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Availability of Occupational Safety and Health (OSH) Facilities and Potential Hazards in a Senior High School Biology Laboratory: A Compliance Assessment Against Indonesian National Standards

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Abstract: The biology laboratory plays an important role in science learning through practical work. However, laboratory activities also have potential hazards that can threaten user safety if occupational safety and health (K3) facilities are not optimal. This study aims to identify the availability of K3 facilities, potential hazards, and compliance with the standards of Permendikbud No. 8 of 2018 in the Biology Laboratory of SMAN X Tangerang Selatan. A descriptive method with a mixed approach (qualitative and quantitative) was used. Data were collected through observation using a checklist (40 items), interviews with laboratory assistants, and documentation. The results showed the level of availability of K3 facilities was 55% (complete category). Hazard identification found that chemical hazards were the main potential (10% of the total items), especially from corrosive and flammable materials. Facilities such as eyewash stations, evacuation routes, and B3 waste bins were not yet available. This study concluded that the laboratory generally met basic safety standards, but needed improvement in emergency response facilities and waste management.

Keywords: biology laboratory; occupational safety and health standards; hazard identification; Permendikbud No. 8/2018

Abstrak: *Laboratorium biologi memiliki peran penting dalam pembelajaran sains melalui praktikum. Namun, kegiatan laboratorium juga memiliki potensi bahaya yang dapat mengancam keselamatan pengguna jika fasilitas keselamatan dan kesehatan kerja (K3) tidak optimal. Penelitian ini bertujuan mengidentifikasi ketersediaan fasilitas K3, potensi bahaya, serta kesesuaian dengan standar Permendikbud No. 8 Tahun 2018 di Laboratorium Biologi SMAN X Tangerang Selatan. Metode deskriptif dengan pendekatan campuran (kualitatif dan kuantitatif) digunakan. Data dikumpulkan melalui observasi menggunakan lembar checklist (40 item), wawancara dengan laboran, dan dokumentasi. Hasil menunjukkan tingkat ketersediaan fasilitas K3 sebesar 55% (kategori lengkap). Identifikasi bahaya menemukan bahwa bahaya kimia merupakan potensi utama (10% dari total item), terutama dari bahan korosif dan mudah terbakar. Fasilitas seperti eyewash station, jalur evakuasi, dan tempat sampah B3 belum tersedia. Penelitian ini menyimpulkan bahwa laboratorium secara umum telah memenuhi standar keselamatan dasar, namun perlu peningkatan pada fasilitas tanggap darurat dan pengelolaan limbah.*

Kata Kunci: *laboratorium biologi, standar K3, identifikasi bahaya, Permendikbud No. 8/2018*

INTRODUCTION

The biology laboratory is one of the key supporting facilities in the science-learning process at the senior high school level. When biology instruction is integrated with practicum-based activities, students are better able to connect theoretical concepts with real-world phenomena, making the learning experience more meaningful. Through practicum activities, students do not merely acquire theoretical knowledge; they also gain direct experience in conducting observations and experiments while developing their science-process skills (Zulaika et al., 2022).

Optimal laboratory function requires facilities and infrastructure that meet established standards appropriate to the type of laboratory in use. Laboratory infrastructure encompasses furniture, practicum tools and materials, instructional media, and occupational safety facilities that together support the effective and safe implementation of practical work. Adequate facility availability sustains the smooth running of learning activities; therefore, laboratory conditions must be properly maintained so that they can support learning activities aligned with the three educational domains cognitive, affective, and psychomotor (Setiawati et al., 2021).

Practicum activities in biology laboratories carry a range of potential risks capable of endangering laboratory users when occupational safety and health (OSH) practices are not properly implemented (Sri et al., 2025). These risks may originate from the use of chemical substances, sharp instruments, electrical installations, or laboratory environmental conditions that fall short of safety requirements. School laboratories therefore need to comply with applicable safety standards, including the provision of safety facilities such as portable fire extinguishers (APAR), first-aid kits, personal protective equipment, adequate ventilation, evacuation routes, and standard operating procedures (SOPs). These components must be present and fully functional to ensure that practicum activities proceed safely, comfortably, and in accordance with prevailing standards (Zulaika et al., 2022).

A study by Dedu et al. (2026) found that several senior high school biology laboratories still lacked fire extinguishers, evacuation routes, and adequate safety SOPs. This finding indicates that the implementation of OSH standards in school laboratories has not been fully realized, underscoring the continued need to evaluate the completeness of safety facilities and the potential hazards present.

