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Full Length Research Article

Marketing Expansion Strategies for Local Crops-Based Couscous in Tahoua State, Niger Republic

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ABSTRACT:
This study investigates the own-price and cross-price elasticities for locally grown crops-based couscous and compares confidence intervals computation for willingness-to-pay and market shares under Krinsky Robb and Delta bootstrapping methods. Syntheses of previous literature and a focus group with consumers had helped to identify nine brands of couscous included in this research. The fractional factorial design was used to collect data from three hundred consumers, while the multinomial logit was used to analyze data. Results indicate that rice, cowpea and millet-based couscous were the most preferred by consumers and their market share accounts of more than fifty percent. The Results from simulation showed that confidence intervals under Krinsky and Robb stabilize as a sample size increases and thereby adjusting for skewness. However, confidence intervals under Delta computation are constant regardless of sample size, thereby failing to adjust for skewness. Finally, results also indicate that skewness was also accommodated in confidence intervals for market share because its values progressively adjust as sample size increases. These findings may be useful to boost crop-based couscous demand in the study area and beyond and thereby improving farmers' revenue and offering diet diversification opportunity.
Keywords: Marketing expansion, Strategies, Local crops, Couscous, Willingness-to-pay

INTRODUCTION

Resource-poor farmers have been operating within a vicious cycle of poverty due to lack of adequate factors of production. Many producers have remained focused on increasing yield on land that had been intensively cultivated. Only a few farmers are capitalizing on marketing alternative opportunities capable of adding value to their products after transformation. This value chain development once implemented can significantly improve the revenue and the welfare of many rural farmers. However, the development of the value chain is facing several challenges such as lack of economic incentives, poor harvest due to pest infestation and climate change (Gomez and Ricketts, 2013). A considerable amount of effort has been devoted to identifying factors that add value to marginal crops.

Previous research by Sadikh *et al*. (2011) suggested that market expansion for millet and sorghum will not only affect the dynamics of local grain production and farmers' incomes but also food security in West Africa via greater outlets for locally grown grain. They also argued that demand for staple cereals in urban as well as rural centers is fundamental for long-range viability (Sadikh *et al*., 2011). The demand for agricultural products has experienced a rapid increase due to increase in population, shift in consumers' preferences and taste and health-related issues. Before a new product is developed and launched, consumers' preferences and willingness-to-pay, as well as the predicted market share, must be computed to determine its success. Thus, there is a large body of research directed to calculate elasticities, market share and welfare measures. The challenge is how to determine the significance level of these statistics using standard deviation, standard errors or confidence intervals.

A study conducted by Valerio *et al*. (2015) showed the skewness exists in willingness-to-pay (WTP) distribution and it should be reflected in the confidence intervals. Results revealed that the delta method produces a symmetric confidence interval around the WTP mean but fails to account for skewness. Conversely, the t-test inversion and bootstrap methods are found to yield more realistic

confidence intervals. Hole (2007) also investigated the merits of the delta, Krinsky Robb and bootstrap methods for computing confidence intervals for WTP mean. He concluded that all three methods generate similar, but the delta method is the most accurate when data is well-conditioned whereas the bootstrap method is more robust when data is noisy and the model is not well-specified.

One challenge faced in the agricultural product demand analysis is to collect qualitative and reliable data for policy analysis. Aggregate data yielding little information on heterogeneity preferences and uncorrelated with actual consumption are often used. A well carefully designed choice experiment can help to overcome these issues (Lusk and Tonsor, 2015). A second major challenge for small-scale farmers is the lack of market information leading to lower prices for their produces. Recent studies have reported that participating in well-functioning markets and value chains can help a farmer learn new skills, adopt improved practices, earn more stable and predictable income and thereby attracting young people to farming and reducing rural migration and poverty. This is currently a large knowledge gap among direct actors, indirect actors on how local crop-based couscous have been produced, transformed and marketed before reaching end consumers. Also, the chain value of most local crops is not functioning very well and producers are keeping working within a vicious cycle characterized by low capital, low inputs and low yield. Therefore, marketing expansion strategies must be undertaken to help small producers, transformers and marketers and consumers to gain equitably from the value chain.

