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Impact of Air Temperature and Humidity on Sick Building Syndrome among Bank Employees

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Sick Building Syndrome (SBS) is a condition in which inhabitants develop health problems or discomfort as a result of extended exposure to indoor surroundings. The purpose of this study was to investigate the association between air temperature and humidity in air-conditioned rooms and the prevalence of SBS, specifically mental weariness (burnout) instances, among employees of Bank Syariah Indonesia (BSI) in Banjarbaru City, Indonesia. The study followed a quantitative design with an analytical cross-sectional survey approach. Data were gathered using questionnaires and devices that measured air temperature and humidity. Univariate analysis defined the variable features, whereas bivariate analysis looked at the correlations between air temperature and humidity (independent variables) and the prevalence of SBS mental fatigue cases (dependent variable). The survey included 30 bank employees, with an average age of 32.4 years. The average air temperature was 25.8°C, with a relative humidity of 84.2%, which was outside of the permissible limit. The prevalence of SBS was 43.3%, with common symptoms including nose discomfort, eye irritation, headache, and fatigue. The prevalence of mental weariness was 36.7%. Pearson correlation analyses found significant positive relationships between air temperature and SBS prevalence ($r = 0.48$, $p < 0.01$), relative humidity and SBS prevalence ($r = 0.39$, $p < 0.05$), air temperature and mental fatigue ($r = 0.41$, $p < 0.05$), and relative humidity and mental fatigue. The findings emphasize the need of maintaining adequate indoor environmental conditions to reduce SBS risk and increase employee well-being in air-conditioned workplaces.

Keywords: Air Temperature, Humidity, Sick Building Syndrome (SBS), Mental Fatigue, Bank Employees

INTRODUCTION

Sick Building Syndrome (SBS) refers to a situation in which individuals suffer from health symptoms or discomfort as a result of prolonged exposure to indoor environments (Abdul-Wahab, 2014). Sick Building Syndrome (SBS) is commonly found in office environments, where employees spend a considerable amount of time indoors and are exposed to many environmental elements that might lead to the emergence of symptoms (Gomzi and Bobić, 2009; Sakellaris et al., 2016; Zhang et al., 2017). Bank offices are a significant location for studying Sick Building Syndrome (SBS) due to their use of rigorous indoor environmental control systems (Dhungana, Chalise, et al., 2020), such as air conditioning, which aim to uphold a pleasant working atmosphere for both staff and customers. Nevertheless, inadequate administration of these systems can result in difficulties such as subpar air quality, inconsistent temperature levels, and humidity issues, hence elevating the likelihood of Sick Building Syndrome (SBS). (Egbenta and Ubi, 2019).

The objective of this study is to investigate the correlation between air temperature, humidity in air-

conditioned rooms, and the occurrence of Sick Building Syndrome (SBS), specifically cases of mental weariness (burnout), among employees of Bank Syariah Indonesia (BSI) in Banjarbaru City.

The primary goal of this research is to enhance our comprehension of how interior surroundings affect the well-being of employees and to devise ways for enhancing the quality of work environments (Ceylan, 2021; Vimalanathan and Babu, 2014). The specific objectives of this study are to investigate the attributes of bank personnel, measure the air temperature and humidity in air-conditioned spaces, assess the level of mental exhaustion (burnout) among bank employees, and explore the correlation between air temperature, humidity, and the incidence of SBS-related mental fatigue among bank employees.

The significance of upholding ideal indoor environmental quality (IEQ) in workplaces has been extensively established, since substandard IEQ can result in a range of health problems, such as Sick Building Syndrome (SBS) (Frontczak and Wargocki, 2011; Sakellaris et al., 2016). Sick Building Syndrome (SBS) is a

multifaceted occurrence marked by a variety of nonspecific symptoms, including headaches, weariness, eye irritation, and respiratory issues. These symptoms are frequently linked to spending time in a certain building (Abdul-Wahab, 2014; Zhang et al., 2017). The presence of mental weariness, which is a prominent symptom of Sick Building Syndrome (SBS), can have a substantial effect on both the productivity and well-being of employees (Sakellaris et al., 2016). It is essential to identify and treat the elements that contribute to Sick Building Syndrome (SBS) in bank offices in order to enhance staff health, comfort, and overall organizational performance.

METHODS

This study employed a quantitative research design utilizing an analytical cross-sectional survey approach. Questionnaires and instruments were utilized to collect data on air temperature and humidity in the air-conditioned rooms of Bank Syariah Indonesia (BSI) in Banjarbaru City. The study encompassed a cohort of 30 employees from BSI. All participants were employed in climate-controlled office quarters located within the bank's grounds.

Data on employee characteristics, such as age, gender, and job role, as well as self-reported symptoms related to Sick Building Syndrome (SBS) and mental tiredness, were gathered through the use of questionnaires. Accurate devices were used to measure the air temperature and relative humidity in the air-conditioned rooms where the participants spent their working hours.

A univariate analysis was performed to explain the features of the variables, such as employee demographics, air temperature, relative humidity, prevalence of SBS (sick building syndrome), and levels of mental weariness. Bivariate analysis was conducted using Pearson's correlation coefficient to investigate the associations between the independent factors (air temperature and relative humidity) and the dependent variables (prevalence of SBS and mental tiredness cases).

