

## ORIGINAL ARTICLE

# SICK BUILDING SYNDROME AND MENTAL HEALTH AMONG UNIVERSITY LABORATORY STAFFS

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### ABSTRACT

*The aim of this study was to determine the prevalence of sick building syndrome (SBS) and other factors contributing to probable mental health problems among university laboratory staffs. A cross-sectional study was conducted among 264 laboratory staffs in UPM. Data was collected using validated self-administrated questionnaires consists of Job Content Questionnaire (JCQ), General Health Questionnaire (GHQ) and SBS. Data was analyzed using SPSS version 22.0. In total, about 28% of the participants reported having probable mental health problems. The prevalence of SBS was 31.4%. After controlling for confounders, the significant factors for probable mental health problems were job insecurity (AOR 2.33, 95% CI 0.212- 0.867), job demand (AOR 1.12, 95% CI 0.445-0.921), fatigue (AOR 0.94, 95% CI 0.162-1.425), drowsiness (AOR 0.75, 95% CI 1.023-4.647) and household income (AOR 0.339, 95% CI 0.166-0.995). Results visibly showed that psychosocial factors and symptoms of SBS at their working environment contribute to probable mental health problems among laboratory staffs. The strongest predictors in this study were job insecurity. Hence, further assessment and preventive measures should be carried out to reduce the risk factors of probable mental health problems and to improve working environment among university laboratory staffs.*

**Keywords:** Probable mental health problems, Job Content Questionnaire, laboratory workers, Sick Building Syndrome, UPM.

### INTRODUCTION

Mental health problem is a worldwide burden where around 350 million of people are affected by depression<sup>1</sup>. In Malaysia, the prevalence of common reported mental health problems among people aged 16 years old and above was 1.8% for depression, 1.7% for generalized anxiety disorders, and 1.1% for suicide attempt<sup>2</sup>. In 2015, about 4.2 million of Malaysian adults were suspected to have mental health problems<sup>3</sup>. The prevalence of depression and anxiety among Malaysian public has increased from 12% in 2011 to 29% in 2015<sup>3</sup>.

The number of employees who suffered from work-related stress was increased in Europe which resulted to about 50% to 60% of lost working days<sup>4</sup>. Stress becomes the main factor related to health problems that affect workers' physical and mental health<sup>5</sup>. Workers who were stress were more likely to have depression, anxiety and substance abuse<sup>6</sup>. In United Kingdom, it was reported that education and service sectors were ranked as the second most stressful occupation after ambulance<sup>7</sup>. Stress in workplaces also found prevalent in various occupations including laboratory and healthcare workers<sup>8-10</sup>.

Stress among staffs in educational sector was gradually increased particularly in Research Universities to fulfil the institutions high expectation which include the requirement of high capabilities and skills in management, research and teaching methods<sup>11,12</sup>. Findings of a previous

study indicated that the prevalence of work stress among Malaysian local university staffs was about 21.7% and this stress was found to be significantly associated with high job demand, low social support, depression and anxiety<sup>12</sup>.

Factors of chemical exposures, poor physical and psychosocial environments were found to significantly contributing to stress among laboratory technician<sup>8</sup>. Findings of a previous study at industrial company showed that handling with harmful substances or materials and high technological machines were significant in predicting psychological stress among laboratory workers<sup>13</sup>. Also, psychosocial factors such as lack of support from colleagues and supervisors, lack of job control over demands were identified as significant factors of stress<sup>14,15,16</sup>. Similarly, previous studies identified several other significant psychosocial factors including high workload, lack of job opportunities, job insecurity and conflicts that were significantly associated with work stress among university staffs<sup>15,16</sup>.

