

# Hygienic-sanitary conditions of state schools cafeterias in town of Palmeira das Missões, Rio Grande do Sul

## Condições higiênico-sanitárias das cantinas escolares da rede estadual de ensino no município de Palmeira das Missões, Rio Grande do Sul

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### ABSTRACT

**Introduction:** Food marketing within schools' cafeterias needs hygienic and sanitary conditions control, from the beginning of production to the food final distribution, ensuring the offered product's sanity. **Objective:** This study aimed to evaluate the level of suitability of state schools' cafeterias in Palmeira das Missões (Rio Grande do Sul) about good food handling practices. **Method:** The hygienic-sanitary conditions diagnostic was carried out by using the verification list pertaining to Ordinance 817, from May 10<sup>th</sup>, 2013, which has an evaluation instrument that reinforces hygienic and sanitary aspects of the greatest impact to health. **Results:** From the six cafeterias studied the average suitability was of 17.05%, thus under the recommended from scientific literature. The category that has the biggest suitability percentage referred to urban vectors and pest integrated control (55.56%). **Conclusions:** The other categories studied presented less than 35.00% of suitability. Therefore, the studied state schools' cafeterias are not able to safely produce and distribute food to students, according to sanitary legislation, and also adaptations are needed in order to improve the quality of the food offered.

**KEYWORDS:** School Food; Good Food Handling Practices; Food Legislation; Food Quality; Sanitary Surveillance

### RESUMO

**Introdução:** A comercialização de alimentos nas cantinas escolares necessita de controle das condições higiênico-sanitárias, desde o início da produção até a distribuição final do alimento, garantindo, assim, a sanidade do produto ofertado. **Objetivo:** Este estudo objetivou avaliar o nível de adequação das cantinas escolares da rede estadual de ensino de Palmeira das Missões (Rio Grande do Sul) quanto às boas práticas de manipulação de alimentos. **Método:** O diagnóstico das condições higiênico-sanitárias das cantinas foi realizado a partir da aplicação da lista de verificação pertencente a Portaria nº 817, de 10 de maio de 2013, a qual possui um instrumento de avaliação que ressalta os aspectos higiênico-sanitários de maior impacto para a saúde. **Resultados:** Das seis cantinas avaliadas, verificou-se um índice de adequação médio de 17,05%, abaixo do preconizado pela literatura científica e legislações vigentes. A categoria com maior percentual de adequação foi referente ao controle integrado de vetores e pragas urbanas (55,56%). As demais categorias avaliadas apresentaram menos de 35,00% de adequação. **Conclusões:** Desta forma, estas cantinas não se encontram em condições adequadas para a produção e distribuição de alimentos seguros aos escolares, sendo necessárias adequações com as legislações sanitárias para buscar melhorias na qualidade dos alimentos ofertados.

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## INTRODUCTION

The production and marketing of food in school cafeterias must be done in a safe manner so as to minimize contamination and risks to diners. In schools there are children and adolescents who are growing up and may be susceptible to food and waterborne diseases (FBD). Therefore, good handling practices (GHP) should be applied to school cafeterias, with emphasis on careful reception, transportation, storage, preparation and distribution to schoolchildren<sup>1,2,3</sup>.

FBD have been increasing significantly around the world in recent years. According to the Brazilian Ministry of Health (MOH), the number of outbreaks of FBD in the years 2007 to 2017 is relevant in the Southeastern and Southern regions of Brazil, with day care centers and schools ranked as the fifth most frequent places of occurrence of outbreaks (7.9%). However, results may vary due to the lack of proper notification<sup>4</sup>. FBD occur because of chemical, physical and biological hazards, and food handling, conservation and distribution processes are the main factors responsible for the occurrence of these outbreaks. Being careful with the hygienic and sanitary conditions of school cafeterias is of paramount importance, since those are the places where we find customers with greater vulnerability to FBD<sup>5,6</sup>.

GHPs should be implemented by food service owners and handlers to ensure safety at work and for the food produced. It is worth mentioning that the quality of the food produced and marketed is the responsibility of the owner, and it is the responsibility of public administration and society to monitor the quality of these products and services<sup>7,8</sup>.

