

ORIGINAL ARTICLES

Knowledge and practice on using single-use plastic products of rural residents in Binh Luc district, Ha Nam province in 2022

Nguyen Thi Phuong Oanh^{1*}, Nguyen Thi Linh Dan¹, Tran Quynh Anh¹, Dang Quang Tan¹,
Nguyen Thi Ngoc Thao¹

ABSTRACT

Objectives: The increase in demand for plastic products, especially single-use plastic products (Single-use plastic products - SUPs), poses challenges in handling plastic waste and risks of environmental pollution.

Methods: A cross-sectional study was carried out using structured questionnaires to assess the rural population's knowledge and practice of using SUPs among 370 rural residents from Binh Luc district, Ha Nam province in 2022.

Results: The percentage of participants who could identify plastic bags, plastic straws, and plastic bottles as SUPs was 35.8%, 33.3%, and 17.9%, respectively. Over 90% of respondents knew the impact of plastic waste on the environment and human health. The most used SUPs daily were plastic bags (84.9%), mainly used for shopping in the market or supermarket (78.9%) with 2-4 bags per day. Stopping shopping at stores and restaurants using SUPs (15.7%) or sorting recyclable plastic waste and selling to scrap dealers (20.0%) were behaviors that respondents regularly performed to reduce plastic waste.

Conclusions: Participant's general knowledge about SUPs and plastic waste reduction behavior is quite low. Appropriate solutions from local authorities are necessary to raise awareness and change residents' behavior regarding using SUPs.

Keywords: Single-use plastics, plastic waste, knowledge, practice, rural residents.

INTRODUCTION

With the advantages of strength, flexibility, lightweight, and easy and low-cost production, traditional plastics are ideal for application in many industrial and consumer products (1). However, these plastics become waste after use and pollute the environment and ecosystems. Global overconsumption has resulted in 353 million tons of plastic waste being discarded, of which two-thirds ended up in landfills or were incinerated, and 22% was mismanaged-meaning that it was left as uncollected litter,

dumped in unregulated sites on land or water, or burnt in the open (2). Plastics take centuries to degrade, therefore they persist in the environment and can cause serious effects (3).

Single-use plastics (SUPs) like plastic cutlery, bags, bottles, food packaging, and more are ubiquitous daily (4). Globally, up to 50% of plastic produced is for single-use purposes and is normally thrown away after use. It leads to the accumulation of plastic waste and environmental pollution and the loss of valuable resources. Over 10 million tons of



Corresponding author: Nguyen Thi Phuong Oanh
Email: nguyenthiphuongoanh.88@gmail.com
¹Hanoi Medical University

Submitted: 06 July, 2024

Revised version received: 18 August, 2024

Published: 30 August, 2024

DOI: <https://doi.org/10.38148/JHDS.0804SKPT24-056>

plastic enter the oceans annually and kill over 1 million marine animals each year (1,5). According to Greenhub's survey, Vietnam was the fourth largest global contributor to marine plastic pollution, with at least 730,000 tons of plastic waste leakage annually (6). Disposable food containers may leach toxic chemicals that are additives in plastic production (bisphenol A, phthalate, formaldehyde, styrene, heavy metals...) if these are scratched or heated. These chemicals migrate to human body through food (7). Health risks such as endocrine disruption, and cancers... have been demonstrated related to these chemicals exposure (8).

Some worldwide surveys revealed citizens have a relatively high demand for plastics despite awareness of their environmental and health impacts. Walter Leal Filho's research in Europe found that 63.8% of respondents use plastics daily, especially packaging (61%) and plastic bags (24%), though 74% practice waste separation and proper disposal (9). Another study on residents of a rural area in India showed that 70% of participants were aware that plastics cause health hazards and around 25% knew that it leads to respiratory illnesses and cancer, yet 82.4% still frequently used plastic bags (42% used 3-5 bags weekly) (10). The information about the current situation of SUP waste management of people will help policymakers find solutions to reduce the effect on the environment. In Vietnam, a few studies focus on surveying the use of SUPs in urban residents rather than knowledge related to SUP products. All of the participants who joined a survey in Hue City reported using SUPs daily, mostly plastic bags (92.8%), and 58.7% reused them (11). Another research in a town belongs Binh Tan district, Vinh Long province indicated that 42.4% of people practice the correct use of single-use plastic products and only 30.9% of respondents correctly identified the various types of SUP products (15). Research conducted in rural communities is limited. Binh Luc is a rural

district in the southeast of Ha Nam province. The rapid economic development and local people's SUP-using habits in daily life might contributed to polluting the environment. We therefore conducted an exploratory survey to describe knowledge and practice on single-use plastics among residents in Binh Luc district, Ha Nam, Vietnam in 2022.

