

# Assessment of workplace hazards in mortuaries in Port Harcourt, Nigeria

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## Abstract

**Background:** Mortuary workers face various hazards in course of carrying out their duties. These hazards may be ignored by employers and employees alike. Identifying these hazards in time before they become risks that cause accidents and even death is recognized mode of prevention and control. This study was to assess the workplace hazards in mortuaries located in Port Harcourt City Area.

**Methods:** Following ethical approval, this descriptive cross-sectional study recruited 100 eligible respondents from private and public mortuaries, respectively, balloted for from six known and registered mortuaries in Port Harcourt city. Respondents answered pre-tested, close-ended, structured, self-administered questionnaires which probed sociodemographics, occupational history, knowledge and behaviour towards hazards encountered while at the workplace. There was also an adapted checklist used for the walk-through survey of the study sites' identification and quantification of hazards. Data obtained were analysed and presented using descriptive and analytical statistical tools.

**Results:** The study had mostly male (95%) respondents with only 15% having acquired tertiary education. The majority (94%) of the hazards respondents were exposed to were mechanical slips, trips and falls. The majority (93%) of respondents had safety training on the hazards associated with the mortuary, while 11% used personal protective equipment (PPE) always.

**Conclusion:** Hazards abound in mortuaries in Port Harcourt City even though most workers had received training on hazards and hazards prevention. There was also a poor use of PPE. It is recommended that health education, provision, enforcement and monitoring of the use of PPE be intensified among this group of workers.

**Keywords:** Hazards, mortuary, Port Harcourt

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Received: 06.09.2016, Accepted: 14.09.2016

## Introduction

Workers worldwide are ultimately themselves while at work. However, compliance by worker requires the employer to do

everything – a great deal to provide necessary general and personal protective equipment (PPE), train, enforce and monitor compliance. Preservation of dead bodies has religious,

Access this article online	
Quick Response Code:	Website: www.phmj.org
	DOI: 10.4103/0795-3038.197752

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**How to cite this article:** Douglas KE, Peterside SS. Assessment of workplace hazards in mortuaries in Port Harcourt, Nigeria. Port Harcourt Med J 2016;10:102-10.

cultural and even forensic uses. This, however, comes with attendant hazards, in which knowledge and safety practices could help in the prevention and control of these hazards.<sup>1-3</sup> The job schedule of mortuary workers which involves receiving the corpse, attending the various preservation processes and the delivery of the deceased may present with an array of hazards.<sup>4</sup> All mortuary workers (namely, diener, mortician/undertaker, pathologists, mortuary cosmetologist, etc.) may encounter different hazards as they embalm, refrigerate, mummify, cremate, bury or even exhume bodies.<sup>4,5</sup>

Healthcare workers irrespective of cadre or specialisation in Sub-Saharan Africa are inadvertently exposed to chemical, biological, physical, mechanical and psychosocial occupational hazards.<sup>6</sup> Against the backdrop of mostly preventable risk of exposure to these hazards, the need for the use of PPEs to reduce the risk of contraction of disease or injury to health workers cannot be over emphasised.<sup>7</sup> The healthcare workforce globally represents 12% of the entire working population, and in addition to the usual workplace-related exposures, healthcare workers and indeed mortuary workers are exposed to an array of hazards peculiarly innate to their work and workplace.<sup>8,9</sup>

Workplace hazards in the mortuaries include chemical (exposure to formalin, detergents and other solvents), physical (electric shocks, burns, hearing problems, eye strain, allergic reactions, radiation, manual handling, etc.), mechanical (cuts, pricks, sharps, slips, trips and falls), biological (viruses, bacteria, fungi, etc.) inherent in the cadavers as a result of cause of death and instruments and psychosocial (i.e., work-induced stress, stigmatisation, depression, substance abuse) among others are implicated.<sup>10</sup> Chemical hazards in the mortuary may lead to health effects such as respiratory irritation, eye irritation, skin irritation, dermatitis, respiratory sensitisation (possibly leading to occupational asthma), cancer and allergies. Exposure to formaldehyde, disinfectants, fixatives and solvents during the autopsy process or subsequent processing of tissue or cleaning of the environment, dust/aerosol from cutting and latex consumables are common hazards that mortuary workers may be exposed to. For instance, despite the effective disinfectant property of glutaraldehyde, it is not recommended for use in the mortuary and post-mortem even as it has long been implicated as an asthmagen, causing ill-health, with dermatitis and respiratory problems as main symptoms.<sup>11</sup>

For biological hazards, infections are key concerns. These may become manifest due to exposure to infected blood, body fluids or tissues through aerosols from bone and tissue sectioning example, tuberculosis in infected lungs, blood product of a deceased with hepatitis B virus (HBV), HIV and Ebola virus (as carrier or confirmed case, contacts or bodies exposed to rodents, needle stick, bone or sharp medical

instrument inoculations puncture wounds, direct splashes or spillages of infectious material, incorrect or careless work techniques, e.g., failure to adhere to hygiene procedures and failure to vaccinate against common diseases). Tuberculosis is transmissible from dead body, its risk of infection has little or no dependence on the distance from the operating table in an operation room. A 10-min exposure in the operating room is enough to result in transmission.<sup>12</sup> Considering the fact that it is possible for tuberculosis to remain undetected until a patient dies, autopsy exposure is said to be far more infectious than exposure during life. In a study of hospitals in Dundee, Scotland, 50% of autopsied active tuberculosis cases were unrecognised before death. Furthermore, it is also possible that dead bodies may be infectious despite having no known ante-mortem risk of infections by pathogens such as HBV, hepatitis C virus, HIV, Ebola, yellow fever, rabies and Group A streptococcal, meningococcal, etc. Contacts with cadaver can occur either during removal of the deceased from place of death, during storage, washing, embalming or preparation for viewing or at internment at final resting place.<sup>12-14</sup>

