



STREET FOOD AND FOOD SAFETY: PERCEPTION OF CONSUMERS IN PARANÁ, BRAZIL

SEGURANÇA DE ALIMENTOS DE RUA: PERCEPÇÃO DOS CONSUMIDORES NO PARANÁ, BRASIL

Rosyzela Cordova Neyra^{1*}, Francini Martini Mantelo², Lorena Yanet Cáceres Tomaya³, Paula Aline Zannetti Campanerut-Sá², Jane Martha Graton Mikcha^{1,2}

ABSTRACT: **Aim:** To assess perceptions, attitudes, and knowledge about safety of food prepared and/or sold on streets, among consumers in the state of Paraná, Brazil. **Methodology:** A total of 813 street food consumers responded to an online, self-administered questionnaire, resulting in a high proportion of female, young, college-educated, and employed people. **Results:** The majority of participants were confident in the safety of the food consumed, concerned about Foodborne Diseases (FBDs) and good food handling practices, and attentive to the hygienic-sanitary conditions of the preparation environment, the food handlers, and food handling at the street food outlet. In addition, they believed in the importance of handler training and sanitary inspection, and they demonstrated knowledge about food safety, especially in relation to good handling practices and FBDs. **Conclusions:** The results reaffirm the importance of disseminating information about food safety to consumers.

KEYWORDS: Attitude. Food safety. Knowledge. Street food.

RESUMO: **Objetivo:** Avaliar as percepções, atitudes e conhecimentos sobre a segurança dos alimentos preparados e/ou vendidos nas ruas entre os consumidores do Estado do Paraná, Brasil. **Metodologia:** Um total de 813 consumidores de comida de rua respondeu a um questionário on-line e autoadministrado, resultando em uma alta proporção de pessoas do sexo feminino, jovens, com ensino superior e trabalhadores empregados. **Resultados:** A maioria dos participantes estava confiante na segurança dos alimentos consumidos, preocupada com as Doenças Transmitidas por Alimentos (DTA's) e com as boas práticas de manipulação de alimentos, e atenta às condições higiênico-sanitárias do ambiente de preparação, dos manipuladores e da manipulação de alimentos. Além disso, eles acreditavam na importância da capacitação dos manipuladores e da fiscalização sanitária, e demonstraram conhecimento sobre segurança de alimentos, principalmente sobre boas práticas de manipulação e às DTA's. **Conclusões:** Os resultados reafirmam a importância da disseminação de informações sobre segurança de alimentos para os consumidores.

PALAVRAS-CHAVE: Atitude. Comida de rua. Conhecimento. Segurança de alimentos.

¹Postgraduate Program in Food Science, State University of Maringá, Maringá (PR), Brazil; ²Postgraduate Program in Health Sciences, State University of Maringá, Maringá (PR), Brazil; ³Center for Exact and Technological Sciences, Federal University of Acre, Rio Branco (AC), Brazil.

***Corresponding author:**
Rosyzela Cordova Neyra – Email: rosyzelacn@gmail.com.

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INTRODUCTION

Food plays a central role in maintaining health and preventing disease, and the nutritional quality of the food consumed, as well as its safety, are determining factors in this process.

In recent times, significant changes have been observed in people's eating habits and lifestyle, including the demand for foods served on the streets is growing. It is estimated that approximately 2.5 billion people worldwide consume street food every day, and it contributes up to 40% of the daily diet of urban consumers in low- and middle-income countries, according to the World Health Organization (WHO)¹.

Current fast-paced lifestyles, lack of time or skills to prepare meals at home, and women's increased involvement in the professional realm are some factors that present street food as an affordable and palatable option^{2,3}. According to the Food and Agriculture Organization of the United Nations (FAO), street foods or street-vended foods are ready-to-eat foods and beverages prepared and/or sold mainly on the streets and in other public places⁴.

The street food trade has been popular mainly in Asia, Africa, and Latin America for a long time³, and it has been configured as an activity of social, economic, nutritional, and health importance⁵. It is a source of employment and income and an important source of food for many people^{4,6}. Street food is consumed due to its practicality, accessibility, affordability, and taste, and also because it is an expression of local culture and gastronomy⁷⁻¹⁰.

However, there are concerns about street food safety, as deficiencies in the sanitary handling of food and facilities by vendors are common, exposing consumers to the risk of FBDs¹¹⁻¹³. Risk factors permeate the entire street food retail chain and can be the quality of raw materials, hygiene practices in product handling and transportation, waste management, infrastructure and sanitation of the vending environment, and the knowledge and attitudes of the vendors^{7,8,13,14,15,16}.

FBDs are a major public health problem with a huge impact on society's health and the economy¹³. The WHO estimates that 600 million people (almost 1 in 10 people worldwide) fall ill and 420,000 die each year from consuming contaminated food and water¹⁷.