METHODS

Research design: A cross-sectional study was applied.

Research site and time: The study was conducted in Binh Nghia commune, Binh Luc district, Ha Nam province. The data was collected in July 2022.

Study Subjects: Residents were over 18 years old and living locally for over 6 months. They were household heads/representatives who knew about plastic management in their houses and agreed to participate in the research.

Sample size and sampling method

Using the formula for estimating a population proportion:

$$n = Z^2_{(1-\alpha/2)} \frac{p(1-p)}{d^2}$$

In this study, Z represents the value from the standard normal distribution corresponding to the chosen confidence level of 95%, for which $Z = 1.96$. The permitted margin of error, d, was set at 0.05. The value of $p = 0.354$ was based on the proportion of respondents who had good practices in preventing adverse effects of SUPs in Hue City (11). Taking more 10% for absence prevention, the total of participants was $n = 369$. We interviewed 370 people.

The convenience sampling method was used: select the first household nearest the commune health station and subsequent households were selected using the "door-to-door" technique

until there were enough participants. At each household, one representative who meets the selection criteria was interviewed.

Study variables and assessment

- General characteristics of study participants including age, gender, ethnicity, educational level, and current occupation.

- Variables on SUP Knowledge: general knowledge about SUPs, the impacts of waste from SUP products.

- Variables on SUP management Practices:

+ Use of SUP product: most used SUPs, activities involving highest use of SUPs, daily usage of plastic bags, methods of disposing of used plastics, frequency of waste collection, frequency of waste segregation before collection

+ Variables related to addressing waste issues from SUP products practices: Frequency of engaging in behaviors for reducing SUPs waste, reusing, and recycling SUPs.

Research tools: Data Collection Tool: A structured questionnaire was designed based on a previously conducted similar study (12).

The paper-based questionnaire consisted of 19 questions, divided into 3 sections: general information about the study participants, local people's knowledge about SUPs and plastic waste and local people's practices related to SUPs.

Data collection and data analysis:

Data Collection Technique: Face-to-face interviews. The data was entered into Microsoft Excel 2016. After data cleaning, statistical analysis was performed using SPSS 27.0. Frequencies and percentages were utilized for descriptive purposes.

Ethical approval: The study proposal was reviewed and approved by the Committee on Research Proposals at School of Preventive Medicine and Public Health, Hanoi Medical University (No 1102/QĐ-ĐHYHN). Participants were explained about the purpose, content of the research and were face-to-face interviewed after getting their agreement to join in the study. The data and information collected had to be complete, truthful, accurate, and solely used for research purposes.

RESULTS

General information of participants

Table 1. The demographic of respondents (N = 370)

	Characteristics	Frequency	Percentage
Age group	18 - 59	260	60.3
	≥60	110	29.7
Gender	Male	169	45.7
	Female	201	54.3
Ethnicity	Kinh	370	100
Educational levels	No formal education	29	7.8
	Primary school	56	15.1
	Secondary school	188	50.8
	High school	68	18.6
	Vocational/College and above	29	7.8

	Characteristics	Frequency	Percentage
Occupation	Farmer/Agricultural worker	168	45.4
	Factory workers/Craftsmen	44	11.9
	Civil servant	9	2.4
	Business/Trade	38	10.3
	Homemaker	19	5.1
	Retired	31	8.4
	Other	35	9.5

Of 370 respondents, 54.3% were female and 60.3% were 18-60 age. All of them were Kinh's ethnicity (100%). Most people (77.9%) had at least a secondary school education

level. Farming and agriculture constitute the highest proportion (45.4%) among the occupational groups of the interviewees.

Knowledge about SUPs among local people

Table 2. Knowledge about plastic products among the local people

Knowledge about plastic products	Frequency	Percentage
Raw materials for plastic production: are petroleum/gas	166	39.4
Identifying SUPs		
Plastic drinking straws	249	33.3
Plastic water bottles	132	17.9
Plastic bags	264	35.8
Do not know	21	2.8
Disposal of SUPs waste is sorting and selling to scrap dealers	158	22.3
Impact of plastic waste		
The impact of plastic waste on the environment	348	94.1
The impact of plastic waste on human health	352	95.1

The proportion of the population with adequate general knowledge about plastic was quite low. Only 9,7% of interviewees knew that the raw materials for plastic production come from petroleum and gas. The proportion of local people who knew plastic bags as SUPs was the highest at 35.8%, followed by plastic drinking straws at 33.3% and plastic

water bottles at 17.9%. A few local people did not know any SUPs (2.8%). The 22.3% of interviewees knew that the disposal of SUPs after use is sorted and sold to scrap dealers. Most participants knew plastic waste impacts on the environment (94.1%) and human health (94.8%).

