

Knowledge, Attitude and Practice Towards Domestic Solid Waste Management in Rural District, Bac Lieu Province, Vietnam

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Abstract

The characteristics of waste composition and community behavior are important data for making an appropriate domestic solid waste management plan. However, these data are lacking or not studied in Bac Lieu, especially in rural areas. Therefore, the study was conducted to determine the domestic waste composition and evaluate the factors related to the knowledge, attitude and practice (KAP) level of the community in domestic solid waste management in Phuoc Long district, Bac Lieu province, Vietnam. The results of domestic solid waste samples collected at households showed that the waste was composed of organic (73.8%), recyclables (15.7%), hazardous waste (0.7%), and others (9.9%). Plastic bags (42.7%) and papers (30.5%) were predominant in the recyclables. The interview of 150 households indicated that the majority of respondents had an average level of knowledge (46%), and attitude (49.3%). However, 46% of respondents had an inadequate level of practice. In addition, the study observed that respondents have a good level of knowledge and attitude that leads to good practice. The Chi-square test showed that the KAP level of the respondents is influenced by demographic factors including age, education, occupation and income ($p < 0.05$). In which, education level and age were the significant influencing factors. The results indicated that education for improving the community's knowledge and attitudes in domestic solid management should pay more attention on the population aged over 60 years and those with occupations belonging to agriculture and housework.

Keywords

Attitude, Household, Knowledge, Phuoc Long, Practice, Solid Waste

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1. INTRODUCTION

Economic and population growth have led to the generation of a large amount of domestic solid waste (Darban Astane and Hajilo, 2017; Han et al., 2018; Liu et al., 2022). Inappropriate treatment of solid waste is a threat to the environment and human health (Ministry of Natural Resources and Environment, 2019). Vietnam is still facing the problem of overcrowding related to domestic solid waste (Thang et al., 2019). The lack of investment budget leads to a low level of waste management system and lack of synchronization, especially in treatment methods and recycling technology (Tong et al., 2021). Furthermore, landfill method is being applied mainly for waste treatment, which is not a complete solution to solid waste treatment in Vietnam (The World Bank, 2018). Therefore, the provision and selection of a suitable waste management model is considered an urgent task. Minimizing waste generation is the most effective and cost-effective method (Malav et al., 2020). One of the appropriate approaches to reduce waste generation is to separate

and recycle waste at source (Laor et al., 2018). Vietnam has learned from the experiences of developed countries and has begun to apply recycling and household waste separation policies in some cities. Despite the benefits of this program, the implementation has faced many difficulties due to lack of community participation (Ministry of Natural Resources and Environment, 2019). Studies have shown that citizen participation strongly influences the success of household segregation and mitigation (Almasi et al., 2019). Therefore, it is necessary to examine and conduct a theory-based survey to identify the problems, barriers and needs of the community in the management of domestic solid waste management. Assessment of factors affecting behavior was carried out including knowledge, attitude and practice (KAP) (Pasukphun et al., 2019). Knowledge is a community's familiarity or understanding of something, acquired through experience or education by perceiving and learning. Attitude is a steady way of thinking or feeling about an issue and refers to the thoughts of the community that may lead to it. Practice refers to ways of demonstrating their knowl-

edge and attitudes through action. Many studies assessing people's level of knowledge, attitudes and practices toward solid waste management have been previously performed (Yukalang et al., 2018; Su, 2019; Nhung, 2021). Yukalang et al. (2018) pointed out that providing knowledge on waste sorting and recycling through educational methods is an important issue. However, despite having good knowledge about domestic solid waste management, most residents do not practice it properly (Seng et al., 2018). Furthermore, the relationship between demographic characteristics and KAP in domestic solid waste management is well known. Education level and income have an influence on the level of community KAP in MSW management (Laor et al., 2018; Han et al., 2018).

