

CONSUMERS WILLINGNESS TO PAY FOR PORANG RICE IN MEDAN CITY

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Abstract

A healthy lifestyle and the desire to avoid various diseases motivate consumers to switch to healthy foods such as porang rice. However, the limited availability of porang rice products in various cities such as Medan makes the price expensive, so most consumers still do not regularly buy porang rice, while some consumers buy it regularly. This study aims to analyze consumers' willingness to pay for porang rice in Medan City and the various factors influencing it. The study uses primary data with a snowball sampling method and sample calculation using the Lemeshow formula, resulting in 100 porang rice consumers as the sample. The data was analyzed using the contingent valuation method and logistic regression. The results of the study indicate that consumers' willingness to pay for porang rice has increased compared to the previous price, ranging from 0.79% to 8.68%. The study also revealed that variables such as occupation, ease of access, and health significantly influence consumers' willingness to pay for porang rice, while other factors such as age, education level, income, number of family members, and gender do not significantly influence consumers' willingness to purchase porang rice.

Keywords: *porang rice, willingness to pay, contingent valuation method, logistic regression*

INTRODUCTION

Indonesia is highly dependent on rice as a staple food. According to data from the Central Statistics Agency (BPS), in 2020, rice imports continued to increase every year. This has led to serious health issues because white rice, as the staple food in Indonesia, contributes to high carbohydrate intake, which increases the risk of obesity and diabetes (Suharno et al., 2024). Obesity is a global health issue, including in Indonesia. The Indonesian Ministry of Health (2023) shows an increase in obesity prevalence from 10.5% in 2007 to 21.8% in 2018. Obesity contributes to various non-communicable diseases such as diabetes, heart disease, cancer, and hypertension (Puspita et al., 2024). To reduce this dependency, the government, through the Food Security Agency of the Ministry of Agriculture, aims to diversify food sources by reducing rice consumption by at least 1.5% per capita per year. One solution is to replace white rice with low-calorie, high-fiber alternatives, such as porang rice (Puspita et al., 2024).

Porang rice is a type of artificial rice that resembles paddy rice and can be made from various types of starch flour, such as porang flour, garut flour, sago flour, and seaweed puree. Porang rice has a texture and tastes similar to white rice, making it readily accepted by consumers. The main ingredient of porang rice is porang flour, which contains glucomannan. Glucomannan is beneficial for lowering cholesterol, alleviating constipation, preventing cancer, and reducing blood sugar levels. Compared to other types of rice, porang rice has the lowest calorie content, at only 70 kcal per 100 grams, significantly lower than white rice (180 kcal), red rice (149 kcal), and other analog rice varieties like Gayong and Rasbi. This makes it an ideal alternative for low-calorie diets (Setyono et al., 2021). The porang rice industry in Indonesia is still relatively new and not widely known. Major producers such as PT Ambico, PT Asia Prima Konjac (Fukumi), and CV Bali Yuan Organic have marketed this product. However, its reach is still limited, primarily to the Java and Bali regions (based on Google Trends data from 2023). Therefore, the market penetration of porang rice is still relatively low, especially in urban areas like Medan City. Besides the limited reach of porang rice producers, other factors contributing to its limited consumption include a lack of information about the product's benefits, relatively higher prices than conventional rice, and the absence of a substantial perceived value among consumers. Therefore, it is important to determine the extent to which consumers are willing to pay (willingness to pay) for porang rice as an indicator of market potential and a basis for consideration in marketing

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strategies, pricing, and product development (Suharno et al., 2024). As one of the largest metropolitan cities outside Sumatra Island, Medan has complex socioeconomic diversity and consumption patterns. Against this backdrop, research on consumer willingness to pay for porang rice in Medan is expected to be relevant in determining the extent to which this product can be widely accepted and adopted by urban communities. This information is crucial for agricultural industry players, SMEs, and policymakers in designing promotional strategies, consumer education initiatives, and pricing policies supporting local food diversification based on porang plants. Therefore, this study aims to (1) analyze the willingness to pay consumers for porang rice and (2) analyze the factors influencing consumers' willingness to pay for porang rice.

