



Occupational Safety and Health Management Systems and Their Compliance among Petrol Stations in Kenya: A Case Study in Nakuru County

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Authors' contributions

This work was carried out in collaboration among all authors. Author JKM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors WM and Author SM managed the analyses of the study and refined the manuscript. Author JKM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Companies have a legal and social responsibility to ensure the safety of its workers, all persons lawfully present at the workplace and the surrounding community. This requires laid down procedures and routing process which aims at identifying, eliminating, minimizing and control the work-related hazards and decrease the risks. To be effective, the Occupational Safety and Health Management Systems (OSHMS) need to be integrated within the organization's safety policy and objectives. Therefore, this explains why OSHMS has continued to play a pivotal role in the decision making process in most companies. This study aimed at assessing occupational health and safety management systems in place and their compliance. The sampling unit was petrol stations and the study employed use descriptive study design. The purposive sampling was employed to select thirty two (32) petrol stations in Njoro Molo and Nakuru Municipalities of Nakuru County with a special focus on petrol stations which have dispenser pumps, car servicing bay and Front Office section. Data was collected using purposive sampling, stratified and simple random where interviews, observations and questionnaire survey. Descriptive statistics which involved frequency tables and

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percentages was used to analyze the data. The findings of this study shows that more than half of the petrol stations lacked defined Occupational Safety and Management systems. There is need of Occupational Safety and Health Management System to be integrated within petrol stations policy in order to reduce the operations mistakes, costs of reducing problems and level of risks while ensuring that they comply with laws and regulations.

Keywords: BTEX; compliance; occupational safety and health management systems; premium motor spirit.

1. INTRODUCTION

The number of petrol station has increased tremendously in the recent years in Kenya. These petrol stations are located in major routes and highways with passing traffic [1], towns and busy shopping centers serving as a vehicle fueling and servicing point, food outlets and parking areas [2]. Petrol stations have attracted large number of people both as staff and customers [3]; whereby some serves as a designated booking place where Public service Vehicles (PSV) starts or ends its scheduled route. This is despite the fact that petrol stations stores flammable materials, generates and releases toxic substances which consist of a mixture of benzene, toluene, ethylbenzene, and xylenes (BTEX) in all its operations [4]. The atmosphere around the petrol stations contains high concentration level of BTEX due to emission of toxic fumes during loading, storage, refueling, oil spill, exhaust fumes and leakages from Liquefied Pressurized Gas (LPG) Cylinders; pose a high potential risk to the environment, staff and general population [5]. Further, a study done by Jo and Song [6] indicates that exposure levels associated with gasoline vapour emissions in petrol service stations, car service bay and petroleum refineries were higher than those associated with motor vehicle emissions.

Apart from hazardous substances and fumes generated and release by petroleum products, other health and safety risks found in and around petrol station include fire and explosion, lone working, vehicle movements, lifting and carrying, slips, trips and falls [7]. Efficient and effective operations gains at any workplace including petrol stations are realized by organizations that move from simply attaining legal compliance towards implementing of the best practices of safety and Health [8]. The good occupational health and safety practices should be in balance with socio-economic needs of the workplace. A sound occupational health and safety management systems must link workplace operations in order to effectively manage the

business. The OSHMS aims at eliminating where possible or minimizing the likelihood of work related accidents, diseases and fatality cause by occupational hazards. Therefore, OSHMS encompasses monitoring, assessment, identification and control of hazard, ongoing inspection and incident investigation, emergency preparation and response to safeguard health of the workers and the public. It addresses the anticipated safety concerns and gives a room for continual improvement of the laid procedures and routing processes. The success of OSHMS depends on the commitment of all stakeholders including and not limited to top management, workers and customers. Petrol stations are required to establish a safety and health management systems which entails safety policy and periodic risk assessment to its hazardous nature [9] Fire incidences and explosions have been reported in petrol stations around the world. Notable incidences include petrol stations fire incidences in Ghana in year 2015 and 2017 where a total of 150 people and 3 people lost their lives respectively and dozens injured [10]. In Kenya, tankers explosions have been report along our major roads and highways killing dozens of people. Recently, a shell petrol station in Nairobi, Kenya, busted into flames. According to statement issued by Energy Regulatory Authority, the fire started after the motorist sped off while the pump was inside the vehicle's fuel tank; the friction between the ground and the pump produced sparks which ignited a fire. Although no injuries were reported on the 14th April 2018 incidence, however the station was extensively damaged. This has led to scrutiny on the level of emergency preparedness and responds plan, work procedures, safety culture and training which are part of issues addressed by OSHMS. There have been studies related to health and safety in both petroleum industry and other sectors in Kenya. For instance, Operational risks management in petroleum filling station [11] and Health and safety assessment in Kenyan petrol stations [12]. However these studies focused on examination and evaluation of operational risks management practices, safety

regulations awareness and management of physical controls to health and safety. Thus, this study intent to fill the research gap by documenting safety and health management systems in place and the compliance with existing safety regulations among petrol stations in Kenya.