Phuoc Long district is a real rural coastal area of Bac Lieu province, with a natural area of 417.84 km². The economic growth combined with the improved quality of life leads to a significant increase in domestic solid waste in the district. According to Urban Service Center (2020), the amount of solid waste is partly collected and most of the rest is treated by households by open burning or discharging into the environment. In addition, collection work is concentrated in densely populated areas and major roads while it is not paid attention in rural areas due to limited infrastructure and collection equipment (Bac Lieu Department of Natural Resources and Environment, 2021). To improve the management of domestic solid waste, not only providing infrastructure for local government, waste generation reduction plan is very important (Laor et al., 2018; Ao et al., 2022). As a first step in implementing a correct mitigation plan, it is necessary to investigate and determine the extent of community KAP in domestic solid waste management (Almasi et al., 2019). However, most of the studies about knowledge, attitudes and practices assessment in waste management were focused on cities (Phuong, 2019; Nhung, 2021); available information on this matter is limited in the district. This study was conducted to determine the waste composition and assess KAP level of the community, providing a scientific base for future improving domestic solid waste management in Phuoc Long district, Bac Lieu province.

2. MATERIALS AND METHODS

2.1 Study Site Description

Phuoc Long district is a rural district located in the north-west of Bac Lieu province, with geographical coordinates of 9°24'N and 105°24'E. The district has an area of 417.84 km² with eight commune-level administrative units (seven communes, one town) and 78 hamlets. According to the statistical results in 2020, the total population is 124,405 people, with 30,196 households and three main ethnic groups including Kinh (96.1%), Hoa (0.2%) and Khmer (3.32%). Other ethnic groups accounted for 0.38%. In the past years, the implementation of the socio-economic development plan, especially the goal of building a new rural, has gradually promoted economic restructuring and replicated highly effective

production models contributing to the economic development of the region. Along with economic growth, increasing generation of domestic solid waste is causing many environmental problems in the district. The study was conducted in Phuoc Long district including Phuoc Long town, Vinh Phu Tay commune and Phong Thanh Tay A commune (Figure 1). The selected research areas representing communes and towns with common characteristics, therefore, the results can be generalized to households in communes and towns that were not sampled.

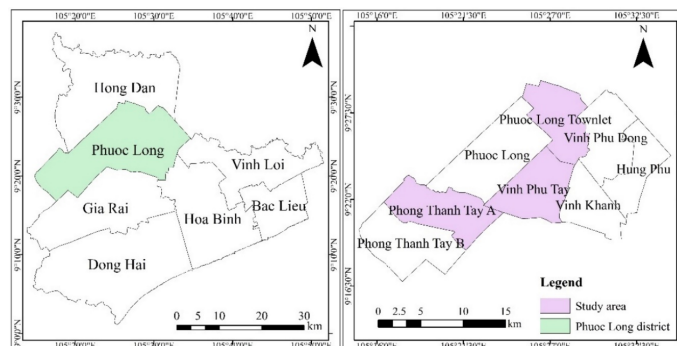


Figure 1. Map of Study Areas

2.2 Data Analysis

The data is collected for the purposes of determination of household solid waste composition and assessment of community KAP level in domestic solid waste management. To determine the composition of domestic solid waste, the study collected waste samples from 30 households in Phuoc Long district including Phuoc Long town (Phuoc Hoa Tien, Phuoc Thuan 1, Long Thanh hamlets), commune Vinh Phu Tay (Binh Tot, Phuoc 2, Binh Ho hamlets) and Phong Thanh Tay A commune (hamlets 1A, 1B). In each commune, 10 households were randomly selected. Waste samples are collected at a fixed time once a day, within a week. After that, the waste sample was manually classified into components according to the guidance of Decree 09/VBHN-BTNMT including biodegradables, recyclables, others and hazardous (Table 1).

