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Acceptability of jackfruit-nut-bars as a healthy snack in Uganda

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Discussion Paper

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Abstract

The growing prevalence of ultra-processed foods in Uganda is driving the double burden of malnutrition. Overweight and obesity are on the rise while the intake of micronutrients remains insufficient. Simultaneously, jackfruits that are rich in minerals and vitamins remain underutilized. Its large size, sticky insides, and high perishability make it challenging to handle and cause high postharvest losses. In an attempt to address both issues, the present study investigates the potential of long-lasting, nutritious, and sugar-free jackfruit-nut-bars (JNBs) as a channel to enhance and promote the utilization of jackfruit, and provide healthier options of processed foods. To analyze consumer demand for the products, we first assess the sensory perception of four different JNBs at a university campus in Uganda. We then use Van Westendorp's price sensitivity meter to elicit consumers' willingness to pay (WTP) and identify factors shaping their demand. The results show that the sensory properties are, on average, rated positively, and price preferences are similar to established snacks. Based on our findings, we conclude that JNBs provide an option to enhance jackfruit utilization. A random effects model shows that WTP increases with sweetness, age, and frequency of snack consumption that JNBs can potentially substitute. These findings help future development and promotion of processed jackfruit products.

1 Introduction

The supply and consumption of ultra-processed foods are rapidly growing in Africa (Baker et al., 2020). These diets are characterized by high fat, sugar, and salt intake which, are significant contributors to non-communicable diseases and obesity (Auma et al., 2019). Since they are low in minerals and vitamins, this trend leads to an increasing prevalence of double burden of malnutrition (Reardon et al., 2021), which means that the same person can be overweight or obese and still deficient in micronutrients. In Uganda, deaths caused due to non-communicable diseases increased from 31 to 36% from 2015 to 2019 (The World Bank, 2021). Baalwa et al. (2010) estimate around 12% prevalence of overweight and obesity among young adults, who are aged between 18 and 30 years in Kampala, a more previous study on women of reproductive age finds rates around 16% (Yaya & Ghose, 2019). Thus, there is a need to develop products that meet consumer preferences but provide higher dietary quality and do not add to the current burden of malnutrition.

Beyond this background, it could be promising to expand the use of highly nutritional but underutilized indigenous fruits, such as jackfruits. Jackfruits (*Artocarpus heterophyllus* Lam.) grow naturally in Uganda and provide valuable nutritional profiles, including carbohydrates, proteins, vitamins, minerals, and dietary fiber (Ranasinghe et al., 2019). Moreover, they can grow in a diverse spectrum of climatic conditions and can thus, play an important role in the face of climate change (Nakintu et al., 2019). However, farmers in Uganda grow jackfruit mainly for home consumption and experience losses ranging between 15 and 50% (Balamaze et al., 2019). Their utilization is hampered by their large size, sticky insides, and short shelf life (Ranasinghe et al., 2019). Simple processing techniques are recommended to overcome the current obstacles and develop nutritious, easily accessible, long-lasting food products (Ranasinghe et al., 2019). Previous literature demonstrates that the fruit is suitable for being processed into various products such as jackfruit chips, wine, jam, or jackfruit-nut-bars (Nansereko & Muyonga, 2021; Xing et al., 2021). However, there is no common knowledge about consumers' demand for processed jackfruits in Uganda.

The present paper addresses this issue by analyzing consumer demand for jackfruit-nut-bars (JNBs); it does so by combining sensory analysis with Van Westendorp's price sensitivity meter (PSM). Recent literature demonstrated the value of PSM when implementing novel food products on the market (Weinrich & Gassler, 2021). JNBs are

chosen, on one hand, because they are rich in minerals and nutrients, entirely plant-based, and without added sugar. On the other hand, they provide benefits commonly attributed to processed foods, such as time-saving preparation and consumption, no requirement of preparation knowledge, and suitability for out-of-home consumption (Sauer et al., 2021; Xing et al., 2021). Additionally, JNBs are optimal snacks that can positively impact cognitive performance and physical activity (Masoomi et al., 2020). Due to their convenience and nutritional characteristics, they offer a healthier alternative to currently existing products in the market.