LITERATURE REVIEW

Willingness to pay (WTP) is an important concept in consumer economics that describes the extent to which individuals are willing to sacrifice a certain amount of money to obtain a product or service, especially one that has added value or specific benefits. In the context of alternative food products such as porang rice, WTP serves as a crucial indicator for understanding market potential and consumer preferences toward products that are not yet widely available in the market. Porang rice (*Amorphophallus muelleri* Blume) is known as a low-calorie food source rich in glucomannan fiber, which offers health benefits such as lowering blood sugar levels, cholesterol, and aiding weight management (Kapoor et al., 2024; Hosiana et al., 2023). These nutritional advantages position porang rice as a functional product with the potential to attract the interest of highly educated consumers with middle-to-high incomes who are increasingly concerned about health and sustainable lifestyles (Hosiana et al., 2023). Previous studies have shown that WTP for functional or organic foods is influenced by factors such as perceived health benefits, level of knowledge, income, relative price, and trust in product labels or claims (Katt & Meixner, 2020); Nurohman et al., 2024). In this context, the success of porang rice marketing heavily depends on the ability of producers and stakeholders to effectively communicate the product's added value to potential consumers. A study by Wardania & Rachmina (2024) found that consumers are willing to pay more for processed healthy food products if they are well-packaged, accompanied by health information labels, and available in modern markets. Therefore, a deep understanding of WTP for porang rice is not only important from a marketing strategy perspective but also serves as the foundation for formulating sustainable development policies for the porang commodity at the national level.

METHOD

The location for this study was determined purposively, namely in the city of Medan. This was done considering that it is still difficult to find consumers of porang rice because few producers are selling it, and there is a perception among the public that the price is too high compared to other types of rice. This study used snowball sampling as the sampling method. The sample used in this study was consumers who had purchased and consumed porang rice. The sample size was calculated using the Lemeshow formula, considering that Medan's total population of porang rice consumers is not precisely known. With a 10% margin of error, the total sample size was set at 100 respondents. This study uses the Contingent Valuation Method (CVM) and logistic regression analysis. There are three stages in CVM: identifying the goods or services to be evaluated, constructing hypothetical scenarios, and estimating the WTP value (Hasanah & Yanuar, 2024). For logistic regression, the following equation is used:

$$\ln \left[\frac{p}{1-p} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + e$$

Description:

P = willingness to pay for porang rice (willing/unwilling)

β_0 = regression constant or intercept

β_1 = coefficient of work

β_2 = coefficient of age

β_3 = coefficient of education

β_4 = coefficient of income

β_5 = coefficient of family members

β_6 = coefficient of gender

β_7 = coefficient of accessibility

β_8 = coefficient of healthy

X1 = employment (1=private employee, 2=housewife, 3=civil servant, 4=student, 5=health worker)

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X2 = age

X3 = Level of Education (1=Elementary School, 2=Junior High School, 3=Senior High School, 4=University)

X4 = income

X5 = family members

X6 = gender (0=female, 1=male)

X7 = accessibility (1=very difficult, 2=difficult, 3=average, 4=easy, 5=very easy)

X8 = Health (1=very unhealthy, 2=unhealthy, 3=average, 4=healthy, 5=very healthy)

RESULTS AND DISCUSSION

Characteristics of Porang Rice Consumers in Medan City

This study involved 100 respondents who consume porang rice either regularly or occasionally. A total of 69 respondents were willing to pay more for porang rice, while 31 respondents were not willing to do so. The characteristics of the respondents based on occupation, age, education level, income, number of family members, and gender are as follows.