Based on this background, the present study aims to: (1) identify the availability and completeness of OSH facilities in the Biology Laboratory of SMAN X, South Tangerang; (2) identify potential hazards present in the laboratory; and (3) analyze the conformity of laboratory conditions with applicable safety standards under Permendikbud No. 8 of 2018 concerning Technical Guidelines for the Special Allocation Fund in the Education Sector. This regulation establishes science-laboratory standards covering biology, physics, and chemistry laboratories, and further specifies the types of equipment that must be available for a laboratory to meet the prescribed standard (Taufik et al., 2024).

METHOD

Research Location and Design

This study was conducted in the Biology Laboratory of SMAN X, South Tangerang, in May 2026, using a descriptive method with a mixed-methods approach that combined simple qualitative and quantitative procedures. Mixed methods refers to a combined research design that integrates quantitative and qualitative findings to derive a more comprehensive conclusion (Subagyo, 2020). The qualitative approach was used to analyze interview data in order to understand the contextual management of laboratory OSH, while the quantitative approach was used to process observational data obtained from the OSH facility checklist (Nasution et al., 2024). The combination of both approaches was selected to obtain a comprehensive picture of laboratory OSH conditions, both factually and interpretively.

Research Subjects and Objects

The research subject was the laboratory assistant directly involved in managing and operating the Biology Laboratory of SMAN X, South Tangerang. The laboratory assistant was selected as the subject because of their direct knowledge and experience regarding the laboratory's operational conditions, safety procedures, and the challenges encountered in implementing OSH practices. The research objects comprised three aspects: (1) the availability of occupational safety facilities (OSH); (2) potential hazards present within the laboratory; and (3) the conformity of laboratory facilities and infrastructure with applicable OSH standards.

Data Collection Techniques

Data were collected through three techniques: observation, interview, and documentation. Direct observation was conducted in the laboratory to examine the physical condition of OSH facilities using a checklist instrument. Interviews were conducted with the laboratory assistant using a semi-structured interview guide to obtain deeper information regarding facility management, challenges encountered, and the safety procedures applied. Documentation was carried out to obtain supporting data in the form of photographs of laboratory conditions and related OSH documents.

Instrument Development

The research instruments consisted of an observation checklist and an interview guide. The checklist was developed by adapting the occupational safety facility and laboratory infrastructure indicators specified in Permendikbud No. 8 of 2018 concerning Technical Guidelines for the Special Allocation Fund in the Education Sector. Indicators derived from this regulation were used to ensure that the laboratory's condition was assessed against an applicable, legally grounded standard. The checklist consisted of 40 items covering five categories: safety equipment, physical safety facilities, room utilities, occupational health and comfort, and furniture completeness. The interview guide was developed based on aspects of laboratory OSH management to obtain supporting information regarding the implementation of occupational safety in the laboratory.

Data Analysis

Interview data were analyzed using descriptive qualitative analysis through the stages of data reduction, data display, and conclusion drawing. Checklist data were calculated using percentage.

Table 1. Classification of Percentage Results

Percentage of Facility Conformity Obtained	Assessment Criteria
0% – 24%	Very incomplete
25% – 49%	Incomplete
50% – 74%	Complete
75% – 100%	Very complete

Source: Sugiyono (2012)

RESULT AND DISCUSSION

Availability of Occupational Safety and Health (OSH) Facilities

Observation of OSH facilities in the Biology Laboratory of SMAN X, South Tangerang, found that most basic safety facilities were available and consistent with the standards set by Permendikbud No. 8 of 2018. Of the 40 facility items observed, 22 items were available and met the standard, 6 items were available but did not meet the standard, and 12 items were not available at all.

Table 2. Recapitulation of OSH Facility Availability and Completeness at SMAN X, South Tangerang

Category	Items	Available & Compliant	Available, Not Compliant	Not Available
Safety equipment	3	3	0	0

Physical safety facilities	17	6	0	11
Room utilities	7	4	2	1
Occupational health and comfort	7	5	2	0
Furniture completeness	6	4	2	0
Total	**40**	**22**	**6**	**12**

The observation results revealed that several essential facilities were already in place. The availability of fire extinguishers, first-aid kits, general waste bins, sinks, chemical storage cabinets, hazard labels, gloves, masks, safety signage, laboratory rules posters, laboratory doors, lighting openings, electrical points, and washbasins indicates that the laboratory has taken meaningful steps toward creating a safe practicum environment.