Additionally, sick building syndrome (SBS) was identified to be related to stress among workers indirectly or directly<sup>17,18</sup>. SBS is a collection of non-specific symptoms reported by building's occupants<sup>19</sup>. Disturbed body system affect mental health that produce symptoms of headache, dizziness, anxiety and sleeping problems when workers exposed to indoor contaminants related to SBS<sup>17</sup>. Infection was found to be related to SBS such as mucosal irritation, allergies and fatigue among

stress workers<sup>20</sup>. Complaints of sleepiness, headache, weakness and skin irritations among laboratory assistants were also prevalent<sup>21</sup>.

Studies related to stress factors have been done in various occupations, but less documented among laboratory workers<sup>7</sup>. While considerable attention has focused on SBS particularly among office workers, SBS-related mental health problems among laboratory workers have not been well-studied. Thus, the objective of this study was to determine the prevalence of probable mental health problems related to SBS and psychosocial factors among laboratory staffs.

## METHODS

A cross-sectional study design was used involving 264 laboratory staffs in UPM. Out of 121 laboratories in science-based faculties, 55 laboratories were chosen based on systematic random sampling method.

### Study tools

A set of questionnaire booklets was distributed among respondents in selected laboratories. This questionnaire includes questions on socio-demographic characteristics, psychosocial factors, SBS and mental health and well-being. The Job Content Questionnaire (JCQ) was used to assess the psychosocial factors and staff's work tasks<sup>22</sup>. JCQ includes of 27 questions consisted of decision latitude, job demand, social support and job insecurity. Answers were in a form of Likert scale from 1 (strongly disagree) to 4 (strongly agree).

A modified version of questionnaire for assessing SBS was adapted from Malaysia Industry Code of Practice on Indoor Air Quality<sup>23</sup>. The questions consist of workplace information and 12 current health symptoms including general symptoms, mucosal irritation and skin symptoms. Answers were in a form of binary scoring from 0 (no) and 1 (yes).

Mental health and well-being of respondents was assessed using the General Health Questionnaire (GHQ-12)<sup>24</sup>. This tool comprised of 12 questions. In the answering scheme, the two least symptomatic answers score 0 and the two most symptomatic answers score 1<sup>24,25</sup>.

### Data analysis

All data analysis was performed using SPSS version 22.0. Chi-square and Pearson correlation tests were used in the data analysis to determine the significant association between dependent and independent variables. The significant level was set to be at  $p < 0.05$ . Using this statistical analyses, the odds ratio (OR) was chosen to describe the strength of association between the outcome and

the factors. The final model for predicting probable mental health problems among laboratory staffs in UPM was developed by conducting multiple logistic regression analysis.

## RESULTS

A total of 300 questionnaire booklets were distributed to laboratory staffs in a university and 80% (N=264) of the questionnaires were completely answered and returned by the respondents.

### Prevalence of probable mental health problems among respondents

Table 1 shows the prevalence of probable mental health problems among respondents. The mean GHQ score for the sample was  $1.31 \pm 2.06$ . About 72% of the respondents scored 1 and below indicating as having good mental health while 28% of them scored 2 and above indicating as having poor mental health.

### Association between socio-demographic and work characteristics with GHQ scores.

The distribution and association of socio-demographic and work characteristics of respondents is presented in Table 2. A majority of the respondents were found to be female (55.3%), age from 18 to 37 years (65.9%), non-smokers (91.3%), Malay (92.4%), and married (72.0%). Age, marital status and household income were significantly associated with higher GHQ score (poorer mental health and well-being) of respondents.

For work characteristics, most of the respondents worked in their room (77.3%) and 54.9% of them worked in dry laboratories. Majority of respondents worked for eight normal working hours, five working days per week and less than 10 years of working experiences in the particular workplace. In terms of psychosocial factors, the level of each factor was dichotomized based on mean score to obtain high and low values. The present finding showed that respondents with higher level of job demand had significantly poorer mental health than those with lower job demand ( $\chi^2=0.16$ ,  $p=0.011$ ). Respondents with lower level of decision latitude had significantly poorer mental health than those with higher level of decision latitude ( $\chi^2=2.41$ ,  $p=0.046$ ). Moreover, respondents with higher level of job insecurity had significantly poorer mental health than those with lower job insecurity ( $\chi^2=0.27$ ,  $p=0.001$ ). Even though factor of social support was not significantly associated with GHQ scores, respondents who had lower social support had higher GHQ scores compared to those with higher social support ( $M=9.90$ ,  $SD=4.48$ ).

