Environmental Attitudes of Firewood Users in Hungary: Contradictions of Knowledge and Emotions

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ABSTRACT

This study examines environmental attitudes toward the production and utilization of firewood. A telephone survey using a structured questionnaire was conducted. The survey yielded 603 usable responses, and the analysis revealed that firewood users exhibited strong support for two fundamental environmental concepts: the notion that harvesting firewood from healthy trees is acceptable and the assertion that firewood is, in principle, carbon-neutral. However, a significant proportion of respondents also expressed concerns that firewood use may potentially contribute to forest degradation and increase climate change. To further explore these attitudes, respondents were categorized into three distinct groups. A statistical analysis revealed significant differences among these groups in educational attainment and standard of living. Attitudes towards complex environmental issues are predominantly influenced by emotions that reflect general environmental concerns due to the public's limited knowledge base, which hinders factual assessments.

TANULMÁNY INFÓ

Kulcsszavak:
Szolgáltatások fenntarthatósága
Körforgásos gazdaság
Karbonsemleges
Szénciklus
Éghajlatváltozás
Fa tüzelőanyag
Fatüzelés

KIVONAT

A tűzifát használók környezeti attitűdje Magyarországon: A tudás és az érzelmek ellentmondásai. A jelen tanulmány a tűzifa termelésével és felhasználásával kapcsolatos attitűdöket vizsgálja. Telefonos felmérést végeztünk, strukturált kérdőív segítségével, amelyből 603 felhasználható válasz érkezett. Az elemzés kimutatta, hogy a tűzifát használók két alapvető környezetvédelmi koncepciót támogatnak: azt, hogy a tűzifa egészséges fákról való kitermelése elfogadható, és azt, hogy a tűzifa elvileg szén-dioxid-semleges. A válaszadók jelentős része azonban aggodalmát fejezte ki amiatt is, hogy a tűzifa felhasználása potenciálisan hozzájárulhat az erdők degradációjához és fokozhatja az éghajlatváltozást. Ezen attitűdök további feltárása érdekében a válaszadókat három különböző csoportba soroltuk. A statisztikai elemzés jelentős különbségeket tárt fel e csoportok között az iskolai végzettség és az életszínvonal tekintetében. Az összetett környezeti kérdésekkel kapcsolatos attitűdöket túlnyomórészt az általános környezeti aggodalmakat tükröző érzelmek befolyásolják, ami a lakosság korlátozott tudásbázisának köszönhető, ami akadályozza őket a tényszerű értékelésben.

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1 INTRODUCTION

Woody biomass plays a significant role among renewable energy sources in Europe, which the recent energy crisis has underscored (Carnia et al., 2020; Kożuch et al., 2023). Firewood is a vital heating source in Hungary, used by 1,398,278 households, representing a 31% share of all households. It is the second most common home heating fuel after natural gas (Central Statistical Office, 2022).

This study focuses on three aspects of firewood use. First, as a traditional energy source, it is produced in large quantities. Consequently, it contributes to the economic output of forestry significantly and plays a crucial role in the energy supply. Second, wood harvesting from forests induces concerns that production can lead to environmental disturbances or even permanent degradation. Third, wood combustion is often associated with air pollution even though firewood is renewable and its carbon cycle is almost completely closed. *Table 1* summarizes the above-listed aspects.

Table 1. Examined aspects of firewood use

	Production	Consumption
Contribution to the economy	Added value to the regional economy	Energy security improvement through diversification
Environmental impacts	Forest disturbance	Air pollution
Regulatory effects	Circular carbon-flow Competition to other wood products serving as carbon pools	

Forests are vital natural assets, and their utilization increases the added value in the regional economy. Exploiting this economic potential is crucial in rural areas where economic activity is lower than in urban areas (Huttunen, 2012). The availability of other energy sources, such as natural gas, coal, and electricity, influences firewood demand and prices (Trømborg et al., 2008). Beyond that, regional and national energy security heavily depends on a diversified energy mix (Ladanai and Vinterbäck, 2009; Mydlarz et al., 2024). The energy crisis caused by the Russian-Ukrainian war revealed the importance of adaptability (Balmaceda et al., 2024). The crisis caused the prices of various energy sources, including gas, crude oil, and coal, to surge (Zaid and Farooque Khan, 2023), instigating a shift in household heating preferences in Hungary (Tóth et al., 2024). Rising natural gas prices may increase reliance on firewood because the choice between the two most common heating options primarily depends on relative costs (Csuvár, 2019).

Rising firewood prices increase competition in paper, wood, and fiberboard markets, which is a significant economic consideration (Nepal et al., 2019) because industrial utilization generates larger added value. Such utilization also provides opportunities for longer-duration carbon content storage, thereby creating or maintaining a carbon pool (Király et al., 2019).

