

## FACTORS RELATED TO SAFETY BEHAVIOR AMONG BREWERY WORKERS IN LAO PDR

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### ABSTRACT

This study describes factors related to safety behavior among brewery workers in Lao PDR. Data were collected with a self-administered questionnaires based on the Health Belief Model (HBM). Results showed that the majority of the subjects believed that following safety rules and procedures would help in accident prevention, and in their ability to work safely. Seventy three percent had anticipated high to highest risk of accident at work. However, almost 70% admitted that there was a barrier to perform safety actions. Significant relations between HBM constructs and safety behavior were found on perceived benefits of action ( $r = 0.350$ ,  $p < 0.001$ ), perceived barriers to perform action ( $r = - 0.142$ ,  $p < 0.05$ ), self-efficacy to perform action ( $r = - 0.279$ ,  $p < 0.001$ ), and reminder from media ( $\chi^2 = 29.260$ ,  $p < 0.001$ ). Moreover, safety training ( $\chi^2 = 35.450$ ,  $p < 0.001$ ) was also related to safety behavior. Suggestions of negative perceptions of safety appeared among younger workers and those with a relatively low education levels but may have been caused by supervisory failures and must be considered preliminary. The results of this study can be used to help guide the development and implementation of future safety interventions and behavior modification programs among the brewery workers in Lao PDR.

**Keywords:** Safety behavior, brewery workers, health belief model, Lao PDR

## INTRODUCTION

In developing countries, brewery is an industry in which occupational accidents frequently occur worldwide (Oyawale et al., 2011). According to a Heineken Group statistic, the corporate accident report indicated that during 2006–2008 accident frequency and severity rates were still higher than the company's target (Heineken International, 2012). Although the accident frequency and severity was declining, from 2.7 to 2.4 cases per 100 FTEs (full time equivalent), and from 62 to 55 days per FTEs, respectively, while the fatality of personnel and contractor was still occurred.

In 2011, there were five breweries in Lao PDR, with an estimated production capacity of 470 million liters per year. Beer has become one of the most successful export products from the country and is currently sold through the distributors in more than 10 countries worldwide (World Intellectual Property Organization, 2012). Although reliable information about occupational accidents in developing countries is scarce, it has been estimated that occupational accident rate in Lao PDR is 2-fold higher than that in Thailand (Hamalainen et al., 2006).

Health Belief Model (HBM) is used as the theoretical framework to explain and predict health behavior (Conner and Norman, 1996). Numerous scholars applied this model to design and assess safety behavior modifications (Arcury et al., 2002; Ghaen et al., 2010; Patel et al., 2001; Seo, 2005; Viriya, 2008). Executing this model makes it possible to explore personal belief and perceived benefit, and barriers to be diagnosed (Strecher and Rosenstock, 1997). Perceived risks were associated with workers' willingness to adopt safe working practices (Harrell, 1990). Factors such as perceived susceptibility, perceived severity, and perceived barrier had been examined with respect to their relationship with safety behavior (Weinstein, 1998). Furthermore, it was shown that individuals were likely to have greater judgments of risk if the negative effects of the actions were immediate as opposed to delayed (Bjorkman, 1984). A few researchers had examined whether individuals were conscious of the risks associated with their jobs and whether they understood

the implications of performing the work unsafely. In some cases, individuals were aware of the risks involved with performing the work unsafely and decided to violate safety procedures and perform the work unsafely. This finding provided support for the more recent debate that a majority of workplace accidents were attributed to unsafe work practices of workers rather than unsafe working conditions (Garavan and O'Brien, 2001; Hoyos, 1995). Therefore, worker's perceptions, organizational and social factors must be examined when identifying the causes of workplace accidents. The purpose of this study was to identify factors related to safety behavior among brewery workers in Lao PDR. The result of this study will provide information to guide interventions and prevention strategies for the company in changing safety behavior of workers in the brewery factories in Lao PDR.

## MATERIALS AND METHODS

A purposive sampling technique was executed at three out of five breweries in Lao PDR. Subjects were selected randomly from the production line which included malt house, brew house, bottling hall and filling, packaging and warehouse. A total of 316 subjects were recruited. Data were collected with a self-administered questionnaire based on the parameters of the HBM. The questionnaire consisted of three parts; the first comprised demographic information including age, sex, marital status, education level, division of work, and experience of accident at work. The second consisted of questions of safety behavior self-evaluated by the participants. The third consisted of HBM constructs including perceived accident susceptibility (nine questions), perceived severity of the consequences of an accident (nine questions), perceived benefit of action (four questions), perceived barriers to perform action (five questions), self-efficacy to perform action (five questions), and cues to action (12 questions). Cronbach's alpha reliability estimates for the constructed model for safety behavior, perceived accident susceptibility, perceived severity of the consequences of an accident, perceived benefit of action, perceived barriers to perform action, self-efficacy to perform action, and

