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CORRELATE OF SAFETY MEASURES OF OIL MARKETING COMPANIES AND SAFETY BEHAVIOURS OF FUEL STATION ATTENDANTS IN SEKONDI-TAKORADI METROPOLIS

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Abstract

Workers of fuel retail industry are exposed to many hazards as result of their job and behaviors. Management's safety practices are important workplace preventive measures to reducing health and safety hazards. The purpose of this study was to explore the level of safety behaviors among pump attendants and the relationship between attendants' safety behaviors and safety measures of the companies in the Sekondi-Takoradi. This survey involved 114 pump attendants from four purposively sampled oil marketing companies. Researcher generated questionnaire with Cronbach's alpha internal consistency reliability of .81 was used to collect data, using SPSS version 16.0 with Pearson correlation as statistical tool. The results indicated that 70% of the respondents disagreed they sometimes ignore safety rules to get their work done quickly, while 86.8% disagreed they sometimes intentionally allow fuel to touch their body. Also, as 60% of the participants agreed they always change into house dresses after work, 78% agreed they always observe safety rules at their stations. Pearson bivariate correlation analysis showed that safety policy enforcement positively correlated moderately (r = 0.6) with attendants' safety behavior while a low positive relationship was observed between personal protective equipment and safety

behaviors of the attendants. The fuel attendants performed their jobs with high sense of safety. Furthermore, provision of appropriate workplace safety measures has positive relationship with the safety behaviors of the participants. Hence, instituting worksite safety policy and enforcing them will positively promote safe work performance among the attendants.

Key Words; Safety behavior, safety measures, pump attendants, health and well-being.

Introduction

Contemporary workplace health and safety issues are importance to the worker, the family, their organisation and the general society. They are not only about the health and safety of the workers, but also about promoting business, corporate image and an act of cooperate social responsibility (Hafner, van Stolk, Saunders, Krapels, & Baruch, 2015). Maintenance of appropriate worksite health and safety provides the highest standards for worker health promotion while increasing productivity. In that case, safety measures management institute become important vehicles to which worker health and safety can be improved (Ansah, & Mintah, 2012). Such measures can reliably reduce injury rates and promote the health of employees (Remawi, Bates, & Dix, 2011). Moreover, provision of appropriate safety measures improved safety procedures, reduce injury rate, illness and promote the health and well-being of workers. Evidence suggests that organisations with strong safety culture and management support for safety have high turn-over rate, low absenteeism, hospital expenses and worker compensation claims. Additionally, strong organizational safety culture promotes increased co-operation, worker confidence, productivity and corporate image of the organization (Remawi, Bates, & Dix, 2009).

Fuel service stations are hazardous working environment where attendants are exposed to harmful conditions ranging from customer abuse, armed robbery attack, and exposure to carcinogenic petroleum fumes (Ansah, & Minth, 2012). There are research indications, for instance, that repetitive and long standing work, that form attendants' routine duties, have negative influence on musculoskeletal system like low back, leg and foot pains. Such work settings are positively associated with high blood pressure (Hughes, Nelson, Matz, & Lloyd, 2011). Fuel station work at developing countries expose the attendants to acute and chronic carcinogenic petroleum compounds such as lead, benzene, toluene and high amount of sulphur (Gueniat, Harjono, Missbach, & Viredaz, 2016). These heavy metals and chemicals are grave carcinogenic and can cause various lung cancers (Attfield et al.,

2012) eye and respiratory tract irritation, skin and neurocognitive dysfunctioning (WHO, 2010). Rapid unconsciousness and death due to respiratory failure may also result from exposure to these petroleum compounds at very high concentration (Boschetto et al., 2006). Therefore, to ensure that workers are safe and healthy, management has to institute measures such as personal protective equipment (PPE), safety education and workplace safety policies (Clarke, 2008).