**Table 1- Prevalence of probable mental health problems of respondents (n=264)**

GHQ score	n (%)	Mean ( $\pm$ SD)	Range
Non-cases	190 (72%)	1.31( $\pm$ 2.06)	0 - 9
Cases	74 (28%)		

**Abbreviations and Notes:** SD = Standard deviation, Non-cases: 0 - 1 score, Cases:  $\geq$ 2 score

#### Association between sick building syndromes with GHQ scores

In total, the prevalence of reported SBS among respondents was 31.4% and majority of respondents (68.6%) reported never or sometimes of having any of the SBS symptoms at their workplace. See Table 3. The highest score of SBS reported by the respondents was drowsiness (12.1%) followed by irritating and runny nose (8.3%), fatigue (7.6%) and headache (5.7%). There were significant association between headache ( $\chi^2=8.057$ ,  $p=0.005$ ), fatigue ( $\chi^2=7.802$ ,  $p=0.005$ ), drowsiness ( $\chi^2=8.712$ ,  $p=0.013$ ) and skin rashes ( $\chi^2=4.859$ ,  $p=0.028$ ) with poor mental health among respondents.

#### Multiple regression in predicting probable mental health problems of respondents

Table 4 shows the results of multiple logistic regression analysis among 264 respondents in UPM after adjusting for age, gender and working duration. In the model, the odd of having probable mental health problems among respondents with average household income from RM1501 to RM3999 was 0.34 times higher than those with high income (95% CI 0.166-0.995). The odds of having probable mental health problems among those with high job insecurity was 2.33 times higher than those with low job insecurity (95% CI 0.212- 0.867).

The odds of having probable mental health problems among those with high job demand was 1.12 times higher than those with low job demand (95% CI 0.445-0.921). The odd of having probable mental health problems among those with high compliant symptoms of fatigue was 0.94 times than those with no complaint symptoms (95% CI 0.162-1.425). The odd of having probable mental health problems among respondents with high complaint of drowsiness was 0.75 times than those

with no complaint of such symptoms (95% CI 1.023-4.647).

#### DISCUSSION

Findings of the present study indicated that the prevalence of probable mental health problems among laboratory staffs was 28%. The finding of this study was similar with the result of previous research where prevalence of job stress among laboratory technician was 33.3%<sup>8</sup>. This previous study suggested that workers involved in research activities have high stress level and poor mental health status<sup>26</sup>.

The most significant predictor that contributes to probable mental health problems identified in this study was high job insecurity. Job insecurity involves the risk of losing the job and lack of career opportunities that become one of stress factor in workplace. Majority of the respondents had high job insecurity due to their work status as contract workers. As contract workers, they are at risk of losing job every year because their contract has to be renewed yearly. This finding was supported by a previous study where high job insecurity and long working hours were found significant in predicting work stress among Malaysian office workers<sup>27</sup>.

The present finding showed that high job demand was significantly associated with probable mental health problems among respondents. High job demand includes multitasking in management, teaching and research activities that cause high workload among respondents. This findings were consistent with several of previous studies<sup>16,21</sup>. It was proven that high psychological job demand was significantly related to symptoms of mental health problems such as nervous, anxiety and distress among workers<sup>10</sup>.

