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Risk Perception amongst Petrol Pump Attendants and Analysis of Indiscriminate Siting of Petrol Stations in Enugu Metropolis

Perception des Risques par les Pompistes et Analyse de l'Emplacement des Stations-Service dans la Métropole d'Enugu

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ABSTRACT

Proliferation and unregulated siting of petrol stations expose petrol pump attendants to occupational hazards. This study assessed knowledge, risk perception, occupational hazards of petrol pump attendants and site-suitability of petrol stations in Enugu metropolis, Nigeria.

This was a cross-sectional analytical study of 210 pump attendants from 105 petrol stations spread within the city and highways. A structured pretested, interviewer-administered questionnaire and a check-list were used to collect data. Analyses were done using descriptive and inferential statistics. Mean age of the respondents was 23.55 ± 5.43 with 65.7% being females, three-quarters (75%) had good knowledge, while 64.3% had poor risk perception of occupational hazards. The commonest hazards reported were fuel inhalation (81.0%) (always) and fuel splashes (81.4%) (sometimes). About half (46.7%) of the respondents used protective equipment. Most of petrol stations had functional fire extinguishers (99.0%) and sand buckets (98.1%) while 36.2% had muster points. Forty percent and 76.2% of petrol stations had inadequate residential and road setbacks respectively with private petrol stations and those on streets leading.

Poor risk perception of hazards and indiscriminate siting of the petrol stations exposed petrol pump attendants to hazards. Adequate regulation and enforcement of petrol station operating guidelines with regular safety and health training is necessary. **WAJM 2023; 40(2): 181–189.**

Keywords: Occupational hazards, petrol pump attendants, petrol stations, site suitability.

RÉSUMÉ

La prolifération et l'implantation non réglementée des stations-service se poursuivent, exposant les pompistes à des risques professionnels. Cette étude a évalué les connaissances, la perception des risques, les risques professionnels des pompistes et l'adéquation des sites des stations-service dans la métropole d'Enugu, au Nigeria.

Il s'agit d'une étude analytique transversale portant sur 210 pompistes de 105 stations-service réparties dans la ville et sur les routes. Un questionnaire structuré, pré-testé, administré par un enquêteur et une liste de contrôle ont été utilisés pour collecter les données. Les analyses ont été effectuées à l'aide de statistiques descriptives et inférentielles. L'âge moyen des personnes interrogées était de $23,55 \pm 5,43$ ans, 65,7 % étant des femmes, les trois quarts (75 %) avaient une bonne connaissance des risques professionnels, tandis que 64,3 % avaient une mauvaise perception des risques. Les risques les plus fréquemment signalés étaient l'inhalation de carburant (81,0 %) (toujours) et les éclaboussures de carburant (81,4 %) (parfois). Environ la moitié (46,7 %) des personnes interrogées utilisaient des équipements de protection. La plupart des stations-service disposaient d'extincteurs fonctionnels (99,0%), de seaux à sable (98,1%) et 36,2% de points de rassemblement. Quarante pour cent et 76,2 % des stations-service n'avaient pas de marge de recul suffisante par rapport aux habitations et aux routes, les stations-service privées et celles situées dans les rues étant en tête.

La mauvaise perception des risques et l'emplacement des stations-service exposent les pompistes à des dangers. Une réglementation adéquate et l'application des directives d'exploitation des stations-service, ainsi que des formations régulières en matière de sécurité et de santé, sont nécessaires. **WAJM 2023; 40(2): 181–189.**

Mots clés: Risques professionnels, Pompistes, Stations-service, Adéquation du site.

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INTRODUCTION

Premium Motor Spirit (PMS) also called Petrol or Gasoline is one of the byproducts of fractional distillation of petroleum and the main source of energy demands in the world, especially in developing countries.¹ This is aided by increasing population, limited electricity generation and poor innovation in clean energy alternatives.² The PMS contains Volatile Organic Compounds (VOC) such as Benzene, which is regulated at 6–8% exposure limits in Nigeria and 1–5% exposure limits in USA and Europe.³ Most people are exposed to petrol through air pollution whenever it is dispensed in the Petrol Stations (PSs) or depots, contamination of underground water from leaks in underground tanks and fuel spillage during fueling and refueling. However, the Petrol Pump Attendants (PPAs) are most at risk because of their occupational exposure.⁴

Increased urban growth due to population increase has led to proliferation of PSs beyond the regulatory capabilities of government. PSs lack standard safety measures like fire protections, layout and location.⁵ These PSs are constituted both on the city streets and expressways or highways. The city streets PSs are located in residential and commercial areas where they serve town commuters and domestic needs. Expressway PSs are for intra or interstate commuters and long-distance travelers. The residential and road setbacks PSs differ depending on the location and the organization that owns it-government, multinational or privately owned.

