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Contents

Visions for Sustainability is an indexed scientific journal published in open access by the Interdisciplinary Research Institute on Sustainability (IRIS). The journal promotes a debate on how the concept of sustainability can be addressed and applied in existing and foreseeable societies worldwide. Particular emphasis is placed on facilitating communication between researchers of different disciplines, supporting educational projects and examining the role of contemporary science in dealing with issues related to sustainability. Papers are welcome from researchers and scholars of natural, political, social and other sciences as well as philosophical and humanistic disciplines, and in particular from anyone wishing to make a contribution which combines multiple viewpoints. The aim is to host as wide a range as possible of multidisciplinary, interdisciplinary and transdisciplinary perspectives on sustainability. Discussions or comments on articles which have previously appeared in the journal are also welcome. All submissions will be refereed before publication.

Articles can be submitted directly online at the journal website http://www.ojs.unito.it/index.php/visions through the login procedure. Any further questions and/or submission enquiries can be addressed to g.barbiero@univda.it or martin.dodman@gmail.com.

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Editorial

Intersecting trajectories

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When we launched *Visions for Sustainability*, we wanted to provide a space for as wide a range as possible of ways of looking at the concept of sustainability and at the same time of considering the multiple perspectives from which that concept can shed light on the ecological trajectories of all the biotic and abiotic components of the planet we inhabit.

Since we are human beings, we are particularly concerned with the trajectories of our own species, how they are driven by evolutionary feedbacks between characteristics and adaptations, how they intersect with and impact on all other trajectories, and how our understanding of this can lead to developing ways of changing them and rendering them more sustainable. The papers in this issue provide specific perspectives on various aspects of these concerns, emphasizing the importance of promoting public and institutional awareness as an essential prerequisite for action, while focusing on a wide range of diverse geographical locations. We are particularly pleased to host studies from different parts of the Global South.

One of the principal characteristics of *Homo sapiens* has been an early and ever-increasing propensity to travel. Recent studies link movement out of Africa to climate change which made travelling necessary and at the same time rendered it possible. Such initial migration was determined by the quest for space, food, and security. Dynamic population growth then led to groups splitting and travelling ever further apart. New technologies and in particular means of transport, such

as boats, enabled ever greater distances to be covered. Other important aspects included human traits such as imagination, adaptability, curiosity, adventure, and risk-taking. Each one of these factors is clearly involved both in the migratory flows that characterize all human history as well as a very recent predilection for a particular kind of movement, known as tourism, which has seen a rapid exponential growth in the last few decades.

In "Sustainable tourism: tourists' behaviour and their impact on the visited place", Ingaldi and Dziuba address the question of overtourism and the need for tourist destinations that suffer from overcrowding and its various consequences to develop ways to render the influx of tourists sustainable. They argue that a prerequisite for this is greater awareness of the problem on the part of tourists themselves. As part of a larger project on sustainable tourism and people's perceptions of this in different parts of Europe, they investigate the understanding and attitudes of people towards the concept of sustainable tourism in the countries of the Visegrád Group. The results of their survey show that, while respondents demonstrate understanding of what sustainable tourism means, this frequently does not translate into a consequent and coherent behavior. They argue that further research can become a stimulus to investigating ways of rethinking and changing behaviors.

In "Community participation in creating sustainable community-based tourism", Kurniawan, Astuti and Syifauddin consider the question of the welfare of the local community of tourist destinations, together with that of environmental and cultural preservation. Their research investigates community participation in realizing sustainable community-based tourism in Karimunjawa, Indonesia. The results show that community participation in realizing sustainable community-based tourism is a combination of Spontaneous Participation and Induced Participation, involving elements of participation that are active and bottom-up while others that are passive and top-down still remain.

Another striking characteristic of *Homo sapiens* has been to go beyond satisfying our basic needs for survival and develop increasingly high rates of consumption. This has led to the consolidation of embedded over-consumption patterns, the frenetic generation of techno-scientific innovations for resource gathering and accumulation, the establishment of forms of organization based on the principle of growth as an accelerating tendency towards *increase* in every sphere of human activity, population dynamics, and urban settlements. At whatever scale, increasing consumption, population size and density inevitably lead to waste production and concomitant problems related to waste management, sanitation, and the spread of disease.

In "Improving household waste management through a door-to-door collection in Ruaka Town, Kenya" Chisika and Yeom explore ways of improving household waste collection in urban areas by comparing households served by door-to-door waste collection and those without it. Their results show that door-to-door solid waste collection can induce positive behavioural changes and enhance sustainability at waste generation points. They argue that the resulting waste separation and recycling can help improve revenue from waste management and help resolve the waste financing gap facing many governments. At the same time, current practices are unsustainable and can reinforce inequality. More studies are necessary to investigate the correlation between individual household demographic attributes and the effectiveness of door-to-door waste collection Moreover, priority must be given to regulating door-to-door service, increasing citizen participation in waste management, and improving waste separation at the source to measure the system's maximum impact.

In "Health Literacy Programme and Proper Solid Waste Disposal Habits Among Housewives in Onitsha, Anambra State, Nigeria", Okorie and Ihemegbulem investigate different aspects of the efficacy of a health literacy programme related to understanding the dangers of improper disposal of waste, building the necessary knowledge for proper disposal, and developing a positive attitudinal change towards personal habits. Their findings show that the community health literacy programme has achieved good results in each of these areas. They illustrate further recommendations for developing the programme to increase its efficacy in terms of behaviors.

In "The Impacts of Covid-19 on Household Behavior and Household Waste" Yalçınyiğit, Dönmez-Turan, Akbaş and Varank examine the impacts of Covid-19 pandemic on household behavior and waste in Istanbul. Their research shows that mask, glove, disposable bag usage, cooking at home, online shopping, cargo arrival, dishwasher and washing machine usage all increased, while ordering food from outside decreased. Consequently, medical, food, disposable bag and plastic waste also increased. The authors also investigate the correlation between the changes in household behavior and waste disposal and income and household size. Their findings show the importance of developing specific management strategies for medical, food and plastic wastes and for households with different socio-economic backgrounds.

Human trajectories leading to the increasing pervasiveness and dimension of urban settlements as complex systems based on intricate and dynamic relationships can be analysed from many other perspectives. One is the way in which they have given rise to a multidimensional heritage, involving both tangible and intangible

components, that can be variously analysed through the lens of sustainability in terms of urban heritage management.

In "The development of a construct in the heritage urban sustainability index" Saleh, Mahat, Hashim, Nayan, Suhaily, Ghazali, Hayati and Utami consider the question of identifying sustainability indicators for the creation of sustainable cities for communities, with reference to the development of a heritage urban sustainability index construct in Malaysia using exploratory factor analysis. Their study is based on five main constructs of urban heritage sustainability: economic prosperity, social well-being, environmental well-being, cultural heritage, and the role of government and community. The results demonstrate the relationship between the items that constitute each of the constructs. The authors believe that their findings can help research on the sustainability of heritage cities in other areas.

The intersecting trajectories of *Homo sapiens* and forest ecosystems have given rise to a vast literature in recent decades. The focus has been principally on the reasons for and the consequences of the massive human destruction of ever-increasing areas of tropical rainforest. Forest ecosystems have been analyzed as a key provider of many ecological services related to climate, water, air, energy, biodiversity, and innumerable others.

Only very recently has there been a development of a literature related to the benefits that can derive for human beings, as for all living organisms, from a relationship with forests as a therapeutic environment. In "Return to forests. Therapeutic potential of woodland environments.", Piras argues that, while forests can undeniably be beneficial for human beings, there are still open questions that need further research concerning what is beneficial for whom and for what aspects of human psychophysical health. At present there is neither a clear understanding of the characteristics to look for in the forests nor of the activities to be carried out there. She illustrates two lines of research. The first aims at investigating forest ecosystems with a high degree of biodiversity and their relationship to individual human characteristics and needs and types of activities. The second refers to the possibility of benefiting from forests in terms of a *pathway* by which the patient develops, rather than acquires, an ability to relate to forests themselves. The pathway consists of five stages – biophilic, sensory, haptic/proprioceptive, adaptive, integrative – and becomes a circular path in which each phase is gradually retraced employing the new skills and competencies developed previously.

Citation

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Original Paper

Sustainable tourism: tourists' behaviour and their impact on the place visited

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Keywords: overtourism, survey, sustainable tourism, tourists' behaviour, tourism impacts.

Abstract. *With more members of society increasingly becoming more affluent, greater ease of movement around the world, cheaper airline tickets, and intense competition on websites that offer accommodation, tourism has become more and more popular. Many places have become a destination for tourists, not only because of their tourist value but more often because of fashionable trends. This is consequently associated with increasing overcrowding in such places, and thus with the occurrence of the phenomenon termed overtourism. Potential salvation for such places lies in attempts to incorporate the*

concepts of sustainable tourism into their way of operating. However, for this to be successful, tourists must also understand the need to change attitudes and behaviors. Otherwise, it will be hard to do anything that achieves a true impact. The aim of this paper was to assess the attitudes of people from the countries of the Visegrád Group (i.e., the Czech Republic, Poland, Slovakia, and Hungary) towards sustainable tourism, with the emphasis on their understanding of the concept and incorporating it into their travel habits. The survey was conducted in the form of an online questionnaire administered to residents of these countries. The survey is part of a larger project on sustainable tourism and people's perceptions of this tourism in Europe. The results of the survey showed that the respondents understand what the concept of sustainable tourism means and what its assumptions are. However, this often does not translate into changing their behavior and applying these assumptions within their lives as tourists. Conducting similar research, however, can be a way to encourage respondents to rethink and change their behavior. At the same time, it is also necessary to help build scientific knowledge in the context of sustainable development and sustainable tourism in order to inform policies and decisions.

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1. Introduction

Tourism is an important sector of service industries that has been constantly growing at an ever-increasing pace in recent years. There is a continuous growth in the number of tourists around the world, especially in the most popular tourist destinations (Heslinga, 2018). Major tourist-related investments and changes can be seen in areas such as transport, the hotel industry, catering, trade, and the production and sale of souvenirs. This creates new jobs, which results in the local community having the opportunity to earn money and live better, which is especially important in places with high unemployment. Tourists potentially bring income to the place visited, so that it can be cared for, developed, and new investments can be made (Gonzalez et al., 2018; Scheyvens, 2009).

However, the positive developmental outlook for the future was abruptly interrupted when the COVID-19 pandemic swept across the world. The years 2020

and 2021 have witnessed a freeze in many sectors, including the tourism industry. With restrictions in many countries, movement bans, and mandatory quarantine, the pandemic has taken its toll on the industry's business (Mroz, 2021). Kuqi et al. (2021) argue that tourism is the sector most affected by the pandemic, experiencing a rapid and steep decline in demand and an increase in job layoffs. This not only leads to lower revenues for the tourist destination but also for its residents. Consequently, adequate synergy is needed between tourists and tourist destinations. It remains to be seen to what extent tourists, businesses, and people who profit from tourism will be able to initiate a new cycle of sustainable tourist growth.

Almost everyone likes traveling, especially to relax and change habitual environments. Every year people look for new and interesting places to visit (UNWTO, 2018). The choice of destination is determined by various factors, such as the cost of the trip, its duration, and the interests of the traveler. Due to the increasing affluence of parts of society, wider access to modern means of transport, lower costs of travel, and simplified procedures for obtaining the necessary documents, traveling is becoming easier and more frequent (Pan et al., 2021; Japutra, Hossain, 2020; Baryshnikova et al., 2020).

People want to spend their time actively while exploring new places that they may have seen on television or read about online (Beeton, 2016). Information about interesting places that are worth visiting or various events can often be found on the Internet. People are naturally curious about the world, about other cultures, about other lifestyles, and the best way to get to know them is to travel. This makes tourism a significant element of globalization. Tourism has become one of the principal industries in the world, characterized by the largest and fastest growth (Gorica, 2007). According to Eurostat (Eurostat, 2021) the number of employees (full and part-time) in the tourism sector in European Union countries rose from 216 214.6 thousand in 2011, to 220 915.0 in 2015 and 232 612.9 in 2019. The overall growth rate in the sector has been in line with a 2011 forecast of 3% per annum (Hills, 2011). Although the COVID-19 pandemic has severely impacted on the industry, it would seem likely that sooner or later rapid growth rates will be resumed.

Unfortunately, with the increase in the number of travelers, especially for tourist purposes, the phenomenon of *overtourism* has emerged. Well-known European examples of where the negative effects of overtourism are felt are cities such as Barcelona, Berlin, Lisbon, and Prague (Koens et al., 2018; Milano, 2017; Novy and Colomb, 2016; Ingaldi, 2020). With the growth of tourism, local stakeholders have started to loudly voice the need to counteract the problem of overtourism.

Overtourism should be considered from two perspectives: the right of tourists to travel and the right of residents to live in peace and dignity (Perkumiene and Pranskuniene, 2019). Without tourists, many tourist destinations would not survive since tourists are the main source of income. However, residents, tired of the influx of too many tourists, and often their strange or inappropriate behavior, may attempt to find other sources of income. Several studies have been exploring the relationships between the rights of tourists and residents from different perspectives (e.g., Juss, 2004; Dauvergne, 2004; Gilbert, 2014).

The solution that is proposed for many tourist destinations burdened with overtourism is developing ways of implementing *sustainable tourism*. The main idea behind this concept is to minimize the negative effect of tourism on the environment and local culture while helping generate employment opportunities and income for residents. The goal of sustainable tourism is to ensure that development brings a positive experience for local communities, tourism businesses, and tourists themselves (Peeters, Dubois, 2010; Larsen, Guiver, 2013; Canavan, 2014). For sustainable tourism to be properly implemented, it needs to be understood both by tourists and the local population. Only in this case is it possible to implement its underlying assumptions.

It should be remembered that this will not only improve the condition of the natural environment or have a positive impact on local communities, although these are the most important premises for the implementation of sustainable tourism. There should also be an improvement in the quality of the various services offered to tourists (Ulewicz, Blaskova, 2018; Anttila, Jussila, 2018; Staniszewska et al. 2020; Kardas, 2016). High quality of services should translate into tourist satisfaction, and at the same time into an appropriate level of prices. Therefore, the income of the members of local community and of the specific place visited as a whole can increase (Zelga-Szmidla, Kapustka, 2019; Teplická, Hurná, 2020).

The following study aimed to explore the attitudes of people from the countries of the Visegrád Group towards sustainable tourism. The survey was conducted using the authors' questionnaire distributed through Internet forums and social networking sites among residents of these countries. The questionnaire included 15 statements concerning the organization of holiday trips and tourist behavior during such trips, rated on a five-point Likert scale, and 6 questions designed to test respondents' understanding of the basic problems of sustainable tourism. This survey was developed based on a previously conducted literature study. The findings themselves were also compared to other studies on similar problems that have been published in recent years.

2. Literature review

Year by year, the issues of tourism in the context of sustainable development are becoming an increasingly important aspect of research on both the tourism sector and the problems of sustainable economy related to the environment. Numerous in-depth studies in this field have been published over a period of several years. An exhaustive review of publications from the previous few decades is included in a paper published in 2013 (Nunkoo et al., 2012), which highlights an increase in both methodological sophistication and awareness of the theory behind the research. In the extensive literature on green tourism, publications dealing with the negative effects of excessive (and therefore harmful from the point of view of sustainable development) activity of tourists are worthy of note.

Among the most important papers in scientific journals dealing with this issue there are many examples whose authors adopted overtourism as the specific focus of their investigation. Some of these studies were conducted using a method like that presented in our paper, i.e., a questionnaire designed on the basis a literature review and previous experiences in studying the problems discussed (Muler Gonzalez et al., 2018). However, this is often the only similarity. Publications tend to focus on residents of tourist destinations rather than on tourists themselves, which represents an important difference in examining attitudes and behaviors that negatively impact on the environment. At the same time, the published research is not only useful for investigating solutions, but also helps formulate questions properly. The term overtourism itself is sometimes misused, or at least used in very different contexts (Koens et al., 2018). This should not be surprising, although there are often doubts as to whether it is related to a new line of research or simply used as another term for a long-known phenomenon (Capocchi et al., 2019).

Undoubtedly, the problem of overtourism has become of increasing importance in recent years, as it leads to discontent and conflict in terms of social relations, and, at the same time, resistance from activists aware of the potential threat and demanding action to reduce harmful effects of tourism (Milano et al., 2019). This is often linked to the notion of degrowth, understood to mean demands to limit the unfettered growth of the capitalist economy, which can be considered complementary to objections to overtourism (Fletcher et al., 2019). Therefore, regardless of the theoretical investigations, the problem is important from an economic, social, and environmental point of view. Moreover, by its very nature, it is also interdisciplinary. For this reason, it is important to clearly define precisely what the research involves at the stage of method description. Questions are usually asked based on the assessment of the effects of overtourism (or otherwise

harmful tourism), whether from the standpoint of tourists or residents. Analyses targeting local residents may have some specific assumptions, including those related to sustainability, for example, in the context of tourism area life cycle theory (Lee, Jan, 2018).

While from a social point of view the attitude of residents seems to be particularly important (it is also the one most often studied, even when the axis of tourist-resident relations is analyzed (Cheung, Li, 2019)), from the point of view of attitude formation and concern for sustainable development, observations of the attitudes of tourists seem to be underrepresented. Among the important research studies focusing on this topic (especially using a survey based on a large research sample), should be mentioned the analysis of tourists of one of the most popular destinations in Norway (Oklevik et al., 2019). An important conclusion drawn here is that tourist areas should cater for people who visit them in terms of length of stay, expenses, and intentions. This helps build a sustainable tourism economy, without severe restrictions, by creating one that is better adapted to economic, social, and environmental conditions. It offers a path for possible exploration that represents a more rational point of view, different from that of the often-critical residents or community activists who might see a problem but are unable to propose a constructive solution. Only the search for a kind of activity that considers both the needs of the environment and the attitudes and expectations of visitors, can result in the development of an effective strategy for sustainable tourism.

As can be seen from this review, research on tourist behavior and attitudes is among the most important issues concerning the tourism industry. Frequently cited publications in this area, directly concerning current problems, already appeared at the beginning of the second decade of the 21st century. Obviously, this is related to the then growing interest of researchers in tracking the impact of the economy on the environment in the context of the idea of sustainable development. Even then, it was noted that while humans are inclined to adopt pro-environmental attitudes in their places of residence, when assuming the role of tourists, they tend to show much less awareness of and commitment to such problems (Barr et al., 2010). Subsequent analyses were devoted to this observation, including those leading to the conclusion that motivating visitors to behave pro-environmentally during holidays is not a simple task (Ballantyne et al., 2011a). This finding is significant because the growing environmental awareness within society may obscure the fact that a correct attitude suffers reduction during trips.

Similar premises were used when investigating the attitudes of tourists seeking wilderness experience, calling for actions that foster personal engagement to

encourage sustainable activities and practices. It was also noted that, depending on the impressions of visitors, these attitudes may persist for shorter or longer periods of time (Ballantyne et al., 2011b). Equally important for this type of tourist destination is to consider the potential for sustainable tourism in specially protected areas such as national parks (Cetin et al., 2018). Nevertheless, the problem of visitor attitudes affects virtually every type of destination, as they are all exposed to the effects of climate change. It is worth noting that the real attitudes and actions of tourists related to the needs of the environment are also important, although these are not easy to explore and interpret (Gossling et al., 2012). Therefore, analyses aimed directly at the identification of attitudes declared by tourists and their less frequently formulated expectations and motivations are extremely important for the future of effective actions aimed at reducing the harmful effects of tourism. In this respect, it seems reasonable to search for a balance between environmental and social concerns.

Years ago, the impact on society caused by the constant flow of tourists was already noted, and more in-depth qualitative research on their interrelationship was called for (Deery et al., 2012). This should not be underestimated, especially since it cannot be ruled out that the two dimensions are closely linked, especially in recent times. This, of course, does not exclude the use of quantitative methods, based, for example, on techniques related to big data, as is already being done both for tourist behavior (Miah et al., 2017) and by analyzing the effects of their presence, for example in the form of a carbon footprint (Henar Salas-Olmedo et al., 2018). Emphasizing the importance of qualitative methods should serve as a reminder of the need for in-depth analyses that are ultimately intended to lead to a better understanding of tourists' decisions and attitudes. This can be attempted through various means, including a systematic literature review (in scientometric terms (Fang et al., 2018)), but due to the evolving nature of this sector of the economy, empirical research seems to be the most effective approach. In this group, the survey or interview techniques are most popular. Furthermore, it is common among researchers dealing with these problems to focus on a geographic region, not necessarily a specific location, as there may also be similar locations in a larger area (Ali et al., 2018). There is no doubt that a survey or interview targeted on an essentially homogeneous group of tourists can lead to more consistent results, which in turn can later be used by local industries to improve both services and marketing and increase care for the environment. The transformation of tourist areas towards improving the comfort of young people, who are constantly using ICTs and the Internet, and therefore expect adequate facilities regardless of the type of tourist destination, is an important and developing issue (Femenia-Serra, 2019). One of the interesting directions of

contemporary trends is also the tourism networks organized according to Islamic rules (Al-Ansi, Han, 2019). The all-encompassing view of the tourism industry is indicative of the ever-increasing internationalization and globalization. Nevertheless, in order not to be harmful, any development must be accompanied by adequate environmental attitudes, something which is unanimously indicated by all significant contemporary published research.

In conclusion of this analysis of previous publications, it is worth noting that both the validity of the research and the empirical approach play an important role in them. The rapid evolution of the tourism sector, society in general, and, above all, questions related to the environment, makes it necessary to constantly supplement previous knowledge with conclusions concerning previously unknown or neglected aspects and conditions. Only by learning about the expectations and behavior, and thus the attitudes and choices, of tourists, is it possible to reliably draw conclusions about the current state and the near future of tourism. The available empirical studies are dominated by those concerning a specific aspect of tourism services or a given geographical area. However, analyses conducted on consumers in this sector can show greater cognitive usefulness than those conducted on providers of these services. At the same time, certain uniqueness of offers and attractiveness of given destinations, and diverse needs and expectations of tourists from a specific area, suggest the need for developing research based on a certain unification of populations. Therefore, the conclusions drawn will be more legible and possible to implement by eventual practical recipients of the research results. Efforts to learn more about tourists' attitudes should also continue so that measures can be developed to ensure that sustainable tourism increasingly reflects the realities of both the industry and consumer behavior, and that overtourism becomes less of a problem.

3. Materials and Methods

The overall study was designed to analyze the attitudes of people in different regions of Europe towards sustainable tourism. The research was part of a larger research project the authors were involved in. The authors started their research with the Visegrád Group countries, as they come from one of these countries and collaborate with several universities from other countries in the same region. Another aim was also to ascertain the difference between these countries and Western European countries. A great socio-cultural transformation has taken place in Central and Eastern Europe over the last 30 years. With the free-market economy and no restrictions on movement, more and more people are spending

their holidays in different parts of the world, although there are still many people who consider price as a determining factor. Therefore, further research in Western European countries and a comparison of the results of both phases of the research are planned to examine whether these differences are still observed between the various parts of Europe, also as regards sustainable tourism in general.

The study was divided into two parts. The first part was conducted in the form of an online survey. It was made available through various Internet forums and social networking sites. Over 2,500 respondents from the Visegrád Group countries participated. The survey was made available in English, which may have had an impact on its results, as it could only involve people with the necessary level of communicative competence in that language. However, this solution allowed the survey to be targeted to a wider range of respondents and to include the international community. The research using this tool was conducted in the period from January to November 2019. This part is presented in this paper.

Before conducting the survey, in November 2018 pilot studies were carried out on 30 respondents from Poland to check the correctness of the survey (the content of the questionnaire in electronic form), the correctness of response collecting process (form operation) and the manner of answering by the respondents (understanding the questions, especially in the second part of the survey). To avoid bias, these responses were not included in the final analysis.

The survey was divided into three sections. The first part included questions about the respondents' tourist preferences. Respondents were asked to rate the statements concerning tourism on a Likert scale of 1 to 5 (1 meaning "I totally disagree", 5 meaning "I totally agree"). The numbers of the statements were used in the subsequent analysis of the results to identify them more easily.

1. I choose places that are popular with tourists.
2. I go on vacation from July to August.
3. I look for the most comfortable accommodation possible.
4. I look for accommodation close to tourist attractions.
5. I use the services of travel agencies.
6. I like to spend time during my vacation in luxury.
7. I prefer to travel by plane.
8. I don't like trains/buses.
9. I choose the best restaurants.
10. I choose franchised restaurants (e.g., McDonald's, KFC).
11. I like visiting trendy tourist destinations.

12. I like visiting places that are promoted on social media by famous people.
13. I like looking into every nook and cranny, even the forbidden places.
14. I like crowds.
15. Residents of tourist destinations should welcome tourists with open arms because they bring in money.
16. The visited place should pay for cleaning and removal of garbage left by tourists.
17. Tourists have priority.
18. Tourists during vacation time are entitled to have a good time, even at night.
19. I will pay almost any price for the opportunity to visit a unique place.
20. I will pay almost any price for the opportunity to purchase unique memorabilia.

The statements were structured in such a way that responses of 5 in most cases mean that respondents do not consider sustainable tourism when choosing their holiday destination and when traveling. Respondents were not informed of this fact so as not to influence their responses.

The second part of the questionnaire was to check the extent to which the respondents understand sustainable tourism. The structure of the questions and possible answers was quite different from the previous part of the survey. They were asked 6 closed questions to which they were requested to answer: 'Yes', 'Neither yes nor no', 'No', 'I don't know'. A symbol was added next to the questions, which was used in the subsequent analysis of the results. The letter P was added to ensure that these symbols do not interfere with those used in Part 1 of the survey.

1. Do you identify agritourism as an element of sustainable development in the context of human impact on the natural environment, while meeting the social, economic, and environmental needs of both present and future generations? (P1)
2. Do you think that agritourism is not only a chance for the economic revival of rural areas but also a form of promoting ecological thinking and greater respect for the environment? (P2)
3. Do you think that sustainable tourism also includes the development of the production of foods with higher ecological parameters and traditional food? (P3)

4. Do you believe that sustainable tourism consists in maintaining the integrity of the landscape, cultural values, and attractiveness of the village and surrounding area? (P4)
5. Do you think that sustainable tourism also means promoting the protection of the natural environment while taking into account economic and social aspects? (P5)
6. Do you think that development of sustainable tourism is a determinant of the development of infrastructure supporting green solutions in transportation, energy production, waste, sewage and water management, and services for tourists? (P6).

The third part of the questionnaire was respondent data (gender, age, education, place of residence, and status). It allowed for statistical analysis of the structure of the sample of respondents.

The use of a five-point Likert scale in the first part of the questionnaire allowed for analysis of the survey results for the reliability of the responses. The Cronbach's alpha test and the standardized Cronbach's alpha were used, and the results of the analysis were interpreted according to the assumptions presented in Hair et al. (2003). It is assumed that a Cronbach's alpha index over 0.7 means that the collected data is suitable for further analysis. This analysis was the first part of the questionnaire. A scale analysis was conducted to see which ratings were most frequently given by respondents. The results of the assessments were then analyzed, i.e., basic statistics and percentages of each assessment were calculated.

The second part of the questionnaire was also analyzed. Due to the specificity of the possible responses, it was not possible to compile the results in a similar way as in the first part. The percentages of each assessment were calculated and presented in the form of a cumulative bar graph, which clearly highlighted the differences in responses.

In the questionnaire, respondents were also asked to indicate whether they wished to take part in further research in the form of a face-to-face interview. About 8% of the respondents declared their willingness to do so, and eventually 26 people from the Czech Republic, Poland and Slovakia took part in the interview. This part was intended to find how the respondents define the concept of sustainability and sustainable tourism in particular, but also whether they apply their principles in their lives during holidays. This was the second part of the

overall project. The results of the face-to-face interview were also analyzed, but they represent a separate study and are not presented in this paper.

4. Results

There were 2569 respondents to the survey. For formal reasons, 62 questionnaires were rejected as they were incomplete. Subsequently, 2507 questionnaires were further analyzed (Table 1).

	Number	Percentage
Observations, including:	2569	100.00
valid	2507	97.59
excluded	62	2.41

Table 1. Data analyzed (own study).

First, the structure of the sample of respondents was analyzed to see what the statistical profile of the respondent was. The results of the analysis are presented in Table 2. The majority of the respondents was male (58.3%). Most respondents came from Poland (45.6%), followed by Slovakia (24.7%). Perhaps this is due to the authors' country of origin and thus better (direct) dissemination of the survey.

The most frequent respondents were aged 21-30 years (32.4%), followed by those aged 31-40 years (21.9%), and 41-50 years (19.4%). Perhaps these are the groups of people who travel the most and organize their vacation time on their own. The lowest percentage was recorded for those over 70, which may be due to two reasons. The first reason is digital exclusion. People of this age often do not use computers or the Internet, although this situation is slowly changing in the countries of the European Union. The second reason, especially in the Visegrád countries, is that people over 70, living on a pension, can rarely afford the luxury of a distant holiday.