RESULT AND DISCUSSIONS

Table 1

Demographic Characteristics of Study Participants

Characteristic	Value
Number of Participants	30
Gender	
Male	11 (36.7%)
Female	19 (63.3%)
Mean Age (years)	32.4 (SD = 5.8)
Job Role	
Customer Service/Teller	20 (66.7%)
Manager/Supervisor	5 (16.7%)
Other	5 (16.7%)
Mean Work Duration (hours/day)	8.2 (SD = 1.5)

The gender distribution exhibited a greater number of female participants in comparison to males. The average age oh the participants was in the early thirties, suggesting a workplace that is relatively young. In terms of job roles, the majority of employees were engaged in customer-facing positions, such as customer service or teller duties. A Lessser percentage occupied management or supervisory roles, while the remaining individuals had various additional responsibilities inside the bank. The participants, on average, dedicated more than 8 hours each day to working in office premises that were equipped with air conditioning.

The demographic profile of the study participants is consistent with that of normal office settings, where a substantial proportion of the workforce consists of young to middle-aged individuals (Felgueiras, 2023) . Furthermore, there is a greater presence of females in customer service and administrative positions (Sakellaris et al., 2016). Other research examining indoor environmental quality and occupant well-being in office settings have found similar patterns (Frontczak and Wargocki, 2011; Zhang et al., 2017).

It is important to take into account the average daily work duration of more than 8 hours in air-conditioned areas, since spending a long time in indoor surroundings can raise the likelihood of experiencing symptoms of Sick Building Syndrome (SBS) (Abdul-Wahab, 2014; Lu et al., 2015). Prior studies have demonstrated that individuals who spend prolonged periods in air-conditioned workspaces are more prone to having symptoms associated with Sick Building Syndrome (SBS), including headaches, exhaustion, and respiratory disorders (Egbenta and Ubi, 2019; Sakellaris et al., 2016).

It is crucial to uphold ideal interior environmental conditions, encompassing suitable temperature and humidity levels, in order to guarantee employee comfort and well-being (Fitriyanto, Maharani, Avenzoar, & Mutia, 2025). Inadequate management of these elements might result in a higher occurrence of symptoms associated with Sick Building Syndrome (SBS), which can have a detrimental effect on productivity and the overall performance of the business (Vimalanathan and Babu, 2014; Zhang et al., 2017).

Rooms where the study took place. The average air temperature deviated from the acceptable range, with certain rooms being slightly colder and others being warmer than the optimal range. In the same way, the average relative humidity level was significantly greater than the permissible range, with all rooms surpassing the upper limit of the recommended humidity levels.

The indoor environmental conditions found in this study do not conform to the acceptable parameters specified by the Indonesian Ministry of Manpower Regulation. It is essential to maintain optimal air temperature and humidity levels in order to ensure the comfort of occupants and reduce the likelihood of experiencing symptoms of Sick Building Syndrome (SBS) (Abdul-Wahab, 2014; Zhang et al., 2017).

Table 2
Indoor Environmental Conditions

Parameter	Value	Recommended Range*
Air Temperature		
Mean	25.8°C (SD = 1.2)	23°C - 26°C
Range	24°C - 28°C	
Relative Humidity		
Mean	84.2% (SD = 2.4)	40% - 60%
Range	80% - 88%	

*Based on the Indonesian Ministry of Manpower Regulation No. 5 of 2018.

Prior research has consistently shown that being exposed to high temperatures and humidity levels can lead to the emergence of symptoms associated with Sick Building Syndrome (SBS), including headaches, exhaustion, and respiratory problems (Valença, Franco, Peres, & Andrade, 2025; Surawattanasakul et al., 2022; Egbenta and Ubi, 2019; Sakellaris et al., 2016). Elevated levels of humidity have been linked to a higher occurrence of symptoms related to Sick Building Syndrome (SBS). This is because high humidity fosters the growth of microorganisms and the buildup of indoor air pollutants (Frontczak and Wargocki, 2011; Zhang et al., 2017)).

The results of this study are consistent with prior research conducted in office environments, which has shown that inadequate management of indoor environmental conditions can lead to negative health impacts and reduced comfort and productivity for occupants (Mewomo, Toyin, Iyiola, & Aluko, 2023; Sakellaris et al., 2016; Vimalanathan and Babu, 2014).

It is imperative to tackle these problems and put in place strategies to uphold the highest possible indoor environmental quality (IEQ) at the bank offices under investigation. Not complying with this may lead to higher rates of employee absence, worse levels of staff efficiency, and possible legal responsibilities for the firm (Egbenta and Ubi, 2019; Vimalanathan and Babu, 2014).

By ensuring optimal temperature and humidity levels, as well as implementing effective ventilation and air filtration systems, the indoor environmental quality (IEQ) can be greatly enhanced, hence reducing the likelihood of occupants experiencing symptoms of sick building syndrome (SBS) (Abdul-Wahab, 2014; Frontczak and Wargocki, 2011).

