



## Research Article

**Factors Related to Personal Protective Equipment Use between Factory Cement Employ in Ilam, the west of Iran: Application of BASNEF Model**Hojat Kakaei<sup>1</sup>, Mehdi Mirzaei Alavijeh<sup>2</sup>, Mohammad Mahboubi<sup>3</sup>, Roholah Maghsodi Moghadam<sup>1</sup>, Fazel Zinat Motlagh<sup>4</sup>, Farhad Farasaty<sup>1\*</sup>, Saeid Jalilian<sup>5</sup><sup>1</sup>Department of Occupational Health, School of Public Health, Ilam University of Medical Sciences, Ilam, Iran<sup>2</sup>Department of Health Education, School of Health, Shahid Sadoughi University of Medical Sciences- Yazd, Iran<sup>3</sup>PhD in Health Services Administration, Kermanshah University of Medical Sciences, Kermanshah, Iran<sup>4</sup>Social Determinants of Health Research Center, Yasuj University of Medical Sciences, Yasuj, Iran<sup>5</sup>Islamic Azad University, Borujerd Branch, Borujerd, Iran**ARTICLE INFO***Article history:*

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Email: [farasaty\\_64@yahoo.com](mailto:farasaty_64@yahoo.com)**ABSTRACT**

Personal protective equipment are any equipment that is used by a worker to eliminate or minimize exposure to a specific occupational hazard. The aim of this study was determine the factors related to personal protective equipment use among factory cement based on BASNEF model. A cross-sectional study was conducted among 205 men cement worker in the Ilam, west of Iran, during 2012 which was randomly selected for participation in this study. A structured questionnaire was applied for collecting data and data were analyzed by SPSS version 18 using bivariate correlations and linear regression statistical tests. The four predictor variables of 1) attitude, 2) subjective norms, and 3) enabling factor, and 4) intention accounted for 47% of the variation in the outcome measure of the personal protective equipment use behavior. Our results support the use of BASNEF model to develop and implement field practice guidelines, which can be applicable to design and implement effective promotion programs to increasing personal protective equipment use among worker and could be a useful model to safety behavior promotion program among workers.

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**1. Introduction**

Control measures had developed to avoid injury and illness as a result of exposure to the hazards. The most effective and safest of control measures considered those implemented at the source. The second most effective control measures are along the path. These typically include engineering controls like local exhaust ventilation. The least effective control measures are those that are implemented at the worker. These controls include things like wearing of personal protective equipment (PPE) [1]. PPE are any equipment that is used by a worker to eliminate or minimize exposure to a specific occupational hazard, when other control measures do not completely eliminate the hazard or if no other practical means exist for effectively controlling it, PPE becomes useful as a control measure. Such as respirators, gloves, aprons, fall-protection devices, personal warning devices and full body suits, as well as head, eye and foot protection [2]. Cement producing factory is one of the industrial that there are a lot of hazards to their worker such as exposure to cement dust that has been demonstrated to have adverse effects on human health [3]. There have been a number of studies that reported effects of cement dust exposure on respiratory symptoms such as reduction in lung function, high risk of developing chronic obstructive pulmonary diseases (COPD) and a reduction in ventilator capacity [4-12]. For this reason some of research in addition to emphasis on control hazard in source recommended providing adequate personal respiratory protective equipment for the production workers [13]. In a number of studies have also reported the rates of personal protective equipment very low or no properly use of them [14-17]. Some of the studies also reported the lack of training and motivation as a reason of do not use of equipment's [15 and 18]. Also, in

