





**When the sick carers become sick:
The prevalence and risk factors of
sick building syndrome (SBS)
caused by poor indoor air quality
(IAQ) among healthcare workers in
Sabah, 2015.**



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INDUSTRY CODE OF PRACTICE ON INDOOR AIR QUALITY 2010

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JKKP DP(S) 127/379/4-39

Ideal IAQ

Table 1: Kadar Spesifik parameter fizikal boleh terima

Parameter	Julat bacaan boleh terima
Suhu	23-26 °C
Kelembaban	40-70 %
Pergerakan Udara	0.15-0.5m/s

Ideal IAQ

Indoor Air Contaminants	Had boleh terima		
	ppm	mg/m ³	cfu/m ³
<u>Chemicals Contaminants</u>			
a.) Carbon monoxide	10	-	-
b.) Formaldehyde	0.1	-	-
c.) Ozone	0.05	-	-
d.) Respirable particulates	-	0.15	-
e.) Total volatile organic compounds (TVOC)	3	-	-
<u>Biological contaminants</u>			
a.) Total Bacterial counts	-	-	500*
b.) Total Fungal counts	-	-	1000*
<u>Ventilation Performance Indicator</u>			
a.) Carbon dioxide	C1000	-	-

Background

SBS is known as “sick building syndrome” where the occupants of some buildings **repeatedly describe a complex range of vague and often subjective health complaints** (Horvath, 1997).

Background

One important strand lies in sick building syndrome (SBS), which is widely used to describe symptoms experienced inside a building, such as **headaches, eye, nose, or throat irritations, itchy skin, and fatigue** (e.g. Burge, Hedge, Wilson, Bass, & Robertson, 1987; Finnegan, Pickering, & Burge, 1984).

Despite their minor nature, **SBS symptoms may have a greater impact on public health and cost to the economy than some major diseases due to widespread absenteeism and lowered productivity amongst affected workers** (Wallace, 1997).

Objective of the Study

To examine the prevalence of sick building syndrome that reflects poor indoor air quality

To investigate the factors that contribute to the prevalent SBS symptom among healthcare workers

Literature Review

Some researchers **attributed SBS to ventilation problems** in sealed buildings (Letz, 1990), while others argued that SBS can also be work related (Lyles et al., 1991).

Literature Review

In Malaysia, Rohizan & Abidin (2015) **found that relative humidity and female gender were significantly linked with the reporting of SBS.**

Methodology

Study Design:

Cross-sectional data analysis was performed to compare the prevalence of sick building syndrome (SBS) symptoms among 119 healthcare workers in Sabah.

Methodology

Population: All HCWs that work inside a building

Methodology

Sample: HCWs who are currently working in **Rumah Persekutuan Jabatan Kesihatan Negeri Sabah** and **Pejabat Kesihatan Sandakan**.

Methodology

Period: From (January 2015 to December 2015).

Framework

Past Symptoms

- Asthmatic
- Sinusitis
- Eczema

Environmental Condition

- Type of Workstation
- Number of people sharing Workstation
- Air-conditioned status

SBS (Headache)

Background Factor

- Sex
- Age
- Smoking Status

Nature of Occupation

- Working Period
- Working Hours

Methodology

2. Dataset Collection

A total of **119 respondents** were participating on the survey, where all the respondents were **all health care workers in the state of Sabah** from January 2015 to December 2015. The list of health care workers was based on notification to the Area Health Units in Sabah and all categories of health care workers were included.

