

Socio-demographic Determinants of Safety Practices among Medical Radiological Workers in Port Harcourt Metropolis of Rivers State

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Abstract

The aim of this study was to unravel the socio-demographic determinants of safety practices among medical radiological workers in Port Harcourt Metropolis of Rivers State. A descriptive cross sectional survey design was adopted for the study as the research design. The sample size 314 was determined using Cochran formula method. A multi-stage sampling procedure was adopted for the study which was presented in three stages in order to select the sample for the study. The instrument for eliciting information for this study was structured questionnaire titled Questionnaire on Socio-Demographic determinants of Safety Practices among Medical Radiological Workers (QSDSPMW). The Reliability coefficient value of 0.82 was obtained using Pearson Products Moment Correlation Coefficient. Collected data were coded and analyzed using Statistical Products for Service Solution (version 25.0). The findings of the study showed that there is no significant difference in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on gender ($p>0.05$); there is no significant difference in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on availability of PPE ($p<0.05$); there is no significant difference in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on training ($p>0.05$); there is a significant difference in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on availability of PPE ($p<0.05$). It was concluded that the rate of exposure to occupational hazards was determined by level adherence with safety practices based on gender, training, work experience, availability of protective devices. The following recommendations were made among others; managers of medical radiographic facility should ensure that safety or protective devices are supplied, available and used in the facility by workers/technicians during diagnostic proceedings.

Keywords: socio-demographic, determinants, safety practices, medical radiological workers

Introduction

There is no occupation without hazards. Hence, safety measures remain the hallmark of accident and hazards preventions in any workplace. It is pertinent to note that workers in the hospital or clinical settings are exposed to occupational hazards such as biological, chemical, physical, psychosocial, ergonomic and mechanical hazards most especially in the radiological laboratory. O'Sullivan et al. (2010) reported that 87% good number of radiation workers had not received safety protection instruction and measures which expose radiologists to occupational risks. Medical radiological workers or radiographers working in the x-ray department may definitely suffer for the effect of radiation and might not be comply with safety measures at all time. Lee et al. (2014) indicated in their study that 77% of radiological workers had underestimated doses of radiation as they carry out x-ray diagnosis. Additionally, Biswas et al. (2021) put up that more average number of workers suffered for health problems

attributed to occupational hazards and excess dose of radiations. Safety precautions are series of practices that safety and avoidance of accident hence it promotes and maintains the welfare of the medical radiological workers. This may involve the use of safety device such as lead apron, hand gloves, medical shoe, face mask and shield, eye goggle among others to reduce the exposure to hazards from radiological examination. Lee et al. (2018) revealed medical radiation workers who adhered to safety measures are 5 times less likely to expose to occupational risks and potential health risks. Salama et al. (2016) added that average percentage of workers (50%) that worn lead glasses and lead shield may have radiation safety as compared with those without safety device. Similarly, Abuzaid et al. (2019) in their study buttressed that total adherence to radiation protection practices (75%) are less exposed to occupational hazards. It is plausible radiological workers or radiographers who obey safety rule and regulations are free from hazards to a large extent. Fatahi-Asl et al. (2013) affirmed that educational level was significantly associated with safety practices among radiographers. It is plausible that medical radiological workers who update the level of education such as attending seminars and workshops training on the innovations concerning safety in the workplace would be less exposed to occupational hazards.

However most of the safety devices necessary for protection from radiations are likely not available for the disposition of radiographers whereas some workers are carefree concerning the compliance with safety measures hence they are at higher risk of occupational hazards. Erkan et al. (2019) agreed that medical radiological workers with fluoroscopy education are less likely to be exposed to occupational hazards and more likely to use safety devices during laboratory proceedings. Adejumo et al. (2012) in their study illustrated that workers who have up to five years of work experience are less likelihood to suffer for the effects of occupational hazards and would be able to comply with safety measures. Naithani et al. (2021) revealed that work experience helps to improve the level of knowledge of safety measures hence reduce the chance of exposure to occupational hazards. The compliance with safety practices or measure were affected due to work inexperience, non-availability of protective equipment, lack of quarterly training among others. Hence, medical radiological workers are exposed to hazards in the laboratory. In the light of this background this study identifies the socio-demographic determinants of safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State.

