

## **THE EFFECT OF DEMOGRAPHIC FACTORS TOWARD WILLINGNESS TO CONSUME PORANG AND ITS PRODUCTS AS A DIET MENU USING MULTINOMIAL LOGISTIC REGRESSION APPROACH**

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### **ABSTRACT**

The Indonesian authorities have echoed that Porang can be an opportunity for meals in the future. Currently, diverse applications are designed through the rules to help the improvement of Porang cultivation and industry. Although in truth, Indonesian human beings aren't acquainted with the life of Porang and its benefits. As a result, this study aimed to investigate the impact of demographic characteristics on willingness to consume Porang and its preparations as a diet menu. The study took place from July to October 2021, with 436 participants selected using a convenience sample procedure. The data was compiled from both primary and secondary sources. Primary data was collected by distributing online questionnaires via social media (Whatsapp and Instagram). While secondary information is gathered from journals, books, the internet, and other sources relevant to the research topic, primary data is gathered from primary sources. A multinomial logistic regression analysis evaluated the data, including five independent factors (monthly income, age, education, employment, and family category) and one dependent variable (willingness to use Porang/its product). According to the results, 49.3 percent of respondents said they would eat Porang on a diet menu. The respondents' occupation and degree of education influenced their propensity to take Porang as a diet menu (significance level 10 percent). Programs could be organized according to the type of employment and level of education to undertake education and outreach to present Porang to the community.

**Keywords:** diet; logistic regression analysis; Porang; willingness to consume

### **INTRODUCTION**

Indonesia is the largest archipelagic country with various natural resources, one of which is Porang. Porang (*Amorphophallus* sp.) is a bulbous shrub that can live in tropical and subtropical areas (Wardani et al., 2021). At present, Porang is one of Indonesia's local plants that various parties widely eye because it has considerable economic potential (Yasin et al., 2021). However, the Indonesian people have not widely cultivated this plant because it is still considered a liar plant. According to (Yasin et al., 2021), people in Indonesia still think that Porang tubers can only be used as tertiary food because these tubers will only be distributed as supplies of essential commodities have run out. Porang tubers have a significant enough potential to be cultivated as an export commodity. In the January to July 2020 period, Indonesia's Porang exports were recorded at 14,568 tons with IDR801.24 billion (Anonim, 2020).

Porang tubers are exported to various countries such as South Korea, Sri Lanka, Pakistan, Malaysia, Japan, Italy, Australia, New Zealand, and China, shipped in chips or flour. Until 2021, the demand for Porang from Indonesia continues to increase. Based on the Agricultural Quarantine Agency records, in 2018, 254 tons of Porang tubers were exported with an export value of Rp 11.31 billion. Since the Minister of Agriculture has shipped 60 tons of this plant commodity to China, many

people have tried to cultivate and develop this tuber. The majority of Porang tubers are exported in the form of flour. In 2020, it was recorded that 32,000 tons of Porang tubers were exported or equivalent to 1.42 trillion to these countries. In 2020 there was an increase in exports 2019 by around 160% (Utami, 2021). Based on trends in recent years, the need for Porang is tremendous, which is indicated by the number of Indonesian export requests for Porang in 2020, reaching 11,170 tons (Hamdhan, 2021).

Besides having great potential as an export commodity, Porang also has the opportunity to be optimally cultivated by the community. However, the district has not widely cultivated this plant because it is still considered a wild plant (Utami, 2021). However, Porang tubers have a lot of benefits for the health of the body. One of the benefits of Porang is that it can lose weight for someone who is obese because of its high content of glucomannan. The main content of the Porang plant is glucomannan which is found in the tuber. Glucomannan is a food fiber that is water-soluble and low in calories. It has strong hydrocolloid properties, so it is widely used in various industries such as food, chemical, biotechnology, and pharmaceutical. Porang plants contain glucomannan compounds low in calories but contain calcium oxalate, which can cause itching when consumed directly. Porang glucomannan content is relatively high, namely 40% and 64.98% in flour (Yuniwati et al., 2021). This content is very efficacious for body health, especially for people with diabetes, because it can lower blood sugar (Yasin et al., 2021). In addition, there is also other nutritional content such as carbohydrates, protein, starch, fat, and water. As for the itchy oxalate content, before processing, it must be washed and then dried in the sun to dry so that the content is lost.

