

Perception of hazards and utilization of safety measures among operators of small scale battery repair shops in a North-Central State, Nigeria

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Abstract

The small scale repairers of lead-acid battery are at higher risk of lead poisoning above the risk for other members of the population in addition to the risk of other hazards of the battery repair work. The battery repair company may not implement effective preventive and control measures for workplace lead exposure. This study assessed the perception of hazards and utilization of safety measures among operators of small scale battery repair shops.

This study was descriptive cross-sectional in design involving 200 Lead acid battery workers in Ilorin, Kwara State, North Central Nigeria. Systematic sampling method was used to recruit respondents using nominal roll of registered battery repairers as the sampling frame.

Majority of the respondents (96.0%) and (92.0%) were aware of one or more protective devices and measures respectively. Half of the respondents that do not use face mask at work (53.5%) considered its use as unnecessary and none of the respondent has separate work dress. The workers should be educated on the need to protect their families from the hazards of Lead Acid Battery by wearing separated work dress and overall cloth always at work.

Key words: Perception, Safety measures, lead poisoning, battery repair.

Introduction

The small scale repairers of lead-acid battery are at higher risk of lead poisoning above the risk for other members of the population^{1, 2} in addition to the risk of other hazards of the battery repair work. The battery repair company may not implement effective preventive and control measures for workplace lead exposure.³

Lead intoxication is slowly progressive and difficult to detect. Lead poisoning is a common environmental health hazard world-wide especially in developed countries, and it remained the commonest cause of occupational poisoning world-wide especially in the developing countries.⁴

In a Nigerian city of Jos, 34% of the population age 3 weeks to 90 years have blood lead concentration $\geq 10\mu\text{g/dl}$.⁵ Home near battery smelter was identified to be a risk factor for toxic blood lead level of $12.9\mu\text{g/dl}$.^{1, 5} Workers in lead base industries are at increased risk of lead poisoning resulting in the neurotoxic effects, hematologic effects, fertility problems, kidney damage and encephalopathy. Matte investigated the risk of lead poisoning among household members exposed to small scale battery repair shops in Jamaica. Elevated blood lead $\geq 25\mu\text{g/dl}$ was common among subjects of all ages living near repair shops, especially among children less than 12 years old, 43% of whom had blood lead greater than $70\mu\text{g/dl}$. Eighty four percent of yards had soil lead levels above 500 parts per million at the premises of households near battery shop). Geometric mean blood and environmental lead levels were significantly lower at control households, where less than 10% of subjects in all age groups had elevated blood lead (maximum 33

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$\mu\text{g/dl}$).¹ Many workers in these industries are unaware of the hazards related to the work.^{2,6}

In a study of battery workers in Philippine, personnel observed working in the battery reconditioning shops were not wearing any protective clothing, gloves or safety goggles.⁷ Some of the personnel working in the shops wore only shorts, no shirts or shoes, and others who were wearing tee shirts wore only sandals on their feet.⁷ In another study of battery recharging and reconditioning shops in Cambodia, only 2% and 5% of the respondents were aware of the toxic effects of lead on the population and the environment respectively.⁸ It is therefore pertinent to determine perception of hazards and utilization of safety measures among operators of small scale battery repair shops.

Materials and Methods

This study was descriptive cross-sectional in design. The study population was Lead acid battery workers in Ilorin, Nigeria. The register of the Association of their association was the basis for the selection into the study. Systematic sampling method was used to recruit respondents using nominal roll of registered battery repairers as the sampling frame.

The data collected were entered into, and analyzed using SPSS version 16. Chi-squared analysis was done to assess the association between categorical variables. P-value < 0.05 was considered significant at the 95% confidence level.

Consent was sought from the state chairman of the Association of Battery repairers, Kwara state. Individual informed consent was obtained from each participant after they had been educated about the study.

Results

Two hundred questionnaires were administered to the eligible Lead acid battery repairers in Ilorin west Local Government Area of Kwara state. The questionnaires received 100% response rate. All the returned questionnaires were fully completed and suitable for analysis. All the respondents were males and of Yoruba ethnic group. Majority 83 (41.5%) of the workers were in the age range 40-49 years. Majority of the

respondents were married (92%). The highest educational qualification in the majority 154 (77.0%) of the respondents was secondary education (Table 1). Almost all the respondents (96.0%) were aware of one or more protective devices against the hazards of Lead Acid battery repair work. Majority of the respondents (92.0%) were aware of one or more safety measures against the hazards of Lead Acid battery repair work.

