



## Honey consumer in Rio de Janeiro

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### Abstract

The aim of this study was to evaluate the profile of honey consumers in the state of Rio de Janeiro. The addition of different methodological steps, from the bibliographic review to the creation of institutional material, was carried out after the research ethics committee approval. For the data collection, an online questionnaire with 26 questions was applied. The socioeconomic profile provided a clear view of the demographics of the 77 participants, with 62.3% aged between 30 and 49 years, 76.3% being women, and 69.7% having a family income of more than R\$3,000.00. Concerning product identification, it was visible that their lack of knowledge regarding the label information, the inspection seals, the possibility of adulteration, and the process of crystallization, recrystallization, and fermentation. Most respondents preferred to obtain honey directly from the producer and in a glass bottle. Concerning the honey benefits, they identified that this product is healthy and used for medicinal purposes. More than 60% of the respondents stated that the price of honey is high, influencing the quantity and frequency of consumption. The development of interactive material seemed to be effective in increasing consumer awareness about the quality of the honey they are obtaining and promoting market transparency.

**Keywords:** health benefits; bee honey; institutional material.

**Practical Application:** Honey consumers are generally unaware of the health benefits of honey; therefore, this research will help local producers to develop suitable labels and marketing information to improve this activity.

## 1 INTRODUCTION

Beekeeping is a widespread activity in Brazil, with the focus on breeding bees of the genus *Apis mellifera*, native of Europe, Africa, and Asia (Maciel & Khan, 2020). Besides producing honey, these bees play a crucial role in the pollination of plants such as native flowers and those cultivated for human consumption, such as avocado, guava, melon, watermelon, and orange.

According to the Brazilian legislation (Brasil, 2000), honey is defined as a food product produced by bees from the nectar of flowers or other sources, processed in the digestive tract of bees, and stored in hive combs. The nectar is transformed into honey because the pH of the stomach acid associated with the enzymatic activity (invertase, diastase, and amylase) in the intestinal tract of the bees originates a supersaturated aqueous solution composed of 80% sugars, predominantly fructose and glucose, and to a lesser extent sucrose, maltose, and other complex sugars (Cornara et al., 2017). The honey is appreciated in many countries as an energy food and natural medicine due to its functional properties and nutritional value.

Brazil is an important producer and exporter of honey, driven by its vast and diverse flora, combined with the favorable climate that allows production throughout the year. Brazilian consumers tend to consider honey as a medicinal food, as its

balanced consumption can contribute to reducing the risk of diseases, while in other countries, such as Australia, it is used as a sweetener (Novais et al., 2021).

Honey can be classified according to its origin into floral honey (unifloral or multifloral) and melate. Regarding the honeycomb extraction procedure, it can be drained, pressed, or centrifuged honey. Regarding presentation, it can be honey in combs, with pieces of comb, crystallized, granulated, creamy, and filtered (Brasil, 2000).

Honey is a complex substance, influenced by various plant sources, weather conditions, and type of bee, among other factors. On average, honey contains around 17.2% water and 81.3% sugars, including fructose, glucose, sucrose, and maltose, among other disaccharides and polysaccharides, and is a source of B vitamins such as thiamine, riboflavin, pyridoxine, nicotinic acid, pantothenic acid, and folic acid (Sousa, 2023).

Physicochemical analyses of honey are necessary to monitor the quality of the products being manufactured. The results of these analyses are compared to standards established by international or national regulations, which protect consumers from purchasing adulterated or poor-quality products, which could lead to health problems, since honey is recognized for its beneficial biological properties, such as its antimicrobial, curative, calming, healing, and

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stimulating action (Eller, 2022). These properties are attributed to the enzymes, vitamins, and chemical elements present in its composition, such as selenium, manganese, zinc, chromium, and aluminum. For example, 100 g of honey has approximately 0.4–0.8% of amino acids (proteins), 5 mg of sodium, 33 mg of phosphorus, 5 mg of calcium, 16 mg of copper, 5 mg of sulfur, 10 mg of potassium, 3.5 mg of vitamin C, 6 mg of manganese, and 0.6 mg of iron.

European standards establish minimum quality requirements and analysis parameters, which aim to guarantee the quality of honey, prohibiting the presence of foreign substances such as dyes, preservatives, and flavorings, thus protecting consumers against fraud and ensuring the authenticity of the product (Mundo Agro Brasil, 2021).

However, there is still a need for more information about the consumer preferences and strategies to raise the consumption of apicultural products. Therefore, consumer profile research is essential to understand and meet market demands and needs. In this sense, this study aimed to understand the socioeconomic profile of honey consumers and the factors influencing their choices and develop an institutional interactive material based on the data collected with the questionnaire to promote the consumption of honey as a nutritious food with functional and therapeutic properties.

