

## Socio-Economic Characteristics And Demographics Analysis Of Honey Consumption Patterns And Preferences

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**ABSTRACT:** This study analyzed honey consumers' socio-economic characteristics and demographics in Cross River State, Nigeria. The results showed a gender distribution of 45.7% female and 53.8% male. In terms of age, the majority (60.1%) fell within the 40-49 years category. Most consumers (93.6%) were married. The education level of the respondents showed 53.8% with tertiary education and 6.9% with no formal education. Household size varied, with 74% having 5-10 members. Occupation-wise, 72.3% were employed. The study revealed a significant preference for honey over sugar, with 87.30% of respondents favouring honey. Health considerations (34.1%) and taste (33.5%) were the primary reasons for preferring honey. Most respondents (29.5%) consumed honey for 16-20 years, and 37.6% used honey as a sweetener. Furthermore, 27.7% used honey for medicinal purposes, and 23.1% used it in cosmetics. The study found that taste (48.6%) was the most significant factor influencing the perceived quality of honey. During the COVID-19 pandemic, 88.4% of respondents reported a decrease in honey consumption. The binary logistic regression model showed that education status and quantity of honey consumed per year/liters had a significant influence on preference for honey consumption.

[Ugbe, J. A.; Tee, T.N.; Ancha P.U. **Socio-Economic Characteristics And Demographics Analysis Of Honey Consumption Patterns And Preferences.** *Nat Sci* 2024,22(12):3-16]. ISSN 1545-0740 (print); ISSN 2375-7167 (online). <http://www.sciencepub.net/nature> 02. doi:[10.7537/marsnsj221224.02](https://doi.org/10.7537/marsnsj221224.02)

**Keywords:** Socio-Economic Characteristics; Demographics Analysis; Honey Consumption; Pattern; Preferences

### INTRODUCTION

Since ancient times, people have used honey as a natural sweetener owing to its distinct flavour, nutritional benefits, and therapeutic qualities (Samarghandian *et al.*, 2017). Global health awareness and cultural trends are driving an increase in the demand for honey (Ugbe and Japheth, 2023). Beekeepers, honey producers, and marketers need to comprehend honey consumers' socio-economic and demographic attributes of honey consumers to optimize their products and approaches to effectively cater their target market. Beekeeping is widely acknowledged as a significant agricultural endeavour in Nigeria, with a considerable number of rural populations depending on it as a means of subsistence.

Many variables impact the socio-economic attributes and demography of honey consumption patterns and preferences in Cross River State, Nigeria. The range of honey consumption patterns is mostly determined by regional, cultural, and personal preferences (Mesias *et al.*, 2021). Honey intake habits are also influenced by dietary preferences, cultural beliefs, culinary customs, and accessibility to honey. Honey is a natural sweetener that is frequently used in a variety of culinary traditions. Its uses in the cosmetic, pharmaceutical, and wellness industries have grown as well (Bojago, 2023).

Demand for natural and nutritious food products has increased as the result of shifting consumer tastes. As people grow more health conscious, they prefer natural sweeteners like honey over processed sugars (Arshad *et al.*, 2022). There are regional variations in honey consumption and preferences; for instance, Manuka and Thyme honey are widely valued for their unique flavours and potential health advantages (Wang *et al.*, 2023). Dietary habits can also have an impact on honey consumption patterns. Given that honey naturally contains carbs, some users use it as an energy supplement (Samarghandian *et al.*, 2017). The honey industry does, however, face challenges such as restricted market access, inferior processing facilities, and low consumer knowledge of honey's health advantages. To address these challenges, it is essential to investigate the socio-economic characteristics and demographics of honey consumers in Nigeria.

The aim of the study is to investigate into the socioeconomic characteristics of honey consumption habits and preferences in Cross River State, Nigeria. Knowledge about employment concerns, environmental potential, and the costs and benefits of honey production and selling was also provided. Future forest management initiatives can benefit from the research, which can also help vulnerable populations launch enterprises in the forest subsector.

## MATERIALS AND METHODS

### Description of the Study Area

This study's data was sourced from Cross River State, Nigeria, which is situated in the country's tropical rainforest region (Macarthy *et al.* 2010). Spanning approximately 21,265 square kilometers, the state lies between latitudes 4°30'0"N and 7°0'0"N and longitudes 8°30'0"E and 9°30'0"E. The region experiences heavy rainfall during the wet season (April-November), with annual rainfall ranging from 1800mm to 4000mm and temperatures between 10°C and 32°C. The state boasts an impressive 50% of Nigeria's remaining tropical high forests (Macarthy *et al.* 2010; CRSFC, 2018), comprising Forest Reserves, Community forests, and Cross River National Park forests. These forests, covering around 8,968 square kilometers, are divided into three ecological zones: Tropical High Forest (7,292km<sup>2</sup>) (CRSFC, 2018), swamp forest, and Savannah Forest, offering a diverse range of forest products.

### Sampling Technique

The study employed a multistage and purposive sampling technique to select respondents from the three ecological zones in Cross River State, Nigeria. The state was stratified into Northern, Central, and Southern ecological zones, with 10 Local Government Areas (LGAs) selected based on the presence of organized and non-organized honeybee farmers, bee hunters, retailers, and consumers. The sample size was determined using the Taro Yamane formula, with a total of 684 respondents selected, comprising 242 bee farmers, 162 marketers, 59 honeybee hunters, and 221 consumers.

The sampling procedure involved purposive selection of ecological zones, LGAs, council wards, and communities noted for honeybee farming and marketing. Snowball sampling was used to select honeybee hunters and consumers, while the Taro Yamane formula was used to determine the sample size for each group. The study also included 10 Key Informant Interviews (KII) and three Focus Group Discussions (FGD) for triangulation of information. The sample size was calculated using the formula  $n = N / (1 + N(e)^2)$ , where N is the population size and e is the error degree of tolerance.