Although, since the Indonesians are not well-versed with Porang, most people are quite familiar with similar plants, so most people still think that Porang is a wild plant that cannot be used for life (Yasin et al., 2021). Porang contains various compounds that are beneficial to the health of the body. So that the level of public consumption of Porang varies greatly depending on several demographic aspects. People are willing to consume Porang in a different form processed into ready-to-eat products. This is influenced by several factors, including demographic conditions such as age, gender, religion, generational race, social class, family size, family life cycle, education level, type of work, and income level (Malelak et al., 2016). Through the nutritional content contained in Porang plants, such as glucomannan (Yuniawati et al., 2021), carbohydrates, proteins, vitamins, and minerals (Hamdhan, 2021), Porang can be used as one of the potential alternative diet menus for people with obesity and other comorbid diseases. Menus recommended for Porang are noodles, dry bread, wet bread, chips, and other industrial ingredients. vitamin, mineral (Hamdhan, 2021).

Around 2 billion individuals are overweight worldwide, with 650 million obese. (Mendagudli, 2021). In a survey conducted in August 2020 in the United States, approximately 77% of the 17,000 people hospitalized for COVID-19 were overweight (29%) or obese (48%) (Goma, 2021). The Indonesian National RISKESDAS in 2018 showed that the value of the prevalence of obesity in adults, namely > 18 years, has increased from year to year and is quite significant in Indonesia (Najib et al., 2021). Obesity is caused by several factors, namely physical activity, eating patterns, sleep patterns, psychology, and social isolation at the age of children, including obesity factors that affect a person's life habits (Arisman, 2010). The disease is highly susceptible to pro-inflammatory states, and microthrombi coexist with the severe acute respiratory syndrome (Vas et al., 2020). So far, obesity is still being handled by improving diet with a healthy menu. Healthy menus for obese people include supplements, chemical drugs, and herbal ingredients. The utilization of the potential of local plants, namely Porang, can be used as an asset to help overcome the problem of obesity.

Research on willingness to consume is one of the essential initial researches to be carried out to determine market interest in the product to be produced. This is what underlies this research in developing the Porang markets and its consequences. Both internal and external variables influence consumers' willingness to consume a product. Such as, based to Susanti (2020), a person's inclination to consume imported organic food was affected by their preferences and views, as well as the country's origin. (Chen et al., 2019). Their research also stated that the main factors determining willingness to pay for MP4 reproduced are age, occupation, education, consumer preference for new or old, and environmental awareness.

Furthermore, social and mental centers are two significant components influencing customer buying behavior, counting the sum of utilization, the social (age, sexual orientation, instruction foundation shopper ethnic and devout contrasts) (Hoyer et al., 2013). A few other creators categorize the determinants of customer acquiring behavior into four bunches: financial, mental, socio-cultural, and statistical determinants (Hołysz, 2018). Sekhampu (2012) found that socio-economic determinants like family salary and estimate, age, and the instructive level of the family have a positive effect on the sum of nourishment use, hence utilization. In contrast, sex didn't demonstrate to be noteworthy. Sánchez et al. (2012), in their consideration, found that item data and financial

components with the maximum impacts on consumers' buying behavior were sex, age, and instructive level. (2018) also found that age, wage and family estimate, and instruction-level of the family level had a considerable impact on utilization use. Consumer preferences for organic food can foster a consumer's desire to buy organic food products (Xie et al., 2016). Based on the information above, we know that the research, especially about the factors toward a willingness to consume, is essential. On the other hand, new product acceptance is used to measure whether individual consumers will buy or try the product first or insist on buying a familiar brand rather than replacing it (Van Weelden et al., 2016). Thus, to find out the opportunities for Porang plants, it is necessary to use a multinomial logistic regression analysis approach to determine the factors that influence the willingness to consume Porang and or its processed products specified as a diet menu.

