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Household Food Waste: The Meaning of Product's Attributes and Food-Related Lifestyle

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The increasing volume and value of food waste is a huge threat to achieving sustainable development, food market stability, human population growth, and people's well-being. Considering that consumers are responsible for a large degree of food waste, the current study looks at the problem of household food waste from the perspective of both food product attributes and consumers' lifestyles. Specifically: How do people differ in their food disposal inclination based on their food-related lifestyle and products' quality attributes? The Total Food Quality Model was applied to describe product attributes (taste, health, process, and convenience) whereas food-related lifestyle was measured with: innovativeness/novelty, information about products/health, convenience, price, taste, local/organic food, and social events. The Choice-Based Conjoint Analysis method, based on 753 participants, was used to assess the importance of individual attributes and levels. Clustering was carried out to identify people with similar preferences: through elbow method and Silhouette value maximization, three customer segments were identified. To investigate the distinct characteristics of these clusters related to food waste, one-way multivariate analysis of variance (MANOVA) was conducted. The obtained results confirm that consumers who overlap in their product attribute preferences also share a food-related lifestyle. The main contribution is the identification of consumer groups and the differences that characterize them in terms of the determinants of behaviour related to the importance of the factors of food products influencing the tendency to waste them.

Keywords: food waste, household, product's attributes, food-related lifestyle, conjoint analysis

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INTRODUCTION

The increasing volume and value of food waste is a huge threat to achieving sustainable development, food market stability, human population growth, and people's well-being. Food waste is defined as any food disposed from the food supply chain, which includes food production, distribution, and consumption (Aschemann-Witzel et al., 2015). It is generated in immense quantities throughout the lifecycle of food and yields serious environmental, social, and economic consequences (Beretta et al., 2013; González-Santana et al., 2020; Kummu et al., 2012; Stefan et al., 2013; Williams and Wikström, 2011). The United Nations' Food and Agriculture Organization (FAO) estimates that about a third of all food produced in the world is not consumed and becomes waste. From an ecological point of view, food waste

causes approximately 8% of all greenhouse gas emissions (UNEP, 2021). If the total amount of wasted food were treated as a separate country, it would be the third largest producer of greenhouse gases after China and the United States. In fact, food waste produces more than four times the annual greenhouse gas emissions of the aviation industry. Researchers warn that excessive waste can also have serious effects on climate change: They estimate that about 10 percent of greenhouse gases are produced by decomposing food in waste dumps (Kratochvíl, 2021). In 2021, UNEP (2021) estimated that cc 1.03 billion tons of food end up in dumps every year. This is a much larger number than was found in previous measurements (by cc 20% more in comparison to estimations published in 2018; Heller, 2019). If this food was saved, it would feed about three billion people—in a situation where almost 700 million people suffer from hunger and another three billion do not have access to a sufficient quality and quantity of food (FAO, 2020). The volume of food waste also presents problems for the environment, as there are limited resources for food production (energy, land, water or nutrients) that should be applied sustainably and efficiently (Beretta et al., 2013).

As reported by FAO (2020), approximately 14 percent of whole foods produced degrade before being sold and another 17 percent of total food volume is lost at the level of individual households. Consumers' food waste is huge, estimated to be cc 74 kg/cap/year (Bogdanović et al., 2019; Buzby et al., 2009; UNEP, 2021). For this reason, researchers have dedicated significant attention to household food waste and consumers' related behaviours (Bernstad, 2014; Bloom, 2011; Diaz-Ruiz et al., 2018; Díaz-Ruiz et al., 2015; Farr-Wharton et al., 2014; Graham-Rowe et al., 2014). In general, any household food waste originates in three predictable stages–when shopping, storing, and serving (Wansink and Wright, 2018). That is, food can be purchased and never prepared, prepared and never served, or served and never eaten (Chandon and Wansink, 2012). Consumers also have many motives, both rational and irrational, for generating food waste. The most common reasons for such behaviours are the low prices, a short expiration period, limited and poor storage capacities (Salam et al., 2012; Schmidt et al., 2019; van Dooren et al., 2019), but also actual and perceived product quality as well as facilities and capabilities in household food activities (Aschemann-Witzel et al., 2015). Many researchers (Porpino et al., 2016; Quested et al., 2013) agree that food waste is not the result of a single behaviour, but a combination of multiple behaviours and a range of complex factors (González-Santana et al., 2020). Therefore, food waste should be analysed from multifaceted points of view (Aschemann-Witzel et al., 2015, 2016). Therefore, the current study explores the problem of household food waste from the perspective of both food products' attributes and consumers' lifestyles. Specifically, we consider how people's inclinations towards food disposal differs based on their food-related lifestyle and valuations of product quality attributes (taste, health, process and convenience).

