



ORIGINAL ARTICLE

Assessment of Occupational Hazards, Health Problems and Safety Practices of Petrol Station Attendants in Uyo, Nigeria

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ABSTRACT

Background: Petrol station attendants encounter several hazards and health problems while working. This study was conducted to determine the occupational hazards, health problems and safety practices of petrol station attendants in Uyo, Nigeria.

Methods: This was a descriptive cross-sectional study carried out among all consenting attendants working in filling stations owned by independent petroleum marketers in Uyo. Data was collected using structured interviewer-administered questionnaire and analyzed using STATA 12.1 software. Analysis employed descriptive and inferential statistics. Level of significance was set at 5%.

Results: A total of 215 respondents participated in the study. The mean age of respondents was 24.3 ± 4.6 years with 117 (54.4%) being females. Hazards reported included inhalation of petrol fumes 145 (67.4%), confrontation from customers 112 (52.1%) and noise 98 (45.6%). Health problems reported included headache (53.6%), low back pain (33.3%), eye irritation (29.5%), dizziness (24.6%), cough (18.6%) and nausea (18.6%). There was a statistically significant association between having headache, nausea, cough and inhalation of petrol vapour ($p < 0.01$) or car exhaust fumes ($p < 0.05$). Awareness about personal protective equipment was 30.7%, while use was 7.0%. Hand washing after contact with fuel was practiced by 73.5% of the respondents. Only 4.2% reported ever undergoing pre- or post-employment medical examination.

Conclusion: Petrol station attendants in this study were exposed to various hazards and health problems. Awareness and use of PPE was very low. Efforts should be made by stakeholders to ensure that owners of filling stations take responsibility for the health and safety of their workers.

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INTRODUCTION

Petrol station attendants are workers who dispense premium motor spirits and other petrochemical products commonly sold at filling stations. Several studies have reported that these categories of workers are exposed to several hazards in their workplaces, which

could be physical, chemical or ergonomic.¹⁻³ A hazard is a substance or situation that has the potential of causing adverse health effect to a person.⁴ One of the physical factors is extremes of temperature depending on the season. Exposure to excessive heat can lead to heat stress which may result in adverse mental and

physical effects such as anger, depression, dizziness and reduced performance, while repeated exposure to air temperature of 0-16 degrees centigrade can cause hypothermia and chilblains^{5, 6} Petrol station attendants are also exposed to loud sounds and distracting noise levels from vehicles which could lead to irritability, physical stress and decreased hearing acuity.⁷ In a study in Brazil, physical hazard was reported by 88.2% of the petrol station attendants.³

Ergonomic risk factors on the other hand can arise from repetitive movements which the attendants engage in and from standing for long hours.^{3, 7} Chemical hazards which emanate mainly from contact and inhalation of fuel are recognised to have profound impact on petrol attendants. These workers are exposed to both the hydrocarbon in fuel and the fumes from the exhaust of vehicles.⁸ The pollutants from fuel include benzene, toluene, ethylbenzene and xylenes (BTEX) which can lead to several health conditions such as neurological diseases and cancers. It can also cause teratogenicity. Many diseases affecting the immune, endocrine, cardiovascular, respiratory and reproductive systems have also been attributed to benzene which is considered the most hazardous pollutant in gasoline due to its genotoxic and carcinogenic effects.⁸⁻¹³ Long term exposure of petrol attendants to petrol vapour have been reported to cause hepatotoxicity, nephrotoxicity and cardiotoxicity.^{14, 15} A link has been observed between long term exposure to benzene and higher prevalence of hypertension.¹⁵