Table 1: Socio-demographic Variables

Socio-demographic Variables		Frequency	%
Age group (Years)	20-29	39	19.5
	30-39	70	35.0
	40-49	83	41.5
	50-59	8	4.0
Sex	Male	200	100.0
Highest Educational	Primary	46	23.0
	Secondary	154	77.0
Marital status	Married	184	92.0
	Single	16	8.0
Religion	Christianity	39	19.5
	Islam	161	80.5
Ethnicity	Yoruba	200	100.0

(Table 2). Nearly half of the respondents (47.0%) use overall cloth always while another one out five respondents (23.0%) sometimes use it. None of the respondents reported frequent use of facemask at work

Table 2: Respondents' Awareness of safety measures

Safety measures	Awareness	
	Yes	No
Personal protective devices	192(96.0)	8(4.0)
Other safety measures	184(92.0)	16(8.0)

(Table 3). All the respondents wash hand before meal at work. Also, the majority of the respondents (92.5%) do not smoke cigarette at work. Only about one out of

ten respondents (11.5%) reported ever doing medical examination. None of the respondent has separate work dress (Table 4).

Table 3: Distribution of Respondents by Use of Protective Devices Multiple response

Protective Devices	Regularity of use	Frequency	%
Overall Cloth	Always	94	47.0
	Sometimes	46	23.0
	Never	60	30.0
Apron	Always	44	22.0
	Sometimes	16	8.0
	Never	140	70.0
Cap	Always	40	20.0
	Sometimes	16	8.0
	Never	144	72.0
Glove	Always	39	19.5
	Sometimes	31	15.5
	Never	130	65.0
Booth	Always	16	8.0
	Sometimes	7	3.5
	Never	177	88.5
Goggle	Always	8	4.0
	Sometimes	16	8.0
	Never	176	88
Face mask	Always	0	0.0
	Sometimes	39	19.5
	Never	161	80.5

Table 4: Distribution of Respondents by Use of other Safety Measures

Safety Measures	Multiple Responses N=200	
	Frequency	%
Wash hand before meal at work	200	100.0
Do not smoke at work	185	92.5
Eating place separated	87	43.5
Bath before leaving work place	55	27.5
Wash Workplace floor	39	19.5
Wash face before meal at work	38	19.0
Ever done Medical examination	23	11.5

Half of the respondents that do not use face mask at work (53.5%) considered its use as unnecessary

(Figure 1). Respondents' with secondary education were more likely to use Face Mask and glove at work compared with the respondents' with primary education. However, there is no statistically significant association between the respondents' education and use of face mask since the P-value is more than 0.05 (Table 5).

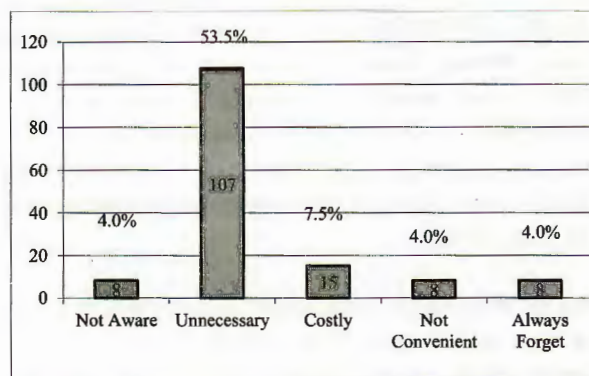


Figure 1: Respondents' Reasons for not using Face Mask

Table 5: Distribution of Respondents' Use of Face Mask and glove by Educational Level

		Highest Educational Qualification		χ^2	P-value
		Primary	Secondary		
Face mask	Yes	8 (17.4%)	31 (20.1%)	0.1692	0.6808
	No	38 (82.6%)	123 (79.9%)		
Glove	Yes	16 (34.8%)	50 (35.1%)	0.0012	0.9718
	No	30 (65.2%)	100 (64.9%)		

Discussion

The respondents' age ranged from 22 years to 52 years. The mean age was 36.5 years while the modal age was 34 years. This finding is similar to the finding of Ahmed et al who reported aged range between 23 and 57 years and who had worked for over six months in lead acid battery repair units of transport service enterprises in Addis Ababa.¹² All the workers studied were male. This is different from the finding of Ahmed et al where 11.1% of the respondents were female.³ The difference could be due to cultural differences. In

Nigeria, women rarely engage in occupations requiring technical skills.

Majority of the respondents had secondary education (77.0%). None of the workers had tertiary education. This is probably due to low education requirement for the work.