### Data Collection

The study adhered to best practices and research ethics by obtaining Free Prior Informed Consent (FPIC) from all data collection communities to ensure inclusive participation and reduce suspicion. Primary data was collected using semi-structured questionnaires administered to honeybee consumers through the electronic Kobo Toolbox, which enhanced

objectivity and efficiency. Additionally, 10 Key Informant Interviews (KII) and 3 Focus Group Discussions (FGD) were conducted to triangulate and supplement information. Geographical Positioning System (GPS) was used to note sample points and authenticate locations. The instrument's validity and reliability were ensured through expert consultation, revision, and GPS validation. The data collected included socio-economic variables, consumption dynamics, and challenges faced in the honeybee farming and marketing business.

### Data Analysis

The study employed a range of statistical tools to analyze the data, including descriptive statistics, such as frequency distribution, percentage, mean, and standard deviation, to summarize the socio-economic characteristics and demographics of the respondents. Additionally, binary logistic regression was used to determine the influence of demographic attributes on the preference for honey consumption, with the dependent variable being preference for honey consumption and the independent variables including gender, age, marital status, education level, household size, years of consuming honey, quantity of honey consumed per year/liters, and unpleasant experiences after honey consumption. The model summary included the -2 Log likelihood, Cox & Snell R Square, and Nagelkerke R Square, while the omnibus tests of model coefficients included chi-square, degrees of freedom, and significance level. The study used SPSS software for data analysis and set the significance level at 0.05 ( $p < 0.05$ ) to determine the statistical significance of the results.

## RESULTS

### Socio-economic Characteristics and Demographics Analysis of Honey Consumers

The socio-economic characteristics and demographics of honey consumers were analyzed, revealing a gender distribution of 45.7% female and 53.8% male, totaling 173 individuals (Table 1). In terms of age, the majority (60.1%) fell within the 40-49 years category, followed by 22.5% in the 50-59 years range, while no respondents were under 30 years old. Most consumers (93.6%) were married, with 2.3% single, 1.2% divorced/separated, and 2.9% widowed. The education level of the respondents showed 53.8% with tertiary education, 31.8% with secondary education, 7.5% with primary education, and 6.9% with no formal education. Household size varied, with 74% having 5-10 members, 14.5% with less than 5, and 11.6% with 11-15 members. Occupation-wise, 72.3% were employed, 15.6% were farmers, 2.9% were traders, 6.4% were unemployed, and 2.9% were

students. Unfortunately, no data was available on experience in honey production/marketing.

**Table 1: Socio-economic Characteristics and Demographics Analysis of Honey Consumers**

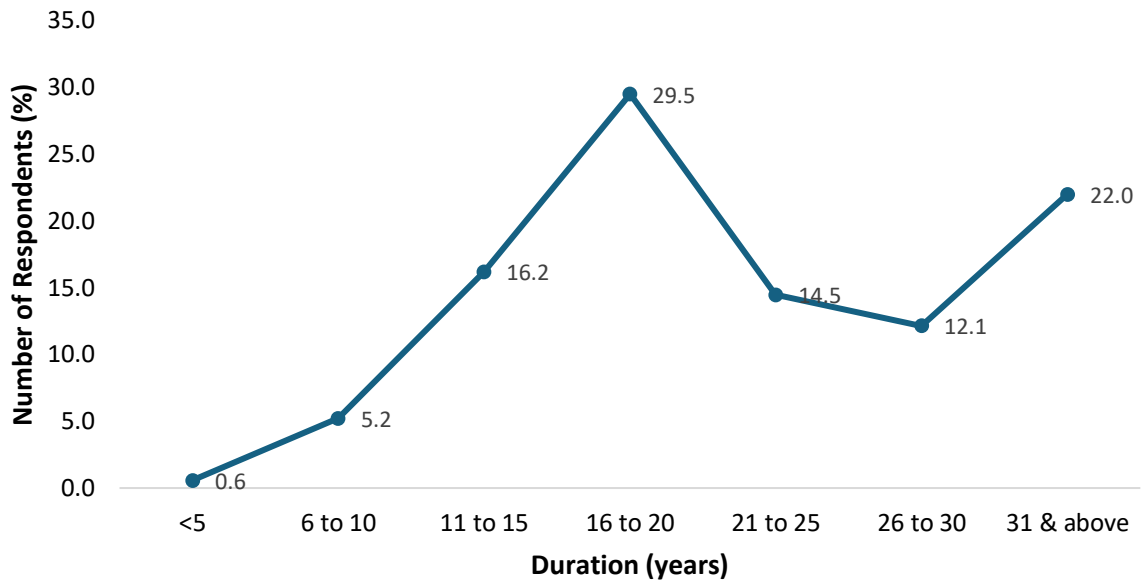
<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Female	79	45.7
Male	93	53.8
<b>Total</b>	<b>173</b>	<b>100</b>
<b>Age category (years)</b>		
20 -29	0	0
30 – 39	18	10.4
40 – 49	104	60.1
50 – 59	39	22.5
60 & above	9	5.2
<b>Total</b>	<b>170</b>	<b>98.3</b>
<b>Marital status</b>		
Single	4	2.3
Married	162	93.6
Divorce/Separated	2	1.2
Widowed	5	2.9
<b>Total</b>	<b>173</b>	<b>100</b>
<b>Level of education</b>		
No formal education	12	6.9
Primary education	13	7.5
Secondary education	55	31.8
Tertiary education	93	53.8
<b>Total</b>	<b>173</b>	<b>100</b>
<b>Household size</b>		
<5	25	14.5
05-Oct	128	74
Nov-15	20	11.6
>15	0	0
<b>Total</b>	<b>173</b>	<b>100</b>
<b>Occupation</b>		
Employed	125	72.3
Farmer	27	15.6
Honey producer/marketer	0	0
Trader	5	2.9
Unemployed	11	6.4
Student	5	2.9
<b>Total</b>	<b>173</b>	<b>100</b>

#### 4.1.3 Consumption Level of Honey, Sweeteners for possible alternatives traded in Cross River State.

The result on honey consumption among respondents in the study area (Figure 1), provides insight into the length of time individuals have been consuming honey, ranging from less than 5 to 31 years or above. The results revealed a distribution across various durations, with most respondents having consumed honey for extended periods. The largest proportion of respondents (29.5%) reported consuming honey for a duration of 16 to 20 years, followed by 11 to 15 years (16.2%) and 31 years and above (22.0%). A significant percentage of the honey consumers reported consuming honey for intermediate durations, with 6 to 10 years accounting for 5.2% and 21 to 25 years comprising 14.5% of respondents. A notable percentage (12.1%) indicated consuming honey for 26 to 30 years. While a low percentage of respondents (0.6%) reported consuming honey for less than 5 years, indicating a relatively recent adoption of honey consumption among a minority of individuals.

