

# The environment within production and distribution of school meals

## O meio ambiente no espaço de produção e distribuição da alimentação escolar

Maria Assunta Busato<sup>1</sup>; Ana Paula Benck Pasa<sup>2</sup>; Natali Letícia Provensi Silva<sup>3</sup>;  
Roberta Taglietti<sup>4</sup>; Carla Rosane Paz Arruda Teo<sup>5</sup>

### Abstract

Brazilian Food Guide reiterates that food should be safe from harvesting, transportation and even storage, preparation and distribution in the school environment. From this perspective, this study aimed to identify aspects of the environment, physical spaces and the surrounding area where school meals are produced and distributed, as well as food handling conditions and environmental education. Ten public schools in a city in Western Santa Catarina were analyzed. A semi-structured questionnaire was applied to a representative from each school and to those responsible for the handling and distribution of school meals. It is an adapted instrument, based on the Collegiate Board Resolution of the National Health Surveillance Agency No. 216/2004 and No 275/2002. It was observed that there are environmental education actions in all schools; 90% (n=9) presented selective system of garbage collection and 20% (n=2) designed organic waste for composting. In 90% (n=9) of the schools, water comes from the public system and in 10% (n=1) from artesian water wells. None of the schools fully complies with the standards on the condition and adequacy of physical facilities in the areas of production and distribution of school meals. In all of them, partial adjustments were observed about legislation on physical spaces and environment besides the lack of guidance to handlers. This demonstrates that corrective and preventive actions are necessary to address the inadequacies found in schools.

**Keywords:** Waste products. Environmental education. Food handling.

### Resumo

O Guia Alimentar brasileiro reitera que o alimento deve ser seguro desde o seu plantio, transporte e até o armazenamento, elaboração e distribuição no ambiente escolar. Nessa perspectiva, esse estudo objetivou conhecer aspectos do ambiente, espaços físicos e o entorno dos locais onde é produzida e distribuída a alimentação escolar, as condições de manipulação dos alimentos bem como ações de educação ambiental. Foram analisadas 10 escolas da rede pública de um município do Oeste Catarinense. Foi aplicado um questionário semiestruturado a um representante de cada escola e aos responsáveis pela manipulação e distribuição da alimentação escolar. Trata-se de instrumento adaptado, com base nas Resoluções da Diretoria Colegiada nº 216/2004 e nº 275/2002 da Agência Nacional de Vigilância Sanitária. Observou-se que em todas as escolas há ações de educação ambiental; 90% (n=9) apresentam sistema de coleta seletiva de lixo e 20% (n=2) destinam os resíduos orgânicos para compostagem. Em 90% (n=9) das escolas, a água é proveniente da rede pública e 10% (n=1) utilizam água de poço artesianos. Nenhuma das escolas atende integralmente às normas sobre o estado de conservação e adequação das instalações físicas das áreas de produção e distribuição da alimentação escolar. Observou-se a presença de focos de contaminação nas imediações da maioria (70%, n=7) das escolas. Em todas elas, observaram-se adequações parciais à legislação em relação aos espaços físicos e do ambiente e a falta de orientação aos manipuladores. Isso evidencia que são necessárias ações corretivas e preventivas para solucionar as inadequações encontradas nas escolas.

**Palavras-chave:** Resíduos. Educação ambiental. Manipulação de alimentos.

<sup>1</sup> Doutora em Biologia pela Universidade de Barcelona. Docente do Programa de Pós-Graduação em Ciências da Saúde da Universidade Comunitária da Região de Chapecó. E-mail: [assunta@unochapeco.edu.br](mailto:assunta@unochapeco.edu.br)

<sup>2</sup> Nutricionista pela Universidade Comunitária da Região de Chapecó. E-mail: [anapasa@unochapeco.edu.br](mailto:anapasa@unochapeco.edu.br)

<sup>3</sup> Nutricionista pela Universidade Comunitária da Região de Chapecó. E-mail: [natali@unochapeco.edu.br](mailto:natali@unochapeco.edu.br)

<sup>4</sup> Mestre em Ciências da Saúde. Docente da Universidade Comunitária da Região de Chapecó. E-mail: [rotagli@unochapeco.edu.br](mailto:rotagli@unochapeco.edu.br)

<sup>5</sup> Doutora em Ciência de Alimentos pela Universidade Estadual de Londrina. Docente do Programa de Pós-Graduação em Ciências da Saúde da Universidade Comunitária da Região de Chapecó. E-mail: [carlateo@unochapeco.edu.br](mailto:carlateo@unochapeco.edu.br)

## Introduction

The quality of environment is important for life, for when ecologically balanced it provides human beings with favorable health conditions. It is a result of both natural phenomena and the human action. The state in which finds him or herself is the result of several factors, including physical, natural, technical, historical and political economic settings (TAMBELLINI; CÂMARA 1998).

