional to Size (PPS). PPS is a technique for selecting samples from small unit groups called clusters. This technique can be used if complete data on the population are not available, costs of research are limited, and the population is geographical. The technique was begun by determining clusters in the form of villages/sub-districts in the South Denpasar District. The selected clusters were Sesetan Sub-District, Panjer Sub-District, Sanur Sub-District, Serangan Sub-District, and Sidakarya Village. The total samples were divided equally into each cluster, making it 22 samples per cluster. Then, each sample was selected using the Simple Cluster Sampling technique.

The study occurred from April to June of 2021. The data collection process was carried out by interviewing each head of the household with questionnaires as a tool. The inclusion criteria for the samples were people aged 18-65 years and domiciled in South Denpasar District. The exclusion criteria were those who lived less than six months in South Denpasar District.

The data collected were then analyzed bivariate using a simple logistic regression method and analyzed multivariate using binary logistic regression method in a data processing application.

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RESULTS AND DISCUSSION

Table and Image

Table 1. Respondent's Demographic

Demographic Characteristics	Frequency	Percentage (%)
Sex		
Male	55	50.0
Female	55	50.0
Umur		
18-24 Years Old	21	19.1
25-54 Years Old	73	66.4
55+ Years Old	16	14.5
Occupation		
Private Sector Employee	20	18.2
Government Employee	6	5.5
Entrepreneur	34	30.9
Student/College Student	18	16.4
Retiree	4	3.6
Household Wife	22	20.0
Others	6	5.5
Education Level		
No School	0	0.0
Elementary	11	10.0
Junior High	7	6.4
Senior High/of the same level	68	61.8
College	24	21.8
Monthly Income		
<Rp 1,500,000.00	41	37.3
Rp 1,500,000.00-Rp 2,500,000.00	37	33.6
Rp 2,500,000.00-Rp 3,500,000.00	13	11.8
>Rp 3,500,000.00	19	17.3
n Total	**110**	**100**

Table 2. Behavior, Knowledge, Attitude, Subjective Norm, and Perceived Behavior Control of Waste Management

Variable	Frequency	Percentage (%)
Behavior		
Good	61	55.45
Poor	49	44.55
Knowledge		
Good	45	40.9
Poor	65	59.1
Attitude		
Positive	29	26.4
Less Positive	81	73.6
Subjective Norm		
Supportive	40	36.4
Less Supportive	70	63.6
Perceived Behavior Control		
Supportive	37	33.6
Less Supportive	73	66.4
n Total	**110**	**100**

Table 3. Relationships between Demographic Factors and Knowledge with Behavior

Variable	Behavior				OR	95 CI	P-value
	Good		Poor				
Education Level	n	%	n	%			
High	55	90.2	37	75.5	2.97	1.02-8.62	0.045
Low	6	9.8	12	24.5	Ref		
Monthly Income							
<Rp 1,500,000.00	20	48.8	21	51.2			
Rp 1,500,000.00-Rp 2,500,000.00	20	54.1	17	45.9	1.23 Ref	0.50-3.00	0.642
Rp 2,500,000.00-Rp 3,500,000.00	8	61.5	5	38.5	1.68 Ref	0.46-6.00	0,425
>Rp 3,500,000.00	13	68.4	6	31.6	2.27 Ref	0.72-7.1	0.159

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Knowledge							
Good	31	50.8	14	28.6	2.58	1.16-5.73	0.020
Poor	30	49,2	35	71,4	Ref		

Table 4. Relationships between the Theory of Planned Behavior and Waste Management Behavior

Variable Category	Behavior				**OR**	**95 CI**	**P-value**
	Good		**Poor**				
Attitude	**n**	**%**	**n**	**%**			
Positive	22	36.1	7	14.3	3.38	1.30-8.80	0.012
Less Positive	39	63.9	42	85.7	Ref		
Subjective Norms							
Supportive	27	44.3	13	26.5	2.19	0.97-4.94	0.057
Less Supportive	34	55.7	36	73.5	Ref		
Perceived Behavior Control							
Supportive	27	44.3	10	20.4	3.09	1.31-7.31	0.010
Less Supportive	34	55.7	39	79.6	Ref		