other researches was showed a significant relationship between use of equipment protector and risk perception, knowledge and attitude of worker's [19-21]. Arezes et al also mentioned the reason of lack of use by workers has been Lack of accepted equipment [22]. To perform a particular behavior such as the use of personal protective equipment in addition to availability of tools as well as enabling factors, other factors as well as interpersonal factors such as attitudes toward behavior also needed, which of these factors were known as psychological factors and to investigate the psychological factors developed and has been offered several models [23]. In other words, models have been developed and applied to explain, why people do or do not engage in various activities and behaviors? Although there has link between these models and workplace behavior, but very little study has been given to examining them about to protect the workers from job related hazards [24]. One of them is BASNEF model which it or its related structures includes; Behavior intention, Attitude, Subjective Norms, Enabling Factors, have been used in number of various and similar studies [25-28]. The main objective of this study was to investigate the factors related to personal protective equipment use among factory cement employ in Ilam, the west of Iran based on BASNEF model.

**2. Methods**

This cross-sectional study was conducted on 205 men factory cement employ in Ilam, Iran, aged 22 to 53 years old, during 2012. The sample size was calculated at 95% significant level according to the results of a pilot study and a sample of 205 was estimated. Being literate for completing written questionnaire were eligibility criteria to participate in this study. Of the population of 205, 191 (93.2%) signed the consent form and voluntarily agreed to participate in this study. This

study was conducted with approval from Ilam University of Medical Sciences' institutional review board and informed consent was obtained from participants. Prior to conducting the main project, a pilot study was conducted to obtain feedback about the clarity, length, comprehensiveness, and completion time of the questionnaire, as well as estimating the internal consistency of the questionnaires.

2.1. Theoretical Framework

The BASNEF model was proposed by Hubley in 1993 (Figure 1), the components of which deal with beliefs, attitudes, subjective norms and enabling factors. Attitudes are a person's positive or negative evaluation of performing the focal behavior, Subjective norms are a person's perception of other people's opinion regarding behavioral performance and enabling factors are skills and sources that allow person's aim or intention to change the behavior [23].

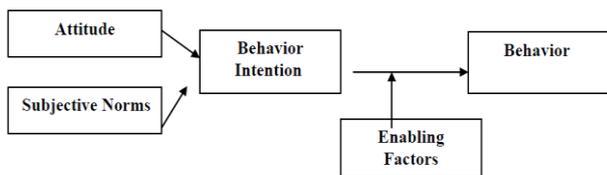


Figure 1. Design of BASNEF model

Prior to conducting the main project, a pilot study was carried out. Initially the relevant questionnaires were administered to 30 men employ were similar to study population in order to estimate the duration of the study conduction and to evaluate the reliability of the questionnaire. Estimated reliability using alpha Cronbach coefficient for each BASNEF model constructs questionnaire were as follows: attitude ( $\alpha = 0.90$ ); subjective norms ( $\alpha = 0.86$ ); enabling factor ( $\alpha = 0.83$ ) and behavioral intention ( $\alpha = 0.90$ ). Questionnaire included three sections that comprised of 38 questions: 7 questions for demographic factors, 7 questions about personal protective equipment use (PPEs) and 24 questions for BASNEF variable.

2.1.1. Demographics

The demographic variables assessed in this study included: age (year), education level (primary school/secondary school/high school/academic), marital Status (married/single) job history (year), pre employ job training (yes/no), safety training (yes/no), and history of job accident (yes/no).

2.1.2. BASNEF Scale

BASNEF scale was designed based on BASNEF model standard questionnaires [25 and 26]. and included 24 items under four constructs including (a) attitude; (b) subjective norms; (c) enabling factor; (d) behavioral intention. Six items were designed to measure attitude toward PPEs use (e.g. "I believe PPEs use is essential for accident prevention."). Five items were designed to measure subjective norms toward PPEs use (e.g. "My supervisor encouraged me to PPEs use."). Six items were designed to enabling factor toward PPEs use (e.g. "It is difficult for me to PPEs use."). Seven items were designed to evaluate behavior intention toward PPEs use (e.g. "I intend to use of safety shoe during the work."). In order to facilitate participants' responses to the items, all items were standardized to a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

2.1.3. Personal Protective Equipment Use Behavior

Behavior (PPEs use) was measured with intangible observed by the occupation health specialist. Included seven items regarding the PPEs use (mask, safety shoe, goggle, ear plug, overall, spectacles and gloves) which is measured as yes or no. Data were analyzed by SPSS version 18 using appropriate statistical tests including bivariate correlation, and linear regression at 95% significant level.