Aim of the Study

The aim of this study was to identify the socio-demographic determinants of safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State.

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant relationship between gender and safety practices of medical radiation workers among medical radiological workers in Port Harcourt metropolis of Rivers State;
2. There is no significant relationship between training and safety practices of medical radiation workers among medical radiological workers in Port Harcourt metropolis of Rivers State;
3. There is no significant relationship between work experience and safety practices of medical radiation workers among medical radiological workers in Port Harcourt metropolis of Rivers State;

4. There is no significant relationship between availability of protective devices and safety practices of medical radiation workers among medical radiological workers in Port Harcourt metropolis of Rivers State;

Methodology

A descriptive cross sectional survey design was adopted for the study as the research design. The population of the study comprised of all medical radiological workers operating in both government-owned and private facilities in Port Harcourt metropolis, Rivers State. The sample size 314 was determined using Cochran formula (Cochran, 1977). This formula was adopted to determine the sample because of population used for this study was estimated

Formula:

$$n = \frac{p(1-p)z^2}{e^2}$$

n= sample size

p=the proportion of the population (0.80)

e= acceptable sampling error (e=0.05)

z= value at reliability level or significance 95% for 1.96 at 0.05 level of significance

A multi-stage sampling procedure was adopted for the study which was presented in three stages in order to select the sample for the study. Stage one: Simple random sampling technique was used to select Port Harcourt City and Obio/Akpor Local Government Areas of Rivers State out of the four LGAs by balloting without replacement. Stage two: simple random sampling technique was used to select 20 X-ray/ CT scan centres from both government-owned and private facilities in the selected local government areas for the study. Stage three: systematic sampling technique was employed to select only 16 workers from the five selected areas in each Local Government Areas used for the study to enable the researcher gather data from the sample. Medical radiological workers from private CT/X-ray and imaging centers and government owned radiological departments were selected to form the sample used for the study.

The instrument for eliciting information for this study was structured questionnaire titled Questionnaire on Socio-Demographic determinants of Safety Practices among Medical Radiological Workers (QSDSPMW) which illustrated information regarding the safety practices which was keyed to Always, Sometimes, Rarely, and Never respectively. The instrument was validated by the researchers and two experts in Public Health, Occupational health and Safety, from the Department of Human Kinetics Health and Safety Studies for content and face validity. The Reliability coefficient value of 0.82 was obtained using Kuder Richardson 21 model using a split half method. Hence the instrument was reliable and used for the study. Collected data were coded and analyzed using Statistical Products for Service Solution (version 25.0).

Results

The return rate of the instrument after filed work was 95.5% which 300 copies of questionnaire were retrieved out of 314.

Hypotheses

1. There is no significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on gender;

Table 1: Chi-square test showing significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on gender

Variables	Safety practices		Total Freq %	Df	X ² - value	p- value	Decision
	Good Freq %	Poor Freq %					
Gender							
Males	186(77.5)	54(22.5)	240(100)	1	0.820	0.65	Accepted
Females	61(82.4)	13(17.6)	74(100)				
Total	247(78.7)	67(21.3)	314(100)				

*Statistical significant (p>0.05)

The finding of the study showed that there is no significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on gender (X²-value = 0.820; df = 1, p>0.05). Therefore, the null hypothesis which states that there was no significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on gender was accepted.

Hypothesis 2: There is no significant relationship in safety practices of medical radiation workers in among medical radiological workers in Port Harcourt metropolis of Rivers State based on work experience

Table 2: Chi-square test showing significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on work experience

Variables	Safety practices		Total Freq %	Df	X ² - value	p- value	Decision
	Good Freq %	Poor Freq %					
Work experience							
1-5 years	115(77.2)	34(22.8)	149(100)	2	9.363	0.003	Rejected
6-10 years	89(80.2)	22(19.8)	111(100)				
11 years and above	43(79.6)	11(20.4)	54(100)				
Total	247(78.7)	67(21.3)	314(100)				

*Statistical significant (p<0.05)

The finding of the study showed that there is no significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on work experience (X²-value = 9.363; df = 2, p<0.05). Therefore, the null hypothesis which states that there was no significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on work experience was rejected.