**Table 2- Relationship between socio-demographic and work characteristics with respondent's GHQ score (n=264)**

Variables	n (%)	Mean ( $\pm$ SD)	$\chi^2$ <sup>a</sup> or r <sup>b</sup>	p value
<b>Gender</b>			2.80 <sup>a</sup>	0.09
Male	118 (44.7)			
Female	146 (55.3)			
<b>Age of respondents</b>		37.32 ( $\pm$ 10.8)	0.702 <sup>b</sup>	0.001*
<37 years old	174 (65.9)			
$\geq$ 37 years old	90 (34.1)			
<b>Smoking Status</b>			0.49 <sup>a</sup>	0.48
No	241 (91.3)			
Yes	23 (8.7)			
<b>Ethnicity</b>			1.54 <sup>a</sup>	0.22
Malay	244 (92.4)			
Non-Malay	20 (7.6)			
<b>Marital Status</b>			11.76 <sup>a</sup>	0.003*
Single	65 (24.6)			
Married	190 (72.0)			
Divorced /Widow	9 (3.4)			
<b>Education Level</b>			9.28 <sup>a</sup>	0.08
Secondary school	77 (29.2)			
Certificate/ Diploma	109 (41.3)			
Bachelor's/ Master's/ PhD	72 (27.3)			
<b>Household Income</b>		3697.25( $\pm$ 2100)	-0.206 <sup>b</sup>	0.001*
$\leq$ RM1500	43(16.3)			
RM1501- RM3999	113(42.8)			
$\geq$ RM4000	108(40.9)			
<b>Work environment</b>			29.27 <sup>a</sup>	0.051
Dry labs	145(54.9)			
Wet labs	119(45.1)			
<b>Type of air conditioning</b>			0.61 <sup>a</sup>	0.436
Local unit	165(62.5)			
Central unit	99 (37.5)			
<b>Working hours/day</b>		8.29( $\pm$ 0.55)	0.103 <sup>b</sup>	0.096
<b>Working days/week</b>		5.10( $\pm$ 0.42)	0.190 <sup>b</sup>	0.022*
<b>Average working hours in laboratory</b>		6.81( $\pm$ 1.4)	0.074 <sup>b</sup>	0.228
<b>Working duration (years)</b>		10.48( $\pm$ 10.5)	1.84 <sup>b</sup>	0.175
<10 years	176(66.7)			
>10 years	88(33.3)			
<b>Psychosocial factors:</b>				
<b>Job demand</b>	31.04(3.9)	1	0.16 <sup>a</sup>	0.011*
High	9.23(4.58)			
Low	8.67 (4.49)			
<b>Decision latitude</b>	69.01(7.97)	1	2.41 <sup>a</sup>	0.046*
High	8.53(4.70)			
Low	9.50(4.33)			
<b>Social support</b>	24.46(3.03)	1	5.07 <sup>a</sup>	0.153
High	8.78(4.56)			
Low	9.90(4.48)			
<b>Job insecurity</b>	5.27(1.80)	1	0.27 <sup>a</sup>	0.001*
High	9.82(4.59)			
Low	8.00(4.30)			

**Abbreviations and Notes:** <sup>a</sup>= Chi square test ( $\chi^2$ ), <sup>b</sup>=Pearson correlation (r), Non-Malay= Chinese, Indian, Others, \*P-value= <0.05

**Table 3- Association between SBS with GHQ score (n=264)**

SBS symptoms	Yes (%)	No (%)	$\chi^2$	p value
Drowsy	32(12.1)	232(87.9)	8.712	0.013*
Irritate Nose	22 (8.3)	242 (91.7)	0.171	0.679
Fatigue	20(7.6)	244(92.4)	7.802	0.005*
Headache	15 (5.7)	249(94.3)	8.057	0.005*
Irritate Eye	10 (3.8)	254 (96.2)	0.738	0.390
Dry Throat	9(3.4)	255 (96.6)	1.244	0.265
Skin Rashes	8(3.0)	256 (97.0)	4.859	0.028*
Cough	7(2.7)	257 (97.3)	3.021	0.082
Heavy Headed	5(1.9)	259(98.1)	0.163	0.686
Dizzy	2(0.8)	262(99.2)	0.482	0.487
Calculated SBS	83 (31.4)	181 (68.6)		