2. METHODOLOGY

The study was conducted in Nakuru County and the sampling unit was petrol stations. The purposive sampling was used to select thirty two (32) petrol stations in Njoro Molo and Nakuru Municipality with a special focus on petrol stations which have dispenser pumps, car servicing bay and Front Office section. A number of respondents were picked randomly and proportionately drawn from each section in all petrol stations involved in the study to give a desired sample size of one hundred and two (192) [13]. The study used descriptive study design. A pilot test had been conducted to five (5) petrol stations in Naivasha subcounty to test the validity [14] and reliability [15] of the research instruments.

Both primary and secondary data was used. Data was collected through use of interviews, observations and questionnaire survey. Open and closed-ended questionnaires were used to

collect data from the respondents in forecourt, servicing and front office sections. Observational checklist was used to observe safety practices, recording of the health risks and physical structures and document records related to health and safety issues. The study used purposive sampling to select two (2) key informants from DOSHS to get depth information and an opportunity to clarify OHSMS issues arising from the interview process. The data collected from the field was coded, organised and analysed using descriptive statistics which involved frequency tables and percentages.

3. RESULTS AND DISCUSSION

3.1 Results

The study had set out to collect data from one hundred and ninety one (192) respondents but only one hundred and eighty three (180) which were successfully filled were analyzed representing 93.8% response rate. The study had more male respondents (76.1%) than female (23.9%) while the majority of the respondents were from the age bracket of 18-25 years (43.3%). Majority, 86.7% worked 8-10 hrs a day, 84.4% had worked 5 years and below while over 90% of the respondent had received post primary education (Table 1).

Table 1. Social economic characteristics of the respondents

| Social economic characteristics of the respondents | | |
|--|-----------------|------------|
| Variable | Frequency N=180 | Percentage |
| Age (years) | | |
| 18-25 years | 78 | 43.3 |
| 26-35 years | 69 | 38.3 |
| 36 - 45 years | 33 | 18.3 |
| Sex | | |
| Male | 137 | 76.1 |
| Female | 43 | 23.9 |
| Education | | |
| Primary | 16 | 8.9 |
| Secondary | 84 | 46.7 |
| Tertiary | 74 | 41.1 |
| University | 6 | 3.3 |
| Work experience | | |
| Below 1 year | 76 | 42.2 |
| 1-5 years | 76 | 42.2 |
| 6-10 years | 28 | 15.6 |
| Hours worked per day | | |
| Below 8 hours | 10 | 5.6 |
| 8-10 hours | 156 | 86.7 |
| 11-12 hours | 10 | 5.6 |
| Over 12 hours | 4 | 2.2 |

Source: Field data (2017)

The findings of the study shows that all respondents, 180 (100%) were aware of the occupational hazards associated with their job where more than one hazard/risk were mentioned. Risk of fire was reported by all respondents, 180 (100%) while commonest accident occurrence reported was fuel splash to skin and eyes, 162 (90%). Majority of the respondents, 108 (60%) stated that employer provided PPE, out of which the commonest being Aprons/overall. In addition, 12 (6.7%) reported use of PPE with the most commonly used being apron/overall, 10 (83.3%) and the least used being gloves and face mask, 1 (8.3%) each as illustrated in Table 2.

Most of the respondents 165 (91.7%) stated that they had specified work assignment where staff had define job descriptions outlining how to

perform their duties. However, from observation checklist, multitasking was evident in most stations whereby staff from front office and car servicing section could also been seen refueling customer's vehicles. Also, 126 (70%) reported that they had guidelines for emergency action plan mentioning evacuation plan, fire exits and fire assembly notices though 40% did not show any document to support it. Majority, (57.8%) said that they did not have written policy statement for their company while those who had, only 20% had them displaced at the front office. Only 34 (18.9%) reported undergoing medical examination before or after commencement of work with the most commonly medical test being chest examination 32 (94.1%), eye sight 10 (29.4) and blood sample 2 (5.9%). Most of the respondents 143 (97.9%) who had not been subjected to medical

