

## REVIEW PAPER

UDK: 373.23:614.3  
613.954

DOI: 10.5937/hralsh2402012T

# Ensuring Sanitation and Hygiene in Preschool Childcare Facilities

Marija Turan Vucetic<sup>1</sup>, Damir Hodzic<sup>2</sup>,  
Jelena Gudelj Rakic<sup>3</sup>, Jelena Ilic Zivojinovic<sup>4</sup>,  
Milos Maksimovic<sup>4</sup>

<sup>1</sup>Preschool Institution „Poletarac“, Stara Pazova, Serbia

<sup>2</sup>Sport Club NBGGYM, Belgrade, Serbia

<sup>3</sup>Institute of Public Health of Serbia “Dr Milan Jovanovic  
Batut”, Belgrade, Serbia

<sup>4</sup>Institute of Hygiene and Medical Ecology, Faculty of  
Medicine, University of Belgrade, Belgrade, Serbia

Corresponding author:

Milos Maksimovic

Institute of Hygiene with Medical Ecology,  
Faculty of Medicine, University of Belgrade,  
Dr Subotica Starijeg 8, 11000 Belgrade, Serbia

Phone: +381 11 3612 762

Email address: milos.maksimovic@med.bg.ac.rs

Received 12. 02. 2025.

Revised 19. 02. 2025.

Accepted 05. 03. 2025.

## Abstract

*Proper nutrition is important for the healthy growth and development of preschool children. During this period, they undergo rapid physical, cognitive, and emotional changes, making it essential to provide both the necessary nutrients to support their overall development and hygienically safe foods. Maintaining high sanitary and hygienic standards in preschool food facilities requires a comprehensive approach that integrates regulatory compliance, facility design, staff training, and effective sanitation practices. By prioritizing these standards, preschools can provide a safe and healthy environment that supports the well-being and development of preschool children. Regulatory requirements form the backbone of sanitation standards in preschools. These guidelines are often established by public health authorities and childcare regulators, setting out minimum standards for cleanliness, food handling, and facility maintenance. Adherence to these regulations ensures that preschools provide a safe and healthy environment for children. Essential components include proper kitchen design, adequate ventilation, pest control measures, and*

*accessible handwashing facilities. Assessing the effectiveness of hygiene practices in preschools involves a multi-pronged approach, including regular inspections, health monitoring, feedback collection, staff training assessments, and incident analysis. By continuously evaluating and improving hygiene practices, preschools can provide a safe and healthy environment for children.*

**Keywords:** diet; preschool children; food safety.

## ENSURING SANITATION AND HYGIENE IN PRESCHOOL CHILDCARE FACILITIES

Ensuring sanitation and hygiene standards in preschool childcare facilities is of paramount importance for their health and well-being. Preschool children are particularly vulnerable to foodborne illnesses due to their developing immune systems, which is why strict hygiene practices are essential [1]. Ensuring sanitation and hygiene standards in childcare facilities involves a multidisciplinary approach that includes regulatory guidelines, best practices, and ongoing staff education.

Depending on its internal organization, a preschool may have a central kitchen in a separate building or as part of one of the facility's units. For preschools without a central kitchen, the childcare facility must have

a designated area for the preparation and serving of dairy products (dairy kitchen). If the preschool does not have a central kitchen and organized food distribution, each childcare facility should be equipped with its own kitchen, adequately equipped for the preparation of food and meals for children and staff.

Premises used for food preparation, including transport vehicles and storage areas, must be designed and maintained to support good hygiene practices. In addition, the facility must be organized to prevent cross-contamination between the so-called “clean” and “dirty” areas, i.e. between raw food processing areas and waste disposal areas [2].

The food storage room should be located adjacent to the kitchen, with a designated area for storing equipment and cleaning supplies separate from food. Both the kitchen and the room must comply with the

hygiene and technical standards prescribed by relevant regulations. The kitchen should be equipped with adequate heating and cooling devices, as well as the necessary equipment, utensils, and work surfaces that are appropriate to the needs of the facility and the technological processes. The sink intended for washing food must have a reliable hot water supply. In addition, kitchen staff should have access to a sufficient number of strategically placed handwashing sinks with hot and cold running water, hand sanitizer, and hygienic drying options.

