

Potential Demand for a New Value-Added Cowpea Product as Measured by the Willingness-to-Pay for Cowpea Flour in West Africa

Miriam Otoo
Department of Agricultural Economics, Purdue University,
403 W. State Street, West Lafayette, IN 47907, USA.
Email: motoo@purdue.edu

Joan Fulton
Department of Agricultural Economics, Purdue University,
403 W. State Street, West Lafayette, IN 47907, USA.
Email: fultonj@purdue.edu

Germaine Ibro
Institut National de Recherche Agronomique du Niger (INRAN), Niamey, Niger.
Email: geribro@yahoo.fr

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Processing stages of Kossai, a popular cowpea based street food by women street vendors. This entails very labor intensive techniques

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Miriam Otoo, Graduate Research Assistant, Purdue University; Joan Fulton, Professor, Purdue University; Germaine Ibro, Economist, Institut National de Recherche Agronomique du Niger



A newly developed cowpea flour



BACKGROUND AND PROBLEM

Value-added processing of cowpeas into street foods (such as kossai) is important in alleviating poverty and food insecurity in West Africa because:

1. Provides income for women street vendors and their families (Tinker, 1997).
2. Supplies inexpensive and nutritional foods for the urban poor who often can only afford to buy small quantities of food at a time (IFPRI, 2000).
3. Promotes domestic agriculture (Ibro et al. 2006).

Processing of kossai is labor-intensive creating challenges for the women vendors.



Cowpea flour product could increase efficiency for the kossai vendors by reducing labor and uncertainty.

Commercialization of cowpea flour requires knowledge of potential and real market size.

Previous research identified that vendors' stated willingness to pay for cowpea flour exceeded the cost of the cowpea input (Ibro et al. 2008).

OBJECTIVE

The objective of this paper is to assess the potential demand for cowpea flour for purchase by women street food (kossai) vendors.

DATA

- Primary Data from Staged Transactions
- Real Market Exchanges of Cowpea Flour
- December 2009 in Niamey, Niger
- 60 Kossai Vendors Selected via Stratified Random Sample
- Specific Data Collected Included:
 - WTP for Cowpea Flour
 - Vendors' Personal Characteristics
 - Vendors' Business Characteristics
 - Production Constraints



METHODOLOGY

Researchers assess consumer demand for new products with:

1. Stated preference methods (Lusk et al. 2006, Kimenju and Groot, 2008) based on hypothetical settings and intended behavior. These may not be incentive compatible and may overestimate consumer demand.
2. Non-hypothetical preference-revealing methods (Silva et al. 2007)

Real-purchase decision mechanisms and experimental auctions are incentive compatible as individuals' dominant strategies are truthfully revealed.

Experiment Design:

- Non-hypothetical real purchase decision mechanism – real purchase exchanges of 1 kg. packages of cowpea flour in a real market environment.
- Price was determined by active negotiation in the market place between an upper and lower bound price
 - $P^i < p_i^* < P^j$ Final price of the exchange is a true Willingness to Pay.

Theoretical Framework of Real-Purchase-Decision Mechanism:

- Women street food vendors are rational utility maximizing consumers. Demand can be derived from the indirect utility function.
- $WTP = f(x)$ where x is the vector of explanatory variables.
- The sample is truncated by the upper and lower bound prices.
- The derived log-likelihood function of the two-limit truncated regression model is defined as (Greene, 2003):

$$l = \sum_{i=1}^N \left\{ \ln \left[\phi \left(\frac{y_i - x_i \beta}{\sigma} \right) / \sigma \right] - \ln \left[\Omega \left(\frac{P^i - x_i \beta}{\sigma} \right) - \Omega \left(\frac{P^j - x_i \beta}{\sigma} \right) \right] \right\}$$