Table 5. Multivariate Analysis Results

Variable	**First Model**			**Last Model**		
	AOR	**95 % CI**	**p-value**	**AOR**	**95 % CI**	**p-value**
Education Level	2.64	0.81-8.59	0.107			
Knowledge	2.50	1.02-6.12	0.045	2.52	1.08-5.85	0.032
Attitude	2.91	1.03-8.20	0.043	3.06	1.13-8.28	0.028
Subjective Norms	2.08	0.82-5.23	0.120			
Perceived Behavior Control	2.93	1.14-7.55	0.025	3.00	1.22-7.38	0.016

Table 1 shows that the proportion of male and female respondents was the same (50%), and the majority was in the age group of 25-54 years (66.4%). Most respondents worked as entrepreneurs (30.9%) and 3.6% as retirees. The majority of respondents had completed high school education/equivalent (61.8%) and had an income of <Rp1,500,000.00 (37.3%) per month.

In general, waste management behavior in the South Denpasar District community was good (55.45%). 17.3% of respondents always sorted the waste they produced at home, 23.6% sometimes, and 59.1% never. Waste sorted by the community was then distributed to scavengers or waste banks with a percentage of always 17.3%, sometimes 22.7%, and never 60%. This finding was similar to Manado city, where 25% of people separated wet and dry waste, and 45% of the people never sorted their waste (Pianaung, 2007). 13.6% of respondents had also provided special containers for B3 waste such as used batteries, bulbs, or expired drugs, 45.5% of respondents occasionally, and 40.9% mixed hazardous waste with other waste. In line with the research of Muhyiddin et al., (2016) in the community of Mangasa Village, Tamalate District, Makassar City, which disposed of hazardous waste separately from other waste (13.3%), and the rest of the community (86.6%) still mixed hazardous waste with other waste. The trash cans used by respondents were always closed (30%), sometimes closed (20%), and 50% of those used open trash cans. The use of open trash cans can make it easier for vectors such as flies, mice, and cockroaches to breed and cause unpleasant odors (Kumala and Patangan, 2017). As many as 13.6% of respondents always did compost for food waste and leaves, 27.3% sometimes, and 59.1% never. In addition, respondents also reused the waste they produced, such as cans/iron (32.3%), bottles/glass (50.1%), and plastic/cracks (48.2%). The rest, 36.4%, never reused the waste they produce. Littering behavior was still found. As many as 10% of respondents always disposed of their waste in a place

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that was not transported to landfills, and 36.4% sometimes did so. 1.8% of respondents also still burned the waste they produced, and 9.1% sometimes. The rest claimed to have never burned the waste they produced. The waste usually burned was in the form of leaves that fall on the lawn, paper, and plastic. Susenas data stated that 66.8% of Indonesians still managed their waste by burning (Badan Pusat Statistik, 2018b), meaning that the percentage of people who burned waste in the South Denpasar District was much lower.

Based on the analysis results, knowledge had a significant relationship with waste management behavior (p=0.032). However, there was no significant relationship between the demographic factors of the respondents, namely the level of education and monthly income with waste management behavior in the community in South Denpasar District.

People with good knowledge had a significant relationship with waste management behavior (p=0.032). However, there was no significant relationship between the demographic factors of the respondents, namely the level of education and monthly income with waste management behavior in the community of South Denpasar District.

People with good knowledge had a 2.52 times greater chance of behaving well than people with poor knowledge (AOR=2.52; 95%CI= 1.08-5.85). Knowledge is the output of people who are sensing a particular object. Most of the human knowledge is obtained through the senses of sight and hearing. Health-related knowledge is essential for forming one's healthy behavior because behavior based on knowledge will be more durable in practice than one not based on knowledge (Notoatmodjo, 2014).

