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Investigation the environmental health status of dental clinics in Ilam city in 2024

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A B S T R A C T

Introduction: Dental clinics, as public centers, must adhere to environmental health principles to reduce the risks of contamination and the spread of dangerous infectious diseases. Failure to follow these principles can endanger the health of dentists, patients, and staff. The present study was conducted with the aim of determining the state of environmental health status of dental clinics in Ilam City in the year 2024.

Materials & Methods: In this descriptive cross-sectional study, 13 active dental clinic units in Ilam City were investigated using a census method. The required information was collected by reviewing existing documents in urban comprehensive health service centers and based on a health inspection checklist for dental offices with form code 920318/111 approved by the Ministry of Health. The collected data were analyzed using Excel software.

Results: In the survey, the individual health indicators, health deficiencies were observed in the studied dental clinics, including the lack of use of clean, intact, light-colored lab uniforms and personal protective equipment in 46.38% of cases and improper disinfection of the suction unit and its components in 15.46% of clinics. In the tools and equipment section, proper disinfection and sterilization of the tools and equipment used showed non-compliance rates of 46.15% and 53.85%, respectively. In the building health and safety section, the condition of ventilation was adequate in 46.15% of cases, and fire extinguishers with valid charges complied with regulations in 53.85% of cases.

Conclusion: In order to improve the health indicators of the dental clinics in this study and address health non-compliances, particularly in the areas of instrument and equipment hygiene and waste management, it is recommended to conduct training courses on the principles of disinfection and sterilization of instruments, ensure continuous supervision by environmental health experts, implement self-monitoring and self-reporting health processes, raise awareness about the use of standard personal protective equipment, and provide the necessary infrastructure to utilize the capabilities of private companies involved in the management and safe disposal of infectious waste generated in the dental clinics under study.

Keywords: Dental office, dental clinic, environmental health, Ilam city

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Introduction

Preserving, expanding, and promoting health in human societies is one of the basic policies for achieving social justice in countries, and this goal has always been a national priority as an important human need and an individual and social value (1 and 2). The principles of the Iranian Constitution also emphasize the provision of health and treatment as one of the main needs of the people (3). Health systems include all organizations, institutions, and resources that provide health services, and their main goal is to promote the health of the community (1). According to the definition of the Environmental Health Regulations approved in 1992 by the Council of Ministers, dental offices and clinics provide health and treatment services to patients as public places (4 and 5). In providing dental services, there is a possibility of dentists and patients coming into contact with contaminated blood, mucus, or saliva, which can expose them to severe contamination. Failure to control risk factors associated with these services can lead to the spread of dangerous diseases such as hepatitis and AIDS (6). Compliance with environmental hygiene principles, including the provision of safe drinking water, sanitary disposal of wastewater, waste management, and proper disinfection of instruments, is of great importance. In addition, employees' attention to hygiene standards such as proper hand washing and the use of disposable items is effective in promoting the health of clients (7). According to Article 7 of the Environmental Health Regulations, the Ministry of Health is required to monitor public places such as dental clinics in terms of environmental hygiene principles (8).

In recent years, numerous studies have been conducted to examine the environmental hygiene indicators of medical and dental offices, each of which has examined a part of these environmental hygiene criteria and principles. For example, in the section on waste management and proper disposal, it has been stated that very large amounts of infectious and hazardous waste are produced daily in medical clinics around the world. In the 1980s and 1990s, exposure to HIV and hepatitis B viruses increased the potential risk of exposure to medical waste, making waste generated in these centers a threat to the health of physicians, patients, staff, and even buildings adjacent to these centers (9). Several other studies have examined microbial and infectious contamination resulting from failure to comply with hygiene standards in offices and clinics, especially dental offices and medical offices, which is related to the environmental health index of ensuring the health and hygiene of clients and relevant staff (10-13). In another study, Ali Hosseini and colleagues in Bushehr in 2012 studied the building health sector indicators, the status of health services, waste management, ensuring the health of clients, safety, sewage disposal, and the status of health facilities, and found that in general, the centers providing health and medical services had favorable health conditions in most of the indicators studied (4).