Our work offers the following contributions to existing literature: first, while earlier research examined the nutritional value of jackfruits and their potential for processing, there is no current insight into consumers' demand for processed jackfruit products. Second, we gain a first impression of how consumers receive sugar-free snacks. Third, an economic evaluation of consumers' willingness to pay (WTP) for the products allows us insights into consumers' price preferences and, thus, the product's competitiveness in the market. Finally, analyzing factors that shape consumers' demand provide approaches for future successful development and implementation of processed jackfruit products.

The paper is organized in the following manner: Section 2 describes the methods that are applied, along with a description of the product, study site, and data collection; Section 3 will present the results and their discussion; Section 4 concludes the paper.

2 Methods

2.1 Product

Jackfruit is globally the largest edible fruit. The jack tree has high productivity and can yield up to 700 fruits per year. The weight of the fruits varies between 0.5 to 50 kilograms (Rahman et al., 2016). The bulbs inside the fruits are the edible part. The fruits are held together by laticiferous cells that produce latex and make handling of jackfruits difficult. In Uganda, jackfruits are available all year round, with the highest yields in December and January (Nakintu et al., 2019).

Our analysis is built on four JNBs that were slightly different from each other. Project colleagues from Göttingen University developed the recipes for JNBs. All JNBs consisted of jackfruit, peanuts, mango, and lemon. In addition, desiccated coconut was added to

two JNBs since previous research from Nigeria demonstrated an increase in flavor through coconut in breadfruit snacks (Okafor & Ugwu, 2014). The ingredients were mixed and roughly blended. Two mixtures, one with coconut and one without, were finely puréed into a homogenous mixture. The remaining two products were kept crispy to analyze the effect of texture on consumer preferences. All four mixtures were oven-dried (Table 1). The ingredients were sourced from local markets in Kampala, Uganda. The products were prepared freshly by a project colleague at Makerere University for the study. Combining fruits with nuts lead to high mineral contents in the final products (Xing et al., 2021). The nutrient contents for the puréed JNB with coconut are available in Table 2. Since differences between the JNBs were small, we do not expect significantly different results for the remaining products.

Table 1: Product overview

	Plain	**Puréed**	**Coco**	**Coco & Puréed**
				
Ingredients	Jackfruit (60) Peanuts (10) Mango (20) Lemon juice (10)	Jackfruit (60) Peanuts (10) Mango (20) Lemon juice (10)	Jackfruit (55) Peanuts (18) Mango (9) Lemon juice (9) Desiccated coconut (9)	Jackfruit (55) Peanuts (18) Mango (9) Lemon juice (9) Desiccated coconut (9)
Preparation technique	Roughly blended	Finely puréed	Roughly blended	Finely puréed

* % of each ingredient in the final product in parentheses

Table 2: Mineral contents of the puréed JNB with coconut

Mineral	mg/ 100g DM[1]
Potassium (K)	1214.03
Phosphorus (P)	358.52
Sulfur (S)	211.00
Magnesium (Mg)	174.73
Calcium (Ca)	80.05
Sodium (Na)	40.72

Copper (Cu)	5.91
Iron (Fe)	5.20
Zinc (Zn)	6.86
Manganese (Mn)	2.32

[1] Displayed are the nutrient contents after drying

Source: Xing, Keding, and Pawelzik 2021

2.2 Study site and participants

We collected data from students and staff at Makerere University in Kampala, Uganda, based on the following criteria: 1) being at least 18 years old; free of diabetes or any other diet-related restriction; willing to taste four different JNBs. Participants were selected based on their availability and willingness to take part in the study, which was conducted in March 2020. The enumerators informed the participants about their right to leave at any time and asked them to give their written consent. All study participants received 4000 Ugandan Shillings (UGX) (1 US$ = 3669 UGX at the time of the survey) to express our gratitude.