LITERATURE REVIEW

Consumers are responsible for a large degree of food waste. Although the share of households in total food waste generation differs strongly among countries—from 50% in Canada (Gooch et al., 2010) to about 15% in Netherlands (Aktas et al., 2018)—consumers in highly developed countries generally cause about 40%–50% of global food waste (Aschemann-Witzel et al., 2018). Moreover, British studies have shown that about 60% of that food waste was avoidable (Quested et al., 2013), which leaves opportunities for reduction. Scholars have also found out that decreasing food waste at the level of households always produces environmental benefits, unlike reductions at other stages such as farm-to-store (Cattaneo et al., 2021). Given this situation, the EU has prioritised reducing half of food waste by 2030 as one of its Sustainable Development Goals. To facilitate this goal, numerous studies (Ariyani and Ririh, 2020; Stancu et al., 2016; Bell and Ulhas, 2020; Kim and Lee, 2020) have sought to answer the underlying question: why do people waste food in the first place?

Consumer decisions about wasting food are determined by two sets of factors: The first related to product attributes (Hingston and Noseworthy, 2020; Wikström et al., 2019; Wilson et al., 2017) and the second related to customer characteristics and behaviours (Kim and Lee, 2020; Aktas et al., 2018; Ariyani and Ririh, 2020; Marek-Andrzejewska and Wielicka-Regulska, 2021; Principato et al., 2021). Regarding product attributes, previous studies have shown that the amount of food wasted is related to the food category (Loebnitz and Grunert, 2018). In a study of the United States, Conrad (2020) found that "meat and seafood" and 'fruits and vegetables' were the leading categories of waste (and generated almost 70% of daily per capita cost of total food waste). This makes sense given that fresh products are generally easier to waste than long-life products (Jörissen et al., 2015). The other product attribute that drives waste is the visual attractiveness of a product, which consumers sort into optimal and suboptimal states based on certain visual cues (de Hooge et al., 2017). This distinction usually arises from some external symptoms (Jaeger et al., 2018), like shape, size, colour, smell, lack of defects, a fresh and clean look (in the case of unpackaged food), and information on the package (such as the expiry date in the case of packed products). The look of unpackaged foods is very important and serves as a heuristic for quality. Consumers generally prefer optimal food over suboptimal (Aschemann-Witzel, 2018): In fact, a key determinant of food waste derives from their rejection of products that deviate from the image of a category protype (e.g., a misshapen fruit) (Hingston and Noseworthy, 2020). Granted, there is some nuance to this tendency: Earlier studies found that customers always put a premium on beauty (Raghubir and Greenleaf, 2006), whereas more recent ones have found that consumers respond much better to visual imperfection under some circumstances (Hingston and Noseworthy, 2020; Grewal et al., 2018). The preference for fruits and vegetables with deviating size and/or shape (e.g., bent cucumbers, split carrots, irregular tomatoes, overripe bananas or unwashed potates) has been associated with the place of decision (customers were more willing to choose suboptimal foods at home than in a supermarket), the design of price badges (Helmert et al., 2017) and customers' personal characteristics (de Hooge et al., 2017; Gracia and Gómez, 2020; Aschemann-Witzel et al., 2019; Symmank et al., 2018). The packaging itself is also an

important product attribute with regard to levels of food waste. Packaging plays several roles: to contain, protect, facilitate handling, and carry information (Wikström et al., 2019; Wohner et al., 2019). In relation to perceived product quality, data labels play a special role in communicating the level of freshness and healthiness: Products close to their expiry date are perceived as less fresh and less healthy, and are thus more likely to be wasted (Wansink and Wright, 2006; Wilson et al., 2017). To counteract this, retailers commonly offer suboptimal products at a decreased price.

In the current study, we examine food disposal based on two perspectives that are highly meaningful for consumers: namely, product quality attributes, and food-related lifestyle. Since we focused on attributes that are meaningful in the post-purchase stage, we adopted the Total Food Quality Model (Brunsø et al., 2002), which has been widely applied by research in the fields of food and consumer studies. The model granted us a broader, multi-dimensional insight on food disposal that was applicable to the post-purchase stage of the food waste journey. TFQM integrates the multi-attribute and hierarchical approaches to quality perception, as well as distinguishes quality assessments based on before and after purchase. "Before purchase" evaluation is based on perceived extrinsic quality cues, like visual attractiveness or expiry date. In the current study, we focused on perceived quality determinants: taste, health, convenience, process (Brunsø et al., 2002).