Now, considering the importance of the subject and the lack of coherent research in evaluating the environmental health indicators of dental clinics in Ilam City, the results of this study can play an effective role in providing basic information to help managers and planners of health and treatment centers in Ilam City establish preventive measures in adverse health cases and also to inform citizens. Therefore, efforts to improve and promote the level of environmental health of dental clinics through making appropriate decisions, providing practical solutions, and allocating sufficient resources, especially in the environmental health sector, are expected to achieve the desired situation. This study was conducted with the aim

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of determining the environmental health status of dental clinics in Ilam city in 2024.

Materials and methods

In this descriptive cross-sectional study, 13 dental clinics in Ilam city were surveyed in 2024 using a census method. The required information was collected by reviewing the documents available in the comprehensive urban health service centers and based on the health inspection checklist of dental offices with form code 920318/111. This checklist was developed based on the guidelines of the Health and Workplace Center and includes 62 questions in the fields of personal health of employees (13 questions), hygiene of tools and equipment (13 questions), health and safety of buildings (20 questions), waste management (8 questions), and specific regulations of dental clinics (8 questions) (14 and 15). The collected data were analyzed using Excel software. The following relationship was used to obtain the health status of each part of the checklist and the percentage of compliance and non-compliance of the evaluated parameters (4 and 16).

Compliance with Health Regulations = (Compliant Data / Total Data) × 100%.

Results

Tables 1 to 5 show the health status of the studied indicators, broken down into the personal health status of employees, hygiene of tools and equipment, health and safety of buildings, waste management, and specific regulations of dental clinics in Ilam City. In examining the personal health indicators of the studied dental clinics, the existence of health deficiencies in the areas of not using healthy, clean, and brightly colored gowns and not using personal protective equipment in 38.46 percent and not properly disinfecting the suction unit and its components in 46.15 percent of the studied dental clinics was evident (Table 1).

Table 1. Status of personal health indicators of dental clinics in Ilam city in 2024.

Row	Parameters	Status	Compliance with Regulations (%)	Non-compliance with Regulations (%)
1	*Proper hand washing		100	0
2	Hand washing guideline		92.31	7.69
3	Prohibition of work for staff with communicable diseases		100	0
4	Prohibition of sale and use of tobacco products		100	0
5	Installation of no-smoking signage		84.62	15.38
6	Use of clean, intact, and light-colored gowns		61.54	38.46
7	Designated area for equipment storage		92.31	7.69
8	Vaccination of healthcare staff against diseases		76.92	23.08
9	Infection control training certificate specific to healthcare staff		76.92	23.08
10	Use of personal protective equipment		61.54	38.46
11	Use of sterile disposable instruments		100	0
12	Disinfection of suction unit and its components		53.85	46.15
13	Sterile examination set for each patient		100	0
* Critical cases				

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In the section on hygiene of instruments and equipment, the most important critical non-conformities in the studied units include failure to observe the correct principles of disinfection and sterilization of instruments and equipment used, with 46.15 and 53.85 percent of non-conformities, respectively. Also, according to the surveys conducted in none of the studied dental clinics in Ilam, the self-control and self-declaration process of hygiene was carried out (Table 2).

Table 2. Status of health indicators of tools and equipment of dental clinics in Ilam city in 2024.

Row	Parameters	Status	Compliance with Regulations (%)	Non-compliance with Regulations (%)
1	* Use of single-use blades and needles		100	0
2	* Adherence to proper disinfection principles for instruments and equipment		85.53	15.46
3	* Sterilization of instruments in use		15.46	85.53
4	Use of standard periapical radiography equipment		100	0
5	Availability of facilities for washing and disinfection of instruments and equipment		23.69	30.77
6	Use of standard disinfectant and antiseptic solutions		92.76	23.08
7	Availability of a separate handwashing sink for clients		100	0
8	Availability of a wash basin separate from the instrument washing sink		92.76	23.08
9	Use of standard materials and medications		100	0
10	Condition of shelves, drawers, etc.		92.76	23.08
11	Condition of chairs, furniture, etc.		92.76	23.08
12	Installation of a first aid kit with necessary items		92.76	23.08
13	Self-monitoring and self-reporting of hygiene practices by the owner		0	100
* Critical cases				

