



Risk Factors Associated with Sick Building Syndrome Among Workers in High-Rise Office Buildings

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<p>Track Record Article</p> <p>Revised: 13 December 2025 Accepted: 22 February 2026 Published: 31 March 2026</p> <p>How to cite : Oktavia, W. A., Setiani, O., Joko, T., Sulistiyani, & Suhartono. (2026). Risk Factors Associated with Sick Building Syndrome Among Workers in High-Rise Office Buildings. <i>Contagion : Scientific Periodical of Public Health and Coastal Health</i>, 8(1), 141–153.</p>	<p style="text-align: center;">Abstract</p> <p><i>Indoor air quality is one of the crucial aspects of the work environment. Poor workplace conditions not only reduce comfort and job satisfaction but also significantly affect work productivity. One clinical manifestation of poor office environmental quality is the emergence of Sick Building Syndrome (SBS). The etiology of SBS is multifactorial, involving complex interactions between physical environmental factors (temperature, humidity, particulate dust), chemical factors (VOCs, CO₂), and biological agents, as well as individual characteristics and psychosocial conditions. This study aimed to determine the risk factors associated with the occurrence of SBS among employees of the Central Java Provincial Archives and Library Office. This research employed an analytical observational approach with a cross-sectional design involving 93 employees as respondents. The results showed that the average indoor air quality measurements in the work areas were as follows: humidity 56.30%, temperature 27.85°C, lighting intensity 170.04 lux, and air change per hour 3.43 times/hour. The prevalence of SBS among employees was 58.1%. There was not a significant association between temperature ($p=0.035$; $RP=1.840$), humidity ($p=0.085$; $RP=0.712$), lighting ($p=0.121$; $RP=0.733$), and ACH ($p=0.791$; $RP=1.088$) with SBS. In conclusion, this study identified no relationship between indoor air quality and the incidence of SBS among employees of the Central Java Provincial Archives and Library Office.</i></p> <p>Keywords: <i>Indoor Air Quality, Sick Building Syndrome, Risk Factors, Workers.</i></p>
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INTRODUCTION

Indoor air quality (IAQ) is an important aspect of the working environment, given that most people spend more than 80% of their time indoors, including in offices and government buildings (Adiningsih & Hairuddin, 2021). Office workers today face high work demands and long hours, spending an average of eight or more hours a day indoors (Drastyana et al., 2024). This situation creates prolonged, intense exposure to indoor work conditions, which can trigger various health problems related to building conditions. One clinical manifestation of poor office environment quality is Sick Building Syndrome (SBS), a medical condition characterized by nonspecific symptoms that worsen indoors and subside upon leaving. SBS is defined as a collection of symptoms experienced by building occupants, including eye, nose, and throat irritation, headaches, fatigue, and difficulty concentrating (Subri et al., 2024). The etiology of SBS is multifactorial, involving complex interactions between physical, chemical, and biological environmental factors, as well as individual characteristics and psychosocial conditions (Abdullah et al., 2025).

Environmental factors, both physical and chemical, are the main causes of SBS in office workers. Thermal comfort is an important factor, as inappropriate air temperature and extreme relative humidity (too low or too high) can lead to mucosal dryness (Abu et al., 2024). In addition, indoor air pollutant concentrations, such as particulate matter (PM_{2.5} and PM₁₀) dust, are often major respiratory irritants (Thongchom et al., 2021). Exposure to volatile organic compounds (VOCs) from furniture, paint, and office equipment also contributes significantly to irritation (Lu et al., 2015). Biological factors, such as mold, bacteria, and dust mite contamination, especially in ventilation systems and damp areas, can exacerbate the potential risks of SBS (Rozi et al., 2025). In addition to environmental variables, individual factors are also significantly correlated with a person's susceptibility to SBS, including age, gender, and length of service (Suryadi et al., 2021). In addition, psychosocial factors such as work stress, lack of control over the work environment, poor interpersonal relationships, and excessive workload have been shown to be strongly associated with increased SBS complaints (Isman et al., 2024). The interaction between suboptimal physical environmental factors and psychosocial stress creates conditions conducive to the development of SBS symptoms in the work environment.