## MATERIALS AND METHODS

Porang is one type of food with benefits and high nutritional value, suitable for the human body, and has increased economic potential (Natsir et al., 2015). Even though the Indonesian people are unaware of the existence of Porang and its benefits, and it has not been managed optimally, the Indonesian government has set a goal for Porang to be used as alternative food in the future. As a result, the government has created various programs to support the development of Porang cultivation and industry (Sulistiyo et al., 2015). The nutritional content contained in Porang has good benefits for health, industry, paper, and food (Supriati, 2016). Therefore, the framework for this research is presented in Figure 1.

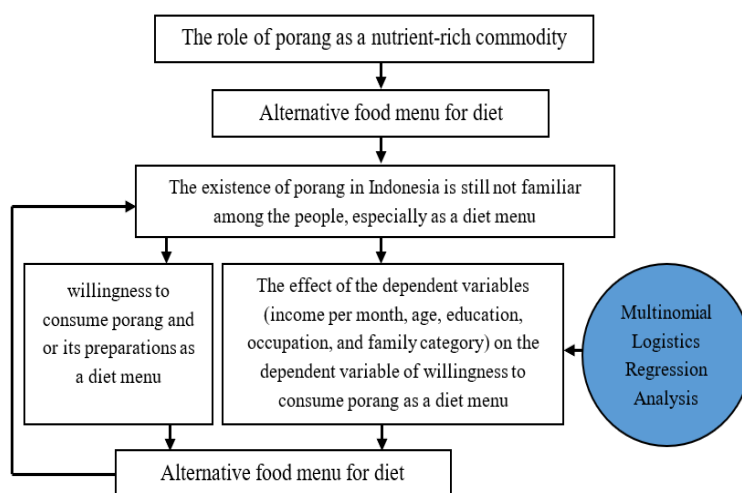


Figure 1. Research Framework

This research was held in July – October 2021 in Bogor. The population used in this study was the entire population of Indonesia based on the results of the Indonesian population census, which is 272,229,372 residents based on BPS data in 2021. While the sample is part or representative of the population studied in the form of all respondents who filled out the questionnaire provided by the author. The sampling method used in this study is convenience sampling as the sampling method.

Convenience sampling is sampling done by choosing samples freely at the researcher's discretion (Bintang Arbina Swari & Sri Darma, 2019). This method was selected as a means for researchers to facilitate research because there were many social media users in Indonesia, reaching 170 million people. It made easier for the process of distributing questionnaires and collecting data. The number of samples is determined by using a statistical calculation method, namely by using the Slovin formula. The formula is used to determine the sample size of a known population. The sample in this study was selected using the Slovin formula using a 5% precision level. This was in line with what was conveyed by (Sugiyono, 2017), which stated that the level of precision specified in the determination of the sample is 5%. Thus, the sample in this study consisted of a minimum of 400 respondents so that the leniency of inaccuracy in sampling could be tolerated. The number of respondents used in this study is as many as 436 respondents, so the level of validity of the data is also higher, reducing the data error preference.

The data used are primary and secondary. Primary data was collected through structured interviews using Google form-based questionnaires disseminated via social networks (Whatsapp and

Instagram). Meanwhile, secondary data is collected through literature studies from sources related to the research topic, journals, electronic news, books, theses, and other sources. The collected data were analyzed using descriptive analysis and multinomial logistic regression analysis. A descriptive study aims to describe the various data collected without intending to make general conclusions or generalizations (Sugiyono, 2017).

Logistic regression is a statistical analysis method to explain and describe the correlation or relationship between the affected variable (dependent variable) or response variable with at least two categories or more explanatory variables or independent variable (independent variable) on an interval or category scale. Logistic regression analysis is an analysis that is used to see the relationship or correlation between response variables that are qualitative (categorical) and predictor variables that are ordinal or nominal (qualitative) as well as ratios or intervals (quantitative) (Biri et al., 2017).