An advantage of firewood is that it contains carbon sequestered from the atmosphere, and its continuous production by sustainable forest management maintains a closed carbon cycle. Other alternatives, especially fossil fuels, entail permanent carbon dioxide emissions (Matthews and Robertson, 2001; Pierobon et al., 2015; Jayakrishnan et al., 2022). Under a constant environment, all energy and matter circulating between the forest and its environment through its natural processes are in balance in the long run. The carbon cycle is no exception. A very

low rate of carbon accumulation is observable in the soil. Firewood production does not disturb this cycle. On the contrary, it allows us to access the stored energy that the decomposition of organic matter would have released, all without benefiting humans.

Although the energy flow of forests can serve human interests, forestry activities disturb the natural process regardless of their intensity (Bouget et al., 2012). Firewood production necessarily decreases the amount of deadwood (Bölöni et al., 2017), which inevitably affects the ecosystem. Forestry practices of lower technical standards can have more significant consequences, such as degradation of tree species composition and vertical structure, micro-habitat loss, and soil damage. In extreme cases, the whole ecosystem can be damaged when forests are converted into tree plantations and their maintenance requires active management.

The most significant environmental effect of firewood use is the release of smoke (Lipfert and Lee, 1985; Press-Kristensen and Tolotto, 2021). Wood burning can cause indoor and outdoor air pollution, which poses serious health risks, depending on the technology used (WHO 2015). According to a report by the European Environment Agency (EEA), 96% of the urban population in the EU is exposed to PM2.5 concentrations that are harmful to health (Targa et al., 2024). The pollution may be severe if heating devices are unequipped with filters and/or the combustion is of low efficiency. The latter also depends on the moisture content of the wood (Price-Allison, 2019).

The above contradictions concerning the benefits of firewood production cannot be fully resolved. Research on the shaping of environmental attitudes and behavior by personality traits, emotional intelligence, knowledge, and social context, among other factors, has highlighted knowledge as the most effective predictor. Individuals with a comprehensive and profound understanding of environmental issues are more likely to demonstrate environmentally conscious behaviors. (Hadler et al., 2022; Ienna et al., 2022) Other studies claim that although knowledge has no significant direct effects on pro-environmental behaviors, it is a key factor that creates a starting point in a chain of causation leading to positive environmental attitudes (Liu et al., 2020).

Some of the above issues are covered by the elementary and secondary education curriculum, others are the focus of public discourse and are well articulated by the media, while others remain within professional circles. Therefore, different societal groups possess varying levels of knowledge. Coupled with dissimilar levels of susceptibility and interest, this results in a wide range of attitudes towards these issues. This study aims to reveal how firewood users, who are expected to understand the direct benefits of wood utilization, think about relevant environmental issues and how they fill knowledge gaps with emotionally based beliefs. We extend this analysis by describing the environmentally friendly lifestyle choices of firewood users.

2 MATERIALS AND METHODS

2.1 The field of study

A questionnaire survey was conducted to assess the attitudes of firewood users in settlements outside the capital and county towns of Hungary. *Figure 1* shows the number of samples by county. Residents of the capital and the county towns were excluded from the survey. According to the 2022 census of the Central Statistical Office—only 2 % and 9 % of the residences using firewood are located there, respectively. Wood combustion is, therefore, more common in rural areas in Hungary, with 55 % of homes using firewood in villages and 34 % in small towns (Central Statistical Office, 2022).

