



ANALYSIS OF FOOD WASTE BEHAVIOUR IN THE HOUSEHOLD SECTOR

Suci Maudy Aulia*, Evi Martha

¹Master of Public Health, Faculty of Public Health, Universitas Indonesia, Jalan Prof. Dr. Bahder Djohan, Pondok Cina, Beji, Depok, West Java 12345, Indonesia

²Department of Health Promotion and Behaviour Science, Faculty of Public Health, Universitas Indonesia, Jalan Prof. Dr. Bahder Djohan, Pondok Cina, Beji, Depok, West Java 12345, Indonesia

*sucimaudy@gmail.com

ABSTRACT

A total of 62% of food waste comes from household waste in the world. In Indonesia, as much as 40.3% of food waste is recorded as waste generation in 2020. This problem of food waste arises from a diverse set of household behaviours. This study aims to analyze the behaviors that lead to food waste in households using Social Cognitive Theory (SCT) and Theory of Planned Behaviour (TPB). This research is using the Systematic Literature Review research method. The search was conducted using three databases namely Google Scholar, Pubmed, and ScienceDirect. The keywords used were 'food waste', 'behavior', and 'household'. The inclusion criteria of this study were articles published since the last 5 years using English. Articles were screened using the PRISMA Framework. Food waste behaviour in household sector can occur due to various factors such as demographic, consumptive behaviour, food management knowledge and skills, psychological and consumer perceptions, and environmental and accessibility in community. The discovery of factors causing food waste through the SCT and TPB theoretical approach can help in planning more optimal and targeted health promotion interventions.

Keywords: behaviour; food waste; household

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INTRODUCTION

The increasing number of population and the need for food for the community causes consumptive behaviour that can lead to food waste. Food waste is defined as all food that is wasted, even if it is still fit for consumption. The entire world is estimated to waste 1.05 billion tonnes of food in the retail, foodservice, and household sectors. This is equivalent to 132 kilograms per capita per year, of which 79 kilograms per capita is wasted in households. A total of 62% of food waste comes from household waste, far more than packaging waste and residual waste. This percentage consists of 62% fruit and vegetables, 11% meat, 11% processed dairy products, and 16% bread (United Nations Environment Programme, 2024). Fruits and vegetables are the most common food items in the household sector (Bain et al., 2024).

Food waste accounted for 40.3% of Indonesia's waste generation in 2020. If this problem is not addressed immediately, it can lead to an increase in waste generation and problems that must be considered immediately, especially in development and public health (Bappenas, 2023). The impact of food waste is not only an increase in carbon emissions, but also the waste of food that could still be given to other communities. (The Global Hunger Index, 2024) shows that Indonesia is ranked 77th out of 127 countries with a moderate level of hunger at 16.9 (with a range from 10 - 19.9). This result is obtained from 4 components, namely 7.2% of the population is malnourished, 26.8% of toddlers are stunted, 10% of toddlers are wasting, and 2.1% of children die before the age of 5 years.

Households are a major contributor to produce waste and can potentially contribute a key role in solutions such as food waste reduction through composting (Oehman et al., 2022).

Households are made up of individuals who can spearhead behaviour change to maximise the impact of food waste, its threat to health and the environment in the future. Households generate significant food waste with varying sorting behaviours (Nguyen et al., 2023). Busy lifestyles and unpredictable schedules can hinder meal planning and increase food waste, as consumers may not have time to reuse leftovers (Aloysius et al., 2025). Accumulated household food waste is also reported to disrupt the food supply chain, posing economic, social and environmental challenges (Sigala et al., 2024).

In everyday life, variations in individual behaviour can influence the process of food waste. Storage practices, including the tendency to store leftovers, often lead to waste as households throw away food that they will initially consume later (Bhatia & Sharma, 2023a). Not only that, life is getting more modern and things are becoming more practical, one of which is the ease in the shopping process through the online system. Households with young age and high income tend to prefer online shopping and it is reported that this behaviour leads to an increase in food waste generation (Ananda et al., 2023).