2.3 Data collection

Trained enumerators collected data using electronic tablets. The first part of the survey comprised a structured questionnaire that addressed the socio-demographic characteristics of participants. Following which, the participants received about 10 g of each JNB, shaped in squares, one at a time. The order was randomized. The participants were asked to rate each JNB on color, aroma, texture in the mouth, taste, and general appearance using a five-point Likert scale, with values ranging from 1 = dislike it very much, 2 = dislike it, 3 = neither like nor dislike it, 4 = like it, and 5 = like it very much.

Further, participants were asked to rate the sweetness and fruit flavor of the JNBs on a just-about-right scale, with values ranging from 1 = much too sweet, 2 = slightly too sweet, 3 = just about right, 4 = somewhat not sweet enough, and 5 = very much not sweet enough for sweetness and 1 = much too weak, 2 = somewhat too weak, 3 = just about right, 4 = somewhat too strong, and 5 = much too strong for fruit flavor. We used symbols to label the different bars. This way, we ensured double-blind testing since neither enumerator nor study participant knew the difference between the JNBs. Between testing, participants were asked to rinse their mouths with water.

After the sensory analysis, PSM was used to assess participants' WTP for each JNB. PSM helps provide first insights about optimal prices for a novel product (Van Westendorp, 1976). The approach forces consumers to think about price ranges (Chhabra, 2015). The PSM included the following questions about each JNB:

(1) At what price would you consider the product to be too expensive that you would not consider buying it?
(2) At what price would you consider the product to be too cheap that you would doubt its quality and not consider buying it?
(3) At what price would you consider the product to be getting expensive, but you would still consider buying it?
(4) At what price would you consider the product to be getting cheap that you would consider it to be a bargain?

The participants were asked to answer these questions for 200 g packs of the JNBs. A 200 g packet of cookies was provided as a reference quantity. As it is commonly done with PSM, the data were analyzed graphically to display cumulative distributions at different price points. Following the PSM, the survey was concluded with general questions about participants' consumption habits and attitudes using a structured questionnaire, including open questions about what they dislike and like most about jackfruits.

2.4 Statistical analysis

To get a general idea about factors that influence the demand for JNBs, we ran one model across all four products simultaneously. Thus, we combined the four JNBs to one and calculated the mean of the four price questions: too cheap, cheap, expensive, and too expensive. We used a random effects model to account for participants who state their WTP four times, once per JNB. We used the following model to fit the data:

$$WTP_{ij} = \alpha + x_{ij}\beta + \varepsilon_i\gamma + v_i + \epsilon_{ij} \quad (1)$$

WTP_{ij} is the willingness to pay of the i^{th} participant for the j^{th} JNB. $x_{ij}\beta$ describes the explanatory variable that is alternative-specific, thus changing between the JNBs such as perceived sweetness. Explanatory variables that are case-specific, which implies they do not vary across JNBs, such as socio-demographic variables, are denoted by $\varepsilon_i\gamma$. v_i displays the random effect and ϵ_{ij} the error term.

A special concern in the production of these bars was to add no industrialized sugar. Therefore, we included "sweetness" as an independent variable, in addition to socio-demographic characteristics, namely age, sex, and number of people living in the households. Moreover, we included frequency of snack consumption, control of families' sugar intake, and participants' food neophobia in the model. The frequency of snack consumption was measured on a scale ranging from 1 = never to 8 = daily, and control of families' sugar intake was measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Food neophobia is a factor derived from five different statements towards new food (Table 3). The enumerator effect was included as a control variable. The analysis was carried out using Stata 16.

