

BEYOND THE BIN: ASSESSING THE ROLE OF ENVIRONMENTAL AWARENESS AND EDUCATION IN HUNGARIAN HOUSEHOLD FOOD WASTE REDUCTION AMONG YOUNG ADULTS

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Food waste is one of the most pressing environmental, economic, and social challenges of our time. In Hungary, a significant portion of food waste originates at the household level, which is why this study aims to explore some of the correlations related to food waste through quantitative research. The primary goal was to examine how respondents perceive sustainability, their food consumption, and waste. The research was conducted using a non-random sampling method, with a sample size of 798, which is not representative, but the authors aimed to approximate a random sampling approach as closely as possible. The results of the study indicated that the extent of food waste is strongly correlated with demographic factors, attitudes, and habits. It was found that education and environmental awareness play a crucial role in reducing waste. The findings of this research can contribute to the development of targeted policy measures and social campaigns aimed at reducing food waste and promoting more sustainable lifestyles in Hungary.

1. Introduction

The global food system, from production to disposal, is a major contributor to humanity's most pressing sustainability challenges, including climate change, biodiversity loss, and resource depletion (Poore and Nemecek, 2018). Within this system, food waste emerges as a critical node, linking unsustainable consumption behaviors directly to vast environmental and economic consequences. Globally, approximately one-third of all food produced for human consumption is lost or wasted (FAO estimates). Given that the majority of avoidable food waste in high-income countries occurs at the household consumption stage, understanding and modifying consumer behavior is paramount. In consumer-behavior research, the study of food consumption drivers (such as income, pricing, and preferences) has long been a focus. However, through a sustainability lens, it is increasingly apparent that the consumption and disposal behaviors of young adults (ages 18–30) play a pivotal, yet often high-risk, role in waste management. This demographic is strategically important for several reasons:

High-Risk Cohort for Waste: Young adults often exhibit higher rates of food waste than older cohorts, owing to lifestyle factors like frequent eating out, less established food-management routines, smaller household sizes, and reliance on take-away or online ordering (Zhang et al., 2022; Byker Shanks et al., 2020). For example, studies of U.S. young adults (18–24 y) found nearly one-quarter reported high levels of food waste ($\geq 30\%$), and critical factors like time constraints negatively affect their intention to minimize waste as they prioritize convenience (Jribi et al., 2020; Salem and Wagner, 2025). This group often displays apathy and underestimates their own contribution to the problem, perceiving food waste as an issue for others (Nikolaus et al., 2018).

Formative and High-Potential Phase: Young adulthood is a crucial transitional phase during which individuals acquire essential food-related skills (shopping, cooking, storage, portioning) and establish patterns that are likely to persist over the life course (Byker Shanks et al., 2020). Consequently, interventions targeted at this group have the potential to yield long-term sustainability benefits.

The Attitude-Behavior Gap: Young consumers typically demonstrate a heightened awareness of environmental and sustainability issues, positioning them as potential change-agents. However, a significant gap exists between their pro-environmental attitudes and their actual waste-reduction behavior (Nielsen et al., 2023). This discrepancy is not due to a lack of concern, but rather a lack of practical routines and skills, inadequate kitchen habits, and the overriding influence of social contexts (Nielsen et al., 2023).

To bridge the knowledge-practice gap among young adults, research must explore three interlinked domains: behavioral mechanisms, contextual influences, and intervention strategies. Research has extensively applied models like the Theory of Planned Behaviour (TPB) to this cohort. Studies confirm that environmental concern significantly influences key behavioral predictors—such as attitudes, subjective norms, and perceived behavioral control—which, in turn, influence waste behavior (Tsai et al., 2020). However, the ultimate translation into behavior is constrained by a lack of actionable knowledge. The influence of education and environmental awareness is therefore not merely a matter of conveying facts, but of cultivating practical food management skills and increasing self-efficacy (Nikolaus et al., 2018). Young adults' living arrangements, characterized by smaller households and less organized routines (e.g., lack of meal planning or shopping lists), often amplify food-waste risk (Nikolaus et al., 2018). This research is particularly pertinent in Hungary, where domestic consumption patterns are undergoing rapid shifts. A Hungarian study on young consumers confirms that factors like trust in food safety authorities, purchasing local products, and health consciousness are strong determinants of sustainable food consumption intentions (Kovacs, 2020). Understanding how these local attitudes interact with waste-specific behaviors is essential. If young adults are a high-risk yet high-potential group, sustainable management strategies must be tailored accordingly. Simple informational campaigns often fall short; effectiveness appears to improve when information is paired with behavioral insights, such as providing timely prompts, modifying the choice architecture (nudges), or eliciting social comparison and activating emotional drivers like anticipated guilt (Schneeman and Oria, 2020; Keller, 2023). Digital platforms and gamified interventions may be particularly effective for this cohort (Huszka, 2019; Nielsen et al., 2023).

