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ORIGINAL ARTICLE

Determining the knowledge, attitude and practice about the environment and recycling of individuals living in a public housing compound: A quantitative, qualitative mixed method study

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Abstract

Background: The environment is the physical, biological, social, economic and cultural environment in which people and other living things maintain their relationships and interact throughout their lives. In this study, it was aimed to determine the knowledge, attitudes and behaviors of individuals residing in a public housing estate towards the environment and recycling.

Methods: The research was designed as cross-sectional and conducted with a mixed method including both quantitative and qualitative methods. 330 of 437 residents participated in the qualitative part of the study (participation rate 75.5%) in January 2021. The quantitative part of the study was attended by 10 apartment workers.

Results: 51.5% of the participants (n=170) believe that they have sufficient knowledge about recycling. However, only 38.8% of the participants (n=128) stated that they collect recyclable waste separately. The environment-emotion level of men was found to be higher (Z=-2.242, p=0.025). A statistically significant difference was found between the general level average scores in terms of marital status. In terms of "knowledge sub-levels", the mean environmental knowledge level scores of health workers were found to be significantly higher than other occupational groups (Z=-2,460, p=0.014). Apartment workers stated 202 flats (46.2%) collect recyclable waste separately.

Conclusion: To prevent the climate crisis, it is important to recycle domestic waste to protect the environment. Individuals' recycling behavior levels can be increased with practices that aim to inform, direct and encourage recycling. In parallel with all these practices, it is important for governments to be politically determined and implement legal regulations on waste recycling.

Keywords: Recycling, Environment, Public housing, Knowledge, Attitude, Practice.

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INTRODUCTION

The environment is the physical, biological, social, economic and cultural environment in which people and other living things maintain their relationships and interact throughout their lives. John M. Last, on the other hand, defines the environment as everything other than human. It can be understood from these definitions that people and the environment are in constant interaction. As a result of this interaction, human and public health are "directly and indirectly" affected "positively or negatively" (1).

Mankind has produced waste in every period of history. While this situation did not cause a big issue in the periods when the population was less and nomadic life existed, it became a serious issue with population growth, intense urbanization and the growth of cities (2). Wastes threaten the survival of humans and other living things and all natural resources necessary for human existence. Inadequate waste management causes soil, water and air pollution. This significantly affects public health (3).

The management of wastes within the recycling and recovery processes ensure that both serious material and energy resource losses and major environmental problems are prevented. Recovery, which includes the concepts of reuse and recycling, is defined as the collection and grouping of recyclable wastes at the source, and their conversion into other products or energy via physical and chemical methods (1).

To protect and improve the environment, both national and international legal regulations have been prepared. With these legal regulations, individuals and the state are given the task of actively participating. The studies carried out to date have shown that the fight against environmental problems is not possible only with the measures taken or the strategies developed by the administrative offices and official institutions. Initiatives should be made to increase social consciousness, awareness and participation. (4,5). As emphasized by many scientists, the aim of the concept of environmental awareness is environmental knowledge, attitude towards the environment and behaviors that impact the environment positively (6).

In the detailed literature review, it was found that the research on this subject were mostly done in children and young people and studies on environmental and recycling awareness of adults are limited. It is clear that environmental and recycling awareness should also be evaluated in adults who both carry the role of practitioner and teacher.

In this study, the researchers tried to determine the knowledge, attitudes and behaviors of individuals residing in a public housing estate towards the environment and recycling. In addition, the opinions of the apartment workers working in the same residence on this subject were also evaluated.

MATERIALS AND METHODS

The research was conducted with a mixed method including both quantitative and qualitative methods in January 2022. The quantitative part is a cross-sectional study and a questionnaire (77 questions in total) was applied. In the qualitative part, face-to-face individual in-depth interviews were conducted. The population of the study consists of the people residing in the 437 occupied flats (one person from each flat) in the Health Sciences University Gülhane Lodgings, which is a public housing site. Since the aim was to reach the entire universe, no sample selection was made. 330 residents, one from each flat, participated in the qualitative part of the study (participation rate 75.5%). The quantitative part of the study was attended by 10 apartment workers working in the lodging.

In the first stage, the sociodemographic section created by the researchers and the section consisting of 18 questions about recycling practices and environmental problems in the public housing unit, and the questionnaire containing the 59 questions on "Environment, Recycling, Plastic and Plastic Waste Attitude Scale" were distributed to all flats on recycled papers and in closed envelopes. The questionnaires were filled by one person from each flat and collected under observation. In the second stage, face-to-face in-depth interviews were conducted with the apartment workers using the information collection form for recycling created by the researchers.