Multinomial logistic regression analysis is a type of logistic regression used when the response variable is multinomial or polychotomous, ordinal, and nominal in scale with two or more categories (Tulong et al., 2018). The following is the multinomial logistic regression formula used in this study:

$$\Pi_1(x) = P(Y=1|) = \frac{\exp g1 (x)}{1+ \exp g1 (x)+ \exp g2 (x)} \quad (1)$$

$$\Pi_2(x) = P(Y=2|) = \frac{\exp g2 (x)}{1+ \exp g1 (x)+ \exp g2 (x)} \quad (2)$$

$$\Pi_3(x) = P(Y=3|) = \frac{\exp g2 (x)}{1+ \exp g1 (x)+ \exp g2 (x)} \quad (3)$$

Information: Y: Willingness to consume Porang (yes, maybe, no); X1: Income per month; X2: Age; X3: Education; X4: Work; X5: Family Category.

Multinomial logistic regression was used to determine the effect of independent variables (income per month, age, education, occupation, and family category) with the dependent variable in the form of respondents' willingness to consume Porang and or its processed products using SPSS software. The hypotheses in this study were:

- H1: There is a significant and positive effect of the monthly income factor with the willingness to consume Porang and its processed products as a diet menu.
- H2: There is a significant and positive effect of the age factor on the willingness to consume Porang and its processed products as a diet menu.
- H3: There is a significant and positive influence of the educational factor on the willingness to consume Porang and its processed products as a diet menu.
- H4: There is a significant and positive influence of work factors on the willingness to consume Porang and its processed products as a diet menu.
- H5: There is a significant and positive influence of family factors on the willingness to consume Porang and its processed products as a diet menu.

## RESULTS AND DISCUSSION

### Characteristics of Respondents

The online survey was conducted using a questionnaire in a google form. Questionnaires were distributed through social media (WhatsApp and Instagram). Based on the survey results of 436 respondents shown in Table 1, female respondents dominated the research sample at 61.70%. According to Handayani et al. (2019), women generally prefer the type of food consumed. This can happen because the food consumed can affect body weight. According to research, women experience weight gain drastically faster than men. While the age category, most respondents consisted of the late teen's age range of 53.21%. According to Imelda (2018), age affects individual food consumption patterns because it relates to food energy needs. In general, adolescents need more energy than children, and this energy need will continue to increase with age. After reaching its peak in old age, energy needs will decrease. The family size category is dominated by respondents who come from moderate families, namely 66.28%. Handayani et al. (2019) stated that the size of the number of family members determined the level of food security. An increase in the number of household members without being balanced with an increase in resources and sources of livelihood supporting the economy will cause the allocation of food fulfillment per household member to be low. The results of this study were in line with the opinion of (Adha et al., 2020), which states that the greater the number of household members, the greater the burden to be borne by the household.

Undergraduates than 58.94% dominated the majority of respondents in terms of education. According to Putri et al. (2017), the level of formal education was positively related to nutritional knowledge. Household food security and good nutritional status are indicators of family members' high level of nutritional knowledge and education (Imelda, 2018). (Rahardja & Mandala, 2008) also stated that a high level of education would increase consumption expenditure and affect consumption patterns. Based on the type of work, students or students rank the largest percentage, 49.08%. Looking at the knowledge capacity possessed, the category more widely knows most consumers of Porang and their processed products of student or student work. This was because of the intensity of accessing information related to Porang and its products. The majority of the income categories per month were dominated by respondents with an income of less than IDR2.500.000.000.00 by 57.8%. (Samuelson & Nordhaus, 1995) stated that families with small incomes would spend most of their income on food consumption needs. (Achmad & Diniyati, 2018) stated that household food expenditure is positively related to food availability as a source of energy for household consumption. Income reflects purchasing power, so the quality and quantity of goods that can be purchased also depends on purchasing power. The greater the income received, the greater the opportunity for households to choose various types of food that are more varied and improve the quality of their food by buying food with higher nutritional value.

