

# **Analysis of Consumer Attitudes Toward New Fried Food Prepared From Cowpea Flour**

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## **Abstract**

American consumers are exposed to thousands of new food products on supermarket shelves each year. For new products, such as akara products, it is crucial to determine consumer preferences and buying intentions. In this study, 346 randomly selected consumers were surveyed to reveal their preference for five akara products prepared from cowpea flour. Preference data were analyzed through use of a multi-ordered response model. Model results indicate that socio-demographic factors were weakly linked to explaining consumer preferences while product characteristics were much more important in preference considerations.

## **Introduction**

Consumer's perceptions and attitudes toward products are crucial information to a successful introduction of new food products. Without such information, marketing or promotional programs cannot be specific, which results in costly and unpredictable results. To further illustrate this point, approximately 1,191 new consumer food products were introduced in 1988 with high rates of failure common (*Supermarket News*). To avoid such ineffectiveness of product promotional programs, an investigation of consumer's preference toward products as well as identification of the targeted consumer are necessary.

Cowpeas were once an important agronomic crop, but at present it only has limited agronomic use (Fery). Currently the cowpea is utilized both as a vegetable and a dry bean. Cowpea production for use as a vegetable is located mainly in the Southeast, while the dry bean industry is located mainly in California and Texas. Cowpeas are an excellent source of protein and B-vitamins. However, cowpea usage is limited in the U.S. because of its inconvenient product form. If the appropriate product form for cowpeas could be found, the demand could be greater due to increased consumer awareness concerning products containing high nutrition.

Akara is a popular breakfast snack food in many West African countries. This product is made from whipped cowpea paste. An earlier study by Osei-Yaw and Powers found an acceptance based on sensory evaluations of Washington state consumers. Thus, akara made from cowpea paste has a potential to extend domestic cowpea use which would benefit U.S. farmers who are seeking alternative agricultural products.

The purpose of this study is to provide information on consumer preferences and buying intentions toward various products prepared from cowpea flour.<sup>1</sup> For this purpose, a survey of consumer's reaction to five cowpea products was conducted during 1988. A multi-ordered response model was then employed to identify important determinant factors. Conclusions and implications were developed.

### Research Design

A consumer sensory panel composed of 450 consumers was randomly selected in the Metro-Atlanta area. Due to the incompleteness of the data provided by some participants, only 346 consumer surveys were used in the analysis. The participants answered a series of socio-demographic questions, tasted the akara, and then responded to specific questions about the products.

The akara was prepared by technologists in the Food Science department at the University of Georgia and frozen prior to the survey. Akara packages were removed from frozen storage on the day of the survey. Two balls of akara per

participant were heated in a microwave oven to an internal temperature of approximately 70°C prior to their evaluation by participants. Individuals were asked to rank the two product characteristics, appearance and flavor, on a five point differential scale ranging from 'dislike very much' to 'like very much'. They were also asked to rank on a three point scale ('very unlikely', 'possibly' and 'very likely') how likely they would be to use or purchase the akara in various product forms. The product forms were as follows: (1) dry mix, (2) partially cooked, frozen to be finished fried at home, (3) fully cooked, frozen to be reheated at home, (4) fast food item, and (5) restaurant or cafeteria item. The response frequency for the five product forms are shown in Figure 1.