The overall objective of this study is to determine consumer demand for local crops - based couscous. Specific objectives include to determine the willingness-to-pay (WTP) and market share with their associated confidence intervals using delta and Krinsky and Robb methods share and to determine own-price and cross-price elasticities.

MATERIALS AND METHODS

The conceptual and theoretical framework for this study is rooted in the microeconomic theory of consumer behavior. Here, we assume that consumers maximize utility when they decide to choose one type of food as the most important and another as the least important. They also maximize utility when selecting sources of income and expenditure as the most important and others as the least important. Determining and understanding which types of food are most important for consumers are fundamental to predict and forecast consumer demand for a novel product. In addition, understanding and the most important food for consumers will assist in designing new products and thereby keeping the market fresh and alive. The best-worst scaling technique first developed by Louviere (1987) and Flynn et al.(2007), and consistent with random utility is used for the modeling because it is capable to compare both inter and intra attributes and forces respondents to discriminate amongst items (Louviere *et al*., 2000).

Data and Choice Experiment

The design called factorial design in which each attribute was varied at three levels was used as a tool for data collection. Thus, nine brands of couscous having three levels of price randomly assigned were considered. In total, 3^9 (19643) combinations exist for the full factorial, but due to lack of time and limited resources, the 3^9 is reduced to 3^3 which is called the fractional factorial design. The latter contains 3 blocks having every nine brands of couscous and only the block that is orthogonal and balanced was used to design the questionnaire. The block with the biggest determinant and having uncorrelated prices was selected. The no purchase option is also added to serve as a base for comparison for other options. The questionnaire having ten questions was presented to consumers. For each question, consumers were asked to repeatedly choose their best option in a hypothetical market situation. To increase the diversity and the representativeness of the sample size, only one person of specific gender was selected and interviewed. In total, 300 consumers were

randomly sampled and interviewed using face-face interview at three markets' locations in Tahoua city, capital of Tahoua state. In each market, hundred consumers were randomly selected using five footstep techniques, which consist of counting from one to fifth consumers entering the market and then sixth consumers are targeted for interview. The authors briefly explain the different types of couscous and their price levels. They also explained that the survey is voluntary. Table 1 listed below is a sample question used in the survey.

Table 1: **Selection of the most important couscous brand**

Millet/kg	260
Maize/kg	270
Sorghum/kg	200
Rice/kg	400
Wheat/kg	420
Cassava/kg	360
Bambara nut/kg	400
Fonio/kg	240
Cowpea/kg	400
None	

Example of choice experiment question ($1=500FCFA local currency)

Econometric Estimation Method

Data used in this study were analyzed using a random utility model developed by McFadden in 1973 and as well as recent work on how meat demand elasticities vary with price, income, and product category (Lusk and Tonsor, 2015). Thus, consumer i deriving utility from options j can be mathematically written as follows:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (1)$$

Where U_{ij} is utility of consumer i buying option j, V_{ij} is the deterministic portion of utility and ε_{ij} is the stochastic part and they follow type i extreme value distribution and they are independently identically distributed across i and j. The multinomial logit model (MNL) was used to model the utility of consumer i facing j options as follows:

$$Prob(consumer\ i\ chooses\ j) = \frac{e^{V_{ij}}}{\sum_{k=1}^{10} e^{V_{ik}}} \quad (2)$$

The deterministic portion of utility can be mathematically expressed as follows:

$$V_{ij} = \beta_j + \alpha P_j \quad (3)$$

Where β_j is an alternative specific constant indicating the utility of option j relative to the utility of the none option, α is the marginal utility of price change and P_j is the price of alternative j.