## 1.1 Relevance of the work

The apicultural scenario is constantly expanding in all regions of Brazil; however, despite the low honey production in the state of Rio de Janeiro, this production has been considered an alternative source of income for rural producers. Understanding the consumer profile is crucial to understanding the market demands, especially for small rural producers, and thus to meeting consumer expectations. In this context, this study aimed to analyze the socioeconomic profile of honey consumers in the state of Rio de Janeiro and the factors influencing their choices.

## 2 MATERIAL AND METHODS

The study was conducted in an applied, exploratory, and qualitative manner, using a remote methodology, after approval by the IFRJ Ethics and Research Committee (CAAE:63604422.4.0000.5268). This research was carried out in three stages: bibliographic research, application of a questionnaire, and production of instructional material, taking place between March 2022 and January 2023.

Participants received the link to respond to the questionnaire (Table 1), containing the Free and Informed Consent

**Table 1.** Survey questionnaire on the consumption of honey.

Section	Question No.	Question	Response Options
<b>Socioeconomic data</b>	1	How old are you?	Under 18; 18–29; 30–49; Over 50
	2	What is your gender?	Female; Male; Other
	3	City and state of residence (Brazil)	Open-ended
	4	Approximate monthly family income	Up to R\$900; R\$901–1,800; R\$1,801–3,000; ≥ R\$3,001
<b>Attitudes and motivations</b>	5	Do you consider honey a nutritious food?	Yes; No
	6	Does honey provide health benefits?	Yes; No
	7	Does honey help prevent or cure colds or flu?	Yes; No
	8	Do you consume honey only when sick?	Yes; No
	9	Is honey healthier than sugar?	Yes; No
	10	Do you avoid honey because it is caloric?	Yes; No
	11	Are honey and similar sweeteners healthy alternatives?	Yes; No
<b>Origin</b>	12	Is honey from producers safer and higher quality?	Yes; No
	13	Can you identify adulterated honey?	Yes; No
	14	Where do you usually buy honey?	Multiple choice
	15	Can you identify the health inspection seal?	Yes; No
<b>Price</b>	16	Preferred packaging type	Glass; Plastic; Tube/Sachet
	17	Is honey affordable?	Yes; No
<b>Information</b>	18	Does price influence consumption?	Yes; No
	19	Is information about honey easy to obtain?	Yes; No
	20	Do you have questions about honey?	Yes; No
	21	Do you know what organic honey is?	Yes; No
	22	Does crystallization indicate adulteration?	Yes; No
	23	What do you do when honey crystallizes?	Open-ended
	24	Is fermented honey suitable for consumption?	Yes; No
	25	Should children under 1 year avoid honey?	Yes; No
<b>Frequency</b>	26	How often do you consume honey?	Frequently; Occasionally; Never

Record explaining the research and the expectations of the participant. Exclusion criteria included age under 18 years of age and residence outside the state of Rio de Janeiro.

The questionnaire used in this research was prepared based on previous studies related to the profile of honey consumers that evaluated the common doubts about the choices between honey, sugar, and other sweeteners. The consulted literature includes dissertations, theses, magazines, and scientific articles published in the databases: PubMed, Scielo, Google Scholar, Science Direct, Scopus, and Web of Knowledge. The following keywords were considered: benefits of honey, bee honey, honey consumer profile, and booklet.

The questionnaire consisted of 26 questions, 24 closed and 2 open, covering personal information, attitudes and motivations regarding the consumption of honey, the origin of the honey, the knowledge about the product, and frequency of consumption. The questionnaire was developed in Google Forms and released on social media platforms and in emails.

The collected data was analyzed using descriptive statistics in Google Forms using tables and graphs. Subsequently, the results were compared with the contents of related bibliographical research, resulting in indicators that subsidized the creation of the interactive booklet for honey consumers.

### 3 RESULTS AND DISCUSSION

The research was carried out in the state of Rio de Janeiro, covering several municipalities, including Araruama, Cabo Frio, and Campos dos Goytacazes, among others. Among the 81 respondents, four were excluded for not meeting the requirements, totaling 77 participants in the period from November to December of 2022.

Regarding the demographic profile of the respondents, 62.3% were between 30 and 49 years old, 76.3% self-declared female, and 69.7% had an average monthly family income greater than R\$3,000.00 (Table 2).

Previous studies related to honey consumption, such as C. R. Santos et al. (2020), demonstrated a greater predominance of females (58.1%), which may be related to women's central role in obtaining food and being responsible for identifying needs, choosing products and deciding where to buy them.