In Brazil between 2014 and 2023, 6,874 FBDs outbreaks occurred, with 110,614 ill people and 121 deaths¹⁸. Furthermore, between 2009 and 2018, 16% of FBDs outbreaks were related to food services, such as street food¹⁹. Recently, FBDs outbreaks involving deaths have caused concern among health authorities and attracted the attention of consumers²⁰.

Since street food consumption is growing, it is necessary to understand the risk perceptions from the perspective of not only the food handler but also the consumer²¹. One of the pillars upon which food consumption is based is the evaluation made by the consumer concerning the perception of safety. That is, consumers evaluate the characteristics of the place and product, considering whether or not the food is safe, and, based on this perception, they choose whether or not to buy it^{21,22}. In this context, consumers' knowledge and attitudes toward food safety play an important role in FBDs outbreaks prevention²³.

Several studies evaluated consumers' behavior, knowledge, attitudes and practices regarding street food safety. Most of them were in Asia: Vietnam²⁴, India¹¹, Turquia²⁵, Korea²⁶, and Bangladesh¹⁴. To a lesser extent, other researches were conducted in Africa: South Africa²³, and Ghana¹²; America: Haiti²⁷, Colombia²⁸, and Europa: Polonia³.

In Brazil, there are still few studies that evaluated street food safety from the consumers' point of view or their behavior regarding street food consumption. Most of them were conducted in the northeastern (Maranhão⁵, Bahia^{22,29}, and Sergipe³⁰) and southeastern (Minas Gerais³¹) regions. To the

best of our knowledge, there are no reports in the southern region, therefore, more updated studies and ones conducted in other states, such as Paraná, are lacking.

In this context, the present study aimed to 1) assess the sociodemographic profile of street food consumers in Paraná, 2) assess the confidence, concerns, and perceptions of consumers toward street food safety, and 3) assess the knowledge and attitudes of consumers toward food safety in general.

METHODOLOGY

STUDY DESIGN AND PARTICIPANTS

A descriptive cross-sectional study³² was performed from November to December 2022. The study population was non-probabilistic, initially composed of the institutionalized community of the State University of Maringá (Professors, technical and students). The research subjects were invited by email and *WhatsApp*, and asked to invite their close contacts to participate in the study. The invitation link was also made available on social media platforms namely *Facebook* and *Instagram*.

The inclusion criteria were: individuals over 18 years of age who purchased and consumed ready-to-eat foods and drinks sold on the street in the state of Paraná, Brazil.

ETHICAL ASPECTS

The study was approved by the *Comitê Permanente de Ética em Pesquisa Envolvendo Seres Humanos* (Standing Committee on Ethics in Research with Human Beings) (COPEP) of the State University of Maringá (UEM), Brazil, under Protocol CAAE 60705622.5.0000.0104 and Opinion Number 5.719.507. In addition, participants were informed of the existence of the informed consent form (ICF), which mentioned the importance, risks, and benefits involved in the research as well as participants' rights and duties.

DATA COLLECTION TOOL

A structured questionnaire was formulated based on information from previous scientific studies^{14,23,30,24,28} and WHO recommendations for food safety, and then it was designed in Microsoft Forms. The questionnaire was composed of the ICF and 27 questions organized into three blocks: questions on sociodemographic profile, questions on frequency, reasons for and factors regarding consumption, level of confidence, concerns and perceptions related to street food safety, and questions on knowledge and attitudes about food safety in general (Supplementary material). Before the final version of the questionnaire was validated by food microbiology professionals, and it was pre-tested by street food consumers in order to verify the content clarity.

DATA COLLECTION PROCEDURE

The questionnaire link was sent via internet to the study participants and used Snowball approach, where initial respondents further recommend additional subjects to participate in the study³³.

The questionnaire was self-administered and participation was voluntary. By agreeing to take part in the research, the individual accepted the terms and conditions set out in the ICF.

DATA ANALYSIS

Data was tabulated, inconsistent observations (not understandable responses to open-ended questions, and responses who did not meet the inclusion criteria) were checked, and these participants were removed from the study, using Microsoft Excel spreadsheets (version 2019) and R software (version 4.3.0). In addition, the responses of questions Nº 3 (age), Nº 7 (knowledge area), and Nº 9 (occupation) were grouped into categories.

Subsequently, statistical analyses of the data (absolute and relative frequency tables and figures) were carried out to summarize the behavior of the variables of interest. It is worth mentioning that the participants were only identified by a number so anonymity was guaranteed at all times.