The coefficients from the estimated can be used to compute the willingness-to-pay as follows:

$$WTP_j = \frac{-\beta_j}{\alpha} \quad (4)$$

Where WTP_j is the willingness-to-pay for attribute j, β_j is the marginal utility for attribute j and α is the marginal utility for the price.

Simulation method was used to compute market share all food products alternative relative to no purchase option.

Data Analysis and Interpretation

R statistical package was used design questionnaire served in data collection, while the Survival package built in R was employed to fit multinomial logit. Estimates from multinomial logit were used to compute willingness-to-pay, market share and own price and cross-price elasticities.

RESULTS AND DISCUSSION

This section shows results from summary statistics of the respondent, multinomial logit, willingness-to-pay (WTP), market share, own-price and cross-price elasticities and marginal effects. Thus, Table 2 presents summary statistics for respondents included in our analysis. Results show that most of the respondents were male (83.2%), married (80.8%) and had formal education (77.3%) with a large household size (50.7%). The average age of the respondents was about forty years

and the average monthly income was 49300 FCFA. This implies that young male and married consumers should be targeted to effectively and successfully stimulate the consumption of couscous made with local crops and thereby creating market segmentation capable of increasing the demand of these food products in the study area.

Table 2: Summary Statistics of Surveyed Respondents

VARIABLES	CHARACTERISTICS	MEAN	STANDARD DEVIATION
Age	Age in years	39.965	10.464
Gender	1 if male, 0 if female	0.832	0.402
Marital Status	1 if married, 0 otherwise	0.808	0.395
Education	1 if educated, 0 if uneducated	0.773	0.420
Income	Monthly income	49300	25600
Family size	In numbers	8	6
N	300		

Note $1=500FCFA

Table 3 reports estimates for the multinomial logit model. Results reveal that the price coefficient is negative and significant; implying that demand for couscous is downward sloping and that couscous with lower price more likely to be purchased than those with higher prices. Results also indicate that coefficients are all positive and statistically significant; indicating that the nine types of couscous found in the market place would be more referred than the non-option. The positive coefficients mean a premium while negative coefficients are discount. In addition, a recent study by Abubakar *et al.* (2015) indicated that consumers' willingness-to-pay for cowpea is higher with lower prices and lower with higher prices.

Table 4 provides the WTP and confidence interval for each couscous category using Krinsky and Robb and Delta methods. The WTP of each couscous is compared with the non-purchase option. Results reveal that rice-based couscous (636.1), followed by cowpea based couscous (472.8) and millet-based couscous (449.3) were the most appreciated, while fonio (166.4), followed by bambara nut (178.3) based couscous were the least preferred. Results show that confidence intervals computed under Krinsky Robb method progressively stabilize as the sample size tends to infinity. Conversely, confidence intervals calculated under the Delta method are constant regardless of sample size. Additionally, regardless of sample size and computational methods, the mean WTP was statistically significant for each type of couscous, indicating that consumers positively value all kind of couscous offered in the market. This also suggests that there is a market opportunity for marginal crops once they have been transformed and marketed as couscous and related products. These results were similar to those documented by Naico and Lusk (2010), stating that consumers are willing to pay a premium for orange sweet and white potatoes.

Table 5 provides a marginal comparison for all the nine couscous. Results show that regardless of the sample size, the mean WTP of millet-based couscous is significantly different from that of cassava, bambara nut and fonio based couscous. Similarly, the mean WTP for maize couscous is significantly higher than bambara nut and fonio based couscous, the mean of WTP for sorghum couscous is significantly higher than that of cassava, bambara nut and fonio based couscous. While rice based couscous followed by cowpea based couscous have the highest WTP, their mean WTP comparison are significantly higher than all other forms of couscous.

