

Survey the environmental health status in bakeries of the city of Darrehshahr

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Article Info	ABSTRACT
Article type: Original article	Introduction: Bread is a staple food in many countries around the world, particularly among the people of Iran, and it holds a special significance and status. Bread is also one of the important sources of nutrients such as sugar, iron, calcium, protein, and various vitamins. In all stages of bread production, maintaining personal hygiene, food hygiene, building sanitation, and cleaning tools and equipment play a significant role in improving the quality and safety of the consumed bread. The unsanitary conditions of bread production can create the grounds for the emergence of certain diseases due to chemical and microbial contamination in the community. This research aimed to determine the environmental health status of bakeries in the city of Darrehshahr and to provide necessary health solutions to improve the sanitary conditions.
Article History: Received: Jan. 10, 2025 Revised: Feb. 21, 2025 Accepted: Mar. 12, 2025 Published Online: Jun. 30, 2025	Materials & Methods: This research was conducted descriptively-cross-sectionally in the city of Darrehshahr. All the active bakeries present (a total of 34 units) were examined through a census method. Using the traditional bakery health inspection checklist (personal hygiene, food hygiene, tool and equipment hygiene, building hygiene) with form code (111/920318) from the Ministry of Health, Treatment, and Medical Education, information about the bakeries was collected. The data collected using Excel software was analyzed.
 Correspondence to: Anis Aghaei Fateme Gholami Department of Environmental Health Engineering, School of Public Health, Ilam University of Medical Sciences, Ilam, Iran	Results: The results showed that in terms of personal hygiene, food hygiene, equipment and tool hygiene, and building hygiene, the percentages of satisfactory conditions were 71.85%, 39.12%, 78.13%, and 73.53%, respectively.
Email: anisaghaei@gmail.com	Conclusion: In this study, the highest satisfaction score was related to the hygiene status of tools and equipment, while the lowest score was related to the hygiene status of food materials.
	Keywords: Bakeries, Environmental Health, Darrehshahr city

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Introduction

Environmental health means controlling all factors in the living environment that somehow affect or will affect human physical, mental, and social health. Improving places that are directly related to the health of the general public is one of the important duties of environmental health (1). Bread is one of the most consumed foods among people worldwide, especially in Iran. The quality parameters of bread and bakeries play an important role in the health and satisfaction of consumers (2). Bread is one of the important sources of nutrients such as carbohydrates, iron, calcium, protein, and various vitamins. According to studies conducted, about 50% of protein, 60% of thiamine and niacin, 40% of calcium, and 80% of the iron required for an adult's body are provided by consuming approximately 300 grams of bread per day (3). In our country, on average, bread accounts for 46.2% of the total daily energy consumption of an urban individual and 59.3% of the total daily energy consumption of a rural individual (4). Producing a product with appropriate volume and size, a suitable appearance, and easy digestibility is one of the goals of baking bread. The materials used for making bread include wheat flour, salt, water, and yeast or sourdough, which must meet the national standards of Iran. Yeast causes the dough to rise, but nowadays, to speed up the rising process, unauthorized additives like baking soda and sodium metabisulfite are used instead of yeast. Excessive use of baking soda in bread causes a change in the bread's color, making it yellow, dark, and dull, and it also makes the taste and flavor of the bread undesirable and alkaline. Prolonged and continuous consumption of bread containing baking soda has negative effects on the stomach (5). Nutrition experts believe that by improving the quality of flour and bread, many issues, such as iron, protein, calcium, and various vitamin deficiencies caused by malnutrition, can be reduced in society (6). One of the important factors in maintaining the quality of bread and its healthiness is adhering to personal hygiene, building, and equipment issues at all stages of bread production.