The prevalence of Sick Building Syndrome (SBS) among bank employees, as well as the most frequently reported symptoms associated with SBS, are presented in table 3. The most common symptoms of SBS were nasal irritation, ocular irritation, headaches, and fatigue, which were experienced by a significant number of the participants. Furthermore, a significant number of employees reported experiencing mental fatigue, which is defined by symptoms such as emotional weariness, depersonalization, and diminished personal accomplishment.

Table 3
Prevalence Of Sick Building Syndrome (SBS) And Mental Fatigue

Condition/Symptom	Prevalence
Sick Building Syndrome (SBS)	43.3% (n = 13)
Symptoms of SBS	
Nasal Irritation	76.9%
Eye Irritation	61.5%
Headache	53.8%
Fatigue	46.2%
Mental Fatigue	36.7% (n = 11)
Burnout-related Symptoms	
Emotional Exhaustion	Reported
Depersonalization	Reported
Reduced Personal Accomplishment	Reported

The high prevalence of SBS and the specific symptoms reported in this study are consistent with the results of previous research conducted in office environments (Abdul-Wahab, 2014; Sakellaris et al., 2016; Aloudah, 2020). Headaches, fatigue, and nasal and ocular irritation are among the most frequently reported symptoms associated with SBS, and they can be exacerbated by exposure to indoor air pollutants, inadequate ventilation, and poor indoor air quality (Frontczak and Wargocki, 2011; Zhang et al., 2017; Valença, Franco, Peres, & Andrade, 2025).

Additionally, the burnout symptoms that are frequently linked to SBS are consistent with the observed prevalence of mental fatigue, which is defined by emotional exhaustion, depersonalization, and diminished personal accomplishment (Sakellaris et al., 2016; Vimalanathan and Babu, 2014). The development of mental fatigue and exhaustion can be influenced by prolonged exposure to suboptimal indoor environmental conditions, which can ultimately affect the well-being and productivity of employees (Egbenta and Ubi, 2019; Zhang et al., 2017).

These results underscore the significance of addressing indoor environmental quality (IEQ) concerns in

office environments, as they can have substantial effects on the health of employees and the performance of the organization. The risk of SBS and its associated symptoms, such as mental fatigue and exhaustion, can be reduced by implementing measures to enhance air quality, ventilation, and thermal comfort (Abdul-Wahab, 2014; Frontczak and Wargocki, 2011; Aziz, Adman, Suhaimi, Misbari, et al., 2023).

A healthier and more comfortable indoor environment for employees can be achieved through interventions such as proper temperature and humidity control, adequate ventilation rates, and air filtration systems (Felgueiras, 2022 ; Egbenta and Ubi, 2019; Vimalanathan and Babu, 2014). Furthermore, by addressing organizational factors that may contribute to exhaustion, such as workload, work-life balance, and job demands, we can further improve the well-being and productivity of employees (Sakellaris et al., 2016).

Table 4
Correlation Between Environmental Factors And SBS /Mental Fatigue

Correlation	Pearson's r	p-value
Air Temperature and SBS Prevalence	0.48	< 0.01
Relative Humidity and SBS Prevalence	0.39	< 0.05
Air Temperature and Mental Fatigue	0.41	< 0.05
Relative Humidity and Mental Fatigue	0.36	< 0.05

(Travers et al., 2022).

CONCLUSION

The research focused on exploring the relationship between air temperature and humidity and the occurrence of Sick Building Syndrome (SBS) and mental fatigue among bank employees working in offices with air conditioning. The findings confirm that temperature and humidity play important roles in determining the health and comfort of the employees. Inadequate indoor environmental conditions were found to be the cause of SBS symptom occurrence and psychological fatigue, demonstrating that discomfort from temperature and poor control of humidity play a direct role in affecting the well-being and performance of workers.

The significance of the findings supports the importance of maintaining optimal indoor environmental quality through adequate control of temperature and humidity, proper ventilation, and routine system upkeep to reduce the risk of SBS in the workplace. Future research is encouraged to investigate other environmental parameters such as air quality, lighting, and noise, to further improve measurement methods and confirm these findings within diverse workplace environments so that further integrated strategies for healthier and sustainable indoor environments can be created..

SUGGESTION

According to the results of this study, it is advised that Bank Syariah Indonesia (BSI) and other organizations give priority to enhancing the interior environmental quality in their office spaces. It is vital to implement efficient heating, ventilation, and air conditioning (HVAC) systems that can consistently maintain the necessary ranges of air temperature and humidity levels. It is important to regularly check and maintain these systems to ensure that they are functioning correctly. In addition, soliciting input from occupants and implementing educational programs can effectively increase knowledge regarding the significance of indoor environmental quality.

These initiatives can also motivate employees to promptly report any discomfort or symptoms associated with Sick Building Syndrome (SBS). Moreover, it is advisable for enterprises to regularly evaluate the quality of indoor air, ventilation rates, and other environmental elements in order to detect possible problems and swiftly execute necessary remedial actions. Organizations can minimize the occurrence of Sick Building Syndrome (SBS), decrease employee absences and reduced productivity by actively working towards building healthy and comfortable indoor environments. This will ultimately improve overall organizational performance.

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