Table 3: Estimates of the multinomial logit model for local crops based couscous

PARAMETERS	COEFFICIENTS	STANDARD ERROR (SE)	Z-VALUES	PROBABILITY
Price	-0.006	0.001	-10.271	< 0.0001
Millet	2.838	0.191	14.887	< 0.0001
Maize	2.768	0.193	14.312	< 0.0001
Sorghum	2.497	0.155	16.164	< 0.0001
Rice	4.019	0.275	14.596	< 0.0001
Wheat	2.576	0.280	9.216	< 0.0001
Cassava	2.026	0.257	7.879	< 0.0001
Bambara nut	1.127	0.239	4.710	< 0.0001
Fonio	1.052	0.190	5.549	< 0.0001
Cowpea	2.987	0.232	12.877	< 0.0001
N	300			
Log-likelihood at start	-6222.198			
Log-likelihood at convergence	-5592.93			
Pseudo R^2	0.10			

This is because rice is affordable and available, while cowpea considered as a cheap source of protein and cowpea based product as well as rice combined with cowpea were widely marketed and consumed in the study area. Also, the socio-cultural consumption pattern reveals that farmers preferred to purchase cheap and available food during the long dry season, while their products from the previous harvest would be kept until the next rainy season.

Table 6 reports calculated and simulated market shares and its confidence intervals. Results show that simulated market share is slightly different from calculated market share and this is true regardless of sample size. Results also indicate that rice (36.2%), followed by cowpea (12.9%), millet (11%) and maize (10.30%) had the most important market share, while fonio (2%), followed by bambara nut (1.9%), cassava (4.9%) and sorghum (7.9%) had the least important market share. This implies that demand for rice, cowpea, millet and maize was largely dominant in this study area.

Confidence intervals for market share are generally significant regardless of sample size and computation methods, but confidence intervals stabilize as sample size tends to infinity.

Table 4: WTP mean and its confidence interval using Krinsky and Robb and Delta method and across various sample size

KRINSKY AND ROBB METHOD				DELTA METHOD		
N=1000				N=1000		
Couscous	MWPT Mean	Lower	Upper	MWPT Mean	Lower	Upper
Millet	449.3	408.5	502.4	449.3	403.0	495.6
Maize	438.1	399.5	489.3	438.1	393.8	482.4
Sorghum	395.3	353.7	452.1	395.3	347.0	443.6
Rice	636.1	590.4	697.1	636.1	585.4	686.8
Wheat	407.8	370.5	447.6	407.8	370.4	445.1
Cassava	320.6	278.6	362.5	320.6	279.8	361.5
Bambara nut	178.3	115.8	231.5	178.3	125.4	231.2
Fonio	166.4	123.9	207.9	166.4	124.2	208.7
Cowpea	472.8	435.1	519.3	472.8	432.1	513.5
	N=10000			N=10000		
Couscous	MWTP	Lower	Upper	MWTP	Lower	Upper
Millet	449.3	409.4	503.5	449.3	403.0	495.6
Maize	438.1	399.6	490.4	438.1	393.8	482.4
Sorghum	395.3	353.3	453.4	395.3	347.0	443.6
Rice	636.1	592.7	696.9	636.1	585.4	686.8
Wheat	407.8	370.1	445.6	407.8	370.4	445.1
Cassava	320.6	277.1	360.8	320.6	279.8	361.5
Bambara nut	178.3	121.4	228.5	178.3	125.4	231.2
Fonio	166.4	120.8	206.6	166.4	124.2	208.7
Cowpea	472.8	436.3	519.5	472.8	432.1	513.5
	N=100000			N=100000		
Couscous	MWTP	Lower	Upper	MWTP	Lower	Upper
Millet	449.3	408.6	503.9	449.3	403.0	495.6
Maize	438.1	398.8	490.2	438.1	393.8	482.4
Sorghum	395.3	353.0	452.5	395.3	347.0	443.6
Rice	636.1	592.1	696.5	636.1	585.4	686.8
Wheat	407.8	369.4	445.7	407.8	370.4	445.1
Cassava	320.6	277.2	360.7	320.6	279.8	361.5
Bambara nut	178.3	119.4	227.9	178.3	125.4	231.2
Fonio	166.4	121.1	207.2	166.4	124.2	208.7
Cowpea	472.8	436.0	519.6	472.8	432.1	513.5
	N=1000000			N=1000000		
	MWTP	Lower	Upper	MWTP	Lower	Upper
Millet	449.3	408.6	503.9	449.3	403.0	495.6
Maize	438.1	399.0	490.1	438.1	393.8	482.4
Sorghum	395.3	353.1	452.7	395.3	347.0	443.6
Rice	636.1	592.0	696.7	636.1	585.4	686.8
Wheat	407.8	369.6	445.7	407.8	370.4	445.1
Cassava	320.6	277.5	360.8	320.6	279.8	361.5
Bambara nut	178.3	119.8	228.0	178.3	125.4	231.2
Fonio	166.4	121.2	207.6	166.4	124.2	208.7
Cowpea	472.8	436.1	519.7	472.8	432.1	513.5