PPAs are high risk group of workers who dispense PMS and other products in PSs and are constantly exposed to VOCs (mainly Benzene, Toluene, Ethylbenzene and Xylenes) and several other workplace hazards-physical, psychological and ergonomic.^{6,7} Occupational hazards (chemical) from petrol enter the body mainly through inhalation of polluted atmospheric air, body contact and ingestion through contaminated water and food. The health effects are due to long term exposure and may be multisystemic resulting in neurotoxicity, nephrotoxicity, cardiotoxicity and hepatotoxicity. Other systems involved

are the respiratory system, reproductive system, immunological and gastrointestinal system.^{3,4,6} Above effects can be mitigated by ensuring safety practices, appropriate emergency response, personal protective equipment (PPE), staff training and retraining and protection of the environment by standardized siting of PSs.⁵ However, safety practices depend on adequate knowledge and high-risk perception of the harmful effects of hazards by the PPAs and the safety measures put in place by the employers.⁷

An estimated 0.07% of PPAs die annually from work related ill-health and injuries and about 5.3% suffer from work related injuries.⁸ Benzene, Toluene, Ethylbenzene and Xylene (BTEX) contribute to 20–25% of air pollution.⁹ Exposure to contaminated air result in 50% of BTEX absorbed into the body.⁹ World Health Organization estimates that 4 in 1 million people are at risk of developing leukemia in their life time following exposure to 1mg/m³ of Benzene.¹⁰ A study in Uyo, Nigeria found that workers exposed to BTEX are associated with multisystemic toxicity profile.¹¹ Another study in Uyo, Nigeria found that among hazards PPAs are exposed to, 67.4% inhaled petrol fumes, 52.1% were abused by customers, 45.6% complained of noise and 29.5% complained of eye irritation.⁶ American fire protection association noted an estimated 7400 fires and explosions occurred at public service stations per year from 1994 to 1998 in America with one civilian death, 37 civilian injuries and 7.7 million dollars loss and damage in civilian property.^{7,12} Many PSs in Nigeria and developing countries do not adopt suitability criteria in siting their stations. A study in Oyo state, Nigeria, found that 2.65% and 5.31% of PSs were in the high and medium suitability zones, 67.3% were at an unacceptable distance to residential land use while 5% have their dispensing pumps at least 15m off the edge of the road.¹³ Another study in Port Harcourt noted that 53% of PSs do not comply with Department of Petroleum Resource (DPR) guidelines in locating PSs.¹⁴ The use of safety measures is generally poor among PSs in Nigeria. A study in Uyo, Nigeria found that 7.0% used PPE and only 4.2% had any form of medical examinations.⁶

Despite known standard safety measures and practices that help minimize exposure to hazards and established standard guidelines to operate a PS regulated by DPR or town planning authorities, PPAs are still exposed to a wide spectrum of occupational hazards with short- and long-term implications. This study helped in understanding the occupational hazards profile common among PPAs in Enugu metropolis, the exposure sources and safety measures in place. Understanding of knowledge and risk perception levels would help in targeted health education and safety training intervention to minimize risk. Understanding the impact of poor regulation among the designated agencies in assessing road and residential setback could prevent deficiencies in siting of PSs.

This study aimed at describing the occupational hazards of petrol pump attendants, assessing the knowledge and risk perception of workers towards occupational hazards of their workplace, determining the safety practices in their workplace and the site suitability of the petrol stations.

METHODOLOGY

The study area was Enugu metropolis which is the capital of Enugu State in the South East geopolitical zone of Nigeria and former headquarter of former Eastern Nigeria. It is constituted by three Local Government Areas (LGAs) which are Enugu North, Enugu South and Enugu East. The three LGAs have a combined population of 722,664 which is 22.2% of the state population and 0.515 of the Nigerian population.^{15,16} Most inhabitants are civil servants and traders. There are industrial layout for establishment of industries that run on petroleum products for energy. It also has heavy presence of transportation companies that convey people to other states in the country. In the metropolis, hundreds of PSs are located along the city streets and expressways and they belonged to independent and major oil marketers.

The study was a descriptive cross-sectional study of PPAs working in functional PSs for at least three months prior to the data collection period that gave consent to participate in the study.