3. Results

The mean age of respondents was 36.46 years [SD: 8.11], ranged from 22 to 53 years. More details of demographic characteristics of the participants are shown in Table 1.

Table 1. Distribution of the demographic characteristics among the participants

Variables	Number	Percent
<b>Age group (year)</b>		
20-29	46	24.1
30-39	74	38.7
40-49	66	34.6
50-59	5	2.6
<b>Job history (year)</b>		
1-5	41	21.5
6-10	40	20.9
11-15	65	34
16-20	35	18.3
21-25	10	5.2
<b>Education</b>		
Primary school	28	14.7
Secondary school	36	18.8
High school	94	49.2
Academic	33	17.3
<b>Pre employ job training</b>		
Yes	158	82.7
No	33	17.3
<b>Safety training</b>		
Yes	62	32.5
No	129	67.5
<b>Have a job accident</b>		
Yes	28	14.7
No	163	85.3
<b>Marital status</b>		
Single	29	15.2
Married	162	84.8

Vast majority of participants (38.7%) were 30-39 years, and those 40-49 years (34.6%).The mean age of job history was 11.12 [SD: 5.87], ranged from 1 to 25 years. Regarding the educational status: 14.7 (n=28) had primary school, 18.8% (n=36) Secondary school, 49.2 % (n=94) were high school and 17.3 % (n=33) were academic educated. 84.8 % participants were married and 15.2 % were single. About 32.5 % (62/191) respondents reported have safety training education. Almost 14.7 % (28/191) of the participants had reported job accident. Prevalence the type of personal protective equipment among men employ factory cement showed in Diagram 1. Our result showed overall (78%), safety shoe (75.9%) and mask (63.9%), were the most commonly used personal protective equipment among participations.

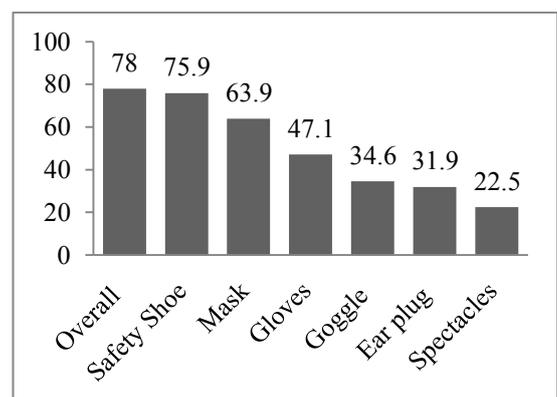


Diagram 1. Prevalence of personal protective equipment use among participants

The correlation between different components of BASNEF model is shown in Table 2. According to these results, there is a mild to moderate correlation between different components of the theory.

**Table 2. Correlation between different components of BASNEF model**

Component	Mean (SD)	X1	X2	X3	X4
X1. Attitude	12.18 (4.94)	1			
X2. Subjective norms	13.86 (4.93)	0.547*	1		
X3. Enabling factors	21.61 (5.77)	0.360*	0.113	1	
X4. Intention	23.09 (6.32)	0.648*	0.463*	0.332*	1
X4. Behavior	3.53 (2.35)	0.535*	0.310*	0.552*	0.530*

\* Correlation is significant at the 0.01 level (2-tailed).

As can be seen in Table 3 linear regression analysis was performed to explain the variation in personal protective equipment use, and our results showed on 2<sup>nd</sup> step the procedure stopped and the best model was selected, among the BASNEF constructs: attitude, enabling factors and behavioral intention were accounted for 47% of the variation in personal protective equipment use, ( $F = 41.449$  &  $p < 0.001$ ).