Table 3: Factor analysis of food neophobia of the study participants, displayed are the factor loadings

	Neophobia factor
I am afraid to eat food I did not eat before.[1]	0.85
I do not trust new food.[1]	0.79
I constantly try new foods (reversed). [1]	0.80
I am very particular about the food I eat. [1]	0.75
I eat almost anything (reversed). [1]	0.88
Cronbachs-α	0.74
KMO	0.72

[1] Scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree

3 Results and discussion

3.1 Participant characteristics

The sample comprises 93 people, who are primarily young and well-educated students with an average age of 28 years and 14 years spent in formal education. Almost half of the participants are females, who live, on average, in households of five people (Table 4). The study participants consume fresh jackfruits mainly due to their taste (44%), and the majority dislike its sappiness (61%).

The descriptive results of participants' food neophobia reveal that participants tend to be relatively open toward trying novel products. Less than one-third of the sample agrees to

the statement “I do not trust new food.” and “I am afraid to eat food I did not eat before.”. Over 60% state that they constantly try new foods.

Table 4: Participant characteristics

Characteristics (n = 93)	Mean	Std. Dev.	Min	Max
Sociodemographic				
Female (%)	48%			
Age (years)	28.29	11.29	18	61
No. household members	5.05	3.03	1	17
Years in formal education	14.51	3.76	1	23
Reasons for Jackfruit consumption[1]				
Taste	44 %			
Health	25 %			
Availability	8 %			
Dislike about Jackfruits[1]				
Sap	61 %			
Perishability	9 %			
Strong smell	9 %			
Food Neophobia[2]				
I am afraid to eat food I did not eat before.	2.31	1.40	1	5
I do not trust new food.	2.28	1.27	1	5
I constantly try new foods.	3.75	1.18	1	5
I am very particular about the food I eat.	3.01	1.28	1	5
I eat almost anything.	3.08	1.45	1	5

[1] Open question, listed are the three most frequently stated reasons; [2] 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree;

Most participants consume fruits at least twice a week (Table 5). Only one participant consumes processed jackfruit products, namely jackfruit crisps. Over 70% consume snacks at least twice a week. Sugared snacks are consumed a little less frequently, with 25% indicating to consume them daily and 32% to consume them two to three times per week (Table 5). Our finding that less than 30% of the participants consume fruits daily aligns with previous research that shows that insufficient fruit consumption in Uganda occurs among various social classes (Kabwama et al., 2019). This fact reinforces concerns

about general dietary quality among the urban population in Uganda, especially considering that in our sample, sugared snack consumption is almost as high.

Table 5: Consumption frequencies

	Fruits (%)	**Fresh Jackfruit (%)**	**Processed Jackfruit (%)**	**Snacks (%)**	**Sugared Snacks (%)**
Never	2.15	9.68	98.92	3.23	5.38
Less than once per month	1.08	9.68	0	1.08	4.30
Once per month	1.08	21.51	0	6.45	8.60
2 to 3 times per month	4.30	12.90	0	5.38	2.15
Once per week	13.98	15.05	0	9.68	15.05
2 to 3 times per week	37.63	18.28	1.08	26.88	32.26
4 to 6 times per week	10.75	4.30	0	10.75	6.45
Daily	29.03	8.60	0	36.56	25.81
N	93	93	93	93	93

3.2 Sensory analysis

On average, all sensory characteristics show a slight tendency of being liked, with mean scores above 3 (“neither like nor dislike it”) (Table 6). The only exception is the score for texture in the mouth for the JNB with coco, which is rated slightly lower. The plain JNB received the highest score for color, the puréed JNB the highest for texture in the mouth, and the puréed JNB with coco the highest score for aroma, taste, and general appearance. However, the differences between the plain JNB and the puréed JNB with coco are insignificant for aroma and general appearance. Most characteristics receive scores of “like it” and “like it very much” by more than 50% of the participants. It is noticeable that texture in the mouth for the two bars that are not puréed receive significantly lower scores than their counterparts. The findings indicate that the soft texture of the puréed bars is preferred. The sensory scores of all four JNBs are displayed in Figure A. 1. Finally, we want to point out that the high scores for JNBs are not necessarily obtained from the same participants, which indicates that different participants preferred different JNBs.

