

## HIDDEN RISKS: AN INVESTIGATION INTO THE EFFECTIVENESS OF GOOD FOOD HANDLING PRACTICES IN SEASIDE RESTAURANTS IN THE CITY OF SÃO LUÍS – MA

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### ABSTRACT

Food safety has become a topic of increasing importance in the field of public health, especially in regions with intense tourist activity, such as the city of São Luís, capital of the state of Maranhão. Given the need to guarantee consumer health and ensure the quality and maintenance of services in the local

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### Bridges of Knowledge: Multidisciplinary Encounters

*HIDDEN RISKS: AN INVESTIGATION INTO THE EFFECTIVENESS OF GOOD FOOD HANDLING PRACTICES IN SEASIDE RESTAURANTS IN THE CITY OF SÃO LUÍS – MA*



tourism sector, the objective is to identify potential hidden risks in food handling and storage processes, in addition to assessing the degree of compliance of these establishments with the criteria established by the legislation of the National Health Surveillance Agency (ANVISA). To this end, a checklist developed based on Resolution RDC No.216 (Brazil, 2004) was applied, document that regulates good practices for food services in Brazil. Thus, it was observed that an average of 65.5% of responses were positive, which, according to the adopted criteria, classifies the fifteen restaurants evaluated as having a regular level of GMP compliance. This allows us to conclude that there are good intentions and specific efforts on the part of the establishments, but also highlights the urgent need for structural improvements, ongoing training of food handlers, and greater rigor in the application of health protocols.

**Keywords:** Food safety; Hygiene; Food handling; Sanitary risks.



## INTRODUCTION

Food safety constitutes a central element in discussions on public health, especially in urban contexts where eating outside the home has become a daily practice. Restaurants, as environments for large-scale food production and consumption, play a critical role in this scenario, while also representing potential points of sanitary vulnerability. Improper handling and storage of food are directly associated with the incidence of waterborne and foodborne diseases (WFDs), highlighting the need for a rigorous analysis of the practices adopted by these establishments.

It is essential to ensure food safety, the quality of the meals served, and consumer health. Improperly handled or inadequately stored food can become contaminated, causing foodborne illnesses. Proper storage—with control of temperature, humidity, ventilation, and expiration dates—prevents spoilage, losses, and contamination, while maintaining the flavor, texture, and nutritional value of food.

In the city of São Luís – MA, there has been significant expansion of the food sector, driven by factors such as population growth, tourism, and diversification of eating habits. However, this progress is not always accompanied by the adoption of effective hygiene and food safety practices. Previous studies indicate that, despite the existence of regulatory standards such as ANVISA Resolutions RDC No. 275 and 216, recurring failures in the implementation of Standard Operating Procedures (SOPs) and in the training of food handlers compromise the effectiveness of preventive measures.

Supporting these concerns, Costa et al. (2023) analyzed samples of fish sold in restaurants along the São Luís seafront, revealing the presence of pathogenic microorganisms with potential risk to public health. The research identified deficiencies in handling and storage practices, emphasizing the need for stricter application of Good Manufacturing Practices (GMP) and compliance with current sanitary legislation. These findings reinforce the relevance of local investigations into the hygienic-sanitary quality of food offered in areas with high tourist traffic.

The present study aims to critically and systematically analyze the effectiveness of hygiene and food safety practices in handling and storage processes in restaurants located in the city of São Luís – MA. The analysis will be based on technical-scientific criteria that allow not only the identification of nonconformities but also an understanding of the structural, behavioral, and institutional factors that contribute to the persistence of hidden risks in this sector. It is expected that this will provide relevant input for the formulation of more effective intervention strategies adapted to the local reality, promoting advances in consumer health protection and the quality of food services.



## THEORETICAL FRAMEWORK

### GOOD MANUFACTURING PRACTICES (GMP) FOR FOOD

Good Manufacturing Practices (GMP) are recognized as fundamental tools for ensuring the quality and sanitary safety of food. They encompass operational standards that guarantee control over physical, chemical, and biological hazards throughout all stages of food production and handling. The application of GMP in food services is an effective strategy for preventing outbreaks of waterborne and foodborne diseases (WFDs), as it provides guidance ranging from personal hygiene control of food handlers to monitoring environmental conditions (Oliveira, Santos & Costa, 2021).

Studies indicate that failures in adopting good practices are frequently associated with foodborne illnesses and the loss of service quality. Furthermore, health surveillance authorities have emphasized the importance of continuous training for food handlers as a strategy to ensure compliance with established standards (Franco & Landgraf, 2008).

