



EATING HABITS ON FOOD WASTE BEHAVIOR IN FOOD DELIVERY HOUSEHOLDS

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ABSTRACT

The impact of food waste behavior indirectly results in environmental impacts that occur in the process of food production, storage, transportation, and waste management. A person's food disposal behavior is related to self-regulation which plays a role in the regulation of meal timing, the amount of intake, and food preferences. The study aimed to determine the effect of eating behavior on food waste behavior conducted by distributing questionnaires to 100 household managers who used food delivery service applications to serve family meals. Household characteristics show that the average number of family members is mostly inhabited by three people with an average food expenditure in households of 54% of the UMR of Bogor City per month with the age of household managers at the prime age of female sex. Most use one type of delivery application with the gofood application is the most chosen application with a frequency of online shopping 1-3 times a month. The staple food type is the most purchased food at dinner and the average food spends. Households that do not finish their food treat their leftovers by storing them in the refrigerator. Based on the average results, the score shows that most households have good eating behavior and food waste behavior. Eating behavior affects food waste behavior in households using food delivery applications with a significance value of $p < 0.05$ and an R Square value which means eating behavior affects food waste behavior $>50\%$. However, healthy consumption patterns can be reversed in everyday life in order to reduce food waste in households.

Keywords: eating behavior; food waste; food delivery; food management; food and nutrition; household nutrition

Introduction

Problems related to food that until now have not been resolved in various countries, including Indonesia is food waste. Nearly 1.3 billion tons of food are wasted each year, costing the global economy an estimated US\$2.6 trillion and accounting for 8% of global greenhouse gas emissions(1). It is estimated that around 50% of food waste comes from households in developed countries. Households are responsible for the largest portion of all food waste. The Rethinking Food Waste Economic and Data (ReFED) estimates that households in the United States throw away 76 billion pounds or about 34.5 million tons of food per year (2). The 821 million people affected by hunger could be fed four times as much with avoidable food wastage worldwide (3)

In Indonesia, the largest source of food waste comes from the household sector, amounting to 63.64 servings or 77 kg per year, followed by restaurants at 23.14 servings (28 kg) and

entrepreneurs at 13.22 servings (16 kg) (4). There are four types of food waste in the household in each process, during the purchase process, such as excessive food purchases; during food preparation, such as excessive preparation and aesthetics on food; during consumption, such as leftovers that are no longer consumed; on food storage, when improper storage of food. Increased frequency of social media use and new marketing patterns from food manufacturers may result in more impulse purchases of food products (5).

All needs become utilizing the internet both for business and non-business so that people's mobility out of the house is decreasing, where the type of m-commerce that is popular is Food Delivery Apps (FDA) in the food sector. Food manufacturers are encouraged to utilize online business as one of the resilience strategies (6). There are 19.1 million users of food delivery applications, and Statista Digital Market Outlook estimates that by 2024 there will be a growth of around 68% of users, with the most frequently used GoFood application being around 78% of users according to the survey (7) These changes in conditions, there is a change in eating behavior in the community. Many changes during the pandemic are also related to consumer behavior towards food purchased. In a study (8) stated that 44.7% of respondents did not spend their time during this pandemic cooking.

Judging from the development of technology and innovation, companies engaged in food will result in a large variety of foods that consumers can choose. A psychological approach to the field of consumer behavior that aims to select and quantify factors and certain intra-personal, cognitive, motivational, and structural processes that either encourage or inhibit pro-environmental behavior that are the main influences in food waste (9–12). In addition, planning and shopping routines are also factors that have a significant influence on food waste (11). Different levels of consumer preferences can determine eating behavior in the selection of food they will consume, especially with the diversity of food available.

The behavior of throwing away a person's food is related to self-regulation which plays a role in regulating the timing of meals, the amount of intake, and food preferences, because these three things are aspects of eating behavior (13). Three-meals-a-day eating patterns such as breakfast, lunch, and dinner have different structures, so people consciously or unconsciously give different cultural meanings. Meal timing and food preferences are factors that influence food cravings. An important aspect of parental socialization about their child's eating is the environment, mealtimes, and some studies have found a positive relationship between family meal frequency and children's eating behaviors, such as healthy food consumption (14). The quantity and quality of food determines the level of consumption (15)