In summary, focusing on Hungarian young adults aligns consumption-behavior research with national and global sustainability imperatives. While existing international literature identifies the drivers of waste and the existence of the attitude-behavior gap, there remains a critical need for locally-focused, quantitative

analysis. This study aims to contribute to the literature by quantifying the extent of household food waste among young adults in Hungary, assessing the level of environmental awareness and food management knowledge within this demographic, and determining the specific correlations and explanatory power of environmental awareness, education, and attitudes on reported household food waste reduction behaviors. By concentrating on this demographic in the Hungarian context, this research will gain insight into a segment that both generates significant avoidable waste and holds the highest potential for long-term behavioral change. The ultimate goal is to provide evidence-based recommendations for effective, targeted interventions in Hungary.

2. Methodology

Our survey is based on managing the domestic economic and energy crisis and its effect, with the primary aim of exploring young adults' perceptions of sustainability and their corresponding food consumption and waste behaviors. The present analysis focuses solely on the subsample of young adult respondents (aged 18–30), who accounted for 41 % of the total survey population. In this group, 327 valid responses were obtained and analyzed. Previous research indicates that this demographic is particularly relevant for sustainability research, as young adults often display high environmental awareness but inconsistent behavioral translation regarding food waste (Nikolaus et al., 2018; Manika et al., 2022).

A non-random sampling technique was employed to recruit participants, and although the sample cannot be considered statistically representative, efforts were made to approximate random sampling conditions. Data collection was carried out by commerce and marketing students at Széchenyi István University in Győr, who were instructed to approach individuals within the specified age range through random encounters in public and online spaces. The survey ran for two months, participation was entirely voluntary and anonymous, and all data handling procedures conformed to the General Data Protection Regulation (GDPR) and the ethical standards of the university.

The questionnaire consisted of three major sections:

- **Attitudinal assessment:** A series of five-point Likert-scale statements measured respondents' attitudes toward food waste, emphasizing habitual, emotional, and value-based dimensions (e.g., guilt associated with throwing away food, planning habits, and perceived moral responsibility). The structure of this section followed previous studies emphasizing the psychological underpinnings of waste behavior among young consumers (Aktas et al., 2018; Nikolaus et al., 2018).
- **Behavioral section:** Frequency-type questions captured specific patterns of food waste, including the categories of food most often discarded (e.g., bread, fruits, dairy, or prepared meals) and the reasons for doing so (e.g., spoilage, over-preparation, or lack of appetite). These behavioral dimensions are consistent with frameworks identifying young adults' capability and motivation factors as drivers of waste (Manika et al., 2022).
- **Demographic profile:** Standard questions recorded gender, educational attainment, place of residence, and self-reported monthly net income, aligning with prior findings that socio-demographic characteristics are significant determinants of food waste behavior (Mokrysz, 2016; Talia et al., 2019).

Out of the 330 surveys completed, 327 were retained after data cleaning. The gender distribution was nearly balanced, with 48.9 % male and 51.1 % female respondents. Most participants were university students or recent graduates, living in urban or suburban settings. Roughly two-thirds described their income status as average, while 21 % reported below-average and 13 % above-average income levels. This aligns with prior findings that young, economically active individuals with fluctuating income levels tend to engage in higher levels of food waste due to irregular meal planning and purchasing patterns (Filipová et al., 2017; Nikolaus et al., 2018).

A pilot test involving ten young adult respondents preceded the main data collection to ensure the clarity and interpretability of the questionnaire. As no substantial difficulties emerged, the original structure was retained. All items were closed-ended, combining metric and categorical scales. Several questions were developed by the research team, while others were adapted from Szabó-Bódi's (2018) doctoral dissertation on food waste behavior. To confirm reliability, a small subsample of participants was re-surveyed after two weeks; the consistent results verified the internal stability of the instrument (Manika et al., 2022).