The incidence of SBS is reported to be high and has become a significant global occupational health issue, particularly in developed and developing countries (Bardi et al., 2021). Research among garment factory workers reported a high prevalence of SBS, namely 82.1% (Alwi et al., 2021). Research in China has shown the prevalence and risk factors of SBS among hospital medical staff, highlighting the importance of understanding this syndrome across various work environments (Weng et al., 2025). In Indonesia, SBS incidence is also a concern. In an office environment, 44.1% of employees at PT PLN (Persero) Central Java and DI Yogyakarta Distribution Unit were found to have symptoms of SBS (Putri et al., 2020).

The Central Java Provincial Archives and Library Building is a relevant study location because it has unique working environment characteristics that may trigger SBS. The building was constructed with painted brick walls and ceramic floors and relies on a hybrid air circulation system, namely natural circulation through windows and artificial circulation via air conditioners (AC). All workspaces have windows that are regularly opened to maintain air circulation, since the central AC temperature cannot be adjusted in each room. Lighting in the workspaces is dominated by always-on artificial lighting, with additional natural light from windows. The cleanliness management conditions in the office environment are not yet fully optimal, which could lead to the accumulation of pollutants. Based on these conditions, this building has a closed working environment with high work activity, as well as the potential for

chronic exposure to various physical, chemical, and biological factors in the air. The purpose of this study was to comprehensively identify the risk factors that are significantly associated with the occurrence of SBS among employees of the Central Java Provincial Archives and Library Office.

METHODS

This study is an analytical observational study using a cross-sectional design to examine the correlation between independent and dependent variables. The study was conducted at the Central Java Provincial Archives and Library Building. The primary data collection period was from July to August 2025. The study population consisted of all employees actively working in the building, particularly in the main work areas on the first to third floors. The subject population in this study comprised all employees of the Archives and Library Service of Central Java Province, namely 115. Meanwhile, the sample size for this study was 93 employees, calculated using the LEMESHOW formula and selected via random sampling.

The variables studied in this research were classified into independent and dependent variables. Independent variables included physical environmental factors (relative humidity, air temperature, lighting intensity, air change per hour (ACH)) and CO₂ concentration. Measurement of the physical quality of the room as an independent variable in this study was carried out in 8 workspaces including the General and Personnel Sub-section (Umpeg); Finance, Program, and Secretariat Sub-section (KPS); Archiving Development, Development, and Supervision Division (P3K); Archives Management and Preservation Division (PPA); Archives Services and Utilization Division (LPA); Archives Depot; PPID; and Library Development Division (PP). Meanwhile, the dependent variable was employees who experienced Sick Building Syndrome (SBS). Primary data was collected through direct interviews and measurements of indoor air quality in the workplace. Interviews were conducted using a structured questionnaire, while physical measurements of the environment were taken using a portable indoor air quality monitor (KM-410), anemometer (ANMO-300), roll meter, and luxmeter (L4-4000), which have been calibrated by the Environmental Health Laboratory officers of the Faculty of Public Health, Diponegoro University. Secondary data was obtained from agency profile documents and reviews of relevant previous research articles.

The collected, validated, and processed data were then analyzed using SPSS statistical software. The analysis began with univariate analysis, which aimed to describe the data by calculating frequency distributions and percentages for each variable in the study. Next, a bivariate analysis was performed to test for significant relationships between the independent

variables (risk factors) and the dependent variables (SBS incidents). Multivariate analysis using logistic regression was conducted to identify factors influencing SBS incidence, controlling for confounding variables. This study has obtained ethical clearance from the Health Research Ethics Committee of the Faculty of Public Health, Diponegoro University, with the number 214/EA/KEPK-FKM/2025.

RESULT

Table 1. Distribution of Respondents Based on Variables Studied

Variable	n	%
SBS Diagnosis		
SBS	54	58.1
No SBS	39	41.9
Gender		
Female	52	55.9
Male	41	44.1
Age		
<40 years	46	49.5
>40 years	47	50.5
Working Period		
<5 years	29	31.2
>5 years	64	68.8
Humidity		
<40 or >60%	56	60.2
40-60%	37	39.8
Temperature		
<23 or >26oC	73	78.5
23-26°C	20	21.5
Lighting		
<300 or >500 lux	57	61.3
300-500 lux	36	38.7
Air Change per Hour		
<2 or >3 times/hour	49	52.7
2-3 times/hour	44	47.3
CO₂ Concentration		
<0.07 mg/m ³	93	100

