ASJ: International Journal of Health, Safety and Environment (IJHSE)
Vol. 7 (03) 30 June, 2021, Pp. 801 – 809
www.academiascholarlyjournal.org/ijhse/index_ijhse.htm
ISSN: 2360-9311©Academia Scholarly Journals
Also Available@: Archive.org/Ogunkoya_et_al.
Indexed in: International Institute_of_Organized_Research_(I2OR)_database
Open access

Full Length Research

Assessment of Safety Practices and Use of Personal Protective Equipment among Petrol Pump Attendants within Sagamu Metropolis in Ogun State, Nigeria

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Accepted June 20, 2021

Petrol station attendants' exposure to vapours of PMS while refueling motor vehicles has led to ill health among these attendants. The implementation of safety policies and practices, enforcement of these policies and provision of PPE is important to safeguard the health of these workers. The objectives of this study were to assess the degree of awareness of safety training and retraining, safety policy enforcement and availability of PPE among petrol pump attendants in Sagamu metropolis and to determine the types of PPE used at work on regular basis. Using random sampling technique, 106 out of 142 petrol station attendants were included (50 males and 56 females) in this study. Data was collected with the use of investigator-administered questionnaires. The data was analyzed with SPSS version 20. Means and standard deviation were used to summarize numerical quantitative variables. Percentages were used to describe categorical variables and tables are used as a method of data presentation. The study showed that majority (63.2%) of filling stations strongly agreed or agreed they were trained and re-trained on safety measures. Less than half (47.2%) agreed that petrol station employers actually institute safety measures and put mechanism in place to enforce them. Above a quarter (25.4%) agreed petrol station employers provided enough PPE for petrol pump attendants and less than half of petrol pump attendants use any form of PPE while dispensing petrol. This study has shown that enforcement of existing laws by supervising agencies of government is essential. Enforcement of the use of PPE by petrol station employers will reduce occupational exposure to harmful components of petroleum products and safeguard the health and wellbeing of workers in this important sector of Nigerian economy. This study recommends that

petrol pump employers should be mandated by safety authorities in Nigeria to strengthen training, enforce compliance with safety policies and provide adequate PPE for petrol pump attendants.

Keywords: Hydrocarbons, Non hydrocarbons, Premium motor spirit.

INTRODUCTION

Petrol also known as Premium Motor Spirit (PMS) or gasoline is a complex combination of hydrocarbons and non hydrocarbons. About 95% of the components in petrol vapour or fumes are alicyclic compounds and less than 2% aromatics (Gupta and Dogra 2002). Non hydrocarbon components include sulphur, vanadium and nickel (Akinosun et al., 2006). Petroleum also contains various volatile compounds such as benzene, toluene, xylene, cadmium, lead and arsenic (Edokpolo et al., 2014). These substances are present in Premium Motor Spirit (PMS) could evaporate, be inhaled or even be absorbed into the body through the skin (Rowat, 1998, Mitri et al., 2015).

Petrol station attendants' exposure to gasoline or petrol vapours while refueling motor vehicles has generated a lot about the health effect of gasoline on the health of these attendants in Nigeria, being a tropical country with high temperature for most period of the year which may increase the vaporization of petrol. Furthermore, exposure for prolong period during extended working hours especially during fuel scarcity may also be associated with poor health outcomes (Ogunkoya et al., 2018). The benzene content of petrol is limited by regulations to 6-8% in Nigeria, between 1-5% in USA and Europe (Rowat, 1998; Udonwa et al., 2009), but may have risen due to removal of lead additives. Atmospheric concentration of gasoline vapour (approximately 2000 ppm) is not safe when inhaled even for a brief period. During fuelling of vehicles, the atmospheric concentration is between 20 to 200 ppm (Pranjic et al., 2002; Lewne et al., 2006). This amount is higher when there is long queue of cars to be fuelled, which is a usual occurrence during fuel scarcity.