Taste, a hedonic value of food, is an intrinsic cue that can only be experienced by trying the product. This factor can be paradoxical: On one hand, it is given more credence than extrinsic cues (e.g., the brand), but on the other hand, a customer may have little confidence in their ability to evaluate it (Veale and Quester, 2009). In cases where a customer is going to discard food, their subjective opinion on taste seems to be more important than their objective ability to assess taste. Other studies have found that taste perceived as bad is one reason for throwing a product away (Heikkila et al., 2016).

Health has gained importance as a quality attribute due to consumers' rising awareness about the influence of diet on their health. Health-related product quality expresses customers' perceptions about how a product will affect their health (Brunsø et al., 2002). Conrad et al. (2018) and Carroll et al. (2020) found that higher-quality diets and healthy eating in general are associated with higher food waste, mainly due to the higher share of fresh food (like fruits and vegetables) in said diet. Because these products are also more likely to be purchased raw than other foods, more of the waste comes from the consumer phase than the processing phase.

Process is the quality dimension that covers organic production, production that takes animal welfare into consideration, and production without the use of GMOs. Much of consumers' interest in the production process focuses on 'naturalness.' In the current study, we focused on organically produced vs. conventionally produced. Based on the importance that consumers attribute to local origin which is often associated with, even if not directly synonymous to, "organic" (Costanigro et al., 2014), we postulate that consumers value organic products more than non-organic products, which might prevent waste. At the same time, because organic foods lack artificial preservatives, they may have a shorter lifespan that leads to higher waste.

As a product quality factor, convenience reflects the ease of any stage of the food product journey: purchase, storage, preparation, consumption, clean up, and leftovers disposal (Brunsø et al., 2002). Prior research has shown that customers who are the most wasteful are generally the most reliant on convenience food (Mallinson et al., 2016), which leads us to the conclusion that consumers do not regard convenience food as very valuable.

Beyond product quality attributes, we also consider the consumer-related determinants of food wasting behaviour. Because consumer-related factors are numerous, they can generally be divided into: social (household type, family stage and related lifestyles), individual behaviours, perception, attitude, demographic features (Aschemann-Witzel, 2018; Aschemann-Witzel et al., 2020) and individuals' "resources" in terms of time for food-related activities, cooking skills, knowledge and awareness (Aschemann-Witzel et al., 2015). Alternatively, Principato et al. (2021) divided consumers' food waste factors based on their individual characteristics (psychological, demographical, situational) and household food waste journey stages (planning, in-store, storage and cooking, consumption, disposition). Our research develops the aforementioned division with subjectively product attributes that determine the motivation to use or throw away food products. Our research develops the aforementioned division by including subjective product attributes that determine the motivation to use or throw away food products, based on the finding that food wasting behaviour is highly connected with food-related lifestyle behaviour (Aschemann-Witzel et al., 2021). Stefan et al. (2013) revealed that food-related shopping behaviours, such as shopping routines (in terms of quantity of food bought as well as impulse purchases) and planning routines (concerning both buying food and cooking), predict food waste behaviour. Looking specifically at fresh bread waste, Østergaard and Hanssen (2018) found that people who waste more bread buy it more frequently and in greater bulk. Di Talia et al. (2019) achieved the opposite result with regard to food in general: They found that low-frequency shopping increases the tendency to generate food waste in a household. However, when people use shopping lists to carefully plan their purchases, they waste less food. Other strong predictors of food waste behaviour include food waste habits (Russell et al., 2017) and leftovers routines (Zainal, 2019).

In the current study, we focused on food-related lifestyle factors that are related more to consumption attitudes and preferences and less to planning and buying behaviours. These include those identified by (Choi et al., 2020): innovativeness/novelty, information about products/health, convenience, price, taste, local/organic food, or social events. Innovativeness is related to trying new food behaviour; information about products is connected with food content analysis, mainly resulting from health concern; convenience refers to the ease of getting and preparing food; price captures price-focused food purchase behaviour; taste reflects consumers' perceived meaning of taste; local/organic food refers to people's preferences for those

TABLE 1 | Products attributes and their respective level.

Factor	Level
Convenience	Easy and quick to prepare
	Difficult to obtain
	Difficult to prepare
Health	Healthy
	Nutritionally enriched
	Potentially detrimental
Taste	Of preferred taste
	Of neutral taste
	Of non-preferred taste
Process	Organically produced
	Conventionally produced

types of foods, and social events refers to eating as a social experience. On this basis, and given the explorative nature of the current study, we formulated one main hypothesis:

H1: Consumers who hold similar viewpoints about the food attributes that should lead to disposal are also similar in terms of their food-related lifestyle.