Table 5: Marginal WTP mean comparison amongst different couscous using Krinsky and Robb Bootstrap methods and across sample size

N= 1000				N= 10000		
MWTP	**MEAN**	**LOWER BOUND**	**UPPER BOUND**	**MEAN**	**LOWER BOUND**	**UPPER BOUND**
Millet vs Maize	10.69	-9.61	31.52	10.69	-11.21	32.24
Millet vs Sorghum	53.58	28.15	78.06	53.58	29.49	78.22
Millet vs Rice	-1.50	-437.40	452.50	-1.50	-438.36	426.98
Millet vs wheat	39.15	-5.52	81.09	39.15	-2.02	80.55
Millet vs cassava	127.23	89.38	164.88	127.23	88.30	165.89
Millet vs Bambara nut	269.12	225.61	311.51	269.12	226.93	311.35
Millet vs Fonio	281.50	247.58	320.40	281.50	245.36	317.59
Millet vs Cowpea	-24.10	-50.39	3.66	-24.10	-51.11	2.73
Maize vs sorghum	42.88	17.37	67.31	42.88	17.17	68.33
Maize vs Rice	436.22	103.31	764.85	436.22	118.92	751.76
Maize vs Wheat	28.46	-14.53	69.02	28.46	-12.49	68.78
Maize vs Cassava	116.53	79.65	152.92	116.53	78.03	155.43
Maize vs Bambara nut	258.43	213.98	304.42	258.43	216.30	301.10
Maize vs Fonio	270.81	237.26	308.08	270.81	234.98	307.38
Maize vs Cowpea	-34.79	-60.67	-9.20	-34.79	-61.28	-7.75
Sorghum vs Rice	-241.03	-288.24	-195.21	-241.03	-288.28	-193.77
Sorghum vs Wheat	-14.43	-70.33	36.02	-14.43	-65.32	36.17
Sorghum vs Cassava	73.65	29.28	118.28	73.65	26.85	120.55
Sorghum vs Bambara nut	215.54	167.77	262.32	215.54	170.78	261.09
Sorghum vs Fonio	1.58	-427.74	435.18	1.58	-430.95	439.74
Sorghum vs Cowpea	-34.79	-60.67	-9.20	-34.79	-61.28	-7.75
Rice vs Wheat	226.61	196.14	256.80	226.61	197.76	256.44
Rice vs Cassava	314.68	280.88	351.35	314.68	279.86	349.58
Rice vs Bambara nut	456.58	405.44	504.64	456.58	408.90	505.21
Rice vs Fonio	468.96	418.14	522.74	468.96	417.15	520.46
Rice vs Cowpea	163.36	136.69	190.96	163.36	136.16	190.53
Wheat vs Cassava	88.08	46.67	131.65	88.08	46.69	129.90
Wheat vs Bambara nut	229.97	174.46	285.56	229.97	177.99	281.89
Wheat vs Fonio	0.31	-440.04	439.40	0.31	-432.80	426.84
Wheat vs Cowpea	-63.25	-96.96	-29.58	-63.25	-97.33	-29.15
Cassava vs bambara nut	141.89	87.43	190.70	141.89	90.44	193.56
Cassava vs Fonio	154.27	104.06	203.41	154.27	102.43	205.44
Cassava vs Cowpea	-151.32	-186.72	-117.42	-151.32	-187.47	-115.65
Bambara nut vs Fonio	12.38	-38.38	64.27	12.38	-38.10	63.66
Bambara nut vs Cowpea	-293.21	-335.36	-247.92	-293.21	-337.75	-249.62
Fonio vs Cowpea	-305.60	-349.56	-264.15	-305.60	-348.22	-262.67