In the study, a refined form of questionnaires titled "Environment, Recycling, Plastic and Plastic Waste Attitude Scale" was used (7,8). Scale usage permissions were obtained. Ethics Committee approval was received from SBU Gülhane Scientific Research Ethics Committee (No. 2020/520).

SPSS 25.00 package program was used in the analysis of the collected data. Descriptive statistical analyzes were made in the evaluation of the data; Kolmogrov-Smirnov tests were used for normality tests, and Mann Whitney U and Kruskal Wallis tests were used to compare the scale score averages of the groups. Statistical significance value was accepted as $p<0.05$. The qualitative part was analyzed and reported.

This study was approved by the clinical research ethics committee of the University of Health Sciences, Gulhane School of Medicine (Date: 29.12.2020 number: 2020/520).

RESULTS

Quantitative Study Findings

The mean age of the individuals participating in the study was 40.5±8.88, 50% (n=165) were women and 79.4% (n=262) were married. 53.3% (n=176) of the participants had university and 40% (n=132) had postgraduate degrees. When the professions of the participants were examined, it was seen that 36.4% (n=115) were doctors and 24.7% (n=78) were from other health professions (nurse, health officer, etc.) (Table 1).

Table 1. Sociodemographic Characteristics of the Participants

Sociodemographic Characteristics	Number	%*
Age (n=317)		
Mean ± SD (min, max)	40.58±8.88 (min=18, max=64)	
Gender (n=330)		
Women	165	50.0
Men	165	50.0
Marital Status (n=330)		
Married	262	79.4
Single	58	17.6
Other (Separated/Divorced/Widowed)	10	3.0
Child Status (n=330)		
Yes	256	77.6
No	74	22.4
Number of Children (n=256) those without children?		
1	75	29.3
2	153	59.8
3	24	9.4
4	3	1.2
5	1	0.4
Educational Status (n=330)		
Literate	1	0.3
Primary Education	6	1.8
High School	15	4.5
University	176	53.3
Postgraduate	132	40.0
Occupation (n=316)		
Doctor	115	36.4
Other Health Professionals (nurse, health officer, etc.)	78	24.7
Other (engineer, teacher, banker, psychologist, housewife, etc.)	123	38.9
Number of people living in the household (n=329)		
1 or 2 people	92	28.0
3 or 4 people	205	62.3
5 people or more	32	9.7

*Column percentage.

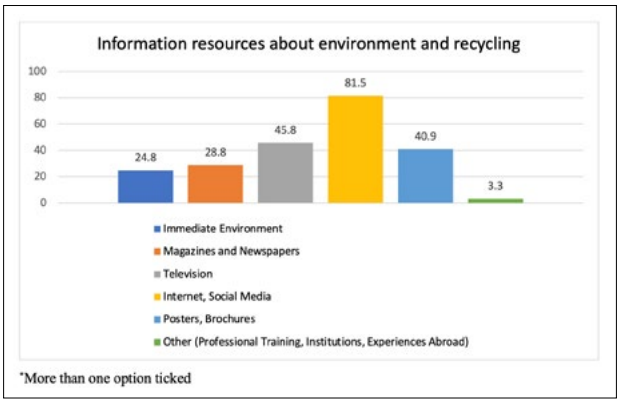
97% of the participants (n=320) stated that they have future concerns about environmental problems. The rate of respondents stating that there are recycling bins or collection points in the residential area they live in is 57.3% (n=189). 49.2% (n=96) of the lodging residents stated that they were not satisfied with the recycling practices in the lodging area. 66.7% (n=220) of the participants stated that the information signs in shopping malls, workplaces, etc. were drawing attention. However, 82.1% (n=271) stated that there are not enough warning and information signs about recycling in public places. 51.5% of the participants (n=170) believe that they have sufficient knowledge about recycling, 83.6% (n=276) believe that the effects of global warming will decrease with the use of recyclable products. 50.0% (n=165) stated that they consider the products purchased in terms of recycling while shopping. However, only 38.8% (n=128) of the participants stated that they collect recyclable waste separately (Figure 1).

Figure 1. Participant's separate collection of recyclable waste

The areas of concern about environmental problems are as follows; 94.5% of the participants (n=312) are concerned about water pollution, 76.4% (n=252) are concerned about air pollution, 71.2% (n=235) are concerned about soil pollution, 84.2% (n=278) are concerned about healthy food supply, 84.5%, (n=279) are concerned about global climate change and related conditions (flood, hurricane, storm, forest fires etc.), 87.6% (n=289) is concerned about other problems such as infectious diseases, terrorism, war, radiation pollution and technology.