PMS remains the only option used as fuel in the automobile industry in Nigeria without any viable alternative in sight. In Nigeria, petrol station attendants are the norms rather than self dispensers as seen in advanced countries, increasing the chance of exposure (Rowat, 1998). Some petrol station attendants do not wear personal protective equipment and personal hygiene is variable at workplace. Increased health and safety risks have characterized many occupations all over the world (International Labour Organization, 2007). The health and safety of these workers are the responsibility of their employers. The implementation of health and safety practices in the workplace start with instituting safety policies, providing protective equipment and enforcing these policies. These will reduce workplace injuries and safeguard the health and wellbeing of employees (Akpan, 2011). The effect of poor safety policies is felt more in occupations and occupational environments than others, leading to early retirements of young workers due to poor health status (Ezenwa, 2001). Workers are subjected to psychosocial, physical, biological and chemical hazards in workplaces which lead to injuries, disabilities and premature death (Rosenstock et al., 1990). 2 million workers die yearly from ill health and injuries suffered from their places of work worldwide and about 270 million fatal work related injuries occur each year (International Labor Organization, 2007). Work related injuries from chemical compounds is on the increase worldwide and is fast becoming a major concern in workplaces (Cezar-Vaz, 2012).

Petrol filling stations are facilities where fuels and lubricants for automobiles and other machineries such as PMS, kerosene, aviation fuel and engine oil can be purchased. In Nigeria, as a result of rapidly increasing population, the increased demand for these products has led to proliferation of filling stations sometimes in close proximity to or within densely populated neighborhoods (Ahmed et al., 2014). These petroleum products often release vaporized chemical components which are highly inflammable at high temperature resulting in fire outbreaks and pose a significant health risk to petrol station workers (Emokpae et al., 2020).

The volatile hydrocarbons present in PMS primarily get absorbed into blood through respiratory tract (Periago and Prado 2005), causing damages to various vital body organs such as the liver in the body (Friday et al., 2005). Petrol contains Benzene, Toluene and Xylene, which are known potential neurotoxins, irritants as well as carcinogens

(Edokpolo et al., 2015). Exposures to these petroleum products have also been associated with diseases like dermatitis (Goldberg, 1992), hematological abnormalities (Pranjic et al., 2002; Udonwa et al., 2009), malignancies (Linet et al., 1996), respiratory disorders (Ogunkoya et al., 2018), and kidney dysfunctions (Neghab et al., 2015).

A study carried out in Ghana (Ansah et al., 2012) concluded that there were appropriate safety management practices at fuel stations across central and western regions. However, fuel station attendants are exposed to hazardous fuel contents due to inadequate provision of PPE. Another study done to assess the level of awareness of health hazards and the use of PPE by fuel pump attendants in Benin City, Nigeria (Emokpae et al., 2020) revealed that despite the fact that 95 % of participants were aware of one form of PPE or another and 24.4% were aware of the health hazards of petroleum products, only 18.8% actually use PPE at work. Most of the participants were in the age range of 18-25years. The study showed that the awareness level of a worker on occupational risk is closely associated with the provision of proper knowledge and understanding of the subject and recommended the provision of an effective training module in order to improve the awareness level of occupationally exposed workers. A study from Ile-Ife, Nigeria (Afolabi et al., 2011) on safety practices in filling stations among participants with a mean age of 24 years in which majority of participants were within the age range of 18-24 years showed the level of awareness of safety measures was 93% and 91% of study participants had attended some training on safety measures. The study does not explore the type of PPE used by filling station attendants.

In a study carried out among paramedics in California, USA who are at risk of exposure to human immunodeficiency virus, hepatitis B virus and hepatitis C infection from occupational blood exposure investigated if and how regular was the supply of PPE and selected safety devices by their employers, Mathew et al., (2008) revealed that the lack of safety devices is the major factor affecting their use and increased supply of PPE, training of participants and safety device improvement are germane in protecting the paramedics from exposure. Runyan et al., 2008 studied teens and adolescents working in retail service sectors and their exposure to various harmful agents and noise. Despite continuous exposures to these harmful occupational hazards, few teens actually reported using PPE despite provision by their employers, though those who were trained on the danger of occupational exposures and use of PPE reported higher compliance and of usage compared to their compatriots who received no training.

Therefore, training and retraining will equip workers with knowledge, techniques and procedures important for taking preventive measures and reduce the occurrence of workplace injuries (Geller, 2005; Clarke, 2008).