According to ANVISA Resolution RDC No. 275, dated October 21, 2002 (Brazil, 2002), GMP covers aspects such as the physical infrastructure of the facility, pest control, cleaning and sanitization of equipment and utensils, storage conditions, health and hygiene of handlers, and process traceability. Proper implementation of these measures significantly contributes to preventing contamination and foodborne outbreaks, promoting food safety and consumer confidence.

### QUALITY AND SAFETY IN FOOD SERVICES

Quality in food services is directly related to process standardization, hazard control, and the application of specific technical standards that ensure the integrity of the food offered. These factors involve everything from raw material selection, temperature control, and handler hygiene to monitoring environmental conditions (Pereira & Costa, 2020).

Food safety, in this context, is achieved through a preventive approach based on good practice programs and continuous staff education. The absence of effective control can result in outbreaks of foodborne diseases, compromising consumer trust and business sustainability (Silva & Santos, 2018).

The implementation of sanitary control systems in food services must be constant and adaptable to local realities. In coastal and tourist regions, where there is high turnover of food and people, this control becomes even more sensitive, requiring strict application of standards and close monitoring of internal procedures (WHO, 2020).

### WATERBORNE AND FOODBORNE DISEASES (WFDs)

Waterborne and foodborne diseases (WFDs) represent one of the greatest challenges to public health in the context of food services. These diseases are caused by the ingestion of food or water



contaminated by pathogenic microorganisms such as bacteria, viruses, and parasites, as well as toxins produced by these agents. The occurrence of WFDs is strongly associated with failures in good handling practices, inadequate hygiene conditions, and the consumption of raw or undercooked food (WHO, 2020).

In coastal areas with high tourist density, such as the São Luís seafront, the risk of WFD outbreaks can be amplified by the high circulation of people, specific environmental conditions, and, often, negligence regarding food safety. Sanitary monitoring of restaurants located in tourist regions must be rigorous, as the presence of contaminated water or poorly preserved food can compromise consumer health and negatively impact the tourism sector (Souza & Lima, 2023).

To prevent the spread of waterborne and foodborne diseases, it is essential to implement continuous good practices, combined with worker training and systematic inspection of establishments. According to Silva Júnior & Martins (2016), many risks present in the handling environment are invisible to the customer, making sanitary surveillance an essential component for ensuring safe food.

## HYGIENIC-SANITARY CONTROL IN SEASIDE RESTAURANTS

In collective food establishments, hygienic-sanitary control is a central element for preserving public health and preventing foodborne diseases. This control involves the systematic application of standards and procedures aimed at ensuring food safety throughout all stages of the production process, from raw material reception to distribution to the final consumer (Almeida et al., 2019).

In food services that operate with a high volume of daily meals, such as restaurants located along the São Luís seafront, the risk of sanitary failures is heightened by environmental conditions, high product turnover, and pressure for quick service. Non-compliance with cleaning protocols, improper food storage, and lack of continuous inspection are recurring factors that compromise sanitary control in these environments (Oliveira, Santos & Costa, 2021).

ANVISA Resolution RDC No. 275/2002 establishes specific guidelines for the organization, hygiene, and maintenance of physical facilities, as well as for the adoption of Standard Operating Procedures (SOPs) that ensure food safety. These measures are essential to prevent cross-contamination and eliminate microbiological risk points (Brazil, 2002).

In addition to adequate physical structure, the human factor also plays a decisive role in this control. Continuous training of handlers and awareness of the risks associated with sanitary negligence are fundamental strategies for promoting a culture of responsibility and food safety within establishments (Ferreira & Mendes, 2022).



## METHODOLOGY

This research adopts a quantitative and descriptive approach with an exploratory character, aiming to evaluate the hygienic-sanitary conditions in food handling and storage processes in restaurants located along the São Luís seafront (MA).

The study was conducted in fifteen restaurants situated along the São Luís seafront, selected by convenience, considering criteria such as location, customer flow, and the owners' willingness to participate in the study. The choice of restaurants in this region is justified by the intense tourist activity and the economic relevance of these establishments to the local food sector.

For data collection, a structured checklist was used, developed based on the criteria established by ANVISA Resolution RDC No. 216/2004 (Brazil, 2004). The instrument included items related to Good Manufacturing Practices (GMP), covering aspects such as: personal hygiene conditions of food handlers; physical structure of the handling environment; temperature control and food storage; cleaning and sanitization procedures for equipment and utensils; pest and vector control.

The checklist was applied during scheduled visits to the establishments, respecting all ethical and biosafety protocols. The data obtained were organized in electronic spreadsheets, enabling descriptive analysis of the results.

Conformities and nonconformities identified were expressed in absolute and relative frequencies (%), facilitating the identification of the main critical points related to hygienic-sanitary practices in the evaluated restaurants.