cues to action were 0.71, 0.95, 0.95, 0.73, 0.86, and 0.79, respectively. We used four point Likert scale (strongly agree, agree, disagree, and strongly disagree) for questionnaire scoring. Sum of scores was averaged from one to four. Data were analyzed using SPSS version 16. A two-tailed p-value of less than 0.05 was considered statistically significant. At the outset, participants were informed regarding the study objectives and confidentiality of personal information. All subjects signed the consent form and answered all questions.

## RESULTS

The majority of the participants were male (77.8%), 19 to 54 years of age, with a mean of 32.9 (S.D = 7.3). Most of the participants (45.3%) obtained a vocational school diploma. Seventy percent was married, and 48% had worked from one to five years. Eighty five percent never had an

accident at work during the last three months, and 95% reported that the company provided personal protective equipment.

The mean of model constructed for perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy was  $2.6 \pm 1.2$ ,  $2.9 \pm 1.0$ ,  $3.5 \pm 0.7$ ,  $2.1 \pm 0.9$ ,  $3.2 \pm 0.7$ , respectively. As to perceived susceptibility, 60.4% of the participants had anticipated high to highest risk of accident at work. As to perceived severity, 72.8% predicted that an accident would highly affect their lives. With regard to perceived benefits, 93.0 % had thought that following safety rules and procedures would be helpful in accident prevention. In terms of perceived barriers, 68.9% indicated that wearing of personal protective equipment was uncomfortable and checking of hand tools and machinery delays their work. As to self-efficacy, 82.6% could perform their work well according to safety rules, as shown in Table 1.

**Table 1.** Perception levels and mean scores of constructed health believe model variables.

Susceptibility of accidents	Frequency (n=316)	Percentage
Highest (4.00 -3.26)	97	30.7
High (3.25 - 2.51)	94	29.7
Low (2.50 - 1.76)	36	11.4
Lowest (1.75 - 1.00)	89	28.2
Mean = 2.63, S.D = 1.189, Min = 1.00, Max = 4.00		
Severity of consequences of accidents	Frequency	Percentage
Highest (4.00-3.26)	114	36.1
High (3.25-2.51)	116	36.7
Low (2.50-1.76)	39	12.3
Lowest (1.75-1.00)	47	14.9
Mean = 2.94, S.D = 1.039, Min = 1.00, Max = 4.00		
Benefits of action	Frequency	Percentage
Highest (4.00-3.26)	185	58.5
High (3.25-2.51)	109	34.5
Low (2.50-1.76)	18	5.7
Lowest (1.75-1.00)	4	1.3
Mean = 3.5, S.D = 0.664, Min = 1.00, Max = 4.00		

Barriers to perform action	Frequency	Percentage
Highest (1.00 - 1.75)	88	27.8
High (1.76 - 2.50)	130	41.1
Low (2.51 - 3.25)	69	21.8
Lowest (3.26 - 4.00)	29	9.2
Mean = 2.12, S.D = 0.923, Min = 1.00, Max = 4.00		
Self-efficacy to perform safety behavior	Frequency	Percentage
Highest (4.00 - 3.26)	116	36.7
High (3.25 - 2.51)	145	45.9
Low (2.50 - 1.76)	48	15.2
Lowest (1.75 - 1.00)	7	2.2
Mean = 3.17, S.D = 0.762, Min = 1.00, Max = 4.00		

The results revealed that there was a relationship between education level, accident experience and the company provision of personal protective equipment, as shown in Table 2. Moreover, a reminder from media, and safety training were also related to safety behavior.

**Table 2.** Relationship between modifying factors, constructed HBM and safety behavior.

Variables	n (%)	Safety behavior (SB)			$\chi^2$	P
		Regular n (%)	Often n (%)	Sometime n (%)		
Gender						
Male	246(77.8)	145 (58.9)	83(33.7)	18(7.3)	3.382	0.184
Female	70(22.2)	43(61.4)	26(37.1)	1.0(1.4)		
Educational level						
Below university	229(72.5)	125(54.6)	87(38.0)	17(7.4)	9.072	0.011*
University level	87(27.5)	63(72.4)	22(25.3)	2(2.3)		
Division of work						
Malt house	32(10.1)	15(46.9)	14(43.7)	3(9.4)	4535	0.605
Brew house	107(33.9)	68(63.5)	35(32.7)	4(3.7)		
Bottling hall	55(17.4)	31(56.36)	21(38.18)	3(5.5)		
Filling, packaging and warehouse	122(38.6)	74(60.7)	39(32.0)	9(7.4)		
Marital status						
Single, widowed, divorced	94(29.7)	57(60.6)	31(33.0)	6(6.4)	0.149	0.928
Married	222(70.3)	131(59.0)	78(35.1)	13(5.9)		