In order to promote the population's health protection and considering the need for constant improvement of sanitary control actions in the food area, the Brazilian Sanitary Surveillance Agency (Anvisa) published Collegiate Board Resolution RDC n. 216, in September 15, 2004<sup>9</sup>, which establishes good practice procedures for food services with a view to ensuring hygienic and sanitary conditions of the prepared food<sup>10</sup>. Also in this sense, there is Ordinance n. 817, of May 10, 2013<sup>11</sup>, which has an evaluation instrument that addresses the aspects of hygiene that have the greatest impact on health.

Considering that GHP are principles to ensure the quality of the food offered to the consumers, this study aimed to evaluate the suitability level of the school cafeterias of the state schools of Palmeira das Missões, Rio Grande do Sul, Brazil, regarding food-related GHP.

## METHOD

The study is characterized as quantitative-descriptive. It was carried out in six schools of the state school network in the city of Palmeira das Missões, Brazil, from October 2015 to May 2016.

Those people responsible for the schools were contacted for an explanation of the objectives and methodology of the project. Those who agreed to participate signed an authorization agreement for the conduction of the research. As an inclusion criterion, the study included public primary and secondary schools in the urban and rural areas. The cafeterias of the state schools were identified by numbers (1-6) in order to maintain their confidentiality. As an exclusion criterion, schools that did not have cafeterias were not included in the study.

Data on the hygienic-sanitary conditions of school cafeterias was collected through a checklist for categorization of food services<sup>11,12</sup>, which was subdivided into nine categories, namely: Water supply (category A); Structure (category B); Hygiene of facilities, equipment, furniture and utensils (category C); Integrated vector and urban pest control (category D); Handlers (category E); Raw materials, ingredients and packaging (category F); Preparation of the food (category G); Food storage, transportation and display (category H) and Responsibility, documentation and registration (category I), totaling 51 issues with the greatest health impact. Noncompliance with the first three items in the checklist excluded the establishment of categorization. Each of these items had three options: Suitable (AD), Not suitable (NS) and Not applicable (NA). The last alternative was used when it was not possible to evaluate the conditions of the item, which then received no score<sup>10,11,12</sup>.

In order to assess the suitability of hygienic-sanitary conditions, the cafeterias were classified in accordance with RDC n. 10, of March 11, 2014<sup>10</sup>, which determines that noncompliance with any disqualifying item should exclude the establishment from the categorization, in view of the aspects with the greatest impact on health<sup>12</sup>. The items only scored when the evaluated establishment did not fulfill the requirements, therefore, the higher the score, the greater the number of non-conformities verified in the establishment. In the scoring of the items, the Impact Index (IIP) was used, representing their importance in the prevention of a FBD, and also the Factorial Load (FL). Scores were divided into four categories presented in the Table<sup>10</sup>.

Table. Categories of food services and required conditions.

Category	Required condition
A	Score equal to or higher than 0 and lower than 13.3, compliance with disqualifying items and at least one of the qualifying items.
B	Score equal to or higher than 13.3 and lower than 502.7 and compliance with disqualifying items.
C	Score equal to or higher than 502.7 and lower than 1,152.3 and compliance with disqualifying items.
Pending	Score equal to or higher than 1,152.3 and/or noncompliance with disqualifying items.

Source: Brazil (2014)<sup>10</sup>.



Data was collected through the onsite application of the Good Practice Checklist (GPCL). For this purpose, school cafeterias were visited during the food production process, when we could watch the production and distribution of food. These visits were done by the researchers responsible for the project previously trained by professors in the area.

When applicable, the temperature of the school cafeteria equipment (freezers, refrigerators, fryers and food distribution counters, among others) was checked by a digital thermometer of the Inconterm® brand, with a sensitivity of  $-50^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ .

The collected data was fed into the System of Evaluation and Monitoring of Sanitary Risk in Food Service (Siars), version 1.0<sup>13</sup>. This system generates specific reports for the evaluation of hygienic-sanitary conditions of food services, and the score is presented in percentages of suitability.

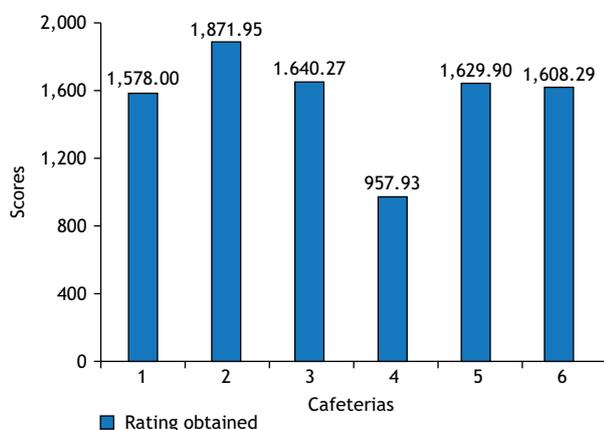
In addition, the data was typed and tabulated with *Microsoft Office Excel*®, version 2007, and the figures were created through *GraphPad Prism* version 5.0. Data was submitted to simple descriptive statistical analysis (mean and percentage of compliance), with *Statistica* version 7.0.