Workplace safety policies are regulations instituted by management (in conjunction with workers) as the first step towards promoting the health of workers. Primarily, safety regulations aim at protecting and/or promoting the health and safety of the workers (Choudhry, Fang, & Ahmed, 2008). Instituting and actively enforcing these policies also promote effective health and safety behaviors of workers. It further provides increased supervisory safety interactions in the form of regulation enforcement that could significantly increase the safety behaviors of the workers (Zohar, & Luria, 2003). Companies with workplace safety policies are more likely to have better worker safety performance than those without such policies (Boustras, & Hadjimanoli, 2012). Moreover, it been observe that firms that enforce instituted workplace safety regulations decrease compensation claims of 22.5% to 12.8% as compare to a slight increase in firms without enforcement activities (Baggs, Silverstein, & Foley, 2003). Moreover, the policies forms the bases for the formation of safety committees, providing safety training, facilities and PPE.

Workplace safety committee is a vital indicator of the importance management places on the health and safety their workers. For example, companies with safety committee are also about 1.7-2.1 times more likely to have positive worker safety records relative to those without such committees (Parker et al., 2007). On the whole, worksite safety policies promote effective worker safety behaviors and safeguard their health safety. Thus, safety committee influenced positively the safety work practices of workers including the appropriate use of PPE and safety facilities (Tsung-Chih, Chi-Wei, & Mu-Chen, 2007).

The import PPE to worker health and safety cannot be underestimated in any work environment. Availability of PPE is required to promote constant use of such devices (Strong, Thompson, Koepsell, & Meischke, 2008). The use of PPE is expected to reduce the risk of exposure to many workplace hazards and injuries (WHO, 2010). And that, workers are more likely to always wear PPE when such devices were available. Therefore, unavailability of PPE may put workers especially young workers at greater risk of exposure. Yet, combining PPE with training, strong safety culture and strong leadership skills produced the desired safe work behaviors for the well-being of workers (Lehmann et al., 2009). However, protective use of PPE will always be hampered without accompanied safety education or training (Ansah, & Mintah, 2012).

Employee safety education and training has been recognized over ages as an effective instrument for promoting worker safety behaviors (Jensen, 2005). Occupational health and safety training embodies instructing workers to recognise known hazards and assisting them to use available methods to protect themselves. This form of education gives guidance to become better informed worker that takes action(s) aimed at eliminating workplace hazards. Education positively influenced worker safety climate perception, compliance with safety procedures and accident involvement among some Ghanaian industrial workers (Gyekye, & Salminen, 2009). Besides, safety training predicted safety compliance and safety participation among industry workers in Kerala (Vinodkumar, & Bhasi, 2010). In addition, safety training correlated positively high with safety compliance and safety participation among workers. Perhaps, effectiveness of safety training is also evidence in the level of the use of provided safety facilities.

The important of safety facilities to promoting health and safety of workers has been identified since the end of the Second World War (LaDou, 2003). Provision of safety facilities enhances safety behaviors, protects and promotes the health and well-being of workers (Jensen, 2005). Workplace safety facilities are appliances,

except PPE, use by workers in their day-to-day operations. These facilities enhance the smooth operation of work and help prevent injury and ill health. For instance, provision of required safety devices and interaction with workers lead to a reduction in the number of self-reported needle stick injuries among public hospital nurses (van der Molen, Zwinderman, Sluiter, Frings-Dresen, 2011). Similarly, attitude of workers towards work and personal hygiene improved when they were provided with appropriate safety facilities. Moreover, a research suggested that engineering controls enhance compliance and reduce exposure incidents among some health care workers (Gershon et al., 2000). Thus, safety facilities are necessities if workers behaviors are to be enhanced to help preserve their health and safety.

The strategies to upscale workers' behaviors require management to institute health and safety policies, provide appropriate PPE, educate workers on workplace safety procedures and provide the necessary safety facilities (Boustras, & Hadjimanoli, 2012). There is a need to place premium on worker behavior as a key determinant of whatever good or bad that occurs to their health now or in the future. And that, workers behaviors stem mostly from the work environment (Lovato, Sabiston, Hadd, Nykiforuk, & Campbell, 2006). However, there is generally a lack of empirical literature on the level of safety behaviors among pump attendants in Ghana. Besides, no study explored the relationship between the provision of safety measures and safety behaviors among this population of workers. This study therefore, aimed to explore, the level of safety behaviors among pump attendants and the correlation between the safety measures provided by the OMCs and the safety behaviors of the attendants in the Sekondi-Takoradi Metropolis of Ghana.