RESULTS AND DISCUSSION

Education	Up to elementary school*	5	0.62
	Incomplete high school	0	0.00
	Complete high school	52	6.40
	Incomplete higher education	272	33.46
	Complete higher education	127	15.62
	Postgraduate studies	357	43.91
Knowledge area	Agricultural sciences	78	9.59
	Biological sciences	50	6.15
	Health sciences	172	21.16
	Exact and earth sciences	79	9.72
	Human sciences	87	10.70
	Applied social sciences	150	18.45
	Engineering	57	7.01
	Linguistics, literature, and arts	32	3.94
	Not informed	61	7.50
	Not applicable	40	4.92
Occupation	Other	7	0.86
	Employed	429	52.77
	Self-employed	42	5.17
	Student	318	39.11
	Unemployed	18	2.21
Monthly income	Retired	6	0.74
	Up to minimum wage**	240	29.53
	From 1 to 3 times the minimum wage	252	31.00
	From 3 to 6 times the minimum wage	161	19.80
	From 6 to 9 times the minimum wage	63	7.75
	From 9 to 12 times the minimum wage	52	6.40
	From 12 to 15 times the minimum wage	27	3.32
	More than 15 times the minimum wage	18	2.21

Source: Authors.

*Included in this category: illiterate, never went to school but can read and write, and incomplete and complete elementary education.

**Included in this category: No income, and income up to minimum wage (In 2022, the minimum wage was R\$ 1212.00 or US\$ 246.30).

PURCHASE AND CONSUMPTION OF STREET FOOD

This section of questions assessed the frequency of street food consumption, types of food consumed, and reasons for and factors regarding consumption. It was observed that 24.11% of the participants consumed street food two to four times a week, 20.66% once a week, 3.32% five to six times a week or every day, while 51.91% consumed it either less than once a month or one to three times a month.

Among the ready-to-eat foods and/or drinks sold on the street, *lanche* such as *cachorro-quente*, sandwich, or hamburger (73.06% of the participants), *pastel* (62.48%), and *espetinho* (37.88%) were the most consumed, followed by sugarcane juice (20.30%), *churros* (18.94%), *açai* (18.82%), coconut water (10.33%), *pamonha* (8.49%), *crepe* (6.64%), *tapioca* (5.41%), popcorn (3.69%), and others (10.09%) such as *salgados*, sweets, *pão de queijo*, pizza, fruit juice, ice cream, and bread. A study carried out in Maranhão State reported that *pastel* and *cachorro-quente* were also preferred by the interviewed population⁵. It is important to mention that consumption of hamburgers, a food type characteristic of modern times, is related to easy preparation and greater availability in the street trade²⁹. Moreover, another factor that explains the high consumption of street foods is the sociocultural significance of these foods for the population. Thereby, street trade is also responsible for providing characteristic foods of a certain region or place. In Maringá, for example, *cachorro-quente* is perceived as “signature of the city” and is considered a typical food of the city³⁴. Likewise, *pastel* is widely consumed at the city’s street markets.

Regarding the reasons for consuming street food, personal taste and pleasure (62.36% of the participants), convenience due to lack of time (44.77%) and easy accessibility (42.93%) were the main reasons given by the participants, as shown in Table 2. The taste of the food, referral or invitation, and price were the next most common reasons for consumption. Participants who chose the “Other” option (3.32%) referred to leisure, sightseeing, and economic support for street vendors. Similar results were found in previous studies carried out in another Brazilian state, Minas Gerais³¹, and in other countries, such as Bangladesh¹⁴, Colombia²⁸, Turkey²⁵, India¹¹, and South Africa²³, where street food was preferred mainly for its variety of flavors, low price, accessibility, and pleasure.

The convenience, accessibility, and availability of street food are a great help to people, especially workers and students, who do not have much time to prepare meals at home²³. Furthermore, food sold on the street serves not only a biological function but also a social one, as its consumption is a time for meeting or leisure²⁹. This is reaffirmed by the fact that referrals or invitations from family or friends, taste or pleasure, and leisure or sightseeing were also determining reasons for street food consumption in the present study. In this context, one of the factors that influences the consumer’s decision to buy and consume food is benefit perception, which is the belief in the extent to which they will feel good about buying and/or consuming the product¹¹. In this sense, street food offers the economic, personal, and social benefits mentioned above.

Regarding the factors of choice, participants mainly considered hygiene and care in food preparation (63.71%) and the appearance of the establishment (57.20%) when choosing where to purchase street food, as shown in Table 2. In addition, participants also considered price, easy access, menu, and recommendations by others. The participants who chose the “Other” option (1.48%) referred to the occasion, desire, particular taste, and friendliness of the vendor.