METHOD

Experiment Design

We used the Choice-Based Conjoint Analysis method to assess the importance of individual attributes and their levels. The model included four food product attributes (Brunsø et al., 2002) that represent 11 total levels (**Table 1**). The purpose of this method is to decompose preferences based on declared behaviour in relation to various scenarios, and thereby achieve higher realism. This method is often used in research on consumer preferences and attitudes. The number of scenarios depends on the number of factors and their levels. In the analysed case, the maximum number of scenarios (possible combinations) is 52. However, presenting all of them would spur fatigue in respondents and thereby lower the reliability of the obtained results. We chose an orthogonal experimental set-up in order to limit the overrepresentation of any given level. In the $3 \times 3 \times 3 \times 2$ system of variables, the appropriate and sufficient number of compositions presented to the participants is nine. During the study, each participant received information about nine products, which were displayed and responded to separately and in a sequence. Participants did not see photos or the product category, only the text description (see **Supplementary Appendix SA1**). This is due to the fact that the perception of products on each of the 11 levels is subjective and may differ among consumers. In order to maintain psychological realism, the instructions prompted participants to imagine that they were standing in front of a refrigerator containing a lot of different products. In order to further strengthen the stimulus, we presented a photo of an open refrigerator, devoid of any products or brands in order to avoid affecting the obtained responses. Using an 11-point scale, participants rated the degree to which the situation compelled them to feel inclined to throw away the displayed food product (0-I would throw out without hesitation; 10-I would have a lot of resistance to throw out). The study was approved by the Committee of Ethical Science Research, conducted with participation of humans at Poznan University of Economics and Business (Resolution 9/2021).

Data Collection and Participants' Characteristics

The questionnaire consisted of three parts: In the first part, participants saw a description of the product and then declared how much resistance they would feel towards throwing the product away. In the next part, participants responded to the variables related to the food-related lifestyle scale. This scale consists of 7 subscales: Innovativeness/Novelty (INN), Information about products/Health (HEALTH), Convenience (CON), Price (PRI), Taste (TAS), Local/Organic food (LOC), Social events (SOC). We derived our statements directly from the work of (Choi et al., 2020). The full list of items can be found in **Supplementary Appendix SA2**. The third part captured respondents' personal details and self-reported food waste at home, like in the study by (Aschemann-Witzel et al., 2021). The study also included attention checks (e.g., "If you read carefully, mark the number 3 next to this question"), which were the first elimination criterion for the final analysis The second elimination criterion was whether respondents answered all questions in an apparently thoughtless way (e.g., choosing "4" on a 0–9 scale for all questions). The study was conducted using the Amazon MTurk platform, where participants received a small remuneration considering the time needed to answer all the questions in the survey. The study was restricted to US residents for the sake of sample homogeneity, as well as because the US market is a key leader in global consumption, and by extension, food consumption. Due to its market size, purchasing power, and consumption volume, the US is one of the world's top-level food consumers per capita. Moreover, the US market is a very good benchmark for the future behaviour of developing and transitional economies, which tend to copy the consumption behaviour of developed countries while transitioning.

A total of 958 people took part in the study. Of these, 168 failed the attention check questions and so-called "speed-runners". Another 37 people answers were removed due to obtaining 0 of the standard deviation of the answers, which made it impossible to decompose the preferences. The final analysis covered 753 respondents, differentiated by age, sex, education, declared income, and professional status (**Table 2**). To analyse the collected data, we used the R environment.

RESULTS

Cluster Analyses

The data were processed using quantitative conjoint analyses, which showed that the most important attributes for preventing wasting were convenience (29.28), taste (28.55) and health

TABLE 2 | Description of the study group–n = 753.

Category	Characteristics	Value
Mean age		43.21 (13.4)
Gender (%)	Female	390
	Male	357
	Prefer not to say	6
Education (%)	Lower than high school	409
	High school or equivalent	13
	Bachelor's degree	155
	Master's degree	144
	Doctorate	28
	Other	4
Income (%)	≤ $19.999	76
	$20.000–$29.999	88
	$30.000–$39.999	99
	$40.000–$49.999	89
	$50.000–$59.999	70
	$60.000–$69.999	91
	$70.000–$79.999	62
	$80.000–$89.999	47
	$90.000 ≥	131
Employment (%)	Full-time	482
	Part-time	77
	Retired	42
	Self-employed	47
	Student	26
	Unable to work	13
	Unemployed	66
Mean values of declared household food wasted*	Prepared dishes/meals	3.615 (1.846)
	Meat and fish	3.408 (1.935)
	Bread and other bakery products	3.839 (1.817)
	Milk and dairy	3.576 (1.94)
	Fresh fruit and vegetables	3.997 (1.888)

*Measured on 7-point scale: one- nothing; 7-a lot.
Values in brackets represent the standard deviation.

