

## **CHAPTER FIVE**

### **CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS**

This chapter is divided into five parts: (1) a summary of the study, (2) a summary of the findings, (3) discussion of the findings, (4) conclusions, and (5) recommendations for further research.

#### **5.1 SUMMARY OF THE STUDY**

The study of Awareness of Sick Building Syndrome (SBS) was conducted to survey the office workers' awareness of Sick Building Syndrome. Overall, the findings of this study can give benefits to office workers, whether they are employers or employees. After the degree of awareness of Sick Building Syndrome was investigated, the extent of Sick Building Syndrome knowledge of the office workers was shown. If the extent of knowledge is low, the office workers are more likely to suffer from Sick Building Syndrome. Therefore, the employers should pay more attention to the health of their workers. They should raise awareness of health issues to their employees through training and educational seminars. In addition, the employees should turn to be concerned about their own health as well. In contrast, if the extent of their knowledge is high, they are less likely to experience Sick Building Syndrome. Therefore, the awareness of Sick Building Syndrome will help increase productivity and decrease absenteeism of the office workers.

##### **5.1.1 Objectives of the Study**

This study aimed to explore the degree of awareness of Sick Building Syndrome of office workers in the Silom area in terms of causes, symptoms, and prevention of Sick Building Syndrome.

##### **5.1.2 Subjects, Materials, and Procedures**

The subjects of this study consisted of 100 male and female office workers who worked full-time in air-conditioned buildings. The samples were selected from the office buildings located in the Silom area by using quota and snowball sampling design. They were asked to complete the surveys anonymously.

The research instrument in this study was a questionnaire with 50 questions. The format of the questionnaire was composed of closed-ended questions, Likert scale, and an open-ended question. The questions were divided into five parts containing general information of the respondents, the degree of awareness of the causes of Sick Building Syndrome, the degree of awareness of the symptoms of Sick Building Syndrome, the degree of awareness of the prevention of Sick Building Syndrome, and the respondents' suggestions or comments.

The data collection took place from November 29 to December 27, 2008. Questionnaires were distributed to those samples in a location convenient to the researcher and the researcher asked the respondents to give referrals to other possible respondents. The data was analyzed by using the Statistical Package for Social Sciences (SPSS) version 15.0 to find out the descriptive statistic. The results were presented by frequency and percentage.

## **5.2 SUMMARY OF THE FINDINGS**

The results of the study can be summarized as follows:

### **5.2.1 General Information of the Respondents**

From the study, it was found that the proportion of male and female respondents was nearly at the same rate, 47% and 53% for males and females, respectively. More than half (53%) of the respondents were aged between 26-30 years. Moreover, nearly half of the respondents held a Bachelor's degree (49%) and a Master's degree (44%), respectively. The majority (95%) of the respondents were private employees. For working period, 34% of the respondents had worked for 4-6 years. In addition, nearly 100% of the respondents experienced discomfort when working long hours in the buildings. Finally, more than half of the respondents who had background knowledge of Sick Building Syndrome accounted for 80% and they gained knowledge of Sick Building Syndrome through TV, the Internet, newspapers and email. Some of them were educated about Sick Building Syndrome through training and educational seminars held at their workplaces.

### **5.2.2 The Degree of Awareness of the Causes of Sick Building Syndrome**

According to the study, the findings revealed that the respondents' degree of awareness of the causes of Sick Building Syndrome was different from very good, good, and moderate levels. When closely examining the results, it was found that the largest proportion of the respondents (58%) were mostly aware of poor ventilation systems and a lack of air circulation. The following causes were working location near a photocopying machine, fax machine, or printer (50%), working long hours in front of a computer (45%), too cold or too hot room temperature (39%), and smoking room near working location (35%), respectively. The degree of awareness of these causes was at a very good level.

Also, the respondents had good awareness of work stress and job dissatisfaction accounting for 50%, followed by too dry or too moist humidity (48%), a lot of persons sharing a work area (47%), no regular room, carpet or office material cleaning (43%), and newly renovated or painted buildings and furniture (36%), respectively.