Methods

This cross-sectional survey consisted of 114 conveniently selected attendants from four purposively sampled OMCs; Allied Oil (23), Ghana Oil Company (32), Shell Ghana Limited (29) and Total Petroleum Ghana (30), operating in Sekondi-Takoradi in the Western Region of Ghana.

The participants responded to a 25-item questionnaire. Part one of the questionnaire (items 1, 2, 3, 4, and 5) collected participants' background information; age, gender, educational level, number of years working at the fuel service stations, and whether shift or not. The part two was a five point Likert scale with scores of 5 strongly disagree, 4 agree, 3 no idea, 2 disagree and 1 strongly disagree. However, negative items had reverse scores. Items 6, 7, 8, and 9 measured safety policy enforcement, 10, 11, 12 and 13 provision of safety education, 14, 15, 16 and 17 safety facilities, 18, 19, 20 and 21 provision of PPE. In addition, items 22, 23, 24, and 25 measured safety behaviors of the attendants. A score below 50% indicated low and 50% or above indicated high safety behavior measure of the participants. The questionnaire yielded alpha reliability of .81. SPSS version 16 was used for data analysis.
Institutional Review Board (IRB) of the University of Cape Coast, Ghana, approved the research protocol. Authorization was obtained from the OMCs and/or managers of the service stations to survey the attendants. The attendants were contacted at their stations for their voluntary participation. Each participant signed an informed consent form before completing the survey.

Results

There were 21 (18.4%) females and 93 (81.6%) male participants. Working experience ranged from less than one to 17 years (M = 3.35; SD = 3.43). Of these participants, 73% (84) had secondary education, 11.4% (13) had vocational education, 7.9% (9) had basic education, and 7.0% (8) had tertiary education. Among this sample, 93% (106) work on 24 hour shift with just 7% (8) on 12-hour basis. The age of the participants ranged from 19 to 45 years (M = 26.3; SD = 5.74).

To determine the level of safety behaviors among the attendants, frequency and percentage distributions were calculated. The results revealed that 70.2% of the respondents either disagreed they sometimes ignore safety rules to get their work done quickly, but 23.7% agreed to this statement. On whether the attendants sometimes intentionally allowed fuel to touch their body, 86.8%

disagreed, while 11.45% agreed. In addition, while about 37% of the participants disagreed that they always change into their house dresses after work (before going home), 59.7% agreed they do so. Moreover, 21% of the participants confirmed that they do not always observe safety rules at their stations. On the contrary, 77.7% agreed they always observe safety rules at their stations. The results therefore, suggest that, majority of pump attendants in Sekondi-Takoradi Metropolis observe a high standard of safety at the fuel service stations (see Table 1 for data).

Table 1: Frequency Data Showing the Level of Safety Behaviors of Fuel Attendants

Variable	Agree f %)	No Idea f (%)	Disagree f (%)
I sometimes intentionally allow fuel to touch my body i.e. mouth, hand	13 (11.4)	2 (1.8)	99 (86.8)
I always change into my house dress before going home after work	68 (59.7)	3 (2.6)	43 (37.7)
I always observe the safety rules when working	88 (77.2)	2 (1.8)	24 (21.0)

Pearson bivariate correlation analysis was also calculated to determine the relationship between safety measures (provided by the OMCs) and the safety behaviors of the attendants. Results from Table 2 revealed that there was a positive moderate correlation (r = 0.6) between safety policy enforcement and attendants' safety behavior measure. Moreover, the correlation between PPE and safety behavior of the attendants was positively low (r = 0.4). In addition, safety facilities correlated positively low (r = 0.2) with attendants' safety behavior measure. However, a moderate inverse relationship (r = -0.5) was observed between safety education and attendants' safety behavior. Hence, generally, there is positive relationship between the safety behaviors of the attendants and safety measures, except safety education, of the OMCs in the Sekondi-Takoradi Metropolis (see Table 2 for data).