Table 2. Hazards awareness, accidents experienced and use of PPE

| Hazard/Risk Awareness, accidents experienced by respondents and use of PPE while at work | | |
|---|----------------------|-----------------------|
| Variable | Frequency (n) | Percentage (%) |
| *Type of hazards/risks | n=180 | |
| Fire | 180 | 100 |
| Fuel contact with body | 170 | 93.9 |
| Inhalation of PMS | 154 | 85.6 |
| Oil spill | 149 | 82.8 |
| Run over by vehicles | 117 | 65 |
| Explosions | 113 | 63 |
| Cold | 47 | 26.1 |
| *Type of accident | n=180 | |
| Fuel splash to skin and eyes | 162 | 90 |
| Slip and fall | 22 | 12.2 |
| Finger pinched/laceration by faulty pump handle | 52 | 28.9 |
| PPE provided | n=180 | |
| Yes | 108 | 60 |
| No | 72 | 40 |
| *Type of PPE provided | n=108 | |
| Aprons /overall | 107 | 99.1 |
| Reflector jacket | 40 | 37 |
| gloves | 39 | 36.1 |
| Safety boots | 22 | 22.1 |
| Face mask | 18 | 16.7 |
| Use of PPE | n=180 | |
| Yes | 12 | 6.7 |
| No | 168 | 93.3 |
| *Type of PPE used while at work | n=12 | |
| Aprons/overall | 10 | 83.3 |
| Reflector jacket | 5 | 41.6 |
| Gloves | 1 | 8.3 |
| Safety boots | 7 | 58.3 |
| Face mask | 1 | 8.3 |
| *Multiple responses | | |

Source: Field data (2017)

Table 3. Safety procedures and routine processes at workplace

| Safety procedures and routine processes at workplace | | |
|---|----------------------|-----------------------|
| Variable | Frequency (n) | Percentage (%) |
| Work procedures | n=180 | |
| Yes | 165 | 91.7 |
| No | 15 | 8.3 |
| Emergency preparedness and response plan | n=180 | |
| Yes | 126 | 70 |
| No | 74 | 30 |
| *Type of Emergency preparedness and response plan | n=126 | |
| Evacuation plan | 54 | 42.9 |
| Fire exits and fire assembly points | 125 | 99.2 |
| Safety policy statement | n=180 | |
| Yes | 104 | 57.8 |
| No | 76 | 42.2 |
| Medical examination done | n=180 | |
| Yes | 34 | 18.9 |
| No | 146 | 81.1 |
| *Type of medical examination tests done | n=34 | |
| Eye Sight | 10 | 29.4 |
| Chest examination | 32 | 94.1 |
| blood sample | 2 | 5.9 |
| *Reasons medical examination not done | n=146 | |
| Fit and well | 9 | 6.7 |
| Lack of awareness | 15 | 10.3 |
| It was not necessary | 143 | 97.9 |
| Supervisor/management are well known to me | 13 | 8.9 |
| Attended Safety training | n=180 | |
| Yes | 87 | 48.3 |
| No | 93 | 51.7 |
| *Type of safety training | n=87 | |
| First Aid | 42 | 48.3 |
| Fire | 86 | 98.9 |
| * Multiple responses | | |

Source: Field data (2017)

examination stated that medical examination was not done because it was not necessary. 143 (97.9%). Moreover, 87 (48.3%) had attended safety training the commonest being fire safety, 86 (98.9%) and first aid, 42 (48.3%).

3.2 Discussion

The respondents in this study were majorly male young adults who had attained post primary education, which is in agreement with findings of similar studies done in Brazil [16] where male staff were 90.5% and in Nigeria [17] where 75% of the respondents were male. Possible reasons for young male dominating the workforce could be due to the fact that pump operations and car servicing were considered to be strenuous and risky task since petrol stations operates till late night. Majority of the respondents (84.4%) had work for less than 5 years. This could be due to

the fact that the workforce was majorly young adult who may have just started working after completing post primary education. All respondents were aware of the occupational hazards associated with their job where more than one hazard/risk was mentioned. Risk of fire was easily mentioned by all respondents and this may be due to presence of fire extinguishers and warning sign "No Smoking" conspicuously in areas of danger including forecourt and offloading area, normally a requirement for licensing. The results concur with Mutua and Fedha whom observed that majority of the petrol stations had scored a 56% regarding installation of fire safety equipment. However, less than a third of the respondents reported having well stocked first aid in their workplace. It is likely that incase of injury or sudden illness, the casualty will not be given emergency aid before being taken to the nearest health facility. Common