Government policies have been created, proposing strategies aimed at preserving the environment and ensuring access to quality food. The Food Guide for the Brazilian population indicates that food and nutrition security is intended to provide balanced nutrition in their nutritional, sensory, social and cultural parameters, and should promote healthy eating practices that respect cultural diversity, and are socially, economically and environmentally sustainable. The Brazilian Food Guide reaffirms further that food should be safe from harvesting, transportation and even storage, preparation and distribution in the school environment (BRASIL, 2006).

Besides that, waste disposal also deserves attention. The food received by schools in plastic, metal and glass containers generate a lot of solid waste likely to be directed for landfills. The increase in solid waste generation is a relatively recent problem, as just a few decades ago, waste consisted mainly of organic materials easily decomposed by nature. However, as changes in lifestyle occurred, and with the advent of disposable packaging, consumption of food and manufactured goods increased, and waste has taken another dimension with a significant impact on its composition (COSTA et al., 2004).

The use of locally produced fresh food contributes to the reduction of such waste, for food can be delivered in returnable containers to the producer. However, if such food is not used in its entirety, it may also contribute to waste or loss. In this sense, Law no. 11,947 / 2009 - the current legal framework

for the National School Feeding Programme (PNAE) in Brazil, states that at least 30% of federal funding for the program implementation should be used to purchase healthy food, locally produced by family farming (BRASIL, 2009). This means that there is a legal mechanism aiming at promoting healthy eating habits, local development and environmental sustainability.

Waste production and its disposal by the population is increasing, and the impact of waste dumping into the environment eventually deteriorates it. Simple day-to-day actions can improve such situation. One alternative is to reduce waste production in its sources, once it will cause less impact than recycling materials that have already been disposed of (ABREU, 2001). In addition to what is related to waste production, the food production environment also needs to come forward with adequate hygienic-sanitary conditions according to legal requirements.

The objective of this study was to understand aspects of the environment in the premises where school meals are produced and distributed, particularly in terms of physical spaces and the surrounding areas, food handling conditions as well as environmental educational actions set out in the Schools Pedagogical Political Project (PPP) schools.

## Methodology

The model adopted in this research is exploratory and quantitative approach. 10 urban schools were selected and evaluated, 20 of which public schools in a city of western Santa Catarina State. A semi-structured questionnaire adapted from Piragine was used (2005), based on Resolution no. 216, of the National Health Surveillance Agency Board of Directors (RDC), of 15 September 2004 (ANVISA, 2004), which establishes the Technical Regulation of Practice for Food services, and RDC No. 275 of October 21, 2002 (ANVISA, 2002) which deals with the Standardized Operating Procedures of Technical

Regulation applied to production and industrializing market of Foods and the Manufacturing Practices Checklist in the food production and industrializing establishments.

The questionnaire was administered to a representative of each school board, to survey data for existing norms in school as well as to those responsible for the handling and distribution of school meals. Guidelines served as orientation for the observation of hygienic-sanitary aspects and environmental conditions of the premises and the surrounding areas of school meals production and distribution.

The results were analyzed in comparison with the provisions of RDC No. 216 (ANVISA, 2004), described as adequate frequencies and classified according to the parameters proposed by Piragine (2005): between 0% and 50% of adequacy of the observed item was considered "not appropriate"; between 50% and 90 - "partially adequate"; and above 90% was considered "suitable or adequate".

The project that gave rise to the study was approved by the Research Ethics Committee, under protocol number 226/08.

## Results and Discussion

This study conducted observations and information gathering about the hygienic, sanitary and environmental aspects of school meals production and distribution areas in 10 public schools in a city in western Santa Catarina. Data were collected from March to June, 2009.

Given the importance of the environmental education issue aimed at the reduction of waste generation, especially packaging and food debris, this study sought to know if the environmental education issue is a constituent part of the Schools Pedagogical Political Project (PPP). This theme is present in the PPP of all schools and the topic is promoted through interdisciplinary projects, involving the whole school community, which is

in line with the recommendations of the National Curriculum Parameters (PCN) that highlight the importance of this theme across the board.

According to the National School Meals Program (PNAE), the school environment is an excellent and appropriate place for encouraging healthy eating habits and building citizenship, taking on pedagogical function through its actions (BRASIL, 2009). On this idea, it is possible to evaluate school meals, not only as a school food supply action, but also as an opportunity to treat food pedagogically, from its cultural, social and environmental aspects, the latter being associated with issues relating to acquisition, manipulation, distribution and disposal of food products.