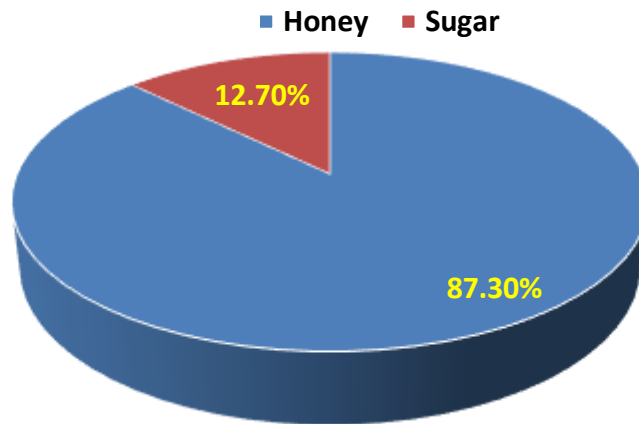
This result had implications out of which, the sustained and widespread consumption of honey over long durations indicates a strong belief in its health benefits and cultural significance. This implies the potential role of honey as a

staple food item and traditional remedy within the community. Also, the consistent demand for honey products over time may have economic benefits for local beekeepers and honey producers, indicating the importance of supporting sustainable beekeeping practices to meet consumer needs while preserving bee populations and their habitats.



**Figure 1: Duration of Honey Consumption in the Study Area**

Figure 2 shows the preference for honey compared to sugar among consumers in Cross Rivers, Nigeria. This indicates a significant preference for honey, with 87.30% of respondents favoring it over sugar. Conversely, only 12.70% of respondents indicated a preference for sugar, even though they consumed honey. This implied a strong preference for honey as a sweetener among consumers in the area, potentially influenced by factors such as taste preferences, health considerations, cultural practices, or economic factors.

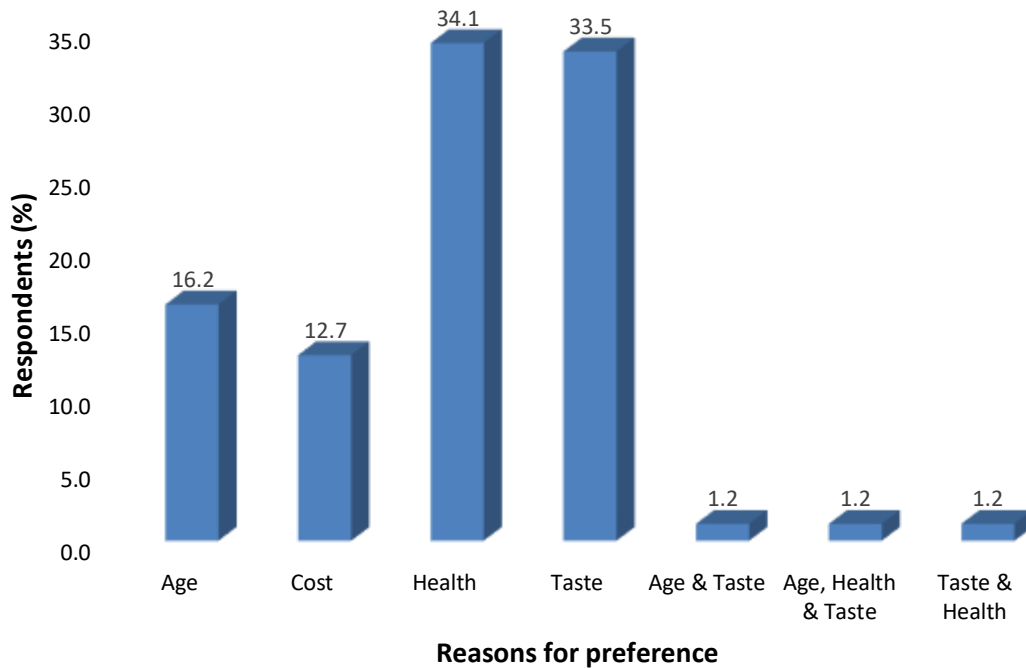


**Figure 2: Preference for Honey or Sugar by Consumers in Cross Rivers, Nigeria**

The reasons behind the preference for honey among consumers in the area, offering insights into the factors influencing their choice of sweetener (Figure 3). The percentage distribution of respondents' reasons for choosing honey over other sweetening options showed most cited reason for preferring honey was health, with 34.1% of respondents

indicated health considerations as a primary factor driving their choice. This suggests that a significant portion of consumers prioritize the perceived health benefits of honey in their dietary preferences. Followed by taste, with 33.5% of respondents attributing their preference for honey to its taste nature. This highlights the importance of sensory factors in influencing consumer choices and suggests that many individuals prefer the taste of honey over other sweeteners.