Table 1. Composition of Solid Waste

Groups of waste	Detail
Biodegradables	Leftovers, leaves, vegetables, fruits, animal carcasses
Recyclables	Paper, plastic, metal, rubber, nylon, glass
Other	The remaining wastes
Hazardous waste	Batteries, light bulbs, expired drugs, chemicals

To assess the KAP level of the community, the study con-

ducted a survey from March to August 2021 in Phuoc Long district. The sample size was determined using the Yamane formula: $n = N / (1 + N(e)^2)$ (Yamane, 1967; Chaokromthong et al., 2021). In which, n: number of samples to be interviewed; e: error tolerance; N: sample population (household). The sample is calculated with a size of 395, but considering the limitations of the complicated situation of the Covid-19 epidemic, the sample size is reduced to 150 and increased by 10% to 165 to explain the error response and invalid records. The study conducted interviews at Phuoc Long town with 50 participants; Vinh Phu Tay commune with 58 participants; Phong Thanh Tay A commune with 42 participants. The study applies a simple random sampling technique, according to the criterion that all respondents have the same probability of being selected for the survey, individuals under 18 years of age are excluded from the study.

A structured questionnaire is designed to collect information related to demographic characteristics and KAP level of the community for MSW management, including four different parts according to data characteristics. The first part was information on demographic characteristics including gender, age, occupation, income, education level, main occupation and household size of the interviewees. The second part was information about the respondents' knowledge structured with a 'yes' or 'no' answer consisting of 15 questions. The third part was an attitude questionnaire, consisting of 10 questions structured on a Likert scale with a minimum score of 1 (disagree) and a maximum of 3 (agree). The fourth part consisted of 15 practice-level questions structured on a Likert scale with a maximum score of 4 (always) and a minimum of 1 (never). The validity of the questionnaire was piloted in 20 households in Phuoc Long district. The reliability of knowledge questions was tested by experts and was derived from similar studies (Pasukphum et al., 2019). The reliability of the attitude and practice scales was tested using Cronbach's tool, which checks whether the observed questions are reliable. Cronbach's coefficient has a variable value [0;1], in which, the scale is good [0.75-0.95] and the scale is acceptable in terms of reliability [>0.6] (Tho, 2013; Ao et al., 2022). The test results are 0.725 and 0.723, respectively, confirming that the measuring tool used has sufficient reliability. Demographic characteristics and KAP levels were analyzed using descriptive statistics. To identify factors related to KAP, the Chi-square test was used to assess the association between demographic variables and KAP level. The relationship between the level of knowledge, attitude and practice was analyzed by Pearson correlation (r). Pearson correlation (r) has a value ranging from [-1;1], in which if r is closer to 1 or -1, correlation is stronger and if r is closer to 0 the correlation is weak, the correlation value is significant when $p\text{-value} < 0.05$ (Tho, 2013). Statistics were performed using IBM SPSS statistics for Windows software, version 19.0 (IBM Corp., Armonk, NY, USA).

3. RESULTS AND DISCUSSION

3.1 Composition of Domestic Solid Waste in Phuoc Long District

The identification of waste components would be very important for solid waste management plan. In this study, the results of the classification of solid waste were presented in Figure 2a. The main component of the waste was organic waste, accounting for 73.8% of the total weight. This is due to fallen leaves or garden waste and kitchen by-products. Usually, these types of organic waste are burned open or disposed of spontaneously in landfills. On the other hand, recyclable waste found in domestic solid waste accounted for 15.7%, followed by hazardous waste and the remaining group were 0.7%, and 9.9%, respectively. As seen in Figure 2b, the majority of recycled waste is plastic bags (42.7%) and paper (30.5%). Plastic bags appear mainly because of convenience and are provided free of charge from the stores. The results of waste composition are confirmed by previous findings, with organic waste and plastic bags predominating in Vietnam (Verma et al., 2016; Em, 2017). This allows households to choose composting as a suitable method for waste recycling, significantly reducing the generated volume and cost of solid waste collection and treatment (Almasi et al., 2019). However, this method has not been widely implemented due to a lack of training in household composting. In addition, the observed results also showed that most of the waste was not collected because the roads are narrow and inaccessible, leading to the decomposition of organic waste and polluting the environment. Therefore, in order to improve solid waste management in Phuoc Long district, it is important to develop waste reduction and reuse policies, especially in areas that do not have access to waste collection services.