OBJECTIVES

The objectives of this study were to assess the degree of awareness of safety training and retraining, safety policy enforcement and availability of PPE among petrol pump attendants in Sagamu metropolis and to determine the types of PPE used at work on regular basis.

MATERIALS AND METHODS

Study area/ study population

This study was carried out among filling station attendants in Sagamu metropolis. Sagamu is one of the four main cities in Ogun State, Nigeria. It is about 50.75 km from Lagos. Sagamu is a conglomerate of 13 towns located along Ibu River and Eruwuru stream between Lagos and Ibadan. It was founded in the mid 19th century by members of the Remo branch of the Yoruba people in south-western Nigeria.

Study design

This cross-sectional study was done between April and September, 2018 among petrol pump attendants who were occupationally exposed to PMS for more than a year. Only those who met the inclusion criteria and gave verbal and written informed consent were included in the study.

Sampling technique

There were 142 petrol pump attendants in Sagamu at the time of this study. The list of all petrol pump attendants in Sagamu was compiled and each individual was contacted. Two attendants who

were below the age of 16 years and 5 who did not give informed consent were excluded. Using simple random sampling technique, 106 out of the remaining 135 petrol station attendants were selected and included in the study. A male participant was randomly picked for every female participant picked (this consists of 50 males and 56 females).

Sample size estimation

The sample size was calculated using the formula in healthy survey with prevalence of exposure to petrol fumes of 50% (Araoye, 2004).
nf= n/1+[n]/N
nf= the deserved sample size when population is less than 10,000.
n= the desired sample size when population is more than 10,000.
N= the total population which in this case is 142.
n is however calculated using the following formula
$n= [z/d]^2 p q$
z= the standard score corresponding to a given confident level.
P= estimated disease prevalence.
Q=1-p
d=difference between two sub samples = 0.05
$n= [1.96/0.05]^2 0.5[1- 0.5]$
n= [[3.84/0.0025]0.25
n= 384.
The sample size nf= n/1+ [n/N]
=384/1 + [384/142]
=384/1+2.704
=384/3.704
103.7
~ **104**

Ethical approval

The study protocol was reviewed and approved by the Research and Ethics Committee of Olabisi Onabanjo University Teaching Hospital, Sagamu, Ogun State, Nigeria (Ethical Number: OOUTH/REC/326/658). Permission was also obtained from managers of the various petrol stations and informed consent was obtained from participants at the commencement of the study.

Inclusion criteria

Participants above the age of 16 years who had worked as petrol pump attendants for more than a year in 8-40 hours per week work schedule and gave informed consent were included in this study.

Data collection

Data was collected with the use of pre-validated investigator-administered questionnaires. The questionnaire was open ended and divided into 3 sections or tools.
Tool 1 contained questions on socio-demographic data such as age, sex, weight, height, body mass index, religion, marital status, level of education and the duration of employment.
Tool 2 used a 5 Point Likert scale to evaluate level of perception of safety training and retraining, safety practices enforcement and the availability of PPE among petrol pump attendants with score ranging from strongly disagree, disagree, no idea, agree to strongly agree.
Tool 3 was used to ascertain the type of PPE each petrol pump attendants used on regular basis. Each attendant was asked to list the PPE he or she used on regular basis.

Statistical analysis

The data obtained was analyzed using Statistical Package for Social Sciences [SPSS] programme version 20. Means and standard deviation were used to summarize numerical quantitative variables. Percentages and proportions were used to describe categorical variables and tables were used as a method of data presentation.

RESULTS

The study showed that most 18(16.98%) of petrol pump attendants worked in filling stations owned by Total Petroleum, followed by Texaco 16(15.09%), Oando 14(13.21%) and African Petroleum 14(13.21%) (Table1).

There were 50 males and 56 females in the study group. The age range of study participants was 16-45 years with an average age of 26.41±5.61 years (Tables 2 and 3). The highest number of respondents were single (64.2%) while smaller proportions were married (26.4%), divorced (3.8%), separated (5.7%) or widowed (0.0%) (Table1). Majority of respondents (66.0%) had secondary level of education, while 21.7% and 10.4% had primary and tertiary education respectively (Table

Table 1. Shows the distribution of petrol pump attendants in filling stations in Sagamu, Ogun State, Nigeria.