Table 1. Characteristics of respondents

	Characteristics	N	Marginal Percentage
Gender	Male	167	38.30
	Female	269	61.70
Age	Late teens (< 25 years)	232	53.20
	Early adulthood (25 - 35 tahun)	145	33.30
	late adulthood (36 – 45 tahun)	43	9.90
	Early seniors (> 45 tahun)	16	3.70
Education	High School/ Equivalent	61	14.00
	Diploma	51	11.70
	Bachelor	256	58.70
	Postgraduate	68	15.60
Work	Student	220	50.50
	Housewife	23	5.30
	Private sector employee	100	22.90
	Government employees	71	16.30
	Entrepreneur	22	5.00
Income/ month	Less than IDR2.500.000,-	248	56.90
	IDR2.500.000, - IDR5.000.000,-	102	23.40
	More than IDR 5.000.000,-	86	19.70
Family	Small Family (< 5 people)	128	29.40
	Medium Family (5 -6 people)	289	66.30
	Big Family (>6 o people)	19	4.40
Willingness to consume	No	44	10.10
	Yes	215	40.60
	Maybe	177	49.30

Source: Primary data was processed (2021)

Porang tubers have a price range of IDR7.000.00 to IDR10.000.00 per kilogram, and for the export market of dry processed chips (thin slices), which cost around IDR 55.000.00 per kilogram, and the form of Porang flour, whose selling value can reach IDR100.000.00 to IDR150.000.00 per kilogram (Idris, 2021). Based on survey data, most of these monthly income categories were willing to allocate their income to consuming Porang or its processed products such as noodles, pastries, cakes, juices, and Porang chips.

Furthermore, if it was seen from the willingness of respondents to consume Porang and or its products on a diet menu, it is known that as many as 40.6% of respondents stated that they are willing to consume it as. Meanwhile, as many as 49.3% of respondents said they might be willing to consider Porang and its processed products as a diet menu. This showed an excellent opportunity to develop Porang and or its preparations as a diet menu. Even though the government is currently developing Porang as an alternative food for the future, Porang, and its products may become a diet

menu for obese people, particularly food menus for people with other serious illnesses that are safe for consumption by sufferers of this disease.

### The effects of demographic factors on willingness to consume Porang and or its products

Based on the survey conducted, the survey results related to the factors that affect the willingness to consume Porang and their processed products as a diet menu are obtained in Table 2 below.

Table 2. Model fitting information

Model	Model Fitting Criteria	Likelihood Ratio Tests
	-2 Log-Likelihood	Chi-Square
Intercept Only	373,054	
Final	333,607	39,447

Source: Primary data was processed (2021), \*significant at a 10% level

Table 2 shows the relevant model results on the willingness to consume Porang and their processed products. In the suitable information model, the multinomial logistic regression equation with the dependent variable, namely desire to consume, showed that at a significance level of 10%, the model with the addition of independent variables in the form of age, education, occupation, monthly income, and family variables was able to provide better accuracy in predicting willingness to consume Porang and or its products. This could be seen from the analysis results on the fitting information model that the p-value (0.074) is smaller than the significance level (0.1). In addition, there was a decrease in the value of -2 Log-Likelihood from the intercept-only model to the final model, which showed a change in better predictive ability with a chi-square value of 39.447. So, the model with the independent variables above could be said to be a fit model.

A goodness of fit test was carried out to test the suitability between the data and the model used so that the model was said to be fit with the data. Based on the goodness of fit value from the analysis result, it was known that this multinomial logistic regression equation model had a significance value of more than 0.1 (significance  $0.600 > 0.1$ ), which indicates that this equation model was compatible with the observed data ( $H_0$  is accepted) with the tested hypotheses were:  $H_0$ : The tested model is suitable &  $H_1$ : The tested model is not correct.

To find out the magnitude of the diversity of the independent variables, which explains the dependent variable in this research, it was indicated by the Pseudo R-square value. The results of the survey of willingness to consume which were predicted with five independent variables, had a Pseudo R-square value of Nagelkerke = 0.102 which indicated that the variability of the variable willingness to consume could be explained by the variables of age, education, occupation, monthly income, and family by 10.2% and the rest was explained by other variables outside the model. These additional variables could be food selection based on the benefits of food, the role of decision-making for family food consumption, how to obtain food, where to buy food, and food that is difficult to obtain (Imelda, 2018). In addition, the frequency of food consumption can also be used as data in other variables. The frequency of food consumption was seen from the frequency of consuming various types of food in one week and is categorized according to (Terati et al., 2020).