Another system of the body commonly showing the health effect of exposure to volatile fuel is the haemopoietic system. Benzene in petrol is harmful to the bone marrow and can decrease the number of red blood cells leading to anaemia.¹⁶ Studies have recorded a significantly lower packed cell

volume (PCV) among petrol attendants compared to the general population.¹⁷⁻¹⁹ According to Azari et al²⁰, petrol station attendants are more exposed to health risks associated with benzene than with any other compound. As a result of the inhalation of these volatile petroleum products, petrol station attendants often develop several symptoms. At low doses, petrol vapour is irritating to the eyes, respiratory tract and skin. Exposure to higher concentration may produce effects on the central nervous system.²¹ Common symptoms reported by petrol station attendants as documented in different studies include chronic cough, breathlessness, nausea, vomiting, redness of the eyes, musculoskeletal disorders, low back pain, headache, fatigue and dizziness.²²⁻²⁴ Inhalation of petrol on regular basis can trigger migraine headache in some individuals.²⁵

Since the different petroleum products which the attendants dispense at filling stations are flammable even at low temperature, there is always a risk of fire outbreak or explosion if a source of ignition is present. The provision of fire fighting equipment at such facilities is a dire necessity.² The use of personal protective equipment (PPE) is an important safety measure which should be common practice among petrol station attendants to safeguard inhaling the fumes of the volatile liquids. Studies among petrol attendants such as those carried out in Ghana and Brazil for example, have reported use of appropriate PPE ranging from 0 to 44%.^{24, 26, 27}

Despite the numerous petrol stations in Uyo, there is paucity of data on the hazards and health problems of the attendants in these stations. The only documented study carried out in 2011 focused on effect of gasoline inhalation on the menstrual characteristics and the hormonal profile of female petrol pump workers.¹¹ Considering the various hazards

that petrol attendants are exposed to and the resultant short and long term health implications, this study's objectives were to determine the occupational hazards, health problems and safety practices of petrol station attendants in Uyo, Nigeria with the intention of communicating findings and making recommendations to the owners of the stations and other stakeholders.

METHODOLOGY

The study was a descriptive cross-sectional study carried out among petrol station attendants working in filling stations owned by independent petroleum marketers in Uyo between April and May 2017. Uyo is the capital of Akwa Ibom State which is located in the south-south zone of Nigeria. It is a fast-growing city with network of roads and an increasing number of vehicles. The estimated population of Uyo as at 2017 is 436,606 with a growth rate of 2.5%.²⁸ Most inhabitants of Uyo metropolis are civil servants and traders. Transportation in Uyo is mainly by tricycles for non-car owners.²⁹ Many of the civil servants go to work using their private vehicles. According to the Chairman of the Independent Petroleum Marketers Association of Nigeria, there are 81 petrol stations owned by their registered members in Uyo. Petrol stations belonging to the major oil marketer's association of Nigeria (MOMAN) were excluded from the study as approval to carry out research in their stations could not be secured from the association.

The formula for estimating single proportion for cross sectional studies was used in calculating the sample size,³⁰ with prevalence, (14%) being the proportion of petrol station attendants exposed to robbery in a previous study,³¹ z of 1.96, sampling error set at 5%, and 10% over estimation to accommodate for non-response. A sample size of 204 was obtained. All the filling stations owned by independent

marketers were included in the study. Each filling station had an average of 4 petrol attendants. Most of them worked from 7am to 9pm with 1-2 off duty days per week, while a few stations had 2 shifts of 6am to 2pm and 2pm to 10pm. In some stations, the newly employed were allowed to work for shorter periods until they were used to the job. Data collection was carried out both in the morning and afternoon in stations where shift duties were observed. All consenting attendants were selected from each filling station until all the 81 filling stations were covered. No coercion was applied on non-consenting attendants. Data was collected using structured interviewer administered questionnaire which was developed by the researchers based on the objectives of the study. Information obtained included respondents' socio-demographic characteristics, identified hazards in the stations, health problems, use of PPE and safety practices. In order to ensure adequate comprehension, the tool was pretested on 20 attendants working in 10 filling stations in Abak, a town about 20 km from Uyo. Ambiguous questions were rephrased based on the feedback from the pretest. Eight resident doctors who were previously trained by the researchers functioned as research assistants in the data collection activity. The hazards, health problems and safety practices of petrol station attendants were discussed with them and all items on the questionnaire were reviewed until comprehension was ensured. Data collection was carried out over a period of one month.