The sample size ($n = 327$) exceeded the minimum requirement for analytical validity within the Hungarian young adult population. Based on Yamane's (1969) formula at a 95 % confidence level, a minimum of 322 responses was required. Therefore, the achieved sample was considered sufficient for the purposes of this analysis.

Drawing on the reviewed literature and the conceptual background of sustainability-oriented consumer behavior, the research pursued the following objectives specifically for young adults:

- To identify the dominant behavioral patterns leading to food waste among young adults.
- To determine which categories of food are most frequently discarded within this age group.
- To assess the influence of income and education level on food waste tendencies.
- To explore the connection between sustainability-oriented attitudes and self-reported waste prevention practices.

3. Results

The analysis of 327 young adult respondents revealed that the majority displayed attitudes aligned with environmental awareness, consistent with prior studies highlighting pro-environmental intentions among this demographic (Nikolaus et al., 2018; Manika et al., 2022). The quantity of household food waste appeared to be influenced more by practical factors—such as storage and meal planning—than by simple consumer negligence, echoing findings from Eičaitė et al. (2022).

Among the most commonly reported environmentally responsible behaviors were deliberate purchasing, i.e., buying only what could reasonably be consumed (mean = 3.65), and home meal preparation (mean = 3.70). Composting, while less prevalent, was practiced more frequently by respondents reporting higher environmental concern. Urban–rural differences emerged, with rural young adults composting more often and urban respondents discarding more food, a trend consistent with Myburgh (2022).

Demographic Influences

- Gender: Women reported higher engagement in environmentally responsible behaviors, including mindful shopping and home cooking, whereas men discarded leftovers more frequently. The correlation between gender and sustainable practices was positive but moderate ($r = 0.28$, $p < 0.05$), consistent with earlier findings that women often take a leading role in household food management (Aktas et al., 2018).
- Education: Tertiary-educated respondents demonstrated lower levels of waste, particularly concerning staples such as dairy and bakery products ($F = 8.12$, $p < 0.01$), suggesting that higher education is associated with better planning, storage, and waste-reduction strategies (Filipová et al., 2017). In contrast, respondents with lower educational attainment tended to discard larger quantities of perishable foods ($r = -0.29$, $p < 0.05$).
- Income: Young adults with below-average income levels reported more sustainable behaviors, including thoughtful purchasing and reusing leftovers, whereas higher-income respondents were more likely to waste perishable goods, particularly dairy and prepared meals. A negative correlation between income and responsible food management was observed ($r = -0.31$), supporting prior research indicating that financial constraints can incentivize careful food usage (Eičaitė et al., 2022).

Place of residence:

Rural respondents engaged more frequently in composting and waste minimization ($F = 9.21$, $p < 0.01$), whereas urban young adults discarded more ready-made and perishable foods. Overall, environmentally conscious behaviors correlated positively with rural residence ($r = 0.36$, $p < 0.01$), highlighting the influence of setting on food management practices (Myburgh, 2022).

Behavioral Patterns

The survey identified several key patterns of waste among young adults:

- Over-purchasing and impulsive shopping led to the frequent discarding of fruits, vegetables, and dairy products.
- Meal planning deficiencies contributed to leftover food being thrown away, despite high awareness of environmental impacts.
- Composting and leftover reuse were more common among respondents who reported strong sustainability values.

Overall, the results suggest that attitudes toward sustainability do not automatically translate into lower waste, emphasizing the importance of interventions targeting storage practices, meal planning, and awareness of food value among young adults (Manika et al., 2022; Nikolaus et al., 2018).

4. Conclusions

The findings of this study provide a nuanced understanding of food waste behaviors among young adults in Hungary, highlighting the gap between environmental awareness and actual sustainable practices. Although the majority of respondents demonstrated strong pro-environmental attitudes, these intentions did not always translate into consistent behavior. Deliberate purchasing, such as buying only what could reasonably be consumed, and preparing meals at home were the most frequently reported sustainable practices. Composting and the systematic reuse of leftovers, while present, were considerably less widespread. This discrepancy between intention and action aligns with previous research emphasizing that young adults, despite high environmental concern, often lack the practical skills, knowledge, or consistent habits required to effectively reduce household food waste (Nikolaus et al., 2018; Manika et al., 2022). The quantity of food waste appeared to be more strongly influenced by practical factors, such as storage techniques and meal planning, than by consumer negligence, indicating that interventions targeting these areas could have substantial impact (Eičaitė et al., 2022).