The study complied with the ethical principles established by Resolution No. 466/2012 of the National Health Council, ensuring the anonymity of participating establishments and the confidentiality of collected information.

To obtain the research results, a numerical score was assigned to the evaluated items, following the methodology proposed by Valente et al. (2003), as shown in Table 1. The collected information was organized in Microsoft Excel, which allowed the calculation of percentages related to items that showed compliance, considering only those with a positive response ("yes"), totaling 100% adequacy. In cases where certain criteria were classified as "not applicable" (NA), these were excluded from the reference total, considering only valid items for each analyzed restaurant. After analysis, the data were presented in tables to facilitate comparison among establishments.

Table 1 – Classification criteria for establishments according to the percentage of items met in the verification checklist.

SCORE (%)	CLASSIFICATION
91 - 100	Excellent
75 - 90	Good
50 - 74	Regular
30 - 49	Poor
< 30	Very Poor

Source: Mallon & Bortolozo, 2008

## RESULTS AND DISCUSSION

According to the previous table, a tabulation was carried out evaluating the following items: Hand hygiene; Appearance and personal hygiene; Infrastructure, cleaning, and functioning of the establishment; Food handlers' perception of GMP; Profile of food handlers. A total of 600 items were addressed in the checklists, and an average of 65.5% positive responses was obtained, which means that the fifteen restaurants are classified as Regular regarding Good Food Handling Practices (Table 1).

### HAND HYGIENE

One of the items evaluated in the checklist was "hand hygiene," a fundamental practice to ensure food safety and prevent cross-contamination. The results showed that 74.07% of establishments presented positive responses regarding the correct adoption of this practice, while 25.93% were negative. Based on these percentages, this item was classified as Regular, indicating that although most restaurants comply, a significant portion still does not adequately follow this essential protocol.

Hand hygiene is one of the pillars of Good Handling Practices, as required by ANVISA RDC No. 216/2004. The absence or inadequate execution of this procedure can substantially increase the risk of pathogen transmission to food. According to studies such as Valente et al. (2003), failures in this aspect are recurrent in commercial food establishments and often reflect a lack of continuous training or ineffective supervision.

Thus, the data suggest the need for immediate corrective actions, such as periodic training programs for handlers and reinforcement of personal hygiene routines. These measures are essential to increase compliance and, consequently, promote greater consumer safety.

Chart 1: Personal Hygiene in Seaside Restaurants of São Luís – MA

HANDLER PERSONAL HYGIENE	COMPLIANCE (%)	CLASSIFICATION
Hand hygiene	74,07	Regular

Source: Prepared by the authors.



## APPEARANCE AND PERSONAL HYGIENE

Another item evaluated was the “appearance and personal hygiene of handlers,” a fundamental criterion within Good Handling Practices as it is directly related to preventing physical and microbiological contamination of food. The data revealed that 57.46% of establishments presented positive responses, indicating that just over half of the handlers meet the minimum requirements established by sanitary legislation. With this performance, the item was classified as Regular, highlighting the need for significant improvements. The main problems observed included the use of adornments (rings, earrings, and bracelets), long or polished nails, unprotected beards, and the absence of hairnets or caps. These failures contradict the standards of RDC No. 216/2004, which establishes clear criteria regarding the personal presentation of workers who handle food directly.

Low adherence to these care measures may be associated with a lack of regular training, negligence in internal supervision, or even the absence of a properly qualified technical supervisor. Studies such as Silva et al. (2017) indicate that handlers’ personal appearance, in addition to being a sanitary requirement, directly impacts consumer trust, especially in tourist regions.

Chart 2: General Conditions of Handlers’ Personal Hygiene

HANDLER PERSONAL HYGIENE	COMPLIANCE (%)	CLASSIFICATION
Appearance and Personal Hygiene	57,46	Regular

Source: Prepared by the authors.

Thus, there is an urgent need to invest in continuous training, strengthen internal inspection routines, and promote a food safety culture within establishments. Appearance and personal hygiene should not be seen merely as a legal requirement but as an essential practice to ensure safe food and the credibility of the service provided.

## INFRASTRUCTURE, CLEANING, AND FUNCTIONING OF THE ESTABLISHMENT

The item “infrastructure, cleaning, and functioning of the establishment” encompasses essential elements for maintaining a safe and hygienic environment for food preparation and distribution. The results indicated that 63.33% of the evaluated restaurants presented positive responses, resulting in a Regular classification for this criterion.

During technical visits, partially adequate physical structures were observed, with some establishments showing cracks in walls, worn floors or residue accumulation, insufficient ventilation, and lack of protective screens against vectors. These conditions compromise the physical barrier necessary to prevent the entry of contaminants and hinder efficient cleaning processes.