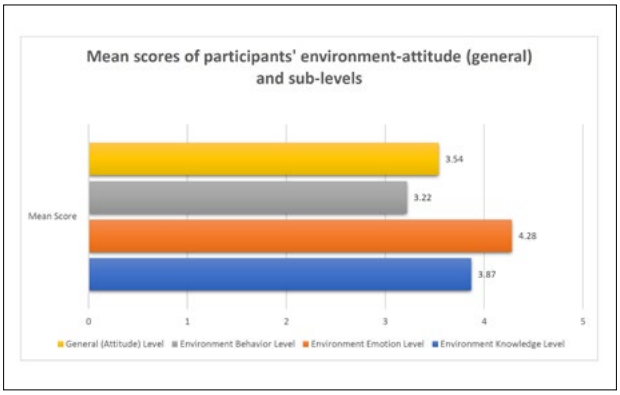
It has been observed that the highest rate of 81.5% (n= 269) information about environment and recycling is accessed via internet and social media. This information source was followed by television with a rate of 45.8% (n=151) (Figure 2).

Figure 2. Resources for participants to access information about the environment and recycling



The mean environmental-attitude (general) score of the participants from the scale was 3.54 (±0.36). Considering the lower-level mean scores, the mean environmental-knowledge level score is 3.87 (±0.46), the environment-level mean score is 4.28 (±0.58), and the environment-behavior mean score is 3.22 (±0.54) (Figure 3).

Figure 3. The mean scores of the participants' environment-attitude (general) and sub-levels



When the average scores of some sociodemographic characteristics and environmental-attitude (general) levels of the participants were examined, no significant difference was found in terms of gender and age (Table 2). However, when the sub-dimensions were examined, the environment-emotion level of men was found to be higher, and this difference was statistically significant (Z=-2.242, p=0.025). There was also a significant difference between age groups in terms of behavioral sub-dimensions (F=3.217, p=0.013). The groups that made the difference were the 26-35 and 46-55 age groups, and the average behavioral score of the 26-35 age group was found to be the lowest.

Table 2. Comparison of the average scores of the participants' environmental attitude (general) levels in terms of some variables

Features	N	Average rank	Test, p
Sex			
Women	165	163.67	Z=-0.348*
Men	165	167.33	p= 0.728
Age			
16-25 years old	9	166.50	
26-35 years	87	138.58	X^2 =6.495**
36-45 years	123	164.89	p =0.165
46-55 years	87	166.89	
56-65 years	11	186.09	
Marital status			
Married***	262	170.38	X^2 =7.169**
Single	58	156.11	**p = 0.028**
Divorced***	10	92.10	
Have a Child			
Yes	256	170.76	Z=-1.862*
No	74	147.32	p= 0.063
Education Status			
Literate	1	6.00	
Primary Education	6	190.00	X^2 =7.396**
High School	15	141.13	p =0.116
University	176	158.34	
Graduate	132	177.91	
Profession			
Health workers (doctor, nurse, health officer, health technician, etc.)	193	165.71	Z=-1.757*
Other professions (engineer, teacher, banker, psychologist, housewife, etc.)	123	147.19	p = 0.079
Number of people living in the household			
Up to 2***	92	139.87	X^2 =9.688**
3-4	205	172.61	**p =0.008**
5 and above***	32	188.47	
Future concern about environmental problems			
Yes	320	167.51	Z=-2.168*
No	10	101.10	**p= 0.030**
Attracting attention of information signs about recycling in places such as shopping malls and workplaces			
Yes	220	179.37	Z=-3.736*
No	110	137.76	**p<0.001**
The state of believing that they have enough information about recycling			
Yes	170	184.84	Z=-3.797*
No	160	144.95	**p< 0.001**
Believes that the effects of global warming will decrease with the use of recyclable products.			
Yes***	276	174.01	X^2 = 13.906**
No	25	131.66	**p =0.001**
No idea***	29	113.67	
Considers the products bought while shopping in terms of recycling			
Yes	165	196.19	Z=-5.845*
No	165	134.81	**p<0.001**
Separate collection of recyclable waste			
Yes***	128	198.79	X^2 =28.821**
No	76	128.60	**p<0.001**
Sometimes	126	153.94	

*Mann Whitney U Test, **Kruskal Wallis Test, ***Groups that make a difference

A statistically significant difference was found between the general level average scores in terms of marital status. The groups that make the difference are those who are married and divorced. No statistically significant difference was found between the mean scores of environmental attitudes in terms of having children, educational status and occupation (Table 2).