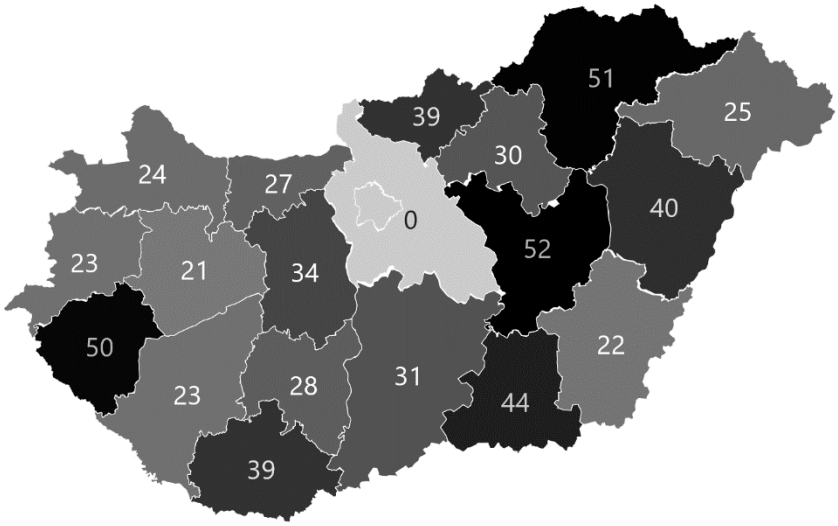


Figure 1. Sample distribution over the counties of Hungary

2.2 The survey

The questionnaire survey was conducted by M.A.S.T. Market and Public Opinion Research Company employing the C.A.T.I. (Computer Aided/Assisted Telephone Interview) methodology. The survey sample comprised adults with Hungarian citizenship residing in Hungary who have at least a partial reliance on firewood for their household energy needs. The survey yielded 603 usable responses, but systematic answers were excluded in some questions. It is vital to note that some of the questions in the questionnaire referred to the household as a whole and activities that are not necessarily performed by the respondent but by someone else in the household. Further questions, such as attitude questions, referred to personal beliefs and thoughts. While national statistics on households exist, no data on the demographics within households that use firewood is available. Thus, the representativeness of attitude questions cannot be assessed.

2.3 Data protection

Participation in the survey was voluntary, and respondents got no reward of any kind. Responses were recorded anonymously by the market research company; therefore, the authors did not need to handle personal information.

2.4 The questionnaire

The questionnaire consisted of 25 questions regarding firewood use habits covering the purpose of use, household energy infrastructure, procurement, handling, storage, and attitudes toward broader sustainability and environmental aspects of firewood use. Respondents can be characterized through nine demographic questions, including age, gender, education, type of residence, household size, and income. All questions were direct, closed-ended questions seeking numerical answers, choosing from the predefined options, or evaluating the question on a Likert scale. For some questions, optional answers included ‘other,’ and respondents could specify what ‘other’ meant in their cases.

The present study examines the survey results on attitudes and habits of firewood users regarding the environmental aspects of firewood use. Questions about attitudes were formulated in a broader sense so that they refer more to feelings than knowledge.

2.5 Methods used in the analysis

Responses were evaluated after excluding 'don't know' and 'no answer' results. Schematic answers were also excluded in Likert-scale questions. Consequently, the sample size varies from question to question and is indicated in each case.

Demographic differences between attitude groups of firewood users were tested with the Kruskal-Wallis test.

3 RESULTS

3.1 Demographic description of the sample

The respondents were mostly (73 %) above 51 years of age, while the younger generation, between 18 and 30 years, represented only 7 % of the sample. A slightly higher proportion of women than men participated in the survey (58 % vs 42 %). The majority (67 %) of respondents live in villages, and 33 % live in towns. In terms of education, the majority (67 %) of respondents cited secondary-level education, including apprenticeships and graduation, while those with higher and elementary education totaled 14 % and 18 %, respectively.

Table 2. Demographic data of the respondents

Age:				
18–30 years: 7 %	31–50 years: 19 %	51–65 years: 33 %	Over 65 years 40 %	No answer: 1 %
Sex/Gender:				
Female: 58 %		Male: 42 %		
Location of residence:				
Town: 33 %		Municipality: 67 %		
Highest completed level of education:				
Elementary: 18 %	Apprenticeship: 31 %	Graduated: 36 %	Higher education: 14 %	No answer: 1 %
Headcount of respondents' households:				
1 person 23 %	2 persons: 31 %	3 persons: 16 %	4 people 20 %	5+ persons: 10 %
Percentage of respondents with at least one child in the household:				
Yes: 38%		No: 62%		
The financial situation of respondents:				
Paycheck to paycheck: 25 %	Monthly expenses can be covered if no major expenditures occur: 48 %	Savings can be made over monthly expenses: 19 %	No answer: 7 %	

The size of the households represented in the survey showed an even distribution: 23 % were single-person households, 31 % were two-person households, while three, four, and five and more-person households were 16 %, 20 %, and 10 %, respectively. Households with non-earning children accounted for 38 %. Households that could only barely cover their monthly expenses (paycheck-to-paycheck) totaled 25 %. Households that could cover monthly expenses provided there were no unexpected large expenditures amounted to 48 %. Only 19 % indicated that their incomes allow them to save money. *Table 2* summarizes the demographic characteristics of the sample.

3.1. Attitude toward environmental aspects of firewood use

Our approach in this study treats the attitude toward firewood use as a mixture of knowledge and feelings with more emphasis on the latter. Knowledge covers facts and processes that together provide a basis for forming an opinion. The certainty and depth of knowledge of a non-professional do not allow for a clear and objective comprehension of the subject matter. Thus, panel arguments and impressions from public discussions can considerably influence opinions. Over time, these opinions can settle into attitudes.