These trends in food waste behaviours need to be analysed to find appropriate and targeted programme interventions that can be a significant strategy in tackling food waste. Targeting specific segments of the population needs to be considered in order to improve understanding of the intention-behaviour formation process in reducing food waste and tackling food waste in the future (Bain et al., 2024).

Theories of individual behaviour change in health promotion can be reviewed through various theories according to the problems that occur in society. Theories that can be a reference in helping to overcome food waste that occurs in the household sector are Social Cognitive Theory (SCT) and Theory of Planned Behaviour (TPB). In SCT, factors that can be analysed are through knowledge, self-efficacy and environmental factors. While in TPB, the factors that can be analysed are through attitude factors, subjective norms and perceived behavioural control. Behaviour change can significantly reduce food waste generation in households. Perception change is not enough to change a person's behaviour (Ita et al., 2024).

These theories can complement each other in analysing household behaviour that can lead to food waste, so in this study researchers will analyse food waste behaviour in the household sector by examining the factors in the SCT and TPB theories. Self-efficacy factors have proven useful for planning health programs through role models for learning and vicarious modelling. Learning occurs through 3 processes: direct experience, indirect experience/observation of others' behaviour, and complex information processing in cognitive operations (Green, 2022).

Based on the background and data described, this study aims to analyse and determine the description of food waste behaviour in the household sector through the SCT and TPB theories.

METHOD

This study uses the systematic review method with PRISMA-P (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocol). Researchers used three databases namely Google Scholar, PubMed, and Science Direct. The keywords used were 'Food Waste', 'Behaviour', and 'Household'.

1. Inclusion Criteria and Exclusion Criteria

The inclusion criteria in this study are articles published since 5 years ago, namely 2019 - 2024 and in English.

2. Data Extraction

At the initial stage, 2736 articles were verified. Consideration was then analysed based on the suitability of the abstract at the screening stage, resulting in 17 articles. From the in-

depth search results, 11 journals were again selected for review in this study.