All the workers had a form of training on the Lead Acid Battery Work. Almost all the respondents (98.0%) had training as apprentice under a trainer while only a few of the respondents (4.0%) had training through the National Directorate of Employment. Many of the workers had worked for 16-20 years (41.0%).

All the respondents were aware of one or more hazards of Lead Acid Battery Work. This is different from the report of Cambodia study of Lead Acid Battery Workers where only 2.0% of the battery workers were aware of the toxic effects of lead on the workers.⁸ The main source of information is the interaction with their colleagues. None of the respondents had accessed any information on the hazards of Lead Acid Battery from the radio, health workers or textbook/journal. The low educational qualification of the respondents may be the reason why they did not obtain information from textbook/journal.

All the respondents considered concentrated acid to be hazardous. Also, the majority of the respondents considered electric shock (96.0%), fume from charging battery (96.0%) and diluted acid (92.0%) to be hazardous. These high levels of awareness and correct perception of the hazards of Lead Acid Battery Work is commendable and it should be encouraged since the awareness of hazards is fundamental to safety practice.

Almost all the respondents (96.0%) were aware of one or more protective devices against the hazards of Lead Acid battery repair work. Majority of the respondents (92.0%) were aware of one or more safety measures against the hazards of Lead Acid battery repair work.

Nearly half of the respondents (47.0%) use overall cloth always while another one out five respondents (23.0%) sometimes use it. More than half of the respondents either do not use overall cloth or were not consistent with the use of cover cloth. This exposes the worker to lead dust and electrolyte. None of the

respondents reported frequent use of facemask at work. Nearly one in five of the respondents (19.0%) always use glove while another 15.5% sometimes use glove. This is sharp contrasts with the findings of Tokyo study where 92.0% and 88.0% of the workers in a Lead Acid Battery recycling company always use face mask and glove respectively.⁹ The difference may be due to the presence of enforcement of the use of protective devices in Tokyo the Company whereas there may not be such in the small scale industries, particularly, Lead Acid Battery repair work. The majority of the respondents that do not use face mask at work (73.3%) considered the use of face mask as unnecessary. The majority of the respondents that do not use glove at work (87.8%) considered the use of glove as unnecessary.

Concerning hygienic practices, a form of safety measure against hazards of Lead Acid Battery Work, it has been recognised that cleanliness in the workplace will reduce the exposure to toxic substances, particularly lead. All the respondents wash hand before meal at work. This is similar to the finding from Tokyo Company where 99.0% of the respondents wash hand before meal at work.⁹ However, the high proportion of the respondents washing hand before meal might be due to the cultural and religious reasons rather than measure against hazards of Lead Acid Battery Work. Nearly one in twenty workers (19.0%) washes face before meal at work. This is lower than the proportion that washes face from Karita study where almost all the workers (92.0%) washes face before meal at work.⁹ This shows that the majority of the workers may be ingesting lead dust on their face and lips every time they eat food at work.

Smoking at work place may act as a vector for lead to be conveyed from hand and face to the mouth. It is possible to ingest lead via contaminated cigarettes and fingers when workers smoke or simply touch their mouth. Therefore, restriction of smoking could reduce the unnecessary uptake of lead in the workplace. The main mechanisms could be inhalation lead dust following the contamination of cigarettes by workers' fingers and partially to the impairment of lung clearance mechanisms by smoking. The majority of the respondents (92.5%) do not smoke cigarette at work. This finding is better than the finding of Karita in Japan where fewer proportions (41.0%) of the workers

do not smoke at work.⁹ Observing very little proportion of workers that smoke at the work place may not necessarily mean that the workers were observing safety measures rather a reflection of the lower prevalence of smoking among the workers. Only about one out of ten respondents (11.5%) reported ever doing medical examination.

The influence of respondents' education on the use of face mask and glove were tested. There were no significant association between the respondents' education and the use of glove or face mask.

Conclusion

All the respondents were aware of one or more hazards of Lead Acid Battery Work including concentrated acid, electric shock, fume from charging battery and diluted acid. The majority of the respondents that do not use face mask or glove at work considered the use of face mask or glove as unnecessary. Non observance of safety measure poses hazards to these workers family members especially, the children.

The Lead Acid Battery Workers should be educated on the need to always observe safety measures and use protective devices at work. The workers should be educated on the need to protect their families from the hazards of Lead Acid Battery by wearing separated work dress and overall cloth always at work. The Government should enforce the use of protective devices among this group of small scale workers through legislation.

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