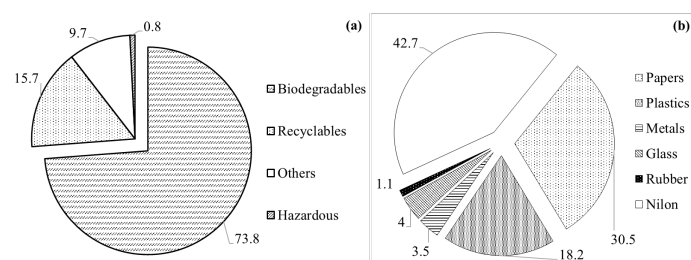


Figure 2. (a) Waste Composition (b) Composition of Reuse and Recycling Group

3.2 Demographic Characteristics

Demographic characteristics of interviewees including gender, age, occupation, education level, income, family members and main employees are shown in Table 2. The results showed that female sex accounted for 52% (78 hh) with was higher than that of male (48%) (72 hh) of the total respondents. Most of the interviewees were aged 31-45, accounting for 44.7% and the main occupation was a housewife (35.3%).

The majority of respondents had a high school education (26%) and had a main income of over 9 million VND/month (35.3%). Young people were generally more likely to have better education (Seng et al., 2018). Besides, most of the respondents had a family of 4-6 members (55.3%) and the main employees were mainly under two members (80.7%).

Table 2. Demographic Characteristics of Interviewees

Characteristics		Frequency (n)	Proportion (%)
Gender	Male	72	48
	Female	78	52
Age	18-30	20	13.3
	31-45	67	44.7
	46-60	41	27.3
	>60	22	14.7
Occupation	Government	30	20
	Agriculture	38	25.3
	Business	22	14.7
	Household	53	35.3
	Free work	7	4.7
Education	No school	13	8.7
	Primary school	35	23.3
	Secondary school	39	26
	High school	27	18
	Further study	36	24
Income (VND/month)	<3 million	5	3.3
	3-6 million	22	14.7
	6-9 million	53	35.3
	>9 million	70	46.7
Family member	<3	47	31.3
	4-6	83	55.3
	>6	20	13.3
Main labor	<2	121	80.7
	3-4	29	19.3

3.3 KAP Level of the Household in Domestic Solid Waste management

Respondent's knowledge of solid waste management was assessed by scores in the interview panel. The level of knowledge was assessed on a scale of 3 to 7, 8 to 11 and 12 to 15, respectively, with low, medium and high knowledge. Interviewees had a maximum knowledge score of 15 points and a minimum of 2 points. Most of the interviewees had knowledge about waste reduction and reuse. The survey results showed that the respondents with high knowledge accounted for 27.3%, the average knowledge accounted for 46% while 26.7% of the respondents had low knowledge (Table 3). This result showed that the respondents' knowledge

level was relatively consistent, which is similar to previous research (Pasukphun et al., 2019).

The attitude level of the interviewee was assessed according to the score in the questionnaire with a scale of 26 to 30, 20 to 25 and less than 18 points corresponding to positive, moderate and negative attitudes. The analysis results showed that the respondents with a positive attitude accounted for 38%, the average attitude accounted for 49.3% and a negative attitude accounted for 12.7% of the total (Table 3). Among the respondents, the maximum score was 30 and the lowest was 15 points. Respondents were aware of their role in waste management and agreed to implement a waste reduction and segregation program.