Analysis of the social status and education reveals that the respondents were mainly people who were employed (59.6%) and self-employed (21.8%), mostly with higher (42.3%) or secondary (31.3%) education levels. These are groups of people who are more likely to be able to afford to travel.

The last characteristic was the place of residence. The majority of respondents came from cities with a population of over 300 thousand (34.1%) and from cities with a population between 201 and 300 thousand (26.7%). Therefore, it can be stated that the most typical statistical respondent is a young male Pole aged 21-30, employed with higher education, living in a city of over 300 thousand inhabitants.

Characteristic	**Option**	**Percentage**
Gender	female	41.7
	male	58.3
Nationality	Czech Republic	17.3
	Poland	45.6
	Slovakia	24.7
	Hungary	12.4
Age	Up to 20	7.6
	21-30	32.4
	31-40	21.9
	41-50	19.4
	51-60	14.8
	61-70	3.7
	Over 70	0.2
Social/professional status	pupil/university student	11.2
	employed	59.6
	unemployed	4.2
	self-employed	21.8
	pensioner	3.2
Education	primary education	1.2
	lower secondary education	6.5

	vocational education	18.7
	secondary education	31.3
	higher education	42.3
Place of residence	rural areas	8.1
	city with up to 50 thousand inhabitants	9.4
	city with 51 to 100 thousand inhabitants	11.3
	city with 101 to 200 thousand inhabitants	10.4
	city with 201 to 300 thousand inhabitants	26.7
	city with over 300 thousand inhabitants	34.1

Table 2. Respondents' characteristics (own study).

In further analysis of the results, Cronbach's alpha and standardized Cronbach's Alpha coefficients were used to assess the reliability of the questionnaire (Table 3). The Cronbach's alpha test resulted in a score just below 0.8, and the standardized Cronbach's alpha was well above this value. According to Table 2, these scores mean good (Cronbach's alpha) and very good strength of association (standardized Cronbach's alpha). According to Table 1 and previous assumptions, such results indicate the reliability of the study, so the results were further analyzed.

	Cronbach Alpha	**Standardized Cronbach Alpha**	**No of items**
Questionnaire Part 1	0.793	0.831	20

Table 3. Cronbach's alpha coefficients: questionnaire Part 1 (own study).

In analyzing the responses given by the respondents, the scale statistics were first evaluated. Table 4 illustrates what the mean, variance, and standard deviation would be on a scale composed of all five items analyzed (a Likert scale of 1-5 was

used). It can be observed that the adopted scale can take values from 20 (if the respondent chooses the lowest possible value for all items, i.e., 1) to 100 (if the respondent chooses the value of 5 for all values). The mean was 51.14 on this scale, which is about the middle of the scale and indicates a rather indifferent attitude of respondents towards sustainable tourism.

Mean	Variance	Standard deviation	No of items
51.14	133.306	11.546	5

Table 4. Scale statistics: questionnaire Part 1 (own study).

Next, the mean and standard deviations were calculated for the scores of each item and each group of items (Table 5). The mean for all responses was 2.56, indicating that respondents either disagree or are indifferent to the statements. Therefore, it can be concluded that, in general, respondents only partially consider sustainable tourism assumptions when deciding where to travel and during the trip itself. The standard deviation for all responses was 1.21, which, for the variable studied, implies considerable variation in responses.

The highest mean was recorded for statement 4: I look for accommodation close to tourist attractions. In this case, the mean was 3.86, i.e., almost 4, which means that the respondents agree with the statement. It seems likely that the cost of accommodation or crowds of tourists are not important for them. The important thing is that the location should be close. It can be concluded that, when choosing accommodation, tourists consider their convenience more than sustainable tourism objectives.

In many cases, the mean was close to 3, indicating respondents' general indifference to the statement and to sustainable tourism itself. This means that in the case of these statements, the respondents are not guided by their convenience, nor do they pay attention to making a choice during their holidays considering only their own interests, but at the same time they do not behave coherently with the assumptions of a sustainable development and sustainable tourism. On the one hand, this situation can be positively assessed, because the respondents are not guided only by their own good or their comfort, and do not behave too selfishly. This does not mean, however, that they base their choices and the course of holidays solely on the good of the visited place, its inhabitants, or also other tourists. It should be emphasized that sustainable tourism is not only a given

place and its inhabitants, which should be considered in various respects, but also the rights of other tourists.

The lowest value was recorded for statement 17: Tourists have priority. Its mean was 1.32. It can be concluded that the respondents are aware of the right of the local community to live peacefully and that tourists should respect the rules of the place. A few statements were rated below 2 on average, which is very positive because also in these cases respondents on average disagree with the statements. This means understanding the need to consider sustainable tourism when traveling.

In the case of statements for which the average score was below 2, it can be said that the respondents consider the rights of visitors and inhabitants during their vacations, they understand that this is the home of ordinary people who deserve peace and respect, and the place itself should not be destroyed.

Statement 5: I use the services of travel agencies and its low rating (i.e., not agreeing with a given statement) is not entirely consistent with the assumptions of sustainable development. The operation of tourist agencies allows the employment of a community living not only in the visited places (e.g., residents), but also where tourists come from. Partly, the use of travel agencies leads to groups of tourists who travel together using one common mode of transport, which may have an impact on the environment.

Statement 10: I choose franchised restaurants (e.g., McDonald's, KFC) and its low assessment means that the respondents either use their own food (e.g., preparing meals on their own), but also can use local restaurants, getting to know the cuisine of a given town, which results not only in supporting local companies, but also willingness to learn about the culture of a given place.

Many respondents disagreed with statement 14: I like crowds. This means that many respondents prefer to visit less popular places with fewer tourists and therefore easier access to local attractions. From the point of view of sustainable tourism, this is good for such places as it permits earning money from tourism, but without a heavy tourist burden.

Statement 19: I will pay almost any price for the opportunity to visit a unique place, and statement 20: I will pay almost any price for the opportunity to purchase unique memorabilia, and their low assessment also deserve special attention. The respondents disagreed with these two statements. Even though in many cases the respondents are educated people in employment from larger cities, they do not want to spend a fortune on the chance to choose a place or souvenirs.

They want to have a good time, visit a new place, but not at all costs. Perhaps from the tourism enterprise's point of view, this is not good, as it means customers are reluctant to spend large sums of money. However, from the point of view of tourists themselves, and as a society, it is a financial saving that can be used in other ways.

Statement	Mean	Standard deviation
1	3.16	1.103
2	3.14	1.455
3	3.05	1.541
4	3.86	1.070
5	1.92	1.343
6	2.30	1.540
7	3.19	1.449
8	2.27	1.388
9	2.62	1.260
10	1.97	1.262
11	3.19	1.352
12	2.46	1.348
13	3.32	1.253
14	1.68	1.116
15	2.35	1.299
16	3.35	1.144
17	1.32	0.773
18	2.32	1.275
19	1.89	1.157
20	1.76	1.282

Table 5. Item statistics: questionnaire Part 1 (own study).

Next, the percentages of ratings given to each statement were calculated, which allowed for the analysis of the structure of the responses (Table 6). It can be noted here how substantially the respondents differed in their answers. What should be emphasized is that for several statements no rating of 5 (completely agree) was recorded. This was the case with statement 1: I choose places that are popular with tourists, statement 9: I choose the best restaurants, statement 17: Tourists have priority, and statement 19: I will pay almost any price for the opportunity to visit a unique place. However, it is difficult to assess the extent to which respondents are driven by the idea of sustainable tourism. The fact that the survey was conducted among people from the countries of the Visegrád Group should be considered here. These are countries with a lower economic status than countries in Western Europe. In a number of cases, social status and travel cost may determine to some extent where and how people travel.

	Percentage fraction of answers				
Statement	**1**	**2**	**3**	**4**	**5**
1	16.22	5.39	24.32	54.07	0.00
2	24.93	5.43	23.41	22.14	24.09
3	29.73	5.44	16.28	26.93	21.62
4	5.93	5.62	16.39	42.31	29.75
5	62.16	10.81	5.41	16.22	5.41
6	54.05	2.70	16.22	13.51	13.51
7	24.38	5.43	16.11	35.17	18.91
8	48.65	5.48	24.32	13.48	8.07
9	32.43	8.11	25.38	34.08	0.00
10	59.21	2.78	21.62	13.48	2.91
11	18.92	2.70	32.43	29.73	16.22
12	40.54	8.17	18.92	29.73	2.64
13	16.22	5.42	21.59	43.24	13.53
14	70.19	2.82	18.92	5.41	2.67

15	43.24	2.73	35.14	13.51	5.38
16	10.81	8.17	29.74	37.74	13.54
17	83.78	2.70	10.81	2.70	0.00
18	43.24	5.68	29.72	18.64	2.72
19	59.46	5.46	21.62	13.46	0.00
20	70.23	2.73	16.23	2.67	8.14

Table 6. Percentages of answers to individual questions: questionnaire part 1 (own study).

Part two of the questionnaire was further analyzed, although the specificity of the possible responses in this section made it impossible to conduct as thorough an analysis as in the first part. Only the percentages of each response were calculated and presented as a cumulative bar graph (Figure 1).

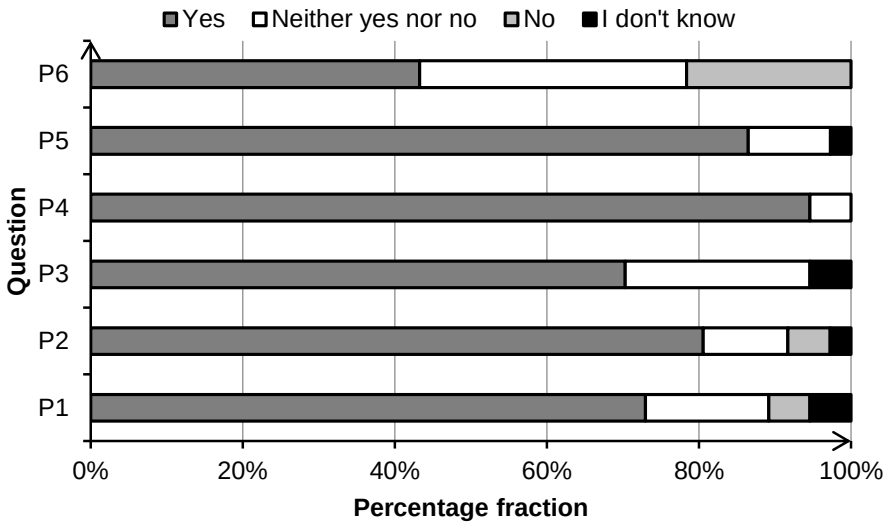
The analysis of Figure 1 and the first part of the questionnaire reveals several interesting elements to note. For all questions, 'Yes' was the predominant answer, meaning that most respondents agreed with the statements. Most 'Yes' responses were recorded for items P4 and P5. In these two cases, no negative responses were observed.

The smallest number of 'Yes' responses (over 43%) was recorded for item P6. However, many respondents were not sure of their opinion in this case and answered, 'Neither yes nor no' (over 35%). This item had the highest number of negative responses (over 21%). However, such a situation may have been influenced by the question itself, which is long and may seem difficult to understand, and only slightly more than 42% of the respondents declared a higher education level.

It can be concluded from the answers given in this part that the respondents understand the idea of sustainable tourism, although the first part of the survey revealed that they do not fully follow its principles in everyday life. It should be remembered that the research involved mainly educated and employed people from larger cities, who by now realize that to survive, to be able to continue living on our planet, it is necessary to take care of the natural, social and economic environment, and thus act in accordance with the principles of sustainable development. In the case of tourists, these are the assumptions of sustainable tourism,

which will not only allow them to enjoy the visited place, but at the same time allow for the proper development of this place, the well-being of its inhabitants, without unnecessarily interfering with their lives and destroying the natural environment.

Figure 1. Percentages of answers to individual questions: questionnaire part 2 (own study).



5. Discussion

The findings presented should be related to other studies in this field recently published in journals. Indeed, some of the studies on sustainable tourism and overtourism show different perspectives, both of tourists and the local community and its representatives. In their research, Aall and Koens (2019) demonstrated that, in terms of social sustainability, there is a conflict between the quality of various aspects of the life of residents and urban development in favor of the tourism industry. Furthermore, there is also a conflict between local people, with their desire for good local environmental standards, and visiting tourists, leading to several local environmental problems related to overtourism. Researching these problems is of great importance for the development of solutions. It is also

important that the tourists themselves understand that, in addition to their right to leisure and sightseeing, they must also respect the right of the local communities to a peaceful and normal life. In this respect, it can be said that both the Aall and Koens' study and the research presented in this paper show that tourists' understanding of what sustainable tourism means can have a positive impact on the place visited and its residents, as well as on tourists' enjoyment of their vacation.

In their study, Neuts and Vannestew (2020) referred principally to the point of view of the local community. They state that there is a concern in many places that tourism has become unsustainable. To promote a dynamic blend of visitors and residents, development strategies must consider the preferences of residents, particularly their right to live normal lives. Residents place high value on green space and improved commercial facilities and the prevention of overcrowding. The research identified the need to accommodate individual differences in preferences and to reconcile the potentially conflicting goals of cities both enhancing local livability and creating an attractive environment for visitors. At the same time, it should be remembered that tourists, by choosing to visit a place, spend money, helping create new jobs. This makes the question highly complex to analyze. Additionally, it should be remembered that both the residents and the tourists are responsible for the conditions of the place visited, and the comfort of living in and visiting it. Tourists need to understand their impact and that they must learn to live with the local community, a fact that also receives some confirmation from the results of the research presented in this paper.

A study by Liao and Chuang (2020) addressed tourists and their expectations of tourism, with an emphasis on package tours. The most important characteristics that tourists consider when choosing package tours were 'attractiveness', followed by 'accommodation', 'length of stay', 'price', 'cuisine', 'transport', and 'season'. Therefore, they were not really interested in whether this way of spending holidays can be called sustainable tourism, which is also in line with what emerges from our research. Only by keeping in mind the principles of sustainable tourism when choosing a destination for traveling, can tourists enjoy their vacation without causing harm to others and their environment. As with the results presented in this paper, the opinions expressed on selected factors related to sustainable tourism, which were included in the analyzed survey, showed that tourists approach them in different ways, but are slowly beginning to understand the problems related to overtourism and excessive impact on the lives of residents, because it also affects their comfort while travelling. A similar approach was presented by Katahenggam (2019). This author conducted research on tourists'

perceptions and preferences in Singapore's cultural heritage districts. The study found that demographic and geographical factors influence tourist preferences and that many tourists, also from other countries, are guided by these factors.

Ciocan et al. (2020) referred to rural tourism (agritourism), an area that has great growth potential. Currently, agritourism constitutes only a small part of tourism in general, but in recent years, its share has been growing regularly. Rural areas attract many tourists who appreciate this way of spending leisure time due to the picturesque landscapes and cultural habits nurtured for generations. They allow tourists to immerse themselves in the local environment, in nature, and help them understand what kind of life the local community has. It can be said that this way of spending a vacation has some elements of sustainable tourism. This perspective has been extended by the results presented in this paper, especially in the second part of the survey, where the respondents were asked about their knowledge concerning sustainable tourism, with particular emphasis on the questions marked P2, P3 and P4.

Leonte et al. (2016) also reported on tourists choosing agritourism destinations. They argued that rural tourism and agritourism, with high rates in rural areas, is a major factor with direct implications for local development and for meeting the consumption needs of tourists. According to the authors, the advantages of agritourism include better use of rural areas and natural conditions, excellent protection and development of cultural heritage and rural traditions, creation of new jobs, meeting the requirements of recreational tourism and traditional cuisine, offering specific products and menus based on local recipes, and contributing to the development of infrastructure. There are also several economic reasons that justify the implementation of socio-cultural initiatives in rural areas that can contribute to increasing the income of rural residents and thus the sustainable development and efficiency of the local economy.

Other interesting research results concerning sustainable tourism and agritourism were published by Ungureanu (2008). In this research, this author referred to tourism in Romania, with a strong emphasis on rural areas, which are particularly attractive in this country, especially from the point of view of folklore and preservation of the purity of the ancient culture. The author's concern was more about maintaining this culture for future generations than about the needs, attitudes, and behaviors of tourists themselves.

Wu et al. (2019) presented an approach to building a hierarchical framework for sustainable tourism. They included socio-economic, socio-environmental, and eco-efficiency aspects in their study. They also showed that tourism businesses

face conflicts in balancing economic growth with environmental impact. Their study proposed rewarding employees for promoting green processes, creating new green trade linkages with society, and establishing green organizations to increase competitiveness and profitability. These kinds of initiatives should affect the satisfaction of both tourists and the local community.

Tekalign et al. (2018) investigated tourists' preferences for tourism activities designed by local stakeholders in one of the oldest protected parks in Ethiopia. Despite many attractions, the local community benefits little from tourism, often coming into conflict with park managers. The study was designed to increase stakeholder involvement in sustainable tourism planning and revealed a mismatch between the preferences of tourists and the activities planned by the host community to engage them in tourism. To be implemented efficiently, planning and development of sustainable tourism must consider the differences in perceptions between host communities and tourists. Only then can tourism be considered sustainable.

Furthermore, a study by Cheung and Li (2019) was designed to show the tourist-resident relationships in terms of sustainable tourism. The researchers argued that all tourist destinations seek to increase the number of tourists, while less attention is paid to balancing the increase in the number of tourists with the resulting irritants for the local community. They mentioned overtourism, which poses a potential threat to many popular tourist destinations around the world. The authors suggest that decision-makers in such places should keep in mind that the deterioration of the visitor-resident relationships due to excessive tourism may lead to a significant hysteresis effect that will persist far beyond the original stimulus.

The research presented in this paper complements that of the previous literature cited, showing at the same time the topicality and validity of the investigations into sustainable tourism. It focuses on a highly significant interested party, the tourists, who decide where to go, what to visit and what to spend their money on, but often forget that a given tourist place belongs primarily to the inhabitants who live there. It must be said that many tourists are indifferent to these problems of unsustainable tourism and that they rarely take them into account when choosing their vacation destinations and during the vacation itself. They do not consider how their behavior affects the place they visit and the local community. And if they do, they are involved to an insignificant degree. This is one of the reasons why sustainable tourism is a difficult problem to address. At the same time, what emerges is that there is at least an increasing understanding of what sustainable tourism and overtourism mean.

6. Conclusions

With the ever-increasing number of tourists, many popular tourist destinations become crowded while sightseeing becomes more and more difficult and burdensome. Large numbers of tourists also cause difficulties for the local community and disturb their everyday life. Through their failure to respect specific rules and conform to certain standards of behavior, tourists damage the places they visit, drop litter, and negatively affect the environment. The excessive number of tourists leads to the phenomenon termed overtourism, which negatively affects tourist destinations.

However, it is important to remember that tourists increasingly create new jobs for the local community. The large amount of money they spend becomes income for the place visited and its residents. On the one hand, it should be remembered that a given tourist destination is a home for its residents and a part of the natural environment or cultural heritage, but on the other, it often has no chance for development without tourists. Therefore, the concept of sustainable tourism is of vital importance. The research presented in this paper showed that many people understand this concept and know what impact tourism has on the local community and the environment. However, too many tourists still do not consider sustainability principles in their behavior during their trips, concentrating their attention on their own expectations and rights without thinking about the place visited and the consequences of this behavior.

The present study is certainly not without limitations. Although the design of the questionnaire was based on a literature review, it was developed specifically for this study and may have been influenced by the subjectivity of the authors. Only selected papers were used for both the literature review and the discussion of the results and comparison to other studies. It was impossible to include all the papers available on the subject, and the authors were guided solely by their experience in selecting references. Although the survey topic was popular, the questionnaire was not completed as frequently as the authors had hoped, hence the smaller research sample size. To make it easier to reach respondents, the questionnaire was made available through various social media platforms and using the authors' closest professional contacts, which can be reflected in the structure of the sample of respondents. This may have led to the exclusion of people without or with limited access to the Internet. Moreover, the structure of the sample could have influenced the understanding of the questions and the answers given by the respondents, which were sometimes surprising for the authors. The last element may be due to the features of the research area (countries of the Visegrád Group). Perhaps respondents from other countries, especially those with

different approaches to environmental protection and sustainable tourism, would answer differently. However, this last limitation opens opportunities for future research in other European countries aand comparative study.

Nevertheless, it is important to continue this type of research, not only to see if tourists incorporate the assumptions of sustainable tourism in their behavior and habits and if they know what the phenomenon of overtourism is. Such research, principally based on as wide as possible respondent participation in the survey, can stimulate reflection and raise awareness, helping at least some people to change their attitudes. Even small steps can gradually contribute to improvements. Moreover, research conducted thus far can be the basis for further studies in the context of sustainable development and sustainable tourism, help build scientific knowledge on this subject and constitute a means of understanding more fully this complex question and making more informed decisions in the field of proper tourism management.

The authors intend to continue their research, making use of their cooperation network and extending the research to other European countries, thereby allowing for a broader and more detailed analysis of the problems studied. This will also allow the results to be used for a comparative study between different regions of Europe to see to what extent the behavior of tourists from different European countries differs. Conducting an in-depth statistical analysis will allow examination of the relationship between the answers to the survey questions and the individual characteristics of the respondents in terms of individual respondent groups.

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Authors' contributions

Both authors contributed to the conception and design of the study; material preparation, data collection and analysis; writing of the first draft of the manuscript; commenting on previous versions of the manuscript; reading and approval of the final manuscript.

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Original Paper

Community participation in creating sustainable community-based tourism

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Abstract. *Tourism is one of the fastest-growing economic sectors in the world. However, the development of tourism in various regions does not necessarily guarantee the welfare of the local community of the tourist destinations. Moreover, there is an inevitable correlation between the rapid growth of tourism and large-scale negative impacts. In promoting sustainable tourism development, national and local government need to pay attention to environmental and cultural preservation. There is also a need to prioritize the interests of local communities to foster a sustainable community-based tourism (CBT). This study analyzes the question of community participation in realizing sustainable CBT in Karimunjawa, an archipelago of 27 islands in the Java Sea. Primary and secondary data were collected with snowball sampling selection techniques, using participatory observation, interviews, and documentation. Data analysis was conducted using the interactive analysis method of data reduction, data presentation, and drawing conclusions. The results show that the typology of community participation in realizing sustainable CBT in Karimunjawa can be classified as the Spontaneous-Induced Participation type – seen from the planning, implementation, and supervision stages. The participation of the Karimunjawa community is the result of the interaction between spontaneous and induced participation. In some of its dimensions, participation is active and bottom-up, while, in others, participation is still top-down and passive. In this respect, we argue that sustainable tourism development will succeed only if spontaneous participation is enhanced. Since the research is limited to the Karimunjawa area, its results cannot be generalized to others. Any further studies need to conduct research on broader or different areas, so that a wider range of similarities and differences can be revealed and analyzed. In this way, it should be possible to identify the characteristics of successful community participation for sustainable tourism development.*

1. Introduction

Tourism is one of the fastest growing economic sectors in the world and acts as the main source of income for various developing countries (Sangkakorn and Suwannarat, 2013). Tourism can be a driving force for the growth of numerous related sectors, including hotel, communication and transportation, trade, culinary, and others. It is an economic locomotive providing jobs, income from foreign exchange, strategic markets for potential local products, and support for infrastructure development in various regions. It has the potential to promote equitable development in multiple areas and influence various dimensions of people's lives, not least in remote areas (Nagarjuna, 2015). The multiplier effect of the tourism industry, together with the fact that it has no boundaries in space nor territorial borders, mean that tourism is a sector that has bright prospects and a high strategic potential to improve the quality of society in the fields of economy, education, culture, politics, and the environment (Aref, Gill, and Aref, 2010; Pramusita and Sinirastiti, 2017).

In the past five years, tourism has become one of the leading sectors playing a role as the backbone for the Indonesian economy (Agfianto, Antara, and Suardana, 2019). However, the development of tourism in various regions does not necessarily guarantee the welfare of the local community of the tourist destinations. This is because many destinations are still controlled by capitalists largely comprised of people from outside the tourist area (Siqid and Resnawaty, 2019). Instead of increasing economic growth for the benefit of the community, tourism development becomes merely income and profit oriented. It is generally top-down and does not reflect the interests of the local communities (Phanumat, et al., 2015). Moreover, the rapid development of tourism is also directly correlated with large-scale negative impacts caused in the form of environmental degradation, disappearing culture and local wisdom, and changes in people's lifestyles (Agfianto, Antara, and Suardana, 2019; Ertuna and Kirbas, 2012; Yazdi, 2012).

Ideally, the development of tourism should pay attention to the preservation of the environment and local culture and involve a significant role for government. The most important thing is to prioritize the interests of local communities (Palimbunga, 2018). Therefore, a shift in the paradigm of tourism development from a capitalist-destructive nature and a top-down approach to a bottom-up approach that guarantees justice and people's welfare and becomes sustainable is necessary. To realize this, local community participation in tourism development is essential (Aref, 2011). Since local people directly or indirectly feel the positive and negative impacts of tourism, participation on the part of the community is

crucial to ensure the sustainability of tourism as a human activity and economic resources for the areas involved (Adikampana, Sunarta, and Pujani, 2019). Moreover, the local community is also a stakeholder with deep knowledge of the characteristics of their tourism products, their activities, rituals, traditions, culture, and their natural conditions, so that they are best aware of the optimal policies to be taken in tourism development (Kim, Park, and Phandanpuvong, 2014; Salleh, et al., 2016).

Concern over the complexity of such problems has given birth to the concepts of CBT and sustainable tourism. CBT is planned, developed, owned, and managed by the community and for the community, based on decision-making that is collective, responsible, and provides benefits to the community (Giampiccoli and Saayman, 2018). The development of sustainable tourism ensures that natural, social, and cultural resources utilized for tourism in the current generation could also be preserved for future generations.

One of the CBT destinations most concerned with sustainability in Indonesia is Karimunjawa. The tourism industry began to be developed since 2005 to 2006 and the area has become a leading tourism destination with abundant natural potential for marine tourism lovers (Laksono and Massadun, 2014; Qodriyatun, 2018). Karimunjawa is also a National Park area that must be preserved in compliance with the Decree of the Ministry of Forestry and Plantation No. 78/Kpts-II/1999. Moreover, Karimunjawa is a multicultural community area consisting of Javanese, Madura, Bugis, Bajau, and other tribes (Central Statistics Bureau of Jepara Regency, 2018).

This massive tourism potential in Karimunjawa and its unique multicultural community permit researchers to study and analyze various aspects of community participation in realizing sustainable CBT there. Community participation analysis can demonstrate its pattern and typology in various aspects and stages of tourism development. So far, we know of no research that has analyzed the characteristics of community participation in multicultural community-based sustainable tourism in national parks and remote areas such as Karimunjawa. The results should primarily contribute to the scientific literature about community participation and the development of sustainable community-based tourist destinations. Moreover, such community participation typology analysis is crucial as a reference for decision-makers and stakeholders involved in making policies and taking action.

2. Literature Review

2.1 Sustainable Tourism and Community Based Tourism

Sustainable tourism can be considered an effort to create tourism that has a low negative impact on local nature and culture and creates a future-oriented economic distribution beneficial for the local community (Joobi and Satheesh, 2017). In this sense, sustainable tourism refers to tourism that takes full account of current economic, social, and environmental impacts, accommodating the interests of visitors, industry, the environment, and local communities. The sustainability principles consist of three main domains in tourism development: environment, economy, and socio-cultural. These domains must be balanced to ensure long-term sustainability (Aal, 2014). In this way, sustainable tourism is seen as tourism development that means "building together with the society" so that it can produce benefits at the economic, social, and cultural levels for the public and thereby becomes CBT (Munawaroh, 2018). CBT is aimed at addressing disadvantages for the community and is related to strategic sustainability issues regarding empowerment, social justice, and self-reliance (Giampiccoli and Sayman, 2018). Three basic principles of CBT are community involvement in decision-making, the certainty of benefits for the community from tourism activities, and tourism education for the local people. CBT will have implications for the creation of sustainable tourism because tourism development is not only related to how to achieve economic growth but also how to preserve the environment, freeing the economic, political, cultural, and social environment autonomy of the region from subordination towards greater political and economic power (Putra, 2014).

2.2 Community Participation in Tourism

The development of CBT requires a participatory approach because it is tourism organized by the community (Pramusita and Sarinastiti, 2017; Sidiq and Resnawaty, 2019). There are various forms of community participation in tourism (Tosun, 2006). Initially, several authors tried to examine the conditions of community participation in development activities in general, including Pretty (1995) and Arnstein (1969), who categorize forms of community participation in terms of several levels based on the involvement of external parties, local control, and reflecting power relations between them. Subsequently, Tosun (2006) identified three forms: spontaneous, induced, and coercive (Figure 1).