Participants did not rate the sweetness between the JNBs with any statistically significant difference. The fruit flavor of the puréed JNB with coco is perceived as strongest. It is rated significantly higher than the fruit flavor of the puréed JNB and coco JNB. We find that between 56 and 59% of the participants rate sweetness, and between 47 and 55% rate

the fruit flavor of all JNBs as just about right. According to the t-test, neither sweetness nor fruit flavor is rated significantly different from 3 = just-about-right for any product. That sweetness being perceived as just-about-right is a welcome finding, considering the absence of sugar. The variance of all JNBs combined (Total) suggests heterogeneity within participants' scores across the products.

In summary, these findings indicate that the differences between the single bars are small, and no JNB can be identified as superior to the others. Since we find variability in participants' scores across the products, we believe that providing more than one kind of JNB allows for developing larger market shares.

Table 6: Mean results of the sensory analysis

	Plain	**Puréed**	**Coco**	**Coco & Puréed**	**Total**
Color	3.86^{a}	3.61^{b}	3.31^{c}	3.51^{bcd}	3.59
	(1.03)	(1.06)	(1.15)	(0.98)	(1.07)
Aroma	3.63^{a}	3.22^{b}	3.15^{bc}	3.69^{ad}	3.44
	(1.05)	(0.98)	(0.99)	(.98)	(1.00)
Texture in the mouth	3.11^{a}	3.61^{b}	2.90^{ac}	3.57^{bd}	3.31
	(1.02)	(1.07)	(1.23)	(1.06)	(1.14)
Taste	3.54^{a}	3.42^{ab}	3.42^{abc}	3.74^{d}	3.53
	(1.06)	(1.14)	(1.07)	(1.09)	(1.10)
General appearance	3.63^{a}	3.60^{ab}	3.49^{abc}	3.82^{ab}	3.64
	(0.89)	(0.95)	(0.94)	(0.87)	(0.92)
Sweetness[1]	2.96^{a}	2.92^{a}	2.84^{a}	2.98^{a}	2.91
	(0.82)	(0.78)	(0.8)	(0.79)	(0.80)
Fruit flavor[2]	3.01^{a}	2.88^{ab}	2.98^{ab}	3.12^{ad}	2.99
	(0.87)	(0.99)	(.86)	(0.91)	(0.91)
N	93	93	93	93	372

Note: mean coefficients, sd in parentheses; different letters a,b,c, and d reflect significant differences ($p < 0.05$) in a characteristic between the JNBs according to Kruskal-Wallis and Duncan-T; [1] scale: 1 = much too sweet, 2 = slightly too sweet, 3 = just about right, 4 = somewhat not sweet enough, and 5 = very much not sweet enough; [2] scale: 1 = much too weak, 2 = somewhat too weak, 3 = just about right, 4 = somewhat too strong, and 5 = much too strong

3.3 Price sensitivity meter

Each participant had to state four prices (too cheap, cheap, expensive, and too expensive) for each JNB. Thus, in total, 372 statements were made. Before analyzing the PSM, we

checked participants' answers for plausibility. Statements had to comply with the following order: too cheap < cheap < expensive < too expensive. We kept 297 statements for further analysis.

The findings from the analysis of PSM display homogeneity across products (Table 7). While prices of approximately 0.55 US$ are perceived as being too cheap, prices of approximately 2 US$ are perceived as being too expensive. We cannot find any statistically significant differences between the JNBs according to Kruskal-Wallis ($p < 0.05$).