Filling stations	Number of attendants. N (%)	Number of Participants. n (%)
Total	18(12.68)	18(16.98)
NNPC	9(6.34)	6(5.66)
Oando	17(11.97)	14(13.21)
African Petroleum (AP)	19(13.38)	14(13.21)
Conoil	7(4.93)	4(3.77)
Mobil	11(7.75)	8(7.55)
Capital oil	7(4.93)	4(3.77)
Texaco	21(14.79)	16(15.09)
Energie oil	7(4.93)	4(3.77)
Gatelink Petroleum	7(4.93)	3(2.84)
Others	19(13.38)	15(14.15)
TOTAL	**142**	**106(100)**

2). The mean weight, height and BMI of participants were 64.87±10.10kg, 1.63±0.09m and 25.55±4.30kg/m^2 respectively (Table 3). This showed that young, single individuals with secondary school education were more likely to be occupationally exposed than any other demographic group.

Most petrol pump attendants 55(51.9%) had worked for less than 5 years. 39(36.8%) had worked for 6-10 years while only a small number, 12(15.9%) have worked for >10 years. The mean duration of employment was 6.08±4.04 years (Table 4).

67(63.2%) of petrol pump attendants strongly agreed or agreed that they were trained and retrained on safety measures by their employers, 6(5.6%) had no idea, 33(31.2%) disagreed or strongly disagreed. Also 50 (47.2%) petrol pump attendants agreed or strongly agreed that their employers instituted and enforced safety policies at their various work places, 12 (11.3%) had no idea, 26(24.5%) disagreed while 18(17.0%) strongly disagreed. In terms of provision of personal protective equipment at work places, 17(25.4%) petrol pump attendants strongly agreed or agreed that their employers provided them with PPE at their various places of employment while 23(21.7%) disagreed or strongly disagreed (Table 5). Most petrol pump attendants used uniforms/aprons/overalls as a form of PPE at work, 23(21.7) used hand gloves, 37(34.9) used boots, 17(16%) used face mask and only 02(1.9) used face shields or goggles at work. (Table 6) This showed that less than half of petrol pump attendants in this study used one form of PPE or another put them at risk of occupational disorders with long-term consequences on their health and wellbeing.

DISCUSSION

The importance of training and equipping petrol pump attendants with appropriate and knowledge and equipment in order for them to safely discharge their duties cannot be over emphasized. This precautionary measures and training will lead to reduction of work related injuries and overall burden of occupational diseases (Geller, 2005).

The age range of study participants was 16-45 years with an average age of 26.41±5.61 years. The observed age range of workers in our study is consistent with that reported by Afolabi et al., (2011) and Emokpae et al., (2020). This showed that teenagers and adolescents are at higher risk of occupational exposures in this economic sector, hence the need for proper trainings and supervision on potential occupational hazards and use of PPE in order to safeguard their health and wellbeing into adulthood.

Findings from this study showed that majority of study participants (63.2%) agreed they were trained

Table 2. Shows the socio-demographic characteristics of Petrol pumps attendants in Sagamu, Ogun State, Nigeria.

Characteristic	Petrol pump Attendants Frequency (%)
Age (Years)	
16-25	65(61.3)
26-35	36(34.0)
36-45	5(4.7)
Sex	
Male	50(47.2)
Female	56(52.8)
Marital Status	
Married	14(13.2)
Single	68(64.2)
Divorced	4(3.8)
Separated	6(5.7)
Widowed	8(7.5)
Level of Education	
Primary	23(21.7)
Secondary	70(66.0)
Tertiary	11(10.4)
NFE	2(1.9)
Religion	
Christianity	52(49.1)
Islam	48(45.3)
ATR	6(5.7)

NFE: Non-Formal Education, **ATR:** African Traditional Religion.

Table 3. shows the mean age, weight, height and BMI of petrol pump attendants in Sagamu, Ogun State, Nigeria.

Variables	Mean $\pm$ STD Deviation
Age (years)	26.41$\pm$5.61
Weight (kg)	64.87$\pm$10.10
Height (m)	1.63$\pm$0.09
BMI (kg/m^2)	25.55$\pm$4.30

and retrained on safety practices at workplaces. Most employers believe that employees will comply with safety measures put in place if they are properly trained. This is in agreement with findings by Ansah and Mintah in Ghana (2012) but lower than finding by Afolabi et al., (2011), in which 92.6% were aware or trained about safety measures.