7	Self-Mobilization	⇦	8	Citizen Control	Degrees of Citizen Power	⇨	**Spontaneous Participation** Bottom-up, active participation, direct participation, participation in decision making, authentic participation, self planning.
			7	Delegated Power			
6	Interactive Participation		6	Partnership			
5	Functional Participation	⇦	5	Placation	Degrees of Citizen Tokenism	⇨	**Induced Participation** Top-down, passive, formal, mostly indirect, degree of tokenism, manipulation, pseudo-participation, participation in implementation and sharing benefits, choice between proposed alternatives and feedback.
4	Participation for Material Incentives		4	Consultation			
3	Participation by Consultation		3	Informing			
2	Passive Participation	⇦	2	Therapy	Non-Participation	⇨	**Coercive Participation** Top-down, passive, mostly indirect, formal, participation in implementation but not necessarily sharing benefits, choice between proposed limited alternatives or no choice, paternalism, non-participation, high degree of tokenism and manipulation.
1	Manipulative Participation		1	Manipulation			
Pretty's (1995) typology of community participation		Arnstein's (1997) typology of community participation					Tosun's (1999) typology of community participation

Figure 1. Typology Partecipation in Tourism. Source: Tosun, 2006.

2.3 Previous Studies

Some previous studies that examined community participation in tourism were conducted by Aref, Gill, and Aref (2010) and Nagarjuna G (2015). Their research suggests that community participation in tourism is crucial because the community is the main reason tourists visit the place. The unique culture, way of life, local products, and the community also forms a landscape. If there is community participation, tourism will also positively impact on society in income generation, equitable development, and improving the quality of education and life in general. Research by Thestane (2019) also suggests that planning, decision making, implementation, and evaluation in tourism must involve the community. Moyo and Tichaawa (2017) conducted a study in Zimbabwe as an example in which the community is less able to develop. Research by Qodriyatun (2018) also shows that current efforts to achieve sustainable tourism in Karimunjawa have still not been realized.

Another study by Guiterrez (2019) suggests that community participation in tourism had different levels in various locations. CBT in the world still suffers from multiple problems. Research by Karta, Sukarsa, Hardini, and Suarthana (2016) and Kim, Park, and Phandanouvong (2014) shows that the low level of competence and awareness of the community and the uneven synchronization of the vision between the community and the government in various regions are crucial causes that hamper the growth of CBT. Research by Sidiq and Resnawaty

(2019) also shows that the asynchronous mission between the government and the community tend to cause excessive domination by the government. People need to get education related to tourism to permit their aspirations to be heard (Moyo and Tichaawa (2017).

3. Research Methodology

Taking account of previous studies, our research was conducted on community participation in realizing sustainable CBT in Karimunjawa to identifying what the patterns and typologies of participation are. The research was conducted in the Karimunjawa National Park Area. It was a case study which applied qualitative data collection methods to analyze community participation in realizing sustainable CBT. The analysis will attempt to identify its pattern and typology in various aspects and stages of tourism development. The qualitative approach aims to analyze in-depth images of the complexities of human interactions (Dezin and Lincoln, 1994), to examine in detail the nature of public participation in realizing sustainable CBT.

The study used primary and secondary data sources. Primary data was obtained through direct research in the field which included data on tourism agents in Karimunjawa, the role of the community and actors involved in tourism activities, the interaction between communities in Karimunjawa, and the role of government in tourism in the area. The secondary data consisted of written library sources that could be in the form of books, scientific magazines, archival sources, personal documents, and official documents, including documents, announcements, letters, banners, photos, statistical data, data from the National Park Office Karimunjawa, and popular scientific articles that have been published. Secondary data were also collected through a general literature review, particularly on previous studies and documents from Statistics Indonesia online. The researchers also obtained various kinds of data from both village and sub-district governments directly at their offices.

The subjects of this study were the community and tourism actors, district and village administrations, the management of the Karimunjawa National Park Office, government offices, NGO stakeholders and tourists themselves visiting Karimunjawa. The sample selection was done by using the Snowball Sampling method. Data collection was started by asking the Karimunjawa Sub-district Office and Village Office for permission. Data collection in this research was carried out through participatory observation techniques, interviews, and documentation.

Interviews were carried out in both structured and non-structured modes. Structured interviews were conducted with the government, including the Head of Karimunjawa Sub-district, the Head of Karimunjawa Village, the Chairman of the Indonesian Tour Guides Association (HPI), and Karimunjawa National Park Office employees. At the same time, non-structured interviews were carried out with the community of tourism actors, including members of HPI, ship personnel, traders, homestay owners, tour service providers, and other tourism actors. The researchers acted as tourists by staying in homes owned by members of the local community, participating in tourist tour activities, using the services of boats and tour guides, and buying various products sold by traders. In this way, multiple questions related to community participation were answered spontaneously, and the interviewees could openly provide detailed and objective information. The researchers also conducted participatory observations so that the data obtained was more complete.

The data obtained was analyzed using three channels identified by Milles and Huberman (1992), following the process of data reduction, data presentation, and drawing conclusions. The objective was to identify and examine the relationship between the various features that emerged from the field research conducted.

4. Results and Discussion

4.1 Community Participation in Creating Sustainable Tourism in Karimunjawa

Community participation in tourism development is crucial if based on the belief that the community knows best what is needed. Achieving the essence of full participation is when in the community is involved in every dimension of the tourist development stage, including planning, decision making, implementation, and supervision of development programs. In realizing this, careful consideration of the community's opportunities, willingness, and ability to act are needed.

4.1.1 Community Participation in the Planning Phase

In tourism development in Karimunjawa, the planning system is carried out with both a top-down and a bottom-up approach. The top-down approach involves development planning and program activities related to tourism that derives purely from government policies, either through the Central Java Provincial Tourism Office, the Jepara Regency Tourism Office, the Regional Planning and Development Agency, or from the Karimunjawa National Park Office. The bottom-up approach is development planning that comes from community

initiatives as a form of community action in achieving goals and finding solutions for various problems encountered in tourism activities.

The government's planning with a top-down approach usually relates to physical development programs that require substantial financial support. Some development programs from the government are the construction and provision of facilities in several tourism destinations, the Karimunjawa Square development plan, the construction of a sports center, the development plan on Bukit Jatikerep, and the cross-cultural facility development plan. Through the tourism office, the government also has a non-physical development program in the form of a Karimunjawa CD-making project as a tourism promotion media. In this planning, the community did not participate in the planning process because the plan had been handled by the government and only sought the community's approval.

Top-down planning is also carried out by the private sector, such as external investors who develop hotel and resort businesses in the Karimunjawa. This condition creates problems in the development of tourism in Karimunjawa in terms of the economy. It inevitably means that the most significant profits go to the owners of capital. In this way, the community becomes a slave to the tourist industry, facing a process of socio-economic marginalization and enjoying minimal profits. This condition is a sign of resurgent neocolonialism that is starting to penetrate the Karimunjawa region and exploiting local communities, causing social and economic disparities within the tourism industry in Karimunjawa. The community does not participate in planning and does not have the power to obstruct or reject development by external investors.

In contrast to top-down planning, the community participates fully in bottom-up planning because its members are driven by the desire to provide the best for tourism in Karimunjawa and sustainable for themselves and their area. Community participation in the planning stage is reflected in forming groups of tourism actors in Karimunjawa initiated by people who are aware of the tourism potential and threats to the environment and the sociocultural characteristics. These groups have goals, ideals, regulations, and policies that each of their members has agreed on. Rules and policies in each group are arranged based on the vision and mission of each group, in the economic, environmental, social, and cultural fields.

The community participates in the process of decision making, which is decided in a meeting forum organized by each group. The community of the tourism actors also hold some forums to accommodate the aspirations of all groups of

tourism actors. The forum is used to discuss the tourism system in Karimunjawa, including price agreements and service systems, the direction of tourism development, regulations regarding the rules of tourism, policies governing the environment and cultural values, and policies towards tourism actors from outside the area. This forum is also used to discuss planned events related to tourism, for example, Barikan Kubro (an ancient Javanese ritual) events, Sail Indonesia (an annual yacht rally), and others.

4.1.2 Community Participation in the Implementation Phase

Communities have a high level of participation in the implementation phase of tourism, in terms of involvement in the management of tourism businesses and thereby in realizing sustainable CBT.

The Karimunjawa community is a party that embodies the fulfillment of the 3A aspects in tourism (*Attraction, Amenities*, and *Accessibility*). It also plays a role in realizing tourist attractions in Karimunjawa, related to something to see, something to do, and something to buy. This condition is reflected in the number of Karimunjawa people who are active in the tourism business. Moreover, many people are engaged in environmental and cultural conservation. This participation is manifested by the active contribution of the people who are members of the groups of tourism actors.

These groups include: 1) The homestay owners group, 2) The shipowner group, 3) Tour package sellers or travel agents, 4) Motorcycle rental owners, 5) Car rental groups and services shuttle (Karimun Trans), 6) The association of souvenir and culinary sellers 7) The merchants' association, 8) The airport car pickup group (Kemojan), 9) The Indonesian Tour Guide Association (HPI) as a tour guide, 10) The Traditional Dance group (Kemojan), 11) The Arts group (Karimunjawa), 12) Karimunjawa typical souvenirs entrepreneurs (Pawon Nyamplungan), 13) Entrepreneurs for rental of snorkeling equipment, 14) The Pitulikur Karimunjawa Foundation, 15) Pokmaswas Karimunjawa Maritime Tourism, 16) MMP Karimunjawa, 17) The Segoro Karimunjawa Circle of Friends, and 18) The Karimun Nature Foundation.

In implementing tourism in Karimunjawa community participation is seen as crucial. This is because the people of Karimunjawa are parties who understand the conditions and potential that exist there. This is very necessary, especially in snorkeling tourism activities, the main base of tourist attractions in Karimunjawa. In snorkeling activities, many local people play the role of tour guides and boat

drivers because of their intimate knowledge of the conditions of the Karimunjawa Sea.

Community participation in tourism activities is also manifested in support for the achievement of *Sapta Pesona Wisata* in the Karimunjawa region. *Sapta Pesona Wisata* consists of safe, orderly, clean, relaxed, beautiful, friendly, and memorable. The community actively participates in realizing these conditions, both those directly related to tourism activities as tourism agents and members of the public who are not directly involved in the tourism business.

The values of honesty and friendliness are held firmly by the people of Karimunjawa and are instrumental in bringing about security and order so that tourists feel safe during their visit. The existence of environmental organizations such as the Pitulikur Foundation and other organizations and the presence of routine community service activities play a notable role in maintaining cleanliness, coolness, and beauty in Karimunjawa. This is realized through cleaning the village, harbor, sea, island, beach, and mosque. The community also strives to be a good host always ready to be friendly, help and respect tourists, understand and be tolerant of their needs and behaviors.

The extent of public involvement in the implementation of tourism in Karimunjawa does not guarantee diminishing outside intervention in the tourism business. The increase in tourist influx adds to the intense competition and intervention can come from domestic or foreign countries that directly manage the tourism business in Karimunjawa or capital owners who have workers (confidants) there. Many of them are engaged in hotel and tour package service provision. Some also hold positions regarding management rights or private property rights to beaches or islands which are tourist destinations. This causes profits from the tourism business in Karimunjawa to be enjoyed less by the local community and more by outsiders who tend to be capitalist and exploitative.

4.1.3 Community Participation in the Supervision Phase

The supervision phase is designed to ensure that the range of activities planned and carried out correspond to the targets set despite the changes. Local communities have a substantial role in developing community-based sustainable tourism because control of the decision-making process must be given to those who later bear the consequences of the tourism industry. Supervision of tourism activities is carried out by the Karimunjawa community, who work hand in hand with the Karimunjawa National Park and the Tourism Office.

Community participation in supervision is clearly foreseen by the regulations that are stipulated and carefully overseen by the community. These regulations set the norms that must be maintained and implemented by tourists, such as clothing, prohibition of consumption of liquor, and related to efforts to protect the environment, in line with the fact that most of the community are Muslims. Community participation plays an important role in maintaining the purity of local culture so as it is not by eroded western culture and Karimunjawa remains a sustainable tourist destination in this respect.

Other regulations to maintain the sustainability of nature in Karimunjawa are based on the agreement of all tour operators in the area. The ordinance regulates the obligation to protect the environment, including prohibiting tourists from touching and stepping on the reef during snorkeling and diving activities, the obligation to maintain the cleanliness of beaches, islands, and the sea for all tour operators, tourists, and the public, the obligation to maintain the quality of ships so minimize fuel leakage, including maintaining the quality of land vehicles for travel entrepreneurs to minimize air pollution.

Tour operators also set other regulations regarding tour leaders, tour guides, and sea tour packages. To maintain the sustainability of CBT, there are rules that prohibit external tour leaders and tour guides from conducting sea tours in Karimunjawa. Tour guides from outside the Indonesian Guides Association (HPI) are not allowed to operate. Tour leaders (tour agents) who from outside Karimunjawa are still allowed to come there. However, the tour activities must be managed by the ships and tour guides from Karimunjawa itself. As well as maintaining the overall sustainability of CBT, this is also motivated by the desire to always protect the marine environment since guides from Karimunjawa are better able to understand and care for the local seabed.

Supervision is also carried out by the Karimunjawa National Park, which focuses on environmental sustainability and the biodiversity of land and sea in Karimunjawa. Its supervision envisages regulations regarding zoning of the park area and ensuring the zoning regulations are familiar to the public and tourism actors. The Karimunjawa National Park provides information to the public and tourism actors on how to work together in maintaining environmental sustainability in Karimunjawa. It also conducts a patrol to monitor tourist and community activities in the area.

4.2 Types of Community Participation in Creating a Sustainable Community-Based Tourism in Karimunjawa

The typology of participation is a picture of community involvement in the participation process, with the leading indicator being the power held by the community to influence decision-making. Knowing the typology of community participation will make it easier for stakeholders to help understand the practices and processes of community involvement, find out the extent of efforts to increase community participation, and evaluate stakeholders' success in increasing community participation. In this study, the typology of community participation in realizing community-based sustainable tourism in Karimunjawa was analyzed in terms of spontaneous and induced features of participation Tosun (2006).

During the planning stage, community participation in realizing sustainable CBT in Karimunjawa is both spontaneous and induced. Spontaneous participation is reflected in community initiatives to form a group of tourism actors, then independently determine the objectives, regulations, and policies regarding the direction and organization of tourism activities in the area. Induced Participation occurs in development planning carried out by the government and private investors in Karimunjawa.

During the implementation stage, spontaneous participation could be identified in the active involvement of the members of various groups of tourism actors whose role is to realize aspects of the 3As (Attraction, Accommodation, and Accessibility) and to realize *Sapta Pesona Wisata*. Induced participation is reflected in the continued intervention of the private sector and the government in implementing tourism in Karimunjawa.

During the supervision stage, community participation still shows spontaneous and induced features. The community plays an important role in monitoring environmental sustainability, preserving cultural values, and ensuring the community's independence in tourism activities. On the other hand, in tourism activities the community is also still under the supervision of the Karimunjawa National Park.

Thus, we see that the community participation in realizing sustainable CBT in Karimunjawa is of the Spontaneous-Induced Participation type, with both features intersecting. In several dimensions, the community has bottom-up participation, is active in achieving its own goals, has considerable power in the decision-making process, has independent planning, and has authentic participation, which is reflected in the awareness of the community to be fully responsible for decisions that have been taken to achieve change.

However, in some dimensions, the community has passive participation in that the government starts participatory actions through strategies to encourage co-operation and support the community. These are largely implemented by the tourism office and Karimunjawa National Park. Thus, what follows is a top-down process leading to pseudo participation, where the community is not involved in making decisions but is involved in implementing decisions taken by other parties. Moreover, the inability of the community to stem the intervention and the presence of investors from outside Karimunjawa has led to induced participation where the community only participated because of the stimulus of possible sharing of economic benefits.

4. Conclusions

Our research leads us to conclude that the typology of community participation at the planning, implementation, and supervision stages in realizing sustainable CBT in Karimunjawa is of the Spontaneous-Induced Participation type. Spontaneous authentic participation based on bottom-up processes coexists with more passive involvement in induced top-down government initiatives and external investment.

Community participation in promoting sustainable CBT in Karimunjawa must certainly be continuously improved. Sustainable tourism development will only succeed if spontaneous participation is fully realized. This allows people to recognize their needs, solve their problems, acquire direction and goals with their specific strategies, and fully participate in the tourism agenda so that the profit will grow over time and feed back into the community. Besides, it will ensure the sustainability of tourism since the community has overall control of the various activities. For this to happen, increasing community capabilities and social capital is an essential process.

Our study has a limitation in that it is a case study that only examines community participation in tourism activities in the Karimunjawa area. Thus, the results are specific and cannot necessarily be generalized and or considered comparable to other sites. Further studies will need to extend research over a broader area, or over several diverse regions so that a range of similarities and differences can be identified and analyzed. In this way, it will be increasingly possible to outline key features for the achievement of community participation and produce a more detailed framework to describe community participation in all the various aspects of tourism development.

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The authors declared that no competing interests exist.

Original Paper

Improving household waste management through a door-to-door collection in Ruaka Town, Kenya

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Keywords: citizen participation; door-to-door waste collection; financial constraints; sustainable development; technology; willingness to pay.

Abstract. *This study explores ways of improving household waste collection in urban areas through a door-to-door waste collection system in Ruaka town, Kenya, by comparing the collection practices between households served by door-to-door waste collection and those without it. Literature review, random sampling technique with semi-structured questionnaires, and direct observation were used. The case results confirm that door-to-door solid waste collection at households has the capacity to induce positive behavioural changes towards sustainability at waste generation points. Waste separation and recycling, which accompanies this system, can help improve revenue streams in the waste management value chain, which may help to plug the waste financing gap facing many governments. However, the study notes that in Ruaka town, the current practice of door-to-door waste collection is unsustainable and could reinforce inequality amongst users seeking to access waste collection facilities. Apart from more household surveys to document the correlation between individual household demographic attributes and effectiveness of door-to-door waste collection, the study calls for developing robust regulations for door-to-door service, increased citizen participation in waste management matters, including the need for waste separation at the source to measure the system's maximum impact.*

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1. Introduction

The dual existence of urban areas as centers for economic growth and innovation as well as hotspots for waste accumulation and pollution continues to challenge and bemuse city planners and environmentalists alike. The concept of sustainable development, which requires a balance between the social, economic, and environmental aspects of human development, forces many cities to navigate the problems and paradoxes facing sustainable urban development. Sustainable

development aims to integrate environmental conservation and economic objectives following the commencement of large-scale industrialization and urbanization experienced in the 21st-century. These aims involve key action points necessary to realize sustainable consumption and production practices that reduce the accumulation of waste and pollution as envisaged under Sustainable Development Goal 12.

All over the world, the challenge of accumulated municipal solid waste (MSW) deposits is an indication of societal lifestyle and how well solid waste management (SWM) practices and production technologies are performing (Roberts, 2010). In some societies, development has led to stagnation due to inadequate waste management policies, leading to the proliferation of disease, environmental degradation, and loss of livelihoods (UN, 2020). It is, therefore, considered imperative for developing countries to rethink policies and practices that could enhance sustainable development. Effective solid waste management policies should be 'good,' sound, and aimed at improving service delivery for people. Sound policy management involves defining public participation and giving people a voice (UN-Habitat, 2016).

In contrast, ineffective or 'bad' policy management could impose heavy social and public administrative burdens on citizens (UN-Habitat, 2014). It has been established that in many developing countries, these 'policy failures' are attributed to the highly segmented nature of some environmental policies, including those that govern solid waste. In addition, the complex application context driven by unclear technical objectives sometimes considered in isolation affects the effectiveness of policies (UN-Habitat, 2016). Consequently, there are growing criticisms that sustainable development policies have somehow led to negative impacts on solid waste management because the threat of waste accumulation appears to be real and threatens to continue, increasing to unsustainable levels with the growing urban population (Hoornweg and Bhada-Tata, 2012; UN Habitat, 2014; UN Habitat, 2012). If the status quo remains, many environmental and biological systems could be disrupted, thus distorting the balance between the various components of sustainable development (Roberts, 2010).

The door-to-door management of household solid waste is increasingly being promoted as a feasible method for promoting sustainable development in developing countries by improving the management of household wastes. This household-level waste management approach is increasingly being promoted since it induces behavioural changes at waste generation points in the long term (Laurieri et al., 2020). A typical door-to-door system of solid waste collection entails vehicles visiting specific waste collection points following a precise schedule as wastes

are collected (Laurieri et al., 2020). Remarkable achievements have been realised with this practice since both the demand and supply sides of waste generation are targeted during implementation (Hoornweg and Bhada-Tata, 2012; UN-Habitat, 2014). In addition, this approach increases the participation of users in the sorting and collection of household wastes (Laurieri et al., 2020; Ibanez et al., 2018; European Commission, 2015).

In general, there is a need to further explore the door-to-door waste collection system across regions and countries in order to document and share experiences on how to improve it and hence the need for this study. Existing literature shows various methods can be used to improve the door-to-door solid waste collection system. But, with inreasing budgetary constraints on governments, there is a growing tendency towards improving solid waste management by imploring citizens to contribute a portion of their income towards sustainable solid waste management. The contingent valuation method has thus gained popularity amongst policymakers and scientists interested in the sustainable management of solid waste because of its application in gauging people's attitudes towards waste. It has proven particularly useful when implemented alone or jointly with other valuation techniques for non-market goods, such as the travel cost method or hedonic approaches. However, it remains the only technique that is capable of placing a value on commodities that have a large non-use component of value and when the environmental improvements to be valued are outside the range of available data. The goal of contingent valuation is to measure the compensating or equivalent variation for good in question.

Other household demographic features have been found to have different influences on solid waste management. For instance, household education, age, and homeownership have a significant influence on the decision to pay and the amount to be paid by a household targeted by a waste improvement project (Banga et al., 2011; Coaffey and Coad, 2015). However, in general, individuals in high-income groups tend to generate more waste at a much higher rate (Zia et al., 2017). Education and knowledge levels on the health impacts of waste have positive impacts on waste management, whereas income was a decisive economic factor of knowledge and attitudes (Seng et al., 2018). Illegal dumping of waste was higher in communities with low employment rates (Matsumoto and Takeuchi, 2011). Knowledge, attitudes, and people's practices of people affect solid waste management (Kiran et al., 2015). Income level, age, number of children, a quantity of waste generated have an influence on solid waste management by households (Awunyo-Victor et al., 2013).

Kenya is also experiencing the challenges of unsustainable solid waste accumulation due to rising urbanization, rapid population growth, and limited budgetary allocation for waste management. However, unlike other parts of the world, urbanization in Kenya has attracted a large population both of informal settlement dwellers and the middle class. Moreover, increasing affluence has increased waste generation and the complexity of waste streams. In attempts to remedy the waste situation in the country and embrace the concept of sustainability, Kenya's environmental policy on waste management highlights that the government will develop an integrated national waste management strategy and promote the use of economic incentives to manage waste (Mutiso, 1994). To this end, following the Earth Summit on sustainable development, Kenya initiated the National Environment Action Plan (NEAP), which was completed in 1994. The NEAP recommended a national policy on laws pertaining to the environment. The policy-making process culminated in 1999, with Sessional Paper No. 6 entitled 'Environment and Development.' In the same year, the legislative process produced the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, which was Kenya's first framework environmental law implemented by a state corporation under the Ministry of Environment called the National Environment Management Authority (NEMA). Both the sessional paper and the act added to a large number of existing sectoral laws and policies on various facets of the environment, such as water, forest, and minerals. It has created a diffuse system of environmental laws and policies to achieve sustainable development as set out in Kenya's development blueprint, Vision 2030. Other national environmental management reforms included developing a task force report, The National Solid Waste Management Strategy, prepared by the National Environmental Management Authority (NEMA) in February 2015, whose aim was to apply the 'zero-waste' principle and recommend methods for creating wealth and employment and reducing environmental pollution while satisfying the minimum conditions for waste generation, collection, transportation, and disposal based on statistics from five fast-growing urban areas in Kenya, namely Kisumu, Thika, Eldoret, Nakuru, and Mombasa. Interestingly, even with these policy reforms and the devolved governance that followed the implementation of the 2010 constitution, many challenges that faced the previous waste management regimes still persist.

Nonetheless, urban residents appear to be shifting focus towards implementing variants of the door-to-door waste collection system, including in Ruaka, a rapidly urbanizing satellite town in the outskirts of Nairobi City County, the capital of Kenya. Waste management is carried out by both the County Government of Kiambu, which has distributed mixed waste collection bins in certain locations

of the residential town, and private waste handlers who are currently providing a form of door-to-door waste collection service. The private waste handlers provide waste bags to tenants (Kiambu County CIDP 2018-2022). Once the bags are full, the tenants deposit them in large waste boxes located outside their apartments from where the private waste handlers load them on lorries for transportation to the dumpsite. Even though door-to-door waste collection appears to be serving the purpose, there is limited information on how it could be improved for maximum societal benefits (Kiambu County CIDP 2018-2022). Moreover, there are limited studies on residents' perception and participation in a door-to-door waste collection system. As such, this study seeks to apply qualitative research approaches to explore ways of improving the current door-to-door household solid waste collection in Ruaka town in order to draw lessons for a wide array of stakeholders on the future of household solid waste management. In order to respond to these research needs, this paper will first review the concept of solid waste management from the theoretical perspective of sustainable development. Secondly, using primary data collected by simple random sampling of households, a comparison will be made for individuals who receive door-to-door waste collection services and those who do not in order to formulate the practical implications of the system. Ruaka town is a particularly suitable study site because it represents one of the rapidly urbanizing areas in the outskirts of Nairobi City County, which is currently characterised by increased production and consumption and infrastructural development. It will be important to investigate whether the rapid growth in Ruaka town is accompanied by an attendant growth and development in sustainable waste management systems.

2. Materials and methods

2.1 Study area: Ruaka town in the outskirts of Nairobi City

Ruaka is located approximately 12 km from the city center of Nairobi and is named after the Ruaka River. The name 'Ruaka' is derived from the local language meaning a place where 'women used to bathe.' The land was once owned communally. During colonial times, the people were regrouped into villages. The first village was in Ruaka shopping center, where the people worked on the white settlers' coffee farms. Some shops were built in the current Ruaka shopping center. The land was subdivided into private plots on which most people practiced agriculture as the main source of livelihood. Urbanization has slowly caused land-use changes, and thus people have been developing residential and commercial shelters (Kiambu County Integrated Development Plan 2018-2022).

According to the KNBS (2009) census, the population of the larger Karuri area in which Ruaka is located stood at 129,000 in 2009, which is a 41.7% increase from the figure in the 1999 census (Cytonn Investment Website, 2020). KNBS (2009) projected that by 2025, the population would be 176,191, an annual population growth of 1.97%. Ruaka's population comprises both local middle-income earners and foreign residents and is a real estate investment satellite town. The town is close to Nairobi's central business district and has two prime commercial retail developments in its vicinity, namely Two Rivers Mall and Rosslyn Riviera Mall. The area's high immigration rate results in a high population growth rate. In turn, this has led to very high demand for housing. Among other reasons, the two main incentives for people to move to this area are cheaper housing compared to other major urban areas and the search for employment, (Cytonn website, 2020). It will thus be interesting to investigate how a door to door waste management is being practiced given these seemingly rapid socio-economic developments in Ruaka town.

2.2 Study design

The current household door-to-door solid waste collection practices in Ruaka town were evaluated in terms of sustainable development by comparing respondents' answers from two waste generation groups, those served by a door-to-door waste collection service and those who do not have such a service, identified by the random sampling technique. Simple random sampling (SRS) is a sample selection method comprising n number of sampling units out of the population and having N number of sampling units, such that every sampling unit has an equal chance of being chosen. SRS was chosen as the most appropriate study design because it is cost-effective, easy to use, and it is normally used to accurately represent a larger population, such as the one in Ruaka satellite town. It was used to select a sample of 166 respondents from a population of 129,000 people with a 92.25% confidence level. Caution was exercised to ensure that all respondents came from different households in the study area.

$$n_{smallest} = \frac{n_e}{1 + \frac{n_e}{N}}$$

If N is large, then the required n is $n \geq n_e$ and $n_{smallest} = n_e$.

This was calculated as follows:

$$n = \frac{129{,}000}{1 + 129{,}000(0.0775)^2}$$

2.3 Data collection

In this study, both primary and secondary data were collected in order to respond to the research questions. Primary qualitative data were collected using a household survey questionnaire (Appendix 1). The survey questionnaire covered three thematic areas (i.e., the demographic characteristics of respondents, the current status of door-to-door household solid waste management, and how the door-to-door solid waste collection could be improved). The survey questionnaire was initially pre-tested on ten respondents. The pre-test was important because there was a need to guarantee the quality of responses from the study given the diversity of the surveyed respondents, especially in terms of differences in education levels. After verifying the quality of the responses, the survey questionnaire was revised and administered as the principal tool for collecting primary data. Up to five research assistants were trained on the objectives of the study as well as how to administer the data collection tool. Both English and Kiswahili, which are widely spoken by residents, were used as the medium of communication.