Table 7: Descriptive results of the price sensitivity meter

	Plain	**Puréed**	**Coco**	**Coco & Puréed**
Too cheap	0.514	0.605	0.536	0.571
	(0.478)	(0.549)	(0.411)	(0.456)
Cheap	0.745	0.885	0.760	0.791
	(0.590)	(0.774)	(0.490)	(0.533)
Expensive	1.434	1.623	1.474	1.534
	(1.176)	(1.143)	(1.310)	(1.114)
Too expensive	1.867	2.299	1.993	2.093
	(1.421)	(2.070)	(1.472)	(1.439)
N*	74	76	73	74

Note: mean coefficients, sd in parentheses; We could not find any statistically significant differences between the products for $p < 0.05$ according to Kruskal-Wallis

Therefore, we combined the results of all four JNBs to one variable to further evaluate PSM. The proportion of participants who find the price up to a certain level as being "too expensive," "expensive," "cheap," or "too cheap" were calculated for different price points. The graphical results are displayed in Figure 1. Four intersections can be identified that should be considered for further product marketing. First, is the optimal price point (OPP), at which this point, the proportions of participants who consider JNBs as being "too expensive" or "too cheap" are equal. For the JNBs, we find the OPP at 0.82 US$. The price at this point is optimal in terms of maximizing sales volume or market share. The price is similar to dried jackfruit bulbs currently found at the market. Their price for 200 g ranges between 0.71 US$ in peak jackfruit season (May to July) and 0.98 US$ in lean jackfruit season (February to April). Similarly, prices for 200 g of cookies also range around 1 US$. These prices were obtained from markets in Kampala, Uganda. The second

intersection is the indifference price (IDP), at which the proportions of participants who consider JNBs as being “expensive” or “inexpensive” are equal. The price that results at this point describes a balanced price-image relationship. Based on the target product, it is generally the average price that market-leading companies can achieve. For the JNBs, IDP is equal to OPP. The finding is common and indicates that the product neither has a negative image, which would lead to an OPP lower than IDP, nor an especially innovative character, which would lead to an OPP higher than IDP.

The final two intersections can be used to determine an optimal price range. The threshold of relative cheapness (Point of Marginal Cheapness) represents the lower price barrier. A price below this point could cause damage to the image of JNBs. The point of marginal expensiveness results in the upper price barrier. Potential buyers will hardly accept higher prices. For the JNBs, we find an optimal price range between 0.68 US$ and 1.09 US$.

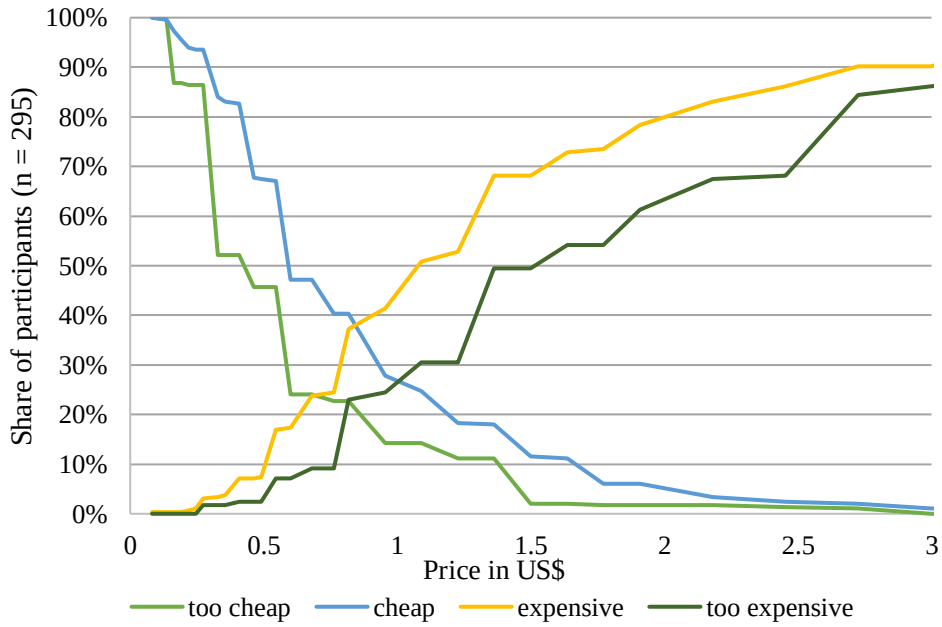

Figure 1: Graph of price sensitivity meter (all four JNBs combined). Displayed are the participant shares against the price for 200 g of JNBs