In addition, the respondents had moderate awareness of only two causes which were job characteristics relating to documents or secretarial work (46%), and inappropriate lighting: too bright or too dim (36%), respectively.

### **5.2.3 The Degree of Awareness of the Symptoms of Sick Building Syndrome**

In summary, the findings demonstrated that the respondents' degree of awareness of each group of symptoms of Sick Building Syndrome was good and moderate. The percentage of each group of symptoms is presented as follows:

#### *5.2.3.1 The Degree of Awareness of the Eye Symptoms of Sick Building Syndrome*

It was found that the respondents had the highest degree of awareness of eye irritation (42%), followed by dry eye (37%), and burning (35%), respectively indicating that their degree of awareness was good. Meanwhile, the degree of awareness of blurred vision (33%), followed by redness (29%) was moderate.

5.2.3.2 *The Degree of Awareness of the Nasal Symptoms of Sick Building Syndrome*

The respondents' degree of awareness of congestion was the highest (40%), followed by sneezing (37%), and runny nose (33%), respectively showing that the respondents' degree of awareness of the nasal symptoms was good.

5.2.3.3 *The Degree of Awareness of the Throat and Respiratory Tract Symptoms of Sick Building Syndrome*

The respondents' degree of awareness of the throat and respiratory tract symptoms was at both good and moderate levels. Nearly a half (43%) of the respondents had good awareness of dry throat, followed by breathing difficulties (33%). However, the degree of awareness of sore throat (41%), followed by dry cough (36%) was at a moderate level.

5.2.3.4 *The Degree of Awareness of Skin Problems of Sick Building Syndrome*

Good and moderate awareness of skin problems was found. 39% of the respondents had good awareness of dry skin, whereas 37% of them had moderate awareness of itchy skin or skin rashes.

5.2.3.5 *The Degree of Awareness of Aches and Pains of Sick Building Syndrome*

The respondents' degree of awareness of aches and pains was good. More than half (52%) of the respondents had good awareness of headache, followed by muscle pain (44%), and backache (39%), respectively.

#### 5.2.3.6 *The Degree of Awareness of Other Symptoms of Sick Building Syndrome*

The respondents' degree of awareness of other symptoms was moderate. The majority (46%) of the respondents had moderate awareness of lethargy, followed by nausea or dizziness (40%), and loss of concentration (36%), respectively.

#### **5.2.4 The Degree of Awareness of the Prevention of Sick Building Syndrome**

According to the study, the findings reported that the respondents' degree of awareness of the prevention of Sick Building Syndrome was very good, good, and moderate. When closely examining the results, it could explain that a half of the respondents were most aware of smoking restriction, followed by adjusting the sitting position appropriately (38%), regular exercising (37%), and regular cleaning and dusting desks, computers, and keyboards (36%), respectively.

Furthermore, the percentage of the respondents who had good awareness of demanding checks of the heating, ventilating and air-conditioning system (HVAC) of the buildings and undergoing a comprehensive physical exam every year was equal at 41%. It was followed by exercising legs, arms and hands while sitting for hours in front of a computer (39%), using computer monitor radiation filters (38%), and avoiding stress (36%), respectively.

Meanwhile, only a few preventive methods of which the respondents had moderate awareness were staying away from newly renovated areas and putting a plant next to a desk to release oxygen and absorb harmful pollutants and toxin from the air accounting for 31% and 29%, respectively.

#### **5.2.5 The Respondents' Suggestions or Comments**

According to the open-ended question asking the respondents to provide their suggestions or comments, it was found that their awareness of Sick Building Syndrome could be raised through media. They gained knowledge of Sick Building Syndrome through TV, the Internet, newspapers and email. Some of them were

educated about Sick Building Syndrome through training and educational seminars held at their workplaces. The common suggestions were that workers' health should be taken into account primarily. The employers should educate their employees on work hazards. Furthermore, they should take some practical steps to improve working environment and conditions probably by providing a green zone or an outdoor garden so as to help refresher employees and reduce their stress. Finally, the respondents advised that an effective way to prevent indoor air pollution should begin at the design phase. A building owner, an architect or mechanical engineer should take responsibility for indoor air quality as well.