In the building health and safety section, the water supply system was in compliance with regulations in 100% of cases. Also, among the health deficiencies in this section, we can mention the discrepancy in the condition of the toilets and the condition of proper ventilation with a frequency of 46.15%, as well as the discrepancy in the condition of the fire extinguisher with a valid charge with a frequency of 53.85% (Table 3).

Table 3. Status of health and safety indicators of dental clinic buildings in Ilam city in 2024.

Row	Parameters	Status	Compliance with Regulations (%)	Non-compliance with Regulations (%)
1	* Water supply system		100	0
2	Wastewater collection and disposal system		84.62	15.38
3	Measures for control of insects and rodents		84.62	15.38
4	Standard heating and cooling system		100	0

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5	Compliance of dental unit space with standards		84.62	15.38
6	Condition of the rest room		84.62	15.38
7	Condition of sanitary facilities		53.85	46.15
8	Functional flush tank in sanitary facilities		76.92	23.08
9	Wall covering of the washing area		69.23	30.77
10	Floor covering of the building		92.31	7.69
11	Wall covering of the building		84.62	15.38
12	Ceiling covering of the building		84.62	15.38
13	Doors and windows		92.31	7.69
14	Temperature and humidity conditions		84.62	15.38
15	Adequate lighting		92.31	7.69
16	Adequate ventilation		53.85	46.15
17	Fire extinguisher with valid charge		46.15	53.85
18	Hygiene status of the pantry area		92.31	7.69
19	Compliance with hygienic principles in the pantry		84.62	15.38
20	Compliance with safety standards		92.31	7.69
*Critical cases				

In the section related to waste management indicators, the critical parameter of proper disposal of sharps and cutting waste was found to be in violation of the regulations in 30.77% of dental clinics. Also, among the non-conformities in this section, we can mention the inappropriate condition of the temporary storage location and the frequency of daily waste collection in 38.46% and the absence of contract records with waste decontamination companies in 53.85% of the units studied (Table 4).

Table 4. Status of waste management indicators of dental clinics in Ilam city in 2024.

Row	Parameters	Compliance with Regulations (%)	Non-compliance with Regulations (%)
1	Proper disposal of sharp and piercing waste	23.69	77.30
2	Use of color-coded bags for waste segregation	92.76	8.23
3	Records of contracts with waste disposal companies	15.46	85.53
4	Covered, pedal-operated, and washable trash bins	62.84	38.15
5	Temporary waste storage area	54.61	46.38
6	Daily waste collection frequency	54.61	46.38
7	Separation of infectious and non-infectious waste	92.76	8.23
8	*Proper and correct disposal of amalgam and other high-use materials	100	0
*Critical cases			

In the section of specific regulations for dental clinics, the status of users' records of radiation training courses and the lack of use of personal protective equipment against radiation were evident in 38.46 and 23.08 percent of cases, respectively, which were in violation of the regulations (Table 5).

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Table 5. Status of indicators related to specific criteria of dental clinics in Ilam city in 2024.

Row	Parameters	Compliance with Regulations (%)	Non-compliance with Regulations (%)
1	Proper disposal of sharp and piercing waste	23.69	77.30
2	Use of color-coded bags for waste segregation	92.76	8.23
3	Records of contracts with waste disposal companies	15.46	85.53
4	Covered, pedal-operated, and washable trash bins	62.84	38.15
5	Temporary waste storage area	54.61	46.38
6	Daily waste collection frequency	54.61	46.38
7	Separation of infectious and non-infectious waste	92.76	8.23
8	Proper and correct disposal of amalgam and other high-use materials	100	0

In Figure 1, the overall and separate averages of the total indicators of personal hygiene, hygiene of tools and equipment, building hygiene and safety, waste management, and specific criteria of dental clinics in Ilam City in 2024 are expressed based on percentages.