However, facility availability has not been matched by consistent maintenance. This emerged from the interview with the laboratory assistant, who stated: "OSH facilities are available at the front of the lab, but their contents have not been updated recently, even though ideally they should be replaced every semester. Completeness checks are conducted once or twice a year to ensure the equipment is still functioning." Yet, the availability and periodic renewal of fire extinguishers and first-aid kits are critical reference points for an effective emergency-response system. Fire extinguishers serve as the first line of defense against fire risks arising from chemical reactions or electrical short circuits, while a properly stocked first-aid kit ensures the laboratory's readiness to manage minor injuries. Periodic renewal is therefore essential to ensure that all equipment functions optimally during an actual incident or workplace accident.

Compared with similar studies conducted in Indonesia, the 55 percent facility-completeness rate found in this study is informative when placed alongside other findings. Muliyah et al. (2024), studying a biology laboratory at SMAN X Jakarta, reported an OSH facility-completeness rate of 72.3 percent, higher than the result obtained in this study. This difference may be linked to variation in school budget capacity and the level of supervision exercised by local education authorities. Taufik et al. (2024), examining SMA Edu Global School, found that private-school laboratories tend to exhibit greater completeness than public-school laboratories, owing to greater funding flexibility. Nevertheless, the unavailability of emergency-response facilities such as eyewash stations, evacuation routes, and fire blankets was found consistently across these studies, suggesting a systemic gap in the implementation of school laboratory safety standards at the national level. This pattern is consistent with the findings of Setiawati et al. (2021), who identified that secondary-school science laboratories in Indonesia generally have not integrated adequate hazardous-waste (B3) management systems. When benchmarked against international standards, the conditions of the SMAN X South Tangerang laboratory remain below the minimum thresholds set by several global safety organizations. The American Chemical Society's (2016) guidelines for secondary-school chemical laboratory safety stipulate that eyewash stations, emergency showers, and B3 waste-management systems are mandatory provisions. The ISO 45001:2018 Occupational Health and Safety Management Systems standard likewise offers a framework that can be adapted to the educational laboratory context to strengthen the completeness and consistency of ongoing safety implementation.

Observation of the laboratory's physical safety facilities found that a sink with running water was available and functioning properly. This is an important provision, since biology practicum activities involve potential exposure to chemical agents and biological contaminants that require immediate rinsing. However, the laboratory does not yet have an eyewash station. The absence of this facility indicates that the emergency-response system for chemical splashes to the eyes remains suboptimal. An eyewash station is a critical facility for reducing the risk of eye injury from chemical splashes or contaminants during practicum work.

Regarding hazardous-material management, the laboratory already has a chemical storage cabinet and hazard labels or symbols that meet the standard. The presence of chemical labels helps laboratory users identify a substance's hazard level, thereby reducing the risk of misuse. In addition, the separation of chemicals through dedicated storage cabinets reflects an effort to control exposure risk. Nevertheless, the observation found that a dedicated B3 (hazardous and toxic waste) bin has not yet been provided.

Further, the laboratory assistant reported that the handling of practicum waste such as residual chemical or biological reactions is still managed independently and does not involve any third-party waste handler. Concentrated liquid waste such as hydrochloric acid (HCl) or sodium hydroxide (NaOH) is first diluted with distilled water to lower its hazard level before being discharged into the drainage system, while broken-glass waste is separated directly into a dedicated container to protect cleaning staff. Waste-management standards (Setiawati et al., 2019) mandate that hazardous (B3) waste be managed through to the stage of transport by a licensed third party. The dilution and sharps-separation methods applied by the laboratory assistant represent the best independent emergency mitigation achievable in the absence of a contract with a specialized waste manager.

This condition indicates that the hazardous-waste management system has not yet met laboratory safety standards. Practicum waste that is not separated from general waste has the potential to cause environmental contamination and health risks for laboratory users. Moreover, the B3 waste-management system is not yet connected to any specialized treatment system. Setiawati et al. (2019) note that B3 waste management is a series of activities encompassing storage, collection, utilization, transport, treatment, and final disposal, and that such waste poses hazards if not handled correctly.

Observation of personal protective equipment (PPE) found that gloves and masks were available and met the standard, whereas laboratory coats and protective goggles were not yet provided. The absence of laboratory coats and protective goggles may increase the risk of chemical or biological-contaminant exposure to the body and eyes of laboratory users. In practicum activities, PPE use is an essential rule for reducing the risk of occupational accidents. According to Arsy et al. (2022), personal protective equipment is gear that must be worn while working in accordance with the potential hazards and occupational risks involved, in order to protect the safety of the worker and those nearby. The incompleteness of PPE thus indicates that laboratory safety implementation still requires improvement.