Random effects model

For the random effects model, we calculated mean of the four prices as the dependent WTP variable; Table 8 presents the results. The model estimates four variables to

significantly affect participants' WTP: sweetness, age, frequency of snack consumption, and an interaction between age and sweetness. Age, sweetness, and frequency of snack consumption positively impact WTP. Sweetness shows the strongest impact. A one-unit increase in sweetness increases participants' WTP by 0.27 US$. The effect is predominant for younger participants. The positive relation between frequency of snack consumption and WTP indicates that JNBs are in line with currently consumed snacks and thus, emphasizes their potential to substitute unhealthier alternatives.

The positive effect of age might be due to our general young sample with an average age of 28 years. We believe that the sweetness effect is predominant among younger participants since their diets might be higher in sugared foods and beverages (Isabirye et al., 2020). Therefore, their taste buds are likely to be already adapted to sweetness. This finding is important for future research that aims to improve diets among these population groups. Moreover, previous studies reveal that liking sweet taste is associated with total energy, carbohydrate, and sugar intake (Jayasinghe et al., 2017). This draws attention to the need to provide healthier alternatives.

Before concluding, we need to elaborate on some shortcomings of our study. We questioned only a small and homogenous number of consumers. The findings give some valuable first insights towards the perception of JNBs and provide starting points for follow-up research. Addressing additional parts of society could help identify further channels to sell jackfruit products. The JNBs can, for instance, be easily implemented as healthy snacks into school diets. Thus, research among children and students is a possible way forward.

Table 8: Results of random effects model

Willingness to pay[1]	Coefficient	St.Err.[2]	t-value	p-value	[95% Conf	Interval]	Significance
Sweetness	.27	.115	2.35	.019	.045	.496	**
Age (years)	.021	.012	1.72	.086	-.003	.044	*
Female (binary)	.142	.14	1.01	.311	-.132	.416	
No. of people living in the household	-.037	.044	-0.84	.402	-.122	.049	
Frequency of snack consumption	.115	.05	2.32	.02	.018	.212	**
I control my families' sugar intake	-.042	.058	-0.72	.472	-.157	.073	
Neophobia (factor)	.145	.089	1.64	.101	-.028	.319	
Age#Sweetness	-.005	.003	-1.65	.099	-.012	.001	*
Constant	-.687	.534	-1.29	.198	-1.734	.359	

Mean dependent variable	1.216	SD dependent variable	0.853
Overall r-squared	0.113	Number of observations	293
Chi-square	28.146	Prob > chi2	0.005
R-squared within	0.038	R-squared between	0.123

*** *p<0.01*, ** *p<0.05*, * *p<0.1*, the enumerator effect is included as a control variable

[1] Willingness to pay is the mean of the four price sensitivity meter items (too cheap, cheap, expensive, and too expensive)

[2] Standard errors are robust

4 Conclusions

Processing is perceived as the way forward to enhance jackfruit utilization in Uganda. Concurrently, processed food consumption is often associated with overweight and obesity. Jackfruit-nut-bars are an option to process jackfruits into long-lasting products that are rich in minerals and vitamins but are free of added sugar, salt, and oil. However, to implement the product successfully on the market, it is required that consumers demand them. This paper examines consumers' demand for four different types of JNBs.

Based on the sensory perception of and willingness to pay for the products, the findings suggest that JNBs can provide an alternative to the existing unhealthy snacks in the market. Simultaneously, the findings indicate that it is possible to derive sweetness in snacks solely from natural plants without adding industrialized sugar. The finding is important in the face of growing obesity rates in Uganda. Still, sweetness is an important factor that drives demand and should be considered in future development of jackfruit products.