These results show that more than half of the participants were concerned about hygiene at the street food establishment. Similarly, cleanliness of the place, vendors, and utensils was the main criterion for buying street food in Bahia State²⁹, and, price, hygiene, and convenience had the greatest

influence on food consumption among university students in the same state²². The environmental aesthetics, spatial layout, appearance of the vendor, and the price play important role in the customer's purchasing decision and satisfaction²⁵. Therefore, understanding the main factors in choosing a street food location can enable vendors to align their services with consumer preferences, demonstrate transparency, and strengthen relationships with their customers¹¹.

Table 2. Reasons for consumption and factors in choosing a street food vending place.

Reasons for purchase and consumption	n	%
Taste and pleasure	507	62.36
Lack of time to prepare meals at home/practicality/convenience	364	44.77
Easy access/available everywhere	349	42.93
Food flavor	220	27.06
Recommendation or invitation from family and friends	155	19.07
Affordable cost	129	15.87
Other	27	3.32
Factors in choice of place	n	%
Hygiene and care in food preparation	518	63.71
Appearance of the cart, stall, kiosk, etc.	465	57.20
Price	434	53.38
Proximity to home or work/easy access	398	48.95
Menu/variety of foods offered	311	38.25
Recommendations from family and friends	297	36.53
Other	12	1.48

Source: Authors.