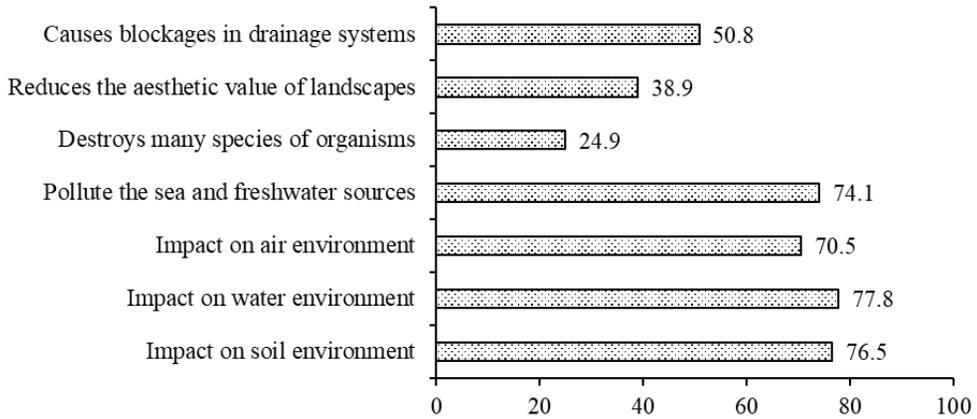


Figure 1. Knowledge of the impact of plastic waste on the environment

Over 70% of the respondents reported that plastic waste harmed the environment, including the air, soil, and water. The majority of people (74.1%) knew that plastic waste causes pollution of the sea and freshwater

sources. Notably, the percentage of people aware that plastic waste harms species of organisms was the lowest, at only 24.9%.

Practice use of SUPs among local people

Table 3. Practical use of plastic products among the local people

Practical use of plastic products:	Frequency	Percentage
Most commonly used SUPs		
Plastic bottle	31	8.4
Plastic bags	314	84.8
Styrofoam boxes, containers	5	1.4
Single-use plates, bowls, cup	6	1.6
Others	14	3.8
Most common activities involving the use of single-use plastic products		
Shopping at markets, supermarkets	292	78.9
Traveling, camping	5	1.4
Dining out	5	1.4
Buying takeout food	25	6.7
Containing waste	18	4.9
Others	25	6.7
Number of plastic bags used daily		
Under 2 bags	92	24.9
2-4 bags	131	35.4
5-7 bags	68	18.4
8-10 bags	18	4.9
Over 10 bags	41	11.1

Practical use of plastic products:	Frequency	Percentage
Disposal methods for plastic bags and plastic items after use		
Reuse	44	11.9
Recycling	8	2.2
Throw in the garbage bin	285	77.0
Discard anywhere convenient	7	1.9
Burn	41	11.1
Classify waste after use	113	30.5

Participants primarily used single-use plastic products, with nylon bags being the most commonly used (84.8%). Most single-use plastic products were used for shopping, accounting for 78.9%. Typically, each

individual used 2-4 nylon bags per day, representing 35.4%. After use, 77.0% of the population disposed of nylon bags and plastic items in trash bins. Additionally, 30.5% of households segregated waste during collection.

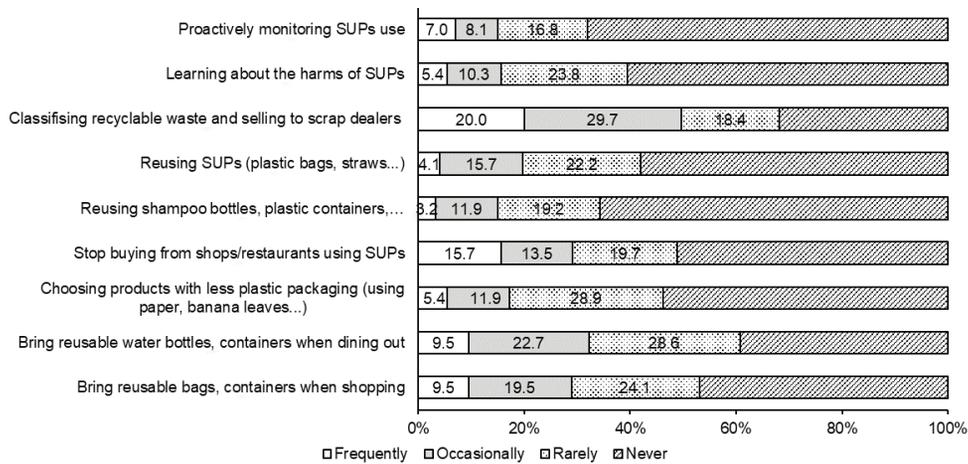


Figure 2. Level of some practicing behaviors to solve and reduce plastic waste

Few respondents regularly performed behaviors to reduce single-use plastic waste. The most common behavior was sorting recyclable waste and selling it to scrap dealers with 20.0%. Only a few people reused plastic products and SUPs (4.1% and 3.2%) or learned about the harmful effects of single-use plastic (5.4%).