### Participants Profile

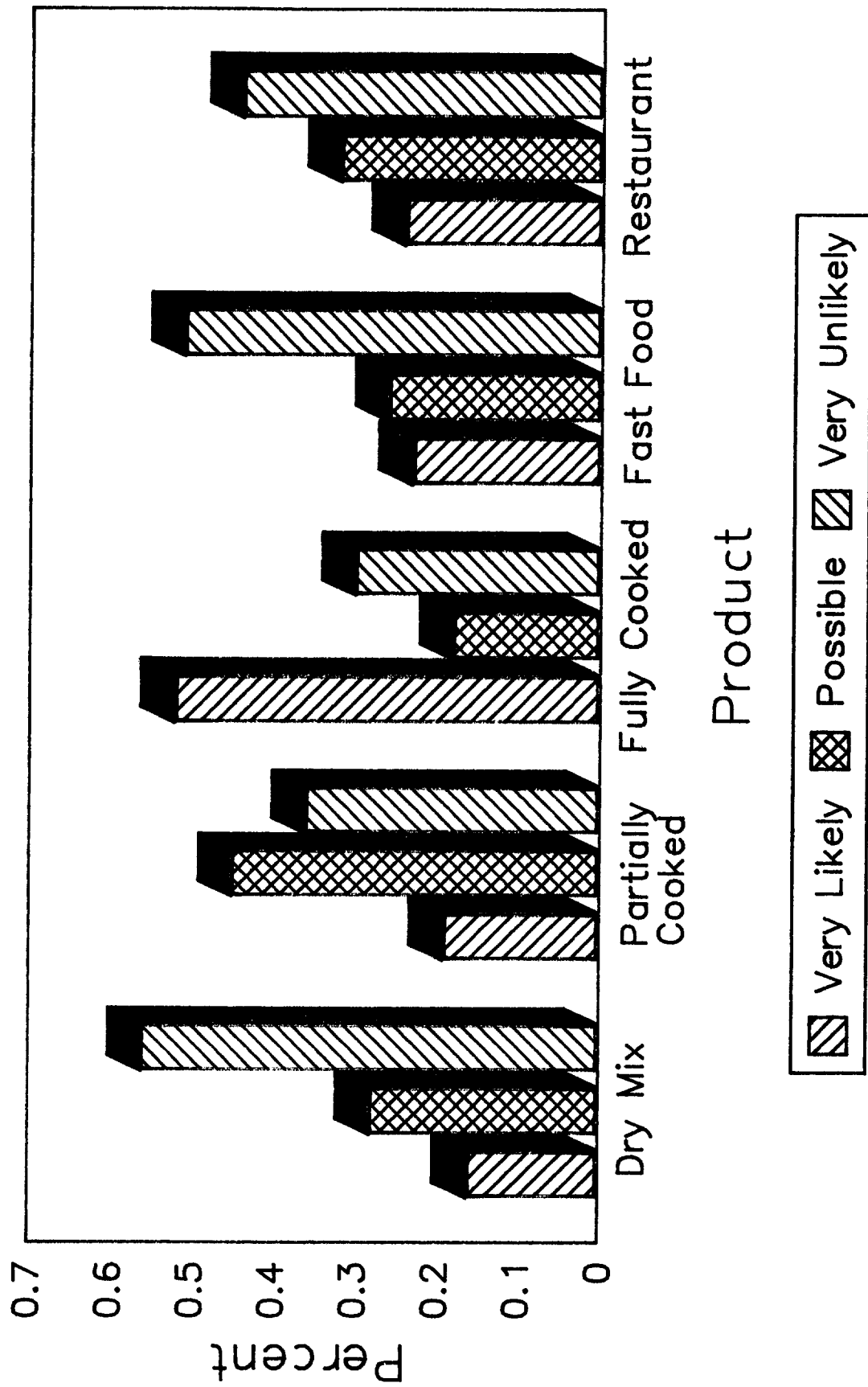
A participant profile was developed using the following socio-demographic characteristics: age, marital status, household with children, education, income, race, sex, employment status and cooking responsibility. In order to capture the influence of the household production and the value of their time, employment status and cooking responsibility were combined in a set of dummy variables. In total, these characteristics were expected to be important factors in explaining consumers' preferences and attitudes toward akara. Means and frequencies for each characteristic are shown in Table 1.

The mean age value of the participants was at middle age, 45.5. More than half of the participants had some college or higher education. Approximately 75 percent of the participants were white. Participant data in Table 1 shows that 67 percent of the respondents were female. Two thirds of the participants were married and 47 percent of the households had children. Approximately 30 percent of the participants were employed full-time and prepared most of the food for home consumption. Finally, more than half of the participants had family income in excess of \$30,000 dollars.

### Econometric Model

Since the dependent variable of buying intentions toward the various product forms was

Figure 1. The Likelihood of Using or Purchasing Various Food Products Prepared from Cowpea Flour by Consumers



**Table 1**

**Socio-economic and Demographic Characteristics of Participants**

<b>Characteristic</b>	<b>Frequency</b>	<b>%</b>
<i>Marital Status</i>		
Never married, separated, divorced, widowed	113	32.7
Married	233	67.3
<i>Educational Level</i>		
1. None, less than H.S., some H.S., high school graduate	113	32.7
2. Some college	123	35.5
3. College Grad., Post Graduate	110	31.8
<i>Approximate Yearly Income for Household before Taxes</i>		
1. Less than \$30,000	145	41.9
2. \$30,000 to \$49,999	124	35.8
3. \$50,000+	77	22.3
<i>Race</i>		
White	262	75.7
Black	84	24.3
<i>Employment Status and Cooking</i>		
Employed full-time & cooks most of time	103	29.8
Employed full-time & cooks seldom	43	12.4
Employed part-time or other & cooks most of time	172	49.7
Employed part-time or other & cooks seldom	28	8.1
<i>Sex</i>		
Male	112	32.4
Female	234	67.6
<i>Households with children less than 19 years old</i>	163	47.1
<i>Age (years)</i>	<i>Mean = 45.5</i>	

a discrete qualitative variable, the use of ordinary least squares would result in biased and inefficient parameter estimates (Judge et al.). The use of binary qualitative dependent variable models can resolve problems associated with OLS estimates and has become more common in qualitative research investigations of individuals' preferences (Fletcher and Terza; Hill and Kau; and Rahm and Huffman).