Hypothesis 3: There is no significant relationship in safety practices of medical radiation workers in among medical radiological workers in Port Harcourt metropolis of Rivers State based on training

Table 3: Chi-square test showing significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on training

Variables	Safety practices		Total Freq %	df	X ² - value	p- value	Decision
	Good Freq %	Poor Freq %					
Training							
Yes	245(78.5)	67(21.5)	312	1	0.546	0.460	Accepted
No	2(100)	0(0.0)	2(100)				
Total	247(78.7)	67(21.3)	314(100)				

*Statistical significant (p>0.05)

The finding of the study showed that there is no significant relationship in safety practices of medical radiation workers in among medical radiological workers in Port Harcourt metropolis of Rivers State based on training (X²-value = 0.546; df = 1, p>0.05). Therefore, the null hypothesis which states that there was no significant relationship in safety practices of medical radiation workers in among medical radiological workers in Port Harcourt metropolis of Rivers State based on training was accepted.

Hypothesis 4: There is no significant relationship in safety practices of medical radiation workers in among medical radiological workers in Port Harcourt metropolis of Rivers State based on availability of PPE;

Table 4: Chi-square test showing significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on availability of PPE

Variables	Safety practices		Total Freq %	Df	X ² - value	p- value	Decision
	Good Freq %	Poor Freq %					
Availability of PPE							
Yes	215(76.5)	66(23.5)	281(100)	1	7.363	0.004	Rejected
No	32(97.0)	1(3.0)	33(100)				
Total	247(78.7)	67(21.3)	314(100)				

*Statistical significant (p<0.05)

The finding of the study showed that there is a significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on availability of PPE (X²-value = 7.363; df = 1, p<0.05). Therefore, the null hypothesis which states that there was no significant relationship in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on availability of PPE was rejected.

Discussion of Findings

Gender and Safety Practices

The finding of the study showed that there is no significant difference in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on gender ($p > 0.05$). This implies that exposure to radiation hazards and safety practices does not differ in male and female therefore compliance with safety practices is not limited to either gender of the workers. The result of this finding is in consonance with studies of Erkan et al. (2019) indicated that good proportion of male radiation workers (58.4%) are more exposed to radiations as compared with female workers and only 32.7% comply with the use of safety protective devices. Biswas et al. (2021) reported that slightly below average percentage of female workers (47%) are exposed to occupational hazards due to non-compliance with safety measures. Biswas et al. (2021) also revealed that men were exposed to noise, vibration, medical radiation, physically demanding work, solar radiation, falls, biomechanical risks, chemical hazards, and blood contamination as a result of negligence to safety practices which affects health status. Badawy et al. (2016) and Dehghani et al. (2014) in their studies it was reported that there is no significant association with the use of safety devices in regards to gender of workers and safety awareness. Both male and female workers are exposed to radiation hazards and other forms of occupational hazards and also have the opportunity to compliance with safety measures to minimize the risk.

Work Experience and Safety practices

The finding of the study showed that there is no significant difference in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on work experience (X^2 -value = 9.363; $df = 2$, $p < 0.05$). The result of this findings indicated that whether a medical radiological worker had worked for many years does not prevent him/her from getting exposed to occupational hazards rather the consistent use of safety devices minimizes the rate exposure to radiation dose. Sima et al. (2017) illustrated that radiation workers who had worked for longer years may have good experience and would likely practice safety precautionary measures. Recently, Cha et al. (2020) and Awadghanem et al. (2020) both studies reported that radiation workers who have over 8 years of work experience been more likely to show signs of health issues if he/she had not been complying with safety protocols during work proceedings. Dehghani et al. (2014) added that job experience does matter mostly with safety awareness and utilization of protective equipment in the health facility. Paolicchi et al. (2016) affirmed that medical radiographers with less than 3 years of experience have an increasing knowledge of safety and more likely to comply with safety measures than older radiographers. The role of work experience in increasing awareness and practices of safety measures cannot be overemphasize. Effective safety practice come from the experience gathered over the years. There is no prior studies that contradict with this variable of the study.