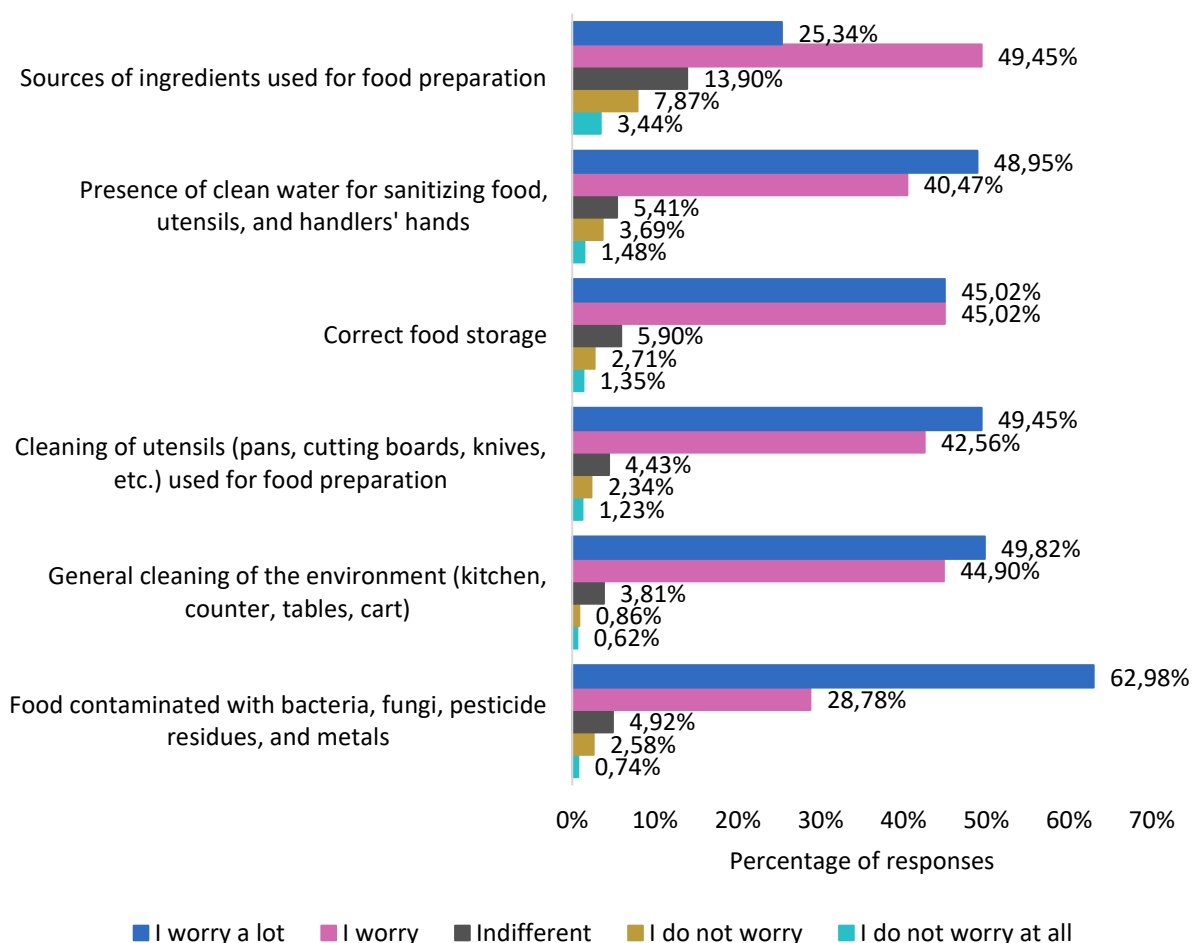
ATTITUDES TOWARD STREET FOOD SAFETY

Confidence, concern, and perceptions regarding street food safety among participants were the aspects assessed in this section. The participants agreed (8.49%) or totally agreed (54.24%) with the statement "I trust in the hygiene of and care taken during the preparation of food sold on the street in the places I frequent" compared with those who disagreed (1.97%), totally disagreed (23.99%), or were indifferent (11.32%). In addition, the participants agreed (42.44%) or totally agreed (41.70%) with the statement "I worry about foodborne illnesses (food poisoning) when I consume food sold on the street" while the minority disagreed (1.60%), totally disagreed (5.17%), or were indifferent (9.10%).

Studies carried out in South Africa²³ and Bangladesh¹⁴ found that 58% and 23.1% of the consumers assessed were confident in the safety of street food, while 47% and 31.4% were concerned about FBDs at the time of purchase, respectively. This lower level of confidence than that revealed in the present study may be due to the higher prevalence of FBD outbreaks following the consumption of contaminated street food because of poor hygiene in the trade, as reported by the authors. Likewise, a study in China revealed that only 18% of the interviewees thought that their street food purchases were completely safe; that is, they had trust in the safety of this food³⁵. In this sense, the perception of risks and benefits influences consumers' attitudes toward consumption and street food safety¹¹.

Regarding the level of concern about aspects of good street food handling practices, it was observed that a large proportion of the participants expressed concern about all the aspects presented in the questionnaire. That is, 94.72% of the participants were concerned or very concerned about the cleanliness of the environment, 92.01% about the cleanliness of the utensils used to prepare the food, 90.04% about the correct storage of the food, and 89.42% about the presence of clean water for sanitizing, as shown in Figure 1. In addition, 62.98% were very concerned about food being contaminated by bacteria, fungi, pesticide residues, and metals, and 49.45% were concerned about the sources of ingredients for food preparation. This reaffirms that most participants were aware of the importance of good practices in the street food trade to reduce contamination and provide safe food to the consumer.

Gupta et al.¹¹ reported that street food consumers in India were also concerned about the cleanliness of utensils and areas for food preparation and storage, the quality of raw materials, and the provision of drinking water at the food preparation site. In Haiti the majority of consumers were aware of the importance of hand washing (93.8%) and proper cleaning of utensils (71.9%) for the prevention of FBDs²⁷, and, in China, street food consumers were most concerned about the presence of pesticide residues (28%), microbial contamination (23%) and food handling practices (10%)³⁵.



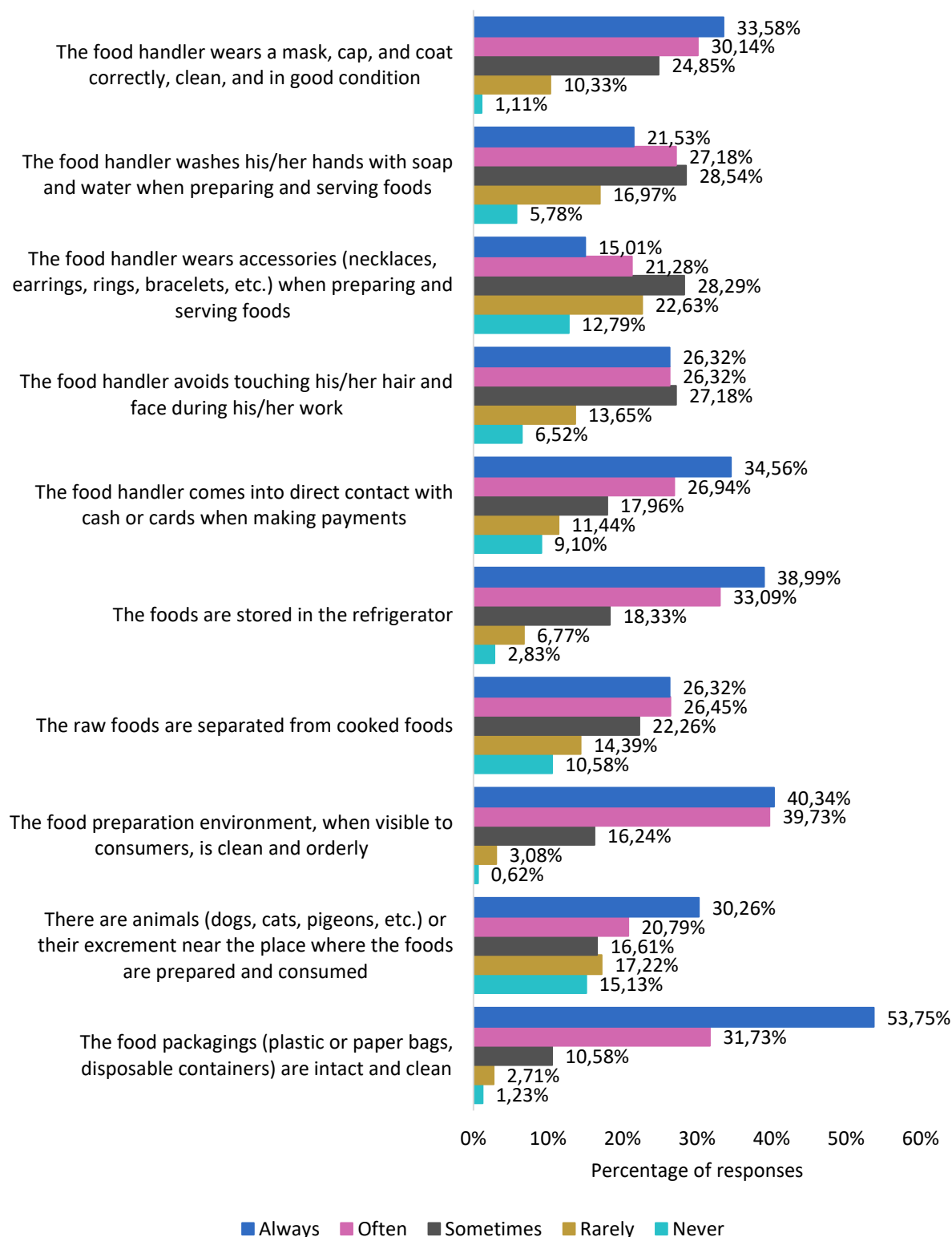
Based on the recommendations of the Nota Técnica N°08/13 – DVVSA/CEVS/SESA - Boas Práticas para Comércio Ambulante de Alimentos³⁶ and the RDC N°216/2004 - Regulamento Técnico de Boas Práticas para Serviços de Alimentação³⁷, the frequency in which certain good food handling

