



# Indian Journal of Public Health Research & Development

An International Journal

## SCOPUS IJPHRD CITATION SCORE

Indian Journal of Public Health Research and Development  
Scopus coverage years: from 2010 to till date. Publisher:  
R.K. Sharma, Institute of Medico-Legal Publications  
ISSN:0976-0245E-ISSN: 0976-5506 Subject area: Medicine:  
Public Health, Environmental and Occupational Health  
CiteScore 2017-0.03  
SJR 2017 - 0.108  
SNIP 2017- 0.047



Website:

[www.ijphrd.com](http://www.ijphrd.com)

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**Print-ISSN:** 0976-0245-**Electronic-ISSN:** 0976-5506, Frequency: Quarterly  
(Four issues per volume)

**Indian Journal of Public Health Research & Development** is a double blind peer reviewed international journal. It deals with all aspects of Public Health including Community Medicine, Public Health, Epidemiology, Occupational Health, Environmental Hazards, Clinical Research, and Public Health Laws and covers all medical specialties concerned with research and development for the masses. The journal strongly encourages reports of research carried out within Indian continent and South East Asia.

The journal has been assigned International Standards Serial Number (ISSN) and is indexed with Index Copernicus (Poland). It is also brought to notice that the journal is being covered by many international databases. The journal is covered by EBSCO (USA), Embase, EMCare & Scopus database. The journal is now part of DST, CSIR, and UGC consortia.

**Website : [www.ijphrd.com](http://www.ijphrd.com)**

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Logix Office Tower, Unit No. 1704, Logix City Centre Mall,  
Sector- 32, Noida - 201 301 (Uttar Pradesh)

### Printed, published and owned by

**Dr. R.K. Sharma**  
Institute of Medico-legal Publications  
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,  
Sector- 32, Noida - 201 301 (Uttar Pradesh)

### Published at

**Institute of Medico-legal Publications**  
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,  
Sector- 32, Noida - 201 301 (Uttar Pradesh)



# Indian Journal of Public Health Research & Development

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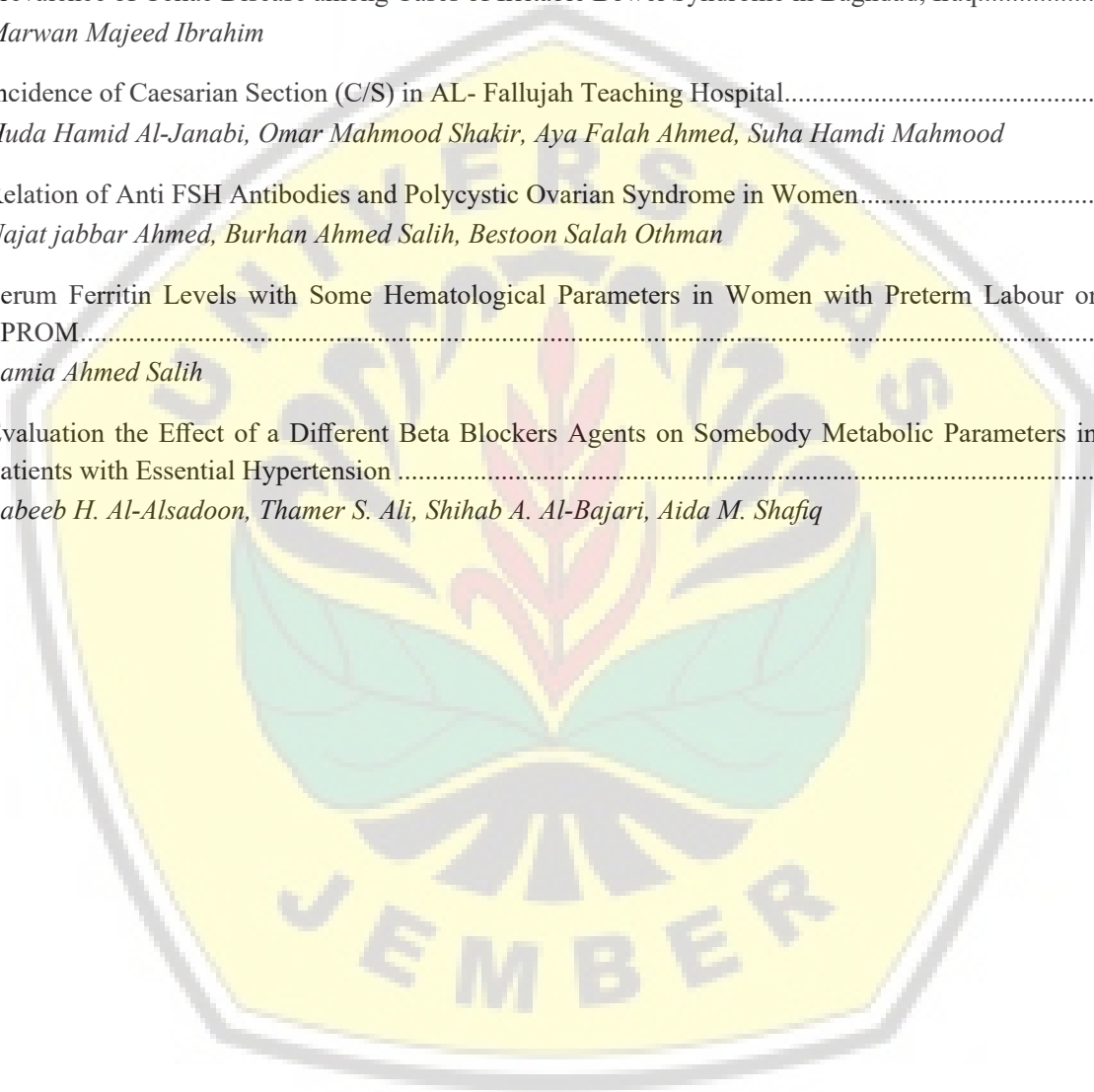
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# The Individual Factor and the Quality of Building's Physical Environment in Correlation with the Occurrence of Sick Building Syndrome (SBS) on Employees of PT. Telkom Jember