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Supplementary material

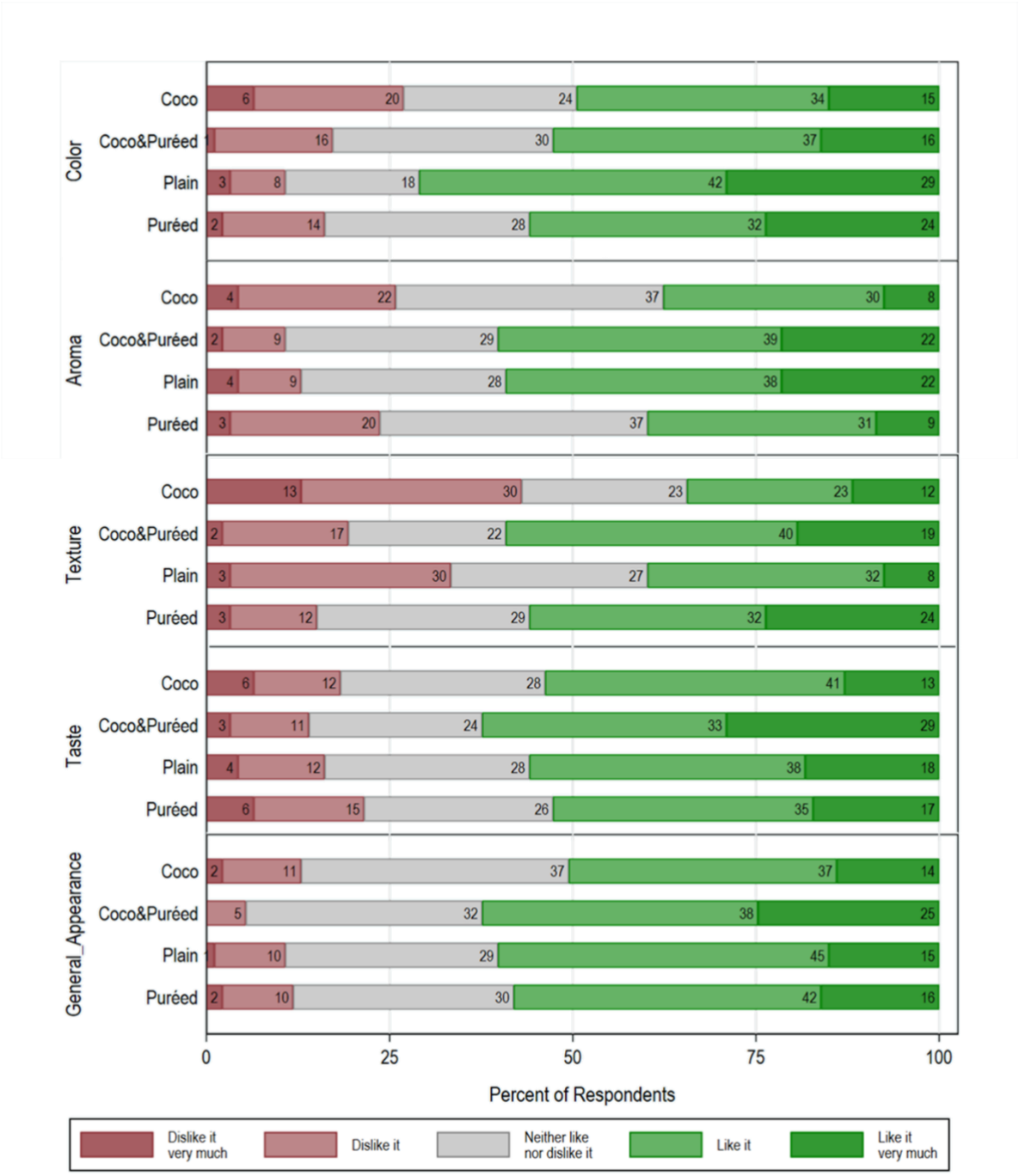

Figure A. 1: Results of the sensory analysis, n = 93