practices (hygiene in relation to the environment, handlers, and food preparation) were perceived by the participants when they bought street food was evaluated, as shown in Figure 2.

With regard to food handlers, more than half of the participants showed a high level of awareness (always or often) of the use of personal protective equipment (masks, caps, and coats) by food handlers (63.72%) and whether they came into contact with money and cards when making payments (61.50%). In addition, participants paid attention always or often (52.64%) or sometimes (27.18%) to whether food handlers avoided touching their hair and face while working, and sometimes (28.54%) or often (27.18%) to whether food handlers washed their hands with soap and water when preparing and serving food. It is important to pay attention to hand hygiene, as it is a crucial factor in food contamination and the spread of pathogens²⁴. Meanwhile, the participants sometimes (28.29%), rarely (22.63%), or frequently (21.28%) observed whether food handlers used personal accessories during food preparation and service.

Furthermore, 80.07% of the participants always or frequently observed whether the food preparation area was clean and orderly, 72.08% whether the food was stored in the fridge, 52.77% whether raw food was separated from cooked food, and 51.05% whether animals or their excretions were present near the place of sale. Participants also always (53.75%) or often (31.73%) noticed whether the packaging of the food on offer was intact and clean.

These results show that the majority of participants paid attention to the hygienic conditions in which street food was prepared and sold in the places they frequented. Likewise, 84.62% of the consumers interviewed in Maranhão State checked to see if the handler was dressed correctly and whether their behavior was appropriate while handling the food⁵. According to these authors, the interviewees were aware that inappropriate places for selling food and irregular behavior of the vendor can directly interfere with the quality of the product and the health of the consumer. Meanwhile, consumers in Poland observed the hygiene of employees, establishment, and food production, also, they pointed out irregularities, although they were not experienced hygiene auditors³. Therefore, it is important to know consumers' perceptions of vendors' practices; as they can develop a negative perception if they observe that good food handling practices are not adhered to¹¹.



When asked about the importance of food safety training and inspection by health authorities, 99.02% of the participants believed food safety training among street food handlers to be important for reducing the risk of food contamination and FBDs. Similarly, 97.66% believed that it was important for health authorities to inspect street food in order to reduce the risk of FBDs among consumers.

Considering that street food consumption is significant, training food vendors in personal hygiene and good manufacturing practices should be mandatory, as it allows them to understand and

adopt basic requirements in their activities to significantly reduce incidence of FBDs^{15,25}. In fact, studies show the lack of compliance with Brazilian legislation and the need of good handling practices training in street food^{38,39}. On the other hand, the implementation of good practices proved effective in improving the hygienic and sanitary conditions of the food services^{40,41}. In this context, it is necessary to strengthen policies and regulations for the safe trade of street food as well as monitoring their application⁷.