Those who were working as managers, supervisors, cashiers, cleaners and clerks were excluded. The minimum sample size was determined using formula for one proportion. The awareness of occupational hazards among petrol pump attendants was 85.3% from a previous study.¹⁷ A minimum of 210 PPAs were recruited for the study after correcting for attrition.

A multistage sampling technique was used to select participants. The PSs were stratified into city streets and expressway PSs. Total of 105 PSs were selected by simple random sampling using the balloting method (52 were selected from the expressway and 53 from the city streets), followed by selection of two PPAs per PS to recruit the required number of participants.

A structured, pretested, interviewer – administered questionnaire was used to assess the knowledge, risk perception, occupational hazards and safety measures of the workplace. The questionnaire was adapted from published articles.^{5,7,18} Observational checklist was also used to assess the available standard of safety practices. Two resident doctors were used as research assistants, they were trained for two days, two hours per day on the objectives of the study, the study instrument and the ethics of the study. The knowledge section contained 25 questions, correct responses were scored 1 and wrong responses scored zero. Scores more than 50% were graded as good knowledge while score less than 50% were graded as poor knowledge. Also, the risk perception section contained 7 questions, correct responses were scored as 1 while wrong responses were scored zero. Scores more than 50% were noted as good risk perception while scores less than 50% were noted as poor risk perception. The standard setback from petrol pump to residential buildings and to the road were 30.48 meters (100 feet) and 15 meters respectively.^{5,19} PS sited below these values were noted as abnormal.

Data collected were analyzed using SPSS software version 20.0. Categorical variables were summarized using frequencies and percentages while quantitative variables were summarized

using mean and standard deviation. Comparative variables were analyzed using Chi-square.

Ethical clearance was obtained from the Health Research Ethics Committee (HREC) of University of Nigeria Teaching Hospital, Ituku-Ozalla. Permission were obtained from the unions and owners of filling stations and informed consent were obtained from the participants.

RESULTS

The mean age of PPAs was 23.55 ± 5.43 years with age range from 17 to 53 years. Most of the respondents, 94.3% were below 30 years of age. About two-thirds (65.7%) were females and three quarters of respondents (74.3%) had secondary education and below. Majority, (97.1%) were single. The respondents were mostly Christians and of Igbo ethnic group. About half (53.3%) of the PPAs worked in private petrol station. Most respondents (97.1%) had worked for 1–5 years with median years of working experience as 1 year. Among the respondents, majority had worked for 6 days or more. The mean working days per week was 6.23 ± 0.77 . The mean working hours per day was 10.04 ± 2.8 hours. Majority (86.7%) had safety training before start of work, only 3.3% had pre-employment medical examination [see Table 1].

About 75.2% of respondents had good knowledge of occupational hazards of workplace with many stating correct examples of hazards. Majority of respondents (90%) knew that petrol is harmful, however, half knew that it could cause dermatitis whereas 23.8% knew that it could cause cancers. The reported commonest route of entry of petrol was inhalation (92.9%) and majority knew safety practices in the workplace. [see Table 2].

The commonest hazards experienced by PPAs were reported “sometimes” as fuel splashes (81.4%) and “always” as fuel inhalation, verbal abuse and excessive noise (81.0%, 35.2%, 51.4%) respectively. [see Table 3].

Concerning the use of appropriate PPE, most PPAs never use gloves (94.8%), masks (99.0%), colored vests (95.2%) and safety glasses (98.6%), while 52.9% and 46.7% never use overall and

boots respectively. Most workers noted that good strategies were employed to minimize risk / hazards which were mainly due to the use of automated pumps, carefulness, hand washing and reporting of events. However, only 28.1% reported periodic training [see Table 3].

About two-thirds (64.3%) of respondents had poor risk perception of occupational hazards of workplace. Three-quarters (76.2%) of respondents believe that their health is at risk. However, 40.5% prefer another job. More than half, 50.5% and 54.8% of the workers still indicated interest on needed knowledge and training respectively. [see Table 4].

Many of the PSs observed were deficient in the use / provision of PPE like overall (48.6%) and designated muster points (36.2%). The other observed safety measures were all available (policy document, sand bucket, functional fire extinguisher, first aid, protective canopy and safety signs) [See Table 5].

