

# Consumer attitudes towards upcycled foods

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## Introduction

Upcycled food production is a food waste management strategy that diverts the edible part of wasted food to the food supply chain (Moshtaghian et al., 2021). Upcycled foods are value-added products and contain ingredients that otherwise would not have gone to human consumption (The Upcycled Foods Definition Task Force, 2020). These ingredients can be food surplus, by-products and food preparation scraps (The Upcycled Foods Definition Task Force, 2020). Upcycled food is a new food category (Bhatt et al., 2018), and thus consumer acceptability is one of the major issues for these foods (Moshtaghian et al., 2021). Encouraging people to eat upcycled foods can contribute to sustainable food consumption goals. Consumer sociodemographic factors (e.g., gender, age, income and education) and beliefs such as concern for the environment can affect their choices (Moshtaghian et al., 2021). Therefore, it is crucial to consider the consumer perspective in upcycled food choices. This study aimed to investigate the Swedish consumer attitude towards upcycled foods and assess the upcycled food consumption intention according to consumer sociodemographic characteristics.

## Material and methods

A questionnaire was developed and distributed online (through social media) to the Swedish population aged 18 and over. The questions focused on attitude towards upcycled food (e.g., intention to eat) and food preferences. Questions on the sociodemographic characteristics of consumers were also included in the questionnaire. The questions were multiple-choice, yes/no, and Likert scale and were available in both Swedish and English. Six hundred and eighty-three participants took part in the survey. Univariate analyses and the chi-square test assessed consumer attitudes towards upcycled foods. Similarly, the chi-square test was used to assess the association between intention to eat upcycled food and participants' sociodemographic characteristics.

## Results and discussion

The mean age of participants was 48 years. Of the 683 participants, 49% had previously consumed upcycled foods, and 536 participants mentioned that if these foods become available, they will definitely eat them. Only 9% of them preferred conventional foods over upcycled foods. For most participants (90%), the food waste management aspect of upcycled foods was one of the important food choice factors. The association between intention to eat upcycled foods and the importance of price and upcycled foods features (being a value-added product and contributing to food waste reduction) are presented in Table 1. In participants aged 18 to 48, there was a significant association between intention to eat and the importance of a low price for upcycled foods ( $P_{\text{value}} < 0.05$ ). Among this age group, 21% of those who intended to eat upcycled foods considered the low price of these foods an important factor. In all participants, there was a significant association between intention to eat and the importance of the contribution of upcycled foods to food waste reduction ( $P_{\text{value}} < 0.05$ ). Other food features such as healthiness, labelling and certification of upcycled foods were also important factors in consumer upcycled food choices.

Table 1. Association between intention to eat upcycled foods and the importance of price and upcycled food features.

	Age: 18 to 48 years			Age: $\geq$ 48 years		
	PI (%)	NI/unsure (%)	$P_{\text{value}}$	PI (%)	NI/unsure (%)	$P_{\text{value}}$
Cheap price	21.0	41.6	0.001	15.4	21.2	0.254
Being value added	4.1	9.3	0.065	8.0	9.1	0.638
Helping food waste reduction	94.1	81.6	0.001	95.4	71.2	<0.001

PI: positive intention to eat upcycled food, NI/unsure: negative intention to eat upcycled food/hesitant to eat

The association between intention to eat upcycled foods and sociodemographic factors is presented in Table 2. In participants aged 18 to 48, there was a significant association between intention to eat upcycled food and sociodemographic factors such as income, education and gender ( $P_{\text{value}} < 0.05$ ). The association between intention to eat upcycled food and education was also significant in the older age group ( $P_{\text{value}} < 0.05$ ).

Table 2: Association between intention to eat upcycled food and participants' sociodemographic characteristics

	Age: 18 to 48 years			Age: ≥ 48 years		
	PI (%)	NI/unsure (%)	P <sub>value</sub>	PI (%)	NI/unsure (%)	P <sub>value</sub>
High income	60.9	50.0	0.019	49.2	48.5	0.905
Highly educated	31.5	47.4	0.006	19.1	33.3	0.002
Women	88.1	59.7	<0.001	91.2	87.7	0.385
Small household	69.2	71.8	0.664	91.6	89.4	0.572

PI: positive intention to eat upcycled food, NI/unsure: negative intention to eat upcycled food/hesitant to eat; High income: household income of >35,000 SEK/month; Highly educated: postgraduate education; Small household: ≤3 persons

Our finding demonstrated that the price of upcycled food is one of the important food choice factors. The high price of environmentally friendly foods (Marian et al., 2014) affects their public affordability (Steenhuis et al., 2011). Our participants also considered food waste reduction a favourable feature of upcycled foods. According to Rahmani (2018), some consumers are sensitive to food waste issues and thus consider upcycled food production as a food waste management option and a compensatory approach. In terms of sociodemographic factors, a higher proportion of those who intended to eat upcycled food had high income, and a lower proportion of them had postgraduate education compared to those who were reluctant or unsure. Other studies found that consumers with high education (Köpcke, 2020) and income (McCarthy et al., 2020) level are motivated to choose upcycled foods. In terms of gender, although women are risk-averse and may be reluctant towards upcycled food (Rahmani, 2018), our results showed that women are interested in consuming upcycled foods. Since women are mainly involved in household grocery shopping, they can be a target group for upcycled food communication.

#### Conclusion

Swedish people are interested in upcycled foods and are inclined to choose and include them in their everyday diet. Some features of upcycled foods, such as contribution in food waste reduction, can attract consumers. Women and those with high income may also be more interested in upcycled foods and thus can be a target group for upcycled food communication and marketing. Upcycled food manufacturers and researchers should consider consumer perspectives and needs to meet their expectations and achieve upcycled food acceptability.

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