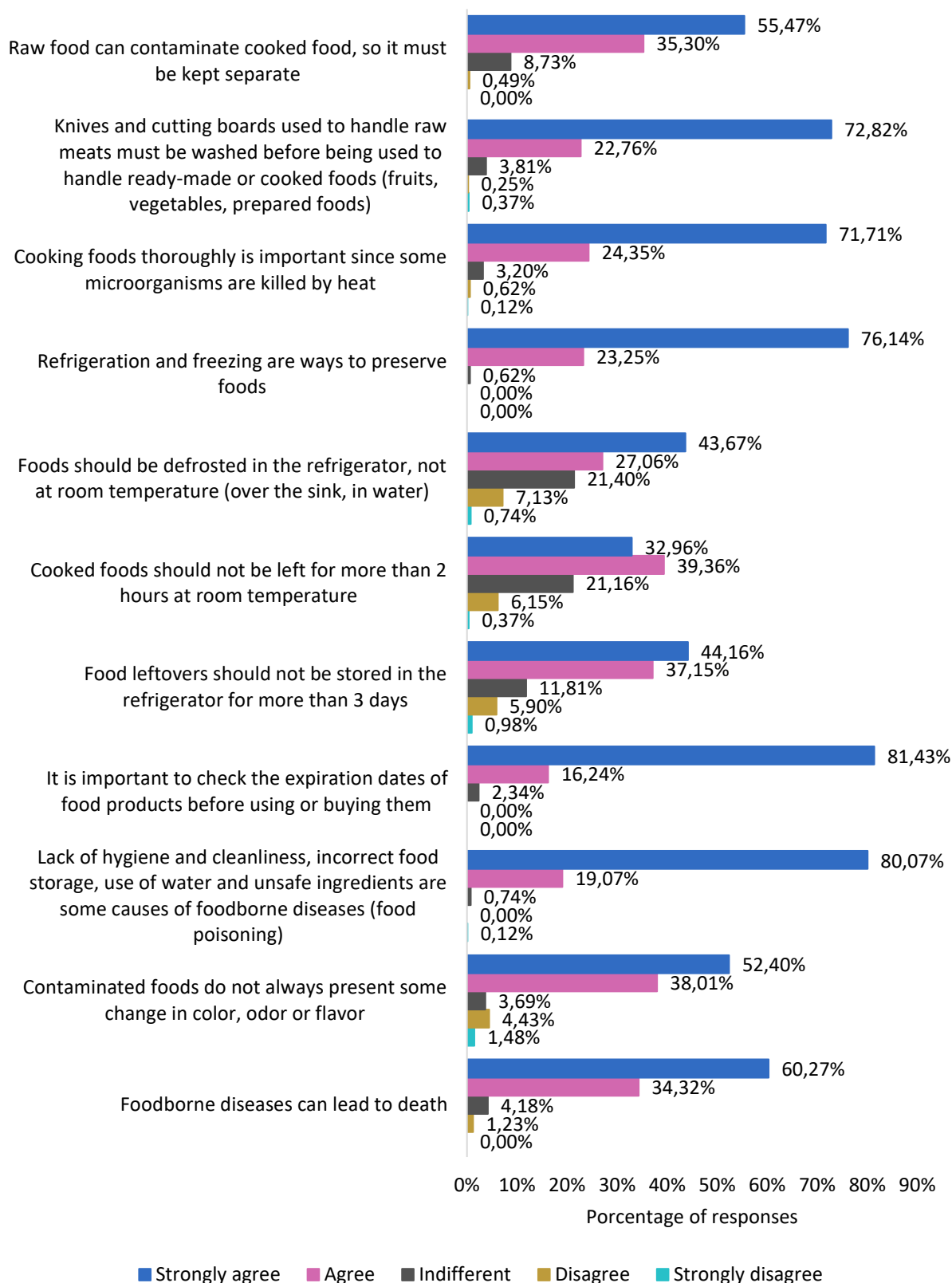
Street food vendors need to strive to minimize the risks and maximize the perceived benefits in order to attract more demand for street food. To do this, they, together with authorities, should develop strategies such as voluntary food safety training and local regulations associated with risk factors¹¹.

KNOWLEDGE AND ATTITUDES ABOUT GENERAL FOOD SAFETY

The last section of questions consisted of assessing participants' knowledge and attitudes toward food safety in general. First, they were asked if they had received or receive information about food safety in general, and 78.84% of the participants answered positively, while 21.16% answered negatively. This shows that a large proportion of street food consumers in Paraná are aware of food hygiene and care, which was also confirmed by their concern about these issues. In turn, the sources of their information were social networks (55.47%), family and friends (53.63%), websites of health authorities or legislation (36.29%), professional courses at undergraduate or postgraduate level (35.42%), email (2.83%), or other sources (7.26%) that included the media (television and newspapers), scientific literature (articles and books), and learning in primary or secondary school. In addition, when the participants had doubts about hygiene and food care in the kitchen, they reported that they searched the internet or other sources of information such as those mentioned above (82.53%) or asked someone they believed would know about the subject (48.95%), while only 12.18% did not ask anyone and did what they believed was best, and 0.86% reported other actions, such as avoiding doing something they did not know about.