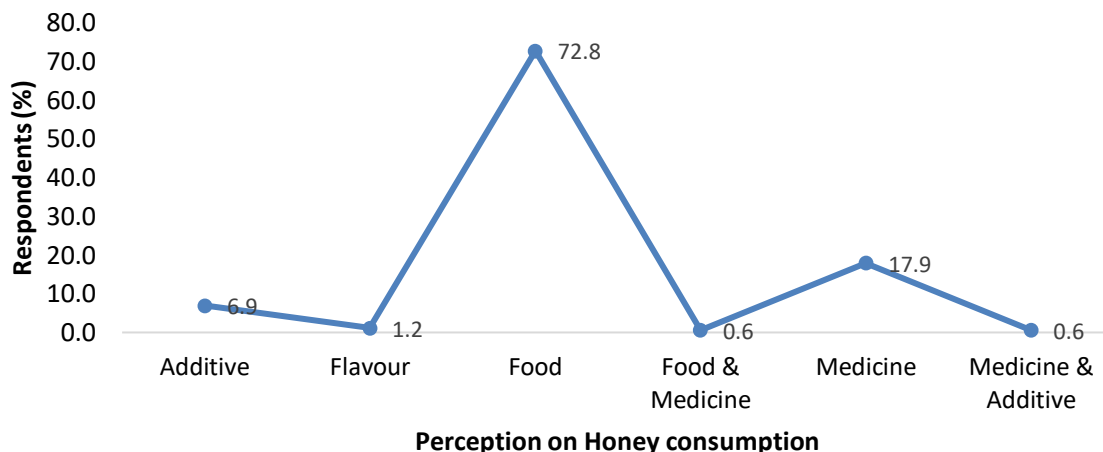
Age emerged as a key factor influencing preferences, with 16.2% of respondents citing age-related considerations as a reason for choosing honey. This revealed that preferences for honey vary across different age groups due to factors such as taste preferences, health consciousness, or cultural norms. Cost was also identified as a factor influencing preferences, albeit to a lesser extent, with 12.7% of respondents indicating cost considerations as a reason for choosing honey. Furthermore, different combinations of reasons, such as age and taste, age, health, and taste, or taste and health, were reported by low percentages of respondents, indicating that preferences for honey may be influenced by a combination of factors rather than a single reason.



**Figure 3: Reasons for the Preference by Honey Consumers in the Area**

The result on how individuals perceived honey and its role in their diets or daily lives (Figure 4) revealed that most respondents perceive honey primarily as a food, with 72.8% indicating that they perceived honey as a standalone food item. This suggests that most individuals that consumed honey in the study area incorporate honey into their diets as a source of nutrition or as a sweetening agent for various food preparations. Furthermore, a high percentage of respondents (17.9%) perceive honey as a medicinal product, revealing the widespread belief in the health benefits associated with honey consumption. This perception aligns with traditional uses of honey in various cultures for its purported medicinal properties, such as soothing sore throats, treating wounds, or boosting overall health.

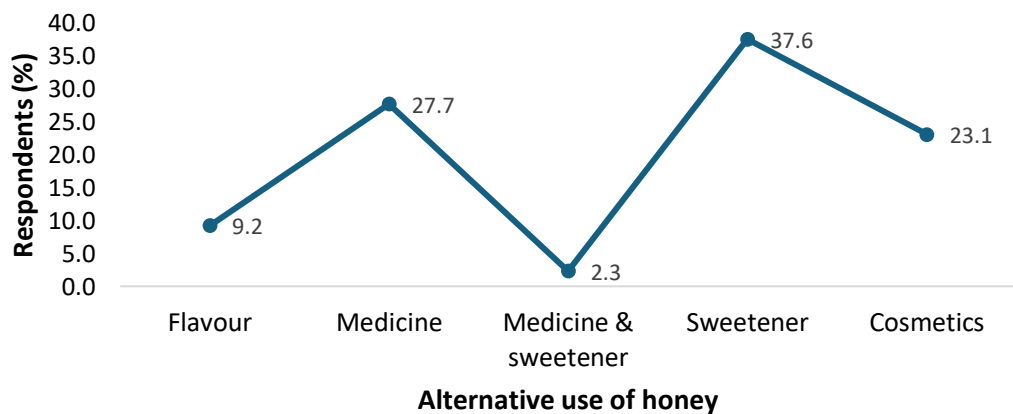
Minority of respondents perceived honey as an additive (6.9%) or as a flavour enhancer (1.2%). The least percentage (0.6%) of respondents perceive honey as both food and medicine, indicating that they recognized its dual role in both dietary and therapeutic contexts. This suggests that some individuals may use honey as an ingredient in recipes or as a flavouring agent to enhance the taste of other foods or beverages.



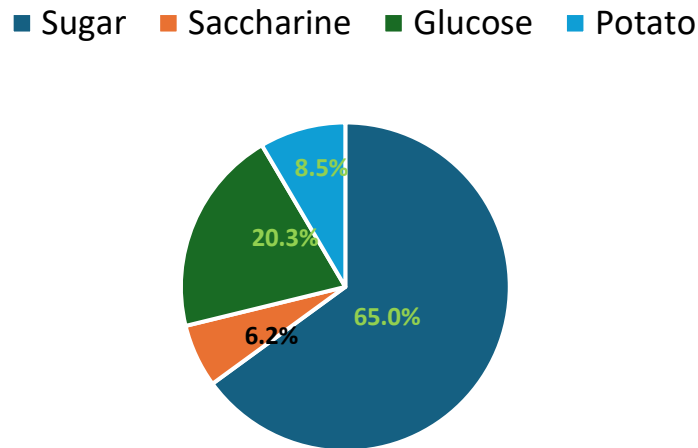
**Figure 4: Respondents' Perception on Honey Consumption**

The alternative uses of honey, aside from consumption, as reported by consumers in the study area (Figure 5) showed that the most reported alternative use of honey was a sweetener, with 37.6% of respondents indicating that they utilize honey as a sugar substitute in their diets. This revealed that many individuals in the study area incorporate honey into recipes or beverages as a natural sweetening agent. Furthermore, a high percentage of respondents (27.7%) reported using honey for medicinal purposes, indicating the widespread belief in the therapeutic properties of honey. This aligns with traditional uses of honey in various cultures for its purported health benefits, such as treating coughs, wounds, or skin conditions. A considerable percentage of respondents (23.1%) reported using honey in cosmetics, indicating its application in skincare or beauty products. Honey is known for its moisturizing and antibacterial properties, making it a popular ingredient in natural skincare remedies and products. A low percentage of respondents reported using honey as a flavour enhancer (9.2%) or as both a medicine and sweetener (2.3%), suggesting additional culinary or therapeutic applications of honey beyond its primary use as a food item or sweetener.