In addition, observation was used to record some of the daily events that the research assistants witnessed during the course of this study. Observation entailed walking through the town and observing how individuals were disposing of their wastes. Through observation and note-taking, photographic data was also collected to show the different practices in waste collection and management. The data obtained was then passed on to the principal researchers for further processing.

There was no need to develop an ethical checklist for this study because it did not involve the extraction of samples on humans or animals, nor did it introduce foreign materials into the country. Moreover, during the data collection process, the research assistants walked through the town and interviewed respondents in the place where they met them during the day. Data collection was challenging due to the current COVID-19 pandemic, which required observing stringent rules such as social and physical distancing as well as the wearing of face masks whenever in public space. In addition, some respondents were not willing to participate in the study because of a lack of cash incentives, and some were uncomfortable with the question relating to weekly income due to the suspicion that such information could be used against them during the fulfillment of statutory tax obligations. However, in order to reduce this suspicion and eliminate

potential legal issues about people's private information, the surveys were conducted anonymously.

Secondary data were collected through a review of the literature, office visits, and desktop searches on official websites. The key documents reviewed are summarized in Table 1.

No.	Document	Key Information	Source
1.	National Environment Action Plan 1994	The key proposed activities, policies, plans, and programmes for sustainable solid waste management	National Environment Management Authority (NEMA)Website
2.	Environment Management and Coordination Act, 1999	Enforcement of policies and programmes for solid waste management	Kenya Law Reporting Website
3.	Constitution of Kenya 2010	The overarching policy provisions on the right to a clean and healthy environment	
4.	Vision 2030	Kenya's development aspirations on becoming a middle-income economy by 2030	Vision 2030 Website
5.	National Environment Policy 2013	Policy provisions on sustainable solid waste management	Climate Laws Website
6.	National Solid Waste Management Strategy 2015	Information on household waste generation per capita for Ruaka town and Nairobi city county	National Environment Management Authority (NEMA)Website
7.	National Waste Regulations of 2006	Directives and rules for handling wastes	National Environment Management Authority (NEMA)Website
8.	Kiambu County Integrated Development Plan, 2018-2022	Context information about Ruaka town	Kiambu County Government Website

Table 1. Key documents Reviewed

2.4 Data analysis

The quantitative aspects of both primary and secondary data were elaborated using a Microsoft Excel spreadsheet, as shown in Appendix 2 and 3, both for with and without door-to-door service. Data were cleaned and sorted then used for statistical analyses and to create the visualizations used in this study, including tables and bar charts. Furthermore, since the reviewed literature indicated a correlation between income levels and waste generation per capita, this study conducted a correlation analysis (r) for the two categories of households investigated

to compare case study results with the literature. Particularly noteworthy was the considerable difference in the door-to-door waste collection between individuals with low incomes and high incomes. The income comparison was based on Kenya's taxable income threshold of US$ 300, where earners whose monthly income was less than US$ 300 are exempted from the 30% monthly income tax.

3. Results

3.1 Respondent characteristics and influence on door-to-door waste collection

In total, 166 survey questionnaires were distributed, out of which 102 were received back. This represents 61% of the target respondents. The survey indicates that there is a marked difference in demographic attributes between households with door-to-door waste collection services and those without them. In terms of gender, results from Figure 1 indicate there were marginally more male respondents (37) with door-to-door waste collection services than female respondents (32). This may signify a relatively equal level of awareness or consciousness on the issue of solid waste management amongst residents of Ruaka town. More female respondents (19) were without the door-to-door service compared to male respondents (14). This outcome may be attributed to the existing income and employment inequalities between men and women in the town.

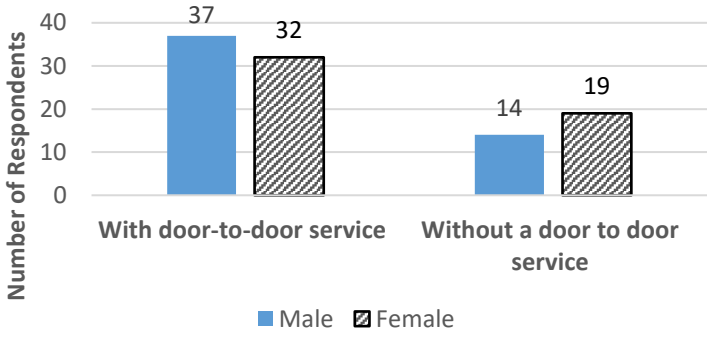

Figure 1. Gender and waste collection category.

There were more respondents in the age bracket 29-39 years (34) with door-to-door service compared to 16 without door-to-door service (Figure 2). Ruaka town is populated by a relatively young population whose members appear to be more conscious about solid waste issues.

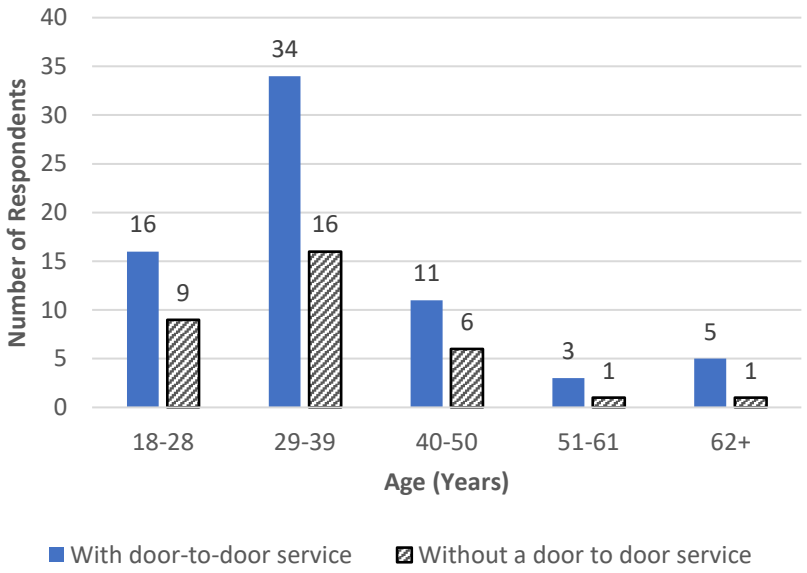

Figure 2. Age and waste collection category

There are more respondents (30) with a secondary level of education currently receiving door-to-door service compared to 11 with a secondary level of education without door-to-door service (Figure 3). This outcome implies a good proportion of households with an education level that is likely to contribute to their understanding of the impacts of an improper solid waste management system.

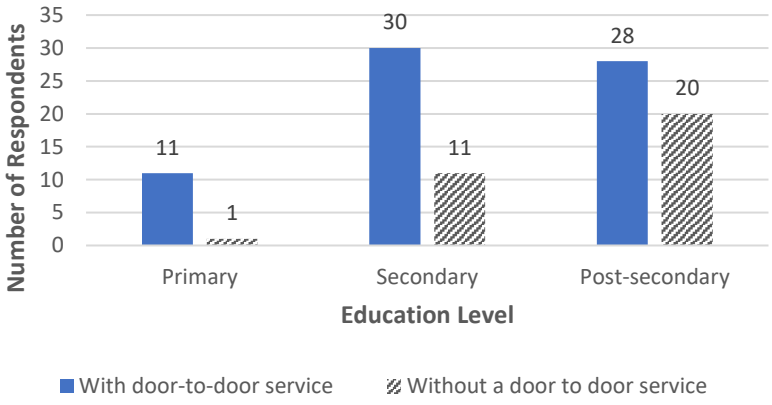

Figure 3. Education and waste collection category

There were more respondents (50) earning a monthly income of more than US$ 300 compared to 13 in the category without a door-to-door service earning the same amount of income (Figure 4). This outcome indicates there may be a high likelihood of finding individuals with a good portion of disposable income who could contribute a portion of their income towards improving the current waste collection system in Ruaka town.

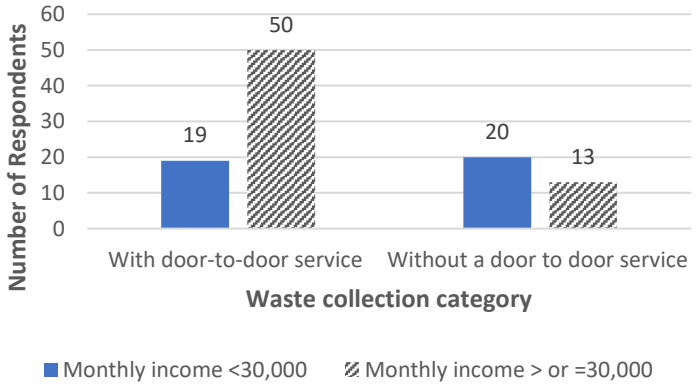

Figure 4. Income and waste collection category

In terms of family size, there were 65 respondents with family size of 1-4 members compared to 29 without a door-to-door service but with similar family size (Figure 5).

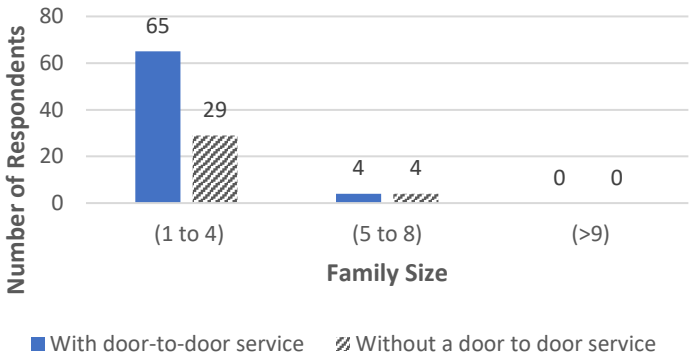

Figure 5. Family size and waste collection category

There were 27 respondents in self-employment in the category with door-to-door service compared with 9 in the category without. Similarly, there were 27 respondents in private employment with door-to-door service compared to 14 in the category without the service, as shown in Figure 6. Since private and self-employment are closely related and could be grouped as private employment, it could be concluded that most Ruaka residents are privately employed.

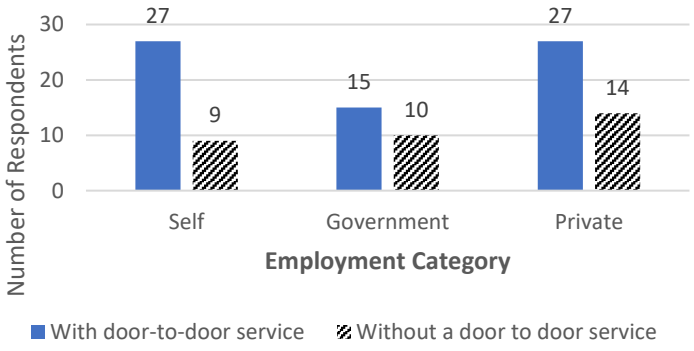

Figure 6. Employment and waste collection category

3.2 The current status of door-to-door household solid waste collection

3.2.1 Waste generation characteristics

Weekly household waste by residents of Ruaka is composed of four major ingredients: food waste, electronic waste, paper, and plastic. Food waste and paper dominate waste generation and composition among residents with a door-to-door waste collection service and those without it, as shown in Figure 7. However, there is more food waste (76%) among residents with door-to-door collection than those without it (46%), as shown in Figure 7. For both categories of study respondents, paper constitutes the second highest waste product by proportion. Paper and food waste together constitute up to 90% of the waste that is generated by respondents with a door-to-door waste collection service. For those without the service, paper and food waste constitute about 82%. On average, those with door-to-door service generate 1.94 kg of waste per day, while those without it produce approximately 1.86 kg per day.

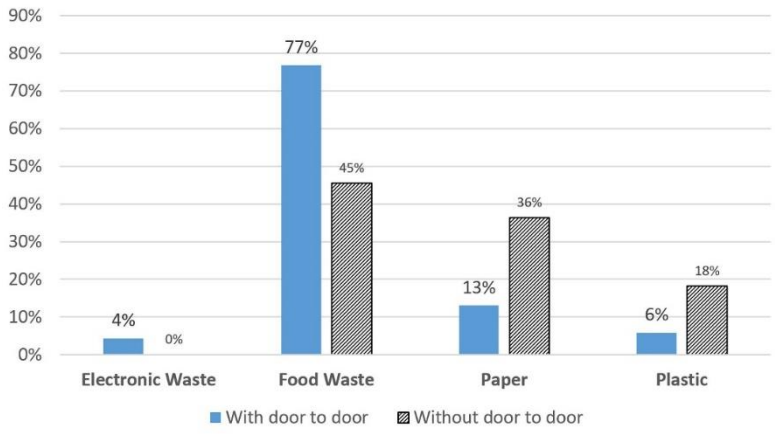

Figure 7. Waste generation per week

Moreover, the correlation (r) between monthly income and waste generated per week indicates a weak positive association (0.05665) amongst respondents with door-to-door service. In contrast, the correlation is relatively strong and positive (0.328866) amongst residents without a door-to-door service for waste collection. Nonetheless, 63 out of 102 surveyed respondents have a monthly income greater than or equal to Kshs. 30,000 (US$ 300).

3.2.2 Door-to-door Household Waste collection

Waste collection from households in Ruaka town is largely similar for both residents with door-to-door and those without it. Waste collection from tenants with door-to-door service is organized so that the landlord contracts a private waste collection service provider who, in turn, provides waste collection bags to households. These waste bags are distributed to tenants with door-to-door service twice per month or at the landlord's discretion and timing in some cases. The size of the waste bag is 'standard' for all households and measures approximately 60-liters (Figure 8). Waste from those with door-to-door service is collectively dumped into the waste bag without being sorted or separated into various constituents. Once the waste bag is full, it is tied at the top or sometimes never tied, and the tenant with door-to-door service deposits it into a concrete waste box in front of the apartment. However, sometimes, if the landlord or his agent has locked the waste box, the tenant with door-to-door service usually leaves the waste on top of or adjacent to the concrete waste box. In some cases, especially where the waste boxes are left open, both human and animal scavengers (ravens, wild cats, and stray dogs) often get into the boxes and may dig and spill the contents out of the waste box.

There is no regulation that limits the size of waste bags, the size of concrete waste boxes, or the number of waste containers. If needed, all tenants can easily buy the readily available extra containers from mobile merchants who roam and sell waste containers around residential areas in order to accommodate more waste. When the extra mixed-waste containers are full, tenants are free to buy more, or they can decide to take the waste into the concrete waste boxes or leave them beside the concrete box if it is full. Most apartments are not fitted with electronic lifts or the opportunities for such technological upgrades, so tenants who live on higher floors have to walk down the narrow winding stairs to take their waste to the concrete box outside the apartment building. This becomes challenging for people living with physical disabilities, the sick, and the elderly who have to contract another person to carry their wastes to the concrete box at an extra cost. For tenants who receive door-to-door collection service, the cost of waste bags is included in the monthly rent payment. The waste collection fee varies, but it is typically Kshs. 250 (US$ 2.5) or below.

Figure 8. A standard waste bag from a private waste collection service provider.

For those households that receive door-to-door waste collection service, once the waste collection bag is ready for disposal, the residents must take it out and dump it into one of the concrete waste boxes located at the gates of most residential apartments. There are various waste box designs; some have lids that can be locked (Figure 9), and others are lidless (Figure 10). Similar facilities are available for those without door-to-door service in some apartment buildings.

Figure 9. A waste box with a lid mostly found in relatively high-income neighborhoods.

Figure 10. A waste box without a lid found in relatively low-income neighborhoods.

3.2.3 Waste transportation to the dumpsite

In some cases, garbage collectors walk around the neighbourhood with a drum or a cart, collecting trash from each household, especially in relatively low-income neighbourhoods. Still, mostly, the trash that is placed in waste boxes is collected monthly by private waste collection trucks for a fee, which is normally paid by the landlord. There are other collectors who simply take the trash away in the plastic bags that individual households provide for waste disposal.

After collection, all trash is brought to the nearest collection point. In addition to County government workers, certain CBOs and informal garbage collectors also provide waste collection services. It costs around US$ 1 per day to rent a cart, and the availability of this option makes it more convenient for households to dispose of their waste, especially in low-income areas. However, the garbage collectors have to deal with poor working conditions, which involve certain health risks. Most collectors, including those who work for Kiambu County and private companies, were observed not wearing any protective gear, such as gloves and masks.

There are certain residential areas that are neglected in that they do not receive any service from Kiambu County. Residents who are excluded in this way are likely to solicit private services, while others who are not able to afford that alternative must manage their waste personally. Often, illegal dumping sites arise when such residents accumulate their waste in a particular spot before setting it all on fire after a few days of storage. In some cases, once a tenant realizes that their waste composition is paper or plastic, they burn it beside the concrete box. Sometimes, smoke billowing from burning waste finds its way into the homes of nearby tenants and other neighbours thus exposing many people to environmental and health risks.

3.3 Improving door-to-door solid waste collection system

Results appear to indicate that surveyed residents would like to improve the current door-to-door system of waste management in Ruaka town, albeit with a few differences between those with door-to-door service and those without. Amongst study respondents with door-to-door waste collection, 40 out of 69 expressed their willingness to pay for an improved service. In contrast, 24 out of 33 among those without the service were willing to pay for improved waste collection, as shown in Table 2 below. In total, 64 respondents from both categories are willing to pay for improved waste collection. It represents approximately 60% of all study respondents. Moreover, 36 respondents indicate that they are willing to pay more than US$ 3 for improvements to the current waste collection service in Ruaka satellite town, as shown in Table 2.

Door to door collection	**The maximum amount (Kshs.)**			
	<100	200~300	>300	Total
Yes	0	17	23	40
No	0	11	13	24

Table 1. WTP Willingness to pay results

4. Discussion

Many developing countries have recognized that proper management of solid waste is important for human advancement within the context of sustainable development goals. Many countries are implementing policy instruments that target

behaviour change at the household level in favour of sustainable solid waste management of waste. In this regard, improving the door-to-door collection of household wastes has emerged as a feasible approach.

Similarly, the government of Kenya is keen on promoting sustainable solid waste management in the country. It has purposefully put in place somewhat robust environmental management reforms to tackle solid waste in its quest for sustainable development, as evidenced by the reviewed policy documents. Generally, there is a convergence of thought that efficient solid waste management is essential as governments strive to deliver services to their citizens (National Environment Action Plan, 1994; Environmental Management and Coordination Act, 1999; National Environment Policy, 2013; National Solid Waste Management Strategy, 2015).

The door-to-door collection of solid waste amongst urban residents is thus fast emerging as an improved waste collection method. The residents of the satellite town of Ruaka on the outskirts of Nairobi City exemplify this government commitment. They show a desire to enjoy the benefits of sustainable development through proper solid waste management. Case results show that out of 102 study respondents, 69 have signed up for door-to-door waste collection, which involves being provided with a polythene bag for waste collection and storage (Figures 1-8). The socio-economic characteristics of the residents appear to have an influence on the sustainability and effectiveness of door-to-door household solid waste collection. Case results show that the family size and employment status were important factors in describing the influence of demography on door-to-door waste management. In particular, private employment appears to be related to an increased desire for door-to-door waste management, as demonstrated by those with door-to-door service. At the same time, it would be important to see if different results might emerge from a study conducted in the post COVID-19 period.

Moreover, a survey of their perceptions on improving the current door-to-door service shows that many study respondents, including those without the service, are willing to pay a fraction of their income in order to improve the current door-to-door waste collection method, as shown in Table 2. These results demonstrate a positive attitude towards proper solid waste management amongst the residents who were studied. The favourable attitude could arise from the consciousness of the effects of accumulated solid waste, especially health risks and environmental risks. Moreover, the results could also imply favourable conditions and opportunities for creating collaborative social networks for financial partnerships towards appropriate waste management in Ruaka town, which appears to be a big

challenge. The literature reviewed has emphasized the importance of understanding local attitudes and the existing situation, focusing on financial partnerships with citizens for improved waste management (Coaffey and Coad, 2015; Sumukwo and Cheserek, 2012; Banga and Mkenda, 2011; Kounani et al., 2020).

In general, the maximum willingness to pay for improved waste collection varies between those who have a door-to-door waste collection and those who do not have the service. Results indicate that no respondent was willing to pay less than Kshs. 100 (US$ 1) to improve waste management. Furthermore, as shown in Table 2, a majority of residents are willing to pay more than Kshs. 300 (US$ 3) for improved waste management, but there are more residents amongst those with a door-to-door collection service who are willing to pay Kshs. 300 (US$ 3) than those without one. However, the quest for a higher premium amongst those with a door-to-door collection service may indicate a certain level of dissatisfaction amongst them since many of them could feel that they are not being served well. Nevertheless, it will be important to conduct more household surveys to further investigate these speculations in the future.

The results appear to have indirectly identified some reasons behind this dissatisfaction among residents with door-to-door service. First, the waste collection charge is fixed by an agreement between the landlord and the private waste collector (company) without tenants' participation. This circumstance is concerning given that the literature review has confirmed that citizen participation is the key to successful waste management (Altaf and Deshazo, 1996; National Solid Waste Management Strategy, 2015; UN-Habitat, 2014; UN-Habitat, 2016; Laurieri et al., 2020; Ibanez et al., 2018; European Commission, 2015). Secondly, waste bags are only provided twice per month, which may be upsetting to this group of residents. Thirdly, the concrete waste boxes outside most apartments are only emptied occasionally, once per month, and this sometimes encourages littering, causes bad odours, and encourages illegal dumping.

In addition, the authors observe that even though door-to-door waste collection may have many advantages, the current form of implementing door-to-door collection practice in Ruaka town is incentivizing increased environmental degradation risks by encouraging an endless generation of waste amongst residents besides entrenching inequality in access to waste collection facilities. First, providing tenants with high-capacity (60-litre) waste bags encourages waste generation at the source (Figure 8). Indeed, on average, residents with the door-to-door collection have a higher daily rate of waste generation (1.94 kg) compared to those without it, who, on average, only produce approximately 1.86 kg per day in comparison with Nairobi City's projected 0.7 kg/capita/day. Secondly, the landlords'

or houseowners' practice of discretionarily allowing apartment tenants to buy extra waste containers reverses the gains that could have been achieved through the door-to-door collection and the transition to a zero-waste society as envisioned in the National Solid Waste Management Strategy of 2015 and other key environmental policy documents already discussed. Thirdly, the current system does not encourage waste sorting and separation at the source, thus complicating waste handling, transportation, and eventual disposal. Fourthly, the fixing of the waste collection fee is non-participatory because tenants are not involved.

Moreover, contracted private collectors' low waste collection frequency indicates that Kiambu County could only be minimally enforcing private companies' waste collection contracts. This may be attributed to limited budgetary allocations, amongst other reasons, as indicated in the National Solid Waste Management Strategy of 2015 and other policy documents. Finally, the apartment building technology, which excludes important facilities such as lifts, could hinder proper solid waste collection on the part of physically disadvantaged groups (especially the sick, people living with disabilities, and the elderly) and is likely to disproportionately escalate their waste collection costs because they may be required to hire another person to help them take their wastes to the concrete boxes. These findings may support the UN-Habitat's (2016) findings, which attribute policy failures to the highly-segmented nature of some environmental policies, including those that govern solid waste, as well as the complex application context, which is driven by unclear technical objectives that are considered in isolation from other factors that determine effectiveness. Our study shows ho some environmental policies are adopted on a foundation that is entirely comprised of ad-hoc assumptions rather than collectively investigated realities, which could then enable policy implementation. Moreover, door-to-door waste management appears to be affected by factors that can be controlled both by the existing waste management strategies such as environmental consciousness amongst residents and factors that are beyond the waste management strategies such as family size, building technology, and socio-cultural factors. On this account, this paper calls for more household surveys that would help to address these waste problems. Notably, Altaf and Deshazo (1996) call for similar actions in the case of Pakistan in efforts aimed at investigating these waste management realities.

In the case of Ruaka, waste separation at the point of generation has the potential to reduce waste collection costs and the risk of health and negative environmental impacts, as Coaffey and Coad (2015) have indicated. Waste separation combined with composting of biodegradable wastes could yield many benefits, including boosting soil fertility for local agricultural productivity and promoting

urban farming as well as rural-urban integration and development. This study's results have expressly confirmed these possibilities, as shown in Figure 7, which indicates that household waste in Ruaka is dominated by food waste and paper, both of which are largely biodegradable and could be composted to produce manure for food production and other functions. Composting and recycling have been recognized as feasible methods of managing waste in Kenya in reviewed policy documents and could offer many benefits in the case of Ruaka town. First, the more waste that is composted or recycled, the less waste there is to be disposed of. It can significantly reduce waste collection costs by reducing disposal fees, time loss at dumpsites, and distances that must be traveled to access remote dump sites. Secondly, selling recyclable materials from separated wastes to recycling industries can generate additional revenue in the waste management value chain and reduce waste collection costs. Thus, the promotion of composting and recycling can help make waste collection more affordable Afroz and Masud (2011).

5. Conclusion and recommendation

This study has reviewed and provided insights on how the current door-to-door system of household solid waste management in Ruaka satellite town in the peri-urban region of Nairobi could be improved. Case study results have shown that proper solid waste management is linked to improved human health and sustainable development. The door-to-door collection of wastes from households, if properly implemented, could accelerate sustainable management of solid waste and even generate new revenue streams for financing waste management programmes. Case results from Ruaka town have also shown that people desire to have improved waste management and are willing to devote a portion of their income to a program that implements these wishes. This offers an opportunity for the County Government of Kiambu to address the current budgetary constraints facing waste management.

At the same time, in the case of Ruaka town, the results of this study lead us to recommend increasing the involvement of residents in issues of waste collection through the formation of resident associations, reviewing the current waste management regulations to clearly define the maximum size of a waste bag, size of concrete waste boxes, providing incentives for waste separation at source, improving the working conditions of waste collectors, improving equity in access to waste collection facilities by redesigning buildings, outlawing the hawking of extra waste containers which is rampant in Ruaka town, and reviewing the tenant-

landlord contract to include provisions that could encourage the minimal waste generation and waste separation. These steps are important for supporting the technical analyses conducted by various waste management stakeholders and providing opportunities for developing an environmentally sustainable waste collection system. In the future, more household surveys are needed to explore better ways of securing a high rate of citizen participation and the application of smart technologies for home waste management.

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Appendix 1: Survey Questionnaire

Part 1: Demographic characteristics
What is your gender?
What is your age?
What is your highest education level?
What is your average weekly income?
What is your family size?
What is your employment status?
Do you have a door-to-door service for collecting your household solid waste?

Part 2: Current Status of household solid waste collection in Ruaka Town
Is the accumulation of solid waste an issue of concern to you as a resident of Ruaka town?
Approximately how much Kg of waste do you generate per day in your house?
Approximately, what is the highest percentage per waste component?
Would you separate waste into the various components if you were told to do so by the waste collection company?
What are the main challenges of the current door-to-door waste collection system in Ruaka?

Part 3: Improving household solid waste collection through the door-to-door system
Are you satisfied with the current door to door to door system of collecting waste?
How much are you charged for waste collection per month?
Do you think government policies have been adequate in promoting door-to-door solid waste management in Ruaka town?

Your household currently pays _____ Kshs. per month as a tariff for door-to-door solid waste management. However, there is a certain level of dissatisfaction regarding service provision. If you were to receive a proper door-to-door waste collection (five days per week), weekly cleaning of intermediate waste bins, and safe disposal of generated waste, would you be willing to pay Kshs. 100 per month for such a service? NB: this amount would be in addition to your current monthly household expenditure, but you have than nothing extra to pay in this regard.

If yes, would you be willing to pay Kshs. 200?
If yes, would you be willing to pay Kshs. 400?
If no, why?
What would be your maximum willingness to pay for improved door-to-door service?