## RESULTS AND DISCUSSION

Of the 11 state schools we visited, 63.63% ( $n = 7$ ) had cafeterias that produce and/or sell food and beverages, of which one refused to participate in the research.

Overall, the evaluated school cafeterias have domestic physical and structural dimensions. They serve from 100 to 300 snacks per day. For the most part, food handlers are the owners, who reported that they had never attended food GHP courses. We also verified that none of the cafeterias had a valid sanitary permit.

According to RDC classification n. 10/2014<sup>10</sup>, the overall average score of the cafeterias was 1,547.72, classified as Pending. It should be noted that only Cafeteria 4 was classified in category C, the others were categorized as Pending (Figure 1).



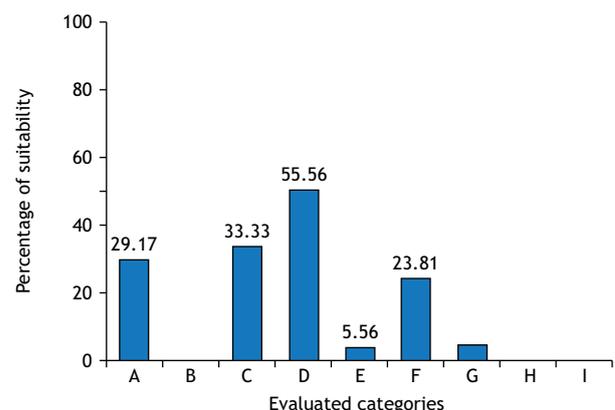
**Figure 1.** Average score of school cafeterias obtained through the application of the checklist on good food handling practices. Palmeira das Missões, RS, Brazil, 2016.

All food services classified in the Pending group had poor sanitary conditions and did not fulfill minimum operating requirements<sup>10,12,14</sup>. The precariousness of the average score obtained in school cafeterias is a warning for the health risks of schoolchildren, since it may affect the safety of the food produced and/or marketed in these places and cause an increase in the incidence of FBD. It should also be noted that no studies were found in the scientific literature that used the checklist of Ordinance n. 817/2013<sup>11</sup> in school cafeterias, which may limit data comparison.

When using the Sanitary Risk Assessment and Monitoring System in Food Service<sup>14</sup>, the percentage of average suitability presented by the cafeterias was 16.84%, noting that they are not in conditions for the production and marketing of safe food to schoolchildren. The recommendations of compliance percentages of food services in Brazil should present levels higher than 75% of suitability<sup>14,15,16</sup>, therefore, we noticed a difference between the verified suitability percentage and the legislation.

The categories that presented the highest percentage of suitability in the checklist of good practices were related to: Integrated vector control and urban pests (category D); Hygiene of premises, equipment, furniture and utensils (category C); Water supply (category A); followed by the raw material, ingredients and packaging category (category F) (Figure 2). The lowest percentages of suitability are in the categories of Handlers (category E) and Food preparation (category G). The categories related to Physical structure (category B); Food storage, transportation and display (Category H) and Responsibility, documentation and registration (category I) did not achieve the suitability percentage (Figure 2).

All the school cafeterias we evaluated presented compliance with the first three items in the list for water supply (category A). These items are of disqualifying nature according to Ordinance n. 817/2013<sup>11</sup> (Figure 2). It should be noted that a food service is not allowed to produce and market food without



A = Water supply; B = Structure; C = Hygiene of facilities, equipment, furniture and utensils; D = Integrated control of vectors and urban pests; E = Handlers; F = Raw material, ingredients and packaging; G = Food preparation; H = Food storage, transportation and display; I = Responsibility, documentation and registration.

**Figure 2.** Percentages of suitability regarding the hygienic-sanitary quality of school cafeterias in the nine categories evaluated. Palmeira das Missões, RS, Brazil, 2016.



the supply of drinking water, because it is not only used for food production, but also for the process of cleaning the environment, equipment, furniture and utensils. It is also necessary to present potability records in order to guarantee the quality of the water<sup>16,17</sup>.