Table 3. Likelihood ratio tests

Effect	Model Fitting Criteria	Likelihood Ratio Tests			Description
	-2 Log-Likelihood of Reduced Model	Chi-Square	df	Sig.	
Intercept	333,607 <sup>a</sup>	,000	0	,	
Income per month	335,209	1,602	4	0,808	H1 rejected
Age	335,211	1,604	6	0,952	H1 rejected
Education	344,642	11,035	6	0,087*	H1 accepted
Work	348,807	15,200	8	0,055*	H1 accepted
Family	337,356	3,749	4	0,441	H1 rejected

Source: Primary data was processed (2021), \*significant at a 10% level

Based on Table 3, the independent variables that significantly affect the variable of willingness to consume Porang and or its products at a significance level of 10% were education and employment variables. Based on the research results by (Adiana & Karmini, 2012), it was stated that the education variable partially affects household consumption patterns. According to his research, the higher a

person's education, the consumption expenditure will also be higher, thus affecting consumption patterns and a positive relationship. When a person or family has higher education, the necessities of life are more and more. This condition is caused because what they have to fulfill is the need to eat and drink and the need for information, good association in society, and the need for recognition from others for their existence. Education is a significant investment. By getting a good education, a person can get a good job as well. Therefore, with education, a person or household can improve their welfare. Education is expected to overcome economic backwardness and eradicate poverty through its effects, namely increasing the ability of human resources.

Following the theory of Sediaoetama (2004) in Putri et al. (2017), which states that the amount of salary received by a person is closely related to his work, a high position can mean high income, and the amount of money to spend for family sufficiency will be even more significant. So, it could be explained that work also determines nutritional adequacy in a family. The higher a person's income, the higher the desire to spend it. At the same time, the rest was explained by other model variables.

### **Managerial Implications**

Based on the description above, several managerial implications can be formulated on the willingness to consume Porang and its processed products. In terms of public knowledge of Porang, it has a significant effect on the desire to consume Porang and or its processed products. So that knowledge of Porang has a vital role in encouraging consumers or the public to be willing to consume Porang and or its preparations, especially as an alternative to processed diet menus for people with obesity. To increase the willingness to consume Porang and or its preparations as an alternative to losing weight, various efforts can be made to increase public knowledge regarding the benefits of Porang and or its processed products for body health, so it is necessary to carry out an increase in Porang education to the broader community on a massive scale so that Porang can be known and optimally developed.

So that the community can feel the benefits of functional food ingredients, export commodities, and other industrial materials, further guidance is needed through massive education. This education can be done through socialization, counseling, general training, webinars, and workshops related to Porang. Based on the analysis results, the category of people with undergraduate and diploma education and the type of work has a significant effect on the willingness to consume Porang and or its processed products. So that the provision of socialization and education should be prioritized for both categories. The recommendations for processed forms of Porang products are presented, among others. Porang processed products in noodles, chips, cooked tubers (boiled, fried, grilled), pastries, and cakes. In addition, the processed forms presented can be recommended to the public for the categories of work and education by adjusting the classification of each type.

### **CONCLUSIONS AND SUGGESTION**

Porang is a type of plant that has been recognized as a food ingredient with high nutritional content and is helpful for various food menus for people. To support the government's program in developing the Porang industry in Indonesia, this study examined the factors of willingness to consume Porang and its products intended as a diet menu. The results showed that the potential desire to consume Porang on a diet menu was 40.6% willing to consume it and 49.3% who might consume Porang and or its processed products. Furthermore, two factors influence the willingness to consume Porang and its processed products as a diet menu: the education factor and the respondent's occupation. Future research can add more variables to analyze willingness to consume Porang and its product, such as social factors, subjective norms, knowledge of Porang, body mass index, etc. Willingness to pay and consumption preferences with the combined attributes describe consumer needs.

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