Demographic characteristics significantly shaped the patterns of food waste observed. Gender emerged as a key determinant, with young women more frequently engaging in environmentally responsible behaviors, including mindful shopping and home cooking, whereas men were more likely to discard leftovers. This finding is consistent with prior studies that underscore the role of women in household management and their generally stronger pro-environmental orientation (Aktas et al., 2018). Educational attainment also played a pivotal role, as respondents with higher education levels reported lower overall waste, particularly concerning staple items such as dairy and bakery products. Higher education appeared to correlate with improved planning, food storage, and utilization skills, supporting the notion that environmental literacy fosters more sustainable consumption behavior (Filipová et al., 2017). Conversely, respondents with lower educational attainment discarded greater quantities of perishable foods, reflecting the influence of knowledge and skill deficits on food waste. Income was similarly influential, with young adults reporting below-average household incomes demonstrating more careful food management, including thoughtful purchasing and reuse of leftovers, while higher-income respondents were more likely to waste perishable products such as dairy and prepared meals. These patterns suggest that economic constraints may act as a natural motivator for sustainability, driving more responsible consumption practices even in the absence of explicit environmental intention (Eičaitė et al., 2022).

Place of residence also affected food management practices. Respondents living in rural areas were more likely to compost and discard less fresh produce compared to urban respondents, who reported higher levels of food waste, particularly of ready-made and perishable foods. This urban-rural divide may be influenced by differences in infrastructure, access to green spaces, and cultural norms related to food use and waste (Myburgh, 2022). The results indicate that interventions targeting urban young adults, such as education on meal planning, storage, and composting opportunities, may be particularly effective in reducing food waste in city environments.

These findings underscore the complex interplay between awareness, socio-demographic characteristics, and practical behavior in shaping young adults' contributions to sustainable food consumption. While the respondents generally valued sustainability and recognized the environmental impact of waste, translating these attitudes into measurable behavioral change remains challenging. The evidence suggests

that education alone may not suffice. Young adults require tangible tools, supportive infrastructure, and consistent reinforcement to bridge the intention-action gap. Food literacy programs that provide knowledge and practical skills for effective meal planning, storage, and creative use of leftovers could play a critical role in reducing household waste (Manika et al., 2022). Policy measures, such as incentives for purchasing imperfect produce, campaigns highlighting the environmental and social consequences of waste, and accessible composting schemes, could further reinforce sustainable behaviors among this demographic.

Despite the valuable insights provided by this study, several limitations must be acknowledged. The reliance on a non-random, convenience-based sampling method limits the generalizability of the findings to the broader population of Hungarian young adults. Additionally, the use of self-reported data may have introduced social desirability bias, potentially leading respondents to underreport waste behaviors or overstate sustainable practices. The cross-sectional design captures behavior at a single point in time, preventing conclusions about the stability of behaviors or their evolution in response to interventions. Although urban–rural differences were evident, the study primarily reflects experiences in specific regions and may not generalize to other geographic or cultural contexts.

These limitations point to several directions for future research. Longitudinal studies would provide a more robust understanding of how young adults' food waste behaviors change over time and in response to interventions. Experimental studies could assess the effectiveness of educational programs, technological tools, and social nudges in promoting sustainable behavior. Comparative research across countries and cultural contexts could elucidate universal versus context-specific drivers of young adult consumption behavior. Linking reported attitudes and practices with objectively measured food waste could provide more accurate assessments of behavior and help identify the most effective points of intervention.

In conclusion, this study highlights the critical role of young adults in advancing sustainable food consumption practices. While environmental awareness is generally high, practical behaviors such as composting and leftover reuse are less consistently adopted, suggesting a need for targeted interventions that address both knowledge and behavior. Demographic factors, including gender, education, income, and place of residence, significantly shape these behaviors, emphasizing the importance of tailored approaches to sustainability promotion. From an environmental and socio-economic perspective, improving young adults' food management practices has the potential to reduce resource depletion, lower greenhouse gas emissions, and foster more ethical consumption patterns. By combining education, supportive infrastructure, and behavioral incentives, policymakers and sustainability advocates can facilitate the translation of pro-environmental intentions into meaningful action, helping young adults lead the transition toward more responsible and sustainable food consumption.

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