This study also revealed that petrol pump attendants believed that less than half of petrol station employers actually put mechanisms in place to enforce safety measures at petrol filling stations. This is similar to findings by Ansah and Mintah, (2012). Despite the fact that these oil marketers are required by law to provide safety policies, most did not comply probably due to poor oversight by regulatory agencies of government who were to ensure compliance by these petrol marketers. Employers have both legal and moral responsibilities to protect their employees from harms and injuries at their workplaces (Ezenwa, 2001).

Providing adequate safety facilities at workplaces is one of the most important mandate and function of employers (Runyan et al., 2008; Akpan, 2011). In this study only just above a quarter of respondents

Table 4. Shows the duration of employment (in Years) of petrol pump attendants in Sagamu, Ogun State, Nigeria.

Variables	Frequency (%)
Duration of employment (years)	
1-5	55(51.9)
6-10	39(36.8)
11-15	7(6.6)
16-20	3(2.8)
≥21	2(1.9)

The mean duration of employment in years is 6.08±4.04

Table 5. Shows frequency data of safety measures among petrol pump attendants in Sagamu, Ogun State, Nigeria.

Variables	Agree (%)	Strongly Agree (%)	No Idea (%)	Disagree (%)	Strongly Disagree (%)	Total (%)
Safety Training and Retraining	51(48.1)	16(15.1)	6(5.6)	22(20.8)	11(10.4)	106(100)
Safety policy and enforcement	35(33.0)	15(14.2)	12(11.3)	26(24.5)	18(17.0)	106(100)
Personal protective Equipment	19(17.9)	8(7.5)	56(52.9)	21(19.8)	2(1.9)	106(100)

Table 6. Shows the use of Personal protective equipment on regular basis by petrol pump attendants in Sagamu, Ogun State.

Variables	Frequency n(%)
Hand gloves	23(21.7)
Face shields/ Google	02(1.9)
Boots	37(34.9)
Aprons/ Overalls/ Uniforms	97(91.5)
Masks	17(16.0)

There were multiple responses

agreed or strongly agreed that their employers provided enough PPE. This is similar to finding by Ansah and Mintah (2012) in Ghana. The effort to eradicate exposure to adverse agents at work place should be complemented by the desire of employee to provide adequate PPE for employees.

In this study, overalls/uniforms/aprons were the most commonly used PPE (97%) while hand gloves, face mask and face shields/ goggle were used in less than a quarter of petrol pump attendants. This is similar to findings by Emokpae et al., (2020) in which only 18.8% of petrol pump attendants used any form of PPE at work. However, Mathew et al., 2008, showed that the use of PPE can improve with

training (Afolabi et al., 2011) and availability of PPE (Mathew et al., 2008). Petrol marketers need to invest in safety equipment at their various filling stations in order to safeguard the health and safety of their employees. Government agencies with oversight functions should ensure that these petrol marketers comply with existing safety laws in the country (Mathew et al., 2008).

CONCLUSION

Observing laid down safety measures by petrol pump attendants to mitigate occupational exposure to hazardous components of petroleum product is very important as there are no established safe limits of exposure in such sectors of the economy in most developing countries. Enforcement of existing laws by supervising agencies of government is also essential. This study has shown that 63.2% agreed they were trained and retrained on safety practices, 47.2% agree that safety measures were instituted and enforced by employers and only 25.4% strongly agree or agree that their employers provided them with PPE.

Enforcement of the use of PPE by petrol pump attendants will reduce occupational exposure to harmful components of petroleum products and safeguard the health and wellbeing of workers in this important sector of Nigerian economy.

RECOMMENDATIONS

This study recommends that petrol pump employers should be mandated by safety authorities in Nigeria to strengthen training, enforce compliance with safety policies and provide adequate PPE especially face masks, gloves, face shields and goggles to petrol pump attendants in their employment.

AKNOWLEDGEMENT

We appreciate the contributions of petrol station managers and petrol pump attendants in Sagamu metropolis toward the success of this study.

FINANCIAL SUPPORT

The authors received no sponsorship for this work.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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