Availability of PPE and Safety Practices

The finding of the study showed that there is a significant difference in safety practices among medical radiological workers in Port Harcourt metropolis of Rivers State based on availability of PPE ($p < 0.05$). The result of this study is required because when safety protective devices such as lead apron, laboratory booth, goggles, among others are available in the X-ray facility it would be easier for medical radiological workers to make use of it during radiodiagnostic proceedings to reduce the rate of exposure to radiation hazards. Cha, et al (2020) buttressed that reception of high doses of radiation is significantly association with lack of required safety protective equipment and constitute a risk factor to occurrence of cardiovascular diseases and

other systemic conditions. Lee et al. (2018) and Salama, et al. (2016) affirmed that lack of radiation protection equipment results into exposure to high doses of radiation that risk the health status of workers and patient in the facility while availability of radiation safety devices such as lead glasses, lead shield, thyroid shield, lead apron is essential for effective protection from radiation hazards. It is plausible because availability of safety devices determines the usability of the same of equipment. If personal protective equipment is available in the medical imaging facility radiological workers may reluctantly utilized it to ensure safety. No prior studies were found contrary wise against the result of the current findings. Hence, availability of PPE determines safety practices among medical radiological workers.

Training and Safety Practices

The finding of the study showed that there is no significant difference in safety practices among medical radiological workers in Port Harcourt Metropolis of Rivers State based on training ($p>0.05$). The result of this study is expected because training is education oriented and boosts the knowledge of workers in order to improve and promote safety compliance during and after work proceedings. Okaro et al. (2010) revealed that radiation monitoring and training of radiologists and radiographers provide increasing awareness of safety measures thereby enable the use of protective devices. The result of this finding is in agreement with studies of Naithani et al. (2021) that workers who have received training yearly are 5.3 times more likely to be currently educated about the job and comply with protocols of safety in the laboratory. In Nigeria, studies of Salama et al. (2016) specified that good proportion of radiation workers (50%) who utilizes safety devices during x-ray proceedings are less likely to be exposed to radiations as compared with others who do not use those devices for safety reasons. Adejumo et al. (2012) added that training showed a significant relationship with the practices of safety measures and enhances increase in knowledge about the current trends of safety in X-ray and medical imaging. It is plausible to note that workers who received training may have current update and advancement in knowledge on the prevention of occupation risks. Hence, training determines safety practices among workers.

Conclusion

It was concluded that medical radiological workers in Port Harcourt metropolis are exposed to different forms of occupational hazards such as physical, chemical, biological, psychosocial, ergonomic and mechanical hazards. The level of exposure to occupational hazards was determines by level adherence with safety practices which were based on training, work experience, availability of protective devices. Hence, there is need to ensure total compliance with safety devices during and after medical diagnosis such as radiological examinations.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Managers of medical radiographic facility should ensure that safety or protective devices are supplied, available and used in the facility by medical workers/technicians during diagnostic proceedings.
2. Medical radiographers should prioritize their health and safety welfare by adhere to the hazards control measures such as ensure that protective devices are worn before, during and after medical diagnostic practices.
3. Ministry of Health through hospital management board should establish monitoring and inspection team to check for compliance with safety precautionary measures in different health facilities including medical radiological centres.

4. Workers should comply with safety protocols and ensure that client worn lead apron and other safety devices to reduce the rate of exposure to hazards during medical diagnostic proceedings to prevent health problems associated with radiation hazards.
5. Medical Association should organize quarterly training for medical workers such as radiologists, technician, and technologists on new innovation and current trend to improve and promote safety in the workplace

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