There was no significant difference between the mean scores of the general environmental levels of the health care workers and other occupational groups in terms of the professions of the participants (Table 2). However, in terms of "knowledge sub-levels", the mean environmental knowledge level scores of health workers were found to be significantly higher than other occupational groups (Z=-2.460, p=0.014).

The mean scores of environmental-attitude (general) level of those who are concerned about the future about environmental problems, those who state that information signs about recycling in places such as shopping centers and workplaces draw attention, those who believe that they have enough information about recycling, those who believe that the effects of global warming will decrease with the use of recyclable products, those who pay attention to recyclability of products they buy and those who collect recyclable waste separately were found to be statistically significantly higher (Table 2).

Qualitative Study Findings

All apartment workers were included through face-to-face individual in-depth interviews. Of the apartment workers serving in 14 buildings; 5 were women, 5 were men, with an average age of 44 (min=36, max=51). Considering the education levels, 7 were primary school graduates, 2 were secondary school graduates and one had an associate degree. The average time of employment in this job was 9.5 years (median: 9.0; min=2, max=18).

In the interview, they stated that all apartment officials have information about recycling and that they obtained this information mostly from their own children (n=5), from media (newspaper, television, internet, etc.) (n=4) and from apartment management (n=1).

Apartment officials serve 437 flats in total, and they stated that 202 of these flats (46.2%) collect recyclable waste separately.

6 of the apartment officials stated that they believe that the recyclable wastes left at the recycling points are collected and recycled with appropriate methods. 8 workers stated that if all flats were to collect their recyclables separately, it wouldn't impose them an additional workload. All of the apartment workers stated that they leave the recycling wastes collected separately at the recycling points. In addition, 9 of them stated that they separate the unsorted packaging wastes (cardboard boxes, plastic and glass bottles, etc. if not contaminated with household waste) in the garbage of the apartments they served and leave them at the recycling point.

When asked whether there is a waste oil collection point, only one apartment worker stated that there is a waste oil collection point in a building they serve, and only 2 flats in this building collect waste oil.

When the participants were asked about the existence of environmental concerns about the future, 8 of them said they had concerns, and some of their statements about their concerns about the future are presented below.

AW-1 and AW-2: More trees should be planted, there should be more green areas, nature should be allowed to renew itself.

AW-3, 4 and 7: Environmental pollution is increasing and we are all causing it. AW-7 also said that "children who do not care about this situation are growing up" and stated that he is worried that the children won't care about the environment in the future.

AW-9: Water scarcity, deforestation and desertification are big problems in the world.

To the question '***Do you have any ideas or suggestions about recycling? What is it, if any?***', participants stated that recycling points are insufficient. Some of the answers given by the apartment staff are as follows:

AW-1: If everyone collects their recyclable waste separately, we can also transport it to the recycling point.

AW-3: This issue should be explained to all apartment officials. Waste bins are insufficient, they should be increased. It would be better if there is a separate recycling collection point in each apartment.

AW-7: All wastes are collected in the same place at the recycling points. It has to be separated.

AW-10: The recycling points are insufficient.

DISCUSSION

In our study, we tried to determine the knowledge, attitudes and behaviors of individuals living in a public housing unit about the environment, recycling and plastic waste. In accordance with the literature, although the participants' environmental-knowledge and attitude level average score was high, their behavior level average score was low (8,9,10). This situation draws attention to the need to increase the number of studies on the underlying reasons why knowledge does not turn into behavior.

Considering whether the participants had concerns about the environment, it was determined that they have a very high rate of anxiety (97%). Although the area of greatest concern was water pollution, participants have also stated that they have concerns about other issues such as air and soil pollution, the problem of healthy food supply, global climate change and related conditions (flood, hurricane, storm, forest fires, etc.), infectious diseases, terrorism, war, radioactive pollution and technology. In the study conducted in İzmir, 69% of the participants stated that air, soil and water pollution cause them anxiety (11).

Many studies show that environmental concerns have a positive effect on consumer behavior. It was determined that the state of being concerned about the environment affects being informed about the environment, i.e. paying attention to the selection of recyclable products, and positive behaviors towards recycling (12,13). A recent study conducted in Israel states that COVID-19 increased anxiety about climate change and positive behaviors related to recycling and decreased consumption (14). In our study, in accordance with the literature, environmental general score averages were found to be higher in those who have concerns about the future about the environment.