Floor surfaces should be in excellent condition, suitable for wet cleaning and disinfection, and made of impermeable materials such as non-absorbent ceramic tiles. In addition, floors should have adequate drainage where necessary to handle excess water [2].

Wall surfaces should also be well maintained, easy to clean and disinfect, and made of non-absorbent materials such as ceramic tiles. Ceilings should be designed to minimize the accumulation of dirt, moisture, and mold. If windows can be opened, they should be equipped with insect screens. In cases where opening windows could lead to contamination, they should remain closed during food preparation. Doors should also be easy to clean and disinfect.

All items, utensils, and equipment that come into contact with food must be made of smooth, solid, odorless, non-toxic, and non-corrosive materials. This ensures that food, i.e. raw foods and prepared foods, remain unchanged in their natural composition when in contact with these items. The surfaces of the equipment should be uniformly smooth, without bumps, dents, cracks, or other damage and designed to allow for effective hygienic maintenance [2].

The dining room in a preschool institution should be a well-designed, multifunctional space for meals and various health, hygiene, educational, and other activities of children. Although it does not have to be physically separated from the play and learning areas, the dining room should create a pleasant, family atmosphere for dining. In addition, dining areas should be large enough to comfortably accommodate children while allowing staff to effectively monitor and maintain cleanliness [1].

In the storage area, storage rooms should be of adequate size, dry, and well-ventilated with separate storage areas for different types of food and necessary equipment such as refrigerators, pantries, shelves, cupboards, thermometers, and hygrometers (for measuring temperature and humidity)[2]. The storage facility should also implement pest control measures, including insect screens on windows and openings, and rodent prevention strategies such as grates and drains on siphons, metal trim on the bottom edge of doors, and effective rodent control.

Proper waste management and disposal procedures are also essential to maintaining a hygienic envi-

ronment, requiring regular waste removal and the use of covered bins to deter pests [3]. Regulatory requirements for hygiene in preschool food service areas [4] are important for ensuring health and safety. Compliance with these standards is mandatory and is regularly monitored through inspections and assessments.

Refrigerators and freezers must be maintained at the appropriate temperature to prevent spoilage, and all food should be clearly labelled and stored in closed containers. In addition, there should be separate areas for storing cleaning products and food to avoid chemical contamination [5].

Ensuring cleanliness in food preparation and serving areas in preschools is important for maintaining the health and safety of preschool children. Given their developing immune systems, preschoolers are particularly susceptible to foodborne illnesses, making strict hygiene practices essential [6].

According to the Regulation, the food business is based on the following principles:

- 1) the ultimate responsibility for food safety lies with the food business operator;
- 2) food safety should be ensured at all stages of the food chain, starting from primary production;
- 3) for food that cannot be safely stored at room temperature, and especially for frozen food, it is important to maintain a cold chain;
- 4) the general application of procedures based on the principles of hazard analysis and critical control points (hereinafter: HACCP), together with the application of good hygiene practice, should enhance the responsibility of food business operators;
- 5) the use of guides to good practice at all stages of the food chain helps food business operators to implement food hygiene rules and apply the HACCP principles;
- 6) establishing microbiological criteria and temperature control conditions based on scientific risk assessment;
- 7) ensuring that imported food meets at least the same or equivalent hygiene standards as food produced in the Republic of Serbia.

In the food business, as necessary, and in accordance with special regulations, hygiene measures shall be introduced that relate to: 1) meeting microbiological criteria for food; 2) procedures necessary to meet the requirements set out in this Regulation; 3) meeting the conditions regarding food temperature control; 4) maintaining the cold chain; 5) sampling and testing. If specific regulations do not establish sampling and testing methods, methods that give results equivalent to those obtained by applying the reference method may be used in the food business, if they are scientifically validated in accordance with internationally recognized rules or protocols. Regulation on Food Hygiene Conditions [7]. Regular maintenance schedules

should be implemented to ensure that all surfaces, including walls, floors, and worktops, are maintained in good condition and free of cracks or crevices where dirt and bacteria can accumulate [8].