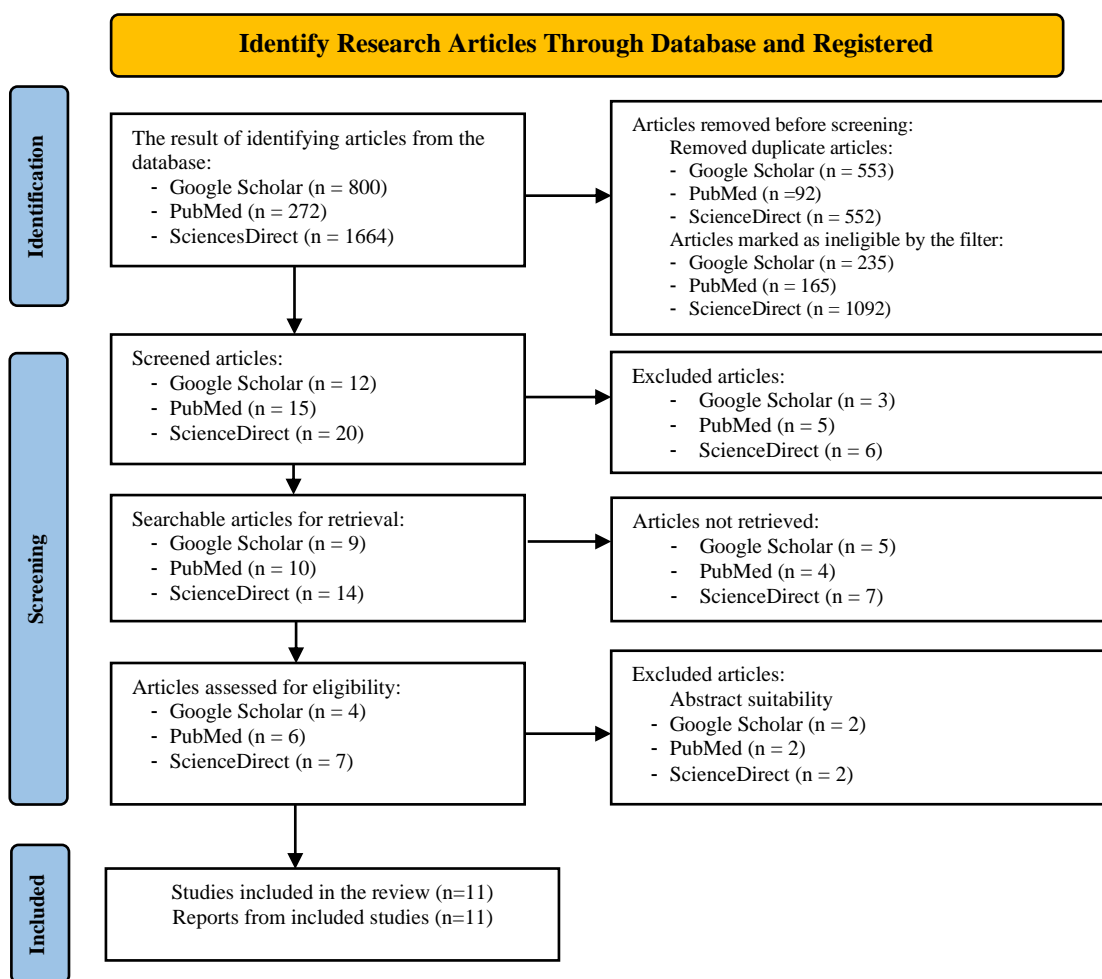


Figure 1. The Flowchart of PRISMA-P

RESULT

Table 1.
Article Analysis

No.	Author (Year)	Title	Method	Result	Conclusion
1.	Apolonio (2020)	Behavioral and Demographic Antecedents to Household Food Waste.	Quantitative Study with Structural Equation Modelling (PLS-SEM)	This article discovered that food conservation has a negative impact on the generation of food waste. Respondents tend to prefer food freshness, which is positively correlated with the generation of food waste. In addition, materialistic values increase food waste and environmental concerns. This raises environmental concerns positively, which influences recycling and	Eating habits play a significant role in food waste generation, while knowledge about food conservation also determines the level of waste generated. Older people tend to be more knowledgeable about food conservation, but environmental concerns do not necessarily reduce materialistic values. In addition, normative beliefs influence waste

No.	Author (Year)	Title	Method	Result	Conclusion
				prevention behaviours. The other factors that influence the generation of waste are age, larger households, and the selection of food freshness triggers the accumulation of food waste.	management behaviour, although food waste is less of an environmental issue. Recycling behaviour is influenced by age and education, and external cues play a role in determining the amount of food waste. Finally, consumer acceptance of imperfect food could be a solution to reduce waste.
2.	Zhang et al. (2020)	The effect of consumer perception on food waste behaviour of urban households in China.	Semi-structured interview	Consumer perceptions significantly influence food waste behaviour in urban households. Positive perceptions reduce the amount of food waste per meal, while negative perceptions increase it. Employment status also affects the amount of food waste, and households with pets tend to waste less food. These results have been confirmed through alternative food waste measurement methods. As a result, a concerted effort is needed from consumers to change perceptions and reduce food waste.	Consumer perceptions were found to significantly influence food waste behaviour in urban households, with employment status contributing as well. Households with pets tend to waste more food. The results confirm the resilience of the impact of consumer perceptions on food waste. Therefore, concerted efforts are needed to change consumer perceptions to reduce food waste.
3.	Ananda et al. (2021)	Analysing behavioral and socio-demographic factors and practices influencing Australian household food waste.	Quantitative with Poisson Regression approach.	The frequency of grocery shopping can significantly affect food waste levels, with weekly grocery shoppers throwing away less food than regular shoppers. Eating out less often can reduce food waste in households. Poor visibility of food storage can significantly increase food waste. The additional cooking of food can increase the level of food waste especially if followed by a lack of skills in cooking leftover	Food waste in households can be caused by various factors such as routine food behaviour, frequency of grocery shopping, eating out behaviour and the cultural background of the local community. There is a need for strategies in the storage process followed by skills in cooking leftovers. Further