The proportion of PSs with setback to residential buildings less than 30 meters was 40% while 76.2% had setback to the road less than 15 meters. About 34.7% of multinational PSs had inadequate distance to residential buildings while 44.6% of private PSs were also noted to be inadequate. This difference was not significant statistically, though. About 63.3% of the multinationals had inadequate distance to the road while 87.5% of the private PSs also had inadequate distance to the road. The statistical difference in this measure was however significant. On the way the filling stations were sited, 13.5% of those sited on the expressway had inadequate distance to residential buildings while 66.0% of those sited on the city streets were inadequate. The difference was statistically significant. Also, 61.5% of filling stations sited on expressways had inadequate distance to road while 90.6% of those sited on city streets were inadequate. The difference was statistically significant. Most of the filling stations on the expressways had adequate residential setbacks, whether multinational or private, while more of the private filling stations had inadequate road setbacks. About two-thirds of filling stations on the city streets had in-

Table 1: Socio-demographic and Work Experience Characteristics of Respondents

| Variables | Frequency | Percentage |
|---|-----------|------------|
| Age | | |
| 15 – 24 | 145 | 69.1 |
| 25 – 34 | 55 | 26.2 |
| 35 – 44 | 7 | 3.3 |
| 45 – 54 | 3 | 1.4 |
| Mean = 23.55; Standard deviation = ± 5.43 | | |
| Sex | | |
| Male | 72 | 34.3 |
| Female | 138 | 65.7 |
| Educational status | | |
| None | 1 | 0.5 |
| Primary | 3 | 1.4 |
| Secondary | 156 | 74.3 |
| Tertiary | 50 | 23.8 |
| Type of filling station | | |
| Government owned | 17 | 8.1 |
| Multinational / major oil marketers | 81 | 38.6 |
| Private owned / independent marketers | 112 | 53.3 |
| Work experience (Years) | | |
| 1 – 5 | 204 | 97.1 |
| 6 – 10 | 2 | 1.0 |
| 11 – 15 | 3 | 1.4 |
| 16 – 20 | 1 | 0.5 |
| Median | 1.00 | |
| Work days per week | | |
| 4 | 11 | 5.2 |
| 5 | 10 | 4.8 |
| 6 | 109 | 51.9 |
| 7 | 80 | 38.1 |
| Mean | 6.23 | |
| Standard deviation | 0.767 | |
| Work hours per day | | |
| 1 – 8 hours | 96 | 45.7 |
| 9 – 17 hours | 114 | 54.3 |
| Mean | 10.04 | |
| Standard deviation | 2.82 | |
| Safety training | | |
| Yes | 182 | 86.7 |

adequate residential setbacks while most of the filling stations (private > multinationals) on the city streets had inadequate road setbacks.

DISCUSSION

This study found that PPAs consists mainly of young adults who were mostly single and have completed secondary schools. These findings were consistent with those of the studies in Uyo, Calabar, Ife, Sokoto, Nigeria, Ghana and Brazil.^{3-7,17,18} This was because pump attendant jobs were mostly temporary

jobs and with monthly pay below the minimum wage and considered as a transit job.⁶ There was female preference to males as revealed in this work. This agreed with study in Uyo, Nigeria,⁶ but contrasted with the study in Sokoto and Ife, in Nigeria, and those in Ghana and Brazil.^{5,7,17,18} Young adult males in the eastern part of Nigeria are engaged in trading or other strenuous apprentice jobs compared to the Northern and Western part of the country. Also, most of the females undertook the job because of shift duties that provide the

opportunity to combine pump attendance with other activities and jobs. This could contribute further to the health burden of young females which are, but not limited to, reproductive toxicities, genetic and carcinogenic toxicities.¹¹ More than half of respondents, (53.3%) worked in private owned PSs. Studies in Ado Ekiti and Ilorin, Nigeria showed very high number of private PSs, 97% and 69% respectively.^{20,21} Most of these private stations were owned by independents marketers whose capacity to institute health and safety measures were mostly not in compliance to standards set in the guidelines, thereby increasing the occupational hazards Pass are exposed to. The years of working experience ranged from less than a year to 20 years with most respondents (97.1%) having worked for 1–5 years. The median years of work duration was 1 year. This agreed with the study in Uyo and Sokoto, Nigeria,^{6,7} and could possibly be due to the proliferation of PSs, the low wage structure of the job, therefore requiring recruiting frequently; as young people took it as a transit job while hoping for a better paying job. The mean working hours of these PPAs was 10.04 (2.82) hours and it is known that above the 8 hours, time weighted average exposure and the mean work days per week of 6.23 (0.767) increases the susceptibility of workers to occupational hazards of the workers. Majority of respondents (86.7%) reported receiving safety training before starting work. This contrasts with study in Ghana where 52% received training before starting work.¹⁷ Though most of respondents (86.7%) in this study admitted being trained before dispensing petrol, the quality of the training was observed to be generally poor. Only few stations employed the services of experts in training employees while majority were trained after weeks of apprenticeship under older attendants. Only 7 (3.3%) of respondents had medical examination out of which 6 (85.7%) had pre-employment examination. This shows the negative attitude of employers to the safety measures of workers.