Regarding the level of knowledge about food safety aspects, the results are shown in Figure 3. It was observed that the vast majority of participants totally agreed with all the statements, which reinforces the idea that they have a good level of knowledge about good food handling practices and FBDs. This knowledge of food safety was most evident in the following aspects: the importance of checking the expiry dates of products before buying or using them (81.43% of participants); the lack of hygiene and cleanliness, incorrect food storage, and the use of unsafe water and ingredients as some of the causes of FBDs (80.07%); refrigeration and freezing as ways of preserving food (76.14%); the washing of knives and boards used to handle raw meats before using them for ready-made or cooked foods (fruit, vegetables, cooked meats, prepared foods) (72.82%); and the importance of cooking food well, as some microorganisms are eliminated by heat (71.71%). In addition, more than half (60.27%) also totally agreed that FBDs can lead to death, 55.47% that raw and cooked food should be kept separate to avoid cross-contamination, and 52.40% that contaminated food does not always show organoleptic changes. These results show that there is a greater awareness of behaviors that are already established in society (for example, the importance of hygiene and cleanliness, preserving food by refrigerating or freezing it, cooking food properly), while there is a slightly lower awareness of more technical information that is not always communicated to consumers (for example, about defrosting food properly and storing leftovers properly).

In a study in Vietnam also reported that just over 98% of the street food consumers assessed knew that hand washing and proper cleaning and disinfection during food handling reduce the risk of contamination²⁴. Meanwhile, in Bangladesh, 76.3% of street food consumers evaluated knew that hand washing contributes to reducing the risk of FBDs¹⁴.



With regard to FBDs, 33.95% of the participants agreed and 61.87% totally agreed with the statement “I care about preventing foodborne illnesses” while only 0.86% disagreed or totally disagreed and 3.32% were indifferent to the question. With regard to knowledge about the symptoms of FBD’s, most of the participants knew that diarrhea (98.40%), vomiting (95.82%), and abdominal pain (84.38%) are the most common symptoms, followed by fever (44.77%), headache (34.32%), and tiredness (19.19%).

Finally, when asked about effective practices for reducing the risk of food contamination, and therefore of FBDs, 88.31% of the participants considered all the alternatives to be correct. The alternatives included the WHO recommendations for safer food, that is, adequate hygiene of food handlers, cleanliness and sanitation in the food preparation area, separating raw food from cooked food, cooking food well, keeping food at safe temperatures, and using safe water and raw materials. The rest of the consumers only considered some of the practices correct, such as keeping the handlers and environment clean or using safe raw materials.

Knowledge plays an important role in improving attitudes toward food hygiene²⁴. In addition, increasing consumer knowledge and awareness about the safety of street food can counteract inadequate hygiene practices by vendors³ and can also determine the quality of inspections carried out by health authorities²⁵.

Considering that a large part of the population evaluated in this study had higher education (59.53%) and had some connection to the health area (21.16%), it can be assumed that these characteristics influenced their levels of knowledge about food safety. In this context, participants with a higher level of education are expected to have more knowledge about food safety issues than those with no or less formal education²³.

It is worth considering that this study has limitations, such as the method used for data collection (Snowball), because, as it is a non-probabilistic technique, there is a risk of obtaining a sample that is not sufficiently diverse or representative. Another limitation is the uncertainty of knowing whether people answered consciously or interpreted the questions correctly, as it was a self-administered online survey. In addition, with the limitation of social desirability bias, it is not always possible to reliably obtain the information requested.

The results of this study showed that a high proportion of the consumers evaluated had confidence, concern, perception, and knowledge regarding the safety of street food. The importance of disseminating information about food safety among street food consumers is highlighted in order to generate awareness and concern, as observed in the results of this study. In addition, the data obtained can provide input to strengthen strategies and policies aimed at improving street food safety.

CONCLUSION

Parte final do artigo, na qual se apresentam as conclusões correspondentes aos objetivos e hipóteses, apresentados na introdução. Aqui são apresentadas as respostas aos problemas de pesquisa, se os objetivos do artigo foram alcançados e se as hipóteses levantadas (quando houver) foram ou não confirmadas. Podem ser incluídas breves recomendações, bem como sugestões para trabalhos futuros.

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