The questionnaire included four statements regarding the environmental aspects of firewood production and use. The respondents were asked to indicate their level of agreement or disagreement with these statements on a 5-point scale. The statements were presented in a random order. Some were positively formulated, while others were negatively formulated.

One statement specifically targeted whether tree harvesting is acceptable if done sustainably (S1: ‘A healthy tree can be harvested for firewood in the frame of sustainable forestry that entails replanting.’) S1 eliminates the possibility that tree felling is rejected because it could potentially lead to deforestation and reinforces this by specifically mentioning replanting for those who are unfamiliar with the term ‘sustainability.’

Another specific statement referred to the carbon-neutral nature of firewood. (S2: ‘Firewood is a carbon neutral (environmentally friendly) energy source since the trees that have been cut get replanted by the foresters.’) Carbon neutrality is a complex concept that cannot be evaluated without a basic understanding of underlying processes and their interrelations. Therefore, the questionnaire included a summary of the essence of carbon neutrality to avoid responses based on misinformation or misconceptions.

A more general statement is required to assess whether the use of firewood will harm forests (S3: ‘The use of firewood for heating poses a significant threat to the forests of Hungary and their ecosystem’). This statement covers at least two mechanisms that potentially influence the state of forests. First, firewood production can directly degrade forests and forest ecosystems. This aspect is closely related to S1, which focuses more on acceptance, while S3 is asking about consequences. Consequences could be evaluated separately to the wood production potential and the natural state of the ecosystem. A detailed analysis would also separate the effects on natural forests and plantations. The second line of arguments covers the environmental effect of firewood use, most importantly air pollution, and its effect on forests. This complex statement could have been separated by these mechanisms, but then we would have received answers about the knowledge of the respondents and less about their attitudes.

The fourth statement investigated the effect of firewood use on climate change (S4: ’The use of firewood for heating significantly increases climate change.’). Similarly to S3, firewood use may have an impact on disturbing the carbon cycle on the harvest side and through air pollution. In the latter case, fumes from firewood combustion can be considered carbon emissions. Furthermore, air pollution, as a negative impact on the environment, can be falsely associated with climate change.

The first two statements (S1 and S2) attempt to narrow down the subject and reduce the possible role of misinterpretation of key terms. The latter two (S3 and S4) address complex

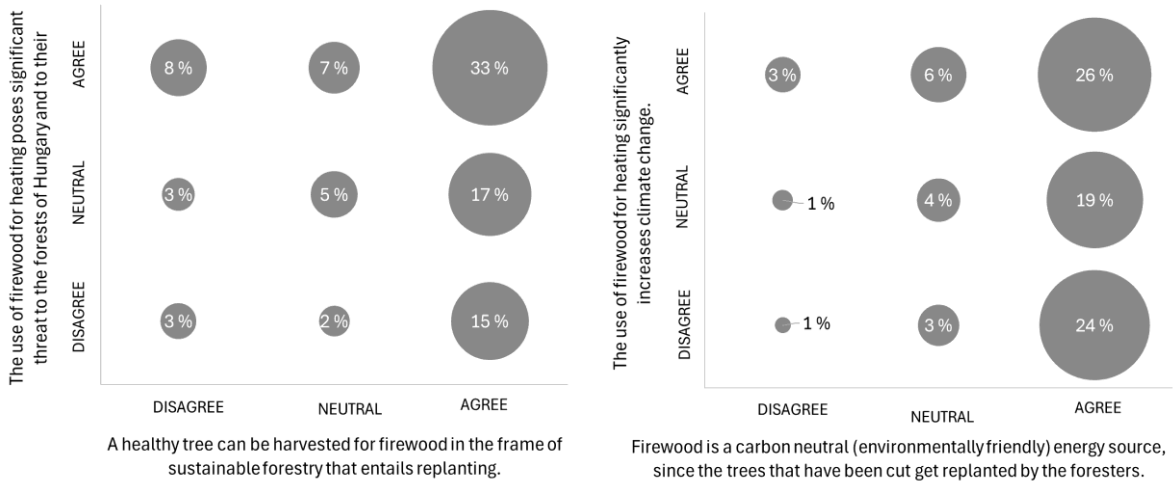
concepts that are more likely judged by feelings and impressions rather than reason. Furthermore, there is a strong relationship between S1 and S3 as well as between S2 and S4, as S1 and S2 address core elements of the complex mechanisms behind S2 and S4.