It was also observed that the highest rate (81.5%) of information about the environment and recycling was accessed from the internet and social media. Some other studies, in accordance with our study, show television and internet on a higher frequency among other sources related to recycling (15,16). Accordingly, the necessity to provide more information about recycling and environmental problems through public service ads and advertisements on television and the internet becomes clearer.

Studies have shown that single participants are more indifferent to environmental pollution, recycling and buying recyclable products. On the other hand, it was determined that the participants who have children associate environmental pollution with their future anxiety (17,18). Although there is no significant difference, the mean of the environment-general score of those who have children is also higher. At the same time, in the interviews made in the qualitative part of our study, it was determined that the apartment workers learned the information about recycling mostly from their own children. A study conducted in Australia also shows that students' environmental knowledge can improve their parents' knowledge (19). According to these studies, increasing the knowledge and awareness of children on environmental problems and recycling aid adults' awareness greatly.

In our study, although the environmental-knowledge level of health workers was found to be significantly higher than other occupational groups, no difference was found between the levels of environment-behavior. In a study conducted on medical faculty students in Istanbul, students' recycling habits were found to be low, and it was seen that the sensitivity of future doctors to environmental issues is not different from other university students (20). In a study conducted on medical school and nursing students in Iran, it was stated that the students' knowledge about recycling was high, but this knowledge does not translate into behavior (21). Although some studies show that there is a relationship between the increase in environmental knowledge and the increase in environmental awareness and environmental behavior, education alone may be insufficient in creating positive environmental behaviors (22,23). In addition to education, the application of legal sanctions can also be an important intervention in developing positive behavior on environmental issues. In a study conducted in Sakarya, the participants who said 'I do not separate for recycling because there is no legal sanction' were found to be substantial (24). This shows that the necessity of legal sanctions and incentives is important.

Most of the participants (57.3%) stated that there is not enough warning and information signs about recycling in public areas. In a study conducted on university students, more than half of the students stated that there are not

enough advertisements, signs, etc. to remind them to recycle. It has also been stated that university recycling facilities (boxes, containers, etc.) are not sufficient (24). In our study, the apartment officials stated that the recycling points in the public housing area are insufficient.

In our study, the rate of those who say 'sometimes I collect them separately' and 'I do not collect them separately' is 61.2%. In a study conducted in Trabzon, 50.4% of the participants stated that they do not separate their household wastes (10). Another study in İzmir reveals that 72.5% of the participants do not separate their wastes (11). As can be seen, the rates of not separating the wastes are quite high. In addition, the statements of apartment officials in the qualitative part of our study also support this finding.

In our study, although the participants who believe that the effects of global warming will decrease with the use of recyclable products are in the high majority that it is also seen that this information cannot translate into behavior. While the rate of consideration of the products purchased in our study in terms of recycling is 50%, in a study conducted on preschool teachers, the percentage of those who purchase products bearing environmental signs is 13.5% (6).

In our study, it can be seen that those who say that information signs about recycling in places such as shopping centers and workplaces attract attention have higher environmental general scores. This shows that sufficient recycling points and practices can guide and encourage individuals to transform their knowledge and attitudes into behavior. In addition, some encouraging practices for the collection of recyclable waste, which have various examples in the world, can also contribute to the development of positive environmental behaviors. For example, in Sweden, recycling machines in food shops provide receipts for all kinds of plastic and metal cans recovered, which then can be used in said shops. Thanks to this incentive, discarded bottles or boxes in the environment are recycled (25).

The most important limitation of our study is that the individuals living in public housing units and participating in our study have a high level of education and most of them are healthcare professionals, which may create deficiencies in representing the society.

To prevent the climate crisis, which is one of the biggest problems of our time, it is also important to recycle domestic waste to protect the environment and ecological balance. Since the source separation method is the basis of recycling practices, it is understood from this research that individuals' recycling behavior levels can be increased with practices that aim to inform, direct and encourage recycling. It is important to plan the activities to be done in a way that increases the behavioral dimension as well as knowledge. Adequate recycling points, providing adequate information boards and providing information from time to time especially via social media or public service ads, motivating individuals to separate wastes by enabling them to make profits through various applications, site managements' reminders on recycling in their area of responsibility, distributing different colored separation bags made of recycled materials, providing detailed training to apartment workers are considered as what needs to be done in creating positive behavior for recycling. In parallel with all these practices, it is important for governments to be politically determined and implement legal regulations on waste recycling.

Declarations

The authors received no financial support for the research and/or authorship of this article. There is no conflict of interest.

This study was approved by the clinical research ethics committee of the University of Health Sciences, Gulhane School of Medicine (Date: 29.12.2020 number: 2020/520).

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