All food preparation surfaces should be cleaned and disinfected before and after each use. Touch-sensitive areas, such as door handles, light switches, and refrigerator handles, should be cleaned frequently throughout the day. In addition, dining tables and chairs should be wiped down and disinfected between meals to prevent cross-contamination. Ongoing staff training and monitoring are essential in maintaining cleanliness. Staff should receive regular training on hygiene practices, food safety standards, and the proper use of cleaning products. Supervisors should conduct routine inspections to ensure compliance with these practices and promptly address any deficiencies [8].

Health authorities carry out regular inspections and audits to ensure compliance with these regulations. Failure to comply may result in fines, penalties, or closure of the facility. Pre-schools are required to keep records of their hygiene practices, including cleaning schedules, temperature logs, and staff training certificates, which are reviewed during inspections [5].

In order to ensure a comprehensive and integrated approach to food safety, the European Union adopted the Food Safety Law in January 2002 [9]. This law covers a wide range of measures and addresses all stages of the food production chain, from primary production and feed production to the sale and supply of food to consumers. In addition, ISO has developed the ISO 9000 series of standards, which, although not mandatory, are highly recommended due to the globalization of markets. These standards aim to help organizations of all types and sizes implement effective and efficient quality management systems, ensuring that their products meet customer expectations and comply with relevant regulations [10].

ISO 22000:2005 is the first international standard specifically designed for food safety management systems, published by the International Organization for Standardization (ISO) on 1 September 2005. This standard has largely replaced the Hazard Analysis and Critical Control Point (HACCP) system in the food industry in many European countries. ISO 22000:2005 integrates both the HACCP requirements and the quality management system specified in ISO 9001:2000, creating a comprehensive approach to food safety [11].

According to the Food Business Regulation, at any stage of food production, processing, and circulation, except at the level of primary production and operations related to primary production, a continuous process, or processes based on the HACCP principles, shall be established, implemented, and maintained.

The HACCP principles referred to in paragraph 1 of this Article shall include:

- 1) identification of all hazards that must be prevented, eliminated, or reduced to an acceptable level;
- 2) identification of critical control points at the point or points where control is important for preventing or eliminating the risk, or for reducing it to an acceptable level;
- 3) establishment of critical limits at critical control points that separate the acceptable from the unacceptable for the purpose of preventing, eliminating, or reducing the identified hazards;
- 4) establishment and implementation of effective monitoring procedures at critical control points;
- 5) establishment of corrective measures in the event that monitoring indicates that a critical control point is not under control;
- 6) establishment of procedures that are carried out regularly and which confirm that the procedures from point 1) to 5) of this paragraph are effective;
- 7) establishment and maintenance of documentation and records that correspond to the type of food business and the size of entities in the food business, and which prove the effective application of the procedures referred to in points 1) to 6) of this paragraph.

In the event that there is a change in the food business related to the products, the process, that is, any phase of production, processing, and distribution of food, the procedure, that is, the procedures from paragraph 1 of this article shall be reviewed and the necessary changes made to them [7].

Good hygiene practice is relevant in this context, focusing on sanitation and hygiene as essential elements in a preschool. It refers to a set of procedures designed to maintain a clean and sanitary environment throughout the food production, processing, storage, and supply chain. This practice specifies what actions should be taken in relation to sanitation and hygiene, specifies when and by whom these tasks should be carried out, and ensures that they are properly documented. The essential areas covered by good hygiene practice include [12], Sanitation of facilities and equipment, Health and personal hygiene of food handlers, Quality control of raw materials used in production, Proper packaging, labelling, storage, and application of sanitation and hygiene products in accordance with their intended purpose and documented procedures.

## **REGULAR INSPECTION AND MAINTENANCE OF PRESCHOOL FEEDING FACILITIES**

Continuous education is essential to keep staff informed of the latest hygiene standards and regulatory requirements. Regular workshops and seminars can provide in-depth knowledge on topics such as preventing cross-contamination, understanding food-borne pathogens, and implementing effective sanitation protocols. These sessions should be interactive, allowing staff to ask questions and participate in practical demonstrations [13].