Table 3. Responses to statements regarding the environmental aspects of firewood use (n=586)

Statements	Strongly agree 5	Rather agree 4	Agree/ disagree 3	Rather disagree 2	Strongly disagree 1	avg.	I do not know	No answer
S1: A healthy tree can be harvested for firewood in the frame of sustainable forestry that entails replanting.	34 %	33 %	15 %	9 %	6 %	3.7	2 %	0 %
S3: The use of firewood for heating poses a significant threat to the forests of Hungary and their ecosystem.	22 %	27 %	26 %	14 %	7 %	3.3	4 %	0 %
S2: Firewood is a carbon-neutral (environmentally friendly) energy source since the trees that have been cut get replanted by the foresters.	47 %	27 %	15 %	4 %	0 %	3.9	7 %	1 %
S4: The use of firewood for heating significantly increases climate change.	12 %	26 %	2 %	18 %	12 %	2.8	7 %	1 %

Table 3 summarizes the responses to the above-described statements. 67 % of respondents agree that even a healthy tree can be cut for firewood (S1), while 15 % reject the idea. There is also a clear majority (74 %) that agree on the carbon-neutral nature of firewood (S2). Only 4 % disagree with this statement.

Despite the divergent opinions regarding S1, 49 % of respondents believe that forestry is threatened by firewood production. Only 21 % deny this assertion. A similar trend is evident in the case of S4, where 38% of respondents consider firewood heating to be a significant contributor to climate change, while 30 % hold a contrary view.



(a) (b)

Figure 2. Contingency tables of environmental aspects of firewood production and use (a) Pair-wise adjudication of S1 and S3 (b) Pair-wise adjudication of S2 and S4

As *Figure 2* illustrates, 33 % of respondents concur with the view that harvesting healthy trees for firewood is a threat to forests, while 16 % disagree, asserting that firewood use does not pose a threat to forests. The results are very similar in statements about firewood as a carbon-neutral energy source and that its use increases climate change, as these statements are supported by 26 % of the respondents. 24 % of the respondents think that firewood is a carbon-neutral energy source and that its use does not increase climate change.

3.2 Characterization of respondents according to their general attitude toward firewood

Survey participants who gave 1–5 responses to all four statements (S1-S4) were classified into three groups. Participants who chose 'I do not know' or 'No answer' to any of the four statements were excluded from the classification. Those responding 'Agree/disagree' to all four statements were also excluded. Altogether, 477 respondents remained in the sample.

The first group, 'Firewood supporters,' consists of people who see firewood positively or neutrally in all four questions. They responded 5-3 to S1-S2 and 3-1 to S3-S4.

The opposite group is called the 'Firewood critics,' formed from those who expressed negative opinions consistently by responding 3-1 to S1-S2 and 5-3 to S3-S4.

The rest of the respondents are classified as 'Miscellaneous.' Here belong those who have at least one positive and at least one negative opinion on the environmental effects of firewood production and use.

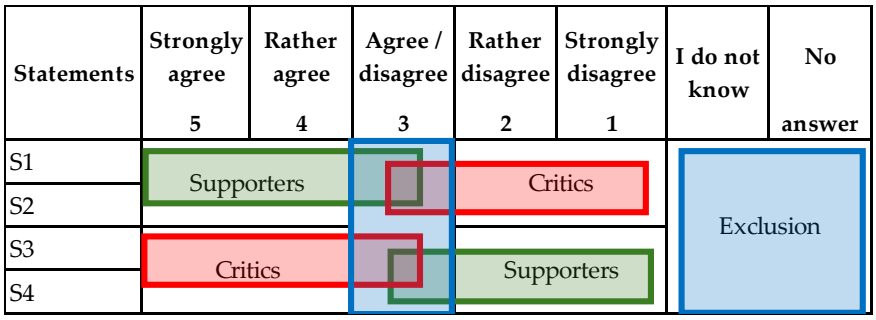


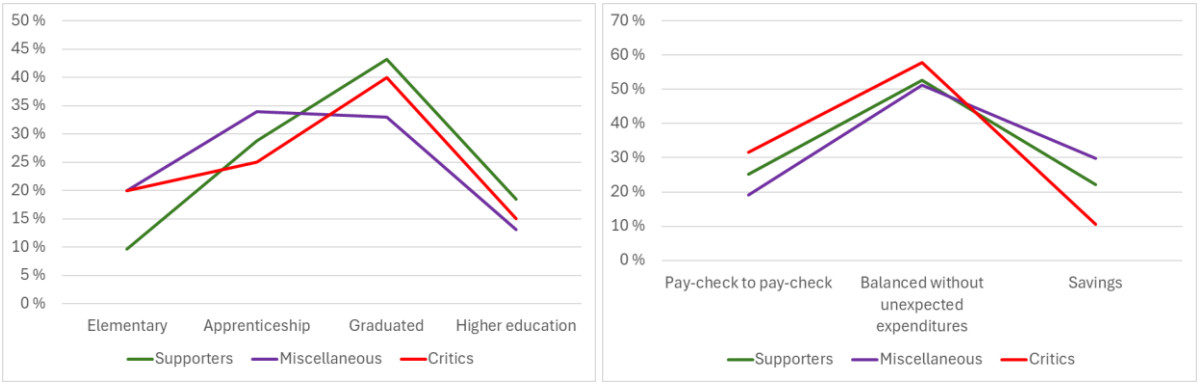
Figure 3. Criteria of classification of the respondents