Methodology

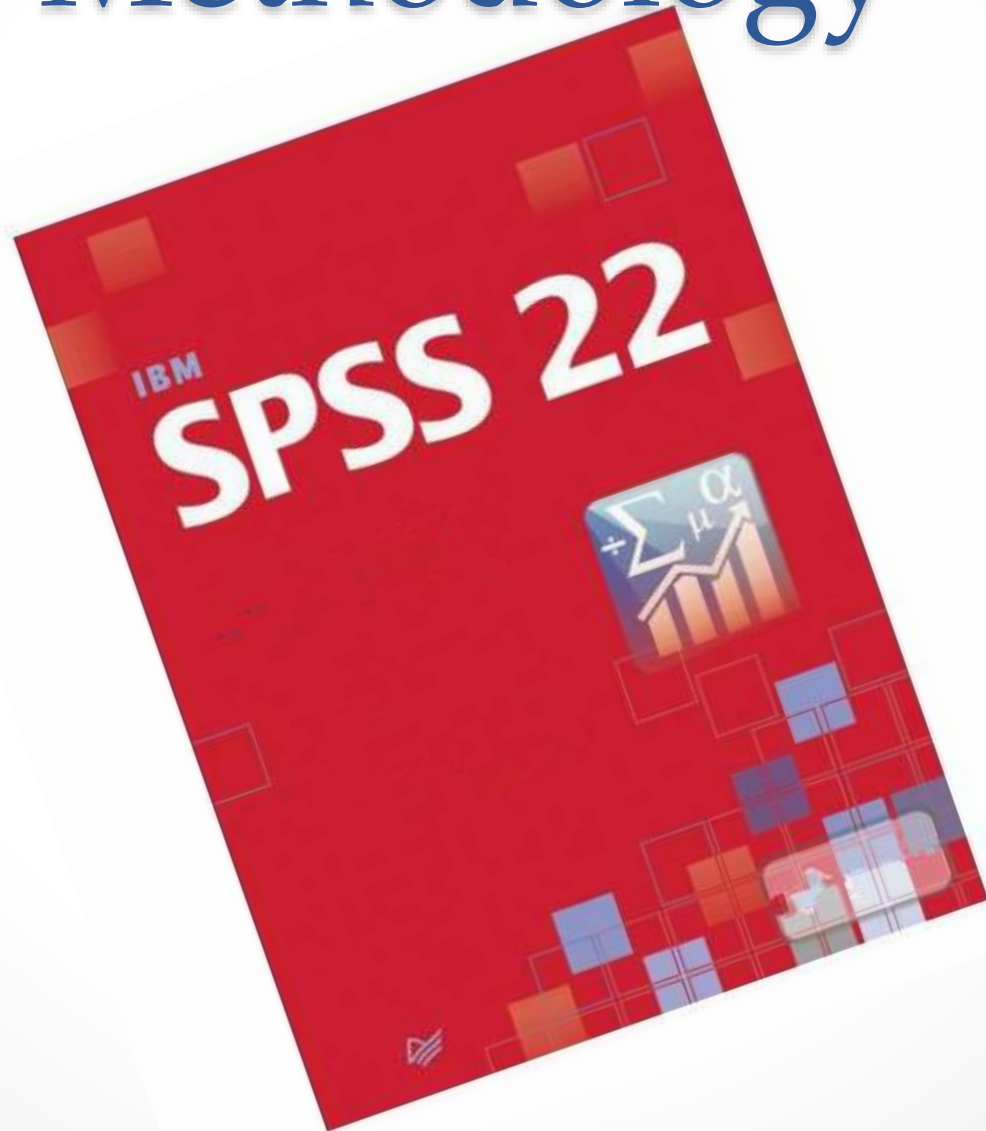
Questionnaires forms published by **Department of Occupational Safety and Health Malaysia (DOSH)**, the **Industrial Code of Practise on Indoor Air Quality (ICOP) (2010)** were used as study tool and filled either by the respondents or through the help of trained interviewer.



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Methodology



Methodology

3. Analysis method

Statistical analysis was estimated using **chi-square test** where appropriate.

Methodology

3. Analysis method

A **p-value of <0.10** was regarded as the critical value to assess statistically significant findings.

Methodology

3. Analysis method

Multiple logistic regression analysis was employed to examine the factors that contribute to the prevalence of SBS symptom among healthcare workers in Sabah.









Result and Finding

1. Descriptive Statistics

A total of **119 respondents** participated in this survey, in which there are 34 male participants attributing to 28.57% of the total respondents and 85 or **71.43% of female respondents**.