Table 1. Characteristics of respondents

Characteristics	Willing		Unwilling	
	Respondent (person)	Percentage (%)	Respondent (person)	Percentage (%)
Employment				
Private employee	16	16%	2	2%
Housewife	9	9%	5	5%
Civil servant	12	12%	6	6%
Student	23	23%	12	12%
Health Worker	9	9%	6	6%
Age				
17-21	10	10%	9	9%
22-26	29	29%	8	8%
27-31	9	9%	4	4%
32-40	10	10%	4	4%
41-61	11	11%	6	6%
Level of education				
University	50	50%	20	20%
Senior high school	19	19%	10	10%
Junior high school	0	0%	1	1%
Income				
10.000.000	30	30%	8	8%
10.000.001	—			
20.000.000	12	12%	1	1%
20.000.001	—			
30.000.000	10	10%	5	5%
30.000.001	—			
45.000.000	6	6%	17	17%
> 45.000.000	11	11%	0	0%
Family members				
2	2	2%	1	1%
3	15	15%	12	12%
4	31	31%	8	8%
5	18	18%	10	10%
>6	3	3%	0	0%
Gender				
Male	27	27%	7	7%
Female	42	42%	24	24%

Table 1 shows that the majority of respondents and willing respondents are students aged 22-26 years old and with a college education. This is because students or people with a high level of education, such as college graduates, tend to be willing to pay more for healthy food products because they are more concerned about the nutritional value of the food they consume (Mustapa & Kallas, 2025). High-income levels dominate the characteristics of respondents with income levels. This is because individuals with high incomes are more likely to increase their consumption by purchasing superior products, as they are more aware of the risks associated with the food they typically consume and seek out foods they consider healthier and more nutritious (Ghali-Zinoubi, 2020; Olson et al., 2025). The characteristics of respondents regarding the number of family members willing to pay more for porang rice is dominated by smaller family sizes, specifically 3-4 people. This is because larger households are more sensitive to food prices, so they typically opt for cheaper products and do not prioritize food quality. In contrast, smaller household sizes are more concerned with nutritional value and food quality (Ghazanfari et al., 2024). The final respondent characteristic, gender, was dominated by women more willing to pay than men. This is because women typically have a higher level of awareness regarding health and are more concerned with maintaining a healthy diet for themselves and other family members (Ali & Ali, 2020).

Analysis of Willingness to Pay for Porang Rice

A total of 69 respondents (69%) stated that they were willing to pay more for porang rice at a higher price both now and in the future if there was an increase in the price of porang rice products. A total of 31 respondents (31%) were unwilling to pay a high price for porang rice because they felt that the price of porang rice was already too expensive, there were still other healthy food products that could serve as substitutes, such as red rice or organic rice, and the majority stated that they did not feel any difference after consuming porang rice. The WTP value of porang rice consumers can be seen in Table 2.

Table 2. Average WTP of porang rice in Medan city

Porang rice brand	The number of consumers willing to pay more	Actual price of porang rice (Rp/kg)	WTP for porang rice (Rp/kg)	Differences
Fukumi	44	210.000	211.650	0,79%
Konjac	17	180.000	195.625	8,68%
Kareta Kin	8	150.000	160.357	6,91%

Based on Table 2, it can be seen that there are three brands of porang rice sold in Medan, and the WTP values differ for each brand depending on the price. The brand with the highest number of consumers is Fukumi because it is the first porang rice brand in Indonesia, is best known by the public, and is the most widely sold in Medan. The other two brands are newcomers but are more willing to pay than Fukumi, whose WTP value only increased by 0.79%. The low increase in WTP value is attributed to respondents stating that Fukumi porang rice is excessively expensive, leading to a low willingness to pay among consumers of that brand. However, the WTP values of the Konjac and Kareta Kin brands are still below that of Fukumi. This is because consumers of these two brands were former Fukumi porang rice consumers. However, they felt that Fukumi porang rice was too expensive, so they sought alternative brands because they were already accustomed to consuming porang rice and hoped to experience benefits equivalent to Fukumi, as the nutritional content of these two brands is not significantly different. The calorie content of porang rice is still lower than that of other healthy rice varieties. Additionally, many consumers switched to these two brands because they promote themselves as authentic Indonesian products, particularly the Kareta Kin brand, which highlights that it is an authentic Indonesian SME product. This contrasts with the Fukumi brand, which many people still believe is Japanese due to its name, leading respondents to be more willing to pay for it because of the country-of-origin label on the product. This aligns with research conducted by (Nafisah et al., 2024) and (Dwivedi et al., 2018), which found that the maximum amount consumers are willing to pay depends on the brand image and the price of the food product.