Figure 3 summarizes the classification criteria. The size of the above categories was:

- Firewood supporters: 148
- Miscellaneous: 309
- Firewood critics: 20

We examined whether there were differences in demographic characteristics between respondents of the three different groups. For this purpose, a nonparametric test, the Kruskal-Wallis test, was used because not all dependent variables have a normal distribution.

As *Figure 4* shows, education and living standards were found to be significantly different between the three groups. Education among Supporters is higher than among Miscellaneous and Critics. A similar, but not entirely the same, phenomenon can be observed in the case of living standard, as Supporters have a higher living standard than Critics, but Miscellaneous have even higher.



(a) (b)

Dependent variable	p
Age	0.659 (N: 472)
Sex	0.6962 (N: 477)
Type of residence	0.8293 (N: 477)
Education	**0.0039 (N: 472)**
Household size	0.4938 (N: 476)
Living standard	**0.0391 (N: 439)**

(c)

Figure 4. Demographic differences between attitude groups. (a) Distribution of respondents over education categories (b) Distribution of respondents over living standard categories (c) Results of the Kruskal-Wallis test (N values vary according to the demographic data availability).

3.3 Environmental awareness of respondents

The survey included a series of statements about lifestyle choices and habits that either symbolically or meaningfully contribute to environmental protection. Respondents were asked to rate these statements on a 5-point scale according to how typical each was for them. *Figure 5* details the results.

Selective waste collection is the most supported item on the list (93 % combined agreement), closely followed by eating local food (90 %) and well behind avoiding plastic packaging (66 %). Although the former is indeed common in Hungary, it is unclear how local 'food source' was understood and what role local food plays in the diet of the supporters. There may have been some confusion between local grocery stores and local food sources.

Another group of statements relates to alternatives to car use. Walking and cycling instead of driving are supported by a slight majority (55 % and 52 % respectively), while public transport is only supported by 39 %. Given that the survey was conducted in rural areas and in small towns, these answers make perfect sense, as short distances allow walking and cycling, while public transport is only available for commuting to nearby cities, which affects only a part of the population.

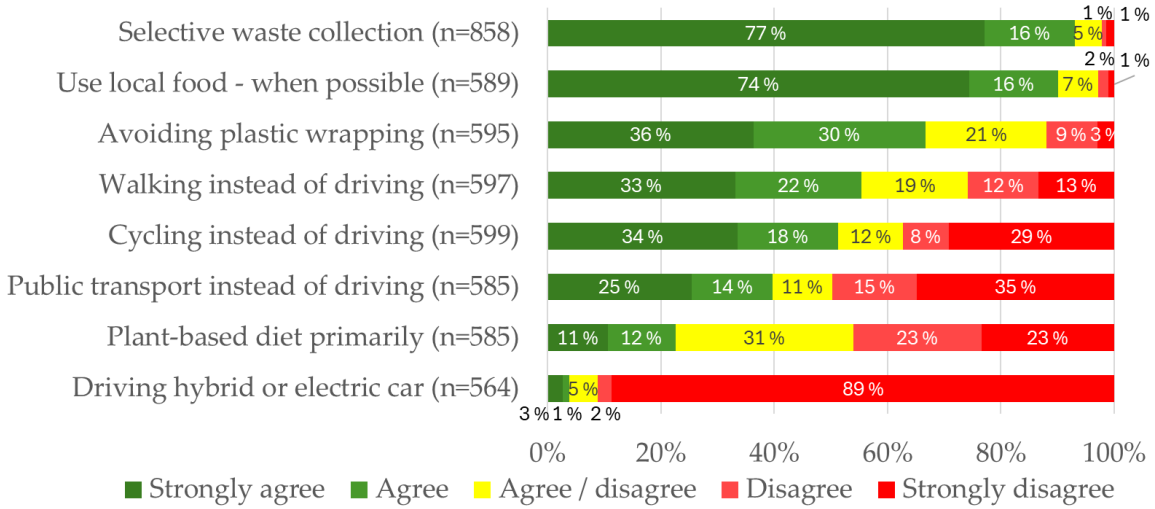


Figure 5. Habits and lifestyle choices with environmental considerations

The least supported statements are a plant-based diet (23 %) and driving an electric car (4 %). The latter has an overwhelming rejection (89 % strongly disagree), which is probably a clear reflection of the low share of electric and hybrid cars in rural areas. Although it is coupled with the highest share of neutral answers (31 %), the low support for a plant-based diet is surprising in comparison to the strong support for local food sourcing. The reason for this balanced distribution of responses may be that, apart from vegetarian and vegan diets, it is difficult to objectively assess how much of a diet is plant-based.