No.	Author (Year)	Title	Method	Result	Conclusion
				food. The study also found that high shopping expenditure, household composition, and cultural identity can influence the generation of food waste.	research is needed to create effective intervention strategies.
4.	Abu Hatab et al. (2022)	An extended integrative model of behavioural prediction for examining households' food waste behaviour in Addis Ababa, Ethiopia.	Quantitative with Integrative Model of Behavioural Prediction (IMBP) approach.	Intention to reduce food waste was a significant predictor, supported by self-identity, attitude and perceived behavioural control as major factors. High perceived control is associated with lower food waste, while anticipated regret also lowers the likelihood of wastage. Environmental constraints, in contrast, increased waste, and lower psychological distance correlated with reduced waste. The findings suggest that sociodemographic and psychological factors play an important role in understanding food waste-related behaviours.	Self-identity, attitude, and perceived behavioural control (PBC) predicted intention to reduce food waste, with high perceived control and prospective regret playing a role in reducing the amount of waste. Knowledge of the impact of food waste also contributed to reducing household waste, but environmental constraints increased it. Sociodemographic factors significantly influenced food waste behaviour. Effective interventions should therefore target consumer attitudes and skills, while community-based initiatives can promote more sustainable food consumption.
5.	González-Santana et al. (2022)	Dimensions of household food waste focused on family and consumers.	Literature Review	Households generate the majority of food waste as a result of consumer habits that are a major cause in food wastage. Following direct and indirect assessments, large families often generate significant food waste. This is characterised by consumer behaviour that varies significantly across demographics. Given the findings in this study, more research is needed to understand the dimensions of food waste that are responsible for the build-up in the household	Households contribute significantly to the generation of food waste, where consumer behaviour and knowledge play an important role in the level of wastage. Large households tend to waste more food than small households, but guilt may motivate waste reduction. Religious beliefs also potentially drive this behaviour, although more research is needed

No.	Author (Year)	Title	Method	Result	Conclusion
				sector.	to understand the dimensions of food waste in depth. Effective strategies are therefore urgently needed to change consumer habits in an effort to reduce food waste.
6.	Ghafoorifard et al. (2022)	Economic hardship, ontological insecurity, and household food waste.	Quantitative with an explanatory approach.	Economic hardship negatively impacts food waste behaviour, where a significant relationship between economic hardship and ontological insecurity leads to excessive food consumption. This overconsumption then contributes to increased food waste. The indirect effect of ontological insecurity suggests partial mediation in food waste behaviour, and this study highlights how economic hardship affects food choices and increases waste.	Economic hardship negatively predicts consumers' food waste behaviour by causing ontological insecurity that leads to overconsumption. This overconsumption results in more food waste, especially under economic stress. The COVID-19 pandemic exacerbated financial hardship, exacerbating food waste patterns in many households. Future research needs to further explore how economic events, such as the global crisis, impact food choices and waste levels in society. These insights could be highly relevant for designing future strategies in the public health and promotion sectors, similar to the challenges in other emerging health promotion issues.
7.	Ananda et al. (2023)	A comparison of online and in-store grocery shopping behaviour and its effects on household food waste.	Quantitative with Ordered Probit (OP) dan Zero-Inflated Ordered Probit (ZIOP) approach.	Online grocery shoppers throw away more food waste compared to offline shoppers. A total of 13% of households shop online for groceries at least once. Younger households are more likely to prefer online shopping compared to older households.	Online grocery shopping behaviour significantly increases household food waste. This trend is more pronounced in younger and higher-income households. The frequency of frequent grocery purchases was