Cafeterias use water from the public water supply network of the municipality. Responsibility for the hygiene and conservation of the reservoirs is of the Regional Education Office, where they are filed. Non-potable water may be a vehicle for contamination of food by pathogenic microorganisms, and potable water control is indispensable<sup>7,8,16,18</sup>.

The category of physical structure (category B) did not achieve the suitability percentage, since most school cafeterias have the layout of a domestic kitchen. In some places we also found walls and ceilings with cracks and dirt, lamps without protection against accidental falls and floor without smooth covering. This means they did not fulfill the minimum requirements of the existing sanitary legislation<sup>9,17</sup> (Figure 2). Correia and Rocha<sup>19</sup> paid technical visits to 20 school cafeterias in Portugal and verified that the operational flow and inadequate working space contribute to noncompliance with hygiene standards and may also increase the risk of accidents at the site. These authors also found out that 50% of the structures of the dining rooms they visited were old, with little ventilation, mold in the ceilings and walls of the food preparation areas. It is also worth noting that in 58% (n = 11) of these sites, the goods and the waste had the same outlet to the external area, allowing cross-contamination between the processes. Thus, we verified that the physical structures of food producing establishments should be planned by professionals who are familiar with the existing sanitary legislation<sup>9,11</sup>.

The sanitation of facilities, equipment, furniture and utensils (category C) achieved the second highest percentage of suitability due to the greater fulfillment of items related to sanitation in the areas of food production and distribution (Figure 2). In a study carried out in two food and hotel nutrition units in the city of Caruaru, Pernambuco, Brazil, the application of the checklist identified a low cleaning frequency of the physical facilities and absence of cleaning records. Furthermore, the study reported that the cleaning process was performed by employees who had not been trained for that role<sup>20</sup>. RDC n. 216/2004<sup>9</sup> establishes the Standardized Operational Procedure (SOP), specific for the hygiene of the facilities, equipment and utensils. Its objective is to prevent the food from being contaminated when in contact with the surface of preparation and distribution. With that, the importance of this category is emphasized, since the handler must be familiar with the principles of hygiene of the food production and distribution areas to minimize the risks of contamination.

The highest average percentage of suitability of all items evaluated was found in the integrated vector and urban pest control category (category D), (Figure 2). This result was possible due to the fact that 50% (n = 3) of the cafeterias answered all the evaluated items of the category, especially those related to the semi-annual pest control by a specialized company in these

places. In the other cafeterias, the presence of insects in the area of food production and distribution during the onsite visits was noteworthy. A 2009 and 2010 study comparing hygiene and sanitary compliance data from four private school cafeterias in Manaus found 100% compliance in this category. The authors pointed out that, following the intervention of health surveillance in these places, it was possible to achieve these adaptations<sup>2</sup>. To add safety to food production, it is extremely important to carry out this control in order to minimize the risks of food contamination<sup>9,17</sup>. It is the responsibility of those in charge of each food service to enable food handlers to monitor the presence of urban pests within the area of food production and distribution<sup>9,20,21</sup>.

As for the category of handlers (category E), a low percentage of suitability was found in relation to the GHP (Figure 2). The job of the handlers is directly linked to the safety of the food, because they can be direct sources of contamination in case of low hand hygiene conditions, leading to FBD among consumers<sup>21,22,23,24</sup>. According to RDC n. 216/2004<sup>9</sup>, when handlers present any illness or injury, they must be removed from the activities of food handling. The low percentage of suitability in this category is also a reflection of the lack of exclusive hand washbasins in all evaluated school cafeterias, equipped with antiseptic liquid soap and disposable towels, as recommended by Ordinance n. 817/2013<sup>11</sup>. Moreover, the need for periodic training in GHP and basic hygiene standards is stressed, since the evaluated personnel handled money and food at the same time in all the cafeterias we analyzed. Similar results were found in a study by Oliveira, Brasil and Taddei<sup>23</sup>, who carried out the analysis of the hygienic-sanitary conditions of five public and philanthropic day care kitchens and observed that all handlers presented inadequate hand hygiene.