The good knowledge of occupational hazards noted in this study contrasted with study in Sokoto State, Nigeria.⁷ This could be due to difference

Table 2: Knowledge of Occupational Hazards among Petrol Pump Attendants

| Variables | Frequency (N = 210) | Percentage (%) |
|---|---------------------|----------------|
| Examples of hazards | | |
| Fuel splashes | 194 | 92.4 |
| Workplace violence | 174 | 82.9 |
| Fuel leaks | 165 | 78.6 |
| Fire outbreaks | 165 | 78.6 |
| Noise | 162 | 77.1 |
| Armed robbery | 162 | 77.1 |
| Is petrol a harmful substance | | |
| Yes | 189 | 90.0 |
| No | 21 | 10.0 |
| Health problems of petrol | | |
| Dermatitis / skin contact disease | 105 | 50.0 |
| Restlessness | 95 | 45.2 |
| Abdominal pains | 91 | 43.3 |
| Kidney problems | 55 | 26.2 |
| Blood cancers like lymphoma | 50 | 23.8 |
| Name of chemicals in petrol | 2 | 1.0 |
| Most common chemical (benzene) | 2 | 1.0 |
| Knowledge of Route of entry | | |
| Inhalation | 195 | 92.9 |
| Ingestion | 149 | 71.0 |
| Contact | 92 | 43.8 |
| Knowledge of Safety practices in workplace | 210 | 100 |
| No smoking | 209 | 99.5 |
| No lighting of matches | 208 | 99.0 |
| Keeping engine off | 207 | 98.6 |
| Washing of hands | 181 | 86.2 |
| Not eating while dispensing | 181 | 86.2 |
| Wearing of protective equipment | 178 | 84.8 |
| Knowledge levels | | |
| Good knowledge | 158 | 75.2 |
| Bad knowledge | 52 | 24.8 |

in the category of knowledge questions asked, as the study in Sokoto included practice questions with consequent low proportions, otherwise other knowledge questions showed higher proportion of knowledge scores. Despite the higher proportion of knowledge scores, only 1% were able to name any chemical in petrol. The knowledge level was found not to be statistically associated with socio-demographic factors nor of work experience. These categories of workers acquired their knowledge of occupational hazards informally through experience in their workplace and repeated occurrences in their work environment.

The commonest occupational hazards, either always or sometimes reported were fuel inhalation, fatigue,

excessive noise, verbal abuse, sexual harassment, fuel splashes on skin and eyes and fuel leaks. These were consistent with findings in Uyo in Nigeria and as well as Brazil.^{6,18} This was because the PPAs were more susceptible to these hazards. They hardly wore mask to limit the inhalation of petrol vapor and their close proximity to the pump increased their risks of exposure and the splashes of petrol depending on petrol pump pressure. Some vehicle tanks under the dispensing pressure vomits out petrol that can splash on skin and eyes as commonly seen among the inexperienced dispensers. The experienced ones have to reduce the pressure flow from the pump. Fuel leak used to occur following faulty rubber hose and the pump nozzle;

unless repaired, the attendants will continue to be exposed to petrol contact. Other psycho-social hazards like verbal abuse and sexual harassment resulted from relationship with customers, mostly from transporters and tricyclic drivers. The attendants were trained to tolerate them as much as possible, thus creating gaps in managing workplace violence. Excessive noise was noted due to the location of petrol stations on major roads where noise pollution was common. These occupational hazards increased the burden of health problems faced by petrol pumps attendants. Some occupational hazards were not reported, they included fire outbreaks, collision with cars, physical abuse and robbery. These were controlled either by security presence, emergency response measures and personal carefulness of attendants and customers. The occurrence of these occupational hazards was associated with the presence of safety measures intended to minimize them except sexual harassment that is commoner among females than males.