Based on Table 1, the results of univariate analysis show that the prevalence of Sick Building Syndrome (SBS) among employees of the Central Java Provincial Archives and Library Office reached 58.1% (n=54) of respondents diagnosed with SBS. It can be seen that most of the employees who participated in the study were female (55.9%, n=52), aged 40 or older (50.5%, n=47), and had worked for more than 5 years (68.8%, n=64). The frequency distribution of the work environment variable shows suboptimal conditions, with most employees (78.5%; n=73) exposed to unsuitable air temperatures: 23% at < 23 °C and 26% at >26 °C. In addition, 60.2% (n=56) of respondents reported relative humidity above 60%, indicating a humid environment. In terms of lighting, most employees (57 people, or 61.3%)

worked in rooms with lighting intensity below 300 lux, indicating that it did not meet visual comfort standards. Based on CO₂ concentration, all employees worked in rooms that met the requirements below the 1000 ppm threshold.

Table 2. Indoor Air Quality Measurement Results

Indoor Air Quality Measurement Results					
Room	Humidity (40-60%)	Temperature (23-26°C)	Lighting (300-500 lux)	ACH (2-3 times/hour)	CO ₂ Concentration (<1000 ppm)
LPA	63.05	25.60	40.17	2.9	628.83
PP	63.35	25.83	184.72	5.7	636.00
PPID	65.70	22.20	23.47	5.2	701.33
KPS	48.30	30.03	329.60	2.8	613.33
P3K	45.35	30.22	346.43	1.6	543.67
Umpeg	62.70	27.17	32.07	6	599.17
PPA	60.35	27.92	25.82	2.6	621.50
Archive Depot	56.13	27.85	69.03	2	482.50
Mean	56.30	27.85	170.04	2.4	606.68

The results of air quality measurements in the work environment in Table 2 show that several parameters exceed the quality standards set by the Indonesian Ministry of Health Regulation No. 48 of 2016 (PerMenKes No. 48 Tahun 2016 Tentang Standar Dan Kesehatan Kerja Perkantoran, 2016). Variables that do not meet the standards include humidity with an average value of 56.30% (above the ideal comfort limit of 40–60% in some rooms), air temperature with an average of 27.85°C (exceeding the standard of 23–26°C), and lighting levels with an average of only 170.04 lux, far below the ideal standard of 300–500 lux. In addition, the average Air Change per Hour (ACH) value of 3.43 times/hour also indicates an imbalance in air circulation. Meanwhile, another parameter, CO₂ concentration, at 606.68 ppm, remains below the safe limit.

Table 3. Distribution of SBS Symptoms Among Employees

Sick Building Syndrome Symptoms	n
Headache	18
Difficulty concentrating	18
Fatigue, weakness, drowsiness	48
Eye irritation, sore eyes, itchy and watery eyes	27
Runny nose/sneezing/itchy nose	13
Shortness of breath/difficulty breathing	6
Itchy, dry, hoarse, sore throat	35
Coughing	23
Nausea	4
Muscle aches, pain, stiffness in the chest, back, arms/hands	40
Stress	8
Dry, itchy, red skin	18

Based on Table 3 above, 54 employees have been diagnosed with Sick Building Syndrome (SBS) and are experiencing various symptoms. The prevalence of Sick Building

Syndrome (SBS) symptoms frequently experienced by employees of the Central Java Provincial Archives and Library Office is fatigue, weakness, drowsiness (48 people), aching, pain, stiffness in the chest, back, hands/arms (40 people), and an itchy, dry, hoarse, sore throat (35 people). Meanwhile, the least commonly reported symptoms are nausea (4 people), shortness of breath/difficulty breathing (6 people), and stress (8 people).