No.	Author (Year)	Title	Method	Result	Conclusion
				Higher-income households are more likely to choose to shop online for groceries with most households shopping for groceries approximately once a week.	correlated with greater food waste production.
8.	Khalid et al. (2023)	Food Waste: Causes and economic losses estimation at household level in Pakistan.	Questionnaire survey	Households with high income dispose of more food compared to households with low income. In addition, monetary losses from food waste were higher among higher income households. The main types of food waste found were cooked food, fruits and vegetables. Respondents prefer fresh food, thus this leads to more frequent food purchases where lack of time and mistakes in food management lead to higher food wastage.	High-income households tend to waste more food than low-income households, which poses a serious threat to the resources used in production. Reducing food waste can not only improve household financial performance, but also improve resource allocation more efficiently. Consumer attitudes and behaviours play a significant role in the generation of food waste, so estimating the economics of this waste is crucial to raise awareness and encourage wiser behavioural change.
9.	Tonini et al. (2023)	Predicting food waste in households with children: socio-economic and food-related behavior factors.	Quantitative	Families with children generally discard perishable food. Two patterns of food wastage identified were inadequate food management and excessive purchases. Other factors that contribute significantly to food wastage are household type and shopping habits. Making shopping lists can help reduce food waste in households. There is still a need for further research, especially empirical studies on the causes of food waste, to	Food waste is a significant global challenge. Contributing factors to food wastage are household composition, inadequate food management, and over-purchasing. There is a need for policies that target young and middle-aged families, as well as a multi-stakeholder approach for effective food waste reduction.

No.	Author (Year)	Title	Method	Result	Conclusion
				shape policies that target young families to reduce food waste.	
10.	Li & Roe (2024)	Segmenting U.S. consumers by food waste attitudes and behaviors: Opportunities for targeting reduction interventions.	Quantitative with K-Means Clustering Technique.	This research identified four consumer segments namely ConConservers, Harried Proligates, Unrepentant Drink Wasters, Guilty Carb Wasters. From this study, it was found that ConConservers represented 22% of households with a total of 10% of waste, Harried Proligates accounted for 26% of households with 38% of waste, Unrepentant Drink Wasters comprised 21% of households with 10% of waste, Guilty Carb Wasters formed 31% of households with 33% of waste. Of these four consumer segments, clusters 2 and 4 represent 57% of households with 71% of waste, hence the need for behaviour change strategies to reduce food waste.	Changes in consumer behaviour are critical in reducing food waste which accumulates at around 50% in residential settings. Four consumer segments were researched to provide targeted interventions with the 2 clusters of Harried Proligates and Guilty Carb Wasters representing 57% of households. Targeting these segments can help significantly in reducing food waste by motivating consumers on financial, environmental and norm compliance factors.
11.	Bilska et al. (2024)	Food waste in polish households – Characteristics and sociodemographic determinants on the phenomenon. Nationwide research.	Quantitative with a cross-sectional approach.	Polish households throw away an average of 62.6kg of food each year. Most of the food wasted is fruits, vegetables, and bread. In addition, one household was found to waste 555.5 grams of food every day. Of the food waste, one-third was from food processing. Researchers also found that household size and income can influence the level of food waste that occurs.	Food waste reduction is necessary in Poland due to high levels of food waste. This is due to household characteristics, income, and how households process food before it goes to waste. There is a need for educational programmes that can help promote effective food waste reduction, followed by further studies to clarify what the variations of food waste are for effective and targeted programmes.

DISCUSSION

Food waste behaviour in the household sector can occur due to various types of behaviour. Based on the analysis of the journals, the behaviours that can trigger food waste in the household sector are demographic factors, consumptive behaviour factors, food management knowledge and skills factors, psychological factors and consumer perceptions, and

environmental and accessibility factors.

Demographic factors found in the analysed journals are household size, income, and economic conditions. Larger household sizes tend to have difficulties in food management and food waste storage, leading to the accumulation of food waste (González-Santana et al., 2022; Tonini et al., 2023). Households with higher incomes dispose of more waste than households with lower incomes due to a preference for fresh food and a lack of skills in food management (Bilska et al., 2024). However, other studies have found that financial hardship can cause ontological discomfort that can encourage households to buy more food than needed. This happened during the COVID-19 pandemic which caused panic buying and consumptive behaviour (Ghafoorifard et al., 2022).