The research results showed that the proportion was not so different between respondents who had good knowledge and poor knowledge, who behaved well in managing waste. This was likely because respondents were accustomed to good behavior in managing waste regardless of the respondent's knowledge of the behavior. According to the WHO expert team (1984) cited by MRL et al., (2019), behavior knowledge can be obtained from one's own experience and the experience of others, such as the closest family and neighbors. The analysis results also showed that 59.1% of the community's knowledge regarding waste management was still poor. For this reason, more efforts are needed to increase knowledge through training by local non-governmental organizations and the government (Salawati, Astuti and Hayati, 2008). For example, the government of Surabaya City did educational programs in schools named Eco-School program(Salawati, Astuti and Hayati, 2008). For example, the government of Surabaya City did educational programs in schools named Eco-School program (Puspasari and Mussadun, 2016)).

In general, the level of education will affect a person's behavior. The higher a person's level of education, the better the resulting behavior (Mubarak, 2012). However, this research found no significant relationship between education level and waste management behavior (p=0.107).

The level of education is a stage of education that has a continuous nature. Determination of the level takes into account the development of students, the level of complexity of the material, and the technique of delivering the material (Ihsan, 2010). High education does not guarantee good behavior in managing waste, as seen from the number of respondents who had poor behavior but had high education, namely 75.5%.

Education will indirectly affect a person's knowledge. With higher education, it is hoped that knowledge about waste management will be better, resulting in good behavior as well (Sari and Mulasari, 2017). However, in this research, there was no relationship between education level and waste management behavior, perhaps because knowledge related to waste management was not provided through formal education but through informal education such as socialization or counseling or training about waste management (Devi, 2016).

Income was the amount of rupiah obtained monthly by the respondent, which came from both basic salary and side income. The income grouping referred to the level by Badan Pusat Statistik, namely >Rp3,500,000.00 in the very high category, Rp2,500,000.00-Rp3,500,000.00 in the high category,

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Rp1,500,000.00-Rp2,500,000,00 for the medium category, and <Rp1,500,000.00 for the low category.

This research showed no significant relationship between income level and waste management behavior, as evidenced by the p-value of 0.137. According to Putra et al., (2013), the amount of a person's income could have a major influence on waste management. People with high incomes had a better ability to provide good facilities to manage waste. For example, to provide closed and easy-to-clean trash cans, pay for a garbage collection service, or to pay someone else to handle the waste they produce. In this research, there was no significant difference between respondents with high income and well-behaved and respondents with low income and well-behaved.

Based on the analysis results, there was a significant relationship between attitudes (p = 0.028) and perceived behavior control (p = 0.016) with waste management behavior in the people of South Denpasar District. However, there was no relationship between subjective norms and behavior (p=0.120).

People with a positive attitude had a 3.06 times greater chance of behaving well than people with a less positive attitude (AOR = 3.06; 95% CI = 1.13-8.28). This finding was in line with research conducted by Pianaung (2007, Kama, (2009), Srisantyorini and Ningtyas (2018), and Rizkiyati (2019).

According to Newcomb in (Notoatmodjo, 2014), attitude is a tendency to accept or reject an activity, such as waste management behavior, based on a person's experience, knowledge, and norms. So, attitude is not the executor of a particular motive. Notoatmodjo and Azwar's quote in Syam (2016) also stated that a person's attitude towards an object is a feeling of support or partiality or a feeling of not supporting the object. According to Thurstone, attitude is the degree of positive or negative effects associated with a psychological object.

The analysis results also showed that there were still respondents who already had a positive attitude but behaved poorly, which was 14.3%. Sudiharti (2012) stated that attitudes would have an impact on the behavior of each individual. Even though the attitude was positive toward waste management, respondents might still behave poorly because they did not want to be bothered with waste problems, so the waste they produced was simply thrown away without treatment.