Result and Finding

Figure 1: Respondents Age

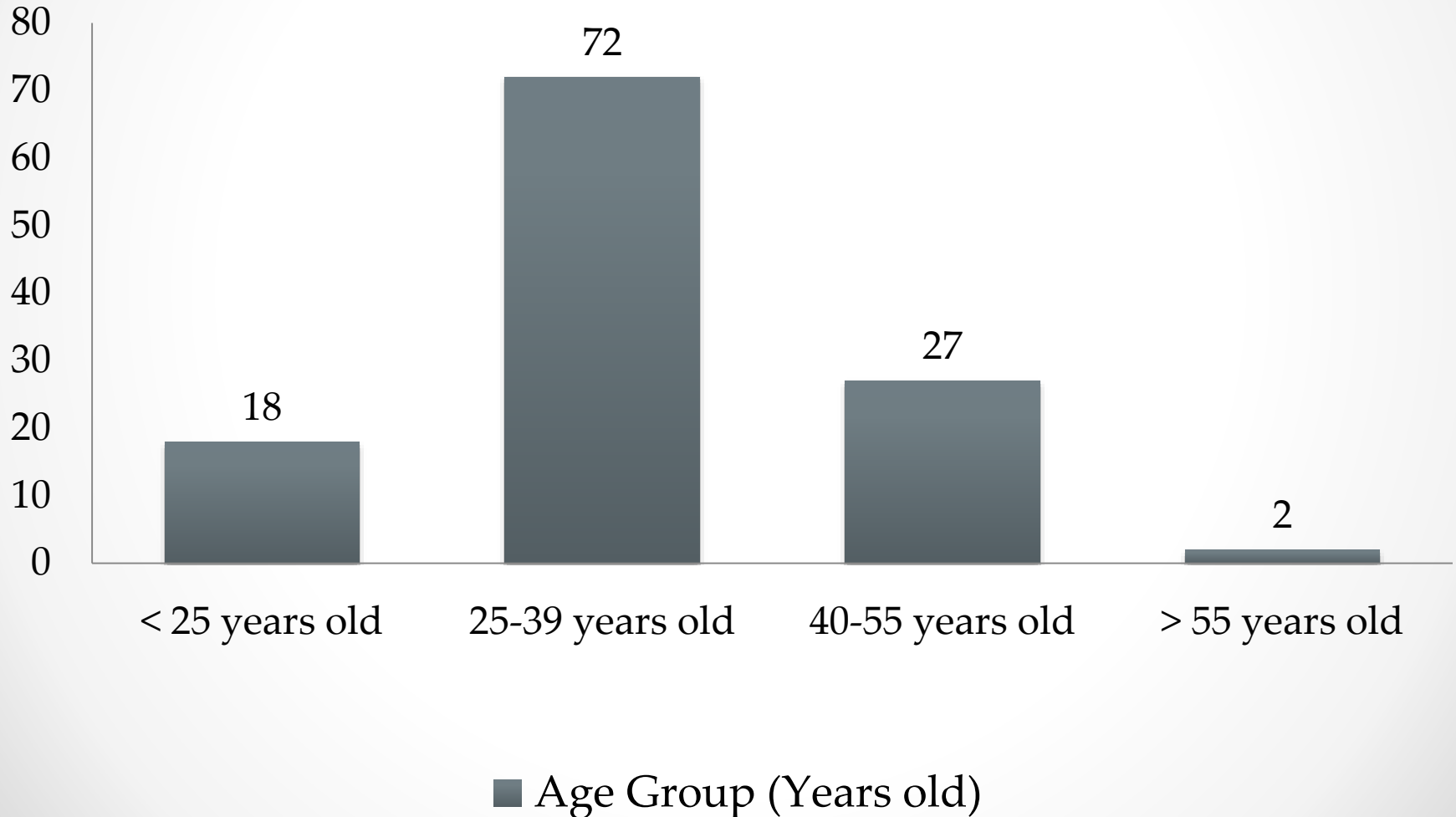


Table 1 : Descriptive Statistics of Main Variables

Other Variables	Frequencies	Frequencies (Person)	Percentage (%)
<i>Smoking Status</i>			
Non-smoker		113	95%
Smoker		5	4.20%
Sometimes smoking		1	0.80%

Table 1 : Descriptive Statistics of Main Variables

Other Variables	Frequencies	Percentage (%)
<i>Place of Survey</i>		
JKNS, Rumah Persekutuan	110	92.44%
Pejabat Kesihatan Sandakan	9	7.56%

Table 1 : Descriptive Statistics of Main Variables

Other Variables Frequencies	Frequencies (Person)	Percentage (%)
<i>Air-conditioned Status</i>		
Central Unit	76	63.90%
Split Unit	43	36.10%

Fizikal		Sampling Point									
Parameter	Acceptable Range	1	2	3	4	5	6	7	8	9	10
a) Air Temperature	23-26 deg cel	24.7	25.2	26.4	25.9	27.5	26.0	24.2	24.6	26.2	26.2
b) Relative humidity	40-70%	51.3	58.8	49	54.4	55.7	56.5	56.5	54.2	54.4	57.6
c) Air Movement	0.15-0.50 m/s	0.05-0.12	0.02-0.17	0.08-0.12	0.01-0.26	0.00-0.02	0.01-0.28	0.01-12	0.1-0.15	0.03-1.1	0.13-0.17
IAQ contaminants											
Chemical Contaminants	Acceptable Limits										
a) Carbon Monoxide	10 ppm	1.1	1.7	1.2	1.1	1.2	1.2	0.8	1.1	0.8	0.7
b) Formaldehyde	0.1 ppm										
c) Ozone	0.05ppm										
d) Respirable Particulate	0.15 mg/m3	0.000 - 0.000	0.000 - 0.000	0.000 - 0.000	0.000 - 0.002	0.000 - 0.000	0.000 - 0.000	0.000 - 0.000	0.000 - 0.000	0.000 - 0.000	0.000 - 0.000
e) TVOC	3 ppm										
Biological Contaminants											
a) Total Bacterial Counts	500										
b) Total Fungi Counts	1000										
Ventilation Performance Indicator											
a) Carbon Dioxide	c1000	825-850	835-855	792-810	805-822	805-807	765-770	783-788	735-787	775-780	622-755