Table 2: Correlation among Safety Behaviors (SB) and Safety Measures (SPE, PPE, SE, SF)

Safety Variables	PPE	SE	SF	SB	R2
Safety Policy Enforcement (SPE)	.627	.715	.349	.594	.35
Personal Protective Equipment (PPE)		.619	.314	.386	.15
Safety Education (SE)			.400	-.541	.29
Safety Facilities (SF)				.185	.03

N = 114

Discussion

The findings of this study revealed that attendants averagely scored high on the safety behavior measure. Perhaps, the participants observed high safety procedures while at work. A probable reason being that majority of the OMCs provides average amount of safety measures at the fuel service stations. Several studies (Lovato et al., 2006; Zohar, & Luria, 2003) revealed that provision of appropriate safety measures at workplaces culminate into high safety performance of workers. Then, provision of safety facilities for these attendant would be effective in increasing some thermal injury prevention practices among them. But safety training among the workers could also increase safety compliance and safety participation as recorded among industrial workers in Kerala (Vinodkumar, & Bhasi, 2010). Thus, providing adequate safety measures do not only improve working conditions for the workers their attitudes and behaviors regarding safe work procedures are equally positively influenced.

One of the first steps towards promoting and protecting the health and well-being of workers is instituting and enforcing workplace safety policies as safe work performance of the workers is also likely to be enhanced. The argument is that increase in the regulation enforcement activities of immediate supervisors is also

key to promoting work safety practices of these attendants (Zohar, & Luria, 2003).

This study also revealed that about quarter of the attendants scored low in their safety behavior index. Perhaps, this was due to high work demand, negative attitude towards safety and inexperience of some of the participants. As observed in earlier research (Parimalam, Kamalamma, & Ganguli, 2007), probably these attendants were aware of the benefits of using PPE at work but just ignored the use of such devices. There may be an existing gap between knowledge they possess or what workers acquire and what they practice at work. This may be due to some workplace factors such as high demand of work and the quest to serve clients, which could override their sense of safety. Further factor complication the challenge may be the fact that many of the attendants are young and prone to taking risk resulting injuries. For instance, experienced and adult workers are less likely to have workplace injuries than the less experienced ones due to poor worksite safety behaviors attributed to inexperience, low or lack of knowledge about the operation guidelines and risk taking behaviors (Parimalam, Kamalamma, & Ganguli, 2007). Acquisition of knowledge by workers is also a product of safety measures provided through safety training, continuous education and provision of appropriate safety facilities (Health and Safety Executive, 2009).

Generally, the findings of this study also suggest a positive relationship between safety behavior of the attendants and safety measures of the OMCs. Safety policy enforcement contributed highest to the variance in safety behavior of the attendants. Safety policy is the panacea to all safety measures companies provide for their workers (Health and Safety Executive, 2008). There is a need to strive for a written workplace safety policy. Because this is an effective way to promoting safety behaviors of workers. Moreover, some among proportion of attendants' safety behaviors was a contribution from PPE. This finding also highlight the importance of providing and enforcing the use of PPE among workers.

Provision of appropriate PPE has been found to be a major mediator in safety behaviors of workers (Vinodkumar, & Bhasi, 2010). For example, increased PPE use was strongly associated with workplace training or education (Macfarlane, Chapman, Benke, Meaklim, Sim, & McNeil, 2008), thus, making worksite safety training an important intervention reducing behaviors counter to safety. Hence, not only should provision of PPE be paramount in the acts of protecting the health of these attendants, more importantly training them to appropriately use the devices. Therefore, provision of appropriate PPE may not necessarily be effective to increasing the attendants' safety behavior, but safety training and/or education would equally be essential contributor (Tiramani, Colosio, & Colombi, 2007).

The moderate but inverse correlation found between safety education and safety behavior of the attendants, and moderate positive correlation between safety education and PPE and safety education and safety facilities explain the knowledge gap that exist between attendants' education and behaviors. This is possible among the attendants as it was observed that apprentices often do not apply safety principles in their line of duty (Lipscomb, Dale, Kaskutas, Sherman-Voellinger, Evanoff, 2008). The positive correlation seen between safety education and the other safety measure variables (safety policy enforcement, PPE and safety facilities), underscores the importance of safety education to the contribution of workers' safety behaviors.