There was generally poor use of personal protective equipment as safety measures by the respondents, most of them never used gloves, mask, colored vest and safety glasses while less than half, 40% and 38.6%, of respondents always use overall and boots respectively. This agreed with study in Uyo and Sokoto and disagreed with studies in Brazil^{6,7,18} where most of respondents were found to use gloves (77.7%) and mask (100.0%), however, the use of overall and boots are similar to the findings in this study. This was dependent on the employers, most of whom did not provide the workers with the necessary protective equipment needed and did not train them on the benefits of PPEs so as to give them the opportunity of providing for themselves. Most of the overalls and boots worn by most of the workers were improvised. They wore the company's uniform and these simultaneously serve as overall and boots. The poor use of PPEs increases workers exposure to occupational hazards. Employees should be educated on the cost effectiveness of PPEs and workers should be trained on the importance and use of PPEs. Other safety

Table 3: Volunteered Occupational Hazards and Work Habits of Petrol Pump Attendants

| Variables | Responses | | |
|--|------------|------------|------------|
| | Never | Sometimes | Always |
| Occupational Hazards | | | |
| Fire outbreak | 193 (91.9) | 17 (8.1) | 0 (0.0) |
| Collision with cars | 190 (90.5) | 20 (9.5) | 0 (0.0) |
| Physical abuse | 137 (65.2) | 66 (31.4) | 7 (3.3) |
| Robbery (Armed) | 112 (53.3) | 97 (46.2) | 1 (0.5) |
| Sexual harassment | 111 (52.9) | 77 (36.7) | 22 (10.5) |
| Eye contact with fuel | 111 (52.9) | 99 (47.1) | 0 (0.0) |
| Fuel leak | 96 (45.7) | 112 (53.3) | 2 (1.0) |
| Excessive noise | 33 (15.7) | 69 (32.9) | 108 (51.4) |
| Fuel splashes | 30 (14.3) | 171 (81.4) | 9 (4.3) |
| Fatigue | 25 (11.9) | 85 (40.5) | 100 (47.6) |
| Verbal abuse | 24 (11.4) | 112 (53.3) | 74 (35.2) |
| Fuel inhalation | 5 (2.4) | 35 (16.7) | 170 (81.0) |
| Work habits of Petrol Pump Attendants | | | |
| Use of personal protective equipment | | | |
| Gloves | 199 (94.8) | 9 (4.3) | 2 (1.0) |
| Overall | 111 (52.9) | 15 (7.1) | 84 (40.0) |
| Mask | 208 (99.0) | 2 (1.0) | 0 (0.0) |
| Boots | 98 (46.7) | 31 (14.8) | 81 (38.6) |
| Coloured vest | 200 (95.2) | 7 (3.3) | 3 (1.4) |
| Safety glasses | 207 (98.6) | 3 (1.4) | 0 (0.0) |

Table 3b: Factors associated with Occupational Hazards among Petrol Pump Attendants

| Variables | Occupational Hazards | | | Statistical Test | |
|--------------------------|----------------------|-----------|--------|------------------|---------|
| | Fuel Splashes | | | Chi-square | P-value |
| | Never | Sometimes | Always | | |
| Knowledge level | | | | | |
| Poor | 12 | 38 | 2 | 19.267 | 0.000* |
| Good | 18 | 133 | 7 | | |
| Work experience | | | | | |
| 1 – 2 years | 28 | 144 | 8 | 1.764 | 0.433 |
| 3 – 20 years | 2 | 27 | 1 | | |
| Sexual Harassment | | | | | |
| Sex | | | | | |
| Male | 67 | 4 | 1 | 19.267 | 0.000* |
| Female | 44 | 73 | 21 | | |
| Verbal abuse | | | | | |
| Knowledge level | | | | | |
| Poor | 11 | 35 | 6 | 1.764 | 0.433 |
| Good | 13 | 77 | 68 | | |
| Sex | | | | | |
| Male | 11 | 38 | 23 | 1.764 | 0.433 |
| Female | 13 | 74 | 51 | | |

• Significant ** Fischer's exact test

measures employed to minimize risk or hazards were found to be good like automated pump, regular hand washing and reporting of adverse events. This

contrasted with study in Brazil.¹⁸ This could be due to very high missing values or high non-responses to the questions. Also, this study found that 28.1% of

respondents had periodic training as strategy to minimize risk. Only the first safety training with questionable quality prior to onset of work was reported to be given to the workers throughout their stay. The periodic safety trainings were carried out by the government/multinational PSs and the impact on the reduction in the incident of unsafe events was significant. The training was important to enhance health education and safety training. This was an area which employees need to imbibe to help improve occupational health practices and prevent hazards.