The school applies two distinct policies regarding PPE provision. The laboratory provides gloves and masks free of charge, whereas a different policy applies to laboratory coats, which students are required to obtain and bring themselves, either by purchasing a new coat or using one handed down from an alumnus. The laboratory assistant confirmed this rule in the interview: "Lab coats must be brought by the students themselves. If a student does not bring or wear a lab coat, they are not permitted to enter the laboratory." This firm policy is consistent with standard OSH procedures. Complete PPE use is crucial throughout practicum activities to reduce hazard exposure, particularly direct exposure to irritant chemicals or biological contaminant splashes (Arsy et al., 2022).

The procurement and maintenance of OSH facilities depend entirely on the school's funding bureaucracy. Procurement requests for tools, materials, and supporting facilities are typically processed at the end of the academic year. The process begins when the laboratory assistant compiles a list of needs together with the subject teachers (Biology, Physics, Chemistry), which is then submitted to the treasurer for budget review before approval by the school principal. Procurement and maintenance procedures for supporting facilities (such as air conditioning) are often delayed due to limited budget disbursement. According to Fadillah and Aliyyah (2024), this funding issue represents a systemic constraint in school facility management that requires laboratory staff to be more creative and self-reliant in maximizing the safety equipment available.

The observation also found that SMAN X South Tangerang already has a laboratory rules poster in place. This safety poster helps raise student awareness of safety procedures during practicum activities. However, several other facilities such as no-eating-or-drinking signage, hazardous-material warning signs, mandatory-PPE signs, and emergency-safety provisions including an emergency telephone number, a fire blanket, an evacuation route, and an evacuation map are not yet available. The absence of these facilities may hinder the evacuation process in the event of an emergency such as a fire or laboratory accident. Evacuation routes and maps are essential for providing clear direction to laboratory users so they can evacuate quickly and in an orderly manner. The unavailability of evacuation facilities indicates that the laboratory's disaster-mitigation system still requires further development.

With regard to room-utility aspects, the observed laboratory door, lighting openings, electrical points, and washbasin can be concluded to meet the prescribed standard. Adequate lighting and ventilation conditions support the comfort and safety of practicum activities. However, air ventilation and electrical outlets fall into the "available but non-compliant" category. Suboptimal ventilation can impair air circulation in the laboratory, particularly when chemical use generates vapors or odors. In addition, an insufficient number of electrical outlets increases the risk of using additional extension connections, which may cause short circuits. A dedicated B3 waste-management system was also found to be unavailable. This indicates that the laboratory has not yet established a specific mechanism for treating hazardous waste, even though sound laboratory waste management is essential for preventing environmental pollution and protecting the health of laboratory users.

Table 3. Percentage of OSH Facility Availability and Completeness at SMAN X, South Tangerang

Category	Percentage	Remarks
OSH facility availability and completeness	55%	Complete

Based on the percentage calculation of OSH facility availability and completeness shown in Table 2, the Biology Laboratory of SMAN X South Tangerang obtained a score of 55 percent, categorized as "Complete." This percentage was derived by comparing the actual score of 22 compliant items against the maximum score of 40 observed facility items, indicating that more than half of the laboratory's OSH facilities are available in accordance with school-laboratory safety standards.

A score of 55 percent suggests that the laboratory has basic readiness in supporting the safety and security of practicum activities. The availability of core safety facilities such as fire extinguishers, first-aid kits, sinks, safety signage, and several items of PPE contributed substantially to this result and reflects the school's efforts to meet educational laboratory safety standards. Nevertheless, the percentage also reveals that several important facilities remain unavailable or non-compliant, as shown by the 6 items in the "available but non-compliant" category and the 12 items that are entirely unavailable. Such non-compliance and unavailability can compromise the effectiveness of the laboratory safety system, particularly in handling emergencies and managing occupational-accident risk.

Several unavailable facilities including the eyewash station, evacuation route, fire blanket, B3 waste bin, and evacuation map are essential components of the laboratory's emergency-response system. Their absence indicates that OSH implementation in the laboratory still requires improvement so that it not only meets the "complete" category but also satisfies a higher safety standard. Muliyah et al. (2025) explain that OSH constitutes a fundamental requirement in every laboratory; sound OSH procedures, properly implemented by all laboratory users, are therefore essential to preventing occupational accidents and work-related illness.