4 DISCUSSION

4.1 Firewood users

Firewood is produced in 1 m or 2 m lengths and less than 50–60 cm in diameter. The moisture content depends on the season and species. Firewood processing includes cutting and splitting, which are rather noisy and dirty and require space. Wood should be dried for at least a whole summer before combustion. All these requirements and circumstances determine that firewood is used more in less urbanized regions. Ready-to-use firewood can be a solution in cities to the above inconvenience, but only if it is a supplementary energy source because of the lack of storage space that can cover all energy needs for heating, hot water, and cooking. For this reason, firewood use in large cities has been phased out since the advent of natural gas. Currently, 92% of dwellings in the capital and county cities are heated with gas or electric appliances in individual or district heating systems (Central Statistical Office, 2022). In heavily populated areas, air pollution is another argument against all solid energy sources, including wood.

Based on the reasoning above, the study targeted firewood users living in villages and small towns, and the sample evenly covers all parts of the country. The survey's representativity cannot be tested because of the lack of demographic data for the whole population. Nevertheless, important insights can be gained about the attitudes toward firewood and its environmental impacts.

One of the results of this survey is that the dominant user group of firewood lives in households of 1 or 2 people, typically without children.

According to official statistics and related studies (Bajomi et al., 2022; Kármán-Tamus and Pálvölgyi, 2022), firewood use in Hungary is most common among the poorer, rural population.

The social, environmental, and economic sustainability of life in rural small settlements depends on many factors where income status plays a significant role (Szlávik – Csete, 2004). Such information is sensitive and private. Therefore, the questionnaire included only general questions regarding the living standard. The results show that the majority of firewood users are living in a balanced financial situation.

4.2 Environmental attitude

This survey was an initial attempt to reveal how attitudes toward firewood are constructed from elements of knowledge and emotions. Although firewood users are not directly involved in firewood production, their insights about firewood use may allow for more balanced views than what we can expect from outsiders.

Answering attitudinal surveys is challenging for the respondents because they are asked to make judgments about complex issues in a relatively short time. In such situations, respondents rely on their pre-existing knowledge or their emotions, making it difficult to assess the responses and uncover underlying motives and causations. However, public attitudes can have a strong influence on various policies. Therefore, they will shape future forests and forestry.

The most accepted (74 %) claim by far was that firewood is carbon neutral. This seems to be a more widely embedded view in society. Harvesting a healthy tree for firewood is acceptable to the majority of respondents (67 %), provided a seedling or sapling is planted to replace it. These results represent situations where a simple environmental concept worded reassuringly and explained well helps gain acceptance.

At the same time, a large proportion (49 %) of the respondents consider firewood use as a serious threat to the forests and their wildlife. Similarly, a smaller but significant proportion (38 %) believes that firewood use increases climate change. Although responses to the effects of firewood on climate change are evenly distributed, they contrast with the answers on carbon neutrality. These results represent situations when a more complex environmental issue, presented without reassuring or explanatory elements, allows more room for emotions and preconceptions.

For the contradictions between the views on a complex concept and its principle, at least four possible reasons can be identified:

- Respondents express a well-grounded opinion and agree with the basic concept, but due to other factors, the related broader concept is not valid, and they disagree with it.
- The wording of the core concepts is more assuring and tries to avoid misinterpretation, while the complex concept is presented without any additional information that could help the interpretation.
- The respondents have little knowledge about the complex concept. They might not realize the relationship between the concept and its fundamental principle, and their answers are more based on feelings and impressions.
- The respondents tend to agree on whatever question they are asked in a questionnaire.