Abbreviations and Notes:  $\chi^2$ = Chi square test, \*P-value= <0.05

**Table 4- Multiple regression predicting for probable mental health problems among respondents (n=264)**

Variables	Multiple logistic regression			
	B (S.E)	Wald	AOR (95% CI)	p-value
<b>Age</b>	-0.04(0.024)	2.42	1.22(0.920-1.01)	0.119
<b>Gender</b> ( <sup>a</sup> male)	0.19(0.337)	0.32	0.71(0.428-1.60)	0.574
female				
<b>Working duration</b>	0.01(0.023)	0.15	1.03(0.964-1.06)	0.619
<b>Marital Status</b> ( <sup>a</sup> Single)				
Married	0.07(0.51)	0.45	1.07(0.420-2.748)	0.882
Divorced /Widow	0.35(0.43)	0.55	1.42(0.201-10.103)	0.724
<b>Household Income</b> ( <sup>a</sup> ≤RM1500)	-1.08(0.49)	1.15	0.339(0.166-0.995)	0.049*
RM1501-RM3999	-1.19(0.45)	0.91	0.305(0.161-1.099)	0.077
≥ RM4000				
<b>Job demand</b>				
( <sup>a</sup> Low)	0.74(0.34)	0.97	1.12(0.445-0.921)	0.023*
High				
<b>Job insecurity</b>				
( <sup>a</sup> Low)	0.31(0.42)	1.71	2.33(0.212- 0.867)	0.018*
High				
<b>Decision latitude</b>				
( <sup>a</sup> Low)	-0.79(0.41)	0.77	1.36(0.581-1.652)	0.162
High				
<b>Headache</b> ( <sup>a</sup> No)				
Yes	0.95(0.46)	0.68	2.58(0.801-2.367)	0.113
<b>Fatigue</b> ( <sup>a</sup> No)				
Yes	1.37(0.51)	1.25	0.94(0.162-1.425)	0.037*
<b>Drowsy</b> ( <sup>a</sup> No)				
Yes	1.28(0.45)	1.02	0.75(1.023-4.647)	0.045*
<b>Skin rashes</b> ( <sup>a</sup> No)				
Yes	1.05(0.39)	0.56	1.845(0.602-3.42)	0.186
<b>R<sup>2</sup>Nagelkerke Square</b>			0.136- 0.196	

Abbreviations and Notes: Multiple logistic regressions, adjusting for age, gender and working duration, \*significant at p<0.05, <sup>a</sup>Reference group

In terms of socio-demographic characteristic, the present result showed that lower household income contributed to poor mental health among respondents. This finding was in line with that

found previously which indicated that more than 50% of breadwinners in Klang Valley, Malaysia were identified as having stress related to financial problem<sup>28</sup>.



Moreover, this study also found that symptoms of SBS such as fatigue, drowsiness, headache and skin rashes were significantly associated with probable mental health problems among respondents. Previous study showed that people who were suffering from mental health problems such as stress, depression and anxiety often present a number of physical symptoms such as headache, irregular heartbeat and dizziness<sup>20,30</sup>. These physical symptoms and mental health problems may also be caused by indoor air contaminants such as chemicals, biological and gases. Past research mentioned that factors of poor physical and chemical work environment affect stress and mental health and well-being among workers<sup>16,31</sup>.

## CONCLUSION

In conclusion, the present study provides valuable support and adds new knowledge for associations between SBS and psychosocial factors with probable mental health problems among the study population. Further research is needed to identify potential intervention strategies in minimizing psychosocial and SBS-related mental health problems among workers.

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## ETHICAL ISSUES

Approval from the Medical Research Ethics Committee of Faculty of Medicine and Health Sciences, Universiti Putra Malaysia was obtained. Approval from head of departments obtained prior to the study being carried out. Both oral and written were informed consent by the respondents.

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