The data obtained was analyzed using STATA 12.1 software. Data analysis was done using descriptive statistics (frequency and proportion to summarize variables) and inferential statistics (chi square to test the significance of association between two categorical variables). Association was explored between inhaling petrol

vapour/vehicle exhaust fumes and the different health problems reported by the respondents. Level of significance was set at 5%. Ethical clearance was obtained from the Akwa Ibom State Health Research Committee. Permission to carry out the research was obtained from the Chairman, Independent Petroleum Marketers Association of Nigeria (IPMAN), Uyo who in turn issued an official letter to the researchers to take to each station. Permission was also obtained from the owners of the individual filling stations. The purpose, content and significance of the study were adequately explained to the respondents after which written consent was obtained from each of them. Participation was entirely voluntary. No names were used to ensure confidentiality.

RESULTS

A total of 215 out of 240 respondents participated in the study giving a response rate of 89.6%. The mean age of respondents was 24.3 ± 4.6 years with a total of 117 (54.4%) respondents being females. Majority, 195 (90.7%) were single and 180 (83.7%) had secondary level of education only. About half of the respondents, 109 (50.7%) had worked for more than a year. The mean daily length of duty was 10.6 ± 3.6 hours. The respondents' monthly income ranged from ₦8,000 to ₦30,000, with majority earning < ₦20,000 (Table 1) The hazards reported by the petrol attendant included inhalation of petrol fumes 145 (67.4%), confrontation from customers 112 (52.1%) and exposure to noise 98 (45.6%). (Fig 1)

Majority of the respondents, 183 (85.1%) experienced various health problems since commencement of work as petrol station attendants. The commonest health problems reported were headache, 98 (53.6%), low back pain 61 (33.3%) and eye irritation 54 (29.5%). Also, 128 (59.5%) reported accidental

occurrences, the commonest being fuel splash on the skin, 109 (85.2%).

Table 1: Socio-demographic characteristics of respondents

Variable	Frequency (n=215)	Percent
Age (years)		
16-20	51	23.7
21-25	92	42.8
26-30	55	25.6
>30	17	7.9
Mean age(SD) years	24.3 ± 4.6	
Sex		
Male	98	45.6
Female	117	54.4
Marital status		
Single	195	90.7
Married	17	7.9
Others*	3	1.4
Educational level		
Primary	13	6.1
Secondary	180	83.7
Tertiary	22	10.2
Monthly Income(₦)		
<20,000	209	97.2
>20,000	6	2.8
Range ₦8,000-₦30,000		
Work years		
<1	106	49.3
1-5	94	43.7
>5	15	7.0
Daily work hours		
≤8	76	35.3
>8	139	64.7
Mean work hours (SD)= 10.6 ± 3.6		

*Separated, divorced, widowed

(Table 2) Only 66 (30.7%) were aware of the existence of any type of PPE for use by petrol attendants, out of which the most commonly known were boots 28 (42.4%), overall 28 (42.4%) and face mask 23 (34.9%). Moreover, only 15 (7.0%) reported using any type of PPE with the most commonly used also being boots 7 (46.7%), overall 5 (33.3%) and face mask 3 (20.0%).