Reminder from media					
No	39(12.3)	13(33.3)	20(51.3)	6(15.4)	29.620 < 0.001*
Yes	277(87.7)	175(63.2)	89(32.1)	13(4.7)	
Reminder from supervisor					
No	121(38.29)	79(65.29)	39(32.23)	3(2.48)	8.199 0.065
Yes	195(61.71)	109(55.90)	70(35.90)	16(8.20)	
Safety training					
No	98(31.01)	40(1.1)	47(3.7)	11(15.8)	35.450 < 0.001*
Yes	218(68.99)	148(98.9)	62(96.3)	8(84.2)	

\*Significant level: p-value < 0.05

Significant correlation was found between age, perceived benefit of action, perceived barrier to perform action, and self-efficacy to perform action. Whereas there was no relationship between working experience in the brewery, perceived susceptibility of accident, and perceived severity of the consequence of accident with safety behavior, as shown in Table 3.

**Table 3.** A correlation between modifying factors, constructed HBM and safety behavior.

Variables	r	p
Age	0.129	0.022*
Working experience in the brewery	0.110	0.050
Perceived susceptibility of accidents	- 0.044	0.431
Perceived severity of consequences of accident	0.099	0.780
Perceived benefit of action	0.350	< 0.001*
Perceived barrier to action	- 0.142	0.012*
Self-efficacy to perform safety behavior	0.279	< 0.001*

\*Significant level: p-value < 0.05

## DISCUSSION

Safety behavior was improved with age in the present study and another (Gyekye and Salminen, 2009a), and with workers with accident experience and higher education in other recent studies (Viriya, 2008; Lekcharoen et al., 2011; Gyekye and Salminen, 2009b). Similar to other studies (Ambak et al., 2011; Eshrati et al., 2008; Germei et al., 2009), perceived benefit of action was positively correlated with safety behavior. Workers increased their safety behavior when they believed in the effectiveness of the strategies designed to reduce the risk or seriousness of the accidents (follow safety rules, the proper use of personal protective equipment, readiness to work). The result of this study was in accordance with Seo (2005) who found that perceived barrier to action was negatively correlated with safety behaviors. The finding of this study emphasized Strecher and Rosenstock's postulation in that perceived barriers was the most powerful single predictor among the HBM across all studies and behaviors (Strecher and Rosenstock, 1997). Perceived inconvenience of complying safety procedures constituted a great part of perceived barriers (Brown et al., 2000, Cox and Cox, 1991, Komaki et al., 1978). Similar to other studies (Arcury et al., 2002; Hendrickson, 2005; Li and Li, 2010), self-efficacy to perform action was correlated with safety behaviors. Self-efficacy could predict the relationship between safety attitude positively and negatively of risk-taking behavior. In regards to cues, safety poster and work place

safety sign were related to safety behavior. This result was in line with Ghaen et al. (2010) and Snowdon et al. (2009) in which safety behavior improved as a result of reminder from media. Safety training improved safety behavior in this study and in other recent studies (Arcury et al., 2002; Ghaen et al., 2010; Seo, 2005; Tronsmoen, 2010).

Gender, marital status, division of work and working experience in brewery were not related to safety behavior. However, these findings were similar to a few studies (Idirimanna and Jayawardena, 2011; Viriya, 2008). Perceived susceptibility of accidents and perceived severity of the consequences of accident were not correlated with safety behavior. These results were in line with Viriya (2008). Although susceptibility and severity are important determinants of health behavior, the discrepancies resulted from our study may be due to the fact that work-related injuries are not immediate and progress over repeated exposure to the harmful agent. Thus, workers who tend not to experience visible or immediate harm are in fact more likely to have a lower judgment of associated risks, thus engage in unsafe work behavior. Our study found that safety behavior was not related to reminder from supervisor. This result conflicted with Ghaen et al. (2010), Idirimanna and Jayawardena (2011), and Kapp (2011) who found that comments presented by managers and supervisor significantly promoted safety behaviors.

Suggestions of negative perceptions of safety appeared among younger workers and those with a relatively low level of education but may have been caused by supervisory failures and must be considered preliminary or improved. In conclusion, the authors suggest that implementation of safety education and supervisory reminder program should be considered to improve safety behavior among brewery workers in Lao PDR.

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