(27.27), while processing (14.9) had a lower importance. The utility data showed that preferential taste (0.58) and preparation easiness (0.49) had high utility and therefore lower waste probability. Similarly, healthy food (0.44) was less wasted. On the other end of the utility scale, non-preferential taste (−0.66), health harmfulness (−0.58) and preparation difficulty (−0.50) tended to motivate wasting. Because the entire sample indicated a low level of R-squared (0.082), we conducted clustering to identify people with similar preferences and better understand the analysed phenomenon. Conducting elbow method and Silhouette value maximisation (0.44), we identified three customer segments. As a result of the cluster analysis, the R-squared value was $r^2 = 0.4$.

Cluster 1 (n = 247), labelled as "taste and health-oriented customers", represented 32.8% of the sample. For this group, healthiness, and preferred taste were instrumental to mitigating waste (i.e., they had high utility). On the contrary, the lowest utility was associated with potentially detrimental products and products of non-preferred taste. Cluster 2 (n = 185), labelled as "convenience-oriented customers", represented 24.6% of the sample. This cluster privileged convenience above all other attributes. Cluster 3 (n = 321), labelled as "balanced customers", represented 42.6% of the sample. These respondents did not demonstrate any specific attribute preference with regard to keeping/wasting products. **Table 3** presents the detailed food wasting patterns based on food attributes and their level.

The following section describes the cluster characteristic on three levels: demographics, respondents' behaviour in relation to food waste, and food-related lifestyle measured on 7 subscales. We observed different demographic characteristics among the individual clusters. Cluster 1 featured the highest share of self-employed consumers and those with a higher income. The number of women predominated in this group as well. Cluster 2, meanwhile, featured the largest share of people with a high school degree or less, and with an income less than 50.000 USD (48% of the cluster). Cluster 3 featured the highest share of people with higher educations (both master and bachelor), but did not otherwise exhibit clear demographic markers. However, this cluster did declare the highest share of food waste in each category (see **Table 4**), in contrast to Cluster 1, which was the most sensitive to wasting.

Food-Related Life Style Analysis

In the next stage, we analysed the characteristics of consumers in the identified clusters in terms of food-related lifestyle. First, we performed a confirmatory factor analysis involving all 7 of the dimensions identified by Choi et al. (2020): innovativeness/novelty (INN), health (HEALTH), convenience (CON), price (PRI), taste (TAS), local/organic food (LOC), and social events (SOC). All 31 items based on Choi et al. (2020) statements were retained due to having factor loadings higher than 0.4, as advised by Fabrigar et al. (1999) for larger (200+) samples. To further examine validity, we used composite reliability (CR), average variance extracted (AVE) measures and Cronbach's alpha coefficients. According to Sekaran and Bougie (2013), the value of the CR for all variables must be above 0.60. Likewise, the AVE values should be bigger than 0.5 (Fornell and Larcker, 1981) and Cronbach's alpha values should exceed the cut-off value of 0.70 (Nunnally, 1967), which would imply convergent validity for the studied factors. The results show that the AVE values for the seven identified factors were greater than 0.5, all CR values were greater than 0.6 and Cronbach's alpha was greater than 0.7 (**Table 5**).

To investigate the distinct characteristics of the three consumer clusters in terms of food wasting, we conducted a one-way multivariate analysis of variance (MANOVA). Prior to conducting the MANOVA, we analysed the group homogeneity of covariance matrices using Box's M value (310.521, $p < 0.001$) finding that the groups were equal for the purpose of MANOVA. We obtained a statistically significant MANOVA effect, Pillais' Trace = 0.169, F (2, 750) = 9.802, $p < 0.001$. The results of this analysis support hypothesis 1. Next, we conducted analyses to deepen the obtained values for the individual dimensions of the food-related lifestyle scale, comparing 3 clusters. All results were statistically significant. Next, we conducted analyses on the three clusters to compare their values on the individual dimensions of the food-related lifestyle scale. All results were statistically

TABLE 3 | Cluster mean values for product quality attributes.