Table 6: Predicted market shares (%) for various crop-based couscous by sample Size

	Millet	**Maize**	**Sorghum**	**Rice**	**Wheat**	**Cassava**	**Bambara nut**	**Fonio**	**Cowpea**
N	[1]0.110	0.103	0.079	0.362	0.086	0.049	0.020	0.019	0.129
500	[2]0.116	0.10	0.083	0.377	0.090	0.051	0.021	0.019	0.134
	[3](0.101,0.131)	(0.095, 0.122)	(0.066,0.100)	(0.337,0.415)	(0.075,0.107)	(0.043,0.060)	(0.016,0.021)	(0.015,0.024)	(0.120, 0.149)
1000	(0.101,0.133)	(0.094,0.122)	(0.066,0.100)	(0.336,0.416)	(0.075 ,0.106)	(0.043,0.061)	(0.016, 0.027)	(0.015, 0.025)	(0.121, 0.148)
10000	(0.101,0.133)	(0.094,0.122)	(0.066,0.100)	(0.336,0.416)	(0.075,0.106)	(0.043,0.061)	(0.016, 0.021)	(0.015, 0.025)	(0.121,0.148)

1= Calculated Market Shares, 2=Simulated Market Shares, 3= Confidence Intervals
Numbers in parentheses are 95% confidence interval calculated using the Krinsky–Robb bootstrapping method.

Table 7 shows that own-price elasticities are all negative; indicating that demand for this couscous is more price inelastic. A food item is said to be price inelastic when its own-price elasticity is greater than -1.0, while food is said to be price elastic when its own-price elasticity is less than -1.0. Results also reveal that millet (-1.57) based couscous is more price elastic than maize (-1.45), sorghum (-1.03) and fonio (-1.34) based couscous. Among the cereal-based couscous, wheat (-2.46), followed by rice (-2.10) are more price elasticity, while among leguminous based couscous, bambara nut (-2.24) based couscous followed by cowpea (-1.96) are more price elastic. It is generally admitted that there is less substitutability at higher prices than lower prices. The higher price elastic obtained may be explained by the fact that consumer in the study spends a large amount of their income on food. The cross-price elasticities were all positive, indicating these food items are perfect substitutes.

Kumar *et al*. (2010) have reported that demand elasticities at disaggregate level vary widely across income groups, which are influenced by the production environment and changes in tastes. They have also indicated that demand elasticities at the disaggregate level are consistent with the long-term changes in consumption for cereals and other foods. They finally concluded that the estimated income elasticities vary across income classes and are lowest for cereals group and highest for horticultural and livestock products. These results were comparable to that of Castellón *et al*. (2012) who reported that most cross-price elasticities were found to be inelastic and to reveal complementary relations across goods. They also concluded that their estimated own-price elasticities for the groups of cereals, meats, dairy, fruits & vegetables, and fats & oils are more inelastic than those found in the literature.