Factors Affecting Willingness to Pay for Porang Rice

The factors affecting consumers' willingness to pay for porang rice were analyzed using binary logistic regression. In this analysis, the dependent variable used was consumer willingness to pay. In contrast, the independent variables were occupation, age, education level, income, number of family members supported, gender, ease of access, and health. The first step was to test the model's suitability using the Hosmer and Lemeshow test to

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see how well the model fits the data. The observed values obtained were the same or close to those expected in the model.

Table 3. Hosmer and Lemeshow test results

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	1.536	8	.992

Based on the table above, a sig. value of $0.992 > 0.05$ was obtained, so the model was declared FIT, meaning that the binary logistic regression model was suitable for use and further analysis because there was no significant difference between the predicted classification (predicted probabilities) and the observed classification (observed probabilities).

Table 4. Model summary table

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	37.959 ^a	.627	.842

Based on the results of Nagelkerke R Square, a value of 0.842 was obtained, indicating that the ability of the independent variables to explain the dependent variable is 84%, with the remainder explained by variables not studied. To determine the simultaneous effect of the independent variables on the dependent variable in logistic regression, the omnibus test of model coefficients table can be used. Based on the table, a sig. value of $0.000 < 0.05$ was obtained, meaning that at least one independent variable has a significant effect on the dependent variable.

Table 5. Results of the omnibus tests of model coefficients

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	98.704	12	.000
	Block	98.704	12	.000
	Model	98.704	12	.000

Next, partial tests will be conducted on the factors that partially influence consumers' willingness to pay more for porang rice. The results of the tests using logistic regression analysis are shown in Table 6.

Table 6. Results of binary logistic regression analysis

Variable	Coefficient	Std. Error	Odd Ratio	Prob.
C	-20.325	2.696	.0000	.030
Employment (X1)	3.465	1.402	31.968	.013
Age (X2)	.100	.093	1.105	.282
Level of education (X3)	-1.879	1.322	.153	.155
Income (X4)	.000	.000	1.000	.096
Family members (X5)	-.849	.643	428	.187
Gender (X6)	-.940	.760	.391	.216
Accessibility (X7)	4.440	1.392	84.787	.001
Health (X8)	4.888	2.127	4.435	.001

The results of the logistic regression estimation in this study are as follows:

$$\ln\left[\frac{p}{1-p}\right] = -20.325 + 3.465X1 + 4.440X7 + 4.888X8 + e$$

Based on the table above, there are three independent variables that have a significant effect on the willingness to pay more for porang rice at a 95% confidence level, namely occupation, ease of access, and health, while the other variables do not have a significant effect. The test results for the occupation variable show a significance value of $0.013 < 0.05$, indicating that occupation has a significant influence and is positively correlated

with consumers' willingness to pay for porang rice. A positive correlation means that consumers with more stable jobs have a higher likelihood of being willing to pay for porang rice. The odds ratio of 31.968 indicates that consumers with better employment have a 31.968 times higher likelihood of willingness to pay for porang rice compared to consumers with lower employment. Employment closely related to health literacy and the health sector has a significant impact on consumers' willingness to pay, as evidenced by the many respondents in this study who work in the health sector, such as doctors, nurses, and consumers related to health literacy, such as medical students (Nam & Suk, 2024). This aligns with the view (Arimurti et al., 2021) that employment influences an individual's willingness to purchase healthy rice.