The substitutes for honey utilized by honey consumers in the study area, (Figure 6) showed the most reported substitute for honey was sugar, with 65.0% of respondents indicating that they use sugar as an alternative sweetener. This implies that a significant number of individuals who occasionally consume honey opt for conventional sugar as their primary sweetening agent. A percentage of respondents (20.3%) reported using glucose as a substitute for honey, revealing the preference for this simple sugar in certain dietary contexts. Furthermore, a low percentage of respondents reported using saccharine (6.2%) or potato (8.5%) as substitutes for honey. Saccharine is a synthetic sweetener commonly used as a sugar substitute in various products, while the use of potato as a sweetening agent is less conventional but reflect local culinary practices or preferences.



**Figure 5: Alternative Use of Honey other than Consumption by Consumers in the Study Area**

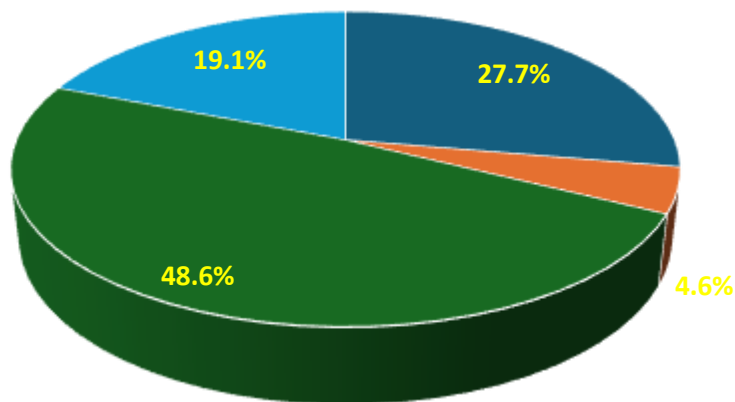


**Figure 6: Substitute for Honey Used by Honey Consumers in the Study Area**

Figure 7 presents the percentage distribution of respondents' opinions on the varied factors that consumers consider for assessment of honey quality they consume in the study area. Based on the result, “taste” was the most significant factor influencing the perceived quality of honey, with 48.6% of respondents indicating that they rely on taste when evaluating honey. This suggests that the sensory experience, such as flavour and sweetness, plays a crucial role in consumers' perceptions of honey quality.

Colour was cited as an important determinant of honey quality by 27.7% of respondents. The colour of honey can vary depending on factors such as floral source, processing, and storage conditions, and consumers may associate specific colours with certain flavour nature or quality attributes. Furthermore, viscosity or thickness was mentioned by 19.1% of respondents as a factor in determining honey quality. The texture and consistency of honey can vary, with thicker honey often perceived as higher quality due to its perceived purity and richness. A low percentage of respondents (4.6%) stated a combination of factors, including colour, odour, taste, thickness, and viscosity, as important indicators of honey quality. This finding revealed that some consumers consider multiple sensory characteristics when assessing honey quality.

■ Colour ■ Colour/Odour/Taste/thickness/Viscosity ■ Taste ■ Viscosity/thickness

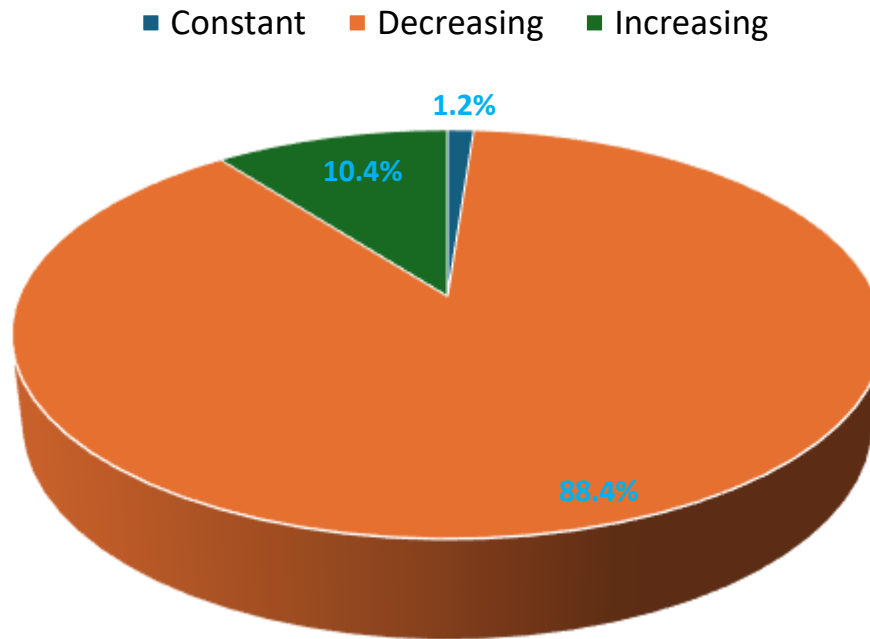


**Figure 7: Factors that Determine Quality of Honey Consumed in the Study Area**



The level of honey consumption during the COVID-19 pandemic as reported by respondents is presented in Figure 8. The result showed the percentage distribution of responses regarding changes in honey consumption patterns amidst the pandemic. Based on the result, most respondents (88.4%) reported a decrease in honey consumption during the COVID-19 pandemic. This indicates that a significant proportion of consumers in the study area reduced their consumption of honey amid the pandemic, potentially influenced by factors such as economic uncertainty, changes in purchasing behavior, or disruptions in supply chains.