Prevalence of SBS among Healthcare workers

Table 2: Result of the reported SBS Symptoms among respondents (n=119)

SBS symptoms	No	<i>n</i> (%)	Yes*	<i>n</i> (%)
Headache	24	(20.17)	95	(79.83)
Heavy-headed	35	(29.4)	84	(70.6)
Fatigue/Lethargy	41	(34.5)	78	(65.5)
Drowsiness	50	(42.02)	69	(57.98)
Dizziness	46	(38.7)	73	(61.3)
Nausea/Vomiting	80	(67.2)	39	(32.8)
Cough	44	(37.0)	75	(63.0)
Irritated, stuffy nose	40	(33.6)	79	(66.4)
Hoarse, dry throat	44	(37.0)	75	(63.0)
Skin rash/itchiness	64	(53.8)	55	(46.2)
Irritation of the eyes	52	(43.7)	67	(56.3)
Scaling/itching scalp or ears	78	(65.5)	41	(34.5)

Notes: Yes included response on 'yes, sometimes (2-3)times per week)" and "yes, often (every week)"

Factors contribute to SBS symptoms (Headache):

Background Factor

Table 3: Chi-square Test of Factors Contributing to Headache

Variables	χ^2	P-value
<i>Background factor with headache</i>		
Sex	5.329***	0.07
Age	14.46**	0.025
Smoking status	6.048	0.196
<i>Nature of occupation with headache</i>		
Working Period	115.137	0.35
Working Hours	34.742*	0.001
<i>Environmental Condition with headache</i>		
Type of workstation	2.055	0.358
Number of people sharing workstation	51.792***	0.067
Air-conditioned status	2.706	0.259
<i>Past Symptoms with headache</i>		
Asthmatic	5.272***	0.072
Sinusitis	2.799	0.247
Eczema	1.228	0.541

Note: *, ** and *** denotes significance level at 1%, 5% and 10% respectively.

Factors contribute to SBS symptoms (Headache):

Background Factor

Table 4a: Result of multiple logistic regression between various factors with SBS symptom (Headache)

Variable	SBS symptom (Headache)	
<i>Background factor</i>		
Sex	Coefficient	P-value
Male	-2.251***	(0.059)
Female	1	-
Age		
Less than 25 yrs old	17.092*	(0.000)
25-39 yrs old	19.151*	(0.000)
40-55 yrs old	17.762*	(0.000)
More than 55 yrs old	1	-
Smoking status		
No	-1.242	(1.000)
Yes	16.523	(0.998)
Sometimes	1	-

Note: * and *** denotes significance level at 1% and 10% respectively.

Various factors contribute to SBS symptoms (Headache)

Table 4b: Result of multiple logistic regression between various factors with SBS symptom (Headache)

Variable	SBS symptom (Headache)	
<i>Nature of occupation</i>	Coefficient	P-value
Working Period	115.137	0.35
Working Hours	34.742*	0.001

Note. * denotes significance level at 1%.

- Working hours have positive relationship with headache among healthcare workers, significant at 1% level.

Summary

Headache is the most prevalent symptoms of SBS at workplace, especially in healthcare facilities in Sabah, with 79.83% prevalence.

In particular, **male** is negatively influencing headache among the respondents, all age group are positively influencing the headache reporting among respondents.

Working hours, number of people sharing workstation, and respondents with **asthmatic history** associated with **headache** in workplace.

Conclusion

The **identification of the factors** leading to the headache symptom is **crucial to avoid SBS syndrome among healthcare workers**, especially in Sabah.

Prevalence of **SBS syndrome** (headache) should not be taken lightly as this symptom **can affect the quality of work** among the healthcare workers.

It is important to assess the prevalence of SBS symptoms and its major contributor in workplace in order **to reduce the symptoms and provide healthy working environments to building occupants, especially healthcare workers.**

Final words..