According to the survey, around 74% of Indonesian respondents ordered local cuisine from food delivery apps and 66% of respondents ordered fast food. The same survey showed that Indonesians mostly order dinner on food delivery apps (7). A study identifies what factors can

increase user satisfaction in Indonesia with food delivery applications for various reasons such as convenience, food quality, hedonic motivation, social media influence, price savings (discounts, promos), e-commerce service quality, time savings, or application usability. Based on the analysis of Partial Least Square Structural Equation Modeling, user satisfaction factors that have a significant effect on user satisfaction are food quality, service quality, hedonic motivation, or from previous online purchase experiences (16)

According to a food service and cloud kitchen survey conducted by Rakuten Insight in Indonesia, around 63 percent of respondents stated that they would continue to order food online after COVID-19 restrictions were lifted, the reason being convenient, about 17% of respondents stated that they would continue to order because they had good food experience and quality (7). However, food waste reports by show that households spend more on food delivery services, but nearly 13% of groceries are wasted (Rabobank 2020).

Methods

This study uses a type of quantitative research with analytical studies and an observational approach is carried out to determine the relationship between shopping patterns and eating behavior with food waste behavior in households using food delivery applications conducted in June 2023. This study aims to calculate independent variables (eating behavior and shopping patterns) and bound variables (food waste behavior) by measuring or observing at the same time using a cross sectional design. The sample involved in this study was household managers who managed family food in Tanah Sareal Village totaling 100 people. In this study using questionnaires as a technical instrument by distributing them to household managers in the Tanah Sareal Village area. The sampling method uses a simple random sampling technique. Univariate analysis in the form of frequency and bivariate analysis with the Pearson correlation method at a significance level of 0.05. This research has passed an ethical review by the enforcement board of the ESA Unggul University code of ethics research ethics commission with number 0923-06.035/DPKE-KEP/FINAL-EA/UEU/VI/2023 in Jakarta, June 14, 2023.

Results

Household characteristics based on the number of family members and food expenditure show an average on the number of family members are inhabited by 3 people. The average food expenditure shows that the average food expenditure in households is around Rp. 2.452.280,00 per month.

The characteristics of household managers based on age and household managers show that the age of household managers using food delivery applications is 37.84 who are at the prime age (25-45 years) with the youngest age of 19 years and the oldest of which is 69 years. The average in

household managers using food delivery apps is 1.94 which indicates that household managers are mostly women. The average does not show a round number because there are still men who are household managers. According to Statista (2022b), the age group of 25-34 years has the largest portion with 33.51% of food delivery application users. The study found that 25–44 year olds were the most active group with one-third of respondents regularly interacting with e-commerce services Clarke, Thompson, and Birkin (2015). In contrast, users over the age of 65 are the least frequent online shoppers, with only 1 in 10 respondents reporting regular e-commerce use. Mortimer et al. (2016) found more frequent use among younger age groups (ages 25–44) and age groups 55–65 is known to show the lowest frequency of online purchases.

According to (19) research that found that sociodemographics are an important driver of e-commerce use for food transactions, more female users in more affluent households, and those in the 25–44 age group are most likely to use home delivery. In this study, the average for household managers using food delivery apps was 1.94, indicating that household managers are mostly women. The average does not show a round number because there are still men who are household managers. According to the (19)study, women showed more regular use of food delivery apps in households, with larger food store references.

The characteristics of household managers who use food delivery applications include the applications used, the frequency of use of food delivery applications, and the type of food purchased.

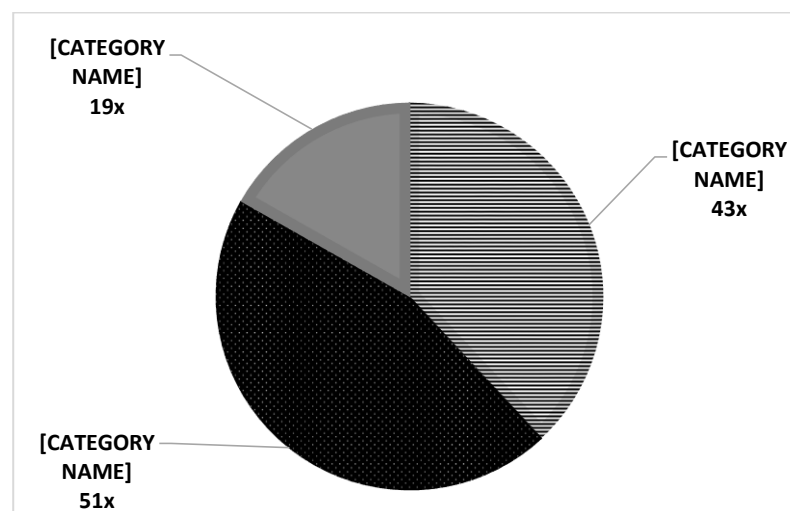


Figure 1. Frequency of use of the Food Delivery App

Based on figure 1 of all household managers, 88 of them consistently use 1 type of application. The picture shows that the gofood application is the most chosen application 51 times, followed by grabfood 43 times and shopeefood 19 times.