Environmental education is a dimension given to the content and practice of education oriented towards solving environmental problems through interdisciplinary approaches, individual and collective active and responsible participation. Considering its importance, the National Curriculum Parameters - NCP point out that students should be able to understand themselves as members, dependent and environmental change agents, identifying its elements and the interactions among them, and actively contributing to the improvement of the environment (BRASIL, 1997a).

### *Waste Disposal*

One major concern is with the production of solid waste. Any material becomes "waste" when the producer no longer considers it valuable enough to preserve it. Waste can influence the quality of the environment, human health and the preservation of natural resources. Thus, trash disposal is a problem related to the reuse of matter and therefore the conservation of natural resources (MEZOMO, 2002).

Improper disposal of waste draws near vectors and urban pests that - according to RDC No. 52/2009 (ANVISA, 2009) - which establishes general rules

for operating companies specialized in providing vector control services and urban pests - are animals infesting urban environments which may cause health problems, through the transmission of microorganisms.

This study identified that 90% (n = 9) of the schools use the selective waste collection system, and it plays an important role in allowing for recycling - a practice responsible for waste disposal reduction on the environment. Some schools which separate waste commercialize the recyclable waste. This practice, besides being an incentive to carry out selective collection, provides financial benefit to the school, although the amount collected is almost symbolic. It is noteworthy that the proposal of selective waste collection at schools (FELIX, 2007) is an educational activity aiming to invest in a change of mindset as a link for developing and raising environmental awareness.

It is noted that 20% (n = 2) of schools directs organic waste for composting, which, according Venzke (2001), is a viable alternative for organic waste generated by food and nutrition activities units. This practice, in addition to providing a quality fertilizer also contributes to reducing waste disposal.

Integral use of food is also a contributing factor to the reduction of waste amount. However, only 40% (n = 4) of the schools realize the full use of food. Perhaps this is not a practice in all schools due to lack of training for cooks, for 40% (n = 4) of them said they had never received training for their work.

Complete use of food is also a contributing factor in reducing the reduction of waste amount. However, only 40% (n = 4) of the schools carry out complete use of food. Perhaps this is not a practice in all schools due to lack of training for cooks, for 40% (n = 4) of them said they had never received special training to perform their work.

In all schools belonging to this study, residues remain in the production area to its final destination, being removed from the production sites at the end

of the day. The RDC No. 275/2002 (ANVISA, 2002) instructs that there should be frequent waste withdrawal from the processing area, to avoid sources of contamination. Therefore, waste should be removed from school food production areas as soon as the cleaning process has finished in order to prevent the proliferation of microorganisms and the approximation of insects, rodents and other animals, which could compromise the safety of meals offered on site at the expense of food and nutritional security of the users.

In this sense, Oliveira, Brazil and Taddei (2008) report that the inadequate waste disposal, characterized by simple waste discharge on the ground without environmental or public health protection measures, interfere on people's quality of life, causing several types of pollution.

In 90% (n = 9) of schools, water comes from the public water network, a service provided by Catarinense Company of Water and Sanitation (CASAN), and other schools (10%; n = 1) use artesian well water. The reservoir cleaning and the microbiological water analysis from the artesian well are held annually in 50% (n = 5) of the schools, every six months in 20% (n = 2) of them and the other (30%; n = 3) do not perform that kind of control. The RDC No. 216/2004 (ANVISA, 2004) emphasizes that, in cases where alternative water supply solutions take place, water drinkability must be certified every six months by laboratory reports. The RDC has that the tank must be free of defects that could compromise water quality, properly capped and proper condition, and should be cleaned at least every six months. It is therefore necessary that schools that have irregular about this item perform the analysis and sanitizing procedures at the recommended intervals.

#### *Premises and facilities*

For the provision of quality foods, free from disease outbreaks, monitoring of premises and facilities is required so that they do not pose

microbiological breeding sites, which may become a source of contamination for foods. In all schools in this study deficiencies have been identified in the physical structures and facilities where school meals are produced and distributed. Table 1 shows non-conformity with the norms laid down in RDC n ° 275/2002 (ANVISA, 2002). This RDC states that the flooring, walls and ceilings must be made up of "smooth, resistant, waterproof, washable, light-colored, good condition material and should present resistance to corrosive substances, be easy

to clean, preventing the accumulation of food and dirt. These should also be free of dripping, cracks, moisture, mold and peeling "; doors and windows "must be made of non-absorbing material with smooth surfaces, light-colored, easy to clean, with 2mm removable protection screens, also easy to clean, and in good conditions".