The significant value for the age variable shows $0.282 > 0.05$, which means that age does not have a significant effect on consumers' willingness to pay for porang rice. Based on the odds ratio value of 1.105, this means that each additional year of age only increases the likelihood of willingness to pay by 1.1 times, which is not statistically significant. The younger age group, which constitutes the majority of respondents in this study, exhibits inconsistent consumption patterns due to trends and marketing exposure that encourage impulsive decisions, leading this group to lack certainty in their willingness to pay more for a product such as healthy food products (Alsubhi et al., 2023). This aligns with research conducted by Riana et al. (2019) and Aufanada et al. (2017), who stated that age is not the most important factor influencing consumers in paying more for organic products. Then, the education level variable shows $0.155 > 0.05$, which means that a person's highest level of education has not been statistically proven to influence their willingness to pay for porang rice. This is because higher education encourages consumers to be more cautious when purchasing a product, especially those labeled as healthy, so they are less willing to pay more if they do not truly feel the benefits or lack strong evidence regarding the quality of healthy food products (Alsubhi et al., 2023). These results align with the findings of Riana et al. (2019), who stated that educational level does not have a statistically significant influence on an individual's willingness to pay for porang rice. Furthermore, the income variable shows $0.096 > 0.05$. This means that income does not influence a person's willingness to pay for porang rice. Although it is close to being significant, this variable is not statistically strong because it has a p-value > 0.05 but < 0.10 . This is because consumers of healthy food, including porang rice consumers, are more willing to pay more based on their goals, such as wanting to adopt a healthy lifestyle or wanting to diet, so that consumers' willingness to pay for healthy products is not limited to their income (Ottaviano et al., 2022).

Then, for the variable of family size, which showed a value of $0.187 > 0.05$. From this significance value, it is evident that family size does not have a direct impact on a person's willingness to pay for porang rice. The results of this study are supported by the findings of Aufanada et al. (2017) and Riana et al. (2019). Riana et al. (2019), who stated that the number of family members does not significantly influence an individual's willingness to pay for porang rice. Furthermore, the gender variable shows $0.216 > 0.05$, meaning there is no difference in willingness to pay between men and women. This result is supported by the research of Ulfa et al. (2023), who state that gender does not influence an individual's willingness to pay for healthy food products, including porang rice. The ease of access variable shows $0.01 < 0.05$, which means that this variable is highly significant. The ease with which consumers can access porang rice has a strong influence on their willingness to pay for porang rice. This is because ease of access, such as product information regarding the benefits of the product or the ingredients contained in the product, is clearly and easily understood, consumers are more likely to feel motivated to pay more because they understand the health benefits offered by the product. The affordability of the product for consumers also makes them more likely to pay more due to the absence of barriers and the convenience offered (Alsubhi et al. (2023); Nam & Suk, 2024). Finally, the health variable shows $0.01 < 0.05$, which indicates that the perception that porang rice is beneficial to health influences consumers' willingness to pay. The greater the perceived health benefits, the higher the willingness to pay, because individuals who are health conscious and care about their health tend to consume healthier foods even if they are expensive. Additionally, consumers are willing to pay more for products with health attributes such as low calories or high fiber, especially if they have specific goals like avoiding health risks or adopting a healthy lifestyle. The findings of this study align with those of Ulfa et al. (2023) and Arimurti et al. (2021), which show that perceptions of porang rice's health benefits influence consumers' willingness to purchase porang rice.

CONCLUSION

The willingness to pay (WTP) of consumers of porang rice in Medan City is Rp 211,650 for the Fukumi brand, Rp 195,625 for the Konjac brand, and Rp 160,357 for the Karet Kin brand. The variables of occupation, ease of access, and health significantly influence consumers' willingness to pay for porang rice, while other factors such as age, education level, income, number of family members, and gender do not significantly influence consumers' willingness to purchase porang rice.

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