### **5.3 DISCUSSION**

This section concerns how the findings of the study match the theories and the existing research. The discussions are divided into four parts as follows:

#### **5.3.1 General Information of the Respondents**

The findings showed that the proportion of males and females in the study was nearly at the same number. It can be implied that there is no significant difference between women and men in terms of their awareness of Sick Building Syndrome. However, when the proportion of males and females was compared, it was found that more than half of the respondents were female. Therefore, it can be consistent with the study of Godish (1995) that women visit the doctor for a physical check-up more often than men and are more likely to be aware of health problem than men. In particular, females consistently report higher rates of sick building syndrome symptoms than males. Hence, it can be assumed that females are more likely to take better care of their health by seeking more information on current issues concerning health problems. Also, more than half of the respondents were aged 26-30 years and most of them had worked for 4-6 years supporting the idea of Godish that younger workers had more symptoms associated with Sick Building Syndrome than older workers. Therefore, it is likely that they start to pay more attention to their health and become aware of health problems. When people turn to be more aware of their health, it is possible that they begin looking for an answer to what makes them sick after

work. This can lead them to gain information about Sick Building Syndrome. In addition, there was a significant finding that nearly 100% of the respondents experienced discomfort when working long hours in the buildings and most of them had background knowledge of Sick Building Syndrome with the knowledge they received mostly coming from the Internet and forwarded emails. The findings go along with UNESCO (2009) mentioning the ability of mass media such as TV, the Internet, and emails to raise public awareness of topics or issues.

### **5.3.2 The Degree of Awareness of the Causes of Sick Building Syndrome**

Overall, the findings of the study revealed that the degree of awareness of the respondents of the causes was equally very good and good. In particular, when each statement of the causes of Sick Building Syndrome was compared, the first three significant causes that the respondents were most aware of were found. The first one was poor ventilation system and lack of air circulation. The second one was working location near a photocopying machine, fax machine, or printer and the third one was working long hours in front of a computer. Nearly 60% of the respondents had very good awareness that poor ventilation can contribute to Sick Building Syndrome. This is quite in line with the study conducted by the National Institute for Occupational Safety and Health (1988) that poor ventilation is a major factor in most problem buildings which are sealed and have mechanical ventilation or air conditioning. Most indoor air pollution complaints are due to a lack of fresh air. Around 50% of Sick Building Syndrome cases result from poor ventilation. Moreover, 31% of Sick Building Syndrome stem from chemicals. This is related to each other because when ventilation is malfunctioning, there will be not enough fresh air entering a building, and air can become stuffy or stagnant. This lack of fresh air can cause contaminants and chemicals to build up inside the building. Also, those working near a photocopying machine, fax machine, or printer take risks to be exposed to more chemicals as well. This agrees with the idea of Lawson (1993) stating that formaldehyde is used in building materials, furniture, paper products, and carpeting.

Hence, it can be implied that the respondents precisely understand the most distinctive causes of Sick Building Syndrome.

In addition, it is quite interesting when considering one of the findings. Many respondents had greater awareness that working long hours in front of a computer can bring about Sick Building Syndrome as well. It can be implied that apart from physical environment factors such as ventilation, temperature, humidity, or lighting, the respondents also pay more attention to personal characteristics including their working styles. The office workers sitting for hours in front of a computer without exercising legs, arms and hands or relaxing their eyes tend to report the symptom of Sick Building Syndrome, especially those who wear contact lenses are more vulnerable. Godish (1995) mentioned that personal characteristics including gender, age, and a variety of lifestyle factors such as smoking, alcohol consumption, coffee consumption, regular exercise, and use of contact lenses are the factors contributing to Sick Building Syndrome.