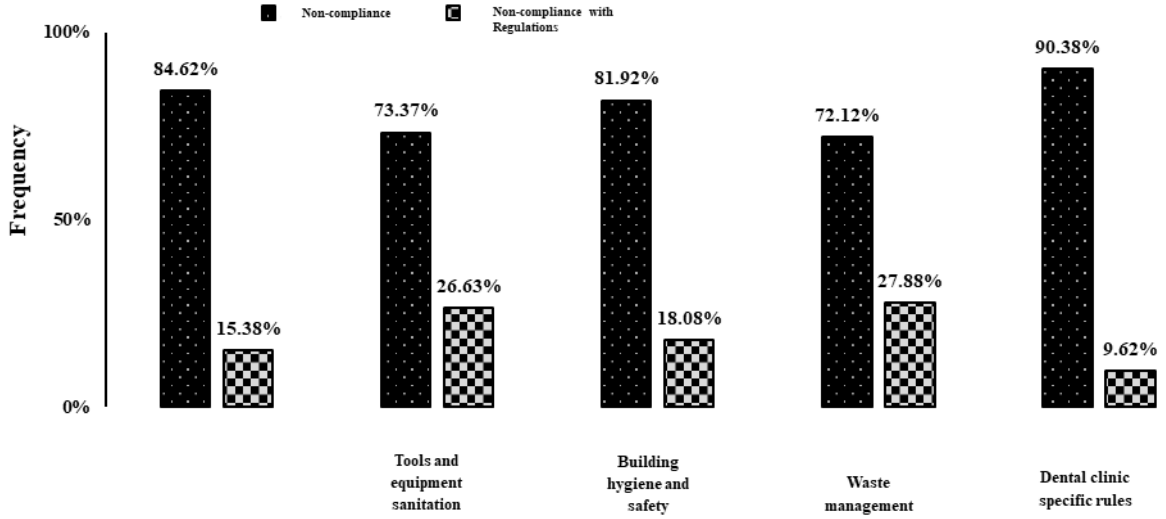

Figure 1. General status of environmental health indicators of dental clinics in Ilam city in 2024.

As can be seen in Figure 1, the status of the health indicator studied in the specific criteria section of dental clinics was in accordance with the regulations with a frequency of 90.38%, and the hygiene of tools and equipment and waste management sections were in conflict with the regulations with a frequency of 73.37% and 72.12%, respectively. Overall, the level of compliance with the regulations in the study of environmental health indicators of dental clinics in Ilam in 2024 was assessed with a frequency of 80.48%.

Discussion

The present study was conducted with the aim of determining the environmental health indicators of dental clinics in Ilam city in 2024. In examining the personal health indicators, the results showed that the failure to use a clean, bright-colored gown and the failure to use personal protective equipment were in 38.46% of

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cases that were contrary to the regulations. In a study conducted by Bastami et al. on the topic of investigating the status of infection control in dental offices and clinics in Qazvin province in 1393, the results indicated that the use of a clean gown and personal protective equipment during work by dentists was in 55.80% and 33.70% of cases that were contrary to the regulations, respectively (17). In another study on the subject of dentists' awareness, understanding, and attitudes about COVID-19 and infection control among Jordanian dentists in 2019, the results showed that the use of gowns and personal protective equipment (dental goggles, masks, and gloves) was observed by dentists in 82.6% and 92.9% of cases, respectively (18). Also, in this section, the lack of proper disinfection of the suction unit and its components was evident in 46.15% of the dental clinics studied. In the study by Ali Hosseini et al. on the subject of environmental hygiene in private offices, laboratories, and radiology departments in Bushehr city in 2014, the results showed that disinfection of the dental unit and its other accessories was carried out correctly in 97.80% of the units studied (4). The Infection Control Guidelines for Dental Clinics, developed by the Centers for Disease Control and Prevention (CDC), emphasize the use of gloves, masks, and their replacement for each patient, the wearing of gowns, eye protection by dentists, and measures such as vaccination, sterilization, and proper disinfection of dental instruments and surfaces to reduce the risk of infection transmission (6).