Issues such as health education for all bakery unit staff, continuous health supervision and control of these food units, the existence of inter-organizational coordination, and the cooperation and participation of the operators can play a significant and crucial role in the quality of food production (7). Separating different sections of the bakery, using appropriate tools and equipment, maintaining personal hygiene, using suitable nets to prevent the entry of mosquitoes and flies, using appropriate tiles for the walls, and so on, are among the factors whose adherence will significantly impact the hygiene of the bakery, the healthiness of the bread, and ultimately the health of the community (8). In bakeries and flour mills, the main problem is rodents and insects. Inspectors should pay attention to blind spots and stagnant areas where flour and crumbs accumulate, as they can be infested with cockroaches. Inspectors should also ensure that the staff adhere to hygiene guidelines while providing training on these instructions (9). Proper control of the preparation and distribution of this food item must be based on existing laws and regulations (the bakery health regulations form), and the correct implementation of these regulations is the responsibility of the environmental health department. The control of bakeries aims to protect and ensure the health of individuals who visit these places and consume the bread produced there. Therefore, examining the sanitary conditions of bakeries, in terms of all environmental and personal hygiene issues, is of particular importance (10). The aim of this research, considering the role of environmental health in improving hygiene standards and maintaining health, is to determine the status of environmental health in bakeries in the city of Darrehshahr in the year 2020 and to provide necessary health solutions to improve the hygiene situation.

Materials and methods

This research was conducted descriptively-cross-sectionally in the city of Darrehshahr in 2020. All active bakeries in the city of Darrehshahr (34 units) were examined through a census method. Using the

traditional bakery health inspection checklist with form code (111/920318) from the Ministry of Health, Treatment, and Medical Education, the necessary health information (individual, food, tools and equipment, building) was collected from the bakeries in the city of Darrehshahr. This checklist consists of 4 sections and 56 questions, including 14, 10, 16, and 16 questions on hygiene of personal, food, tools, and building, respectively. The checklist was completed

in collaboration with environmental health experts using a direct method.

The data collected using Excel software was analyzed. To determine the health status of each section of the checklist as well as the percentage of compliance, non-compliance, and non-applicability of the questions, Equation 1 was used.

Equation1:

$$\text{Desirability}(\%) = \frac{\text{Frequency of data in accordance with the regulations}}{\text{Total data Frequency}} \times 100$$

Findings

The study results are presented in Tables 1 to 4. As seen in Table 1, in the section related to personal hygiene, 76.47% have a valid health card and a valid health education certificate. 79.41% have a clean and

intact coat with a light color, 91.18% have short nails, and 100% of the staff use disposable gloves for wounds and cuts, burns, and blisters. The lowest frequency in this section is related to the use of hats, with a frequency of 23.53%, and the notification of the prohibition of smoking, with a frequency of 0%.

Table 1. Percentage of frequency of personal hygiene indicators in bakeries in the city of Darrehshahr in 2020

Parameter		Status		
		Compliance with regulations (%)	Non-compliance with regulations (%)	Non-applicability (%)
1	Using disposable gloves for wounds and cuts, burns, and blisters	100	-	-
2	Proper handwashing with water and soap	100	-	-
3	Valid health card	76.47	23.53	-
4	Short nails and not using jewelry and ornaments while working	91.18	8.82	-
5	Prohibition of entry for unauthorized individuals	88.23	11.77	-
6	Prohibition on the sale and distribution of tobacco products	100	-	-
7	Prohibition of tobacco use by staff	97.06	2.94	-
8	Public announcement of the prohibition on tobacco use	-	100	-
9	A clean and intact coat in a bright color	79.41	20.59	-
10	The cleanliness and tidiness of other employees' clothing	70.59	29.41	-
11	Using a hat	23.53	76.47	-

12	Having a designated place for storing personal belongings	61.76	38.24	-
13	Installation of illustrated handwashing guide	41.18	58.82	-
14	Valid health education certificate	76.47	23.53	-

As shown in Table 2, which pertains to the food hygiene section, based on observations made in all the studied bakeries, the prohibition on the use of unauthorized colors, essences, flavorings, and

sweeteners was adhered to. Additionally, 94.12% of the food materials used met the necessary standards, and 97.06% of the food items were separated from cleaning and chemical substances.