Appendix 2: Results from those with door-to-door service

Questionnaire Survey No.	Gender	Age	Education level	Monthly income	Weekly Income (Kshs.)	Family size	Employer	Approximate waste generated per week (Kg)	Main Composition (Food waste, paper, bones, etc.)	Have door to door collection or not (Yes/No)	WTP for improvement (Yes/No)	If yes, how much (Kshs.)?
95	F	34	Secondary	32,000	8000	1	Government	3	Electronic Waste	Yes	No	0
11	M	28	Secondary	40,000	10000	1	Government	2.5	Food Waste	Yes	No	0
23	F	26	Tertiary	4,000	1000	2	Government	1.5	Food Waste	Yes	No	0
12	F	36	Secondary	20,000	5000	2	Government	1.8	Paper	Yes	No	0
65	M	38	Tertiary	26,000	6500	2	Government	1	Food Waste	Yes	No	0
9	M	35	Secondary	104,000	26000	2	Government	2	Food Waste	Yes	No	0
10	M	26	Tertiary	12,000	3000	3	Government	1.5	Food Waste	Yes	No	0
43	F	35	Secondary	120,000	30000	3	Government	2	Food Waste	Yes	No	0
71	M	26	Secondary	400	100	3	Private sector	1.3	Food Waste	Yes	No	0
83	F	22	Tertiary	320,000	80000	3	Private sector	2	Food Waste	Yes	No	0
32	F	44	Secondary	2,000	500	4	Private sector	1	Paper	Yes	No	0
34	M	43	Secondary	40,000	10000	4	Private sector	3	Paper	Yes	No	0
31	M	42	Secondary	48,000	12000	4	Private sector	1	Food Waste	Yes	No	0
55	F	26	Tertiary	56,000	14000	4	Private sector	1	Food Waste	Yes	No	0
33	M	46	Primary	80,000	20000	4	Private sector	2.3	Food Waste	Yes	No	0
30	F	39	Tertiary	120,000	30000	4	Private sector	1	Food Waste	Yes	No	0
101	F	49	Tertiary	180,000	45000	4	Private sector	1.3	Food Waste	Yes	No	0
35	M	42	Tertiary	14,000	3500	5	Private sector	3	Electronic Waste	Yes	No	0
61	M	38	Primary	60,000	15000	1	self	1.3	Food Waste	Yes	No	0
22	M	54	Secondary	3,400	850	2	self	1	Paper	Yes	No	0
44	F	72	Tertiary	40,000	10000	2	self	2	Paper	Yes	No	0
77	F	30	Tertiary	40,000	10000	2	self	1.3	Food Waste	Yes	No	0
51	M	22	Tertiary	48,000	12000	2	self	6	Food Waste	Yes	No	0
89	M	35	Primary	100,000	25000	2	self	2	Food Waste	Yes	No	0
4	F	45	Secondary	80,000	20000	3	self	0.9	Paper	Yes	No	0
36	M	35	Secondary	100,000	25000	3	self	4	Plastic	Yes	No	0
17	F	44	Tertiary	120,000	30000	3	self	2	Food Waste	Yes	No	0
2	F	22	Secondary	32,000	8000	4	self	1.5	Paper	Yes	No	0
37	M	55	Tertiary	40,000	10000	6	self	3.5	Food Waste	Yes	No	0
69	M	33	Tertiary	80,000	20000	1	Private sector	1	Food Waste	Yes	Yes	200
63	F	56	Tertiary	12,000	3000	3	Private sector	1.2	Food Waste	Yes	Yes	200
67	M	30	Tertiary	4,000	1000	4	self	1.8	Food Waste	Yes	Yes	200
81	M	30	Tertiary	76,000	19000	1	Private sector	2	Food Waste	Yes	Yes	250
57	F	34	Secondary	64,000	16000	2	Private sector	1.3	Food Waste	Yes	Yes	250
53	M	65	Tertiary	76,000	19000	2	Private sector	3	Food Waste	Yes	Yes	250
27	F	34	Secondary	80,000	20000	2	Private sector	1.3	Food Waste	Yes	Yes	250
73	M	23	Secondary	40,000	10000	5	Private sector	1.4	Food Waste	Yes	Yes	250

Questionnaire Survey No.	Gender	Age	Education level	Monthly income	Weekly Income (Kshs.)	Family size	Employer	Approximate waste generated per week (Kg)	Main Composition (Food waste, paper, bones, etc.)	Have door to door collection or not (Yes/No)	WTP for improvement (Yes/No)	If yes, how much (Kshs.)?
75	F	35	Primary	20,000	5000	1	self	1.8	Food Waste	Yes	Yes	250
79	M	30	Tertiary	140,000	35000	2	self	2	Food Waste	Yes	Yes	250
42	F	39	Tertiary	40,000	10000	1	Government	2	Paper	Yes	Yes	300
19	F	25	Primary	4,000	1000	2	Private sector	1	Food Waste	Yes	Yes	300
25	M	31	Secondary	72,000	18000	3	Private sector	1.5	Electronic Waste	Yes	Yes	300
49	M	35	Tertiary	100,000	25000	3	Private sector	4	Food Waste	Yes	Yes	300
59	M	36	Secondary	52,000	13000	4	Private sector	0.5	Food Waste	Yes	Yes	300
45	F	35	Secondary	400	100	1	self	2	Food Waste	Yes	Yes	300
3	F	33	Primary	40,000	10000	1	self	2	Food Waste	Yes	Yes	300
1	M	18	Secondary	120,000	30000	2	self	1	Food Waste	Yes	Yes	300
85	M	45	Secondary	24,000	6000	3	self	2	Food Waste	Yes	Yes	300
39	F	36	Secondary	60,000	15000	3	self	4	Food Waste	Yes	Yes	300
15	F	37	Tertiary	52,000	13000	1	Government	3	Food Waste	Yes	Yes	350
13	F	38	Primary	800	200	4	Government	1.5	Food Waste	Yes	Yes	350
93	M	36	Tertiary	60,000	15000	6	Government	2	Food Waste	Yes	Yes	350
20	M	23	Tertiary	14,400	3600	2	self	1	Food Waste	Yes	Yes	350
38	F	26	Secondary	60,000	15000	2	self	3.6	Food Waste	Yes	Yes	350
40	F	35	Primary	100,000	25000	4	Government	2.5	Food Waste	Yes	Yes	400
21	M	65	Secondary	52,000	13000	2	Private sector	1	Food Waste	Yes	Yes	400
47	M	23	Primary	60,000	15000	4	Private sector	2	Food Waste	Yes	Yes	400
24	M	32	Secondary	72,000	18000	2	self	1.5	Paper	Yes	Yes	400
6	M	70	Secondary	4,800	1200	1	Private sector	2.5	Plastic	Yes	Yes	500
28	F	37	Tertiary	8,000	2000	3	Private sector	1	Food Waste	Yes	Yes	500
29	F	38	Secondary	40,000	10000	3	Private sector	1	Food Waste	Yes	Yes	500
16	F	39	Tertiary	40,000	10000	1	self	1.6	Plastic	Yes	Yes	500
91	M	26	Tertiary	52,000	13000	2	self	2	Food Waste	Yes	Yes	500
26	F	33	Primary	64,000	16000	3	self	1.9	Plastic	Yes	Yes	500
41	F	35	Secondary	32,000	8000	2	Government	2	Food Waste	Yes	Yes	600
99	M	46	Tertiary	40,000	10000	4	Government	4	Food Waste	Yes	Yes	600
7	M	23	Secondary	60,000	15000	1	Private sector	1	Food Waste	Yes	Yes	600
97	M	44	Primary	800	200	1	self	3	Food Waste	Yes	Yes	600
87	M	70	Secondary	56,000	14000	1	self	1.5	Food Waste	Yes	Yes	600

Appendix 3: Results from those without door-to-door service

Questionnaire Survey No.	Gender	Age	Education level	Monthly Income	Weekly Income (Kshs.)	Family size	Employer	Approximate waste generated per week (Kg)	Main Composition (Food waste, paper, bones, etc.)	Have door to door collection or not (Yes/No)	WTP for improvement (Yes/No)	If yes, how much(Kshs.)?
74	F	35	Secondary	2,800	700	1	Government	1.7	Paper	No	No	0
84	F	33	Tertiary	4,400	1100	1	Government	2	Paper	No	Yes	250
5	F	26	Tertiary	3,200	800	2	Government	0.8	Food Waste	No	Yes	450
14	F	35	Secondary	10,000	2500	2	Government	2	Paper	No	Yes	400
66	F	31	Tertiary	12,000	3000	2	Government	1.5	Plastic	No	Yes	250
88	M	23	Secondary	2,000	500	3	Government	1	Food Waste	No	Yes	500
80	M	30	Tertiary	3,200	800	3	Government	2	Food Waste	No	No	0
94	F	36	Tertiary	92,000	23000	3	Government	3	Paper	No	Yes	300
64	F	22	Tertiary	60,000	15000	4	Government	1.5	Paper	No	Yes	300
100	M	48	Tertiary	18,000	4500	5	Government	3	Food Waste	No	Yes	500
50	F	26	Tertiary	400	100	1	Private sector	5	Food Waste	No	No	0
70	F	45	Tertiary	800	200	1	Private sector	1	Food Waste	No	Yes	250
58	M	36	Tertiary	2,000	500	1	Private sector	1	Food Waste	No	Yes	250
54	F	32	Tertiary	8,000	2000	1	Private sector	2	Paper	No	Yes	250
92	M	33	Tertiary	40,000	10000	1	Private sector	2	Paper	No	No	0
8	M	35	Primary	2,400	600	2	Private sector	1	Food Waste	No	Yes	500
18	F	45	Primary	2,400	600	2	Private sector	2.3	Food Waste	No	No	0
72	F	70	Tertiary	40,000	10000	2	Private sector	1.5	Paper	No	Yes	250
86	M	26	Tertiary	52,000	13000	2	Private sector	1.3	Plastic	No	No	0
56	F	23	Tertiary	40,000	10000	3	Private sector	1.2	Plastic	No	No	0
52	M	35	Tertiary	260,000	65000	3	Private sector	5	Paper	No	Yes	250
62	M	34	Secondary	240,000	60000	4	Private sector	1.2	Paper	No	Yes	250
46	F	56	Secondary	60,000	15000	5	Private sector	2	Plastic	No	Yes	400
102	F	50	Tertiary	64,000	16000	5	Private sector	1.5	Paper	No	Yes	500
68	F	22	Tertiary	800	200	1	self	1.2	Food Waste	No	No	0
60	M	37	Secondary	2,000	500	2	self	1.2	Food Waste	No	No	0
48	F	35	Secondary	2,800	700	2	self	1	Food Waste	No	Yes	300
96	M	45	Secondary	4,000	1000	2	self	3	Plastic	No	Yes	500
82	F	18	Tertiary	76,000	19000	2	self	2	Paper	No	Yes	250
76	F	26	Secondary	40,000	10000	3	self	1.5	Plastic	No	Yes	250
90	M	35	Secondary	4,000	1000	4	self	2	Food Waste	No	Yes	600
78	M	30	Tertiary	4,000	1000	4	self	2	Food Waste	No	Yes	250
98	M	41	Secondary	36,000	9000	5	self	1.3	Food Waste	No	Yes	600

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Original Paper

Health literacy programme and proper solid waste disposal habits among housewives in Onitsha, Anambra State, Nigeria

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Keywords: Health literacy programme; Household solid waste disposal.

Abstract. *This paper presents a study which examines promoting proper solid waste disposal habits among housewives in Onitsha, Anambra State,*

Nigeria, in the context of a health literacy programme. Three research questions focus on different aspects of the efficacy of the programme related to understanding the dangers of improper disposal of waste, building the necessary knowledge for proper disposal, and developing a positive attitudinal change towards personal habits. The study adopted a descriptive survey design, while a simple random technique was used to select 1200 women who have been involved in the health literacy programme. A validated questionnaire with 0.72% reliability index was used to collect data from the respondents. Data collected was analyzed using a statistical package for social sciences (SPSS 25). The findings show that the community health literacy programme has achieved a high level of efficacy for each of the research question. The paper concludes with recommendations for developing the programme.

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1. Introduction

Various empirical studies have shown how waste disposal and management is very poor in most municipal cities in developing countries. Nguyen Matsui and Fujiwara (2011) described how many cities face serious environmental degradation and health risks due their poorly developed municipal solid waste management system. Mamady (2015) also illustrated how indiscriminate waste disposal together with inadequate waste collection is strongly linked with the existence of unplanned settlements in cities. This study links household and community groups' waste disposal practices to residents' socioeconomic status and geographical factors such as the distance of residential areas from permitted municipal dumpsites. Authorities should be encouraged to promote environmental information and education of the public. According to Khatib, Monou, Abdul, Hafez & Despo (2010), solid waste generation (SWG) is an issue of concern everywhere in the world, particularly in urban centers. SWG is considered one of the most challenging issues faced by most developing countries that suffer from severe environmental pollution problems.

Awuah (2018) observed that waste collection systems such as communal container collection methods (waste bins) appear most common in many nations and that this kind of waste collection system is provided at dedicated points within neighborhoods for households to drop-off their solid waste. It is then expected

that trash collectors will use their trash collection vehicles to empty the waste bins and transport the waste to a designated dump site, where it is trashed, often by incineration. Awuah (2018) further explained that this trash collection method is fraught with difficulties, because most of the time the waste ends up not being collected by the authorized waste collectors, thereby leading to overflow of waste and ground dumping at collection sites.

In Nigeria, solid household waste disposal has become one of the fundamental national problems, despite environmental sanitation programmes and policies having been adopted by the government at various levels to manage it. Solid household waste, which comprises kitchen and other home-related waste, is generated daily in large quantities across urban and rural cities and the mode of disposal is a cause of considerable concern. Most residents throw away their trash in an improper manner due to their attitude towards waste as something that is no longer valuable and can be discarded anywhere convenient without paying heed to its impact on the environment and to human health in general.

Most states in Nigeria set aside either the first or last Saturday of every month as monthly sanitation days which usually start at 7am and end at 10am. Lagos and Rivers state government also set aside every Thursday from 7am to 10am as weekly sanitation for the markets and all shops, stores, and any other category of business, excluding pharmaceutical stores. However, most urban cities in Nigeria are every day littered with household generated solid waste. Pedestrian walkways become like waste dumps in most cities due to improper waste disposal habits among residents, non-availability of refuse collectors, or irregular collection habits of existing refuse collection workers.

Onitsha metropolis is one of the urban cities in Nigeria that is best known for improper household solid waste disposal. It is a densely populated commercial city where people from different parts of the county carry out their business activities, mostly as traders in the main market, and the proximity of the residential areas to the market attracts an influx of residents who in turn generate tons of solid waste which are littered on the streets daily. According to Orhorhoro & Oghoghorie (2019), Onitsha generates 84,137 tons of waste monthly, with a density of 310kg/m^3, derived from a daily 0.53 kg per capita waste production. Lawal (2004) affirms that that roughly two thirds of waste generated by households in Onitsha are dumped indiscriminately on the streets and in the drains, thus posing serious environmental health hazards. Places where waste are left to overflow are usually accompanied by serious air pollution due to stench caused by rotten and decayed waste, a problem that is aggravated during the rainy season. Streets in most parts of Onitsha are filled with piles of refuse due to proliferation of illegal

dumping sites despite waste management authorities concerted efforts to clear the city of refuse (Fig. 1-3).

Figure 1. Dumpsite at residential area

Figure 2. Indiscriminate dumping of waste by resident along the street

Figure 3. Dumpsite at a major road in the town

2. Solid Waste Disposal and Health Literacy

Household waste can be hazardous or non-hazardous waste which can be recycled. Waste generated at home is mostly composed of solid waste particles such as garbage, broken bottles or plates, spoiled food items, papers, cartons, different types of plastic and polythene, tins and metals, damaged home appliances, used batteries, insecticide containers, and so on. This waste generation varies, depending on location and time, and its indiscriminate disposal causes a range of environmental pollution and health problems. Solid waste discharged inside drainage systems causes a blockage affecting the flow of water, posing dangers of disease transmission by creating breeding sites for disease vectors. This is one of the major causes of ill-health among people, as well as leading to soil erosion, flooding, and other environmental hazards.

A study by Tessema (2010) shows how the proliferation of pathogens in the living areas of poor homes and neighbourhoods is an aftermath of inadequacies in the provision of sanitation facilities, inappropriate anthropogenic practices of sanitation at household level and current waste management problems. In a study by Suleman, Darko, & Agyemang-Duah (2015) high incidences of water related diseases such as diarrhea, dysentery, typhoid, and intestinal parasites are attributed to inadequate infrastructure and poor waste management practices embedded in the "throw-away" culture of citizens. The pathogens that cause these diseases lead to many debilitating and endemic diseases that mainly afflict the poorer urban households that are hidden from public view in the backyard slums of the city. Wang, Lu, Zhao, et al. (2016) also demonstrate how improper disposal of wastes creates and disseminate pathogens which can quickly spread among human and animal populations in the city. Mazhindu, Gumbo, Gondo (2012) described how waste dumped in the streets for many hours awaiting collection becomes a nuisance, forming foul-smells and leachate from the waste pile, attracting insects and rodents that become vectors of diseases. Their study also shows how high-concentrated leachate due to improper waste disposal causes environmental threats, affecting ground water and surrounding environments, and informal dumping and uncollected household waste in watersheds get carried into waterways by runoff water, often contaminating the local drinking water.

Okorie and Amadi (2017) showed how residents in most urban cities in Nigeria have very little appreciation of the value of the environment and how waste disposal habits are characterized by a lack of awareness both of environmental problems in general and of the health risks generated. The attitude of residents towards waste disposal is a major problem particularly in urban low-cost residential areas. Most of the residents find it difficult to bag their waste before disposal,

some even empty their waste into gutter as soon as it begins to rain, while others carry their refuse to designated dump site and empty it on the ground, thereby littering the whole area. According to Venes (2001), attitude can be seen as behavior based on conscious or unconscious mental views developed through cumulative experience. Altmann (2008) studied the correlation between people's attitudes and their orientation towards their social and physical environment, including themselves. Attitude is seen as having a cognitive, affective, and behavioral component. It is bipolar and is a response to a stimulus. Thus, we argue that the actions residents exhibit towards solid household waste disposal can be seen as a result of their mental disposition towards waste and require a change in behavior through fundamental educational processes such as community-based health literacy programme.

Health literacy is the ability of individuals to understand necessary health care information and being able to use this information in making appropriate health related decisions. Yılmazel and Çetinkaya (2016) observed that health literacy promotes both the health and the quality of life. This requires that healthcare professionals acquire communication and clinical skills and that individuals become involved in decision-making in the health care field. They also asserted that health literacy is based on social and cultural factors in society and serves as a mediator between individuals, the health system, the education system, and health issues. The Institute of Medicine of the National Academies (2004) defined health literacy as the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions.

Nutbeam (2008) identified three levels of health literacy, which are:

1. *Functional Health Literacy Level:* The level at which an individual is expected to possess the ability to apply basic health skills such as reading and understanding medication labels (cognitive skills)
2. *Interactive Health Literacy Level:* The level at which an individual is expected to use cognitive skills and operate in a social environment that supports social participation in health-related issues in the community.
3. *Critical Health Literacy Level:* The level at which an individual is able to evaluate health issues, determine the challenges and advantages of specific issues, recognize the potential benefit of a particular strategy, and offer advice at the community level.

Nutbeam (2009) further explained that at each level of health literacy, successfully completing tasks to maintain or improve health involves specific skills. These skills require a capacity for understanding health information within a given perspective or belief system, and an empowered proactive approach to achieving health related goals, which may be identified as competence. To Jensen, King, Davis & Guntzviller (2010: 807) health literacy:

> is an individual's ability to find and use health information. As such, health literacy could include basic skills (e.g., reading, writing, mathematics, speaking), cognitions (e.g., self-efficacy, health motivation), and environmental factors (e.g., access). Put another way, what constitutes health literacy may be situationally dependent. It is whatever an individual needs to successfully navigate their health care environment (Jensen et al., 2010: 807).

Hepburn (2012) suggested that health literacy can be improved through the provision of information, effective communication, and structured education, and that it can be regarded as a measurable outcome of health education or patient education. Improvements in health literacy can be assessed through the measurement of changes to the knowledge and skills that enable well-informed and more autonomous health decision-making. A health literacy programme for proper waste disposal is thus a health-based programme at the community level that is meant to provide residents with needed health care information on dangers associated with improper waste disposal and human health. It is meant to equip residents with adequate health literacy awareness, knowledge and skills needed to process and understand health information and services in order to be able to make appropriate health decisions.

Unfortunately, several the inhabitants of Onitsha lack awareness of what their action impacts on their immediate environment and their health at large. They are indeed often blinded by their local belief that "*dirty does no kill black man"*. This a local parlance that is generally perpetuated and nurtured by these residents and contributes to their attitude toward waste disposal. They also have the belief that anything can be thrown into gutters and canals, that it will be washed away to the river, that the river does not run dry (*orimiri anaghi ata ata)* and that their tiny household waste cannot pollute it. This explains why many drainage and canals are blocked within Onitsha.

The question of their 'blind' belief in "*dirty does no kill black man"* is of considerable concern and has contributed *laisser-faire* attitude towards waste disposal which - despite government environmental sanitation measures – is damaging to the

sustainability of the environment, human health, and life in general and requires a re-orientation of the residents' awareness and action through appropriate educational programmes. Through the Anambra State Waste Management (ASWAMA) programme, the government has adopted different measures to improve residents' attitude toward waste disposal, and among the measures is community health education programme. This has introduced residents, largely housewives, to knowledge on waste management and disposal, health risks associated with improper waste disposal, and the effects of improper waste disposal on the environment. This research aims to investigate the extent to which the community health literacy has influenced waste disposal habits of housewives in Onitsha.

3. The Research Questions and Methodology

The purpose of this study is to examine the influence of health literacy programme on proper household solid waste disposal habits among housewives in Onitsha. The study focuses on women, since waste disposal is still considered exclusively one of their roles in society. The specific research questions are designed to ascertain:

1. The extent to which the health literacy programme has introduced housewives to the health-related dangers associated with improper household waste disposal habits in Onitsha.
2. The extent to which health literacy programme has equipped housewives with requisite knowledge of proper household waste disposal in Onitsha.
3. The extent to which health literacy programme has orientated housewives in Onitsha towards a positive attitudinal change as regards proper household waste disposal habits.

The study adopted a descriptive survey design, since it only focused on soliciting information from women living in different households in the area where the study was conducted. The population of the study is 4000 women from 20 streets within Onitsha metropolis where indiscriminate waste disposal is more evident (see figure 4 for a map of the area of study).

Figure 4. Maps showing Onitsha Metropolis.

A simple random technique was adopted to select 60 women each from the 20 streets, which gave a total of 1200 housewives. The women were selected from those who have been involved in the health literacy programme in the area studied. The instrument used for data collection was a researcher designed questionnaire called the "Health literacy and Proper Solid Waste Disposal Habits among Housewives Questionnaire". The instrument was face validated by two experts in measurement and evaluation form the department of Adult and Non-Formal Education, University of Port Harcourt while the content validity was carried out by psycho-statisticians in Faculty of Education in University of Port Harcourt. The instrument has a reliability index of 0.72%. The instrument was designed on a four-point modified Likert scale. Data collection was carried out by the researcher with the help of two trained research assistants**.** Data collected was analyzed through descriptive statistics using a statistical package for social sciences (SPSS 25). A decision on each research question was based on a criterion mean of 2.5. Any mean score that is equal to or greater than 2.5 (the criterion mean derived from the four-point Likert scale) is accepted as a positive response (high extent) while any mean score lesser than 2.5 is a negative response (low extent).

4. Results

4.1 Research Question One

To what extent has the health literacy programme introduced housewives to the health-related dangers associated with improper household waste disposal habits in Onitsha?

S/N	Statements	X	SD	Decision
1	You learnt that throwing waste around can create favorable conditions that will lead to the survival and growth of microbial pathogen which are responsible for airborne disease such as cholera.	2.80	0.818	High Extent
2	You learnt that uncollected solid waste can also obstruct storm water runoff, resulting in the forming of stagnant water bodies that become the breeding ground of disease.	2.70	0.705	High Extent
3	You learnt that direct dumping of untreated waste in rivers, seas, and lakes results in the accumulation of toxic substances in the food chain through the plants and animals that feed on it and when we catch these animals and consume them we will be infected with disease such as liver problems.	3.09	1.092	High Extent
4	You learnt that burying or improper disposal of hazardous waste components such as empty insecticide containers can result in explosion and injury to passersby.	2.82	0.750	High Extent
5	You learnt that waste plastic water bottles break down to release a harmful component which hurts our reproductive capabilities, causes liver dysfunction and weight loss issues.	2.90	0.920	High Extent
6	You learnt that rainfall easily mixes with toxic liquid substances and seeps into the water streams to end up in nearby water bodies which affects the quality of water in your area.	2.83	0.872	High Extent
7	You learnt that harmful greenhouse gases are created from decomposing waste and that the gases cause lots of health challenges.	3.08	1.004	High Extent
8	You learnt that heaps of waste that litter the streets are breeding ground for diseases carrying mosquitoes which spread sickness and death among the living population.	2.97	0.942	High Extent
9	You learnt that landfill gases such as smoke (carbon) and methane are cancerous.	2.97	0.947	High Extent
10	You learnt that smoke that is emitted from landfills and refuse dumps creates respiratory viability problems in humans.	2.89	0.923	High Extent

11	You learnt that landfill explosion of cans put people nearby at constant risk.	2.74	0.734	High Extent
12	You learnt that when we come in contact with waste, it causes skin irritation and blood infection.	2.91	0.995	High Extent

Table 1. The responses to items 1-12 gave mean scores and corresponding standard deviations that demonstrate positive responses. The results thus indicate that the community health literacy programme has achieved to a high extent the objective of introducing housewives in Onitsha metropolis to the health-related dangers associated with improper household waste disposal habits.

4.2 Research Question Two

To what extent has the community health literacy programme equipped housewives with necessary knowledge concerning proper household waste disposal in Onitsha?

S/N	Statements	X	SD	Decision
13	Through the community health training programme on waste management, you have learnt how to sort you household waste to minimize waste you generate daily.	2.65	0.949	High Extent
14	You bag your waste properly now and dispose it to waste trucks at appropriate time due to awareness of dangers associated to improper waste disposal.	2.55	0.605	High Extent
15	You no longer pour your waste into gutters when it is raining due to knowledge of dangers associated with the act you learnt from the health literacy programme.	2.76	1.010	High Extent
16	You no longer throw your waste on the floor of the pedestrian walkway along the street due to awareness on implication of indiscriminate dumping on waste on the environment.	2.55	0.548	Low Extent
17	You now practice local recycling of waste in your home to reduce waste generated.	2.57	0.740	High Extent
18	You practice re-use of bottles, polythene bags, and other items that I usually threw away due to the input you got from the community health education programme.	2.58	0.751	High Extent
19	Pollution education will improve habit of people of not discharging solid wastes into drainages and other water ways within and outside your area.	2.95	1.035	High Extent

20	You sort out cans from my waste due to awareness of it been an explosive item that is injurious to human life.	2.83	0.964	High Extent
21	You do not bury your broken bottles, plates, and glasses in the ground due to your knowledge of the negative impact of such act on the environmental sustainability.	2.69	0.658	High Extent
22	You keep to the time that the government has stated for throwing of refuse, to put your waste in the waiting waste van to avoid dumping it on the ground.	2.60	0.791	High Extent

Table 2. The responses to items 13-22 gave mean scores and corresponding standard deviations that demonstrate positive responses, with the sole exception of item 16, which implies that indiscriminate dumping may remain a problem. The results indicate that the community health literacy programme has achieved to a high extent the objective of equipping housewives with requisite knowledge of proper household waste disposal in Onitsha. The mean scores are generally slightly lower than for research question 1.

4.3 Research Question Three

To what extent has the community health literacy programme orientated housewives in Onitsha towards a positive attitudinal change as regards proper household waste disposal habits?

S/N	Statements	X	SD	Decision
23	Through the community health education programme, your attitude toward dumping solid wastes at designated dumpsites has improved	2.80	1.050	High Extent
24	Your attitude to seeing dirt as what cannot kill a black man change due to the input you got from the community health literacy programme	2.81	0.788	High Extent
25	You no longer participate in roadside waste dumping due the input you got from the community health education programme	2.91	1.033	High Extent
26	You now regard my immediate environment as a place that requires nurture and care due to the awareness you developed through the community health literacy programme	2.73	0.806	High Extent
27	Your attitude toward maintenance of clean environment has improved due to experience you got from the community health literacy programme	2.79	0.866	High Extent

28	Your attitude to throwing waste into gutter when it rains has been changed due to the input you got from the community health literacy programme	2.79	0.888	High Extent
29	You now participate in programme that contribute to the beautification of the environment	3.13	1.044	High Extent
30	You participate in weekly environmental sanitation exercise due to the input you got from the community health literacy programme	3.12	1.041	High Extent
31	You regularly speak to neighbors about the need to keep our environment clean by not dumping our waste on the floor, walkways and streets	2.88	0.746	High Extent
32	You champion the cause of bagging waste before disposal in your neighborhood	2.80	0.884	High Extent

Table 3. The responses to items 23-32 gave mean scores and corresponding standard deviations that demonstrate positive responses, without exception.

The results indicate that the community health literacy programme has achieved to a high extent the objective of orientating housewives in Onitsha towards a positive attitudinal change as regards proper household waste disposal habits. The mean scores are once again generally slightly lower than for research question 1.

Discussion and conclusions

Okorie (2016) and Okorie and Amadi (2017) argued that the provision of environmental sanitation, pollution, hygiene, and community health education programmes would help to create awareness of proper waste disposal habit among residents and demonstrate good sanitary behavior and practice of responsible waste disposal, as well as the importance of protecting the environment. The findings of this study show that the community health literacy programme has to a largely high extent successfully introduced housewives to the health-related dangers associated with improper household waste disposal habits.

The study also shows that community health literacy programme has equipped housewives with basic necessary knowledge concerning proper household waste disposal such as sorting of household waste to minimize waste generated daily, bagging of waste, and disposing them at appropriate time, practicing of local recycling at home to reduce waste generated, and other measures. The results also reveal that community health literacy programme has orientated housewives towards a positive attitudinal change as regards proper household waste disposal habits, that women are aware that waste should be dumped properly at

designated site at the appropriate time stated by authorities in charge of waste collection, and that the widespread belief that dirt cannot kill a black man has changed due to the input they received from the community health literacy programme.