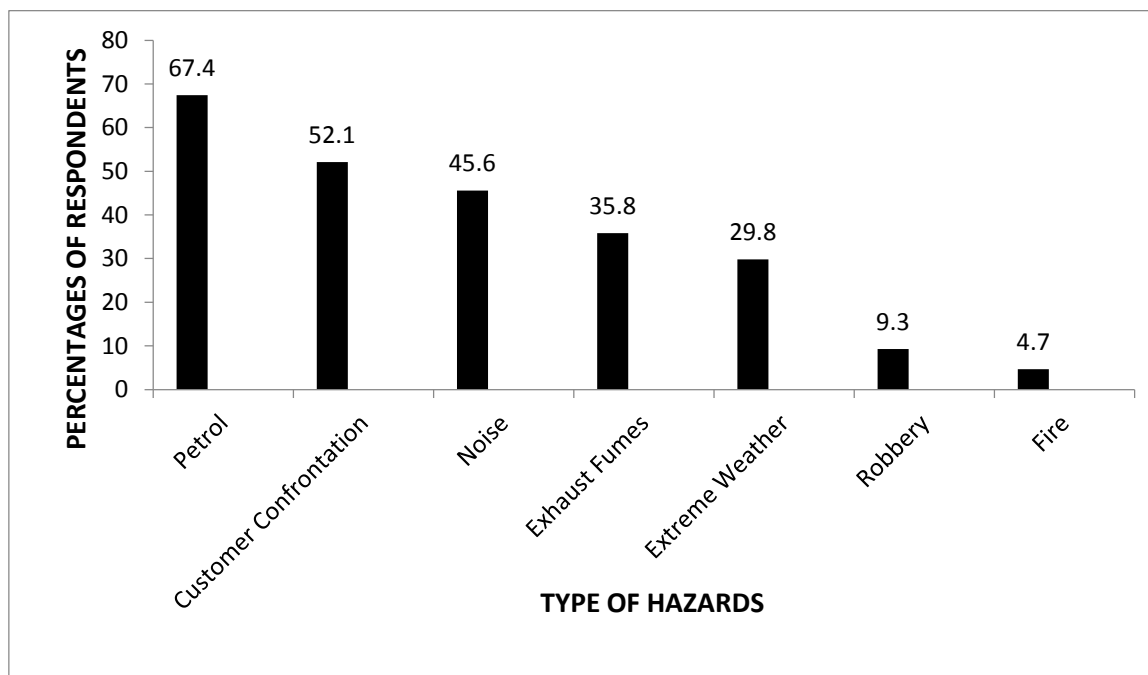


Figure 1: Hazards experienced by respondents

(Table 3) The least available facility was first aid box (23.7%) while the most available was fire extinguisher 200 (93.0%). One hundred and fifty eight (73.5%) of the respondents reported always washing their hands after contact with fuel while 102 (47.4%) always washed their hands before eating snacks. Only 9 (4.2%) reported undergoing medical examination before or after commencement of work as petrol station attendants. (Table 4)

There was a statistically significant association between having headache, nausea and the inhalation of petrol vapour. Among those who had reported headache, 81 (82.7%) had inhaled petrol vapour compared to 17 (17.4%) who had not ($p < 0.01$). Similarly among those who reported nausea, 31 (91.2%) had inhaled petrol vapour compared to 3 (8.8%) who had not ($p < 0.01$). (Table 5) There was also a statistically significant association between having nausea, cough and the inhalation of car exhaust fumes. Among both those who had nausea and cough, 18 (52.9%) complained of inhaling car exhaust fumes compared to 16 (47.1%) who did not ($p < 0.05$). (Table 6)

Table 2: Health problems and accidents experienced by respondents while working

Variable	Frequency	Percent
Health problem	n=215	
Yes	183	85.1
No	32	14.9
*Type of health problem	n=183	
Headache	98	53.6
LBP	61	33.3
Eye irritation	54	29.5
Dizziness	45	24.6
Cough	34	18.6
Nausea	34	18.6
MSD	33	18.0
Itching	22	12.0
Rashes	16	8.7
Breathlessness	13	7.1
Vomiting	12	6.6
Accident	n=215	
Yes	128	59.5
No	87	40.5
*Type of accident	n=128	
Fuel on skin	109	85.2
Splash of fuel into eyes	52	40.6
Collision of attendant and vehicle	13	10.2

*Multiple responses

Table 3: Awareness and use of PPE by respondents

Variable	Frequency	Percent
Awareness about any PPE	n=215	
Yes	66	30.7
No	149	69.3
*Type	n=66	
Boots	28	42.4
Overall	28	42.4
Face mask	23	34.9
Gloves	17	25.8
Goggles	9	13.6
Hood	2	3.0
Use of PPE	n=215	
Yes	15	7.0
No	200	93.0
*Type	n=15	
Boots	7	46.7
Overall	5	33.3
Face mask	3	20.0
Goggle	1	6.7
Gloves	1	6.7
Hood	1	6.7