Since the dependent variable was defined as consumers expressing one of three levels of buying intentions, a multi-ordered response model was used for estimation as described in Amemiya and Maddala. This model is appropriate for use when the dependent variable has more than two outcomes and outcomes can be ranked-ordered. In 1986, this model was used by Carley and Fletcher to explain factors which affected decisions made by dairy farmers given a combination of alternative management practices. It is important that readers understand the advantages and disadvantages of this model in order to interpret the results. So, a brief description of the multi-ordered response model follows.

Let a continuous buying intention for the  $t^{\text{th}}$  consumer be denoted by  $Y_t$  and assume that it is linearly related to a vector of observed consumer and product characteristics. This can be represented mathematically as:

$$Y_t = X_t\beta + e_t \quad (t = 1, 2, \dots, n)$$

where  $X_t$  is a vector of consumer and product specific variables,  $\beta$  denotes the parameters to be estimated and  $e_t$  is the error term which is assumed to be normally distributed. Since  $Y_t$  is not observable, a vector of binary variables indicating which range of buying intention the  $t^{\text{th}}$  consumer has chosen is denoted

$$D_t = [d_{1t}, \dots, d_{jt}, \dots, d_{mt}]$$

where

$$d_{jt} = \begin{cases} 1 & \text{if and only if } \mu_{j-1} < Y_t \leq \mu_j \\ 0 & \text{if otherwise} \end{cases}$$

Therefore, the likelihood of the  $t^{\text{th}}$  consumer selecting the  $j^{\text{th}}$  buying intention category is:

$$\begin{aligned} PR\{d_{jt} = 1\} &= PR\{\mu_{j-1} < Y_t \leq \mu_j\} \\ &= \Phi(\mu_j - \beta'X_t) - \Phi(\mu_{j-1} - \beta'X_t) \end{aligned}$$

where  $\Phi$  is the cumulative standard normal distribution function and the  $\mu$ 's are unknown constants such that  $\mu_1 = -\infty$ ,  $\mu_m = +\infty$  and  $\mu_1 < \mu_2 < \dots < \mu_m$ . Thus, the log-likelihood function for the model is:

$$\begin{aligned} \log L(\beta) &= \sum_{t=1}^n \sum_{j=1}^m d_{jt} \log[\Phi(\mu_j - \beta'X_t) \\ &\quad - \Phi(\mu_{j-1} - \beta'X_t)] \end{aligned}$$

The  $\beta$  vector that would maximize the log likelihood function was solved using maximum likelihood procedure employing the Davidon-Fletcher-Powell numerical optimization algorithm (Maddala).

## Results

Coefficient estimates and associated t-statistics for the multi-ordered response model describing buying intentions of participants toward the five food product forms made from cowpea flour are shown in Table 2. The five models were statistically significant based on the chi-square test statistic criterion.

Two relevant product characteristics, appearance and flavor, were found to be important in explaining the participants preference or buying intentions. This suggests that consumers who have a higher satisfaction of product taste and appearance will also have a higher preference in terms of purchasing. Given that akara is a fried food, it was somewhat surprising that the number of times that a person ate fried food (i.e., fried foods variable) was not significant, except for the partially cooked product group, in explaining buying intentions. This may be attributable to the point that participants were informed that akara was composed of vegetable protein prior to their sensory evaluation.