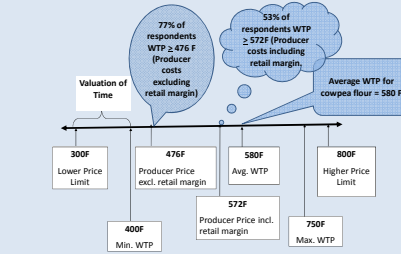


Figure 1: Price indicators of Kossai Vendors WTP for 1 Kg. of Cowpea Flour

RESULTS

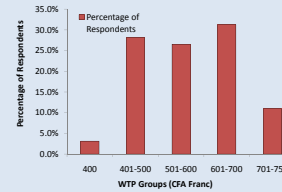


Figure 2: Frequency of Kossai Vendors' WTP Values

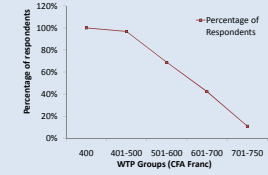


Figure 3: Cumulative Densities of Kossai Vendors' WTP for 1 Kg. of Cowpea Flour

	Avg. WTP	Hypothesis: $H_0: WTP_{low} > WTP_{high} > WTP_{high}$ (Economic Status)	
		P-Value	Chi-Square
Neighborhood Classification			
Low-income	492.9	$H_0: WTP_{low} = WTP_{middle}$	0.55
Pooled low/middle income	496.7	$H_0: WTP_{low} = WTP_{high}$	<0.0001 36.08***
Middle-income	508.1	$H_0: WTP_{middle} = WTP_{high}$	<0.0001 17.35***
High-income	663.3	$H_0: WTP_{middle} = WTP_{high}$	<0.0001 42.42***

***, **, * represents significance at the 1%, 5% and 10% level

	Avg. WTP	Hypothesis: $H_0: WTP_{wet} > WTP_{dry}$ (Vendor Processor Type)	
		P-Value	Chi-Square
Vendor Processor Type			
Wet-milled (traditional)	607.4	$H_0: WTP_{wet} = WTP_{dry}$	<0.0001 15.49***
Dry-milled	490.3		

***, **, * represents significance at the 1%, 5% and 10% level

	Avg. WTP	Hypothesis: $H_0: WTP_{small} > WTP_{medium} > WTP_{large}$ (Scale of Production)	
		P-Value	Chi-Square
Scale of Production			
Small (1.25-2.4kg)	464.4	$H_0: WTP_{small} = WTP_{medium}$	<0.0001 17.74***
Medium (2.5kg-3.75kg)	566.0	$H_0: WTP_{small} = WTP_{large}$	<0.0001 24.24***
Large (>3.75kg)	685.2	$H_0: WTP_{medium} = WTP_{large}$	<0.0001 28.41***

***, **, * represents significance at the 1%, 5% and 10% level



*We used a Kruskal-Wallis test (non-parametric alternative to the t-test) to test for significant differences between the average WTP of the groups.

*The difference in WTP is statistically significant between the low and high income neighborhoods, between the middle and high income neighborhoods as well as between the pooled low/middle income neighborhoods and the high income neighborhoods.

*Vendors using wet-milled processing (traditional) have a higher WTP (and statistically significant) compared to the vendors using a dry-milled processing.

*Large scale vendors have a higher WTP (and statistically significant) compared to medium scale and small scale vendors.

*Medium scale vendors have a higher WTP (and statistically significant) compared to small scale vendors.



Variables	Coefficient	Std. Error
Demographics:		
Middle Income	11.06	20.90
High Income	90.22***	21.92
Household Size	-7.55**	3.86
Married	10.12	17.46
Divorced	-13.34	18.70
Widow	-14.50	22.02
Business Characteristics:		
Medium Scale	58.32***	16.25
Large Scale	87.52***	24.87
Good Relationship with Input Supplier	13.50	15.41
Fair Relationship with Input Supplier	-7.54	14.10
Production Constraints:		
Significant Experience Producing Own Flour	50.40*	29.89
Moderate Experience Producing Own Flour	-38.32***	14.22
Vendor Processor Type	53.22*	29.01
Fair Access to Input Supplier	45.94**	19.20
Difficult Access to Input Supplier	72.69***	22.76
Constant	424.22***	46.46
No. of observations	60	
Wald chi-square (p-value)	380.01***	

*Significance at the 1, 5 and 10% level is denoted by ***, **, and *, respectively.

Two-Limit Truncated Regression Results Revealed

- WTP is influenced by:
 - Economic status
 - Scale of production
 - Experience using dry milled process
 - Access to input supplier

- WTP is higher in more affluent neighborhoods
- Vendors operating in high-income neighborhoods willing to pay 90F more for 1 kg. of cowpea flour compared to one in low-income neighborhood

- Medium and large scale vendors are willing to pay more (58F and 88F respectively per 1 kg. of cowpea flour) compared to small scale vendors.

- Vendors using wet-milling process (traditional) are willing to pay 53F more for 1 kg. of cowpea flour compared to vendor using a dry-milled process.

- Vendors with moderate experience using dry-milled process are willing to pay 38F less for 1 kg. of cowpea compared to vendors with no experience using dry-milled process.

- Vendors who identified access to input supplier (grinder) as a major production constraint were willing to pay 73F more per 1 kg. of cowpea flour than a vendor who did not see this as a constraint.

CONCLUSIONS

WTP values determined from real market transactions provided consistent results with WTP values determined from stated preferences in earlier research.

A significant demand exists for cowpea flour in the cowpea street food sector.

Kossai vendors are willing to pay a premium for cowpea flour that, on average, more than covers the cost of production plus retail margin.

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