This study found poor risk perception of occupational hazards among attendants (64.3%) in their workplace despite the high level of knowledge of occupational hazards of their workplace. This poor perception of risk would lead to poor practice of safety measures and poor work habits as was reported in this study. This contrasted with study in Brazil where there was poor information on the level of risk perception of occupational hazards of PPAs.¹⁸ The risk perception was not found to be associated with socio-demographic or workplace experience. This could be influenced by safety measures provided by employers, temporary nature of the job and personal disposition to the job.

Each PS was observed for adequacy of safety measures using an observational checklist. It was found that most of the PSs were equipped with policy documents (96.2%), first aid box (82.9%), protective canopy (98.1%), sand bucket (98.1), which are mostly positioned very close to pump and could be poorly utilized if there were accidents, and functional fire extinguishers (99.0%). The high availability of above-mentioned items could be due to usual check/supervision by the DPR or the unions. About 60% of PSs had safety sign, some had their signs erased during repainting of their station, and those stations were advised to replace the signs highlighting the safety and legal implications to them and customers. Wash rooms (90.5%) and running water (76.2%) were found to be available in most petrol stations. However, personnel protective equipment was not satisfactorily present. This is important because of its direct use by

Table 4: Risk Perception of Petrol Pump Attendants to Occupational Hazards

| Variables | Responses | | |
|---|-----------------------------|------------|------------|
| | Yes | No | Don't Know |
| Think your life or health is at risk because of this job? | 160 (76.2) | 42 (20.0) | 8 (3.8) |
| Prefer to do another kind of job because of this job? | 85 (40.5) | 112 (53.3) | 13 (6.2) |
| Think you have adequate knowledge of the risk? | 93 (44.3) | 106 (50.5) | 11 (5.2) |
| Think you have enough training to avoid risk in your job? | 86 (41.0) | 115 (54.8) | 9 (4.3) |
| Think you are most at risk to chemical hazards? | 180 (85.7) | 18 (8.6) | 12 (5.7) |
| Think you are most at risk to physical hazards? | 84 (40.0) | 112 (53.3) | 14 (6.7) |
| Think you are most at risk to psychological hazards? | 145 (69.0) | 49 (23.3) | 16 (7.6) |
| Risk Perception Level | Frequency Percentage | | |
| Good risk perception | 75 | 35.7 | |
| Poor risk perception | 135 | 64.3 | |

Table 5: Observational Checklist of Filling Station

| Variables | Frequency N = 105 | Percentage (%) |
|--------------------------------|-------------------|----------------|
| Policy document | 101 | 96.2 |
| Sand bucket | 103 | 98.1 |
| Fire extinguisher | 104 | 99.0 |
| Functional fire extinguisher | 104 | 99.0 |
| First aid box | 87 | 82.9 |
| Protective canopy | 103 | 98.1 |
| Safety signs | 63 | 60.0 |
| Face masks | 3 | 2.9 |
| Overall | 51 | 48.6 |
| Reflective or coloured vest | 1 | 1.0 |
| Boots | 59 | 56.2 |
| Gloves | 4 | 3.8 |
| Muster point or Assembly point | 38 | 36.2 |
| Wash room | 95 | 90.5 |
| Running water | 80 | 76.2 |

Table 5b: Association of Work Habits (Periodic Training), Muster Point and Type of Filling Station

| Variable | Periodic Training | | Statistical Test | |
|--------------------------------|--------------------|-------------------|-------------------|----------------|
| | Yes | No | Chi-square | P-value |
| Type of Filling Station | | | | |
| Government /Multinational | 46 | 52 | 32.297 | 0.000* |
| Private | 13 | 99 | | |
| Muster Points | | | | |
| | Present (%) | Absent (%) | Chi-square | P-value |
| Government /Multinational | 59 (60.2) | 39 (39.8) | 41.856 | 0.000* |
| Private | 19 (17.0) | 93 (83.0%) | | |

*Significant

the workers to self-protect themselves since they are in direct contact and in close proximity to petrol fumes and cars. The use of reflective vest was generally deficient because most PSs did not know much about it since they do not work 24 hours per day. The above findings agreed with similar findings in Uyo and Ife in Nigeria and in Ghana.^{5,6,17}