Table 2. Percentage of desirability frequency of food hygiene indicators in bakeries across the city of Darrehshahr in 2020.

Parameter		Status		
		Compliance with regulations (%)	Non-compliance with regulations (%)	Non-applicability (%)
1	Control and maintenance of temperature in the refrigerator, freezer, and cold storage	-	-	100
2	Maintaining the cold chain in the presence of potentially hazardous food.	-	-	100
3	Separation of food items from cleaning and chemical products	97.06	2.94	-
4	Compliance with the prohibition on the use of unauthorized chemical colors, essences, flavorings, and sweeteners.	100	-	-
5	Essential characteristics for packaged food	-	-	100
6	Self-control and self-declaration of health by the owner	-	-	100
7	Sampling based on self-monitoring guidelines	-	-	100
8	Suitable containers for storing spices and corrosive food items	-	-	100
9	Necessary characteristics for the food products used	94.12	5.88	-
10	Disinfectant and antiseptic solutions	100	-	-

As seen in Table 3, in the section on hygiene of tools and equipment, 100% of bakeries have suitable sinks, 88.24% of bakeries prevent air pollution, and 79.41%

of bakeries have first aid kits. The lowest frequency is related to the complaint handling phone, with a frequency of 26.47%.

Table 3. The desirability percentage of health indicators for tools and equipment in bakeries across the city of Darrehshahr in 2020.

Parameter		Status		
		Compliance with regulations (%)	Non-compliance with regulations (%)	Non-applicability (%)
1	The refrigerator and freezer are in good condition.	-	-	100
2	The kitchen sink is equipped with both cold and hot water.	88.24	11.76	-
3	Having the necessary features for a kitchen sink	100	-	-
4	Separate sink for employee handwashing	100	-	-
5	Proper dishwashing	100	-	-
6	Cardboard boxes and paper envelopes	-	-	100
7	The cleanliness and hygiene of the utensils used	91.18	8.82	-
8	The devices used should be in good condition and clean	97.06	2.94	-
9	Material and specifications of the dishes	100	-	-
10	Preventing air pollution	88.24	11.76	-
11	Rust-proof and the good condition of work tables	94.12	5.88	-
12	Workboard	97.06	2.94	-
13	Dough mixer	91.18	8.82	-
14	The display cases and shelves are in good condition and rust-free.	97.06	2.94	-
15	First aid kit	79.41	20.59	-
16	Complaint handling phone number	26.47	73.53	-

As seen in Table 4, in the building hygiene section, 100% of the bakeries have an appropriate water supply system, 100% have a waste collection and disposal system, 82.35% of the bakeries control insects and rodents, 79.41% have adequate ventilation, and 82.35% have proper shelving and palletizing.

Table 4. Percentage of frequency of building hygiene indicators in bakeries in Darrehshahr city in 2019.

Parameters		Status		
		Compliance with regulations (%)	Non-compliance with regulations (%)	Non-applicability (%)
1	Water supply system	100	-	-
2	Sewage collection and disposal system	100	-	-
3	Waste collection and disposal system	100	-	-
4	Pest and rodent control	82.35	17.65	-
5	The condition and status of the restrooms	14.71	85.29	100
6	Break room	-	-	100
7	The condition and state of the bathrooms	14.71	85.29	-

8	Wall covering in the cooking area	91.18	8.82	-
9	Floor covering of the cooking area	100	-	-
10	Ceiling cover of the cooking area	73.53	26.47	-
11	Floor, wall, and ceiling of the food storage area	85.29	14.71	-
12	Doors and windows are intact and rust-free.	88.24	11.76	-
13	Temperature and humidity	73.53	26.47	-
14	Light	91.18	8.82	-
15	Ventilation	79.41	29.59	-
16	Shelving and palletizing	82.35	17.65	-

Table 5 shows the status of personal hygiene, food hygiene, tools and equipment hygiene, and the building hygiene of bakeries in the city of Darrehshahr in 2020, with the highest satisfaction

percentage related to the hygiene of tools and equipment and the lowest satisfaction percentage related to the hygiene of food.