Sustainable forest management is regulated by law in Hungary, and the forest area is increasing. However, the image of Hungarian forestry that respondents hold may be starker than reality. In theory, they agree with the idea of harvesting forests for firewood, but they do not perceive the necessary conditions for this, namely sustainable forest management. This is also linked to the acceptance of carbon neutrality, which is based on the continuous forest cycle and carbon sequestration. There could be a lack of confidence that what works in theory is implemented in practice, i.e., emitted carbon is sequestered. In a national-level representative opinion poll conducted a few years ago, the majority of Hungarians did indeed think that the forest area in Hungary was decreasing. In addition, many people believed that the condition of

forests had even gotten worse (Lomniczi, 2017). The energy crisis caused by the Russian-Ukrainian war has led the Hungarian government to proclaim many measures related to firewood production, trade, and public supply. The government decree was heavily criticized by conservation NGOs and the media (Lett – Hegedűs, 2024). Many articles defending Hungarian forests and sustainable forest management against the firewood decree have reached the public through the mass media. The effects of these could be reflected in the results presented.

However, carbon neutrality does not necessarily mean climate neutrality, not even in the scientific literature (Sterman et al., 2022). Respondents may also have thought that burning firewood hurts the climate in the short term because carbon is released into the atmosphere and sequestrated only in the distant future.

The classification of the respondents showed that 31 % hold a positive opinion about the environmental impact of firewood use and expressed no negative responses. We call this group Firewood Supporters. Only 4 % of the respondents are on the opposite side, with no positive responses; hence, the name Firewood Critics. In between, with a 65 % share, is the largest group called Miscellaneous. This group offered mixed responses with at least one negative and one positive opinion.

Statistical analysis revealed that these groups differ significantly in terms of their level of education and standard of living. Firewood Supporters have the highest level of education, followed by the Firewood Critics and Miscellaneous group. This result may partly explain why the Miscellaneous group, the least educated group, gave contradictory responses.

The living standards of the groups under consideration also differ from one another, in descending order: Miscellaneous, Firewood Supporters, and Firewood Critics. Although the difference is proven by statistical probing, no evident link has been found to demonstrate how this influences the research results.

4.3 Environmentally conscious behaviors

Nationally representative surveys indicate that a significant proportion of the Hungarian population believes it is doing the right thing for the environment, even if it costs more money and time. Most agree that it is worth doing something for the environment, even if others do not (Schneider – Medgyesi, 2020). The population considers it vital to promote environmentally conscious lifestyles and conscious consumer behavior in society. They also consider it crucial to reduce the amount of waste generated and collect waste selectively (Borda et al., 2016). A positive trend can be observed in Hungarian society in the latter area between 1993 and 2019. However, fewer people are now willing to pay higher prices to protect the environment than in the past. Our survey of firewood users confirms the results of previous research. The majority of respondents avoid plastic packaging, collect waste selectively, and buy local food when they can. In this respect, therefore, Hungarian firewood users continue the attitudes of the rest of society. On other issues, the attitudes of our sample were already divided. On the other hand, transport issues may also be influenced by the characteristics of rural life, such as the varying quality of public transport or the number of electric charging stations. However, a plant-based diet would be a factor independent of place of residence, and the majority of our respondents do not pursue this. Incidentally, 39 % of Hungarians say they would reduce their meat consumption to reduce the negative impact of climate change. This is five percentage points below the global average (Ipsos, 2022). Although we did not ask the same question, 46 % of respondents in our survey are negative in this regard, while a further 30 % are more neutral.

If we examine attitudes toward matters other than heating, firewood users generally follow the environmentally friendly behavior of the Hungarian population as a whole. Of course, we must consider that respondents may try to present themselves in a positive light when asked

about environmental issues, resulting in a slightly more favorable picture of respondents' pro-environmental behavior than the reality.

5 CONCLUSIONS

This research provided additional evidence that attitudes toward the environmental effects of firewood production and use are determined by factual knowledge but also emotions. The more complex the issue and the less stable and detailed the knowledge, the revealed attitude tends to reflect the general environmental concerns and tends to result in contradictory opinions.

While opinions may be contradictory, firewood users generally hold a more positive view of the sustainability of firewood compared to negative perceptions.

The present research study allowed only a few attitude-related questions in a wide-focused survey, which must be considered when assessing the results. Therefore, in-depth analysis is required to gain more precise information concerning knowledge and knowledge gaps, the influence of public discourses, impressions, and personal emotions that play significant roles in shaping attitudes.

These results highlight the differences between public opinion based on sound knowledge and knowledge with gaps. The public is often involved in decision-making processes and policy formulation to gather information and take account of a wide range of interests. However, the public also validates such processes and increases acceptance of the results. Participatory processes should place particular emphasis on communicating the facts, processes, and broader context under the proposed outcomes so that stakeholders and the public have easy access to them.

These findings suggest that environmental issues should be integrated into primary and secondary education to allow the broadest possible range of society to learn about the issues and gain the knowledge needed to assess them. Moreover, environmental education for children outside school and information for the adult population should be further developed.

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