The site suitability of PSs poses both occupational and environmental challenges. Poorly sited PS will contribute to air and underground water pollution, accidents in and around workplace and increased fire accidents. Also, a poorly sited PS leads to poor conception, perception of risk and consequently poor safety measures. This study found that 40% of petrol stations had inadequate distance from dispensing pump to residential buildings while 76.2% had inadequate distance from dispensing pump to the road. This agreed with studies in Port Harcourt, Ife and Oyo in Nigeria on road setbacks but deferred on residential setbacks where more than half (60.0%) of the PSs had inadequate residential setbacks.^{5,13,14} The generally substandard residential and road setbacks of PSs was due to poor monitoring, regulation and implementation of standard guidelines for establishment of PSs making them not to comply with guidelines and encourages poor attitude and low risk perception to potential hazards and consequently poor safety measures. These expose residential houses, passersby on the road and petrol PPAs to the risk of air pollution from fuel inhalation, underground water pollution from leaking underground tanks, and accidents including fire outbreaks. This study further looked at the distribution of these residential and road setbacks to the type and site of petrol station. It was found that more of privately owned PSs (independent petrol marketers) were inadequately located compared to government / multinational owned PSs (major oil marketers). The abnormality was more pronounced in road setbacks; the difference was found to be significant. This agreed with a study in Ife, Nigeria.⁵ The major oil marketers are more likely to be organized and follow the laws in setting up their PSs. Also, PSs sited on the city streets were worse off in their

Table 6: Distribution of Distance of Petrol Station by Kind of PFS and Site of PFS

| Variables | Distance To Residential Buildings | | Statistical Test | |
|--|-----------------------------------|-------------------|------------------|---------|
| | Frequency (%) | Percentage (%) | Chi-square | P-value |
| Adequate | 63 | 60.0 | | |
| Inadequate | 42 | 40.0 | | |
| Distance to Road | | | | |
| Adequate | 25 | 23.8 | | |
| Inadequate | 80 | 76.2 | | |
| Distance to Residential Buildings | Adequate | Inadequate | | |
| Kind of PFS | | | | |
| Government / Multinational | 32 (65.3) | 17 (34.7) | 1.078 | 0.324 |
| Private | 31 (55.4) | 25 (44.6) | | |
| Distance to Road | | | | |
| Government / Multinational | 18 (36.7) | 31 (63.3) | 8.461 | 0.005* |
| Private | 7 (12.5) | 49 (87.5) | | |
| Distance to Residential Buildings | | | | |
| Site of PFS | | | | |
| Expressway | 45 (86.5) | 7 (13.5) | 30.231 | 0.000* |
| City streets | 18 (34.0) | 35 (66.0) | | |
| Distance to road | | | | |
| Expressway | 20 (38.5) | 32 (61.5) | 12.192 | 0.001* |
| City streets | 5 (9.4) | 48 (90.6) | | |
| Distance to Residential Buildings | Adequate | Inadequate | | |
| Expressway | | | | |
| Government / Multinational | 23 (92.0) | 2 (8.0) | | 0.422 |
| Private | 22 (81.5) | 5 (18.9) | | |
| Distance to Road | | | | |
| Government / Multinational | 13 (52.0) | 12 (48.0) | 3.729 | 0.087 |
| Private | 7 (25.9) | 20 (74.1) | | |
| Distance to Residential Buildings | Adequate | Inadequate | | |
| City streets | | | | |
| Government / Multinational | 9 (37.5) | 15 (62.5) | 0.245 | 0.772 |
| Private | 9 (31.0) | 20 (69.0) | | |
| Distance to Road | | | | |
| Government / Multinational | 5 (20.8) | 19 (79.2) | | 0.015** |
| Private | 0 (0.0) | 29 (100.0) | | |

setbacks compared to those sited on expressways and the differences were also found to be significant. This is likely due to availability of more land space following limited commercial activities in the expressway that naturally allows investors to acquire piece of land to build station at lower cost compared to city streets. However, we acknowledge the limitations of this study. The questionnaire used for this study was self-constructed, and pretested for adequacy before use, however, it contains some leading questions which will necessitate qualitative research to

explore more perspectives from these PPAs.

CONCLUSION

This study found that PPA is a high-risk occupational group made up of young adult population of mainly females with mostly secondary education. They were found to have good knowledge of hazards with poor risk perception and were commonly exposed to occupational hazards of fuel inhalation, fuel splashes, fuel leaks and workplace violence of sexual harassment and verbal abuse. The use of PPE was found to be poor coupled

with poor periodic safety training mostly among the private PSs. Inadequate setbacks were noted from the road and residential areas, 74.2% and 40% respectively. The inadequacy of the setbacks were commoner among the private stations located mainly in the city streets.

Recommendations

Repeated training on health, safety and protective measures among PPAs to improve their perception and practice of health and safety is advocated. Efforts should be made towards encouraging employers to improve safety measures in the workplace. Authorities like DPR should enforce PS operating guidelines.

Conflict of Interest

None.

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