Figure 5. Percentage of frequency of building health indicators in bakeries in Darrehshahr city in 2019.

The status of the health index under study		Status		
		Compliance with regulations (%)	Non-compliance with regulations (%)	Non-applicability (%)
1	Personal hygiene	71.85	28.15	-
2	food hygiene	39.12	0.88	60
3	Health of tools and equipment	78.13	9.37	12.5
4	Building hygiene	73.53	20.22	6.25

Discussion

In this study, which aims to determine the status of environmental health in bakeries in the city of Darrehshahr in the year 2020, the results in the personal hygiene section showed that 23.53% of bakery employees lack a valid health card. This indicates a lack of continuous and thorough supervisory programs for bakeries and a lack of cooperation from bakery managers in renewing the validity. In a study conducted by Gholami Parizad and colleagues in 2004-2005 to examine bread and its health-related issues in bakeries in the urban areas of Ilam province, the results showed that 48% of bakery employees lacked valid health cards. This issue may indicate the non-cooperation of bakery operators in obtaining or renewing health card validity, as well as inadequate supervision by health inspectors. Given

the importance of having health cards for bakery employees, it should be a priority for environmental health inspectors (3). In the present study, 23.53% of the staff do not have a valid health education training certificate, which is due to the low level of knowledge among bakery staff and workers, as well as the lack of cooperation in obtaining or renewing the certification due to the high costs involved. This issue should be addressed in the proposed educational programs. In contrast, a study conducted by Gholami Parizad and colleagues in Ilam in 2004-2005 showed that 51% of the staff did not have a health education training certificate (3). In the present study, 100% of the staff use disposable gloves for wounds, cuts, and blisters. 29.41% of the employees do not use clean and intact gowns, and 76.47% do not wear hats, which is primarily due to the employees' insufficient

belief in adhering to hygiene standards. On the other hand, inspectors do not take serious action against those who do not use hats and gowns, and they should provide the necessary hygiene training to them. If they do not comply, they should be reported to the judicial authorities. Additionally, a study conducted by Gholami Parizad and colleagues in 2004-2005 in Ilam showed that 46% of the employees did not use appropriate work clothing (3). While in a study conducted by Khamirchi and colleagues in the city of Sabzevar, the results showed that 43.7% of the staff did not use hats and white coats (7). In the food hygiene section, the study conducted showed that 100% of bakeries do not use unauthorized colors and essences. Additionally, 12.94% of the food items used in the bakeries meet the necessary standards. In the section on the hygiene of tools and equipment, the studies conducted revealed that 91.18% of the bakeries in the city of Darrehshahr are equipped with a water tap above the dough mixer. Furthermore, in a study conducted by Emam Jom'e and colleagues in Qazvin County, the results indicated that 93.4% of the water taps above the dough mixer were installed (10). In the conducted study, 79.41% of bakeries in the city of Darrehshahr had first aid kits. Additionally, in a study by Pouraslani et al. in 2003 in the city of Ardabil, the results showed that in 79.48% of bakeries, the first aid kits were placed in appropriate locations. The box containing the contents should be placed in a suitable location so that it is easily accessible when needed (8). In the building hygiene section, the study conducted found that 73.53% of the ceiling coverings in the bakeries of the city of Darrehshahr are clean, intact, and light-colored. The rental nature of the bakery location might be one reason why the staff do not prioritize the cleanliness and maintenance of the ceiling. Additionally, in the study by Kargar and colleagues, which aimed to examine the environmental hygiene and bread quality of the bakeries in the city of Yazd, the results showed that 31.7% of the bakeries had ceilings that were smooth, clean, and free of cracks (4). Additionally, in a study conducted by Khamirchi and colleagues in Sabzevar, the results showed that