Spatial Arrangement and Laboratory Use Management

The laboratory, located in an older building, is fairly spacious and contains five large practicum tables. During the interview, the laboratory assistant noted: "This laboratory room is fairly spacious (an older building). It contains five large tables, and each table is usually occupied by a group of six to seven students." The total room capacity during a practicum session can therefore reach 30 to 35 students. This capacity is essentially in line with the standard set by Permendikbud No. 8 of 2018, which establishes a maximum ratio of 32 students per study group for biology laboratories. Nevertheless, a formation of six to seven students per table is considered less than ideal, as density at a single work area can reduce the effectiveness of teacher visual supervision and increase the probability of equipment being accidentally knocked over by students.

The laboratory assistant also noted that "biology practicum is used by grade 11 and grade 12 students on a rotating basis so that schedules do not clash." This time-management arrangement reflects sound and well-structured infrastructure administration. Session division is highly effective in avoiding overcrowding within the laboratory, allowing for freer movement among students and minimizing the likelihood of glassware or chemicals being accidentally knocked over during practicum activities.

Potential Hazards in the Biology Laboratory of SMAN X South Tangerang

Hazard-identification observation was conducted using a checklist containing 30 hazard items across five categories: chemical hazards, biological hazards, physical hazards, ergonomic and environmental hazards, and behavior- and procedure-related hazards.

Table 4. Recapitulation of Potential Hazard Identification in the Biology Laboratory of SMAN X South Tangerang

Hazard Category	Items Observed	Identified
Chemical hazards	6	3
Biological hazards	6	0
Physical hazards	7	0
Ergonomic and environmental hazards	5	0
Behavioral and procedural hazards	6	0
Total	**30**	**3**

Note: Identified items consisted of corrosive substances (HCl, acetic acid, concentrated iodine solution), flammable substances (ethanol/methanol), and hazardous biological stains (methylene blue, safranin, crystal violet, Lugol's iodine).

Table 4 shows that of the 30 hazard items observed, 3 items were identified as present, while the remaining 27 were not identified. All identified items originated from a single category chemical hazards where 3 of the 6 items were found present. The other four categories (biological, physical, ergonomic/environmental, and behavioral/procedural hazards) showed no identified hazards at the time of observation.

Based on these results, the percentage of identified hazards was calculated as $3/30 \times 100\% = 10\%$. This relatively low figure does not necessarily indicate that the laboratory is free of risk. Rather, it may reflect the fact that observation was conducted only during periods without active practicum sessions, meaning behavioral hazards (such as student carelessness) could not be observed directly. Biological hazards such as cross-contamination from wet specimens may likewise go undetected through visual observation alone, without dedicated testing. These results should therefore be interpreted as an indication of visible hazards rather than the laboratory's total actual risk.

Chemical hazards were the only category with positive findings, with 3 of 6 items confirmed present. The identified substances included corrosive materials such as HCl, acetic acid, and concentrated iodine solution; flammable materials such as ethanol and methanol used for equipment sterilization and specimen staining; and hazardous biological stains such as methylene blue, safranin, crystal violet, and Lugol's iodine, which are routinely used in microscopy practicum sessions. According to Nadillah et al. (2022), chemicals can be classified according to their hazardous properties including corrosive, flammable, irritant, and toxic each carrying a different level of risk to laboratory-user safety. Similarly, Subamia et al. (2019) note that corrosive chemicals pose a risk of damaging living tissue, while flammable substances may trigger fires if not stored and handled according to procedure. Although the presence of these substances is inseparable from the operational needs of a biology laboratory, their management still requires serious attention, particularly with respect to proper storage, clear labeling, and mandatory PPE use during practicum activities.

For the biological, physical, ergonomic/environmental, and behavioral/procedural hazard categories, no items were identified at the time of observation. This indicates that the laboratory is generally in a fairly well-maintained condition with respect to biological and physical risk. The absence of hazardous practices such as mouth pipetting or bringing food into the laboratory also suggests that users' awareness of basic safety procedures was reasonably good at the time of observation.