People with supportive perceived behavior control hada 3.00 times greater chance to behave well than those with less perceived behavior control (AOR=3.00; 95%CI= 1.22-7.38). This finding was in line with research by Gusti et al. (2015), which stated that perceived behavior control was significantly related to the intention to carry out sustainable waste management behavior. Research by Astuti and Linarti (2020) also found a relationship between perceived behavior control and residents' intentions to become customers of a waste bank

Ajzen (2006) explained that certain behaviors would be automatically carried out when there were external signs, in the case of waste management, external signs in the form of waste transport services, the availability of scavengers or waste banks, as well as adequate socialization or education. In line with the research of Widiyanto *et al*. (2020), which stated that the availability of facilities and infrastructure was a supporting factor that influenced a person's behavior. The better the existing waste management facilities and infrastructure, the better the community's management behavior. Other research stated that the limited facilities and infrastructure that could support good management activities such as temporary landfills and transport services resulted in poor solid waste management (Hutabarat, 2015).

In addition to increasing public access to good facilities and infrastructure to manage waste, the number of waste banks also needs to be increased. In principle, the waste bank is an activity from the community, by the community, and for the community to be more active in sorting waste. Implementing a waste bank can provide benefits in the form of money in exchange for deposited waste. As the name implies, the waste bank has a concept where the community as customers saves waste and gets money according to the amount of waste they collect based on the type. With the existence of a waste bank that is routinely implemented, the community becomes more trained in maintaining

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environmental cleanliness, independence, efficiency, environmental protection, and integration ((Riswan, Sunoko and Hadiyarto, 2011; Selomo *et al.*, 2016).

Research by Suwerda et al. (2019) also stated that there was a relationship between the role of the government and non-governmental organizations and community participation in waste banks. The government and local non-governmental organizations (NGOs) have a role in providing education so public awareness of the importance of managing waste can increase. Research conducted by Puspasari and Mussadun (2016) in Trenggalek District stated that NGOs played a very important role in waste management. Although no NGO participated in waste management, the community believed that with the role of NGOs, the implementation of waste management will improve. In addition, the government can be more active in carrying out programs that can increase community participation in managing the waste they produce, such as holding a waste recycling competition, providing facilities and infrastructure (trash cans, garbage carts, composters, etc.), establishing a waste bank, giving awards for households who are the best in managing waste, and so on (Mulasari, Husodo and Muhadjir, 2014).

The analysis results also showed no significant relationship between subjective norms and waste management behavior (p = 0.120). Subjective norms are social pressures individuals feel to perform or not to perform certain behaviors (Fishben and Ajzen, 1992). Subjective norm is an individual's perception of whether other people will support or not the realization of the action. Other people include families, friends, colleagues, or others who are seen as role models (Caecilia, 2012).

The results showed that 63.6% of respondents had subjective norms that were less supportive. This finding was similar to Ittiravivongs (2011) and Botetzagias et al. (2015)), which stated that there was no significant relationship between subjective norms and waste recycling behavior. Also, Humaira and Falatehan (2021) stated that there was no significant relationship between subjective norms and intentions to sort waste in the COVID-19 pandemic situation. Previous research stated that the subjective norm component had a weak role in the theory of planned behavior because this component depended on the economic and socio-cultural conditions prevailing in the area (Conner and Armitage, 2006; Guomin *et al.*, 2019).

In table 5, it can be concluded that the variables of knowledge, attitude, and control on behavior had a significant relationship with waste management behavior. People with good knowledge had a 2.52 times higher chance of behaving well in managing waste than people with poor knowledge (AOR=2.52; 95%CI= 1.08-5.85). People with a positive attitude also had a 3.06 times higher chance of behaving well in managing waste than people with a negative attitude (AOR=3.06; 95%CI=1.13-8.28). Communities with control over supportive behavior also had a 3.00 times higher chance to behave well in managing waste compared to people with control over unsupportive behavior (AOR=3.00; 95%CI= 1.22-7.38).

CONCLUSION

In general, the waste management behavior of the community of South Denpasar District was good (55,45%). People with good knowledge had a 2.52 times higher chance of behaving well in managing their waste than those with poor knowledge. People with a positive attitude had a 3.06 times higher chance of behaving well in managing waste than those with less positive attitudes. People with a supportive perceived behavioral control had a 3.00 times higher chance to behave well in managing waste than people with a less supportive perceived behavioral control.

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