In relation to the category of raw materials, ingredients and packaging (category F), a low percentage of suitability was obtained because none of the cafeterias separated and stored food properly. The food was found inside pots and plastic bags, with no identification or expiration date, which is in disagreement with RDC n. 216/2004<sup>9</sup> and Ordinance n. 78, of January 30, 2009<sup>17</sup> (Figure 2). Moreover, these cafeterias did not have foodstuffs of proven origin guaranteed by sanitary inspection bodies; therefore, they could not guarantee the quality of the food offered to schoolchildren. A study using a food GHP checklist, based on RDC 216/2004<sup>9</sup>, in 18 food and nutrition units of public schools in the state of Goiás, found that all of them had some control of their raw materials, and 94% (n = 16) used food that had been regularized by sanitary inspection bodies. Thus, the authors demonstrated that it is possible to comply with the legal requirements and guarantee quality food<sup>15</sup>. To optimize production, it is important to purchase quality raw materials and to control all hygiene standards, as these will reduce the risks of FBD<sup>4,17</sup>.

In the food preparation category (category G), the low suitability percentage is the result of inadequate food production temperatures and incorrect cleaning of handlers in the cafeterias we evaluated (Figure 2). The lack of monitoring equipment, such as thermometers in food services, can lead to incorrect food storage at different stages of the process<sup>26,27</sup>.



Concerning hand hygiene, we noticed the absence of washbasins with appropriate cleaning products, as mentioned above. Of the cafeterias we evaluated, 40% (n = 2) had total unsuitability in this category. We know for a fact that an inadequate cleaning process of the handlers' hands can lead to the contamination of the food, making it unfit for consumption<sup>4,9,17,22,25</sup>.

The category related to food storage and display (category H) did not achieve the suitability percentage, and this process is of paramount importance for the prevention of FBD (Figure 2). As mentioned above, school cafeterias did not control the temperature of the food they produced and marketed, nor did they correctly identify the preparations during storage, thus compromising the sanitary and hygienic quality of the final product. Using a checklist based on RDC n. 275, of October 21, 2002, the study found similar results to this study, in which 90% (n = 7) of the sites presented inadequate food storage temperatures. This study also verified nonconformities related to the packaging conditions, expiration date and in the forms of food storage<sup>26</sup>. RDC n. 216/2004<sup>9</sup> provides that food should be kept at adequate conditions and temperatures, not favoring microbial multiplication. It should be noted that the distribution of the food and hot preparations should be maintained at a temperature higher than 60° C for a maximum of 6 hours and the cold preparations should be kept up to 10° C for a maximum of 4 hours<sup>9</sup>. Preparations that do not meet these criteria of time and temperature should be discarded<sup>9,17</sup>.

The low percentage found in the category of responsibility, documentation and registration (category I) is due to the fact that none of the school cafeterias had a Manual of Good Practices (MGP) and SOP (Figure 2). A study conducted in 23 food services in Santa Maria, Rio Grande do Sul, Brazil, in 2011, applying a checklist based on NBR 15635: 2008, confirmed the same results of this study, where none of the establishments that marketed

food had these documents<sup>7</sup>. According to RDC n. 216/2004<sup>9</sup> and Ordinance n. 78/2009<sup>17</sup>, the absence of these documents hinders the standardization of the service, impairing the efficiency and quality of the food and of the food services. MGP and SOP should be accessible to food handlers and health surveillance agencies and they should be implemented in daily practice. It is important to note that, even if the establishments have these documents, the safety of the food produced in the cafeterias may be affected if the handlers are not able to follow the procedures described in the MGP and the mandatory SOP.

## CONCLUSIONS

The assessment of school cafeterias based on the checklist revealed unsatisfactory hygienic-sanitary conditions, and adjustments to existing sanitary regulations are necessary.

It should be pointed out that improvements are necessary in the elements considered to be of greater health risk, that is, the time and temperature of food production and marketing; elimination of procedures that lead to cross-contamination such as inadequate hand hygiene, use of the same equipment and utensils as knives or cutting boards for raw foods and cooked foods; keeping food in open containers, handling and hygiene aspects of handlers. In addition to these factors, the quality of the raw material and the ingredients used in the production of meals should be taken into account, as this may interfere directly with the quality and final safety of the product.

Therefore, it is extremely important that food handlers and cafeteria owners receive GHP training in food, enabling them to establish the adequate priorities and thus reduce the risk of diseases for schoolchildren.

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#### Conflict of Interest

Authors have no potential conflict of interest to declare, related to this study's political or financial peers and institutions.



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