	Cluster 1 (SD)		Cluster 2 (SD)		Cluster 3 (SD)	
Convenience	26.37	(12.75)	34.27	(16.71)	28.15	(14.97)
Easy and quick to prepare	1.16	(1.00)	0.25	(1.55)	0.18	(0.69)
Difficult to obtain	0.28	(0.96)	−0.33	(1.2)	0.03	(0.66)
Difficult to prepare	−1.45	(1.00)	0.08	(1.01)	−0.21	(0.63)
Health	29.65	(17.95)	24.01	(12.47)	27.67	(14.97)
Healthy	1.31	(0.93)	−0.04	(0.75)	0.15	(0.61)
Nutritionally enriched	0.43	(0.94)	−0.03	(0.75)	0.03	(0.61)
Potentially detrimental	−1.74	(1.45)	0.07	(0.82)	−0.18	(0.68)
Taste	32.18	(16.86)	25.86	(12.45)	27.74	(13.92)
Of non-preferred taste	−1.73	(1.3)	−0.05	(0.95)	−0.29	(0.70)
Of neutral taste	0.18	(0.98)	−0.06	(0.75)	0.08	(0.58)
Of preferred taste	1.56	(1.11)	0.11	(0.88)	0.21	(0.64)
Process	11.80	(9.37)	15.86	(11.5)	16.44	(12.94)
Conventionally produced	−0.37	(0.85)	0.14	(0.75)	−0.11	(0.48)
Organically produced	0.37	(0.85)	−0.14	(0.75)	0.11	(0.48)

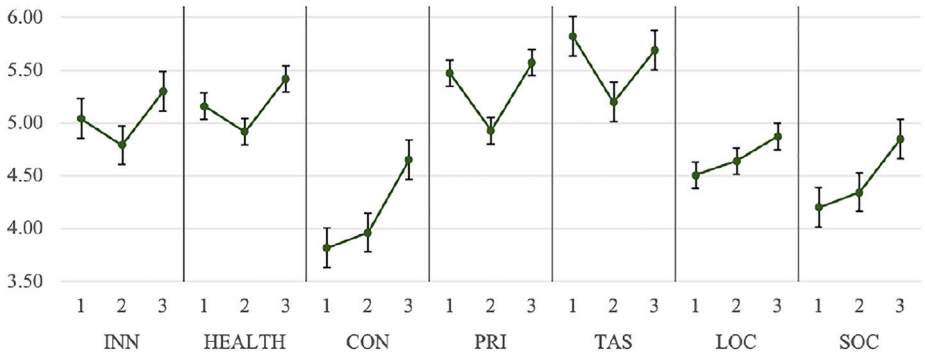
Values in brackets represent the standard deviation.

TABLE 4 | Cluster characteristics.

	Cluster characteristics	Cluster 1	Cluster 2	Cluster 3
Mean age		35.9	36.8	36.5
Gender (%)	Female	58.3	48.1	48.9
	Male	41.3	50.3	50.5
Education (%)	Doctorate	2.0	0.5	2.2
	Master's degree	15.8	17.3	22.7
	Bachelor's degree	52.6	48.1	59.2
	High school degree or equivalent	24.7	27.0	13.7
	Less than a high school diploma	0.0	1.6	0.3
	Other	4.9	5.4	1.9
Income (%)	≤ $19.999	10.1	8.6	6.5
	$20.000–$29.999	6.5	15.1	10.0
	$30.000–$39.999	9.7	10.3	14.0
	$40.000–$49.999	13.0	14.6	12.5
	$50.000–$59.999	12.1	12.4	11.2
	$60.000–$69.999	10.9	10.8	7.2
	$70.000–$79.999	9.3	8.6	16.2
	$80.000–$89.999	6.5	5.9	6.2
	$90.000 ≥	21.9	13.5	16.2
Employment (%)	Employed full-time	49.8	64.9	74.5
	Employed part-time	11.7	13.0	7.5
	Retired	8.1	3.2	5.0
	Self-employed	8.9	5.9	4.4
	Student	5.3	3.2	2.2
	Unable to work	2.8	1.1	1.2
	Unemployed	13.4	8.6	5.3
Mean values of declared household food wasted*	Prepared dishes/meals	2.95 (1.55)	3.73 (1.75)	4.06 (1.97)
	Meat and fish	2.66 (1.64)	3.56 (1.75)	3.89 (2.07)
	Bread and other bakery products	3.32 (1.74)	4.02 (1.63)	4.13 (1.90)
	Milk and dairy	2.85 (1.72)	3.75 (1.82)	4.04 (2.01)
	Fresh fruit and vegetables	3.44 (1.85)	4.13 (1.78)	4.35 (1.88)

**Measured on 7-point scale.*
Values in brackets represent the standard deviation.

significant with small and medium effect size, respectively: INN–F (2,750) = 8.964, $p < 0.001$, $\eta2 = 0.023$; HEALTH–F (2,750) = 9.909, $p < 0.001$, $\eta2 = 0.026$; CON–F (2,750) = 24.607, $p < 0.001$, $\eta2 = 0.062$; PRI–F (2,750) = 17.952, $p < 0.001$, $\eta2 = 0.046$; TAS–F (2,750) = 20.862, $p < 0.001$, $\eta2 = 0.053$; LOC–F (2,750) = 5.869, $p < 0.001$, $\eta2 = 0.015$; LOC–F (2,750) = 16.142, $p < 0.001$, $\eta2 = 0.041$. The obtained research confirms that consumers with a similar perspective on the important attributes that should inform food disposal are also similar in each of the dimensions of food-related lifestyle. **Graph 1** presents the differences between the individual clusters for the seven dimensions of the analysed scale.