DISCUSSION

In this survey, participants' knowledge, was assessed on the understanding of plastic and

plastic waste; general knowledge about SUPs, and knowledge about the impact of SUPs waste. The results showed that the knowledge of most respondents is still limited. Only 9.7% of people interviewed said that oil/gas is a raw material for plastic production. It was approximately 2-fold lower than the results of the WWF survey (13). Relatively few respondents identified plastic bags, plastic straws, and plastic bottles as SUPs, at 35.8%, 33.7%, and 17.9%, respectively. This result was lower than H.Shaira's survey conducted on a group of rural Indians with 53.6%; 86.8% and

58.3% of people recognized plastic bags, plastic straws, and water bottles as SUPs (10). It indicated a significant limitation in people's knowledge about SUPs, populated items used daily. This lack of knowledge could adversely impact consumption behaviors and post-use plastic sorting and disposal practices, thereby reducing the effectiveness of recycling and reuse efforts.

On the other hand, it observed that respondents' knowledge about the harmful effects of SUPs waste was very high. Up to 94.1% and 95.1% of respondents thought plastic waste affects the environment and human health. The results are similar to some studies in Vietnam with over 90% of participants knowing it (14,15). H.Shaira et. al. reported lower results, targeting rural Indian populations (>70%) (8). This result is also higher than the study by Adane and Muleta, which reported that plastic is harmful to the environment (62.6%), human health (51.7%), and animals (72.6%) (16).

Regarding the use of SUPs, the most commonly used item is plastic bags with 84.9% of respondents. Up to 53.8% of them used 2-7 plastic bags per day and was related to shopping activities. The study by Nguyen Thi Minh Thuong et. al. on the residents in Hue City also recorded that plastic bags were the most widely used product at 92.8% and used 5.3 plastic bags per day per household (11). Similarly, 80.4% of Indians participating in H.Shaira's survey used plastic bags regularly, and 42% bought and used 3-5 plastic bags/week (10). In contrast, a survey in Europe showed that packaging was the most used SUPs (61.0%), followed by plastic bags (24.0%) (9). Due to their convenience, ease of use, low cost, and water resistance, plastic bags are widely used everywhere. However, they leave severe consequences for the environment and human health in the coming decades if no intervention measures are taken.

Furthermore, when asked about handling plastic waste, most respondents throw it in the trash (77.0%). There was 55.0% of households did not separate waste. This rate was quite similar to the WWF survey (13). It suggested

that the population might lack knowledge about separating and disposing of SUPs waste.

Recognizing the harmful effects of plastic waste, people might take behaviors to reduce plastic waste generation. Approximately 10.0 - 20.0% of respondents regularly performed behaviors to decrease plastic waste such as bringing cloth reusable bags when shopping, bringing personal items (cups, spoons, contained boxes) when going out, or stopping shopping at stores using SUPs. The number of students at a university in Malaysia who supported the plastic-free campaign by bringing personal lunch boxes was 83.94% (17). Filho et. al. also reported that most participants were 'moderately' to 'very' involved in reducing plastic use (9). Meanwhile, only 18.9% of residents in Vinh Long province used to bring containers and bowls when buying food and drinks in-store (15).

Reusing some plastic products may help reduce plastic waste released into the environment. However, reusing SUPs has harmful effects such as not ensuring hygiene and quality, or adverse health risks. Respondents who have never reused SUPs were 65.7% and 68.0%. It suggested that respondents had inadequate knowledge about identifying recyclable plastics.

Sorting plastic waste and selling it to recycling facilities is also an action to help reduce plastic waste and is chosen by 20.0% of respondents. Such behavior is quite encouraging since it not only contributes to good management of plastic waste but also saves some extra money. Learning about the harmful effects of SUPs waste and proactively monitor family plastic use (<7%) are behaviors which was rarely practiced.

There are some limitations in this study. First, due to participants being from commune level and the small sample size, the results might not fully reflect the knowledge and practice of people in district and province levels. Secondly, respondents' practice of SUPs use and behaviors on reducing plastic waste were subjectively assessed by interviewing, not direct observation.