Table 1. Frequency Distribution Characteristics of Food Delivery App Use

Variable	n	(%)
Application frequency of use		
Sometimes (1-3 times a month)	69	(69)
Often (1 time a week)	18	(18)
Very often (several times a week)	10	(10)
Always (every day)	3	(3)
Exhaustion of Purchased Food		
Already	67	(67)
Not	33	(33)

Based on table 1, the frequency of using food delivery applications has an average of 1.47, which shows that most household managers use food delivery applications 1-3 times a month. Of the food purchased, the average household manager was 1.33 indicating that his family members finished his meal.

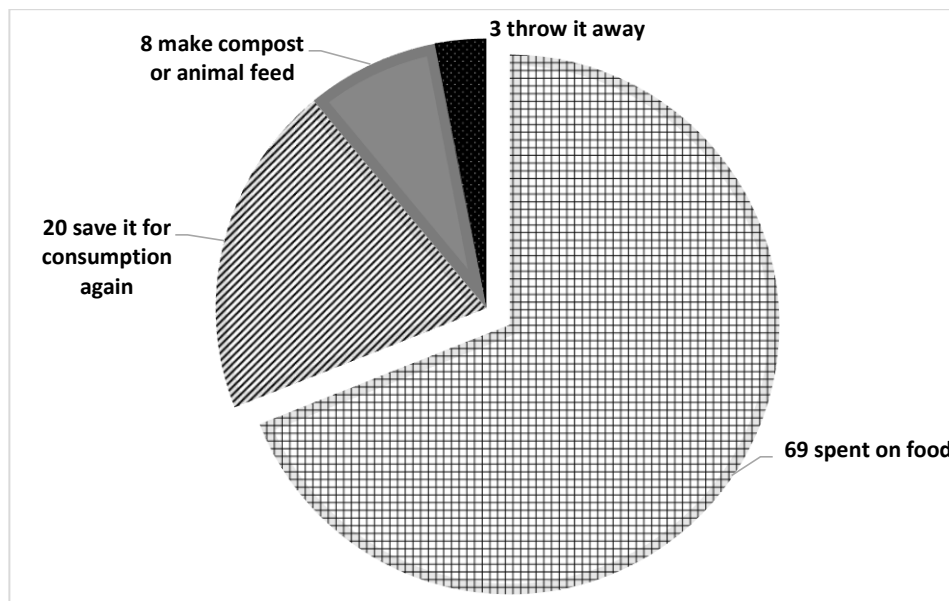


Figure 2. Treatment of household managers on leftovers

Based on figure 2, 69 household managers admitted that the purchased food was spent by the household members, while 31 household managers admitted not spending the purchased food, of which 20 household managers treated leftovers by storing them in the refrigerator for reconsumption, 8 household managers made food waste as compost or animal feed and the remaining 3 household managers treated food waste with Discarded.

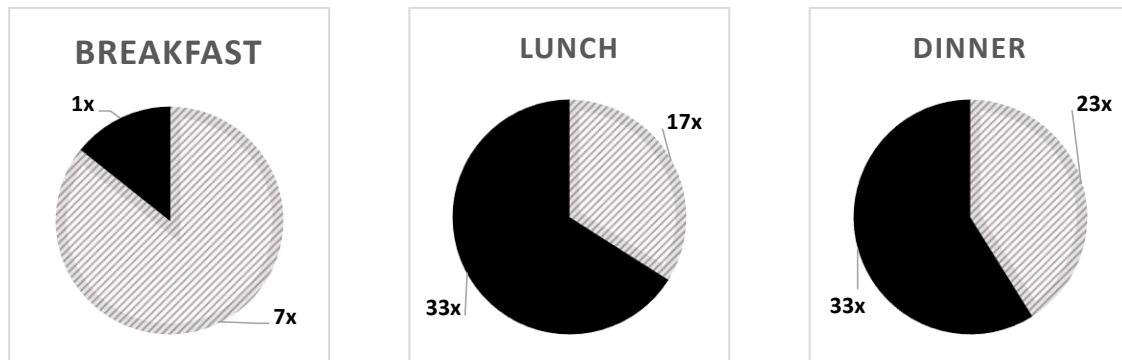


Figure 3. Types of Food purchased at each meal.