Regarding cleaning, most establishments maintained reasonably organized preparation areas, although in some cases there was dirt accumulation in hard-to-reach areas and a lack of documented cleaning and sanitization schedules. The absence of proof of cleaning routines is a recurring failure, contrary to RDC No. 216/2004, which requires standardized procedures and constant monitoring of facility cleaning.

Additionally, operational flow in some establishments did not follow the ideal production sequence, causing cross-contact between raw and ready-to-eat foods, which represents a significant risk of cross-contamination. Therefore, establishments must invest in structural adjustments, process standardization, and implementation of internal cleaning controls to ensure not only legal compliance but, above all, food safety for consumers.

Chart 3: Infrastructure Conditions of Seaside Restaurants

INFRASTRUCTURE	COMPLIANCE (%)	CLASSIFICATION
Infrastructure, Cleaning, and Functioning	63,33	Regular

Source: Prepared by the authors.

#### HANDLERS' PERCEPTION OF GMP

This aspect was evaluated in the study with the objective of understanding the degree of knowledge, awareness, and engagement of professionals with food safety principles. The data obtained indicated that 82.66% of the responses were positive, resulting in a "Good" classification for this item.

This result demonstrates that most of the handlers interviewed understand the importance of Good Manufacturing Practices (GMP), recognizing their application as essential for ensuring food quality and preventing health risks to consumers. Issues related to hand hygiene, proper use of uniforms, separation between raw and ready-to-eat foods, and temperature control were, in general, correctly mentioned by the professionals. Despite this good performance, a portion of respondents still showed partial lack of knowledge regarding more technical procedures, such as the importance of systematic verification of equipment temperature, the need for activity records, and the correct storage of cleaning products away from food. These points indicate the need for continuous reinforcement through training and educational actions.

According to Santos (2019), positive perception on the part of handlers is a key factor for the effective implementation of good practices. When professionals understand the risks associated with poor handling and are involved in quality control processes, there is greater adherence to standards and a lower rate of nonconformities in establishments.



Although the results are promising, it is recommended that restaurants maintain regular training programs with a practical focus and accessible language, in addition to encouraging active participation of employees in the food safety culture, reinforcing the role of each individual in maintaining the quality of services provided. As shown in Chart 4, 82.66% of the tabulated data are in compliance, demonstrating a positive aspect of the study.

Chart 4: Handlers' Perception of GMP

HANDLERS' PERCEPTION	COMPLIANCE (%)	CLASSIFICATION
Perception of GMP	82,66	Good

Source: Prepared by the authors.

## PROFILE OF HANDLERS

The analysis of the item “profile of handlers” in the investigated restaurants revealed 80% positive responses, thus classified as Good. This topic focused on aspects related to job performance, specifically whether the handler enjoys performing their role in the food sector.

Most handlers expressed interest in working in the food area, which is an excellent indicator. However, throughout the research, many shortcomings were still observed regarding the provision of quality service, which directly affects those consuming the food offered. It was also observed that in some establishments there are handlers with low educational levels or without recent formal training, which may compromise the correct understanding and application of Good Practices. According to ANVISA Resolution RDC No. 216/2004, it is essential that handlers undergo periodic training and be supervised by qualified technical personnel to ensure compliance with operational procedures.

Studies by Oliveira et al. (2021) indicate that the profile of handlers directly influences the quality of the service provided, especially when there is low technical qualification or high staff turnover, which hinders the consolidation of an organizational culture focused on food safety.

Chart 5: Profile of Food Handlers

HANDLER PROFILE	COMPLIANCE (%)	CLASSIFICATION
Handler Profile	80,0	Good

Source: Prepared by the authors.

Although the results indicate a generally satisfactory profile, the importance of continuous investment in handler training is reinforced, both through internal training and by encouraging formal qualification. Establishments with well-prepared teams tend to show greater adherence to good practices and, consequently, lower risks to consumer health.



## CONCLUSION

Based on the results obtained, it can be concluded that, on average, 65.5% of responses were positive, which, according to the adopted criteria, classifies the fifteen evaluated restaurants as being at a regular level of compliance with Good Manufacturing Practices (GMP). This result points to the existence of good intentions and specific efforts on the part of the establishments but also highlights the urgent need for structural improvements, continuous training of food handlers, and greater rigor in the application of sanitary protocols.

Thus, the study reinforces the importance of more effective monitoring by regulatory agencies, in addition to continuous investment in education and training for professionals who work directly in food production and handling. Only through these measures will it be possible to ensure safe food for the population and tourists who visit the region, contributing to the appreciation of local gastronomy and the promotion of public health.



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