Further confirmation that women's attitudes towards their immediate environment are gradually changing can be seen in the way that they now speak to neighbors about the need to keep their environment clean by not dumping our waste on the floor, walkways, and street roads. To consolidate on these results, it will be necessary to create incentives for housewives to broaden attendance of such programmes, to provide periodic follow-up training programmes to maintain and further promote what has already been achieve, and to develop health literacy programmes concerning appropriate waste disposal habits for all members of society so that the burden of responsibility does not permanently remain with women alone.

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Original Paper

The impacts of Covid-19 on household behavior and household waste in Turkey

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Keywords: Covid-19; Household Behavior; Household Income; Household Size; Household Waste.

Abstract. *COVID-19 has caused many radical changes in our daily life. The main purpose of this study is to examine the impact of the pandemic on*

household behavior and waste changes in the largest city of Turkey, Istanbul. Research data were collected from 946 participants in the period May to December 2020 through an online survey, and frequency and logistic regression analyses were conducted. Frequency analysis of the data showed that mask, glove, disposable bag usage, cooking at home, online shopping, home delivery, dishwasher and washing machine usage increased, while ordering food from outside decreased. In line with these behavioral changes, we found that medical, food, disposable bag and plastic wastes generated by the sampled households increased as well. We then conducted logistic regression analysis to examine the correlation between changes in household behavior and waste disposal and the income and size of households during this pandemic period. The empirical findings highlight the importance of developing special management strategies for medical, food and plastic wastes and for households with different socio-economic backgrounds to reduce the unsustainable environmental impact of COVID-19.

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1. Introduction

The rapid spread of the COVID-19 pandemic (Clements, 2020; Di Renzo et al., 2020; Zhong et al., 2020; Somani et al., 2020) has meant that, as of January 21, 2022, 216 countries, areas, or territories have been affected, resulting in 340,543,962 confirmed cases and 5,570,163 total deaths globally (WHO, 2022). The protection of people's health and lives has become the most important priority for governments all over the world, and in many countries, including Turkey, drastic measures were taken to slow down or control the spread of the pandemic (Evren et al., 2020; Turgut et al. 2020). These measures focused on social distancing and personal safety measures, in the initial absence of an effective treatment or preventative vaccine (Nussbaumer-Streit et al., 2020). Such measures, together with lockdowns, closing schools and venues where people can gather (i.e., cinemas, shopping centers, restaurants, and bars), travel restrictions, encouraging working from home (Jribi et al., 2020; Somani et al., 2020), brought about significant changes in citizens' lifestyles and had substantial social, economic, and environmental impacts (Buzzi et al., 2020; Pérez-Fuentes et al., 2020; Shakil et al., 2020; Chakraborty and Maity, 2020).

A wide range of literature reports that COVID-19 has had both positive and negative impacts on the environment. The most apparent immediate positive impact was the improved air quality due to the reductions in the concentrations of air pollutants (Bao and Zhang, 2020; EEA, 2020a; Collivignarelli et al., 2020). It has also been suggested that there was an improvement in water quality and cleaner rivers, reduction in noise pollution and recovery in wildlife (Zambrano-Monserrate et al., 2020; Arora et al., 2020; EEA, 2020b). On the other hand, the pandemic has also had negative impacts on the environment by causing an increase in waste generation, especially in medical and household waste (Sarkis et al., 2020; Dente and Hashimoto, 2020; Naughton, 2020; Kulkarni and Anantharama, 2020).

Household waste has for some time been seen as a major environmental problem (Wang et al., 2020; Massawe et al., 2014; Omran et al., 2009) and it has been suggested that the effects of different consumption patterns on waste generation deserve special attention in terms of achieving sustainable development goals (EEA, 2020b), since the amount and composition of household waste is directly related to the lifestyles and socio-economic conditions of citizens which have changed significantly due to the COVID-19 pandemic control measures (Ouhsine et al., 2020; Cesaro and Pirozzi, 2020). In this sense, Kulkarni and Anantharama (2020) have suggested that investigating the impacts of the pandemic on the quantity and composition of household waste represents a prerequisite for developing effective waste management.

The waste management of both medical facilities and households waste must be studied. Although this may help to prevent the spread of the virus, the environment is exposed to various threats due to pollution caused by the unsustainable use of single-use plastics in this period. In addition, many mandatory provisions, such as the global use of personal protective equipment like face masks by every individual, have triggered unsustainable use (Sarkodie and Owusu, 2021). The consequent extra volume of medical waste in households causes great problems for waste management sectors (Das et al., 2021). In accordance with the United Nations Environment Program for sustainable waste management, the directive to control the spread of COVID-19 through waste management states that the virus can be destroyed only by processing waste at a temperature close to 1000 degrees in incinerators. For this reason, household waste should be disposed of and managed in a sustainable manner that does not harm human and environmental health (Elleuch et al., 2018).

This study mainly aims to analyze the impacts of COVID-19 on household behavior and waste in the context of Turkey. We also aim to investigate the effects

of household income (in local currency, *Turkish Lira* "₺") and household size on the behavior of household members and waste changes during COVID-19 pandemic. We focus on research data collected from May to December 2020, during a period while lockdowns continued across the country. Since a gradual "normalization" throughout the country started as of July 2021 (Interior Ministry of Turkey, 2021), the waste behavior of households was examined during the period when the effects of the COVID-19 virus could most clearly be detected.

The rest of the paper is structured as follows. The next section describes the materials and methods employed in the study. The third section reports and discusses the results of the study, and the last section presents the conclusions we have reached.

2. Materials and Methods

Our research aims to examine household behavior and waste changes during the COVID-19 pandemic period focused on, by collecting data to test the following hypotheses related to the influence of household income and size:

Hypothesis 1: During the pandemic period household income influences household behaviors (a. cooking at home, b. ordering food from outside, c. online shopping, d. dishwasher usage, e. washing machine usage, f. disposable bag usage, g. home delivery, h. mask usage, i. glove usage).

Hypothesis 2: During the pandemic period household size also influences the same range of household behaviors during the pandemic period.

Hypothesis 3: During the pandemic period household income influences waste changes (a. paper, b. food, c. plastic, d. glass, e. electronical equipment, f. garden, g. textile, h. disposable bag, i. antivirus protection equipment).

Hypothesis 4: During the pandemic period household size influences the same range of waste changes.

2.1 Sample and Measurement Instrument

Households in Turkey's largest city, Istanbul, were chosen for our research. According to Address Based Population Registration System Results published by the Turkish Statistical Institute in 2019, the number of people residing in Istanbul was 15.519.267, a number equivalent to 18,66 % of Turkey's population. While the total number of households in Istanbul was reported to be 4.521.402 in 2019, the average household size was reported as 3,33 members (Turkish Statistical Institute, 2019).

A survey of such a large population, in a crowded and chaotic metropolis, and during a very difficult period, poses problems in terms of time and cost. All components of the population were eligible to participate the research sample and research data were collected from the participants who volunteered. The sample was created using the convenience sampling method and we reached 946 participants. Table 1 reports the socio-economic characteristics of the participants, including age, gender, marital status, educational level, occupation, household size (in terms of the number of members within the household) and household income.

Demographics	*Characteristics of the household*	*Respondent's number and percentage*
Age	18-20 age range	146 (15.4%)
	21-30 age range	362 (38,3%)
	31-40 age range	208 (22,0%)
	51-59 age range	216 (22,8%)
	60-75 age range	14 (1.5%)
Gender	Women	719 (76.0%)
	Men	223 (23.6%)
	Does not want to indicate	4 (0.4%)
Marital Status	Single	573 (60.6%)
	Married	373 (39.4%)
Occupation	Public Sector	187 (19.8%)
	Private Sector	249 (26.3%)
	Own Business	61 (6.4%)
	Student	267 (28.2%)
	Retired	18 (1.9%)
	Does not work	164 (17.3%)
Educational Level	High School & Lower Degrees	160 (17.0%)
	Vocational School	41 (4.3%)
	Bachelor	534 (56.4%)
	Master	152 (16.1%)
	PhD	59 (6.2%)

	1 member	69 (7.3%)
Household Size	2-4 members	666 (70.4%)
	5-7 members	205 (21.7%)
	8-10 members	6 (0.6%)
	3000₺ (-)	150 (15.9%)
	3001-6000₺	262 (27.7%)
Household Income	6001-9000₺	217 (22.9%)
	9001-12000₺	137 (14.5%)
	12001-15000₺	71 (7.5%)
	15001 (+)	109 (11.5%)
	Total	**946 (100%)**

Table 1. Socio-economic characteristics of the participants.

From Table 1 we see that a large number of the respondents represent the younger age ranges. Like the rest of Turkey, Istanbul is a city whose inhabitants are mostly young people and also attracts many students. At the same time, the vast majority of the sample consists of women. This reflects an imbalance in gender distribution since housework is often attributed to one gender, as is common in communities that maintain a collectivist culture. An average household in Turkey consists of 3.3 members (mostly parents and their children) and the data on household size reflect this.

The questionnaire was created online and with an easy-to-use and simple design to facilitate compilation. The survey link was announced on various social media platforms to reach wider audiences. In order to not limit the sample only to social media users, the link was also disseminated by e-mail and telephone. In addition, volunteers who contacted the researchers to participate were also included in the study. The questionnaire form consists of three sections. In the first section, the demographic characteristics (*age, gender, educational level, marital status, occupation, household size and household income*) of the participants were requested (Umunnakwe et al., 2019). The remaining sections include items on household behavior and waste change during the pandemic period. Multiple-choice questions were prepared for the participants to compare their attitudes before and during the pandemic period considered. In the second and third part, the participants were asked to mark the appropriate choice (increasing/decreasing/no change) for the items according to their experience. In the second part, items related to daily

living habits (i.e., cooking at home) were listed, while in the third part, items related to waste and recycling behaviors (i.e., paper waste and recycling) were included.

To test the changes in household behavior and waste the participants were asked to answer questions in two different sections created after a detailed literature review. Household behaviors are considered as *Cooking at Home, Ordering Food from Outside, Online Shopping, Usage of Dishwasher, Usage of Washing Machine, Disposable Bag Consumption, Home Delivery, Usage of Masks* and *Usage of Gloves*. In addition, waste changes include *Paper, Food, Plastic, Glass, Electrical Equipment, Garden Waste, Textile Products, Disposable Bags,* and *Items for Antivirus Protection.* Data on household behavior and waste changes are given under separate headings as in the questionnaire form.

2.2 Data Analysis

The research designed involved using a cross-sectional and quantitative method for descriptive and explanatory purposes. Statistical analysis was performed using SPSS software (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). The questionnaire items were analyzed using descriptive as well as applied statistics. Data were collected through an online survey, which is thought to be the fastest and healthiest way during the COVID-19 pandemic period considered. The data of 946 participants were analyzed by multivariate logistic regression after examining the frequency distribution.

3. Results and Discussion

3.1 Household behavior changes during the pandemic period

Various changes occurred in individuals' lifestyles. Almost all people wore masks outside their homes, washed their hands frequently, and worked remotely if it was possible (Rhee, 2020). As the lifestyle changed, household behavior changed correspondingly. Spending more time at home led to an increase in domestic activities. While this caused most household behaviors to increase, in some cases it had the opposite effect. Household behaviors that are reported to have increased the most during the pandemic period are *using a mask* (99%), *cooking at home* (71%), *shopping online* (70%), *home delivery* (70%), *usage of dishwasher* (70%).

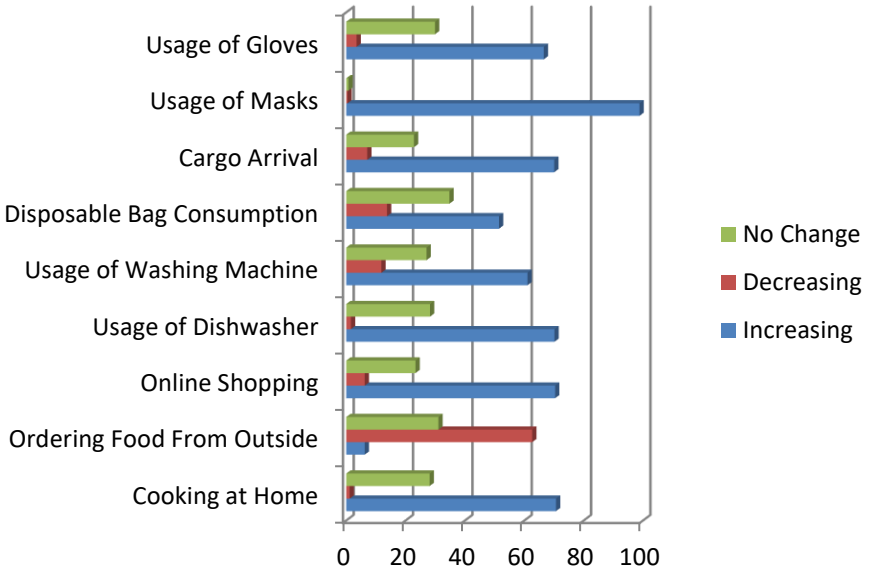

Figure 1. Household behavior changes during the pandemic period

Wearing a mask, a priority for public health concerns, came into effect rapidly (Ahmadian et al., 2020). Masks were increasingly used from the first day the virus started to spread. As found by Almandoz et al. (2020), our results show that there was an increase in cooking at home. The relative literature also reflects that most basic needs were satisfied through online shopping and delivered by courier in disposable plastic-based personal protective equipment (Singh et al., 2020; Rhee, 2020). This led to an acceleration of courier delivery and an increase in packaging waste in a very short period. The increase in home-made food consumption also caused an increase in organic waste and household dishes compared to the pre-pandemic period. In addition, dishwashers started being used not only for household dishes but also for oral hygiene equipment (e.g., toothbrush cleaning) (Bains and Bains, 2020).

On the other hand, most of the respondents (63 %) state that there was a decrease in ordering food from outside. As demonstrated by Rizou et al. (2020), particularly for high-risk populations, take-away, car service and food delivery are

among critical risk management practices to prevent the spread of the virus. Consequently, there was a decrease in the behavior of households regarding ordering from outside.

Based on the percentage changes of household behaviors, we aimed to investigate each change (increasing and decreasing) in detail. Examining the frequencies of behaviors, we saw that only "ordering food from outside" displayed a decreasing tendency while the others showed an increasing tendency. Therefore, we conducted analysis based on the emerging tendencies, using the "decreasing" and "no change" data to design a logistic model only for "ordering food from outside" behavior, and "increasing" and "no change" data to design logistic models for the other behaviors.

Household behaviors were studied as related to household income and household size. Each household behavior was measured with dichotomous variables either changing or not changing the related behavior. Response categories of only "ordering food from outside" behavior were determined as "decreasing" and "no change", whereas the other household behavior categories were determined as "increasing" and "no change" for the logistic model analysis. Response categories of household income were designed as an ordinal variable, as shown in Table 2. As a continuous variable, household size was taken to be the number of people living in the house. Multivariate logistic regression models were designed for each household behavior, so that ten distinct models were analyzed in this study, based on the Equation 1.

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + .. + \beta_k X_k \qquad \text{Equation 1}$$

$$\ln\left(\frac{\text{Changing household behavior}}{1-\text{household behavior}}\right) = \beta_0 + \beta_1(\text{h.income}) + \beta_2(\text{h.size}) \qquad \text{Equation 2}$$

In this context, equation 2 represents ten possible different models of household behaviors described in terms of income and size of households. Each household behavior, the dependent variable in ten separately designed models, was measured as a dichotomous variable "changing"/"not changing" of the related behaviors. This technique was used to reveal the most "change" regardless of the increase or decrease in household behavior changes. In addition, the category of "no change" was fixed as a reference category. The ordinal independent variable household income has six income levels. The minimum level (below 3000₺) was

determined to be the reference category and the other categories were compared with the reference group. Reference categories coding are represented in Table 2.

The results of the analysis showed that each of household behaviors of 'cooking at home', 'ordering food from outside', 'online shopping', 'dishwasher usage', 'washing machine usage', 'disposal bag usage' and 'home delivery' were significantly correlated with the income and size of households. However, household behaviors of "waste separation", "mask usage" and "glove usage" were not significantly correlated with these variables. Table 3 indicates only the significant models. Therefore, each model was designed separately, and the significance level of the models interpreted based on Chi-square, Wald statistics and Nagelkerke values. What emerges is the contribution of each independent variable (income and size of households) in influencing the dependent variables (household behaviors). In a logistic regression model, Wald test's level of significance represents independent variable's predictive ability of the dependent variable (Hilbe, 2016). The odds ratio [Exp(B)] represents "the change in odds of being in one of the categories of dependent variable when the value of independent variable increases by one unit" (Tabachnick and Fidell, 2007, p. 461). The odds heading in the Table 3 represents a ratio between a case happening and not happening (Pallant, 2013).

		Parameter Codes				
		(1)	(2)	(3)	(4)	(5)
Reference Group *(Household Behavior)*	,00 (no change)	.000				
	1,00 (increasing/decreasing)	1.000				
Reference Group *(Household Income)*	,00 (below 3000₺)	.000	.000	.000	.000	.000
	1,00 (3001-6000₺)	1.000				
	2,00 (6001-9000 ₺)		1.000			
	3,00 (9001-12000 ₺)			1.000		
	4,00 (12001-15000 ₺)				1.000	
	5,00 (above 15001₺)					1.000

Table 2. Reference categories of variables.

First, direct logistic regression was conducted to ascertain the likelihood that respondents would report increasing in cooking at home based on income and size of household. The overall model found significant $X^2(6, N=946) = 28,477$; $p< .05$; Wald=161,893. Given the significance level of each independent variable in explaining the dependent variable, it was confirmed that cooking at home was correlated with income and size of households.

	X^2/df	Nagelkerke R2		Beta	Wald	df	Sig.	Exp(B) (Odds)
Model 1			Income [Ref-Below 3000₺]		12,340	5	,030	
Cooking at	28,477/6	.043	Income 4 [12001-15000 ₺]	,936	6,642	1	,010	2,551
Home	p = .000		Income 5 (above 15001₺)	,892	8,675	1	,003	2,440
Ref: Inc			Household size	-,183	11,196	1	,001	,833
Model 2			Income [Ref-Below 3000₺]		14,172	5	,15	
Ordering Food			Income 2 [6001-9000 ₺]	,576	6,040	1	,014	1,779
From Outside	29.875/6	.046	Income 3 [9001-12000₺]	,572	4,886	1	,027	1,772
	p = .000		Income 4 [12001-15000 ₺]	1,009	8,371	1	,004	2,742
			Income 5 [above 15001₺]	,782	7,445	1	,006	2,185
Ref:Dec			Household size	-,165	9,235	1	,002	,848
Model 3			Income [Ref - Below 3000₺]		22,572	5	,000	
Online			Income 1 [3001-6000 ₺]	,463	4,044	1	,044	1,588
Shopping	23.621/6	.039	Income 2 [6001-9000 ₺]	,863	11,495	1	,001	2,370
	p = .000		Income 3 [9001-12000₺]	,536	3,877	1	,049	1,710
			Income 4 [12001-15000 ₺]	1,390	11,895	1	,001	4,017
Ref:Inc			Income 5 [above 15001₺]	1,126	12,629	1	,000	3,083
Model 4			Income [Ref - Below 3000₺]		21,170	5	,001	
Dishwasher	28.532/6	.044	Income 3 [9001-12000₺]	,509	3,693	1	,055	1,663
Usage	p = .000		Income 4 [12001-15000 ₺]	1,379	11,943	1	,001	3,969
Ref: Inc			Income 5 [above 15001₺]	1,087	12,083	1	,001	2,964
Model 5			Income [Ref - Below 3000₺]		10,957	5	,052	
Washing M.	13.695/6	.023	Income 4 [12001-15000 ₺]	,828	5,406	1	,020	2,290
Usage	p = .033		Income 5 [above 15001₺]	,820	6,544	1	,011	2,270
Ref:Inc								
Model 6			Income [Ref - Below 3000₺]		10,775	5	,056	
Disposal Bag	26.571/6	.044	Income 4 [12001-15000 ₺]	,741	4,418	1	,036	2,099
Usage	p = .000							
Ref:Inc.								
Model 7			Income [Ref-Below 3000₺]		16,924	5	,005	
Home	18.490/6	.031	Income 2 [6001-9000 ₺]	,588	5,449	1	,020	1,801
Delivery	p = .005		Income 4 [12001-15000 ₺]	1,372	10,577	1	,001	3,942
Ref: Inc			Income 5 [above 15001₺]	,993	9,695	1	,002	2,699

Table 3. Variables in the multivariate logistic regression models for household behaviors.

Nagelkerke R^2 indicated that the income and size of households explained 4.3% of cooking at home. Based on the multivariate logistic regression model, each category was compared with the reference category. As regards Model 1, by comparing household income with the reference category, it was seen that individuals who have between 12001₺ and 15000₺ household income were over 2.5 times more likely to cook at home than those who have 3000₺ and below household income. In addition, individuals who have more than 15000₺ household income would probably cook at home 2.4 times more than those who have less than 3000₺ income. The odds ratio of .83 of household size was less than 1, which indicated that for each additional person in a house it was .83 times less likely to increase cooking at home, controlling for other factors in the model.

Model 2 indicates the overall model concerning how ordering food from outside behavior was analyzed as related to income and size of household. Household income and size explained 4.6% of ordering food from outside. It was seen that individuals with more than 6000₺ household income were less likely to order food from outside than those with under 3000₺ household income. We found that individuals who have between 6001₺ and 9000₺ household income were over 1.7 times less likely to order food from outside than those who have 3000₺ and below household income. This result was the same for the 9001-12000₺ household income group who order from outside with 1.7 times lower probability than those who have 3000₺ and below. In addition, the household income group of '12001-15000' and '15000₺ above' were approximately 2 times less likely to order food from outside than those who have 3000₺ and below. The odds ratio of .84 of household size was less than 1, which indicated that for each additional person in a house it was .84 times less likely to decrease ordering food from outside, controlling for other factors in the model.

The results of the analysis showed a significant correlation between online shopping and household income, as seen in Model 3. However, household size produced a non-significant coefficient in this model. Household income explained 3.9% of online shopping behavior. All categories of household income ('3001-6000₺', '6001-9000₺', '9001–12000₺', '12001-15000₺', 'above 15001₺') would probably do online shopping more than the reference category ('under 3000₺' household income). Results indicate that individuals who have between 3001 and 6000₺ household income were 1.5 times, individuals who have between 6001 and 9000₺ were 2.3 times, individuals who have between 9001 and 12000₺ were 1.7 times, individuals who have between 12001 and 15000₺ were 4 times, and individuals who have more than 15001₺ were 3 times more likely to do online shopping than those who have 3000₺ and below.

Model 4 showed a significant correlation between dishwasher machine usage and household. At the same time, household size produced a non-significant value in this model. Household income explained 4.4% of dishwasher machine usage. It was seen that individuals who have between 9001₺ and 12000₺ household income were over 1.6 times more likely to use a dishwasher than those who have 3000₺ and below. In addition, individuals with 12001₺ and 15000₺ household income were over 3.9 times more likely to use a dishwasher than those with 3000₺ and below. Furthermore, individuals who have more than 15000₺ household income would probably use a dishwasher 2.9 times more than those who have 3000₺ and below.

Model 5 showed a significant correlation between washing machine usage on the basis of household income, while household size is non-significant in this model. Household income explained 2.3% of washing machine usage. It was seen that individuals with between 12001₺ and 15000₺ household income were over 2.2 times more likely to use washing machine than those with 3000₺ and below. Moreover, individuals who have more than 15000₺ household income would probably use washing machine 2.2 times more than those who have 3000₺ and below.

The results of the analysis showed that disposable bag usage could be significantly explained on the basis of household income, as seen in Model 6. At the same time, household size is non-significant in this model. Therefore, household income explained 4.4% of disposal bag usage. Comparing household income with the reference category, individuals who have more than 15000₺ household income would probably use disposable bags 2 times more than those who have 3000₺ and below.

Model 7 indicates that home delivery was significantly correlated with household income. However, household size proved non-significant in this model. Household income explained 3.1% of home delivery. It was seen that individuals with between 6001₺ and 9000₺ household income were over 1.8 times more likely to prefer home delivery service than those with 3000₺ and below household income. In addition, individuals who have between 12001₺ and 15000₺ household income were over 3.9 times more likely to prefer home delivery service than those who have 3000₺ and below. Moreover, individuals who have more than 15000₺ household income would probably prefer home delivery service 2.6 times more than those who have 3000₺.

Thus, through our logistic regression model and analysis we confirmed the H_{1a}, H_{2a}, H_{1b}, H_{2b}, H_{1c}, H_{1d}, H_{1e}, H_{1f}, H_{1g} hypotheses.

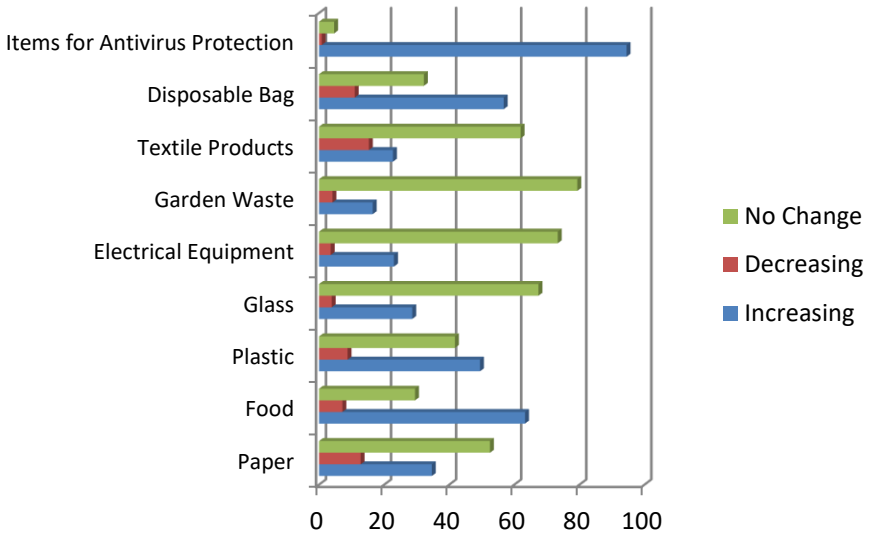

Figure 2. Household waste changes during the pandemic period.

3.2 Household Waste Changes During the Pandemic Period

Factors such as rapid increase in population and urbanization, socio-economic transformations and improvement of living standards lead to an increase in the amount of municipal solid waste generation (Wang et al., 2020; Omran et al., 2009). Istanbul is the most populous city of Turkey and is subject to an ongoing process of overcrowding in various ways, leading to an increase in the waste collected by the municipalities. According to the Turkish Statistical Institute data, in 2018 the amount of waste collected by municipalities in Istanbul was 7,042,585 tons (Turkish Statistical Institute, 2018). This equates to 1,28 kilograms of waste per person living in Istanbul. In addition to the overcrowding of the city, a decrease in recycling sensitivity has been recorded as one of the negative side effects of COVID-19 (Zambrano-Monserrate et al., 2020), significantly leading to an increase in waste in Istanbul. The main reasons for this decrease in recycling sensitivity can be cited as the increase in the use of disposable products, new products that have become a part of daily life, and the closure of the recycling centers necessary for the reuse of the wastes of these products. Like many sustainability

practices disrupted by the pandemic, recycling centers were temporarily closed in many countries, based on the belief that they could add to the risk of spreading COVID-19. Waste separation is another important issue concerning the efficiency of recycling centers. For example, since it was not possible for some municipalities to recycle masks and gloves that are separated as household waste, the increased waste volume caused further negative consequences for the environment, together with decreased recycling sensitivity (Bal and Ozturk, 2020).

Figure 2 represents the data we collected from the households of Istanbul regarding waste change. Household waste, which the households stated to be those that most increased, is listed as *items for antivirus protection* (95%), *food* (63%), *disposable bag* (57%) and plastic (49%).

Waste behavior can clearly be expected to change during a pandemic period. Hygiene products and various methods of virus protection, which are more integrated into individuals' lives than ever before, have also changed the solid waste production of households. Behaviors aimed at increasing individual hygiene standards have caused a large amount of medical waste in the environment (Saadat et al., 2020). Uncertainty about a possible stressful event and the fact that this uncertainty will persist for an indefinite period impairs the necessary self-control required to balance food consumption (Core et al., 2018). The active spread of the virus and the continuing uncertainty about the future have caused individuals to stay home. As a result, household waste has increased due to the increase in home-made meals and the demand for home delivery (Dente and Hashimoto, 2020). Additionally, the literature shows that the demand for and use of plastic packages and disposable plastic bags has increased during the pandemic period because of safety and hygiene concerns (Sharma et al., 2020; Klemeš et al., 2020; Singh et al., 2020). All these factors have played an inevitable role in the increase of household waste.