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## Abstract

Sick Building Syndrome (SBS) is a situation in which occupants complained about health and comfort issues, which are related to time spent in a building, but the symptoms are not specific and the cause can't be identified, such as lethargy, nasal congestion, dry throat, headache, itchy eyes, sore eyes, dry eyes, runny nose, tense eyes, sore, sore neck or back, in the same period. There are 45.7% of employees in PT. Telkom Jember who got Sick Building Syndrome. This study aims to analyze the correlation of individual factor and quality of the physical environment of building with Sick Building Syndrome occurrence of employees in PT. Telkom Jember. This study uses an analytical study with Cross-Sectional approach. The populations were employees of PT. Telkom Jember. The samples were 35 respondents using Simple Random Sampling technique. The analysis used chi-square test ( $\alpha = 0.05$ ). The results showed that there was a correlation between age, occupation, and smoking behavior with Sick Building Syndrome ( $p$ -value  $< 0.05$ ) and there wasn't a correlation between sex, psychosocial condition, nutritional status and physical environment quality (temperature, humidity, airflow velocity, and illumination) with the occurrence of Sick Building Syndrome ( $p$ -value  $> 0.05$ ). It can be concluded that the incidence of Sick Building Syndrome on employees of PT. Telkom Jember is less experienced by Sick Building Syndrome.

**Keywords:** Sick Building Syndrome (SBS), individual factors, the quality of the physical environment.

## Introduction

In the last twenty years in the world, there have been a lot of high-rise buildings completely enclosed with air vents that depend entirely on various machines, such as offices or offices which are one of the workplaces that use ventilation with an Air Conditioning (AC) system. This causes pollution, especially air pollution caused by system ventilation Air conditioner has its own air

circulation so that it will affect indoor air quality<sup>1</sup>. At a glance, the luxuriously constructed building rooms are equipped with adequate infrastructure, and the air conditioner that can be arranged as comfortably as possible is considered a very comfortable place to work. But in fact, it is precisely in a room like this that the health of people who work is often disrupted<sup>2</sup>. Various complaints and symptoms can arise when someone is in the building. Air quality, temperature, radiation, ventilation, lighting and the use of various chemicals in the building, are very potential causes for the emergence of complaints and symptoms in workers/employees when they are inside the building<sup>3</sup>.