**Table 3. Predictors of the personal protective equipment use**

Variable	B	SE B	B	t	P-value
<b>Step 1</b>					
Attitude	0.105	0.037	0.221	2.854	0.005
Subjective Norms	0.016	0.031	0.033	0.504	0.615
Enabling factors	0.159	0.024	0.389	6.673	0.000
Behavioural intention	0.090	0.027	0.242	3.363	0.001
<b>Step 2</b>					
Attitude	0.112	0.034	0.236	3.306	0.001
Enabling factors	0.157	0.024	0.385	6.679	0.000
Behavioural intention	0.093	0.026	0.249	3.529	0.001

Method: Backward. Final model Step 2  
 Dependent Variable: PPE  
 Adjusted R squared = 0.47,  $F = 41.449$  &  $P < 0.001$

#### 4. Discussion

The aim of this study was to determine factors related to personal protective equipment use among men factory cement employ in Ilam, the west of Iran, based on BASNEF model. Determined factors related to personal protective equipment use among worker is important for implementing of the safety work promotion programs. Our results indicated that attitude, enabling factors and behavioral intention were the most influential predictors on personal protective equipment use. Results of this study showed that attitude is one important factor for predicting personal protective equipment use. In this regard, Williams et al reported that focus on safety principle based on engineering approaches without increasing safety attitudes will not be effective [29]. Solhi et al in their study reported for personal protective equipment use should be considered to improve worker attitude [25]. Also Varonen et al, noted the lack of positive attitude is one of important causes for failure to use personal protective equipment among worker [30]. Furthermore, Cook and Geller in their studies noted behavior-based safety approach were likely to increase positive attitudes toward safe behavior [31 and 32]. Compatible with previous research our findings showed a connection between attitude and personal protective equipment use, it seem designing and implementing promotion attitude safety behavior educational program could be beneficial result in industry. The study findings also indicated the enabling factors was strong factor to use of personal protective equipment. Many studies have addressed the predictive value of accessibility, comfortable and

style for personal protective equipment use by worker [33-35]. Enabling factors, often facilitate personal or organizational behavior change with development optimum environmental conditions [36]. Thus, in the application of personal protective equipment use among workers attention to enabling factors is essential. Subjective norms are a person's perception of other people's opinion regarding behavioral performance [37]. Several studies have shown that Subjective norms is a strong healthy behavior predictor. However, our findings showed that subjective norm not strong factor for personal protective equipment use among Iranian cement worker. Subjective norms were evaluated in this study included other workers, employers, family. This results indicate that workplace subjective norms was not encouraging the use of personal protective equipment. It seems more study are needed about predictability of subjective norms on personal protective equipment behavior in different cultures and populations. It seems that using methods of health education can enhance personal protective equipment use among factory employ knowledge of benefits of safety work, change their health beliefs and improve their behaviors regarding personal protective equipment use. Also, Morowatisharifabad et al [38] reported the knowledge of workers about health and environmental hazards in their study was low and Indicates necessity of considering the educational issues in this context. Although the present study has several strengths, such as theory based study, data collection for behavior section based on intangible observing; Data collection in only morning shift and ignoring the relationship between working shift and behavior was a limitations for this study.

#### 5. Conclusion

There are multiple factors to explain personal protective equipment use behavior among workers. The present study findings confirmed the applicability of the BASNEF model variable to explain personal protective equipment use behavior men cement workers in Iran. This study results support the use of BASNEF model to develop and implement field practice guidelines, which can be applicable to design and implement effective promotion programs to increasing personal protective equipment use among worker. BASNEF model variable were accounted for 47% of the variation of personal protective equipment behavior. Thus, our result suggested BASNEF model could be a useful model to safety behavior promotion program among workers.

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#### Conflict of interest statement

The authors declare that they have no conflict of interest.

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