Table 3. KAP Levels of Interviewees

KAP level	Proportion (%)	Frequency
Knowledge		
High	27.3	41
Average	46.0	69
Low	26.7	40
Attitude		
High	38.0	57
Average	49.3	74
Low	12.7	19
Practice		
High	6.0	9
Average	48.0	72
Low	46.0	69

Respondents' level of practice in domestic solid waste management was tested by 15 questions. Responses in the study were ranked on a scale of 46 to 60, 32 to 45, and less than 32 points for good, average, and poor practice, respectively. The respondents had the highest practice score of 52 and the lowest score of 17. The information Table 4 showed that the good practice level of the respondents accounted for 6%, the average practice accounted for 48% and the poor practice accounted for 46% (Table 3). The level of poor practice in the study area was relatively high, which is supported by previous findings (Almasi et al., 2019).

3.4 The Relationship Between Demographic Characteristics and Level of Knowledge

The results of Chi-squared test showed that demographic variables including age, occupation, education level and household income affected the respondents' knowledge level ($p < 0.001$) (Table 4). In which, the characteristics of education level and occupation were important influencing factors, which is consistent with similar research results (Babaei et al., 2015). Regarding the characteristics of education level, respondents had low knowledge mainly without a degree (69.2%) and high knowledge mainly in respondents who have graduated from high school or higher (63.9%). A

high level of education significantly improves understanding in solid waste management (Seng et al., 2018; Han et al., 2018). Considering age characteristics, respondents over 60 years old (45.5%) had a higher percentage of low knowledge than other age groups. For occupation, the majority of respondents with low knowledge belonged to the agricultural sector, accounting for 40.5% and housewives 31.5%. In addition, the low knowledge was mainly found in the households with an income of less than 3 million VND/month and high knowledge with an income of over 9 million VND/month. This is similar to the study Han et al. (2018) and Xuan et al. (2021), which suggests that when people's income increases, they tend to pay more attention to the environment and begin reducing household waste.

Table 4. Relationship Between Demographic Characteristics and Knowledge Level

Demographic characteristics	High	Average	Low	p-value
Age				
18-30	13 (65)	7 (35)	0	0.001
31-45	17 (25.4)	34 (50.7)	16 (23.9)	
46-60	9 (22)	18 (43.9)	14 (34.1)	
>60	2 (9.1)	10 (45.5)	10 (45.5)	
Occupation				
Government	23 (76.7)	5 (16.7)	2 (6.7)	0.000
Agriculture	5 (13.5)	18 (47.4)	15 (39.5)	
Business	3 (13.6)	14 (63.7)	5 (22.7)	
Household	8 (15.1)	28 (52.8)	17 (32.1)	
Free work	2 (28.6)	4 (57.1)	1 (14.3)	
Education				
No school	0	4 (30.8)	9 (69.2)	0.000
Primary school	0	15 (42.9)	20 (57.1)	
Secondary school	6 (15.4)	25 (64.1)	8 (20.5)	
High school	12 (44.4)	13 (48.1)	2 (7.4)	
Further study	23 (63.9)	12 (33.3)	1 (2.8)	
Income				
<3 million	0	1 (20)	4 (80)	0.001
3-6 million	1 (4.5)	11 (50)	10 (45.5)	
6-9 million	10 (18.9)	29 (54.7)	14 (26.4)	
>9 million	30 (42.9)	28 (40)	12 (17.1)	

The information in Table 5 showed that demographic variables including age ($p = 0.025$), occupation ($p = 0.004$) and education level ($p = 0.000$) affected the attitude of interviewees. In the study, the educational level factor had the most significant influence on the respondents' attitudes ($p = 0.000$). The least positive attitude feedback was found among respondents without a degree and the highest neutral attitude among respondents who had graduated from primary school (67.6%). The analysis results also showed that respondents in the agricultural sector and housewives had the highest negative attitude of 21.6% and 13.2%, respectively. In addition, respondents in the age group over

60 had a higher negative attitude than the rest of the age groups.