Practical training is essential to reinforce theoretical knowledge. Staff should participate in regular drills and exercises that simulate real-life scenarios, such as responding to a suspected foodborne disease outbreak or managing a spill of hazardous cleaning chemicals. These practical sessions help staff develop quick, effective responses to potential hygiene and sanitation issues.

The importance of all of this is also highlighted by the research of Fejl *et al.* [14] who highlight the principles of hygienic design of food processing equipment to reduce the risk of bacterial contamination. They point out how improper design can lead to the permanent presence of bacteria, which is a particular concern in environments such as preschool kitchens, emphasizing the need for easy-to-clean surfaces, proper material selection, and regular maintenance to ensure food safety. In surface contamination, the role of surface properties of materials, and mechanisms induced by environmental conditions during soiling or cleaning lead to new proposals for the future as described above. The durability of surface coatings and the traceability of enzymes from closed systems remains to be fully demonstrated. While maintaining high hygiene standards, any option proposed to reduce energy, chemical, or water consumption is currently in high demand.

Salikovna assesses the impact of hygiene conditions in preschools on the growth and development of children [15]. This comprehensive study examines various aspects of the physical environment, focusing on the cleanliness of food preparation areas, the availability of handwashing facilities, and overall sanitation in these institutions. Through careful data collection and analysis, the study reveals a direct link between improved hygiene practices and better health outcomes in preschool children. The findings highlight the importance of maintaining high standards of cleanliness and hygiene to promote healthy development. The study highlights that children attending preschools with strict hygiene practices showed fewer cases of gastrointestinal and respiratory infections. Additionally, these children showed better growth metrics and cognitive development, suggesting that a hygienic environment is very important in their overall well-being.

A study by Viyalaksim *et al.* [16] assessed water, sanitation, and hygiene (WASH) conditions in schools, focusing on their impact on children's health. It included an assessment of the availability and cleanliness of feeding areas, handwashing practices, and the condition of sanitation facilities. Findings indicate significant improvements in child health and reduced absenteeism when WASH standards are met. The study findings revealed that the coverage of WASH facilities among the study preschool groups still needs to be improved according to the criteria defined by the UN Joint Monitoring Programme, namely, basic sanitation and hygiene services [16]. Batol *et al.*

provide insights relevant to European preschools by examining how inadequate water, sanitation, and hygiene (WASH) practices contribute to stunting in children [17]. The research carefully documents the detrimental impacts of poor WASH conditions, such as the prevalence of waterborne diseases and recurrent infections that interfere with nutrient absorption and overall health. The study highlights the critical importance of ensuring access to clean drinking water in preschools. By ensuring that children have access to safe drinking water, preschools can significantly reduce the incidence of these diseases and promote better health outcomes. Adequate sanitation facilities are another focus of the research.

Research by Aslonov *et al.* [18] provides a comprehensive section on the impact of hygiene on children's health within educational settings. This segment of the research highlights the critical importance of maintaining high standards of hygiene in preschools to prevent a wide range of infections and provide a healthy learning environment for children. Aslanov details how poor hygiene practices can lead to frequent outbreaks of infectious diseases such as gastroenteritis, respiratory infections, and skin conditions, which can seriously affect the well-being and educational progress of preschoolers.

The European Hygiene and Engineering Design Group (EHEDG) guidelines provide comprehensive and detailed recommendations for the design, installation, and maintenance of hygienic food processing equipment [19]. These guidelines are essential for ensuring that food processing environments adhere to the highest standards of hygiene, thereby minimizing the risk of contamination and ensuring the safety of food products. By following the EHEDG guidelines, preschools can effectively protect children from the risks associated with foodborne pathogens such as *Salmonella*, *E. coli*, and *Listeria*, which can cause serious health problems in preschoolers. The guidelines emphasize the importance of using hygienic design principles, such as avoiding dead ends in piping where bacteria can accumulate, ensuring that surfaces are smooth and easy to clean, and implementing effective cleaning-in-place (CIP) systems. In addition, the guidelines recommend regular maintenance and inspection of equipment to ensure that it remains in optimal condition and free from the risk of contamination. Implementing the EHEDG guidelines in preschool food service settings also includes training staff on proper hygiene practices and ensuring that they are aware of critical points where contamination can occur.