Table 4. The Relationship between Indoor Air Quality and SBS Incidence

Variable	SBS Diagnosis				Total		<i>p-value</i>	RP (95%CI)
	Yes		No		f	%		
	f	%	F	%				
Humidity								
<40 or >60%	28	50	28	50	56	100	0.085	0.712 (0.509-0.995)
40-60%	26	70.3	11	29.7	37	100		
Temperature								
<23 or >26°C	47	64.4	26	35.6	73	100	0.035	1.840 (0.988-3.423)
23-26°C	7	54	13	65	20	100		
Lighting								
<300 or >500 lux	29	50.9	28	49.1	57	100	0.121	0.733 (0.524-1.024)
300-500 lux	25	69.4	11	30.6	36	100		
Air Change per Hour								
<2 or >3 times/hour	29	60.4	19	39.6	48	100	0.791	1.088 (0.768-1.593)
2-3 times/hour	25	55.6	20	44.4	45	100		
Age								
<40 year	33	71.7	13	28.3	46	100	0.015	1.603 (1.113-2.316)
≥40 year	21	44.7	26	55.3	47	100		
Gender								
Female	25	48.1	27	51.9	52	100	0.047	1.774 (1.031-3.053)
Male	29	70.7	12	29.3	41	100		
Length of Service								
<5 year	22	75.9	7	24.1	29	100	0.034	1.517 (1.102-2.089)
≥5 year	32	50	32	50	64	100		

Based on the cross-tabulation analysis in Table 4, it is evident that in rooms with humidity that did not meet quality standards (<40% or >60%), 28 respondents (50%) experienced SBS. The statistical test results showed a *p-value* of 0.085, indicating no significant relationship between air humidity and SBS incidence. Seven respondents who worked in rooms with acceptable temperatures (23–26°C) experienced SBS, while 47 respondents who worked in rooms with unacceptable temperatures (<23°C or >26°C) experienced SBS. The Chi-Square test results showed a *p-value* of 0.035, indicating a significant relationship between temperature and the incidence of SBS among employees of the Central Java Provincial Archives and Library Office. Based on the statistical analysis, room temperature shows a statistically significant relationship with SBS incidence ($p < 0.05$). However, the estimated strength of the association indicated by the Risk Prevalence (RP) value is not epidemiologically significant, as the 95% confidence interval still crosses 1. This

condition indicates that although there is an association between temperature and SBS incidence, the actual magnitude of the risk cannot yet be determined with certainty.

It was found that of the 57 respondents who worked in rooms with unsatisfactory lighting levels (<300 lux), 29 people (50.9%) experienced SBS symptoms. The statistical test yielded a p-value of 0.121, indicating no significant relationship between lighting and SBS occurrence. Based on the variable of air changes (i.e., < 2 or >3 times/hour), it was found that 30 people working in such rooms experienced SBS. The Chi-Square test yielded a p-value of 0.791, indicating no statistically significant association between ACH and SBS. Based on the CO₂ concentration variable, statistical analysis cannot be performed because the data are homogeneous.

Table 5. Analysis of Multivariate

Variable	B	p-value	RP	95%CI
Age	0.938	0.091	2.556	0.860-7.597
Gender	0.947	0.046	2.579	1.019-6.530
Length of Service	0.439	0.468	1.552	0.451-5.335
Temperature	1.220	0.032	3.389	1.113-10.312
Constant	-4.557	0.000	0.010	

The results of the logistic regression analysis showed that, after controlling for age, gender, and length of service, room temperature and gender were statistically significantly associated with SBS incidence. Room temperatures that do not meet standards increase the risk of SBS by 3.39 times (RP=3.389; 95% CI=1.113–10.312; p=0.032), while respondents of a certain gender had a risk of SBS 2.58 times higher than the reference group (RP=2.579; 95% CI=1.019–6.530; p=0.046). Meanwhile, the variables of age and length of service showed a tendency to increase the risk but were not statistically significant. These findings indicate that room temperature is an independent factor that plays an important role in SBS incidence, while individual characteristics can modify the risk, though the effect is not yet fully consistent statistically.

DISCUSSION

Overview of the SBS Incident

SBS is a condition in which building occupants experience various non-specific health symptoms that subside after leaving the building environment. The causes are multifactorial, including indoor air quality, temperature, humidity, lighting, exposure to VOCs, dust, and microorganisms, as well as individual factors (Abdullah et al., 2025). In the Central Java Provincial Archives and Library Building, the potential risk of SBS is influenced by the air circulation system, which combines windows and central air conditioning that cannot be

adjusted per room, variations in lighting intensity, the presence of pollutant sources such as open trash, piles of files, mold, chemical products, and suboptimal cleaning practices, including infrequent cleaning of air conditioning filters.