According to the Head of the National Population Agency (BAKNAS) around the world, an estimated 2.7 million people die from indoor air pollution. Even though 70-80% of most human time is spent indoors. EPA consistently ranks indoor air pollution as the top five for environmental health risks in public health.

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The incidence of Sick Building Syndrome (SBS) is caused by many factors including chemical factors such as CO, CO<sub>2</sub>, formaldehyde, asbestos, and dust, then physical factors are related to temperature, humidity, airflow velocity, lighting, biological factors also affect such as bacteria and fungi and individual characteristics such as age, gender, smoking, length of work and psychosocial factors<sup>4</sup>. According to the results of research at PT. Infomedia Surabaya obtained data that the physical factors of air quality cause discomfort and health problems for employees who work including skin, eye, nose, nerve disorders, and respiratory disorders<sup>5</sup>.

Sick Building Syndrome can usually be a dry cough, headache, eye irritation, nose and throat, dry and itchy skin, weak body and others. These complaints usually persist for at least two weeks. Complaints that are usually not too great, but quite disturbing and of course this can affect the productivity of work of someone who is exposed to this disease. Sick Building Syndrome can be considered if more than 20% or even 50% of users of a building have complaints as mentioned before<sup>1</sup>.

One of the tallest and most closed buildings in Jember Regency is located at Gajah Mada Street No.182-184, Jember regency consists of 8 floors. The results of the preliminary study conducted by researchers on 10 samples of employees of PT. Telkom Jember found that 50% of the samples felt symptoms of red eyes, watery eyes, dizziness, nausea, coughing, increased body temperature, lethargy, sneezing, frequent urination, dry throat and said the symptoms disappeared after leaving the building

**Method**

This study is an analytical study with a cross-sectional approach. The study population was the employees of PT. Telkom Jember. The number of samples is 35 respondents with sampling using the Simple Random Sampling technique. The exclusion criteria in this study are employees who suffer from chronic diseases that are considered to have similarities with SBS events, such as suffering from chronic illness (anemia), history of respiratory diseases, tuberculosis, eye diseases, diseases related to body metabolism (liver and kidney disease), have a history of allergies, and female employees who are pregnant.

The independent variables in this study were age, gender, years of service, smoking behavior, psychosocial conditions, nutritional status, temperature, humidity, air

flow velocity, and lighting. The dependent variable in this study is the incidence of Sick Building Syndrome in employees of PT. Telkom Jember. The research data collection technique was conducted using a questionnaire for interviews, measurement, and documentation. The research data analysis technique used the chi-square test ( $\alpha = 0.05$ ).

**Result**

**The incidence of Sick Building Syndrome in employees of PT. Telkom Jember can be seen in the following table:**

**Table 1. The incidence of Sick Building Syndrome (SBS)**

Incidence SBS	n	(%)
Not SBS	16	45,7
SBS	19	54,3

In table 1, it can be seen that the respondents who experienced the incidence of Sick Building Syndrome were 45.7%.

**Distribution of Individual Factors and Physical Environmental Quality**

**Distribution of individual factors can be seen in the following table:**

**Table 2. Faktor Individu**

Faktor Individu	n	%
<b>Age</b>		
≤40 years old	22	62,9
>40 years old	13	37,1
<b>Gender</b>		
Man	25	71,4
Woman	10	28,6
<b>Working time</b>		
≤10 year	25	71,4
>10 year	10	28,6
<b>Smoking behavior</b>		
Often	5	14,3
Sometimes	13	37,1
Not smoking	17	48,6
<b>Psychosocial Condition</b>		
Well	29	82,9
Bad	6	17,1
<b>Nutritional status</b>		
Thin	5	14,3
Normal	22	62,9
Fat	8	22,9

Based on table 2, the individual factors show that the employees in most respondents aged <40 years was 62.9%, male respondents were more than 71.4%, respondents who had a working period of <10 years were 71.4%, respondents who have smoking behavior that is equal to 51.4%, respondents who have good psychosocial conditions are equal to 82.9%, and respondents who have normal nutritional status that is equal to 62.9%.