Table 5. Relationship Between Demographic Characteristics and Attitudes

Demographic characteristics	High	Average	Low	p-value
Age				
18-30	10 (10)	10 (50)	0	0.025
31-45	27 (40.3)	29 (43.3)	11 (16.4)	
46-60	17 (41.5)	22 (53.7)	2 (4.9)	
>60	3 (13.6)	13 (59.1)	6 (27.3)	
Occupation				
Government	22 (73.3)	7 (23.3)	1 (3.3)	0.004
Agriculture	9 (24.3)	20 (54.1)	8 (21.6)	
Business	7 (31.8)	13 (59.1)	2 (9.1)	
Household	16 (30.2)	30 (56.6)	7 (13.2)	
Free work	3 (37.5)	4 (50)	1 (12.5)	
Education				
No school	1 (7.7)	5 (28.5)	7 (53.8)	0.000
Primary school	6 (17.6)	23 (67.6)	5 (14.7)	
Secondary school	13 (31.7)	25 (61)	3 (7.3)	
High school	11 (42.3)	11 (42.3)	4 (15.4)	
Further study	26 (72.2)	10 (27.8)	0	

Considering the level of practice, the statistics in Table 6 showed that the demographic variable including age, occupation and education level had a relationship with the level of practice of the respondents ($p < 0.05$). Besides, gender characteristics, income and family members were found to have no relationship with respondents' KAP level ($p > 0.05$). The age of the respondents in the study affected the level of practice, the practice feedback on domestic solid waste management was low, accounting for a high proportion in the age group over 60 (63.3%). The results also showed that the occupational characteristics had the worst performance feedback in the fields of agriculture and housework with values of 62.2% and 50.9%, respectively. The results of Chi-squared analysis found that the educational level factor was associated with the practice level of the interviewees (Han et al., 2018; Almasi et al., 2019). The majority of respondents had poor practice among respondents with primary education (70.6%) and no degree (69.2%).

3.5 Correlation Between the Level of KAP

Pearson correlation test (r) was used to find out the relationship between KAP in domestic solid waste management (Table 7). The analysis results found that there was a statistically significant correlation between knowledge level, attitude and practice of respondents with 99% confidence.

The information in Table 7 showed that the level of knowledge and practice of the interviewees had a positive correlation with $r = 0.566$, which means that the respondents possessing good knowledge also have a good level

Table 6. Relationship Between Demographic Characteristics and Attitudes

Demographic characteristics	High	Average	Low	p-value
Age				
18-30	3 (15)	14 (70)	3 (15)	0.006
31-45	3 (4.5)	37 (55.2)	27 (40.3)	
46-60	1 (2.4)	15 (36.6)	25 (61)	
>60	2 (9.1)	6 (27.3)	14 (63.6)	
Occupation				
Government	5 (16.7)	19 (63.3)	6 (20)	0.013
Agriculture	0	14 (37.8)	23 (62.2)	
Business	1 (4.5)	10 (45.5)	11 (50)	
Household	2 (3.8)	24 (45.3)	27 (50.9)	
Free work	1 (12.5)	5 (62.5)	2 (25)	
Education				
No school	0	4 (30.8)	9 (69.2)	0.002
Primary school	0	10 (29.4)	24 (70.6)	
Secondary school	2 (4.9)	19 (46.3)	20 (48.8)	
High school	4 (15.4)	16 (61.5)	6 (23.1)	
Further study	3 (8.3)	23 (63.9)	10 (27.8)	

Table 7. Correlation Between Levels of Knowledge, Attitude and Practice

KAP	p-value	Correlation (r)
Knowledge and attitude	0.000	0.501
Knowledge and practice	0.001	0.566
Attitude and practice	0.000	0.254

of knowledge and good practice (Laor et al., 2018). The correlation between attitude and practice was detected at 99% confidence level; this was similar to the report of Ao et al. (2022), which suggested that attitude has the greatest influence on practices. The analysis results with coefficient $r = 0.254$ showed the average correlation between the two variables. The positive correlation coefficient also indicated that when respondents had a positive attitude towards domestic solid waste management, the level of practice would increase. In addition, the correlation between the level of knowledge and attitude of the respondents was also found in the study ($p < 0.001$). The results showed that respondents with a good level of knowledge were likely to have a good attitude and a good level of practice toward domestic solid waste management.