Conclusions and Recommendations

The nineteen percent variation in attendants' safety behavior measure was a contribution from safety facilities. Perhaps, as management supplies safety facilities such as changing room with cabinets, washroom, water with soap among others, attendants are more likely to effectively use them which safeguard their health. But, provision of essential safety facilities needs to go hand-in-hand with positive interaction that encourage workers to make positively the use of the facilities. For example, the rate of self-reported needle stick injury reduced among public hospital nurses

as result of provision of carriers and holders (van der Molen et al., 2011). Therefore, providing safety facilities without safety education would perhaps not enough to motivate attendants to take necessary actions to protect themselves and others at work.

This study indicated that pump attendants in Sekondi-Takoradi Metropolis observed quite a high standard of safety at their fuel service stations. Generally, there is positive relationship between safety behaviors of the attendants and safety measures as provided by the OMCs at these fuel service stations. In addition, safety education contributes negatively in promoting the safety behaviors of the attendants. Hence, the attendants may need to be provided with adequate safety facilities and PPE to motivate them put the knowledge acquired through workplace safety education into appropriate use. Moreover, instituting workplace safety policies and enforcing them, increasing provision of PPE, and providing adequate safety facilities would promote significantly the safety behaviors of the pump attendants.

This is the first study that explored the correlation between safety measures, as provided by OMCs and their fuel station heads, and safety behaviors of attendants in Ghana, and the Sekondi-Takoradi where oil found in the country is pushing a lot of companies. The study was done in only two big cities with purposively selected OMCs and conveniently chosen small sample of attendants. Therefore, its results, findings and conclusions cannot be said to represent the generality of Ghanaian OMCs and attendants. There is a need to replicate this study all over the country and assess safety status and needs in the downstream oil sector. To establish cause-effect relations, there is a need to do a bigger study involving many OMCs and their attendants about predictors and their paths of predicting safety behaviors.

References

Ansah, E. W., & Mintah, J. K. (2012). Safety management practices at fuel service stations in Central and Western Regions of Ghana. Nigerian Journal of Health Education, 16(1), 78-89.

Attfield, M. D., Schleiff, P. L., Lubin, J. H., Blair, A., Stewart, P. A., Vermeulen, R… Silverman, D. T. (2012). The diesel exhaust in miners study: A cohort mortality study with emphasis on lung cancer. Journal of National Cancer Institute, 104, 1-15.

Baggs, J., Silverstein, B., & Foley, M. (2003). Workplace health and safety regulations: Impact of enforcement and consultation on workers' compensation claims rates in Washington State. American Journal of Industrial Medicine, 43, 483-494.

Boschetto, P., Quintavalle, S., Miotto, D., Cascio, N. L., Zeni, E., & Mapp, C. E. (2006). Chronic obstructive pulmonary disease (COPD) and occupational exposures (Electronic version). J of Occup Med and Toxico., 1(11) doi:10.1186/1745-6673-1-11.

Boustras, G., & Hadjimanoli, A. (2012). Management of health and safety in micro enterprises in Cyprus-Survey on ergonomics. 63rd Meeting of the Senior Labour Inspectors Committee 29-30 November 2012. NICOSIA, CYPRUS.

Choudhry, R., Fang, D., & Ahmed, S. (2008). Safety management in construction: Best practices in Hong Kong. Journal of Professional Issues, Engineering Education and Practice, 134(1), 20-32.

Clarke, E. (2008). Do occupational health services really exist in Ghana? A special focus on the agricultural and informal sectors. Journal of Science and Technology, 27(3), 86-95.

Gershon, R. R. M., Karkashian, C. D., Grosch, J. W., Murphy, L. R., Escamilla-Cejudo, A., & Flanagan, A. P. (2000). Hospital safety climate and its relationship with safe

work practices and workplace exposure incidents. American Journal of Infection Control, 28(3), 211-221.

Gueniat, M., Harjono, M., Missbach, A., & Viredaz, G. V. (2016). Dirty diesel. How Swiss traders flood Africa with toxic fuels. Accra: Public Eye.

Gyekye, S. A., & Salminen, S. (2009). Educational status and organizational safety climate: Does educational attainment influence workers' perceptions of workplace safety? Safety Science, 47(1), 20-28.