*Multiple responses

Table 4: Available facilities at filling station and practices by respondents

Variable	Frequency	Percent
	n=215	
Facilities		
Washroom	160	74.4
First aid box	51	23.7
Water	195	90.7
Fire extinguisher	200	93.0
Spill containment device	161	74.9
Hand washing practices		
After contact with fuel	158	73.5
Before eating snacks	102	47.4
Before eating food with hand	190	88.4
Medical exam		
Yes	9	4.2
No	206	95.8

Table 5: Association between inhalation of petrol vapour and selected health problems

Health problem	Inhaling petrol vapour		x ²	p-value
	Yes (n=126) n (%)	No (n=57) n (%)		
Headache				
Yes	81(82.7)	17 (17.3)	18.7	0.00*
No	45 (52.9)	40 (47.1)		
Nausea				
Yes	31 (91.2)	3 (8.8)	9.7	0.00*
No	95 (63.8)	54 (36.2)		
Dizziness				
Yes	33 (73.3)	12 (26.7)	0.6	0.45
No	93 (67.4)	45 (32.6)		
Cough				
Yes	27 (79.4)	7 (20.6)	2.2	0.14
No	99 (66.4)	50 (33.6)		

*Significant

DISCUSSION

This study's objectives were to determine the occupational hazards, health problems and safety practices of petrol station attendants in Uyo, Nigeria. The respondents in this study were majorly young people, who were mostly single and had completed secondary education. This is consistent with findings of similar studies.^{27, 31}

The female attendants were slightly more than the males. This is in contrast with findings of similar studies in Minna, Nigeria and Brazil where the male attendants constituted 75% and 90.5% of the workforce, respectively.^{27, 31} In the study area of the present study, whereas other groups of workers exposed to fuel such as automobile technicians were mostly males,³² the work of a petrol station attendant on the other hand is not considered to be strenuous and is therefore commonly engaged in by females. This could however expose these female attendants to additional health challenges besides the general health problems common to both sexes.

Table 6: Association between inhalation of exhaust fumes and selected health problems

Health problem	Inhaling exhaust fumes		x ²	p-value
	Yes (n=69) n (%)	No (n=114) n (%)		
Headache				
Yes	42 (42.9)	56 (57.1)	2.38	0.12
No	27 (31.8)	58 (68.2)		
Nausea				
Yes	18 (52.9)	16 (47.1)	4.13	0.04*
No	51 (34.2)	98 (65.8)		
Dizziness				
Yes	19 (42.2)	26 (57.8)	0.52	0.47
No	50 (36.2)	88 (63.8)		
Cough				
Yes	18 (52.9)	16 (47.1)	4.13	0.04*
No	51(34.2)	98 (65.8)		

*Significant

For instance, exposure to chemical agents such as benzene, toluene and xylene among women working in petrochemical industries was reported to have resulted in the birth of underweight children.³³ Benzene can also have teratogenic effect and it is considered the most hazardous pollutant in gasoline due to its genotoxic and carcinogenic effects.^{8, 10, 12, 13} Also, a study reported that gasoline inhalation among female attendants was significantly associated with disorders in both menstrual cycle length and quantity of flow, with fluctuating levels of reproductive hormones compared to the control group ($p < 0.01$). This may interfere with ovarian functions with possible reproductive impairment.¹¹

Nearly half of the respondents in the present study had worked for less than a year. A possible reason could be the fact that many were young and may just have started working after recently completing their secondary education. Another possible reason could be that people quit the job frequently, thus necessitating fresh recruitment on regular

basis. Whatever the reason, it was likely that staying longer on the job would most likely expose the respondents to more hazards, possibly resulting in more health problems especially with an average daily work period of up to 10 hours. The commonest occupational hazard reported by about two thirds of the respondents in the present study was inhalation of petrol vapour while on duty. This was however lower than findings of 77.8% and 98% reported among petrol attendants in studies in Brazil and Ghana, respectively.^{3, 24} These workers are exposed to both the hydrocarbon in fuel and the fumes from the exhaust of vehicles which have numerous adverse effects.⁸ Among the pollutants from fuel, benzene is considered the most hazardous due to its genotoxic and carcinogenic effects.⁸⁻¹³