Furthermore, there is the need for ventilation, considering the risk of contamination and thermal comfort. For this, the environment must be free of fungi, gases, smoke, grease and steam condensation.

**Table 1** – Conservation status and adjustments, in percentage, of premises and facilities in the production and distribution areas of school meals in public schools, based on the RDC No. 275

	% of premises/ installations suitability					
	Doors	Windows	Flooring	Walls	Ceilings	Ventilation/ Thermal Confort
Adequate	-	10	10	70	20	-
Partially adequate	90	80	90	30	80	100
Inadequate	10	10	-	-	-	-

**Source:** ANVISA (2002).

Although most schools present some items in accordance with the law, it is necessary to make adjustments, ensuring food safety. Importantly, the environment where school meals are prepared and distributed must follow the current legislation to prevent complications that can cause harm to the health of the target group. In this scenario, it is possible to assume that non-compliance with what is determined by law, regarding the physical structure lies in the reduced funds availability that schools have to make these adjustments and in possible detachment of the responsible bodies for health surveillance of the locations of food manipulation. In this sense, we highlight the need for guidance to those responsible for schools, including the responsible technician for preparing school meals, as well as the importance of adaptation to the legislation so that the items in disagreement are identified and corrective actions are developed, providing security of the meals offered.

#### *Outdoor area of school meals production and distribution*

The outdoor areas of schools were also analyzed, as health hazard focus and garbage dump in the immediate vicinities offer health risks and an unpleasant environment aspect. The presence of sources of contamination, sewage and garbage disposal in most of the vicinity was observed (70%; n = 7) of schools, highlighting the possibility of attracting insects and rodents. It emphasizes the importance of having control with respect to the surrounding areas of food production and distribution, for the unsuitability with the legislation can result in the spread of insects and rodents, potential contamination of foods or utensils . This scenario was previously reported by Piragine (2005), in which study only 60% of school units presented the outdoor areas free of health hazard focuses, inadequate objects, as well as garbage accumulation.

*Hygiene aspects of technicians who manipulate food*

Hygienic habits of food handlers are important with regard to food security in schools. For Almeida et al. (2013), the main factor for foodborne illnesses is the handling / inadequate preparation of food, followed by inadequate conservation, demonstrating the need for implementation of educational actions to handlers and consumers.

The awareness campaign, training and monitoring of handlers significantly reduces the risk of foodborne illnesses. Façanha (2002) reiterates that training should give employees practical and theoretical knowledge required for the development of their activities. This educational program should be a continuous and planned process. It is noteworthy that the language used in the training programs should be the same used by workers in everyday situations.

It is necessary to post information containing the correct instructions for hand washing in visible and strategic locations. These instructions should make sure that hands are cleaned and dried with clean towels used for this specific reason, or disposable paper towels. Similarly, clothing and personal hygiene of food handlers deserves a lot of attention (BRASIL, 1997b). In all schools studied, there was a lack of guidance for hygienic habits of food handlers, possibly due to reduced frequency of training for adequate food handling that these professionals receive, and the absence of guidance posters for such practices.

Hygienic habits of food handlers play a key role in the quality of food provided by schools. Adequate control is essential as stated in RDC 216 of 2004 that claims about the Technical Regulation of Good Food Practices Services and determines that food handlers must be supervised and trained on hygiene in food handling and foodborne diseases on a regular basis. In addition to compliance with the current legislation, informing cooks about foods and procedures makes it easier to identify where contamination might occur and ways to avoid it.

**Final Considerations**

Food security and nutrition directly contributes to the improvement of the school community life quality and incorporates such areas as quality food supply - nutritional and sensory - and quantitatively balanced.

This study showed that the hygienic-sanitary aspects, the conditions of the premises and facilities as well as the environment of food production and distribution are partially adequate in relation to the rules of present law. It is noteworthy that most schools have garbage collection, avoiding waste disposal on the environment and providing financial benefit to the schools, and that some of them perform composting as an educational project with students.

Hygienic habits of food handlers and environment care awareness can be improved with training and development courses for the staff and placement of informative posters, given that none of the schools is in accordance with current regulation.

This study shows that preventive and corrective actions are necessary to address the inadequacies found in schools, as well as actions to encourage environmental and hygienic-sanitary conservations, providing improvements in the quality of production and distribution of food in school premises. In this sense, it is suggested that the development of environmental education activities aligned with food and nutritional education strategies could be an efficient plan of action to overcome the barriers identified in this research.

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