About 10.4% of respondents reported an increase in honey consumption during the pandemic. This suggests that a subset of consumers may have increased their consumption of honey for various reasons, such as perceived health benefits, home cooking trends, or changes in dietary habits during lockdown periods. Fewer respondents (1.2%) reported that their honey consumption remained constant during the COVID-19 pandemic. While this represents a small portion of respondents, it indicates that some consumers did not experience significant changes in their honey consumption patterns despite the challenges posed by the pandemic.



**Figure 8: Level of honey consumption during the COVID - 19 pandemic**

The influence of demographic attributes on the preference for honey consumption in the study area was determined using binary logistic regression (Table 2). The -2 Log likelihood value was 92.016, indicating the overall fit of the model. The Cox & Snell R Square and Nagelkerke R Square values were 0.205 and 0.381, respectively, representing the proportion of variance explained by the model. The omnibus tests of model coefficients showed significant results ( $p < 0.05$ ), indicating that the model was statistically significant in predicting the preference for honey consumption. This is evident from the chi-square values for the Step, Block, and Model, all of which were 38.975 with 8 degrees of freedom (Table 2).

The variables included in the equation, along with their respective coefficients (B), standard errors (S.E.), Wald statistics, degrees of freedom (df), significance levels (Sig.), and odds ratios (Exp(B)) were shown (Table 2). Each variable's coefficient represents its contribution to predicting the preference for honey consumption. For instance, variables such as education status and quantity of honey consumed per year/liters showed significant coefficients ( $p < 0.05$ ), indicating that the demographic attributes had a notable influence on preference. Conversely, variables such as gender, age, marital status, household size, years of consuming honey, and unpleasant experiences after honey consumption exhibit non-significant coefficients, indicating these attributes had less impact on preference in this model. The constant term is included in the equation, representing the intercept of the regression equation.



**Table 2: Influence of Demographic Attributes on Preference on Honey Consumption in the Study Area**

Model Summary							
	-2 Log likelihood	Cox & Snell R Square		Nagelkerke R Square			
	92.016 <sup>a</sup>	.205		.381			
Omnibus Tests of Model Coefficients							
Variables	Chi-square	df	Significant				
Step	38.975	8	0.000				
Block	38.975	8	0.000				
Model	38.975	8	0.000				
Variables in the Equation							
	B	S.E.	Wald	df	Sig.	Exp(B)	Remark
Gender	-1.289	.688	3.505	1	.061	.276	Ns
Age	.507	.566	.803	1	.370	1.661	Ns
Marital status	-.094	.554	.029	1	.866	.911	Ns
Education status	-1.187	.361	10.833	1	.001	.305	Sig.
Household size	.154	.174	.779	1	.377	1.166	Ns
Years of consuming honey	.089	.227	.152	1	.696	1.093	Ns
Quantity of honey consume (year/liters)	-.268	.117	5.208	1	.022	.765	Sig.
Unpleasant experiences after honey consumption	-.672	.729	.850	1	.357	.511	Ns

Where: Sig. = significant at 0.05 levels; Ns = not significant

## DISCUSSION

### Socio-economic Characteristics and Demographics Analysis of Honey Consumers

The socio-economic characteristics and demographics of honey consumers provide valuable insights into their profiles and preferences. The gender distribution shows a slight majority of males (53.8%) over females (45.7%), which indicate a potential target market for honey producers. Majority of the people involved in bee keeping are male and this implies that bee keeping is gender sensitive (Adeokun *et al.*, 2022), while Afees *et al.* (2013) which state that majority of honey producers are males. The age distribution reveals a significant proportion of honey consumers (60.1%) in the 40-49 years range, indicating a middle-aged demographic. This result agreed with the report of Adeokun *et al.* (2022), who reported that men, women, as well as individuals of all ages can engage in beekeeping. It doesn't require as many resources as other agricultural branches, and bees can be trained to forage for wildflowers and pollen in big reserves of tropical and vast forests (Folayan and Bifarin, 2013).

Marital status plays a crucial role in consumer behavior, and the high percentage of married individuals (93.6%) may indicate a focus on family-oriented marketing strategies. Education level is also an essential factor, with a significant proportion (53.8%) holding tertiary education, suggesting a potential market for premium or high-quality honey products. Household size and occupation also influence consumer behavior, with 74% of respondents having 5-10 household members and 72.3%

being employed, indicating a potential market for honey as a household staple.

### Consumption Level of Honey, Sweeteners for possible alternatives traded in Cross River State

Most respondents have been consuming honey for extended periods, with the largest proportion reporting consumption for 16 to 20 years. This is an indication of a strong cultural significance and belief in the health benefits of honey. This result is supported by the report of Eteraf-Oskouei and Najafi (2013), which found that traditional foods like honey are often consumed for their perceived health benefits and cultural significance. The sustained and widespread consumption of honey over long durations also implies the potential role of honey as a staple food item and traditional remedy within the community (Ugbe and Japheth, 2023). This is consistent with a study by Eteraf-Oskouei and Najafi (2013), who reported that traditional foods like honey are often used as remedies for various health conditions. The demand for honey products over time has economic benefits for local beekeepers and honey producers, as indicated by this study and supported by other studies (Babatunde *et al.*, 2008; Ijigbade *et al.*, 2023; Ghagane, 2023). Sustainable beekeeping practices can contribute to the local economy and help preserve bee populations and their habitats (Prodanovic *et al.*, 2024).

The low percentage of respondents who reported consuming honey for less than 5 years indicates a relatively recent adoption of honey consumption among a minority of individuals. This may be due to

various factors, such as increased awareness of the health benefits of honey or changes in dietary preferences. This result implies there is awareness on the importance of honey as a traditional food item and remedy in the study area, and the need to support sustainable beekeeping practices to meet consumer needs while preserving bee populations and their habitats.