**Table 2**

**Coefficients from the Multi-Ordered Response Model for Use or Buying Intentions  
Of Consumers Toward Various Food Products Prepared from Cowpea Flour**

Variable	Dry mix	Partially cooked	Fully cooked & reheat	Fast food	Restaurant
Intercept	-1.667* (-2.98) <sup>a</sup>	-1.154* (-2.05)	-.661 (-1.07)	-1.896* (-3.31)	-1.576* (-2.70)
Fried foods	.070 (1.43)	.088* (1.82)	.032 (.64)	.014 (.30)	.042 (.87)
Appearance	.115 (1.30)	.128 (1.39)	.166* (1.72)	.236* (2.73)	.252* (2.93)
Flavor	.275* (4.17)	.506* (7.44)	.305* (4.44)	.276* (4.26)	.374* (6.05)
Age	.005 (.90)	-.007 (-1.43)	.002 (.30)	-.001 (-.25)	-.011* (-2.15)
Sex (male)	-.022 (-.13)	.064 (.42)	-.118 (-.67)	.207 (1.31)	.324* (1.99)
Not married	.066 (.45)	-.204 (-1.38)	.329* (1.97)	.021 (.15)	-.010 (-.07)
Race (white)	-.430* (-2.45)	-.359* (-2.09)	-.236 (-1.26)	-.388* (-2.26)	-.326* (-1.92)
Some college	-.352* (-2.04)	-.191 (-1.15)	-.261 (-1.49)	.027 (.16)	-.250 (-1.52)
College graduate	-.278 (-1.54)	-.184 (-.98)	-.154 (-.78)	-.071 (-.36)	-.092 (-.49)
Income (1,000)	.001 (.32)	-.003 (-.95)	-.002 (-.50)	-0.006* (-1.89)	-.002 (-.64)
Household with children	.009 (.06)	-.159 (-.99)	.129 (.75)	-.108 (-.70)	-.303* (-2.00)
Employ & cook <sup>b</sup>	.188 (.63)	.028 (.11)	-.495 (-1.47)	.545* (1.66)	.285 (.85)
Employ & not cook <sup>c</sup>	-.041 (-.12)	.475 (1.43)	.149 (.39)	.955* (2.67)	.630* (1.73)
Not employ & cook <sup>d</sup>	.211 (.72)	.010 (.04)	-.447 (-1.43)	.524* (1.70)	.349 (1.09)
Chi-square (14df)	47.4*	104.1*	53.2*	67.5*	88.6*
Pseudo R <sup>2</sup>	.149	.296	.178	.203	.256

\* Statistically significant at the 10 percent level.

a. T-ratios are in parentheses.

b. Employed full time and prepares most of the food for at home consumption.

c. Employed full time and does not prepare most of the food for at home consumption.

d. Not employed full time and prepares most of the food for at home consumption.

Except for race, socio-demographic characteristics did not explain consumer's buying intentions well. White households had lower buying intentions for all five products. This result may be explained by the physical similarity of akara to hush puppies. Thus, any marketing promotion would need to differentiate akara from hush puppies. Young males had a higher probability of purchasing akara in a restaurant. Non-married households had a greater tendency to purchase the fully cooked and reheat product form. The level of education did not seem to influence a participant's buying intention, nor did income or the presence of children in a household. The negative sign for the income variable parameter in the fast food equation indicated that akara was viewed as an inferior good. That is, as income rises consumers would purchase less quantity of fried akara in fast food establishments. This implies that a marketing promotion program would need to emphasize the health aspects of the product in order to try to improve the health image of akara. Finally, the last variables in the model captured the interactive influence of household production and employment status. Results for these variables suggested that this interaction had no effect on the products for home consumption, but did have a significant, positive effect on away from home consumption.

### Conclusions and Implications

Consumer's preferences and buying intentions toward new food products are crucial information for successfully introducing and marketing such products. In this study, consumer buying intentions toward five food products prepared from cowpea flour were extensively analyzed. Factors explaining consumer responses such as socio-demographic factors and product characteristics were investigated. Due to the qualitative ranking of consumer responses, the multi-ordered response model was employed for the analysis.

Socio-demographic characteristics as represented by age, education, race, sex, income and marital status were significant in explaining participants buying intentions toward at least one of the products. Since such significance occurred in selected products, the link between socio-demographic characteristics and consumers' attitudes

tend to be weak which supports similar findings in Menkhaus et al.'s study. In contrast, product characteristics (appearance and flavor) were strongly linked to consumer attitudes toward the akara products.

Given that dry cowpeas are an excellent source of protein and B-vitamins, marketing promotions should emphasize this point. This would enable the akara products to be associated with healthy foods. Thus, new forms and uses of the cowpea could be utilized which would extend the utilization of cowpeas in the U.S. This would aid the U.S. farmers in their search for alternative agricultural products.

### Endnote

1. The reader must note that a preference for a form or product does not necessarily translate into a willingness to pay or buy the product. However, previous research has found that preferences have an important influence on an individual's purchase decision (Alexis and Wilson; Walters and Paul).

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