82.5% of the bakeries had flat, clean, and crack-free ceilings (7). In the conducted study, in 17.65% of the bakeries in the city of Darrehshahr, no measures were taken to control insects and rodents. The lack of use of necessary tools by the operators to prevent the entry of pests, the accumulation of bread waste in part of the bakery, and the absence of suitable screens for the windows were reasons for the gathering of insects and rodents in the bakeries. In contrast, a study conducted by Pouraslani and colleagues in Ardabil in 2003 showed that pests had gathered in 92.11% of the bakeries (8). According to the results of our studies, 100% of the bakeries in the city of Darrehshahr are equipped with appropriate water supply systems. Additionally, in a study conducted by Emam Jom'e and colleagues in Qazvin, the results showed that 100% of the bakeries had hygienic water for consumption (10). In the conducted study, the sewage collection and disposal system in 100% of the bakeries followed regulations. In a study conducted by Pouraslani and colleagues in Ardabil, the results showed that 94.73% of the bakeries had hygienic sewage systems (8).

In the present study, 14.71% of bakeries have restrooms with the necessary features. According to the field observations, the results showed that the type of area, ownership, and building type influence the presence or absence of restrooms. Additionally, in the study by Khamirchi and colleagues, which aimed to examine the environmental hygiene status of bakeries in the city of Sabzevar, the results indicated that 83% of the bakeries had hygienic restrooms. In a study conducted in the city of Darrehshahr, 41.79% of bakeries had proper ventilation. The bakery building should have adequate and proper ventilation so that the air inside the bakery is healthy, fresh, sufficient, and odor-free. However, in the bakeries we studied, 20.59% did not pay proper attention to this issue, and if their ventilation system had a technical fault, they were indifferent to it. In a study by Najaf Najafi, aimed at examining the impact of the sanitary conditions of bakeries in the city of Mashhad on the quality of

bread, the results showed that 93.9% of the bakeries had proper ventilation systems (11).

In the health inspection checklist for traditional bakeries used in this study, out of 56 questions, 9 were critical questions whose non-compliance directly endangers public health. According to the results obtained in this study, 100% of the bakery staff who studied use disposable gloves if they have wounds, cuts, or blisters. 100% of the staff wash their hands with soap and water according to the instructions. In 100% of the bakeries studied, there is no refrigerator or cold storage. In 100% of the bakeries studied, there are no hazardous foods that require a cold chain. In 97.06% of the bakeries, the separation of food storage areas from cleaning and chemical materials is observed. In 100% of the bakeries studied, the prohibition of using additives such as colors, essences, flavorings, and unauthorized chemical sweeteners is observed. 100% of the bakeries studied do not have refrigerators or freezers. 88.24% of the bakeries studied are equipped with hot and cold-water sinks. 100% of the bakeries studied have an appropriate water supply system.

Conclusion

In this research, all results were studied based on the bakery inspection checklist. According to this investigation, the level of hygiene in most bakeries was good. The results of this study indicate that the level of personal and environmental hygiene in bakeries, as one of the main centers for supplying food to the public, is at a desirable level, and it is worth thanking and appreciating all environmental health experts who inspect such centers. The most significant problems in the bakeries in the city of Darrehshahr are related to the lack of hats worn by bakery workers and the absence of proper sanitary facilities and showers in the bakeries. This issue is due to the insufficient awareness and belief of bakery workers regarding hygiene standards, the type of building, and the ownership type concerning the existence or absence of sanitary facilities and showers.

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Ethics approval

Ethical approval for this study was obtained from Deputy of Public Health for Tehran University of Medical Sciences.

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Conflict of interest

The authors report no conflict of interest in this study.

Authors' contributions

FG participated in data gathering, SM and AA contributed in data analyses and interpretation. AA and FG did the literature review. Drafting of the paper were done by SM, FG and AA. All authors read, revised, and approved the final manuscript.

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