The preferences and motivations of consumers in the study area, based on their choice of sweetener, were significant. The significant preference for honey over sugar by most (87.30%) of respondents favoring honey, indicates a strong cultural or health-related inclination towards natural sweeteners (Saha, 2015).

Health consideration was the major reason cited by respondents for preferring honey. Taste, age, and cost are among the factors that influences consumers' choices. The fact that some (34.1%) of respondents cited health considerations as a primary factor driving their choice of honey indicates a growing awareness of the potential health benefits of honey, such as its antimicrobial and antioxidant properties (Stefanis *et al.*, 2023). The importance of taste, by moderate (33.5%) number of respondents attributing their preference for honey to its taste nature, highlights the significance of sensory factors in influencing consumer choices. This finding is consistent with other studies that have shown that taste is a critical factor in determining consumer preferences for food products (Marija *et al.*, 2022).

The emergence of age as a key factor influencing preferences, with low (16.2%) number of respondents citing age-related considerations, indicates that preferences for honey may vary across different age groups due to factors such as taste preferences, health consciousness, or cultural norms (Sedik *et al.*, 2023). The finding that cost was identified as a factor influencing preferences, albeit to a lesser extent, with few (12.7%) numbers of respondents indicating cost considerations as a reason for choosing honey, implies that economic factors may also play a role in determining consumer choices (Ramya and Ali., 2016).

Most respondents (72.8%) perceive honey as a food, indicating its significance in their diets, while a few number (17.9%) of the respondents viewed it as a medicinal product, shows the widespread belief in its health benefits (Samarghandian *et al.*, 2017; Arawwawala and Hewageegana, 2017). Furthermore, a minority of respondents perceive honey as an additive (6.9%), flavor enhancer (1.2%), or both food and medicine (0.6%), showcasing its versatility (Srinivasan, 2009; Ugbe and Japheth, 2023). In terms of alternative uses, honey is primarily utilized as a sweetener (37.6%), shows its popularity as a natural sweetening agent (Saha, 2015; Sharma *et al.*, 2016).

Additionally, a high percentage of respondents (27.7%) reported using honey for medicinal purposes, aligning with traditional uses of honey for its therapeutic properties (Eteraf-Oskouei and Najafi, 2013). Moreover, a considerable percentage of respondents (23.1%) reported using honey in cosmetics, reflecting its application in skincare or beauty products (Burlando and Cornara, 2013).

Based on substitutes for honey, sugar (65.0%) is the most reported alternative sweetening agent, indicating a preference for conventional sugar (Ashard *et al.*, 2022; Kapira *et al.*, 2023). Glucose is also used as a substitute for honey, revealing a preference for this simple sugar in certain dietary contexts (Bobis *et al.*, 2018). However, low percentages of respondents reported using saccharine (6.2%) or potato (8.5%) as substitutes for honey.

The consumers in the study area consider various factors when assessing the quality of honey, with taste being the most significant factor (48.6%). This is consistent with previous research which reported that sensory experiences, such as flavor and sweetness, play a crucial role in consumers' perceptions of food quality (Jurkenback, *et al.* 2020). Colour was also cited as an important determinant of honey quality by 27.7% of respondents, which is in line with studies that have shown that consumers often associate specific colours with certain flavor profiles or quality attributes (Spence and Levitan, 2022). Viscosity or thickness was mentioned by few (19.1%) of the respondents as a factor in determining honey quality, which is consistent with research which reported that consumers often perceive thicker honey as higher quality due to its perceived purity and richness (Zanchini *et al.*, 2022; Sedik *et al.*, 2023).

A low percentage of respondents (4.6%) stated that they consider a combination of factors, including colour, odour, taste, thickness, and viscosity, when assessing honey quality. This indicates that some consumers take a more holistic approach to evaluating honey quality, considering multiple sensory characteristics. This result correlate with the report of Yüzbaşıoğlu (2023).

In terms of demand for honey, most respondents (87.3%) perceive the demand to be medium. This indicates that honey enjoys a relatively consistent and stable level of demand among consumers in the study area (Wu *et al.*, 2015). However, a low percentage of respondents (8.1%) perceive the demand for honey to be high, suggesting that there may be specific market segments or contexts where honey enjoys increased popularity or demand (Camilleri, 2018). Conversely, a minority of respondents (4.6%) perceive the demand for honey to be low, indicating that while honey may generally enjoy moderate to high demand in the study

area, there are also segments or situations where demand may be comparatively lower (Wu *et al.*, 2015).

The COVID-19 pandemic has had a profound impact on consumer behavior, including food consumption patterns (Yang *et al.* 2022). Most respondents (88.4%) reported a decrease in honey consumption during the pandemic. This decrease can be attributed to various factors such as economic uncertainty, changes in purchasing behavior, or disruptions in supply chains (Bateh, 2024). The pandemic led to widespread lockdowns, social distancing measures, and economic instability, which have reduced consumers' ability to purchase honey or altered their consumption habits (Das *et al.* 2022). As reported by Mbijiwe *et al.* (2021), the pandemic has had a significant impact on food systems, leading to changes in consumption patterns (Mbijiwe *et al.*, 2021; Das *et al.* 2022).

On the other hand, few (10.4%) of respondents reported an increase in honey consumption during the pandemic. This increase can be attributed to perceived health benefits, home cooking trends, or changes in dietary habits during lockdown periods (Kowalczyk *et al.* 2022). Some consumers may have turned to honey as a natural sweetener or for its perceived medicinal properties, leading to increased consumption. According to Eftimov *et al.* (2020), changes in dietary habits during the pandemic have led to increased consumption of certain food products, including honey.

A low percentage of respondents (1.2%) reported that their honey consumption remained constant during the pandemic. This indicates that some consumers did not experience significant changes in their honey consumption patterns despite the challenges posed by the pandemic. This result agreed with the report of reported by Aday and Aday (2020), some consumers may have been less affected by the pandemic due to factors such as food storage habits or alternative sources of food.