■ : snacks (snacks or drinks)

■ : main meal (side dishes)

Based on figure 3, it is known that 13 household managers bought 2 types of food, namely snacks (snacks or drinks) and main dishes (side dishes either with or without rice). From this study, in 13 households who bought 2 types of food at lunch and dinner both main meals and snacks consecutively or vice versa. Meanwhile, 87 household managers admitted that they buy food through food delivery apps at one meal either at breakfast, lunch, or dinner with the type of food purchased either at the main meal or snack.

The types of food purchased are snacks selected 1 time and main meals selected 7 times for purchase at breakfast time; snacks are selected 17 times and main meals are selected 33 times for purchase at lunchtime; and snacks are selected 23 times and main meals are selected 33 times for dinner purchases. The reason why household managers use food delivery applications states that the application is easy to use is chosen 65 times, the reason more products offered are chosen 4 times, the reason many promos offered are chosen 43 times, the reason the price of the products offered is cheaper than other applications chosen 14 times, the reason for the influence of others (rating, review) was chosen 9 times, the reason for being lazy to cook was chosen 19 times, and the reason for busyness was chosen 12 times.

Many causes of food waste occur because consumers sometimes buy excess food, if not consumed they will store it in the refrigerator for consumption later. In this study, household managers kept leftovers for consumption for at least 1-2 days, and they would throw away the stored food if it had been in the refrigerator for a week or more or if the food was not fit to eat. Sometimes this incident becomes food waste, because they forget to store their food in the refrigerator until the food spoils and must be thrown away (20). Knowledge at the stage of treating food determines food feasibility. Constraints can occur space in storage cabinets and lack of knowledge regarding the best place to store certain types of food to increase the longevity of food (21)

In this study, the main food (side dishes) was the type of food that was often purchased which was chosen 67 times. These types of food are purchased more often at night where they buy either for snacks and/or main meals. This is in line with research that states that meal timing and food preferences are factors that influence food desire. In addition, an important aspect of parental socialization about their child's nutrition is the mealtime environment, and several studies have found a positive relationship between the frequency of family mealtimes and children's eating behaviors, such as eating healthier foods (14). The quantity and quality of food determines the level of consumption (15) Surveys show that most Indonesians order dinner through food delivery apps (22)

In this study, the reason that the application is easy to use is the most widely chosen reason. In Indonesia alone, according to a survey conducted by Rakuten Insight in Indonesia, about 48 percent of Indonesian respondents stated that they order food more often from food delivery apps because they enjoy a variety of food, 13 percent of respondents said the reason they use food delivery apps more often is because they cannot cook (22).

Eating behavior and food waste behavior can be seen in table 2 as follows.

Table 2. Frequency Distribution Characteristics of Household Managers

Variable	Mean±Std. Deviation	Min	Max
Eating behavior	42.05±3,873	32	48
Food Waste Behavior	35.03±3,994	25	44

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3. eating behavior affects food waste behavior in households using food delivery applications

Variable	Food waste behavior	
	p-value	r
Eating behavior	.019	.55

On the household eating behavior score, the average score obtained was 42.05 which shows most households behave well (>60%) with the lowest score of 32 and the highest 48; and behaved in good food waste management with an average of 35.03 with the lowest score of 25 and the highest of 44.

Discussion

In this study, the lowest score was obtained from the aspect of food variety. Most households do not make varied meals every day. Other studies have suggested that variations in the menu of

each meal in a household affect the environmental impact relatively smaller even though more food is made (23). It can also be seen in the lowest points in the second and fourth places that the scores are relatively low because they rarely provide fruit and snacks or snacks. The provision of fruit and snack are important in household consumption. Research (24) states that snacks are one of the efforts to improve children's diets to improve the nutritional quality of food. A good mealtime gap will make the body digest food well when one can determine the distance between food times, and it is advisable to pause 3-4 hours of mealtime to digest properly. In this study, many households did not set the right lunch time because household managers could not ascertain whether family members ate on time when they were out of the home.