This study found that 54 of 93 respondents (58.1%) experienced SBS, with fatigue, drowsiness, and musculoskeletal complaints being the most commonly reported symptoms. The least common symptoms were nausea and shortness of breath. The predominance of these systemic symptoms suggests possible influences from poor air quality, suboptimal ergonomics, and psychosocial factors. Analysis of individual characteristics showed that SBS symptoms were more prevalent among employees who worked more than 8 hours a day, were under 40 years of age, had less than 5 years of service, and were male. Long working hours increase exposure to indoor pollutants, while younger employees and those with less work experience may not yet have adapted to the work environment (Quoc et al., 2020) (Saijo et al., 2025). Overall, the incidence of SBS in this building is influenced by a combination of suboptimal physical environmental conditions and individual employee characteristics.

The Relationship Between Humidity and SBS Incidence

Research results show that the average air humidity in the Central Java Provincial Archives and Library building is 56.30%. However, statistical tests showed no significant relationship between humidity and SBS ($p=0.085$). These findings are consistent with several previous studies, including a study of employees at PLN UIW Sulselrabar Makassar ($p=0.164$), research by Suryadi et al. ($p=0.115$), and the study by Wibisono et al. on employees of the Central Java Provincial Environment Agency ($p=0.396$), which also found no significant relationship between humidity and SBS (Wibisono et al., 2022). This insignificance may be influenced by other factors, such as VOC exposure, room cleanliness, mold presence, and suboptimal central air conditioning systems, making SBS symptoms more likely to be triggered by a combination of environmental factors rather than humidity alone.

This study was conducted during the dry season, thus limiting humidity variation between workspaces. This condition is thought to have contributed to the lack of a significant relationship between humidity and SBS incidence in this study. During the rainy season, humidity tends to increase and fluctuate more, potentially worsening indoor air quality by promoting microbial growth, causing stuffiness, and impairing thermal comfort (Suryadi et al., 2024). Therefore, the study results may have differed had measurements been conducted during the rainy season, when humidity may have more strongly influenced the incidence of SBS. These findings demonstrate the importance of considering seasonal variations in indoor air quality research, as well as the need for further studies with longitudinal designs or cross-

seasonal measurements to obtain a more comprehensive picture of the relationship between humidity and SBS. Although not statistically significant, the increasing risk trend suggests that humidity should still be managed to prevent potential health problems. Mitigation efforts can be carried out through regular humidity monitoring at representative points, improved maintenance of air conditioning systems and filters, and management of room cleanliness to reduce sources of contamination.

The Relationship Between Temperature and SBS Incidence

Measurements show that the air temperature in most workspaces at the Central Java Provincial Archives and Library Office does not meet thermal comfort standards. The average air temperature is 27.85°C, exceeding the recommended quality standard. The Chi-Square test shows a non-significant relationship between room temperature and the incidence of SBS ($p = 0.035$; RP 95% CI=1.840 (0.988-3.423)). These findings contradict previous studies showing a significant relationship between room temperature and SBS symptoms. Studies at the West Sulawesi Governor's Office ($p=0.006$), the AIRMED study in Thailand (aOR 2.63; 95% CI 1.41–4.90; $p=0.002$), and a study at the Central Java Provincial Health Office ($p=0.007$) show consistent results (Larasati & Wahyuningsih, 2023). Although it cannot be concluded that it is a significantly related factor, most employees work in rooms with temperatures that do not meet the requirements. Suboptimal room temperature can disrupt the body's thermoregulation and trigger physiological responses such as fatigue, increased heart rate, and irritation of the respiratory and skin systems (Subri et al., 2024). Increased temperatures can also worsen air quality by elevating levels of volatile organic compounds and carbon dioxide. Therefore, effective temperature management requires improvements to the air conditioning system, setting the thermostat to 23–26°C, and regular maintenance of AC filters.

The Relationship Between Lighting and SBS Incidence

Lighting in the workplace is an important indicator of indoor air quality that affects visual comfort, concentration, and employee productivity. The results of this study indicate that the average lighting in the work environment of the Central Java Provincial Archives and Library Office is 170.04 lux, meaning that most rooms do not meet the quality standards. Cross-tabulation analysis shows that 50.9% of respondents working in rooms with low lighting experience SBS. The Chi-Square test results show a p -value of 0.121, indicating no significant relationship between lighting and the occurrence of SBS.