GRAPH 1 | Relationship between clusters and food-related lifestyle dimensions.

TABLE 5 | Confirmatory factor analyses.

Construct	Item	Loading	*p* value	Cronbach's α	CR	AVE
INN	INN1	0.818	***	0.92	0.92	0.65
	INN2	0.824	***			
	INN3	0.799	***			
	INN4	0.781	***			
	INN5	0.823	***			
	INN6	0.807	***			
HEALTH	HEALTH1	0.765	***	0.91	0.91	0.62
	HEALTH2	0.796	***			
	HEALTH3	0.808	***			
	HEALTH4	0.741	***			
	HEALTH5	0.798	***			
	HEALTH6	0.815	***			
CON	CON1	0.896	***	0.89	0.9	0.69
	CON2	0.916	***			
	CON3	0.776	***			
	CON4	0.712	***			
PRI	PRI1	0.674	***	0.86	0.87	0.62
	PRI2	0.797	***			
	PRI3	0.88	***			
	PRI4	0.797	***			
TAS	TAS1	0.785	***	0.85	0.85	0.59
	TAS2	0.804	***			
	TAS3	0.774	***			
	TAS4	0.714	***			
LOC	LOC1	0.677	***	0.83	0.84	0.57
	LOC2	0.796	***			
	LOC3	0.823	***			
	LOC4	0.678	***			
SOC	SOC1	0.793	***	0.74	0.75	0.5
	SOC2	0.702	***			
	SOC3	0.588	***			

***p < *0.001*.

DISCUSSION

Food waste has become one of the greatest threats to the growth and welfare of human populations, and thus needs to be addressed from different angles. Since consumers are a massive source of food waste, it seems imperative to understand the motives behind their behaviour. To that end, this study investigated the product quality attributes and food-related lifestyle factors that prevent consumers from throwing food away.

Our study shows that product quality attributes have differing importance in relation to food disposal. Surprisingly, consumers in general are inclined to waste food, that is, organically produced. Paradoxically, the biggest benefits of organic food—such as the absence of chemical or synthetic additives, as well as ecological- and animal-friendly production processes (Dowd and Burke, 2013)—can be the main reasons for wasting it. The high probability of wasting organic food may stem from the fact that this type of food (i.e., being chemical-free) does not often fit into the so-called prototypical appearance of fresh products pushed by food manufacturers (Loebnitz et al., 2015; Raak et al., 2017; Dusoruth and Peterson, 2020). Consequently, consumers often associate the quality of food with its visual appeal (Qi and Roe, 2017) and reject products that deviate from this prototypical shape (Loebnitz et al., 2015). Thus, organically produced food—which is often visually imperfect—may be seen as bad and thus thrown away. This is also true of fully edible food products that consumers reject due to the deterioration in appearance (Dusoruth and Peterson, 2020).

On the other hand, our research showed that consumers tend to avoid wasting products that are easy to prepare (convenience), have a preferred taste, and are healthy. The latter two responses are not surprising, but consumers' high preference for not wasting convenience products merits some consideration. Notably, our study adopted a different perspective in this area compared to previous research. As mentioned earlier, Mallinson et al. (2016) showed that customers who are the most reliant on convenience food also exhibit the largest extent of food waste. Similarly, Brunner et al. (2010) reported that consumers purchase fewer convenience food products when they want to avoid food waste. These findings imply that consumers are prone to throwing convenience products away. This would seem to align with Candel (2001), who found no significant correlation between people's purchase of convenience products and environmental impact (which is related to food waste). Alternatively, our results might be explained by consumers wasting less food due to minimizing the physical and mental effort required for food preparation, consumption, and cleanup (Candel, 2001; Brunner et al., 2010). Consumers who want to make their lives easier would be reluctant to get rid of products that could help them

reach this goal. One may also argue that consumers have reinterpreted the meaning of convenience food. The study by Carrigan et al. (2006) showed that consumers are increasingly incorporating convenience products into daily life, to the extent that even homemade meals may include such products. That could be another reason for not wasting them.