**Table 2.** Socioeconomic profile of the respondents.

Gender	Frequency (%)
Female	76.3 (58)
Male	23.7 (18)
Age group	
18–29 years	20.8 (16)
30–49 years	62.3 (48)
More than 50 years	16.9 (13)
Family income	
Up to R\$900.00	1.3 (1)
R\$900.01 to R\$1800.00	13.2 (10)
R\$1801.00 to R\$3000.00	15.5 (12)
R\$3001.00 or more	69.7 (53)

Regarding monthly income, the majority of participants in the present study (69.7%) reported having R\$3,001 or more. These results are consistent with the findings of a previous study by Alves et al. (2021) in the city of Barreiras, Bahia, where around 51% of individuals declared an income between R\$2,824 and R\$7,060. These data suggest a similar distribution of income among residents of the studied areas, indicating common economic patterns among research participants.

In relation to attitudes and motivations for honey consumption, Alves et al. (2021) reported that most respondents (61.8%) use honey as food, which is in accordance with the results of the present study, where 98.7% of respondents considered it nutritious and beneficial to health. Alves et al. (2021) concluded that 33.6% consume honey as medicine, similar to our findings (35.1%); 98.7% reported that honey provides health benefits, and 96.1% consider honey effective in preventing or treating colds or flu-like illnesses. Meanwhile, Silva Neto et al. (2022) found that 42.86% of respondents consumed honey for medicinal and nutritional purposes.

Novais et al. (2021) highlight that different than countries such as Australia that use honey to sweeten cereals and porridge, in Brazil, the consumption is wider, since honey is also seen as a medicinal food. Brazilians consider it healthier than sugar, and the vast majority (90.9%) do not avoid its consumption even though it is high in calories and may cause weight gain.

In the current study, the majority of participants (85.7%) consider honey, molasses, and agave syrup to be healthy natural sweetener alternatives. Nutritionists highlight honey as the most affordable sweetener option on the market, containing glucose, fructose, and sucrose, providing energy to the body through its ability to release energy in a stable way during physical exercise.

Regarding the origin of honey, the majority of consumers (94.8%) believe that purchasing honey directly from the producer offers better quality and safety, but 26% prefer markets and grocery stores, 19% prefer open-air markets, and only 2.6% do not consume honey. In a similar study, carried out by Novais et al. (2021) in Porto Seguro-BA, the results were different, demonstrating a balance between purchasing directly from producers and open-air markets. Silva et al. (2018) reported that the street market is the most common place to purchase honey in Santarém, Pará, in contrast to the results of this study.

When asked about the ability to identify adulterated honey or health inspection seals, the majority of participants stated they were unaware. Furthermore, the preference for glass packaging was evident among the participants.

Ferreira (2022) clarified that in Roraima, half of the respondents considered appearance, color, and density as criteria for purchasing honey, while 32% took the brand or origin into account to avoid purchasing adulterated honey.

In studies related to the consumption of bee products, G. N. Santos (2020) clarifies that regarding frequency: 7.56% consume honey daily, 25% consume it frequently, and the majority (63.95%) rarely consume honey. Also, the constancy of consumption is correlated to the place of acquisition of the honey product and less associated with family income. Another

factor affecting consumption is the lack of information about the properties and benefits of honey, ways of using it, and shortcomings in promoting the product. Therefore, the material produced at the end of this study is intended to clarify doubts and assist consumers in choosing beekeeping products, help in recognizing fraud, ensure adequate conservation of nutrients, and ensure the consumption of genuine and healthy products.

Therefore, based on the results obtained and the literature review conducted, we developed the educational booklet "Honey: Fact or Fake?," providing consumers with interactive information about honey. This includes its therapeutic properties, nutritional composition, and methods to identify possible adulterations, aiming to support informed purchasing decisions and promote conscious consumption of bee honey.

#### 4 CONCLUSIONS

This research aimed to contribute to understanding the profile of honey consumers in the state of Rio de Janeiro. From the analysis of the data obtained, it became evident that consumers consider honey a nutritious food associated with health benefits, widely used also for medicinal purposes. However, there is a gap in consumer knowledge regarding the product, including issues such as identifying adulterated honey, the crystallization process, fermentation, and a preference for purchasing directly from producers to avoid adulterated products. The preference for glass packaging was also highlighted, emphasizing the importance of ensuring quality and proper storage and display conditions by producers.

Despite limitations in the quantitative analysis and the geographical approach of this study, it provided valuable insights for future research. We suggest expanding the scope to investigate consumer perceptions in different cities across the state of Rio de Janeiro. This could provide even more relevant data to support marketing strategies in each region.

Additionally, this study facilitated the development of educational and interactive materials focused on consumer doubts, providing information to support their purchasing decisions and encourage a more conscious consumption of bee honey.

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