The results of this study align with research conducted at the Public Works and Spatial Planning Office in the Water Resources Division of South Sulawesi Province, which found no correlation between lighting and SBS cases ($p=0.076$) (Suryadi et al., 2024). Research

conducted at the PT. X building in Palembang also found no correlation between lighting and SBS cases ($p=0.103$) (Mawarni et al., 2021). The insignificance of this relationship may be influenced by other factors that contribute to SBS, such as temperature, humidity, indoor pollutant concentrations, and psychosocial factors (Subri et al., 2024). To overcome suboptimal lighting, management can install additional lighting, optimize natural lighting, and perform routine maintenance of light sources. In addition, periodic measurements using a luxmeter are important to ensure that lighting levels remain within the ideal range of 300–500 lux, supporting the visual health and work productivity of employees.

The Relationship between Air Change per Hour (ACH) and SBS Incidence

Air Change per Hour (ACH) is an important indicator in assessing indoor air quality, as it describes the frequency of air changes per hour to maintain good circulation and prevent the accumulation of pollutants. The standard ACH quality for workspaces is 2–3 times per hour, as recommended by ASHRAE (Robertson, 2024). Research conducted by the Central Java Provincial Archives and Library Office shows that the average ACH value of 3.43 times per hour meets the minimum standard. However, some workspaces have ACH values below 2 times per hour, indicating that air circulation is not yet optimal. Cross-tabulation analysis shows that 61.2% of employees working in rooms with ACH <2 times/hour or >3 times/hour experience SBS symptoms, compared with 54.5% in rooms with ACH meeting the requirements. However, the Chi-Square test yielded a p-value of 0.659, indicating no significant relationship between ACH and SBS.

The insignificance of this relationship may be due to other factors that also affect SBS, such as natural ventilation through frequently opened windows, the use of a combination of central and split air conditioning, and variations in room conditions and exposure duration. Although not statistically significant, the tendency toward a higher proportion of SBS symptoms in rooms with low ACH suggests that air exchange rate still plays a role in worker comfort and health. Therefore, efforts to improve air circulation quality should be made through routine maintenance of air conditioning systems and filters, optimization of natural ventilation, and rearrangement of furniture to ensure airflow in the room is not obstructed, and the ACH value remains within the ideal range.

Relationship between CO₂ Concentration and SBS Incidence

Carbon dioxide (CO₂) concentration is an indirect indicator of ventilation effectiveness and waste air accumulation in a room. In this study, all CO₂ measurements in the workspace were below the threshold of <1000 ppm as stipulated in Ministry of Health Regulation No. 48 of 2016, with an average value of 606.68 ppm. This condition indicates that ventilation in all

workplaces is in the safe category, and the low variability of CO₂ values makes it impossible to perform statistical analysis of the relationship with SBS. These results are consistent with several other studies reporting no significant relationship between low CO₂ levels and SBS symptoms (Delviana et al., 2024).

The lack of a correlation between CO₂ and SBS is due to the fact that complaints generally occur at much higher CO₂ concentrations or through interaction with other factors. SBS is multifactorial and can be influenced by exposure to chemical pollutants, particulates, thermal conditions, airflow, and psychosocial factors (Hou et al., 2021). Nevertheless, regular monitoring is still necessary to prevent increases in CO₂ concentrations and other IAQ parameters. Mitigation efforts can be carried out through ventilation optimization, HVAC filter cleaning, pollutant source control, and employee psychosocial factor surveys as a comprehensive strategy for controlling SBS risks in the work environment (Zhang et al., 2023).

Strengths, Limitations and Implication for Policy

This study empirically correlates physical and chemical IAQ parameters with SBS risks in archival settings. While VOCs, formaldehyde, and microbiological factors were excluded, the findings underscore the necessity of re-engineering ventilation and optimizing ACH rates to mitigate employee health risks. Theoretically, this study enriches the IAQ discourse by emphasizing the importance of air control in administrative environments. Ultimately, these findings provide a robust framework for policymakers to develop more adaptive occupational health and safety protocols tailored to the unique requirements of the library and archives sector.

CONCLUSION

Based on the results of the study, it can be concluded that there is no significant relationship between temperature, humidity, lighting, ACH, and CO₂ concentration with SBS symptoms among employees of the Central Java Provincial Archives and Library Office. However, there are 58.1% (n=54) employees of the Central Java Provincial Archives and Library Office diagnosed with SBS and working in rooms with substandard air quality, so control is still needed, including maintenance of air conditioning systems and filters, room cleanliness management to reduce sources of contaminants, and periodic measurements using a luxmeter are important to ensure that lighting levels remain within the ideal range.

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