Concerns surrounding safety and hygiene during the pandemic have led to a substantial increase in plastic packaging, with likely implications on global sustainability efforts to curb plastic pollution. The reliance on online shopping for home delivery of commercial and essential products during lockdown has provoked a surge in demand for single-use plastic bags.

Based on the frequencies of waste shown in Figure 2, we aimed to investigate each type of waste change in detail. Investigating the frequency distribution of the waste changes, we observed an increasing trend in the data, so we conducted analysis on the basis of the existing increasing tendencies of each type of waste

change. In addition, we used "increasing" and "no change" data to develop logistic models for waste changes.

Waste changing was explained on household income and household size grounds. Multivariate logistic regression models were designed for each waste change, to analyze nine distinct models, proceeding as in Equation 2 above.

$$\ln\left(\frac{\text{Changing waste}}{1-\text{changing waste}}\right) = \beta_0 + \beta_1(\text{h. income}) + \beta_2(\text{h. size}) \qquad \text{Equation 3}$$

		Parameter Codes				
		(1)	(2)	(3)	(4)	(5)
Reference Group *(Waste changing in household)*	,00 (no change)	.000				
	1,00 (increasing/decreasing)	1.000				
Reference Group *(Household Income)*	,00 (below 3000₺)	.000	.000	.000	.000	.000
	1,00 (3001-6000₺)	1.000				
	2,00 (6001-9000 ₺)		1.000			
	3,00 (9001-12000 ₺)			1.000		
	4,00 (12001-15000 ₺)				1.000	
	5,00 (above 15001₺)					1.000

Table 4. Reference Categories of Variables.

In this way, nine different models of waste changing in household are examined on the basis of income and size of households. Each waste change, the dependent variable, was measured as a dichotomous variable "decreasing"/"increasing" of the relative waste change. The category of "no change" was fixed as a reference category. One of the ordinal independent variables, household income, has six income levels. The minimum level (below 3000₺) was determined to be the reference category and the other categories were compared with the reference group. Reference categories coding is represented in Table 4.

The results of the analysis showed that 'paper', 'glass', 'disposable bag' and 'anti-virus protection equipment' waste changes were significantly correlated with

income and size of household. On the other hand, 'food', 'plastic', 'textile', 'electronic equipment' and 'garden' waste changes were not correlated significantly with these variables. Table 5 represents only the significant models. Each model was designed separately, and the significance level of models analyzed based on Chi-square, Wald statistics and Nagelkerke values. This shows the contribution of each independent variable (income and size of households) to observe their influence on the dependent variables (waste change).

	X^2/df	Nagelkerke R2		Beta	Wald	df	Sig.	Exp(B) (Odds)
Model 1			Income [Ref-Below 3000₺]		16,973	5	,005	
Paper Waste	22,520/6	.039	Income 2 [6001-9000₺]	,589	5,498	1	,019	1,802
Change	*p* = .001		Income 3 [9001-12000₺]	,711	6,825	1	,009	2,036
			Income 4 [12001-15000₺]	,950	8,554	1	,003	2,585
Ref: Inc			Income 5 [above 15001₺]	,861	8,868	1	,003	2,366
Model 2			Income [Ref-Below 3000₺]		36,528	5	,000	
Glass waste	55.394/6	.084	Income 3 [9001-12000₺]	1,021	12,503	1	,000	2,777
change	*p* = .000		Income 4 [12001-15000₺]	1,467	19,361	1	,000	4,337
			Income 5 [above 15001₺]	1,230	16,804	1	,000	3,422
Ref: Inc			Household size	-,185	10,343	1	,001	,831
Model 3			Income [Ref-Below 3000₺]		14,258	5	,014	
Disposal Bag	22.632/6	.036	Income 3 [9001-12000₺]	,773	7,734	1	,005	2,167
Change	*p* = .001		Household size	-,117	4,827	1	,028	,889
Ref:Inc								
Model 4			Income [Ref-Below 3000₺]		10,080	5	,073	
Antivirus	16.689/6	.056	Income 1 [3001-6000₺]	1,161	7,088	1	,008	3,192
protection	*p = .010*		Income 2 [6001-9000₺]	1,148	6,302	1	,012	3,152
Ref:Inc								

Table 5. Variables in the multivariate logistic regression models for waste changes.

Multivariate logistic regression analysis was conducted to ascertain the likelihood that respondents would report an increase in paper waste based on income and size of household. The overall model found household income significant, but household size non-significant. Nagelkerke R^2 indicated that household income explained 3.9% of paper waste change.

On the basis of the multivariate logistic regression model, each variable was compared with the reference category. For Model 1, by comparing household income with the reference category, it was seen that individuals with than 6001₺ household income were more likely to produce paper waste than those with under 3000₺. Results indicated that individuals who have between 6001 and 9000₺ household income were 1.8 times, individuals who have between 9001 and

12000₺ were 2 times, individuals who have between 12001 and 15000₺ were 2.5 times, and individuals who have more than 15001₺ were 2.3 times more likely to produce paper waste than those who have 3000₺ and below.

Model 2 showed that the overall glass waste was correlated with income and size of household. Household income and size explained 8.4% of glass usage. Results showed that individuals with more than 9001₺ household income were more likely to produce glass waste than those with under 3000₺. We found that individuals who have between 9001₺ and 12000₺ household income were over 2.7 times, individuals who have between 12001₺ and 15000₺ household income were over 4.3 times, individuals who have more than 15000₺ household income were over 3.4 times more likely more likely to produce glass waste. The odds ratio of .83 of household size was less than 1, which indicated that for each additional person in a house it .83 times less likely to increase glass waste, controlling for other factors in the model.

Model 3 indicated that disposable bag waste correlated with household income and size. Household income and size explained 3.6% of disposable bag waste change. Individuals who have between 9001₺ and 12000₺ household income were 2.1 times more likely to produce disposable bag waste than those who have 3000₺ and below. The odds ratio of .88 of household size was less than 1, which indicated that for each additional person in a house it was .8 times less likely to increase disposable bag waste, controlling for other factors in the model.

Our results showed that antivirus protection waste change could be significantly correlated with household income, as seen in Model 4. However, household size produced a non-significant coefficient in this model. We found that household income explained 5.6% of antivirus production waste during pandemic period. The household income group of '12001-15000₺' and '15000₺ above' were approximately 3.1 times more likely to produce antivirus protection waste than those who have 3000₺ and below.

Thus, through our logistic regression model and analysis we confirmed the H_{3a}, H_{3d}, H_{4d}, H_{3i}, H_{4i}, H_{3h} hypotheses.

4. Conclusions

In the light of the impact of the COVID-19 pandemic on the lifestyles of citizens, this research aimed to empirically analyze how household behavior and waste changed in the period from May to December 2020 in the largest city of Turkey, Istanbul, by using an online questionnaire survey. Our results indicate that usage

of masks, cooking at home, online shopping, home delivery, and usage of dishwashers increased substantially. On the other hand, results of the study indicate that most of the respondents reduced ordering food from outside. In line with these behavioral changes, we have also detected important changes in the household waste of the respondents. Most of the respondents reported that there are increases in the quantities of medical waste, food waste, disposal bags and plastic waste. These results show that individual health precautions to avoid infection and decreased outdoor mobility led to increase in these types of household wastes.

We also attempted to analyze the effects of household income and household size on the behavioral and household waste changes during the pandemic period. The results of logistic regression analysis show that household income and size are related to the changes in the respondents' behaviors such as 'cooking at home', 'ordering food from outside', 'online shopping', 'dishwasher usage', 'washing machine usage', 'disposal bag usage' and 'home delivery'. 'Paper', 'glass', 'disposable bag' and 'antivirus protection equipment' waste changes during the pandemic period are also related to household income and size.

Our study highlights the need for developing special management strategies and action plans, especially for medical, food and plastic household waste to reduce the negative environmental impacts of such a pandemic. Examples of this could be sustainable industrialization (to support the huge amounts of unexpected material production), reusing (minimizing the unnecessary usage of raw material and waste generation), efficient food use (meal planning, freezing, and preserving), and behavioral change in daily life (optimum consumption and raising awareness towards recycling and reusing) (Babbitt et al., 2021; Rume and Islam, 2020). Furthermore, considering the effects of household income and size on the composition of household waste, it is possible to say that local and central authorities should seek ways of developing effective waste management strategies for citizens who have different socio-economic characteristics. In addition, dissemination of methods such as composting and waste separation by the authorities are necessary to increase the involvement of individuals in sustainable waste management (Khan et al., 2019).

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Original Paper

The development of a construct in the heritage urban sustainability index

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Abstract. *The UN Sustainable Development Goals (SDGs) have outlined that every country in the world needs to create sustainable cities for communities by 2030. The first thing to consider is how to identify sustainability indicators to be used as a guide in measuring the sustainability index. Therefore, this article aims to explore the formation of the heritage urban sustainability index construct in Malaysia using exploratory factor analysis (EFA). The respondents consisted of 100 residents in the heritage city of Kajang, Malaysia, who were selected using a simple random sampling technique. Likert scale questionnaires 1 to 5 were used to elicit feedback. The results showed that the items in each study construct achieved acceptable reliability with Cronbach's alpha values greater than 0.70 and met the normality test requirements. Data was processed using EFA for grouping items according to appropriate constructs. The results of the study from 154 items of the questionnaire have formed five main constructs of urban heritage sustainability in Malaysia, namely (1) economic prosperity, (2) social well-being, (3) environmental well-being, (4) cultural heritage, and (5) the role of government and community. The results of this study also meet the index value requirements set by Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. Furthermore, the formation of the five constructs of this study directly demonstrates the relationship between items according to constructs. Indirectly, these findings help research on the sustainability of heritage cities in other areas as well.*

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1. Introduction

The UN Sustainable Development Goals (SDGs) target all countries globally with the aim of building sustainable cities and communities for all by 2030. The eleventh goal mentions the sustainability of cities and communities. It is detailed under Target 11.3 that by 2030 all countries need to improve inclusive and sustainable urbanisation for integrated and sustainable human settlement planning and management (UNDP, 2019). To achieve the SDGs' recommended

level of sustainability, a method or measurement must be applied systematically and holistically. To achieve this goal, a tool or benchmark must be created to assess each city's level of sustainability. Therefore, countries have been engaged in building their own measurement instruments to measure the sustainability of their respective cities, including Malaysia. The level of urban sustainability in Malaysia is measured by an instrument developed by the Federal Department of Town and Country Planning (Jabatan Perancangan Bandar dan Desa, 2019), the Malaysian Urban-Rural Sustainable Development Indicator Network (Murninet) 2.0, used from 2017 until the present day.

However, the constructs used in Murninet 2.0 do not include all elements, especially elements involving cultural heritage. Indeed, elements of cultural heritage are not included in Murninet 2.0 as a measurement construct. However, the cultural heritage element is element 11.4 in the SDGs, which sets the target that, by 2030, all countries need to strengthen efforts to preserve and protect the world's cultural heritage in urban development. This means that sustainable urban development should involve cultural heritage elements as one of the constructs in the measurement, especially for cities classified as heritage cities.

Many people are unaware that cultural heritage is one of the drivers of sustainable development in the Agenda 2030, especially in the context of urban development. Cultural heritage supports sustainable economic development, the formation of prosperous communities and the creation of a conducive environment. Cultural heritage is able to generate an economy based on heritage tourism, form a harmonious society by cultivating a sense of belonging as a result of the identification of origins and save the use of natural resources by reusing existing heritage elements. The values brought by cultural heritage cross borders and complement every existing dimension in sustainable urban development.

In Malaysia, there are 162 cities classified as heritage cities that existed before World War II (1941). Melaka and Georgetown have been listed in the World Heritage List as World Heritage Sites (UNESCO, 2019). Heritage cities have distinctive and unique features and elements that not found in ordinary cities (Keawsomnuk, 2021). For example, tangible and intangible cultural heritage such as the architectural design of buildings that orient the unique living culture of the local community, dialects used in daily speech, and lifestyle practices in certain ethnic and sub-ethnic cities (Baba Nyonya, Jawi Peranakan, Bugis, and others).

Therefore, the measurement of heritage urban sustainability should be identified in the context of Malaysia so that it can be used as a guide and indicator

in future studies and as a guide for external researchers. This study is in line with the view of Ban Ki-Moon that sustainable urban development does not marginalise elements of cultural heritage (Wiktor-Mach, 2019). Cultural heritage is already an integral part of the life of local communities. It been raised on a par with economic, social and environmental elements in measuring the level of sustainability (Appendino, 2017). Therefore, this article aims to explore and test cultural heritage constructs along with economic, social, environmental, governmental, and community roles in heritage cities in Malaysia.

2. Literature Review

In general, sustainable development has been defined as development that meets the demands of the present without compromising the ability of future generations to meet their needs. Sustainable development associates economic, societal, and environmental sustainability with poverty eradication and income distribution equity as important key goals (Chamhuri et al., 2014). The Limits to Growth (Meadows et al., 1972) was the catalyst, followed by the Brundtland Report (Brundtland, 1987), the Rio Summit (1992) (UNESCO, 2017), the Decade of Education for Sustainable Development (2004-2014) (UNESCO, 2017), and, most recently, the Sustainable Development Goals (SDGs) with 17 key goals that each country must act on (United Nations, 2019). Sustainable development in urbanisation has resulted in a number of global urbanisation agendas, including The Healthy Cities Movement, Local Agenda 21, and the most recent, the New Urban Agenda. A New Urban Agenda has goals for a enhance and more sustainable future (Satterthwaite, 2016; Habitat III, 2016). The New Urban Agenda was accepted at the United Nations Conference on Housing and Sustainable Urban Development in Quito on October 20, 2016 (Caprotti et al., 2017). One of the goals to be achieved in the New Urban Agenda is to create sustainable cities.

According to Fatimah et al. (2008) and Abdul Samad et al. (2004), sustainable urban development is a collaborative decision-making process involving stakeholders in urban planning such as local authorities, local business associations, non-governmental organisations, and consumers, to ensure that economic activities, population welfare (including health), and ecosystems are all given integrated consideration to ensure that current and future generations can meet their needs on an ongoing basis. An important criterion in the formation of a sustainable city is the environment, economy, society, and local authorities' ability to implement efforts to achieve the mission and vision of planned sustainable development.

When the New Urban Agenda is examined more closely, it can be seen that, in addition to the relationship between good urbanisation and job creation, livelihood opportunities, and revised quality of life, the natural and cultural heritage of cities is also a key component in urban planning, including rehabilitation and adaptation efforts, promotion and dissemination of knowledge regarding these issues (Habitat III, 2016). This shows that cultural heritage has been recognised as a key component in creating sustainable cities. This has led to debate between scholars such as Runnalls (2007), Tweed and Sutherland (2007), as well as Salvatore (2018), who place cultural heritage as the fourth dimension in sustainable development. Appendino (2017) has clearly shown a shift in the paradigm towards the foundation of sustainability when placing the element of heritage as one of the main pillars for sustainability achievers.

Each city has its own uniqueness. Whether big or small, a city has its uniqueness related to natural or cultural, tangible or intangible variables (Salvatore, 2018). According to Guzmán et al. (2014) and Abdul Rani (2018), cultural heritage not only transcends economic success and achieves policy-making attention but is also an urban uniqueness. According to Van Oers and Pereira Roders (2012), who studied the role of cultural heritage in sustainable urban development in Belfast, Ireland, cultural heritage has contributed to unique urban features and instilled a sense of belonging in residents of various generations, resulting in the development of a sustainable city. In most cases, heritage cities are often analysed in the context of tourism sustainability, as discussed by Coccossis (2008), Al-Hagla (2010) and Thorosby (2016). At the same time, the role of cultural heritage in contributing to sustainable cities has not been neglected (Thorosby, 2016; Kotradyova, 2019).

As Malaysia is committed to implementing the SDG agenda and adopting the New Urban Agenda, together with being a country rich in relics and uniqueness of its past, especially in cities, it needs to have an index to measure the sustainability of its heritage cities. The term sustainable heritage city does not apply only to UNESCO-recognized heritage cities but includes all cities with unique cultural characteristics. Some countries and cities have developed their own sustainability indexes, such as the Sustainable Cities Index (Australia), the Urban Sustainability Index (China), and the London Sustainable Development Indicator (United Kingdom), as well as Malaysia, which has developed Murninet 2.0, an instrument to measure urban sustainability (Mohamad et al. 2021). All of them view the city in general without placing the heritage element as one of the key domains for forming and calculating the index. This scenario is seen as marginalising the heritage that is the legacy of a city.

Questions concerning the sustainability of heritage cities in Malaysia can be addressed through the availability of instruments and indicators covering all sustainability components. Murninet 2.0 uses only three main constructs: economic, social, and environmental as introduced by Brundtland (1987). We propose that, by using the foundations of these three constructs, integrated by the cultural heritage constructs introduced by Appendino (2017) as well as the government and community role constructs introduced by Leus and Verhelst (2018) and Tan et al. (2018), an instrument with five complete constructs can be built and applied in Malaysia. Next, the details of each construct, sub-construct, and item can be based on the local environment of heritage cities in Malaysia by referring to various relevant sources such as UNESCO, New Urban Agenda, Healthy City Movement, Local Agenda 21, and others.

3. Methodology and Study Area

This study uses exploratory factor analysis (EFA) to identify a limited number of latent factors or constructs from a large number of observed constructs consisting of EFA. In this study, only EFA conducted to explore the heritage city sustainability index components in Malaysia. Pilot study data used to meet the requirements of EFA by using data and samples that were different from the actual study still had similar and almost identical characteristics to the actual study (Worthington and Whittaker, 2006).

3.1 Study Area

The selected study area is the city of Kajang, located in the state of Selangor, Malaysia. Kajang is a city listed in the Malaysian Architectural Heritage Inventory report as a heritage city established before the Second World War (1941). Kajang still retains elements of its cultural heritage despite the expansion of Kuala Lumpur's development. Many elements of tangible cultural heritage buildings and shops built before the war are still preserved in this city and have an early transitional style and architectural design, with balustrades, domes on columns, attractive windows, various plaster decorations, patterns, and carvings that depict the culture of the loaves and fishes (Syed Zainol, 1992). In addition, an element of intangible cultural heritage is still intensely practised by the locals, including young people. In the city of Kajang, there are various elements of the intangible heritage of the cultural life of various ethnic and sub-ethnic groups, such as Javanese, Bugis, Malay, Chinese, and others who inhabit it. Among the popular intangible culture practised by Kajang's community is a Silat Sukmo Rogo performance, which takes place when there is a wedding ceremony (Hafez and

Aloysius, 2019). In addition to the preservation of cultural heritage, the city of Kajang is also competitive in economic growth, social development, and the environment, which makes it listed as one of the cities most chosen for livelihood and inhabited by residents (Abdul Samad et al., 2004). The characteristics of Kajang make it appropriate for selection as a pilot study area.

3.2 Population and Sample

This study set the total study sample at 100 residents aged 18 years and above, living in heritage urban areas. This is the initial sample for the verification process of instrument construction measurement using EFA. This population consists of locals and non-locals who migrated and settled in the city to work or study or for other reasons. The selection of respondents was with a simple random sampling technique. The number of samples is based on Leohlin (1992) and Kline (2005) in terms of the minimum number of samples recommended.

3.3 Instruments

The research instrument used was a questionnaire. This consists of six sections: sections A, B, C, D, E, and F (Table 1). Each section contains information related to the study constructs: Section A (economic prosperity), Section B (social well-being), Section C (environmental well-being), Section D (cultural heritage), Section E (role of government and community), and Section F (respondents' profile). Sections A, B, C, D and E are adaptations and modifications from the sustainability theory introduced over a period of time from Brundland Report (1987) to Appendino (2017). Table 2 shows in detail the constructs, items, and statements of this study.

Table 1: Questionnaire Information

Section	Constructs	Constructs Explanation	Items	Source
A	Economic Prosperity	Economic prosperity refers to human mobility, business/investment activities and economic growth contributing to employment opportunities, income, and human influx.	33	Adapted from Jabatan Perancangan Bandar dan Desa (2019) and Choon et al. (2011)
B	Social Well-Being	Community well-being refers to basic amenities, relationships/communications and utilities, safety and public order. Basic facilities lead to the infrastructure provided for all residents. Safety and public order are related to social problems in society and communication/utilities are related to transportation networks and domestic services such as water and electricity supply that lead to social well-being.	31	Adapted from United Nation Sustainable Development (1992) and Choon et al. (2011)

C	Environmental Well-Being	Environmental quality refers to physical health, namely air, sound, smell, congenital diseases and clean water supply. In addition, the land use that involves saturated built-up areas contributes to the quality of the environment.	20	Adapted from Takano (2003); O'neill and Simard (2006); Lafond and Heritage (2009)
D	Cultural Heritage	Cultural heritage refers to tangible culture that can clearly be seen and touched, such as buildings, monuments and other constructions, while intangible culture is a culture that cannot be seen and touched such as practices, customs, art, and so on, as well as the preservation and conservation of heritage that involves restoration, repainting, modification, and other activities that leading to the survival of cultural heritage	28	Adapted from Appendino (2017); Abdul Aziz (2011) and Syed Zainol (1992)
E	Role of Government and Community	The role of government and community refers to community involvement, environmental management, tourism and heritage management, and risk management, as efforts made to preserve cultural heritage	42	Adapted from United Nation Sustainable Development (1992) and Tan et al. (2018)
F	Respondent's Profile	Involves information on gender, race and population status	3	Built according to the needs of the study

Table 2: Constructs, Items, and Statements of Heritage City Sustainability

Constructs	Items	Statements
Economic Prosperity	a1	Many job opportunities are available in this area.
	a2	Side job opportunities abound in this area.
	a3	The price of essential goods is in accordance with the Ministry of Domestic Trade and Consumer Affairs (KPDNHEP) standards in this area.
	a4	The annual salary increase is inconsistent in this area.
	a5	Many people are unemployed in this area.
	a6	Many job opportunities are monopolized by foreign workers (non-citizens) in this area.
	a7	Many non-locals live in this area due to employment factors.
	a8	Many shops are empty and unused in the area.
	a9	Rental rates for shops or business premises are high in this area.
	a10	Service activities such as hotels/guest houses/motels are plentiful in this area.
	a11	Business activities are thriving/growing rapidly in this area.
	a12	The opportunity to run your own business is huge in this area.
	a13	All types of businesses can be found in this area.
	a14	There are certain business clusters (clothing, retail, furniture, restaurants etc) in this area.
	a15	Multi-National Companies (MNCs) (e.g. 7Eleven, KFC, McD) operate extensively in this area.
	a16	Small and Medium Enterprises (SMEs) (e.g. grocery stores, restaurants etc.) abound in this area.
	a17	Many companies or shops practice shifting hours in this area.
	a18	Business activities are active until night in the area.

	a19	Non -locals run businesses around the area.
	a20	Traders around this area receive special assistance from the local/central government.
	a21	Enough space is provided for locals to do business in the area.
	a22	Land tax for business or commercial lots is adequate in this area.
	a23	This area is the focus of the public.
	a24	This area is the focus of foreign workers.
	a25	Every weekend many tourists come to this area.
	a26	Residents from this countryside often come to travel to this area.
	a27	This city is frequently visited seasonally (school holidays, convocations, etc.)
	a28	Every school holiday season many tourists come to this area.
	a29	Road congestion occurs during the holiday season due to the influx of many vehicles.
	a30	Tourists drive sales in this area.
	a31	The presence of tourists contributes to the development of this area.
	a32	The presence of tourists contributes to the economy of the area.
	a33	The presence of tourists increases the use of technology in this area.
Social Well-Being	b1	Wellness facilities are fully available in the area.
	b2	Hypermarket facilities are available nearby in the area.
	b3	Facilities such as schools, community colleges and institutes of higher education are adequate in this area.
	b4	Security facilities (e.g., Police Station, Fire Station) are fully available in this area.
	b5	Complex facilities and a cultural centre are fully available in the area.
	b6	Facilities for the disabled are fully available in this area.
	b7	Playground and field facilities for leisure and sports facilities are fully available in the area.
	b8	Pedestrian facilities are available throughout the area.
	b9	Safe cycling routes are available in the area.
	b10	Hygienic dining facilities are cleanly available in the area.
	b11	The assembly square facilities are sufficient to accommodate the residents in this area.
	b12	Hygienic public toilet facilities are available in the area.
	b13	Access to services and facilities (Hospitals, police stations, fire stations, post offices, government clinics, etc.) of the urban area is within a radius of less than 5 km.
	b14	Criminal cases (theft, snatching, robbery) are alarming in this area.
	b15	Symptoms of social malaise ("rempit"[1], drugs, vice, etc.) among adolescents are alarming in this area.
	b16	Women are safe to walk in this area.
	b17	Children are safe to play in this area.
	b18	Public safety assurance is good and controlled in this area.
	b19	The police are constantly patrolling and inspecting the area.
	b20	The road infrastructure in this area is good and convenient to use.
	b21	Cases of premise or shop house fires are frequent in this area.

[1] "ramp-(rev)-it" (ramp the throttle)

	b22	Public transport such as buses and taxis are always available in the area.
	b23	E-hailing transport such as Grab and Mycar are easily available in the area.
	b24	Bus terminal facilities are fully available in the area.
	b25	A wide selection of bus ticket counters and kiosks are available in the area.
	b26	There are many bus stops in the area.
	b27	Many parking lots are available in the area.
	b28	Public transport services connect all places in the area.
	b29	Few water supply disruptions occur in this area.
	b30	Electricity supply is often cut off (blackout) in this area.
	b31	Telephone networks and maximum internet speed (4G) are available throughout the area.
Environmental Well-Being	c1	Air pollution is frequent in this area.
	c2	The temperature is at a comfortable level in this area.
	c3	Noise is frequent in this area.
	c4	Bad smells are common in this area.
	c5	Water-borne diseases (e.g., diarrhea) are common in this area.
	c6	Vector-borne diseases (e.g., dengue) are common in this area.
	c7	Domestic tap water supply is clean in this area.
	c8	Tap water needs to be filtered first before being used for cooking and drinking purposes.
	c9	Tap water is often cloudy and silty.
	c10	The is a lot of open space here.
	c11	Buildings in this area are built close together.
	c12	Buildings in this area are a built-in storey.
	c13	The local authority oversees well the physical construction of the building.
	c14	There is construction of buildings on an ad hoc (private) basis by landowners.
	c15	Property values in this area are very high.
	c16	Most of the soil surface has been completely cemented/asphalted in this area.
	c17	Flash floods often occur in this area.
	c18	This area lacks green vegetation cover.
	c19	There is a well-equipped public park in the area.
	c20	There is an open area such as a large football field in the area.
Cultural Heritage	d1	A heritage shop building still functions in the area.
	d2	Another type of heritage building still functions in this area.
	d3	Heritage buildings have their design features in the area.
	d4	Heritage buildings have their architectural features in the area.
	d5	Heritage buildings are the symbol of the community in this area.
	d6	Heritage buildings are the source of education in this area.
	d7	Heritage buildings can enhance the spirit of patriotism and love for the country.
	d8	Heritage buildings are still strong and intact in terms of structure in this area.
	d9	Heritage buildings still retain the originally built structures in the area.

	d10	The walls of heritage buildings are not painted to maintain their originality.
	d11	The walls of heritage buildings in this area have cracks.
	d12	The walls of heritage buildings in this area have been sloping.
	d13	Cultural performing arts are often exhibited in this area.
	d14	The community in this area still listens to folk songs and traditional music.
	d15	Traditional games and folk sports are always played in this area.
	d16	Customs and rituals still practiced in this area.
	d17	Traditional businesses still abound and operate in the area.
	d18	Annual festivals and activities are often organised on a large scale in the area.
	d19	Festivals/ rituals/ crowds are celebrated every year in this area.
	d20	Preservation and conservation of heritage is done by the owner of the premises or local authority in this area.
	d21	Heritage buildings still function as originally in the area.
	d22	The structure of a heritage building has not altered to maintain its originality in the area.
	d23	Heritage tombs are still preserved and preserved in this area.
	d24	Preservation and conservation of heritage enhance the image of this area so that it becomes a visitor attraction.
	d25	Preservation and conservation of heritage increase the value of properties in the area.
	d26	Preservation and conservation of heritage attract many tourists to come to this area.
	d27	Preservation and conservation of heritage attract researchers to this area.
	d28	Preservation and conservation of heritage retain historical value.
Role of Government and Community	e1	Local authorities (PBT) put up posters and signboards promoting recycling practices in the area.
	e2	Local authorities hold recycling programs regularly to promote resident awareness in this area.
	e3	Local authorities provide recycling bins in every place to dispose of garbage in this area for the convenience of residents.
	e4	Local authorities always encourage residents to use public transport to reduce traffic congestion in this area.
	e5	Local authorities always hold environmental education programs for residents in this area.
	e6	Local authorities always carry out scheduled waste collection according to the regulations that have been made in this area.
	e7	Local authorities always clean the drains, drains, public toilets and road shoulders perfectly in this area.
	e8	Local authorities carry out greening (planting flowers) to cool the temperature in this area.
	e9	Local authorities always ensure that the landscape is maintained so that it looks neat in this area.
	e10	Local authorities impose compounds and fines on premises that do not manage solid waste properly in this area.
	e11	Local authorities impose compounds and fines on residents who dump garbage in public areas.
	e12	Heritage buildings are safe to use by the public in this area.
	e13	Road signs provided for the convenience of the public in the area.
	e14	Traffic lights work well for traffic convenience in this area.

e15	The disaster victim collection centre equipped with various facilities in the area.
e16	All accident risk areas are put up with signboards to warn the public in this area.
e17	Local authorities often conduct disaster drills for the public in this area.
e18	Authorities conduct regular inspections of heritage buildings to ensure the level of security in this area.
e19	The government recognizes this urban area as a heritage city.
e20	The government gazetted buildings and monuments as a national heritage to attract tourists to the area.
e21	The government always encourages conservation and preservation activities to be carried out in this area.
e22	The government has always provided financial assistance for the conservation and preservation process in this area.
e23	The government is constantly launching tourism campaigns to attract people to the area.
e24	The government has made the uniqueness of the cultural heritage a key asset for the promotion of tourism in the area.
e25	The government always holds annual festivals or activities in the city to attract tourists to the area.
e26	The government provides assistance and incentives to traditional business activities to drive the economy in the area.
e27	The government supports the movement of associations/NGOs that campaigns for the survival of heritage in this area.
e28	The government provides a comprehensive cultural centre in the area.
e29	The government provides a comprehensive heritage and tourism information centre in the area.
e30	The government has prepared a comprehensive cultural heritage preservation and conservation plan in the area.
e31	Care of the traditional premises of the heritage city is the responsibility of the local government.
e32	Care of the traditional premises of the heritage city is the responsibility of the owner of the premises.
e33	Many groups/clubs that campaign for cultural heritage for the future have been established in this area.
e34	Many groups/clubs that carry out preservation and conservation for future survival have been established in this area.
e35	Heritage groups/clubs often hold community activities to cultivate a love of history in this area.
e36	Heritage groups/clubs often conduct community-based programs for the preservation and conservation of heritage in this area.
e37	Heritage groups/clubs often hold cultural programs with the community to attract young people to this area.
e38	Heritage groups/clubs often run campaigns to attract tourists to this area.
e39	Heritage groups/clubs often hold seminars or cultural classes to teach young people in this area.
e40	Heritage groups/clubs often hold cultural performances to the community for entertainment in the area.
e41	The local community joins heritage groups/clubs to fight for the customs in the area.
e42	Young people join heritage groups/clubs to avoid the extinction of ancestral traditions in the area.