Our study's next major contribution was categorising consumers' food-waste behaviour into three segments. This procedure confirmed the high importance of food taste, healthiness, and convenience in preventing waste—as well as the lack of importance attributed to organical production. The first cluster comprises customers who do not throw away food, that is, healthy and/or features a preferred taste. The second cluster reflects consumers who are attached to convenience products and try not to discard them. The third cluster seems to consider all attributes holistically. All three clusters differ in terms of food-related lifestyle. As a consequence, consumers' food disposal inclination partially depends on their food-related lifestyle. To the best of our knowledge, the above finding is novel and has not been investigated elsewhere. Moreover, different lifestyles can be identified across all three clusters. Respondents belonging to Cluster 3, called 'balanced customers', represented the highest intensity of all six (out of seven) lifestyle dimensions characterised by Choi et al. (2020). As a result, 'balanced customers' turn out to be relatively the most innovative (i.e., trying new recipes and/or new food) and health oriented (i.e., concern for nutrition facts, naturalness of food). On the other hand, a diet that includes convenience food (i.e., instants, frozen food as well as pre-cooked dishes) seems to be very important to this group. At the same time, members of this cluster represent the highest level of willingness to buy local/organic food. For them, eating food seems to be a social event. This group of customers also exhibited the highest price sensitivity. Not surprisingly, the "taste and health-oriented" cluster attributed the greatest amount of importance to the taste of food (although the taste, healthiness and price sensitivity dimensions played a relatively important role in the food-related lifestyles of all groups). This cluster also placed less emphasis on treating food consumption as a social event and buying locally produced food items. Similarly, this cluster's focus on taste and (to lesser extent) healthiness was accompanied by less interest in convenience food. Lastly, the "convenience-oriented customer" cluster placed the least amount of importance on innovativeness, healthiness, and taste of all clusters. In terms of lifestyle, this cluster placed moderate emphasis on convenience locally produced food and eating food as social event.

CONCLUSION

Reducing food waste at the household level is an important issue that has been remarked upon by many international organisations, influential authors, and national bodies. There are several drivers behind increasing food waste, such as: retailers' strategies of pushing consumers to buy as many products as possible; the increasing purchasing power of the global population; consumers' fast-changing preferences and lifestyles. Nonetheless, households' limited ability to estimate their own consumption capacities is a major contributor that can potentially be reduced.

This study aimed at addressing how people's food disposal inclination differs based on products' quality attributes (taste, health, process, and convenience) and consumers' food-related lifestyle. Applying Conjoint analyses to a sample of 753 respondents, we identified three different consumer clusters: those who are against wasting products with a favourable taste and positive health effects; those who are against wasting products that are convenient to prepare; and those who have no particular attribute-driven inclination to eliminate waste and are thus the most wasteful. The clusters were built atop the seven food-related lifestyle factors identified by Choi et al. (2020) (innovativeness/novelty, health, convenience, price, taste, local/organic food, and social events). The individual groups also featured significant differences related to demographic characteristics: Cluster 1 was dominated by women, self-employed people and those with the highest incomes; Cluster 2 was dominated by people with a high school education or less, while Cluster 3 was dominated by full-time workers and people with university educations. Research findings in the context of policy implication can be used to define a communication strategy to promote sustainable consumption and reduce food waste.

Naturally, our contribution features some limitations. One such limitation is that we distributed the questionnaire amidst the ongoing COVID-19 pandemic, which has inclined people toward bulk buying and likely led to even more food waste. Second, our sample was gathered by Amazon MTurk and exclusively consisted of US respondents, who represent a consumption-heavy culture. It would be valuable for future research to include respondents from other high-income nations and try to identify differences between other highly wasteful nations (Canada, United Kingdom) and nations where food waste is a sensitive issue (Netherlands). Additionally, the respondents were remunerated which may lead to bias results. Third, our research described the attributes of abstract products and thus may lack some realism. To counteract this, future research could present specific products instead of simply describing them. Fourth, our study did not account for the role of specific household members who are responsible for grocery shopping and bear the costs of purchasing food. Nonetheless, the issue of financial involvement in relation to food disposal decisions seems to be a promising research area. We also acknowledge that people hold different interpretations of "small/large waste" in the context of food; thus, a 7-point Likert scale might be flattening those differences. However, overcoming this limitation would require further funding and labour in order to measure the amount of food waste from each individual household.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Committee of Ethical Science Research

conducted with participation of humans at PUEB. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

AS, BB, and BP contributed to conception and design of the study. AS organized the database and performed the statistical analysis. AS, BB, and BP wrote the first draft of the manuscript. AS, BB, BP, PK, and LS wrote sections of the manuscript. All authors read, and approved the submitted version.

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SUPPLEMENTARY MATERIAL

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