Hafner, M., van Stolk, C., Saunders, C., Krapels, J., & Baruch, B. (2015). Health, well-being and productivity in the workplace: A Britain's Healthiest Company summary report. Cambridge, UK: RAND Corporation.

Health and Safety Executive. (2008). Safety in petrol filling stations. Health and Safety Executive HS (G) 146, 2008. From http:// www. colerainebc.gov.uk

Health and Safety Executive. (2009). Working alone, health and safety guidance on the risks of lone working. From http://www.hse.gov-.uk/pubns/indg

Hughes, N. L., Nelson, A., Matz, M. W., & Lloyd, L. (2011). Safe patient handling and movement series: Solutions for prolonged standing in perioperative settings. AORN Journal, 93, 167- 174.

Jensen, E. A. (2005). An assessment of safety/risk management practices/perspectives among high/middle school technology education instructors and business/industry professionals. From http://www2uwstout.edu/content/ lib/thesis/2005jense

LaDou, J, (2003). International occupational health. International Journal of Hygiene and Environmental Health, 206(4-5), 303-313.

Lehmann, C. C., Haight, J. M., & Michael, J. H. (2009). Effects of safety training on risk tolerance: An examination of male workers in the surface mining industry. Journal of Safety, Health & Environmental Research, 4(3), 1-22.

Lipscomb, H. J., Dale, A. M., Kaskutas, V., Sherman-Voellinger, R., & Evanoff, B. (2008). Challenges in residential fall

prevention: Insight from apprentice carpenters. American Journal of Industrial Medicine, 51(1), 60-68.

Lovato, C. Y., Sabiston, C. M. V., Hadd, V., Nykiforuk, C. I. J., & Campbell, H. S. The impact of school smoking policies and student perceptions of enforcement on school smoking prevalence and location of smoking. Health Education Research, 22(6), 782-793.

Macfarlane, E., Chapman, A., Benke, G., Meaklim, J., Sim, M., & McNeil, J. (2008). Training and other predictors of personal protective equipment use in Australian grain farmers using pesticides. J Occupational and Environmental Medicine, 65(2), 141-146.

Parimalam, P., Kamalamma, N., & Ganguli, A. K. (2007). Knowledge, attitude and practices related to occupational health problems among garment workers in Tamil Nadu, India. Journal of Occupational Health, 49(6), 528-534.

Parker, D., Brosseau, L., Samant, Y., Pan, W., Xi, M., & Haugan, D. (2007). A comparison of the perceptions and beliefs of workers and owners with regard to workplace safety in small metal fabrication businesses. American Journal of Industrial Medicine, 50(12), 999-1009.

Remawi, H., Bates, P., & Dix, I. (2011). The relationship between the implementation of a safety management system and the attitudes of employees towards unsafe acts in aviation. Safety Science, 49(5), 625-632.

Strong, L. L., Thompson, B., Koepsell, T. D., & Meischke, H. (2008). Factors associated with pesticide safety practices in farm workers. American Journal of Industrial Medicine, 51(1), 69-81.

Tiramani, M., Colosio, C., & Colombi, A. (2007). The impact of personal protective equipment in reducing risk for operators exposed to pesticides: From theory to practice. G Ital Med Lav Ergon, 29(3), 376-379.

Tsung-Chih, W., Chi-Wei, L., & Mu-Chen, L. (2007). Safety climate in university and college laboratories: Impact of

organizational and individual factors. Journal of Safety Research, 38(1), 91-102.

van der Molen, H. F., Zwinderman, K. A. H., Sluiter, J. K., & Frings-Dresen, M. H. W. (2011). Better effect of the use of a needle safety device in combination with an interactive workshop to prevent needle stick injuries. Safety Science, 49(8-9), 1180-86.

Vinodkumar, M. N., & Bhasi, M. (2010). Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation. Accident Analysis and Prevention, 42(6), 2082-93.

WHO. (2010). Preventing disease through healthy environments, exposure to benzene: A major public health concern. Public Health and Environment, World Health Organization Bulletin, 20, 12-27.

Zohar, Z., & Luria, G. (2003). The use of supervisory practices as leverage to improve safety behavior: A cross-level intervention model. Journal of Safety Research, 34(5), 567-577.