3.4 Instrument Reliability

Table 3 shows the reliability of heritage urban sustainability constructs with Cronbach's alpha values for measuring the internal consistency level of the constructs. The Cronbach's alpha value is based on the reliability index analysis: 0.90-1.00 (very high), 0.70-0.89 (high), 0.30-0.69 (moderate), and 0.00-0.30 (low) (Babbie, 1992). Therefore, good reliability values are 0.70 and above (Mohamad et al., 2015). The analysis results showed that Cronbach's alpha value is between 0.70-0.95, within a range between high and very high. Therefore, the instrument used in this investigation demonstrates a high level of dependability (Babbie, 1992).

Table 3: Pilot Study Findings

Constructs	**Items**	**α Coefficient value**
Economic Prosperity	33	.878
Social Well-Being	31	.898
Environmental Well-Being	20	.745
Cultural Heritage	28	.914
Role of Government and Community	42	.974

3.5 Data Analysis Method

The data analysis method used was exploratory factor analysis (EFA). More sspecifically, the EFA procedure proposed by Hair et al. (2010) and Chua (2014) was used. Among the procedures are:

(i) Correlation matrix values for items less than 0.5 dropped.

(ii) Items that do not belong to any of the factors eliminated.

(iii) Items that include more than one factor not accepted and dropped.

(iv) Items with a loading factor value greater than or equal to 0.50 retained in their respective components.

(v) The Keizer-Meyer-Olkin sample adequacy test must be 0.60 or more.

(vi) At least three items must be available for each component.

4. Findings

The study's findings will touch on two main outcomes: the profile of respondents and the analysis of exploratory factors for each construct of the Malaysian heritage city sustainability index.

4.1 Respondents' Background

Table 4 shows 100 respondents living in the Kajang area. The analysis results found that 27 people were male and 73 people were female. 96 people were Malays and four were Chinese. 87 people were locals, born and raised in the city, and the remaining 13 were non-locals who came to live in the area for work, study, and other reasons.

Table 4: Respondents' Background

Respondent Background		**Frequency**	**Percentage (%)**
Gender	Male	27	27.0
	Female	73	73.0
Ethnicity	Malay	96	96.0
	Chinese	4	4.0
Population Status	Local Resident	87	87.0
	Non-Local Residents	13	13.0

4.2 Exploratory Factor Analysis Constructs of Economic Prosperity

The EFA results on the economic prosperity construct measuring tool explained the anti-image correlation analysis procedure, showing that the correlation coefficient value was more than 0.5. This meant that the factor analysis could continue. The Kaiser-Meyer-Olkin sampling adequacy measures and Bartlett's Test of Sphericity obtained showed a KMO value of 0.768. In contrast, Bartlett's Test of Sphericity was significant with a chi-squared value of 2326.386 at 528 degrees of freedom (**Table 5**).

Table 5: Suitability Test for the Use of Factor Analysis and Uniformity of KMO Items and Bartlett's Test on Economic Prosperity Constructs

Kaiser-Meyer-Olkin	**Measure of Sampling Adequacy**	**0.768**
Bartlett's Test of Sphericity	Approx. Chi-Square Sphericity	2326.386
	df	528
	Sig.	.000

The number of components to be separated in the factor analysis was set at three as categorised in the questionnaire. The component matrix with varimax rotation is shown in Table 6. The varimax rotation method was chosen because it can decrease complex variables and improve projected results. As a result, it found that the values of a7, a9, a19, a25, a26, a27, a28, a29, a30, a31, a32, and a33 belong to component 1, human mobility; a3, a6, a11, a12, a13, a14, a16, a18, a20, a21, and a22 belong to component 2, business and investment activities; and a1, a4, a10, a15, a17, and a24 belong to component 3, economic growth. Items that are not specified were dropped because they did not meet the set standards. The coefficients or loading factors for each item that tend to each cumulative factor are shown in Table 6. This number reflects the relationship between the item and the factors that have been formed. Therefore, it is important to know what type of factors have been formed.

Table 6: Component Matrix with Varimax Round Constructs Economic Prosperity

Component					
Human Mobility		**Business/Investment Activities**		**Economic Growth**	
Item	Factor loading	Item	Factor loading	Item	Factor loading
a7	.647	a3	.567	a1	.576
a9	.544	a6	.555	a4	.514
a19	.560	a11	.623	a10	.585
a25	.780	a12	.699	a15	.593
a26	.649	a13	.705	a17	.573
a27	.605	a14	.681	a24	.547
a28	.791	a16	.687		
a29	.668	a18	.503		
a30	.684	a20	.657		
a31	.683	a21	.693		
a32	.709	a22	.516		
a33	.702				

4.3 Exploratory Factor Analysis of Social Well-Being Constructs

The anti-image correlation analysis technique was described through the EFA results on the social well-being measure, which showed that the correlation coefficient value was greater than 0.5, indicating that the factor analysis can continue. Furthermore, the Kaiser-Meyer-Olkin sampling adequacy measures and Bartlett's Test of Sphericity were conducted, with a KMO value of 0.741 and a chi-squared value of 2359.493 at 465 degrees of freedom, respectively (Table 7).

Table 7: Suitability Test for the Use of Factor Analysis and Uniformity of KMO Items and Bartlett's Test on Social Well-Being Constructs

Kaiser-Meyer-Olkin	**Measure of Sampling Adequacy**	**0.741**
Bartlett's Test of Sphericity	Approx. Chi-Square Sphericity	2359.493
	df	465
	Sig.	.000

The number of factors to be separated in the factor analysis was set at three in accordance with the questionnaire's categorisation. The component matrix with varimax rotation is shown in Table 8. As a result, it was found that the values of b1, b2, b3, b7, b11, b13, b20, b21, b26, and b29 belong to component 1, public facilities; b4, b5, b6, b8, b9, b12, b19, b21, b23, b24, b25, and b27 belong to component 2, communication and utilities; b10, b14, b16, b17, b18, and b31 belong to component 3, public safety and order. Items not specified were dropped from the questionnaire instrument. The values shown in Table 8 are the coefficients or loading factors for each item that tends to each accumulated factor.

Table 8: Component Matrix with Varimax Round Constructs of Social Well-Being

Component					
Public Facilities		**Utilities and Communication**		**Public Safety and Order**	
Item	Factor loading	Item	Factor loading	Item	Factor loading
b1	.747	b4	.541	b10	.531
b2	.614	b5	.791	b14	.644
b3	.663	b6	.708	b16	.764
b7	.667	b8	.723	b17	.842
b11	.704	b9	.647	b18	.844
b13	.755	b12	.634	b31	.610
b20	.550	b19	.554		
b22	.723	b21	.645		
b26	.783	b23	.556		
b29	.561	b24	.720		
		b25	.775		
		b27	.550		

4.4 Exploratory Factor Analysis of Environmental Well-Being Constructs

The EFA results on the environmental well-being construct measuring instrument explained the anti-image correlation analysis procedure, showing the correlation coefficient value as more than 0.5, thereby indicating that the factor analysis could be continued. In addition, the Kaiser-Meyer-Olkin sampling adequacy measures and Bartlett's Test of Sphericity obtained showed a KMO value of 0.750, while Bartlett's Test of Sphericity was significant with a chi-squared value of 1038.175 at 190 degrees of freedom (Table 9).

Table 9: Suitability Test for the Use of Factor Analysis and Uniformity of KMO Items and Bartlett's Test on Environmental Well-Being Constructs

Kaiser-Meyer-Olkin	**Measure of Sampling Adequacy**	**0.750**
Bartlett's Test of Sphericity	Approx. Chi-Square Sphericity	1038.175
	df	190
	Sig.	.000

The number of components to be separated in the factor analysis was set at two in accordance with the questionnaire's categorisation. The component matrix with varimax rotation is shown in Table 10. Because it can decrease complex variables and improve predicted results, the varimax rotation method is used. As a result, it was found that the values of c3, c4, c5, c7, c8, c9, c10, c17, c18, and c20 belong to component 1, which is environmental health; c11, c12, c13, c15, c16, and c19 belong to component 2, land use. Unnamed items are items that do not meet the set standards and are dropped. The coefficients or loading factors that tend to each cumulative factor for each item are provided in Table 10.

Table 10: Component Matrix with Round Varimax Environmental Wellness Constructs

Component			
Environmental Health		**Land Use**	
Item	Factor loading	Item	Factor loading
c3	.692	c11	.749
c4	.510	c12	.803
c5	.856	c13	.732
c7	.560	c15	.643
c8	.600	c16	.510
c9	.691	c19	.719
c10	.569		
c17	.725		
c18	.847		
c20	.662		

4.5 Exploratory Factor Analysis of Cultural Heritage Constructs

The EFA results on the cultural heritage construct measuring instrument explain the anti-image correlation analysis procedure. The correlation coefficient value is more than 0.5, indicating that the factor analysis can be continued. The Kaiser-Meyer-Olkin sampling adequacy measures and Bartlett's Test of Sphericity obtained showed a KMO value of 0.834, while Bartlett's Test of Sphericity was significant with a chi-square value of 2576.052 at 378 degrees of freedom (Table 11).

Table 11: Suitability Test for the Use of Factor Analysis and Uniformity of KMO Items and Bartlett's Test on Cultural Heritage Constructs

Kaiser-Meyer-Olkin	**Measure of Sampling Adequacy**	**0.834**
Bartlett's Test of Sphericity	Approx. Chi-Square Sphericity	2576.052
	df	378
	Sig.	.000

Factor analysis was conducted by setting the number of factors to be separated at two as categorised in the questionnaire. Table 12 shows the component matrix with varimax rotation. As a result, it found that the values of d2, d3, d4, d5, d6, d7, d8, d9, d21, d22, d23, d24, d25, d26, d27, and d28 belong to component 1, tangible culture; d13, d14, d15, d16, d17, d18 and d20 belong to component 2, intangible cultures; the rest are dropped. The values shown in Table 12 are the coefficients or loading factors for each item that tends to each of the accumulated factors.

Table 12: Component Matrix with Varimax Rotation of Cultural Heritage Construct

Component			
Tangible Culture		**Intangible Culture**	
Item	Factor loading	Item	Factor loading
d2	.733	d13	.652
d3	.754	d14	.666
d4	.749	d15	.618
d5	.588	d16	.624
d6	.542	d17	.671
d7	.713	d18	.706
d8	.789	d20	.546
d9	.757		
d21	.685		
d22	.675		
d23	.784		
d24	.717		
d25	.605		
d26	.653		
d27	.749		
d28	.784		

4.6 Exploratory Factor Analysis Constructs the Role of Government and Community

The EFA results on the government and community role construct measure explained the anti-image correlation analysis procedure, showing that the correlation coefficient value was more than 0.5, indicating that factor analysis could be continued. In addition, the Kaiser-Meyer-Olkin sampling adequacy measures and Bartlett's Test of Sphericity obtained showed a KMO value of 0.860, while Bartlett's Test of Sphericity was significant with a chi-square value of 4330.186 at 861 degrees of freedom (Table 13).

Table 13: Suitability Test for the Use of Factor Analysis and Uniformity of KMO Items and Bartlett's Test on Government and Community Role Constructs

Kaiser-Meyer-Olkin	**Measure of Sampling Adequacy**	**0.860**
Bartlett's Test of Sphericity	Approx. Chi-Square Sphericity	4330.186
	df	861
	Sig.	.000

Factor analysis was done by setting the number of factors to be separated at four as categorised in the questionnaire. Table 14 shows the component matrix with varimax rotation. As a result, it was found that the values of e4, e28, e33, e34, e35, e36, e37, e38, e39, e40, e41, and e42 belong to component 1, namely, community involvement; e2, e3, e5, e6, e7, e8, e9, e10, and e11 belong to component 2, environmental management; e18, e20, e21, e22, e23, e24, e25, e27, and e29 are in component 3, tourism and heritage management; e12, e13, e14, e19, e26, e31, and e32 are in group 4, risk management. The unspecified items are dropped for not complying with the set conditions. The values shown in Table 14 are the coefficients or loading factors for each item that tends to each of the accumulated factors.

Table 14: Component Matrix with Varimax Rotation Government and Community Role Constructs

Component							
Community Involvement		**Environmental Management**		**Tourism and Heritage Management**		**Risk Management**	
Item	Factor loading	Item	Factor loading	Item	Factor loading	Item	Factor loading
e4	.556	e2	.575	e18	.698	e12	.725
e28	.578	e3	.601	e20	.707	e13	.754
e33	.641	e5	.625	e21	.763	e14	.750
e34	.788	e6	.748	e22	.672	e19	.629
e35	.818	e7	.693	e23	.704	e26	.667
e36	.763	e8	.667	e24	.663	e31	.768
e37	.817	e9	.681	e25	.600	e32	.769
e38	.825	e10	.645	e27	.574		
e39	.722	e11	.631	e29	.564		
e40	.597						
e41	.771						
e42	.809						

5. Discussion

There are five main constructs in measuring the sustainability index of heritage cities in Malaysia that need to be adhered to. The questionnaire constructed and tested in the Kajang heritage city area consists of five constructs with 154 items. After the field test and EFA analysis were performed, only 134 items were accepted, and 20 items were dropped for not meeting the conditions and procedures proposed by Hair et al. (2010) and Chua, (2014). The KMO values obtained for each construct were above 0.6 and Bartlett's Test of Sphericity also showed significant values. This indicates that the findings of this exploratory factor

analysis meet the requirements of the set index value. Thus, a total of 134 items with five constructs can be used as instruments in the study of the construction of the heritage city sustainability index in Malaysia.

After the EFA analysis was performed, there was a change in the order of the items and the number of items in the instrument. For the economic prosperity construct, there are three components, or sub-constructs identified: (1) human mobility, (2) business and investment activities, and (3) economic growth. The social well-being construct also has three components: (1) public facilities, (2) communication and utilities, and (3) public safety and order. The environmental well-being construct has only two components: (1) environmental health and (2) land use. The cultural heritage construct also has two main components: (1) tangible culture and (2) intangible culture. Finally, for the role of government and community construct, there are four components: (1) community involvement, (2) environmental management, (3) tourism and heritage management, and (4) risk management.

The results of the EFA analysis show that the constructs suggested by Appendino (2017) and Brundtland (1987) – economic, social, environmental, cultural heritage, government, and community roles are suitable for use in the context of heritage cities in Malaysia. This finding is also a new perspective in Malaysia because the urban sustainability index measurement instrument used by Murninet 2.0 (Jabatan Perancangan Bandar dan Desa, 2019), does not involve cultural heritage constructs. However, the results of the EFA analysis indicate that cultural heritage constructs are appropriate and should be used as key constructs in the construction of the heritage urban sustainability index. Thus, it can be concluded that there are five constructs with 134 items that need to be used to construct Malaysia's heritage city sustainability index.

6. Conclusion

In conclusion, to identify the main constructs and components of each one of these in the heritage city sustainability index in Malaysia, EFA analysis was used. This is one of the essential methods in each initial study in the production of a research instrument. Results from the EFA indicate that centralised validity and discriminant validity can be achieved in this study. The findings show that there are five main constructs: economic prosperity, social well-being, environmental well-being, cultural heritage, and the role of government and community. The components of each construct or sub-constructs is 14, with 134 items adopted from the original 154 items. This means that as many as 20 items have been

discarded for not meeting the set procedures. Therefore, this EFA can be used as a new questionnaire instrument to be distributed to respondents for the actual study of heritage urban sustainability index measurement in Malaysia and can be used as a guide to researchers in the field of heritage urban sustainability development. However, in the future these indicators need to be further diversified, especially in the context of intangible cultural heritage so that its importance can be highlighted more deeply in the dynamics of heritage cities. For example, the role of traditional lifestyles, customs, taboos are aspects that shape the economic and social environment of an important heritage city. The uniqueness of the economic and social environment in the heritage city is the result of the composition of such elements that are not found in other areas. Therefore, future researchers can consider more indicators that are relevant and appropriate to intangible heritage in particular or cultural heritage in general in contributing to the development of sustainable heritage cities in line with the Agenda 2030.

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Letter to Visions

Return to Forests.
Therapeutic potential of woodland environments

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Dear Editors,

Your journal *Visions of Sustainability* has paid considerable attention to biophilia and biophilic design. Authors often document the benefits of connectedness to Nature. However, relatively little space has been devoted to one of the most ancient environments for our relationship with Nature: the forest. The benefits of frequenting forests are undeniable (Hansen et al., 2017; Kotte et al., 2019; Stier-Jarmer et al., 2021). However, fundamental questions remain about what is beneficial for whom and for what aspects of human psychophysical health. Consequently, there is no clear understanding of either the characteristics to look for in the forests or the activities to be carried out in them in order to benefit from such an environment.

A correct prescription of forest therapies is essential not only for the patient but also for the coherent management of the forests themselves. There is a risk of considering the forest in a partial, reductive, and excessively utilitarian way. For example, the mere consideration of the beneficial effects of some phytoncides (Antonelli et al., 2020) cannot explain those obtained in broad-leaved forests in the winter season, when the production of phytoncides is considered irrelevant (Peterfalvi et al., 2021). The importance of taking account of the characteristics of each forest ecosystem is confirmed by the contradictory results in relation to

the activities proposed. Activities whose efficacy is known when carried out indoors, such as physical exercise, can generate stress in complex forest environments (Toda, 2013), while they are preferred in open natural environments (Zhang et al., 2015). However, more complex forests can offer equal or greater benefits if appropriate activities are carried out in terms of quality and intensity (e.g., Lee et al., 2018). Moreover, making generalizations concerning the therapeutic indications of the forest becomes even more problematic if we add the variables related to the individual visitors: their state of health, their attitudes, their knowledge and predispositions, and, last but not least, the level of their 'connectedness to Nature' (Berto et al., 2018).

To evaluate the therapeutic potential of woodland environments, the Forest Therapies in Italian Forests Network (*Rete Terapie Forestali in Foreste Italiane* - TeFFIt, www.teffit.it) is developing two lines of research. The first aims at identifying and describing forest ecosystems with a high degree of biodiversity, which appears to be the most promising both in terms of individual human characteristics and needs (Haahtela, 2019) and the type of activities proposed (Doimo et al., 2020).

The second refers to cross-sectional and longitudinal studies that indicate how the possibility of benefiting from forests is a *pathway* by which the patient develops (not 'acquires') a growing ability to relate to forests themselves (Sonntag-Öström, 2015). Patients learn to act in the forests in the ways that are most suited to their psychophysical needs. They improve their state of health and, at the same time, develop an awareness of lifestyle habits that are healthier for themselves and more sustainable for the environment (Oh, 2020; Clarke, 2021). However, this is not a linear but rather a circular path, which develops according to individual times and modes. For this reason, forest therapists must have the ability and sensitivity to adapt their proposals to the characteristics and needs of the patient without intrusiveness or forcing.

We can describe this pathway in five stages: (1) biophilic, (2) sensory, (3) haptic/proprioceptive, (4) adaptive, (5) integrative. Each stage corresponds to the central stimulation activated, remembering that it is a circular path in which each phase is gradually retraced employing the new skills and competencies developed previously.

1. BIOPHILIC. It has been observed that people with a poor connection with Nature are unable to restore themselves in complex forest environments, even though these are the most restorative ones (Berto et al., 2018). Therefore, in this first phase, it seems appropriate to give emphasis to accompanying the patient in

environments with a high biophilic value, but with easy, reassuring pathways, which make it possible to encounter the life of the forest (which is initially scarcely or not at all perceived) in a positive way. The patient's attention will be directed towards the forms of life that induce fascination.

2. SENSORY. In the first approaches to the forest, it is appropriate to choose environments whose perceptible biodiversity is represented by similar life forms (mammals, birds) and that are therefore pleasant and reassuring: nesting places for songbirds, flowery areas, or areas with soft and open plant forms, soft mosses, tasty berries, pleasant scents. The goal is to favor an exotopic approach[1], to accompany people towards an emerging and growing curiosity, confidence, and wonder towards forms of life that are increasingly distant and different from the human.

3. HAPTIC-PROPRIOCEPTIVE. Touch is the only 'reciprocal' human sense. Everything that can be touched in a forest is alive. In turn, every living thing perceives the human touch. Being aware of this 'reciprocity' can improve the lived experience in a forest. Even simply walking on different natural soils can represent both a proprioceptive-kinesthetic and a relational experience, to which every individual reacts in a particular way. There is no such opportunity when dealing with artificial sensory pathways (Tsunetsugu, 2013; Gross, 2019; Song et al., 2019). The experience of contact with the life of the soil and subsoil helps to develop an awareness of the presence of forms of life that are barely perceptible and less similar to humans (arthropods, fungi, protists). Patients learn to react correctly together with these living forms, and, over time, the reaction methods can evolve as they become familiar with the complexity and diversity of the forest ecosystem.

4. ADAPTIVE. The biophilic, sensory, and haptic-proprioceptive experiences allow the patient to express their adaptive abilities. Patients explore the environment (in this case, the forest) and look for stimuli that relieve symptoms and discomfort and improve their physiological functions (Sonntag-Öström et al.,

[1] Exotopia is "a dialogic tension in which empathy plays a transitory and minor role, dominated instead by the continuous reconstituting the other as the bearer of an autonomous perspective, as sensible [I read 'sensible' as 'endowed with sense' - which concerns sensoriality and sensitivity - and at the same time 'endowed with meaning', Author's note] as ours and not reducible to ours" (Sclavi, 2003). Exotopia could also prove suitable for preventing eco-anxiety phenomena (Capaldi et al., 2014; Panu, 2020; Verplanken et al., 2020) resulting from distorted or simply inexperienced forms of 'connection with Nature'. Similarly, in the clinical, social, and educational context, the transition from empathy to exotopia has made it possible to have a more constructive dialogue with the 'different' human other, be it a sick person, an immigrant, or a disabled person, helping to reduce the burnout of operators (Sclavi, 2003).

2015), from breathing to movement. The exploration of oneself and the environment leads to the development of an awareness of the dynamism of the processes. This combined approach enables patients to adapt both to changes in the forest (circadian, seasonal, climate, microenvironment) and changes in themselves, such as perceptive skills, awareness, and connection with the forest develop.

5. INTEGRATIVE. The care paradigm adopted by the TeFFIt Network depends on patients' abilities to perceive and be aware of their needs and how to respond to them through the forest. At the same time, patients will have understood (through the exercise of exotopia) the different and often mysterious needs of the life forms that inhabit the forest. In this way, the patient-forest interaction will be adaptive and not opportunistic or, on the other hand, unrealistically emotional. For example, patients will be able to enjoy phytoncides without however voluntarily damaging the plants to perceive some of them better or persistently search for them while neglecting other beneficial elements, as well as being able to express their desire to leave a trace of themselves in the forest or to communicate its presence in some way, without becoming intrusive or harmful. In this way, the feeling of affiliation with Nature can develop into competence. The patient learns how to integrate into wild environments, always maintaining acceptable behavior.

Although the current trend in forest therapies is to multiply the proposals for activities, even in terms of single activities (trekking, mindfulness, yoga, physical exercise, etc.), regardless of environmental analysis and individual needs, a personalized setting of forest frequentation seems a preferable model of health promotion, as it is simpler and easier to apply. A personalized setting requires only minimal initial support, favors the advantages of proximity (Korpela, 2007), and is more suitable for maximizing the reciprocity of benefits for human health and the forests.

In conclusion, I would like to propose a reflection on awareness, a term that is central to forest therapy. Traditional mindfulness practices are recognized as trying to make a non-judgmental acknowledgment of the present moment (Kabat-Zinn, 1994). In forest therapy practices shared by the TeFFIt Network, we prefer to talk about 'taking notice'. This practice goes beyond simply taking note of the present moment. Taking notice involves keeping a memory of it, that is, being capable of re-evoking it in the mind and body, capable of promoting the development of the organism's adaptation and integration with the forest. With 'taking notice' practice, patients are able to maintain delicate divided attention on what they can perceive of the forest, how the organism reacts to it, and how the forest

reacts to itself. Almost an observation 'out of the corner of one's eye', whose sustained maintenance over time is facilitated by the restorative action of the forest, through fascination (Kaplan, 1995).

As members of the TeFFIt Network we have observed that, contrary to what is suggested in established mindfulness practices (Kabat-Zinn, 1990; 1994; Segal et al., 2002), it is counterproductive to focus attention only on a physiological function, such as breathing, or individual parts of the body. It appears more effective to observe when the same function or area of the body emerge from our attention, stimulated by the forest. Likewise, any emerging thoughts and sensations can be noted, to perhaps understand their meaning later, instead of committing oneself to letting them go, facilitated by the fact that among the actions of the forest, there is the interruption of brooding (Chen, 2019) and instead the favoring of the alternation between mind-wandering, which is internally oriented, and soft charm, fascination, which is externally oriented (Williams et al., 2018). The desirable qualities of curious, non-judgmental attention and attentive, decentralized listening will be facilitated both by the exercise of exotopia and by the decentralizing action of the forest itself (Chen, 2019; Oh et al., 2020). In other words, wandering freely, mind and body, in the forest, 'taking note' of what emerges to capture the attention, far from hindering awareness, could instead support people in developing greater flexibility and new associations of ideas (Williams et al., 2018), as well as to adopt healthier (Oh et al., 2020) and more sustainable (Clarke, 2021) lifestyles. Mindfulness-Based Interventions (MBIs)[2], often proposed as examples of green mindfulness (Danon, 2019), seem to have specific objectives that are different from those of immersion in the forest. Furthermore, MBIs also have needs regarding the organization, setting, and privacy that are not easily compatible and consistent with their practice in wild forests (Ambrose-Oji, 2013). A more informal and open awareness seems better suited for therapeutic activities in natural settings (Djernis et al., 2019).

Forest therapies are arousing more and more interest. However, many open questions remain, requiring research efforts to accurately describe the environments where this is practiced. With a precise catalog of the qualities of each forest ecosystem, the therapeutic prescription will be more precise, considering the fact that the observations made so far suggest that it is the forest itself which stimulates a state of awareness and adaptivity that is appropriate to and suitable for each patient.

[2] Such as, for example, Mindfulness Based Stress Reduction (MBSR), Acceptance-Based Stress Therapy (ABST), Acceptance Commitment Therapy (ACT) and Mindfulness Based Cognitive Behavioral Therapy (MBCBT).

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Competing Interests

The author has declared that no competing interests exist.