In this study, the highest score was obtained on the aspect of providing protein types in the first order and providing carbohydrates in the third order. The importance of providing complete types of food at each meal to meet daily nutritional needs. It is recommended Ministry of Health (2020) that at least in one portion there is at least half a portion of vegetables and fruit and half a portion of staple foods and side dishes. Food regulation patterns that affect the body's natural digestive mechanism so that the body can process all intake for maximum results. This includes what is eaten, when and how to eat it so that what is put into the body will not interfere with its natural functions. Mealtime and environment are very influential on eating behavior especially in children which includes food refusal, eating difficulties, and eating speed (26). In this study, household eating behavior pays more attention to the importance of breakfast in the morning before activities and the provision of types of food. A healthy food intake and food selection is related to eating behaviors that become a social and ethical measure of food waste (27). Through behavioral control, this triggers a person to desire to serve food that is considered "proper" thus triggering the provision of excess food and tends to result in food waste(9).

In this study, the lowest scores were on the aspect of purchasing types of carbohydrates (such as rice, potatoes, cassava, sweet potatoes) and proteins (side dishes such as fish, chicken, meat, seafood or tempeh, tofu, milk). When compared to the type of food purchased, online fast-food purchases have a higher score. This shows that households in this study buy fast food more often than other staple foods. Research says that reducing fast food consumption can lower potential household emissions by 29% (28). In the journal Social Sciences and Medicine points out that low-income families are less likely to give their children new, healthy foods. This is because food waste comes from children's displeasure with new foods (such as the consumption of fresh vegetables) because they are used to buying fast food, both for convenience and certainty that the food is spent (29)

In this study, most households bought food online as needed with purchases in moderation. Good household managers tend to be proactive in efforts to prevent or handle food waste in a

more positive direction with several strategies carried out to reduce waste at the consumer level by making plans in purchasing food in terms of quantity and knowing how to store food (30–32). In this study, the reason for using food delivery applications was chosen 43 times, which is the second most chosen reason after the reason for easy-to-use applications.

In this study, the lowest score on the behavioral aspect of food waste occurred because households make good use of ready-made groceries and foods so as not to throw away foodstuffs that are still worth eating do not always make shopping plans before they cook. The food bought by them is also often spent. But whether its food bought or cooked at home, dinner time is the least wasted food. In contrast to research conducted in five-star hotels in Malaysia that dinner is the most mealtime with an average of 400 g of leftovers, 300 g of food at breakfast, and 100 g at the lunch buffet (33). There is no shopping planning because sometimes they determine what groceries they will buy on the spot. A study says that planning and shopping routines are factors that have a significant influence on food waste. Research on household behavior in Greece groups food waste disposal activities into 3 phases, namely shopping, preparing food, and cleaning food waste (11). The results showed that consumers who did not make shopping lists and frequently bought promotional items tended to waste more food (34)

According to Spiker et al. (2017), someone who has a good knowledge of food waste will tend to avoid food waste. Good knowledge will also be followed by good behavior when buying food, food storage, food handling, and accuracy in food portions. This is in line with the results of this study. In Sanastasya's (2019) research also mentioned that knowledge has a relationship with food waste behavior. In this study, the top scores were on storage and treating food well.

The results of the analysis showed that eating behavior as an independent variable had an effect on the dependent variable, namely food waste behavior in households using food delivery applications with a significance value of 0.019 ($p\text{-Value} < 0.05$) and an R Square value of 0.55 which means eating behavior affects food waste behavior by 55%. Food consumption also includes how the habit of re-consuming food left over from the previous day to be reheated or processed into a new menu. Research by Gaiani et al (2018) in Italy found that in the era of modernization, many people have shifted their consumption patterns to healthy and fresh food so as to reduce the possibility of food waste generation. Many studies describe food consumption related to food waste, which on average shows positive behaviors carried out by consumers during consumption can minimize the generation of food waste in households. The most common positive behavior is reprocessing food waste. Brennan and Brown (2021) in their research related to food waste and nutrition quality state that improving nutritional quality and diet will reduce food waste because food ingredients that are generally still wasted are vegetables and fruits so that it is necessary to reduce or process and redistribute.

Conclusion

The results showed that eating behavior affects food waste behavior in households using food delivery applications with a significance value of 0.019 ($p < 0.05$) and an R Square value of 0.55, which means that eating behavior affects food waste behavior by 55%. It is estimated that there are other factors that can influence food waste behavior in households. Therefore, future researchers can further examine eating behavior, food shopping behavior, and food waste behavior in households as well as education to the community, especially household managers who provide knowledge about the impact of food waste if it occurs continuously so that food insecurity and wasted nutrients do not occur in the future, one of which is about how to shop wisely so as not to leave food that is still suitable for eating. However, healthy consumption patterns can be reversed in everyday life in order to reduce food waste in households.

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