Another hazardous situation reported by up to half of the respondents was incidents of confrontations from customers, while almost a tenth had experienced robbery attacks. A similar study in Ghana reported customer

confrontation and robbery attack of 80.7% and 78.6%, respectively²⁴ while another study reported robbery attack of 14%.³⁴ These acts of violence could be life threatening and need to be addressed. Security measures should therefore be put in place at filling stations to ensure safety of the workers. Although there is always a risk of fire outbreak or explosion in a filling station if a source of ignition is present, fire outbreak was reported by less than 5% of the respondents in the present study. It was also commendable that more than nine out of every ten respondents reported adequate availability of fire extinguishers in the filling stations.

More than eight out of every ten respondents had experienced certain health problems since they started working in the petrol stations. The health problems reported included headache, low back pain, eye irritation, cough and nausea. Similar symptoms were observed in other studies.^{18, 24, 35} In the present study, cough, nausea and headache were significantly associated with the inhalation of petrol vapour and car exhaust fumes. The existence of these substances in a petrol station is inevitable. Efforts must therefore be made to reduce the extent to which petrol station attendants are exposed to them. Despite the health problems reported in this study, records of pre-employment and post-employment medical examination was less than 5%. This means that early detection of progressing health conditions is not likely among the attendants in these stations.

Concerning safety practices, only about a third of respondents were aware of the existence of any type of PPE for use by petrol station attendants and consequently, less than a tenth used any. Considering the presence of hydrocarbon and other pollutants in gasoline, the poor use of PPE as observed in the present study put the workers at risk of several diseases which could affect many systems of

the body.⁸⁻¹⁹ Lack of use of PPE may expose many of the attendants to accidental occurrences such as splashes of fuel on the skin and eyes. This volatile liquid easily gets absorbed into the body. A possible reason for the poor awareness about PPE by the respondents may be lack of adequate information from the employers about the hazards involved in working at a petrol station and the role of the different PPE in reducing exposure to such hazardous substances. It is also important to ascertain that the owners of the filling stations are aware of the full health implications of continuous exposure of the petrol attendants to the different hazards. This may motivate them to provide PPE in the workplaces for the attendants.

Other safety practices like hand washing after contact with fuel or before eating snacks was not optimal in the present study. This may have led to contamination of ingested snacks by petrochemical products. It is therefore very important to increase the awareness of this group of workers about the benefits of regular hand washing after accidental contact with fuel and before eating either snacks or food. When workers are made to realize their exposure to risks, they become co-responsible in the prevention of disease and accidents.³⁴ The availability of first aid box was strikingly low in the present study as less than a quarter of the respondents reported having such in their workplaces. The implication of this is that in the event of any medical emergency, majority of the respondents would not have the immediate medical assistance that first aid offers to ill or injured persons before definitive medical treatment can be accessed. Moreover, the petrol stations had no retainerships with hospitals in the city which means that the workers would have to be responsible for their medical treatment in the event of any mishap.

Limitations

This study was carried out among petrol station attendants working in filling stations owned by independent petroleum marketers as approval could not be obtained from the Major Oil Marketers Association of Nigeria (MOMAN). Being owned by multinational companies, the health and safety of workers in such stations may be better than findings of the present study. The findings of this study should therefore be limited to petrol stations owned by independent petroleum marketers.

Conclusion

Petrol station attendants in this study were exposed to various hazards and health problems. Awareness and use of PPE, hand washing practices, availability of first aid boxes and conducting of medical examinations were all poor. Efforts should be made by the independent petroleum marketers association and other stakeholders to ensure that the owners of filling stations take responsibility for the health and safety of their workers.

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