Finally, the results also revealed that the respondents' awareness of work stress and job dissatisfaction was also high. Half of the respondents had good awareness of these causes. Basically, work stress can cause any health problem. In the same way, they also put an emphasis on work stress that is responsible for Sick Building Syndrome. According to the study of Hedge's study (as cited in Godish, 1995, p. 33), work stress such as role conflict and workload were significantly related to the prevalence of Sick Building Syndrome symptoms. As job stress increased, Sick Building Syndrome symptom reporting rates increased, and as job satisfaction increased, symptom reporting rates decreased. It can be interpreted that work stress and job dissatisfaction are a common cause to understand; therefore, the awareness of work stress and job dissatisfaction regarded as the causes of Sick Building Syndrome was also high.

### **5.3.3 The Degree of Awareness of the Symptoms of Sick Building Syndrome**

Overall, the results disclosed that the respondents' degree of awareness of the symptoms was good and moderate. There was a significant result showing that the group of other symptoms including lethargy, nausea or dizziness, and loss of concentration gained the least awareness for which the respondents had moderate awareness of the all. Meanwhile, there was a combination of good and moderate awareness of eye symptoms, throat and respiratory tract symptoms and skin problems. For nasal symptoms and the group of aches and pains, the respondents had good awareness.

Based on the frequency of response, the results showed that more than half of the respondents focused on headaches. Moreover, the majority had greater awareness of eye irritation, congestion, dry throat, and muscle pain. This is in accordance with the research conducted by the National Institute of Occupational Safety and Health (1988) stating that in a large percentage of investigated buildings, more than half of the occupants reported symptoms of eye irritation, headache, fatigue, dry throat, and sinus congestion. Dourish (1992) mentioned that awareness is used in the sense of experiencing what is believed to be an external perception. The researcher thinks that the respondents tend to relate their awareness of the symptoms to the prevalence of Sick Building Syndrome. Namely, the more symptoms the respondents have mostly experienced, the higher level of awareness they can have. It can be implied that the respondents probably report the prevalence of headache, eye irritation, congestion, dry throat, and muscle pain. Thus, when they have more experiences of these symptoms, it enables them to have greater awareness that these symptoms can be associated with Sick Building Syndrome.

### **5.3.4 The Degree of Awareness of the Prevention of Sick Building Syndrome**

Regarding the issue of the prevention of Sick Building Syndrome, it is quite interesting when considering one of the findings. The respondents gave significance to smoking restrictions. The majority had very good awareness that this method can prevent Sick Building Syndrome. Although, they recognized that poor ventilation systems and a lack of air circulation were the most important causes contributing to Sick Building Syndrome, the level of awareness of the prohibition of smoking was higher than demanding checks of HVAC system regarded as the effective way to solve the right problem of the poor ventilation system. It can be assumed that they pay less attention to demanding HVAC check than smoking restrictions because they probably think that demanding a check is not directly involved in their responsibility and there are already mechanics providing HVAC system maintenance. Nevertheless, nearly 50% of the respondents had good awareness that demanding a check of the HVAC system was a prevention of Sick Building Syndrome.

When analyzing the data, it could be observed that the respondents' degree of awareness of the prevention of Sick Building Syndrome was good. This is in line with the concept of Arun Chaisaeree (อรุณ ชัยเสรี, 2547) suggesting about the solutions to Sick Building Syndrome which usually include removing the pollutant source, increasing ventilation quality, staying away from office machines or newly renovated buildings, cleaning air, and eliminating tobacco smoke. Obviously, the respondents have good knowledge of the prevention of Sick Building Syndrome.

Finally, the interesting thing is that the reason why half of the respondents were most aware of smoking restrictions. It is because of the widespread media regarding the drawbacks of smoking. In general, people realize the danger of smoking and the respondents have many chances to gain knowledge and information on the disadvantages of smoking through various media such as the Internet, television, radio, text books, magazines, leaflets or advertisements. According to Media Awareness Network (2008), it said that people absorb and interact with messages from a wide range of media each day. While media can offer them many opportunities to learn and

be entertained, some media images and messages have been linked to public-health concerns such as aggressive behavior and violence, tobacco and alcohol use, and poor nutrition and obesity. Well planned and professionally designed mass media can achieve remarkable results in raising awareness and increasing knowledge. Therefore, it is possible that the respondents' degree of awareness of avoiding smoking considered as the prevention of Sick Building Syndrome was very good because they know the danger of chemicals contained in tobacco smoke such as benzene, formaldehyde and arsenic. The findings also support the statement of Pakkhawat Sancharoen (ภควัฒน์ แสนเจริญ, 2551) revealing that the contaminant that is mostly found in a building is tobacco smoke. If smoking is allowed in a building, it should be confined to an isolated space that is ventilated to the exterior.