In the area of instrument and equipment hygiene, the most important critical non-compliances in this area include failure to follow the correct principles of instrument and equipment disinfection in 46.15% of the units studied and failure to sterilize the instruments used in 53.85% of the units studied. In a study conducted to compare environmental hygiene indicators of private offices in Chaharmahal and Bakhtiari Province in 2008, Fadaei et al. stated that instrument and equipment disinfection was not performed correctly in 66.40% of the units studied (19). It seems that the expansion of necessary training by environmental health inspectors focusing on the correct principles of hand disinfection and disinfection and sterilization of dental instruments and tools can be effective in improving the knowledge and performance of dentists. Also, in the present study, there was apparently no requirement from the comprehensive health service centers of Ilam city to implement the self-control and self-declaration process. Using the capacity of self-control and self-declaration, health companies can be useful in improving the performance level of centers providing health and medical services such as dental clinics. Mirzaei et al., in a study in Dareh Shahr city in 1402, stated that implementing the self-control and self-declaration health process is necessary and essential, and this can only be achieved with the follow-up of health authorities (20).

General principles and regulations of environmental hygiene, such as the provision of safe drinking water, proper disposal of sewage and waste, provision of humidity, adequate light and ventilation, standard physical space, toilets and sanitary facilities, and compliance with hygiene standards by medical staff, are effective and important in ensuring public health and controlling infections (21). In the present study and in the building health and safety section, discrepancies in the condition of sanitary facilities and optimal ventilation were evident in 46.15% and the condition of fire extinguishers with valid charges in 53.85%. Also, in a comprehensive study by Hosseini et al. in Bushehr in 2012, the condition of sanitary facilities and toilets was inconsistent with regulations in 18%; the condition of air conditioning, in 20.09; and the condition of fire extinguishers, in 48.40% of the units studied (4).

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Failure to address the status of sanitation and toilet improvements, failure of flush tanks, improper cleaning of toilets, unpleasant odors due to failure of hoods, and failure to properly place and charge fire extinguishers were among the reasons for the low level of compliance with regulations in the health and safety of buildings in the studied units. Continuous monitoring by environmental health experts, decisive action, and identification of centers that are at fault and have health deficiencies are recommended to eliminate these non-compliances.

In the section related to waste management indicators, in the context of the critical situation related to the proper disposal of sharps and cutting waste in 77.30 percent of dental clinics, there was a clear violation of regulations. Collecting surgical blades and used needle heads in a safe box in accordance with health regulations should be considered (22). In a study by Ali Hosseini et al. in Bushehr in 2012, the failure to use a safe box and improper disposal of sharps and cutting waste in 90.11% of the units studied and improper disposal of infectious waste in 60.7% of the units studied were in violation of the regulations (4). In the present study, waste decontamination records were evident in only 15.46% of the units studied. It seems that using the capacity and services of companies trusted by the Ministry of Health in the collection and decontamination of infectious waste produced by medical centers such as the dental clinics studied can be effective in improving the waste management process. Poor management of medical waste has exposed medical and treatment staff, waste collection staff, and communities around these centers to infections, effects, and injuries caused by the toxicity of medical waste, which has led to serious health problems in most developing countries (4). It is essential to observe the principles of temporary waste storage, separate hazardous infectious waste from normal waste, and transport waste according to a continuous schedule in centers providing health and medical services. Other non-compliances in the waste management sector include the poor condition of temporary storage sites and the frequency of daily waste collection in 38.46% of the units studied. In a study by Pak Fetrat et al. on the subject of investigating the status of waste management in Iranian dental centers in 2018, the results showed that by separating the recyclable part of dental waste from other parts, the volume of waste and, consequently, the costs related to waste collection and decontamination are reduced (23). Waste produced in dental clinics in Ilam City was stored in temporary waste sites in an unprincipled manner and sometimes for 2 to 3 days, which shows the disregard for the importance of principled waste management by the units studied. In a study by Hosseini et al. in Bushehr in 2012, the frequency of waste collection was appropriate in only 89% of the units studied (4). Expanding educational programs, including more effective supervision and monitoring of the activities of health service office training centers and issuing health education certificate cards, as well as face-to-face training and distributing brochures on waste management; continuous supervision of environmental health experts working in health centers on the process of waste separation and disposal; and communication of the comprehensive waste management policy by the provincial health center to all clinics and dental offices operating in Ilam City are recommended to improve the performance of the units studied.