The results of measuring the quality of the physical environment can be seen in the following table:

**Table 3. Physical Environmental Quality**

Variable	Floor					
	1	2	3	4	5	6
Temperature (°C)	30,1	30,3	31,8	30,6	29,4	28,1
Humidity (%)	63,2	59,5	61	59,9	63,9	51
Airflow speed (m/s)	0,85	0,80	0,85	0,18	0,24	0,71
Lighting (lux)	223	241	222	302	179	257

Based on table 3, related to temperature, humidity, air flow velocity, and lighting can understand that most are in accordance with the standards determined by regulations (KepMenkes RI Number 1405/Menkes/SK/XI/2002).

The relationship between Individual Factors and Sick Building Syndrome Events in PT. Telkom Regency of Jember:

**Table 4. The relationship between individual factors and the incidence of Sick Building Syndrome in employees of PT. Telkom Jember**

Individual factor variables	Sick Building Syndrome				P-value
	Yes		Not		
	n	%	n	%	
<b>Age</b>					
<40 Years old	7	31,8	15	68,2	0,032
>40 Years old	9	69,2	4	30,8	
<b>Gender</b>					
Man	13	52	12	48	0,285
Woman	3	30	7	70	
<b>Working time</b>					
<10 years	8	32	17	68	0,022
>10 years	8	80	2	20	
<b>Smoking behavior</b>					
Smoking	12	66,7	6	33,3	0,010
Not smoking	4	23,5	13	76,5	

Individual factor variables	Sick Building Syndrome				P-value
	Yes		Not		
	n	%	n	%	
<b>Psychosocial condition</b>					
Well	15	51,7	14	48,3	0,187
Bad	1	16,7	5	83,3	
<b>Nutritional status</b>					
Thin	1	20	4	80	0,326
Normal	10	45,5	12	54,5	
Fat	5	62,5	3	37,5	

In Table 4, the value of p-value of the age of 0.032 (p <0.05) means that Ho is rejected, the p-value of the working period is 0.022 (p <0.05), meaning Ho is rejected and the value of p-value of smoking behavior is 0.010 (p <0.05), meaning Ho is rejected.

The Relationship between Physical Environmental Quality and Sick Building Syndrome in PT. Telkom Jember:

**Table 5. Relationships between Physical Environmental Quality and Sick Building Syndrome Incidents at PT. Telkom Jember**

Physical Environmental Quality	p-value
Temperature	0,123
Humidity	0,631
Airflow Speed	0,631
Lighting	0,064

In table 5, shows that the p-value of the quality of the physical environment (temperature, humidity, the velocity of air flow, and lighting is greater than 0.05, which means that He is accepted.

### Discussion

Based on the results of research on the relationship between the incidence of Sick Building Syndrome to employees of PT. Telkom Jember that there are several relationships between individual factors (age, years of service, and smoking behavior) with the incidence of Sick Building Syndrome in employees of PT. Jember Regency Telkom, while there is no relationship between several individual factors (gender, psychosocial conditions, and nutritional status) and the quality of the physical environment with the incidence of Sick Building Syndrome in employees of PT. Telkom Jember.

The results of research conducted on employees of PT. Telkom Jember can be seen that over 40 years of age experience SBS more than under 40 years of age.

Age is very influential on the level of risk of occurrence of a work-related illness including the incidence of SBS. The process of someone's aging causes a reduction in workability caused by changes in the functions of the body's instruments, the cardiovascular system, and the body's hormonal system<sup>6</sup>.

The majority of employees of PT. Telkom Jember is male so that in buildings that are at risk of experiencing SBS are men, although, in theory, the riskier ones are women, because the results obtained from a total of 35 respondents who experienced SBS were 16 people, 13 of whom were men and 3 people are women. The male sex experienced more SBS complaints, this was due to several factors including the majority of the total number of employees in the building were male and most active smokers were susceptible to SBS complaints<sup>7</sup>.

The results of research on employees of PT. Telkom Jember can be seen that the tenure of more than 10 years is more susceptible to SBS events compared to work periods of less than 10 years. Then it can be interpreted, the longer the working period of a person the more vulnerable the person experiences SBS<sup>8</sup>.