Consumptive behaviour factors found in the analysed journals are shopping frequency, online shopping, and eating habits. Households that have a more frequent shopping frequency, especially in daily shopping, tend to produce more food waste than more controlled weekly shopping (Ananda et al., 2021). In addition, online shopping behaviour also plays a role in increasing food waste especially among the younger generation and higher income households. The preference for food freshness and convenience provided by the online shopping process is one of the eating habits that neglect leftover food, which can increase food waste (Apolonio, 2020).

The factor of knowledge and skills in food management has been found to be a solution in preventing waste generation. This behaviour is found in several journals where households with better cooking and food waste management skills tend to produce less food waste (Ananda et al., 2021). The other way can be done by making a shopping list which is a solution to avoid excessive purchases (Tonini et al., 2023). The knowledge about food and the environmental impact of food waste, on the other hand, has been shown to significantly reduce food waste (Apolonio, 2020). The more households have knowledge about food waste and have skills in food management, the lower the level of food waste generated in households because households can use food more wisely and efficiently.

Psychological factors and consumer perceptions can also influence food waste behaviour. Households that have better perceived control over food waste behaviour and regret when wasting food (Abu Hatab et al., 2022). Consumers' perceptions of food quality and freshness can also influence how often food is discarded. There is a negative perception of food that is close to the expiry date even though the food is still suitable for consumption. This perception triggers behaviour that can affect food waste itself (Zhang et al., 2020).

Environmental factors and limited access to resources significantly influence food waste behaviour. Environmental constraints such as the lack of good storage facilities and limited access to sustainable food sources, lead to people's habit of accumulating food in households (Tonini et al., 2023). During the COVID-19 pandemic, economic uncertainty and disruptions in the food supply chain led to panic buying which led to an increase in food waste (Ghafoorifard et al., 2020, 2022). Finding targeted interventions in tackling food waste, targeting consumer segmentation is a solution to create targeted programmes by considering the main problems and preferences of the people (Li & Roe, 2024).

CONCLUSION

The analysis of 11 journals showed that consumptive behaviour, namely excessive food purchases and preference for fresher food, is the cause of food waste behaviour. This behavioural factor shows the attitude that households with more frequent shopping and online

food purchases create an unavoidable accumulation of food waste (Ananda et al., 2021, 2023; Apolonio, 2020; Bilska et al., 2024; Khalid et al., 2023; Zhang et al., 2020). The results from several journals suggest that there is a need for increased awareness and knowledge on improving food consumption management practices. In other words, households with effective food consumption management practices reported lower levels of food wastage and significantly reduced food waste generation (Bhatia & Sharma, 2023b).

The other 4 journals state that environmental factors such as social norms and access in the community are factors that can be analysed as causes of food waste such as certain beliefs in food waste management (Apolonio, 2020; Ghafoorifard et al., 2022; González-Santana et al., 2022; Tonini et al., 2023). It also stated in research from (Sarker et al., 2024) that awareness of health and environmental issues associated with waste mismanagement was reported to be high with 80% of respondents recognising these issues. Respondents in this study agreed that door-to-door waste collection systems are effective for food waste reduction and showed willingness to pay for sustainable waste management. This shows that access in the community can increase public awareness and suggests that the SCT theory approach can help address this issue.

One of the other journals stated that the community knowledge factor can create more controlled health behaviour to minimise food waste disposal (Abu Hatab et al., 2022). The results of this journal analysis also align with research from (Wharton et al., 2021) that interventions use a variety of media formats, including podcasts and videos, to increase engagement and effectiveness. Targeting of community segmentation and selection of media types are things that need to be considered and in accordance with community needs. In addition, the findings suggest that educational interventions can effectively influence food waste behaviour. Through the learning process and increasing self-efficacy, it has been proven to reduce food waste behaviour in the household sector.

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