4. CONCLUSIONS

The study discovered challenging issues in domestic solid waste management in Phuoc Long district. Waste com-

position analysis data were used for recommendations on mandatory public participation in waste reduction, reuse and segregation. The results of domestic solid waste samples collected at households showed that the waste was composed of organic (73.8%), recyclables (15.7%), hazardous waste (0.7%) and others (9.9%). Plastic bags (42.7%) and papers (30.5%) were predominant in the recyclables. The research results showed that the level of knowledge and attitude about domestic solid waste management of the respondents was mostly average, but the level of inappropriate practice still accounted for a high proportion. The study also showed that respondents with good knowledge and attitudes would lead to better practices for domestic solid waste management. Furthermore, it was found that the community group over 60 years old and those with occupations in the agricultural and domestic fields had poor practice in domestic solid waste management, so the local authorities need to pay attention to improving knowledge and practices of this group. It is important to propagate and educate knowledge to improve the level of waste management practice of this population.

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REFERENCES

- Almasi, A., M. Mohammadi, A. Azizi, Z. Berizi, K. Shamsi, A. Shahbazi, and S. A. Mosavi (2019). Assessing the Knowledge, Attitude and Practice of the Kermanshahi Women Towards Reducing, Recycling and Reusing of Municipal Solid Waste. *Resources, Conservation and Recycling*, **141**; 329–338
- Ao, Y., H. Zhu, Y. Wang, J. Zhang, and Y. Chang (2022). Identifying the Driving Factors of Rural Residents' Household Waste Classification Behavior: Evidence from Sichuan, China. *Resources, Conservation and Recycling*, **180**; 106159
- Babaei, A. A., N. Alavi, G. Goudarzi, P. Teymouri, K. Ahmadi, and M. Rafiee (2015). Household Recycling Knowledge, Attitudes and Practices Towards Solid Waste Management. *Resources, Conservation and Recycling*, **102**; 94–100
- Bac Lieu Department of Natural Resources and Environment (2021). *Report on Environmental Status of Bac Lieu Province for the Period 2016-2020*. Bac Lieu: Publisher of the Center for Natural Resources and Environment Monitoring
- Chaokromthong, K., N. Sintao, et al. (2021). Sample Size Estimation using Yamane and Cochran and Krejcie and Morgan and Green Formulas and Cohen Statistical Power