### **5.3.5 The Respondents' Suggestions or Comments**

Concerning the suggestions on workers' health, the employers should improve working environment or adjust working conditions suitable for their employees to protect them from work hazards or to refresh them and decrease their stress. This is in accordance with the study of Hedge's study (as cited in Godish, 1995, p. 33) revealing that when job stress increased, Sick Building Syndrome symptom reporting rates also increased. This could be implied that the respondents are aware that job stress whether it stems from poor working environment or inappropriate working conditions can be related to Sick Building Syndrome.

Finally, the respondents also suggested about the effectiveness of emails having more access to mass population. The respondents explained that they knew about Sick Building Syndrome due to forwarded emails they received. In this day of connectedness, email is one of the easiest, most immediate and cheapest methods of communicating with other people. Forwarded emails can easily spread to a large group of people which seem to have contributed substantially to raise their awareness. According to UNESCO (2009), the most efficient strategy for communicating a message widely is to rely on mass communication through the mass media including printed materials, TV, the Internet, emails, and newspapers.

## 5.4 CONCLUSIONS

The following conclusions can be drawn from the discussion above:

5.4.1 Experiencing discomfort when working long hours in buildings and having background knowledge of Sick Building Syndrome help the respondents become well aware of Sick Building Syndrome. Especially, women and younger workers are more likely to be aware of health problems and they are interested in seeking more information to better understand Sick Building Syndrome.

5.4.2 The respondents precisely understand the most significant cause of Sick Building Syndrome; namely, they were mostly aware that poor ventilation is a primary factor contributing to Sick Building Syndrome.

5.4.3 There is a relationship between the prevalence of Sick Building Syndrome symptoms and the awareness of its symptoms. The respondents tend to relate their degree of awareness of the symptoms of Sick Building Syndrome to the symptoms they frequently experience. They probably report the most frequent symptoms of eye irritation, and headache; thus, their degree of awareness of these symptoms was at a high level.

5.4.4 The degree of awareness of the respondents on the prevention of Sick Building Syndrome was at a high level, especially avoiding smoking since they have many chances to gain knowledge and information pertaining to the drawbacks and dangers of smoking through a wide range of media – the Internet, television, magazines and advertisements. Therefore, media help raise their awareness and increase their knowledge.

5.4.5 The respondents wish to have better quality of working environment and appropriate working conditions to help lessen their job stress that can result in Sick Building Syndrome. Moreover, they praise the efficiency of emails that can assist them to quickly know Sick Building Syndrome.

## **5.5 RECOMMENDATIONS FOR FURTHER RESEARCH**

Based on the findings and conclusions of this study, the following recommendations are made for further research.

5.5.1 Due to time limitation, the population for the study is limited to 100 office workers in the Silom area. The sample size should be made at a larger scale and areas of the study should be expanded in order to make further research more valid and reliable and to gain generalized results.

5.5.2 Media consumption should be taken into consideration for further research to investigate whether media messages and images can influence or raise people's awareness of Sick Building Syndrome.

5.5.3 There should be a study of a relationship between health awareness and working environment for further research to explore how working people who are concerned about their health take care of themselves when their working environment is risky to their health.

5.5.4 Further research should be focused on the study of indoor air problems considered as a primary potential factor contributing to Sick Building Syndrome to find out whether Sick Building Syndrome can exist not only in workplaces but also in homes, schools, hospitals or any buildings where indoor air quality is bad and improperly designed HVAC system occurs.