The main cause of changes in honey consumption levels was inadequate supply (63.8%), indicating that disruptions in the honey supply chain or availability significantly influenced consumption patterns during the pandemic. Elevated costs (23.0%) were also a significant factor, implying that cost-related considerations played a noteworthy role in shaping consumption patterns among respondents. According to Aday and Aday (2020), the pandemic has led to disruptions in food supply chains, resulting in changes to consumption patterns.

The availability of honey is a significant concern, with only a few (1.7%) of respondents reporting that they always had honey available to them, and 7.5% stating that the amount of honey available in the study area was increasing. In contrast, most of the (90.8%)

of respondents reported a decrease in honey availability, highlighting a significant decline in the availability of honey. This decline can raise concerns about the state of the honey industry and its broader implications in the study area.

Environmental pressures such as climate change, habitat loss, and extreme weather events contribute to the decline in honey availability by impacting bee foraging areas and honey production (Mishra *et al.*, 2023). Additionally, the prevalence of pests and diseases within bee colonies, coupled with challenges in beekeeping practices, further exacerbates the issue (Bartlett, 2022; Ugbe and Japheth, 2023).

The implications of decreasing honey availability extend beyond the economic sphere, entails environmental, social, and cultural dimensions (Gajardo-Rojas *et al.*, 2022). Economically, reduced honey availability led to increased prices for honey products, affecting consumers and businesses alike, while also jeopardizing the livelihoods of beekeepers and the economies of regions reliant on honey production (Wagner *et al.*, 2019; Adekun *et al.*, 2022). Moreover, the environmental consequences of declining honey availability are profound, as bees play a crucial role in pollinating plants and maintaining ecosystem health (Kortsch *et al.*, 2024). A reduction in honey availability could signal broader environmental degradation and biodiversity loss, with implications for global food security and ecosystem resilience (Japheth *et al.*, 2023).

Quality control is the most popular recommendation, with half (50.8%) of respondents supporting measures to ensure the quality of honey products. This result indicates the need for high standards of honey production and distribution to increase consumer confidence and satisfaction. This result agreed with the report of Sparacino *et al.* (2022), who worked on consumer surveys and experimental evaluation. Sensitization efforts are also crucial, with few (23.0%) of the respondents suggesting this as a key strategy to promote honey consumption. This indicates the importance of raising awareness among consumers about the nutritional benefits of honey, its diverse culinary uses, and its role in supporting bee populations and ecosystems. Consumer protection measures are equally important, with some (23.0%) of the respondents emphasizing the need for policies and regulations to safeguard consumers from fraudulent or adulterated honey products.

Gender, age, education level, and household size are significantly correlated with preferences and quantity of honey consumption. For instance, there is a statistically significant negative correlation between gender and preference for honey consumption (Spearman's Rho = -0.176,  $p < 0.05$ ). Similarly, age

and preference for honey consumption show a significant negative correlation ( $Rho = -0.250$ ,  $p < 0.01$ ). This result agrees with the reports of Yüzbaşıoğlu (2023); Kowalczuk *et al.* (2023); Sedik *et al.* (2023). Higher education levels may be linked to fewer years of honey consumption, as there is a significant negative correlation ( $Rho = -0.407$ ,  $p < 0.01$ ) between years of honey consumption and education status. In contrast, the number of years that a household has consumed honey is significantly positively correlated with its size ( $Rho = 0.640$ ,  $p < 0.01$ ). Additionally, the amount of honey consumed, and household size show a significant positive correlation ( $Rho = 0.745$ ,  $p < 0.01$ ). This result correlate with the report of Kowalczuk *et al.* (2023), who studied the determinants of honey consumption with special reference to the influence of nutritional knowledge and health status on consumption habits. Similarly, Yüzbaşıoğlu (2023), reported that age, level of education, marital status, number of individuals in a household, income, advertisement and health status have statistically significant effect on honey consumption.

The influence of demographic attributes on honey consumption preferences in the study area based on result of binary regression indicates that the model explains between 20.5% and 38.1% of the variance in honey consumption preferences. This implies that behavior is influenced by multiple factors. This result aligns with existing research, which reported on how demographic factors such as age and gender influence food choice (Chambers *et al.*, 2008). For example, older individuals might prefer honey for its health benefits, whereas younger people might be swayed by current trends and lifestyle choices. By understanding the demographic influences on honey consumption, they can design targeted marketing strategies and interventions. For instance, honey's health benefits could appeal more to older adults or health-conscious consumers, while its natural and organic qualities might attract younger demographics who prioritize sustainability and health.

## CONCLUSION

The study revealed significant insights into the socio-economic characteristics and demographics of honey consumers in Cross River State, Nigeria. The findings indicate a strong preference for honey over sugar, with 87.30% of respondents favoring honey. Health considerations (34.1%) and taste (33.5%) were the primary reasons for preferring honey. Most respondents (60.1%) fell within the 40-49 years age range, and 93.6% were married. Household size varied, with 74% having 5-10 members. Occupation-wise, 72.3% were employed. The results also showed that

29.5% of respondents consumed honey for 16-20 years, and 37.6% used honey as a sweetener. Furthermore, 27.7% used honey for medicinal purposes, and 23.1% used it in cosmetics. The study found that taste (48.6%) was the most significant factor influencing the perceived quality of honey, followed by color (27.7%) and viscosity (19.1%). During the COVID-19 pandemic, 88.4% of respondents reported a decrease in honey consumption. The binary logistic regression model showed that education status and quantity of honey consumed per year/liters had a significant influence on preference for honey consumption. Therefore, honey producers and marketers should emphasize the unique taste of honey to appeal to consumers, while promoting sustainable beekeeping practices to meet demand and preserve bee populations. Further research is needed to explore the perceived health benefits and potential therapeutic applications of honey. Additionally, developing honey-based products like cosmetics and medicinal products can diversify honey's uses and increase its economic value.

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