- Analysis by G* Power and Comparisons. *Apheit International Journal*, **10**(2); 76–86
- Darban Astane, A. and M. Hajilo (2017). Factors Affecting the Rural Domestic Waste Generation. *Global Journal of Environmental Science and Management*, **3**(4); 417–426
- Em, N. (2017). *Model of Solid Waste Management and Treatment Suitable to the Role of Rural Women in Chau Thanh District, Hau Giang Province*. Master's thesis, Can Tho University
- Han, Z., Y. Liu, M. Zhong, G. Shi, Q. Li, D. Zeng, Y. Zhang, Y. Fei, and Y. Xie (2018). Influencing Factors of Domestic Waste Characteristics in Rural Areas of Developing Countries. *Waste Management*, **72**; 45–54
- Laor, P., Y. Suma, V. Keawdunglek, A. Hongtong, T. Api-dechkul, and N. Pasukphun (2018). Knowledge, Attitude and Practice of Municipal Solid Waste Management Among Highland Residents in Northern Thailand. *Journal of Health Research*, **32**(2); 123–131
- Liu, B., Z. Han, J. Li, and B. Yan (2022). Comprehensive Evaluation of Municipal Solid Waste Power Generation and Carbon Emission Potential in Tianjin Based on Grey Relation Analysis and Long Short Term Memory. *Process Safety and Environmental Protection*, **168**; 918–927
- Malav, L. C., K. K. Yadav, N. Gupta, S. Kumar, G. K. Sharma, S. Krishnan, S. Rezania, H. Kamyab, Q. B. Pham, and S. Yadav (2020). A Review on Municipal Solid Waste as a Renewable Source for Waste-to-Energy Project in India: Current Practices, Challenges, and Future Opportunities. *Journal of Cleaner Production*, **277**; 123227
- Ministry of Natural Resources and Environment (2019). *State of the National Environment Report 2019. Topic: Domestic Solid Waste Management*. Hanoi: Dan Tri Publishing House
- Nhung, N. T. K. (2021). Social Aspects of Domestic Waste Management in Urban Vietnam. *VNU Journal of Social Sciences and Humanities*, **7**(2b); 332–348 (in Vietnamese)
- Pasukphun, N., Y. Suma, A. Hongtong, V. Keawdunglek, P. Laor, and T. Api-dechkul (2019). Waste Composition Evaluation for Solid Waste Management Guideline in Highland Rural Tourist Area in Thailand. *Applied Environmental Research*, **41**(2); 13–26
- Phuong, N. (2019). *Factors Affecting the Intention to Classify Domestic Solid Waste of People in District 3, Ho Chi Minh City*. Master's thesis, University of Economics Ho Chi Minh city
- Seng, B., T. Fujiwara, and V. Spoann (2018). Households' Knowledge, Attitudes, and Practices Toward Solid Waste Management in Suburbs of Phnom Penh, Cambodia. *Waste Management & Research*, **36**(10); 993–1000
- Su, V. (2019). *Analysis of People's Behavior in Domestic Solid Waste Management Activities in Rural Areas of Tran Van Thoi District, Ca Mau Province*. Master's thesis, University of Economics Ho Chi Minh city
- Thang, N., H. Hanh, D. Anh, and N. Tu (2019). The Outstanding Problem of the Vietnamese Environment. *Science and Technology Magazine*, **6**; 51–53 (in Vietnamese)
- The World Bank (2018). *Assessment of the Management of Domestic Solid Waste and Hazardous Industrial Waste: Options and Actions to Implement the National Strategy*. Hanoi: Hong Duc Publishing House
- Tho, N. (2013). *Scientific Research Methods in Business*. Financial Publisher: Ho Chi Minh
- Tong, Y. D., T. D. X. Huynh, and T. D. Khong (2021). Understanding the Role of Informal Sector for Sustainable Development of Municipal Solid Waste Management System: A Case Study in Vietnam. *Waste Management*, **124**; 118–127
- Urban Service Center (2020). *State of Solid Waste Management in Phuoc Long district, Bac Lieu province, Vietnam*. Internal Report
- Verma, R., G. Borongan, and M. Memon (2016). Municipal Solid Waste Management in Ho Chi Minh City, Viet Nam, Current Practices and Future Recommendation. *Procedia Environmental Sciences*, **35**; 127–139
- Xuan, H., K. Dung, and H. V. Khai (2021). Urban Residents Willingness to Pay for Domestic Solid Waste Management Service in Mekong Delta: Parametric and Non-Parametric Approaches. *Science Journal of Can Tho University*, **57**(Environment & Climate Change); 25–31 (in Vietnamese)
- Yamane, T. (1967). *Statistics, an Introductory Analysis 2nd Edition: Horper and Row*
- Yukalang, N., B. Clarke, and K. Ross (2018). Solid Waste Management Solutions for a Rapidly Urbanizing Area in Thailand: Recommendations Based on Stakeholder Input. *International Journal of Environmental Research and Public Health*, **15**(7); 1302