However, the results of this study provided some preliminary information about the knowledge and practice of plastic, SUPs in rural residents. Further research is necessary to explore the suitable interventions on individual SUP management.

CONCLUSION

The result shows that most of the respondents in rural areas had poor knowledge and practice about SUPs. Authorities may undertake interventions such as environmental awareness creation, through local communication channels to provide knowledge on identifying types of SUPs, disposal and recycling of SUPs waste, as well as encouraging the use of alternative products to SUPs for the community.

Acknowledgments: We received enthusiastic support from the medical staff of Binh Nghia Medical Station for the data collection. We also sincerely thank all respondents who willingness to participate in our research.

REFERENCES

1. Narancic T, O'Connor KE. Plastic waste as a global challenge: are biodegradable plastics the answer to the plastic waste problem? *Microbiology*. 2019 ;165(2):129–37.
2. Uehara T, Asari M, Sakurai R, et.al. Behavioral barrier-based framework for selecting intervention measures toward sustainable plastic use and disposal. *Journal of Cleaner Production*. 2022 Dec 1;384:135609.
3. Kwon D. Three ways to solve the plastics pollution crisis. *Nature*. 2023 Apr;616(7956):234–7.
4. Geyer R, Jambeck JR, Law KL. Production, use, and fate of all plastics ever made. *Sci Adv*. 2017 Jul;3(7):e1700782.
5. Plastic Oceans International. Plastic Pollution Facts. Available from: <https://plasticoceans.org/the-facts/PlasticOceans.org/the-facts>. Access 24/12/2022.
6. Wang H. Zero. Plastic Waste in Vietnam: Based on an Innovative 3R Strategy. *Frontiers in Business, Economics and Management*. 2022 Nov 23;6:169–72.
7. Izhar Husaina, Mesheil Alalyani, Dr. Arif Habib Hanga. Disposable Plastic Food Container and Its Impacts on Health, *J. Energy Environ. Sci*. 2015, vol. 130, no. 12, pp. 618–623, 2015.
8. Rolf U. Halden, “Plastics and Health Risks,” *Annu. Rev. Public Health*. 2010, vol. 31, no. 1, pp. 179–194.
9. Filho W.L., Salvia A.L., Bonoli A., et. al. An assessment of attitudes towards plastics and bioplastics in Europe. *Sci Total Environ*. 2021. 755, 142732.
10. Habeen Shaira, Imaad Mohammed Ismail, Nihal Ahmed, et. al. Assessment of Knowledge, Attitude and Practice Regarding Single Use Plastics among the Residents of a Rural Area in a Coastal District of Karnataka - A Descriptive Study. *National Journal of Community Medicine*. 2020. 11(02):1. DOI:10.5455/njcm.20200207094558.
11. Nguyen Thi Minh Thuong, Hoang Thi Thao, Nguyen Thi Minh Tram, et. al. Situation of single-use plastic use and some related factors among people in Hue city in 2020. *Journal of Preventive Medicine*. 2021. 31(6), 105-13.
12. Le Thi Linh, Dang Quang Tan, Le Thi Hoan. Knowledge, attitude, practice about plastic waste of students prevention medical doctor system Hanoi Medical University 2021. *Vietnam Journal of Community Medicine*, Vol. 64, Special Issue 10, 269-277.
13. Tran Thu Huong. Survey on the current status of plastic waste in Vietnam. Available from: https://wwfasia.awsassets.panda.org/downloads/tom_tat_ket_qua_khao_sat.pdf. Access 24/12/2022.
14. Vu Thanh Ca, Hoang Thi Hue, Trinh Thi Minh Trang, et. al. Research on Halong residents' attitudes towards disposable plastics items. *Vietnam Environment Journal*. 2020 Apr 4;1:24.
15. Vu Thai Son, Nguyen Thi Huong. The current situation of using disposable plastic products of people in a town in Binh Tan district, Vinh Long province and some related factors in 2022. *Can Tho Journal of Medical and Pharmacology*. 2023, Vol 63/2023, page 218-225.
16. Legesse Adane, Diriba Muleta et al. Survey on the usage of plastic bags, their disposal and adverse impacts on environment: A case study in Jimma City, Southwestern Ethiopia. *Journal of Toxicology and Environmental Health Sciences*. 2011.Vol. 3(8) pp. 234-248.
17. Izzah Abd Hamid, Wan Yahaya and Wan Asrina. Zero-Waste Campaign: Assessment on University Student's Behaviour, Awareness, and Impact on Plastic Products. *J Soc Sci Humanit*. 2020;5:24-29. doi:10.47405/mjssh.v5i3.371