In the section on specific regulations for dental clinics, the absence of records of users attending radiation work courses was evident in 38.46% of the units studied. Radiation training courses for users working with ionizing radiation are held in the form of introductory and advanced courses and are supervised by the Radiation Protection Office affiliated with the Atomic Energy Organization of Iran; the validity of these courses

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is one year, and users must participate in refresher courses. Also, in this section, the use of personal protective equipment by dentists while working with radiation was contrary to the regulations in 23.08% of the units studied. Hokamabadi et al. in North Khorasan in 2012 stated that gonadal and thyroid shields were not available in 2 hospitals, and one hospital lacked radiation warning signs (22). In a study by Hosseini et al. in Bushehr in 2012, the results showed that the use of personal protective equipment (such as lead aprons, gonadal, and thyroid protectors) by 76.6% of dentists and 100% of personnel working in the radiology department of the studied units was in accordance with the regulations (4). Given the importance of observing safety and security issues in this sector, environmental health experts should, in accordance with the provisions of the regulations, inspect dental offices and provide necessary and continuous training on the principles of radiation protection and safety for employees working in dental clinics in Ilam. According to the results of the present study, the status of the health indicator studied in the section of specific regulations of dental clinics was in accordance with the regulations with a frequency of 90.38%, and the section of hygiene of tools and equipment and waste management was in accordance with the regulations with a frequency of 73.37% and 72.12%, respectively. In an excellent study by Hosseini et al. on the environmental health of private offices, laboratories, and radiology departments in Bushehr City in 2012, the status of building health indicators, health services, waste management, ensuring the health of clients, safety, sewage, and health facilities were in a favorable state with an average of 85.3, 82, 87.2, 75.8, 61.1, 95.3, and 99.1 percent, respectively (4).

Conclusion

In the present study, and in general, the level of compliance with the regulations in the environmental health indicators of dental clinics in Ilam city in 2024 was assessed with a frequency of 80.48%. The results indicated that dental centers in Ilam city are involved in environmental health challenges such as the lack of use of personal protective equipment by medical staff, lack of attention to disinfection and sterilization of used tools and equipment, poor condition of sanitary facilities, ventilation and firefighting equipment, improper management of waste produced in the centers, and the lack of records of radiation training courses for users. Therefore, in order to improve the environmental health indicators of the dental clinics studied and eliminate health non-conformities, especially in the areas of instrument and equipment hygiene and waste management, it is recommended to expand educational programs, including more effective supervision and monitoring of the activities of health service office training centers and issuing health education certificate cards, as well as holding training courses and distributing brochures on familiarizing with the correct principles of disinfection and sterilization of equipment, continuous supervision by environmental health experts, implementing a self-control and self-declaration process of health by providing incentive plans, raising awareness about the use of standard personal protective equipment, and providing the necessary platforms to use the capacity of private companies active in the field of management and decontamination of infectious waste produced in the dental clinics studied.

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CRediT authorship contribution statement

Conceptualization, Methodology, Validation: AA, Formal Analysis, Investigation, Resources, Software, Data Curation: ZT, Writing–Original

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Draft Preparation, Writing–Review & Editing: AA, Visualization, Supervision, Project Administration: SM.

Conflict of interest

The authors declare no conflict of interest.

Ethical considerations

This study was approved by the Ethics Committee of Ilam University of Medical Sciences (Iran) (IR.MEDILAM.REC.1402.167). The authors avoided data fabrication, falsification, plagiarism, and misconduct.

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