accidents including fuel splash on the attendant skin and fingers pinched by pump handle were not reported as they were considered "normal". These incidents occurred mainly when the attendant is either tired or overwhelmed by work. This implies that workers are mostly likely to be exposed to hydrocarbons which easily gets absorbed into the body since only 6.7% reported use of PPE with the most commonly used being apron/overall, 10 (83.3%) and the least used being gloves and face mask, 1 (8.3%) each. Though, majority of the respondents had stated that PPE were provided by employer, the low usage [18] was attributed by the fact that their availability were only "on need basis" thus worn during offloading which was considered to be hazardous. The findings are in agreement with another study [19] where PPE use was low (15.6%). It is likely that both employers and workers lack adequate information on the role of different PPEs in reducing exposure to volatile compounds which are generated and released nearly in all the petrol station operations. Most of the respondents 165 (91.7%) stated that they had define job descriptions outlining how to perform their duties and were trained on use of work tool and equipment at their workplace upon their employment, however, only 48.3% stated that they had attended safety training the commonest being fire safety, 86 (98.9%) and first aid, 42 (48.3%). This finding concurs with Cherono [20], whom in her study on Occupational accidents in Hotels within Eldoret town, stated that 55% of the respondents had trained on First Aid. This implies most employees at work place are not trained on health and safety issues thus likely to be ignorant in occupational Safety and Health management systems [21]. This is despite the fact that safety training should be carried at induction, on job and in refresher courses [22] and supplemented by placing posters and sign at strategic areas within petrol station. Multitasking was evident in most stations where pump attendant would refuel more than one vehicle at a go, wash windscreen and charge for the services. Similarly, staff from front office and car servicing section could also be seen refueling customers vehicles. The findings collaborate with another study by Rocha *et al.* on use of personal protective equipment by gas stations in Brazil. Multitasking may be as a result of petrol station employing few staff in a busy workplace compelling staff to perform two task or more simultaneously in order to handle the workload. Though majority of the respondents had stated that they had guidelines for emergency action plan, nearly a half of the

petrol stations did not show any documents to support it and those who had, had displayed evacuation plan, fire exits and fire assembly point notices. Though, a fifth of the respondents reported presence of a written and publicized safety policy statement and risk assessment audit reports, these crucial safety documents were not freely accessible by staff since some stations had them either filed or pinned at the manager's office thus limiting their accessibility. The possible reasons for lack of a well-defined emergency action plan and policy statement may be attributed to the fact that safety related issues had not reached all the petrol stations. In terms of medical examination, only 34 (18.9%) reported undergoing either pre-employment medical examination or periodic medical examination with the most commonly medical test being chest examination 32 (94.1%), eye sight 10 (29.4) and blood sample 2 (5.9%). Most of the respondents 143 (97.9%) who had not been subjected to medical examination stated that medical examination was not done because it was not necessary contrary to the fact that the fact that petrol stations attendants are likely to be exposed to occupational hazards [23].

4. CONCLUSION

The findings of this study shows that most petrol stations did not have written and publicized safety statement, emergency preparedness and action plan and medical examination to workers. Most workers perform multiple tasks, non-usage of PPE such as gloves, aprons, boots and face mask was evident, and even by those who said had PPE, which is in agreement with other similar studies. Though, majority of the petrol stations had warning sign, fire extinguishers and sand bucket conspicuously at the forecourt, less than a third of the respondents reported having well stocked first aid in their workplace. Moreover, most of the respondents did not know how to use them in case of emergency [24,25]. The findings of the study clearly indicates that majority of the petrol stations either lacked or did not have well defined an occupational health and safety management system leading to low level of their implementation. There is need of Occupational Safety and Health Management System (OSHMS) to be integrated within petrol stations policy in order to reduce the operations mistakes, costs of reducing problems and level of risks while ensuring that they comply with laws and regulations.

ETHICAL CONSIDERATION

Permissions to conduct the research, research clearance permit were obtained from National Commission for Science, Technology and Innovation (NACOSTI). Consent was also sought from office of Nakuru County Commissioner, Ministry of Education (Moe) and proprietors/managers of the petrol stations where the study was carried out. The researcher clearly explained the purpose of the study to the respondents and their consent sought as indicated in the preamble of the questionnaire. Names of the respondents and place of work were not included in the questionnaire. The respondents were coded and the codes only known to the researcher. Some photos taken as part of observational tool had either the petrol station name censored or faces of attendants blurred to protect anonymity and privacy of the respondents.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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