Smoking behavior can cause changes in the structure and function of the respiratory tract and lung tissue. Smoking can also lower your lung's vital capacity compared to some occupational health hazards. Smoking habits will accelerate the decline in pulmonary physiology<sup>3</sup>. If the person is an active smoker, the person is more susceptible to experiencing SBS. This is because of the total 35 research respondents 18 of whom were active smokers, 12 of them experienced SBS events compared to passive smokers, and 3 people who smoked during working hours.

SBS complaints are also influenced by factors outside the environment, such as personal, occupational and psychological problems that are considered to affect one's sensitivity to SBS<sup>9</sup>. The results of research on employees of PT. Telkom Jember can be seen that psychosocial conditions are not related to the incidence of SBS.

Nutritional status is the end result of the balance between food entering the body (nutrient input) with the body's needs (nutrient output) of these nutrients. The results of research on employees of PT. Telkom Jember can be seen that nutritional status is not related to SBS events. This is not in accordance with Budiono's theory (2003) that workers who have good nutritional conditions

will have better work capacity and endurance<sup>10</sup>.

The temperature is too high or low the body can feel fatigue faster than normal and experience various symptoms such as eye irritation, sore throat and coughing which are symptoms of SBS<sup>11</sup>. The results of research conducted at PT. Telkom Jember can be seen that the temperature is not related to the SBS incident because the rooms are not only dependent on the AC but also the influence of the doors and parts of the window that is open so that the indoor air exchange can occur naturally. So that when measuring the average temperature in the room is normal (18-30°C).

Based on the NAB that applies to the work environment in accordance with the Minister of Health of the Republic of Indonesia Number 1405/Menkes/SK/XI/2002 for humidity, it ranges from 40%-60%. The results of the research in the building of PT. Telkomjember can be seen that humidity is not related to SBS events, this is because these rooms are not only dependent on central air conditioning, but also the influence of additional air conditioning, opening of lobby doors, central air conditioning that does not function properly and open windows so that the humidity in the room is not in accordance with the stipulated NAV.

Air speeds less than 0.1 meters/second or lower make the room uncomfortable because there is no air movement. Conversely, if the airspeed is too high it will cause noise in the room<sup>3</sup>. The results of the research on the building of PT. Telkom Jember can be seen that the speed of air flow is not related to SBS events, this is because the rooms are not only dependent on air conditioning/air conditioning systems but also from ventilation and open doors, so the condition of the air flow velocity in the building is unstable.

According to (Decree of the Minister of Health of the Republic of Indonesia Number 405/Menkes/SK/XI/2002) good lighting allows workers to see objects that they do clearly, quickly and without unnecessary effort<sup>12</sup>. Moreover, adequate lighting gives a better view and a refreshing environment. Lighting problems include the ability of humans to see things, characteristics of the sense of sight. Poor lighting can result in eye fatigue with reduced power and work efficiency<sup>12</sup>. The results of research on room lighting in the building of PT. Telkom Jember can be seen that lighting is not related to SBS incident. Based on the time of going down the study in the building of PT. Telkom Jember, these rooms not



only depend on artificial lighting but also the influence of natural lighting namely sunlight, so that employees of PT. Telkom Jember can easily adjust the need for light intensity in the workspace as needed. Normal light intensity makes the workplace feel comfortable and free of complaints caused by poor lighting.

This is in line with the statement of Acmedi (1991) stating that SBS is not caused by a single cause, but is a set of conditions that cover various kinds of environmental components related to low air quality, among others, related to physical factors namely temperature, humidity, and velocity of air flow, chemical factors, and partly biological factors. Some components of this cause together and each in a low dose will cause non-specific complaints called SBS<sup>13</sup>.

### Conclusions

The incidence of Sick Building Syndrome in employees of PT. Telkom can find out that those who did not experience Sick Building Syndrome were 19 respondents or equal to (54.3%).

There is a relationship between individual factors (Age, years of service, and smoking behavior) with the incidence of Sick Building Syndrome in employees of PT. Telkom Jember because the value of p-value is smaller than 0.05

**Ethical Clearance:** The study was approved by the Institutional Ethical Board of Public Health Faculty, University of Jember.

All subjects have been fully informed about the information and forms for the informed consent form.

**Source of Funding:** The source of this research costs from self.

**Conflict of Interest:** All authors have no conflicts of interest to declare.

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