Cupertino *et al.* [20] provide an overview of the effectiveness of feeding programs worldwide, including in Europe. They assess various aspects such as nutritional content, cultural relevance, and food safety standards. The study highlights the need to maintain

high hygiene standards in feeding facilities to ensure the success of these programs. This study identified a review of school feeding programs worldwide. The region with the highest coverage of programs was Europe/Central Asia. The results obtained from the study did not take into account aspects such as country size, population, and number of countries in the analyzed regions [20].

## CONCLUSION

Maintaining cleanliness in food preparation and serving areas in preschools involves a comprehensive approach that includes proper facility design, rigorous cleaning routines, strict hand hygiene, effective equipment sanitation, and careful waste management. Assessing the effectiveness of hygiene practices in preschools involves a multi-pronged approach, including regular inspections, health monitoring, feedback collection, staff training evaluations, and incident analysis. By continuously evaluating and improving hygiene practices, preschools can provide a safe and healthy environment for children.

## REFERENCES

1. Perić S, Savić S, Djurić S. Ishrana i njen značaj za zdravlje i razvoj predškolske djece. *Biječkijski metodički časopis*. 2021;9(9).
2. Stojisavljević D, Stanivuk LJ, Todorović M, Petković V. Standardi ishrane za planiranje jelovnika u predškolskim ustanovama za djecu uzrasta od prve do šeste godine: jelovnici i normativi. Institut za javno zdravstvo. 2016. Available from: [www.phi.rs.ba/pdf/brosure/standardi%20ishrane%20u%20predskolskim%20ustanovama-za%20web.pdf](http://www.phi.rs.ba/pdf/brosure/standardi%20ishrane%20u%20predskolskim%20ustanovama-za%20web.pdf) (Accessed on 22.06.2024).
3. Jovanović V. Preventivne aktivnosti u sistemu zdravstvene zaštite u Republici Srbiji. *Srpska akademija nauka i umetnosti. Službeni glasnik RS, Beograd*. 2019;(2):25-35.
4. Pravilnik o bližim uslovima i načinu ostvarivanja ishrane dece u predškolskoj ustanovi. *Službeni glasnik RS, Beograd*. 2018.
5. Zakon o zaštiti stanovništva od zaraznih bolesti. *Službeni glasnik RS, br 15/2016, 68/2020 и 136/2020*.
6. Bonić D, Blagojević B, Krstić I. Upravljanje rizikom u proizvodnji zdravstveno bezbedne hrane u dečijim predškolskim ustanovama. *Ekologika, Beograd*. 2012;2-4.
7. Pravilnik o uslovima higijene hrane. *Službeni glasnik RS, br. 73/2010*.
8. Butera A, Maiorani C, Morandini A, Simonini M, Morittu S, Trombini J, Scribante A. Evaluation of children caries risk factors: A narrative review of nutritional aspects, oral hygiene habits, and bacterial alterations. *Children*. 2022;9(2):262.
9. Zakon o bezbednosti hrane. *Službeni glasnik RS, br. 41/2009 i 17/2019*.
10. Bonić D. Primena metoda i standarda u funkciji upravljanja rizikom ishrane dece predškolskog uzrasta. Doctoral dissertation. University of Niš; 2016.
11. Zhukov Y, Zorya R, Shelukhina I, Ashtaiev O. Peculiarities of preparation of the HACCP group members of catering units of preschool educational institutions. *ScienceRise*. 2021;2(73):44-52.
12. Anderson J, Bogart N, Clarke A, Nelson L, Warren B, Jespersen L. Food safety management in the global food supply chain. *Perspect public health*. 2014;134(4):181.
13. Wagner JT, Pramling Samuelsson I. WASH from the START: water, sanitation and hygiene education in preschool. *International Journal of Early Childhood*. 2019;51(1):5-21.
14. Faille C, Cunault C, Dubois T, Benezech T. Hygienic design of food processing lines to mitigate the risk of bacterial food contamination with respect to environmental concerns. *Innov Food Sci Emerg Technol* 2018;46:65-73.
15. Salikhovna YS. Hygienic Assessment of Child Growth and Development in the Context of Preschool Education Reform. *EJLSS*. 2022;12(3):45-58.
16. Vijayalakshmi P, Reddy MK, Devi KS, Padmaja IJ. Hygiene and sanitation practices in school children: An evaluation of WASH conditions in Visakhapatnam. *J Water Sanit Hug Dev*. 2023;3(5):301-11.
17. Batool M, Saleem J, Zakar R, Butt MS, Iqbal S, Haider S, Fischer F. Relationship of stunting with water, sanitation, and hygiene (WASH) practices among children under the age of five: a cross-sectional study in Southern Punjab, Pakistan. *BMC Public Health*. 2023;3(1):2153.
18. Aslonov SG. Modern Approaches to Oropharyngeal Cancer Therapy. *IJDIA* 2021;1(3):38-9.
19. European Hygiene and Engineering Design Group (EHEDG). Guidelines for Food Processing Equipment. EHEDG Documentation Series, 2018.
20. Cupertino A, Ginani V, Cupertino AP, Botelho RB. School feeding programs: what happens globally? *Int J Environ Res Public Health*. 2022;19(4):2265.