Table 7: Matrix of own-price and cross-price elasticities using Price Midpoint for each Couscous

	Millet	**Maize**	**Sorghum**	**Rice**	**Wheat**	**Cassava**	**Bambara nut**	**Fonio**	**Cowpea**
Millet	-1.573	0.263	0.231	0.554	0.137	0.088	0.038	0.053	0.256
Maize	0.266	-1.450	0.231	0.554	0.137	0.088	0.038	0.053	0.256
Sorghum	0.266	0.263	-1.037	0.554	0.137	0.088	0.038	0.053	0.256
Rice	0.266	0.263	0.231	-2.109	0.137	0.088	0.038	0.053	0.256
Wheat	0.266	0.263	0.231	0.554	-2.463	0.088	0.038	0.053	0.256
Cassava	0.266	0.263	0.231	0.554	0.137	-2.322	0.038	0.053	0.256
Bambara nut	0.266	0.263	0.231	0.554	0.137	0.088	-2.245	0.053	0.256
Fonio	0.266	0.263	0.231	0.554	0.137	0.088	0.038	-1.342	0.256
Cowpea	0.266	0.263	0.231	0.554	0.137	0.088	0.038	0.053	-1.964

Table 8 reports matrices of own-price and cross-price marginal effects using the price mid-point. Results indicate that the own-price marginal effects were all negative, revealing that couscous categories were more price inelastic. The cross-price marginal effects were all positive, indicating that these couscous' brands were perfect substitutes. This means that by increasing in price of one couscous will lead to a decrease in the quantity demanded for another, ceteris paribus. Results also reveal that own-price marginal and cross-price marginal effects add to zero, indicating that the symmetry condition is held.

Table 8: Matrix of own-price and cross-price marginal effects using the Price Midpoint for each Couscous

	Millet	Maize	Sorghum	Rice	Wheat	Cassava	Bambara nut	Fonio	Cowpea	None	sum
Millet	-0.00041	0.00003	0.00003	0.00012	0.00002	0.00002	0.00001	0.00001	0.00005	0.00013	0.00
Maize	0.00003	-0.00045	0.00003	0.00013	0.00003	0.00002	0.00001	0.00001	0.00005	0.00015	0.00
Sorghum	0.00003	0.00003	-0.00038	0.00011	0.00002	0.00001	0.00001	0.00000	0.00004	0.00012	0.00
Rice	0.00012	0.00013	0.00011	-0.00125	0.00010	0.00006	0.00003	0.00002	0.00018	0.00051	0.00
Wheat	0.00002	0.00003	0.00002	0.00010	-0.00034	0.00001	0.00001	0.00000	0.00004	0.00011	0.00
Cassava	0.00002	0.00002	0.00001	0.00006	0.00001	-0.00021	0.00000	0.00000	0.00002	0.00007	0.00
Bambara nut	0.00001	0.00001	0.00001	0.00003	0.00001	0.00000	-0.00009	0.00000	0.00001	0.00003	0.00
Fonio	0.00001	0.00001	0.00000	0.00002	0.00000	0.00000	0.00000	-0.00008	0.00001	0.00002	0.00
Cowpea	0.00005	0.00005	0.00004	0.00018	0.00004	0.00002	0.00001	0.00001	-0.00059	0.00020	0.00

CONCLUSIONS

Consumers valued rice, cowpea and millet-based couscous more than fonio and bambara nut with rice having the highest WTP value and market share followed by cowpea and millet-based couscous, indicating that there is a great marketing opportunity for marginal crop-based couscous. The observed statistical significance of the marginal WTP values for rice verus fonio; rice versus bambara nut and rice versus maize imply that rice, cowpea and millet based-couscous were the most preferred in the study area. The own-price inelastic demand for crop-based couscous and cross-price elasticity showed perfect substitution amongst crop-based couscous, indicating that increasing the price of one couscous would lead to a decrease in the demand of another couscous. The respective negative and positive own-price and cross-price marginal effects suggest the various couscous categories were more price inelastic and therefore perfect substitutes. These findings may be useful to develop value-enhancing strategies for staple crops and thereby increasing farmers' revenue, diversifying diet and improving their living conditions. Future direction for research is to conduct sensitivity analysis for these elasticities for different income groups and across different price levels and possibly investigate the stability of average WTP and market share over time.

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