Minor accident incidents have nonetheless continued to occur over the past year, even though the observation found the laboratory to be reasonably safe owing to close teacher supervision. Incidents such as broken test tubes are generally caused by student carelessness in placing hot glassware down haphazardly. Incident patterns at educational facilities are indeed dominated more by human error when assessed against occupational-accident management standards. According to Aswan (2025), carelessness among practicum students and overly rough handling of equipment contribute to equipment damage, which in turn risks physical injury to users. This is reinforced by the laboratory assistant's statement: "So far the laboratory has been safe, with no major problems, because the teacher always stands at the front to supervise the students. The minor incident that has occurred most often over the past year is broken test tubes, caused by students placing them down carelessly right after heating them in a beaker."

Efforts to minimize accident risk in the laboratory are carried out through disciplined preventive measures by the teacher and the school. Based on the interviews, the teacher consistently checks students' module readiness, provides safety instructions before each experiment begins, and actively circulates to supervise practicum tables. The laboratory assistant described this supervisory procedure: "Before the practicum begins, the teacher provides instructions first and checks the students' readiness... While the practicum is underway, the teacher circulates to supervise." In addition to direct supervision, these preventive measures are supported by OSH-rule briefings delivered at the start of each semester, prior to the start of the practicum series. This was reinforced by the laboratory assistant's statement that "explanation of laboratory OSH is given at the beginning... regarding the rules that must be followed and brought." This basic-knowledge briefing and reinforcement of OSH prohibitions is highly consistent with standard risk-prevention practice, in which preventive action is the most critical element in ensuring that practicum students are aware of the potential hazards in their working environment (Zulaika et al., 2022).

Waste Management and Laboratory-Assistant Competency

Regarding environmental governance, the observation recorded the absence of a dedicated, standard-compliant B3 waste-management facility. This finding aligns with the laboratory assistant's account of the independent mitigation measures they have had to take in the absence of cooperation with an external waste manager. The laboratory assistant stated: "Until now, waste disposal is still handled independently and has not involved a third party. Liquid waste such as concentrated HCl or NaOH is diluted/neutralized before disposal, while sharp or broken-glass waste is separated into its own container." These limitations in facility and waste management also intersect with limited access to managerial-competency development for laboratory staff. The laboratory assistant acknowledged having to proactively seek OSH knowledge independently, stating: "There has been no formal training or dedicated class from the Ministry. So far, training has been pursued independently by laboratory assistants online, including one organized by Pudak Scientific via Zoom."

Research Implications

Based on the analysis of OSH facility availability and hazard identification presented above, this study carries two principal implications theoretical and practical. Theoretically, this study reinforces the urgency of integrating occupational safety management into the science-education curriculum, particularly in practicum-based biology instruction. The finding of a 55 percent OSH facility-compliance rate provides new empirical evidence that compliance with national regulatory standards (Permendikbud No. 8 of 2018) at the secondary-school level continues to face implementation challenges in the field. In addition, the 10 percent chemical-hazard identification rate provides theoretical support for the conclusion that school laboratories carry a latent, persistent risk profile, pointing to the need for further research into adaptive, self-administered OSH evaluation models for laboratory staff.

Practically, the findings of this study can serve as an evaluation document and database for the management of SMAN X South Tangerang in establishing procurement priorities for OSH facilities, particularly to fulfill currently absent emergency-response facilities such as the eyewash station, evacuation routes, and a dedicated B3 waste bin. For teachers and laboratory assistants, these findings provide a basis for tightening supervision and reinforcing PPE discipline (such as laboratory-coat use) among students to mitigate risks associated with the corrosive and flammable chemicals identified in the laboratory. Furthermore, the school's annual budgeting mechanism could be reformulated to prevent delays in the periodic maintenance of safety facilities, such as the renewal of first-aid kit contents and monitoring of fire-extinguisher expiry dates.

CONCLUSION

This study concludes that the availability of Occupational Safety and Health (OSH) facilities in the Biology Laboratory of SMAN X South Tangerang reached 55 percent, classified as "complete" under Permendikbud No. 8 of 2018. Available facilities included fire extinguishers, first-aid kits, sinks, masks, gloves, rules posters, and chemical storage cabinets. However, critical facilities such as the eyewash station, evacuation route, evacuation map, fire blanket, and B3 waste bin were not yet available. Facility maintenance was also not yet optimal due to budget constraints and the absence of a routine inspection schedule. Hazard identification showed that chemical hazards constituted the primary risk (10 percent of chemical-hazard items identified), comprising corrosive substances (HCl, acetic acid), flammable substances (ethanol, methanol), and hazardous biological stains. Biological, physical, ergonomic, and behavioral hazards were not identified during observation, although the potential for accidents resulting from human error (e.g., broken test tubes) remains, based on the laboratory assistant's account.

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