# Obezbeđivanje sanitarno-higijenskih uslova u objektima za ishranu predškolske dece

Marija Turan Vucetic<sup>1</sup>, Damir Hodzic<sup>2</sup>, Jelena Gudelj Rakic<sup>3</sup>, Jelena Ilic Zivojinovic<sup>4</sup>, Milos Maksimovic<sup>4</sup>

<sup>1</sup>Predškolska ustanova „Poletarac“, Stara Pazova, Srbija

<sup>2</sup>Sportski klub NBGGYM, Beograd, Srbija

<sup>3</sup>Institut za javno zdravlje Srbije “Dr Milan Jovanović Batut”, Beograd, Srbija

<sup>4</sup>Institut za higijenu sa medicinskom ekologijom, Medicinski fakultet, Univerzitet u Beogradu, Beograd, Srbija

## Kratak sadržaj

*Pravilna ishrana je važna za zdrav rast i razvoj dece predškolskog uzrasta. Tokom ovog perioda, oni prolaze kroz brze fizičke, kognitivne i emocionalne promene, zbog čega je neophodno obezbediti kako neophodne hranljive materije za podršku njihovom celokupnom razvoju tako i higijenski bezbedne namirnice. Održavanje visokih sanitarnih i higijenskih standarda u predškolskim ustanovama za ishranu zahteva sveobuhvatan pristup koji integriše usklađenost sa propisima, dizajn objekata, obuku osoblja i efikasne prakse sanitacije. Davanjem prioriteta ovim standardima, predškolske ustanove mogu da obezbede bezbedno i zdravo*

*okruženje koje podržava dobrobit i razvoj predškolske dece. Regulatorni zahtevi čine okosnicu sanitarnih standarda u predškolskim ustanovama za ishranu. Ove smernice često uspostavljaju javni zdravstveni organi i regulatorna tela za brigu o deci, u kojima se navode minimalni standardi za čistoću, rukovanje hranom i održavanje objekata. Poštovanje ovih propisa obezbeđuje da predškolske ustanove obezbede bezbedno i zdravo okruženje za decu. Bitne komponente uključuju pravilan dizajn kuhinje, adekvatnu ventilaciju, mere kontrole štetočina i dostupna mesta za pranje ruku. Procena efikasnosti higijenskih praksi u predškolskim ustanovama uključuje višestruki pristup, uključujući redovne inspekcije, praćenje zdravlja, prikupljanje povratnih informacija, procene obuke osoblja i analizu incidenata. Kontinuiranim vrednovanjem i unapređenjem higijenske prakse, predškolske ustanove mogu da obezbede bezbedno i zdravo okruženje za decu.*

**Ključne reči:** ishrana; predškolska deca; bezbednost hrane.