Furthermore, there are issues of poor use of PPEs, compliance in reporting and operations control mechanisms, vaccination and poor reaction time if at all by the relevant authorities if and when there are breaches in occupational harm/exposure. Consequently, activities include evaluation of the physical state of facilities for compliance with safety and health standards, safety protocols and their implementation, workers orientation, training, knowledge and practices and risk surveillance/assessment of facilities. Again, factors such as immunisation of the workers, safety and comfort of workers and even customers should necessarily come to the fore.<sup>14</sup> In South West Nigeria, a study was done to ascertain the level of awareness of occupational hazards and practice of universal safety precautions in mortuaries; a total of 76 mortuary workers with an average age of 38.2 years were sampled, male 92% while female 8%. 45 (59.2%) of the respondents were aware of hazards at work. The hazards identified were HIV/AIDS (97.7%), tuberculosis (82%) and formalin-related morbidity. However, 14 respondents (18.4%) rated the work-related risks faced as a moderate/high risk.<sup>15</sup> Only 36.8% of the respondents always used face masks in the course of their duties. About 40 (53.3%) had received at least one dose of hepatitis B vaccine. There was no association between awareness of hazards and practice of universal safety precautions.<sup>16</sup> The use of appropriate protective clothing and the observance of control of hazardous substances and health regulations help protect cadaver handlers.

It is noteworthy that most bodies coming to the morgues do not necessarily come with the cause of death which could just be anything. The majority of mortuary workers are blue collar

in education and standard of living. Therefore, they not even be aware of the hazards inherent in a corpse not to talk of control and preventive measures to apply. Studies such as these are to determine and bring to the fore this range of hazards with a view to instituting preventive and control measures. This study, therefore, was to assess workplace hazards in mortuaries in Port Harcourt with a view to highlight possible factors responsible for the hazards just as control and preventive measures can be proffered.

## Methods

### Study area/population

The study was carried out in Port Harcourt City capital of Rivers State. It is the cosmopolitan city of 1,382,592 (by the 2006 census) with mainly white- and blue-collar workers - the oil industry and the civil service dominating the workforce. It is mainly a Christian populace with English, Pidgin English, Kalabari, Ogoni, Ikwerre, Okrika and the Igbo languages mainly spoken. There are public and private mortuaries in this town – 4 public and 2 private. Working hours and conditions of service are essentially the same. Respondents were aged between 20 and 65 years and work in shifts round the clock every day – although there is an allowance for workers to go on time off. This is a male-dominated profession with most of them barely acquiring a secondary school certificate.

### Study design/sample size

This was a descriptive cross-sectional study with a sample size of 100 calculated using the formula for proportion (with a study of 27% prevalence) with a 10% allowance for non-response. Inclusion criteria were workers of selected mortuaries who were at least 18 years and had worked for at least 1 year.

### Sampling method

Three mortuaries were randomly selected initially for this study from a list of six located in the Port Harcourt City Area. The selected trio included Ashes to Ashes Mortuary, Military Hospital Mortuary (public-owned) and Kpainma Memorial Morgue (private-owned). However, only Ashes to Ashes and Kpainma Mortuaries participated. Staff strength of the mortuaries included - Ashes to Ashes 58 and Kpainma Memorial Mortuary 54. This came to a total number of 112 sampling frames. Respondents were sampled (stratified) proportionate to the total number of workers in each facility to reach the sample size of 100. Ashes to Ashes had 52 and Kpainma 48. Eligible respondents were balloted for in each facility to arrive at the allotted proportionate number.

### Study instruments

Study instruments included a structured, closed-ended, interviewer-administered questionnaire pre-tested among mortuary workers at the University of Port Harcourt

Teaching Hospital (UPTH). The questionnaires probed sociodemographics, past medical history, knowledge, attitude and practice (safety) towards hazards in the mortuary. A walk-through survey was carried out using an adapted Standard Mortuary Inspection Checklist (NWS Health, 2012) covering the mortuary premises details (i.e., premises name, address, owner name, occupier name, development approval, registration number), inspection details (body preparation room, storage room, vehicle reception, slabs, tables, hand wash basins, refrigerators and temperature within, containers, body bag supply, protective clothing, registers, entries and reporting system) and attitude/knowledge of various hazard types within the environment. There was also a section for action taken by management post-inspection and recommendations, respectively.

### Data collection

The study was carried out on a daily basis for 2 weeks during break period (12–2 pm) with minimal interference with their job. Walk-through survey was carried out impromptu and during peak working hours using the earlier mentioned check list.

### Data management

Following retrieval of the coded questionnaires and check for completeness, data were entered into Microsoft Excel worksheet. These were then analysed using the statistical package for social sciences, the SPSS software version 20 (IBM SPSS statistics 20). Means, standard deviation were calculated, and Chi-square test was used to determine statistical significance. The level of significance was set at 5% using the 95% confidence interval.  $P < 0.05$  was considered to be statistically significant. Data were thereafter presented in tables.

### Ethical considerations

Approval for the study was sought for and obtained from the Ethics Committee of the Graduate School of University of Port Harcourt, the management of participating mortuaries and their respective Workers' Union before the commencement of the study. Informed consent was also sought for and obtained from each respondent.

### Limitation

Apprehension by the respondents to disclose information perceived to 'harm' the image of their facilities but was addressed by reassuring respondents that this was an academic exercise with assurances of confidentiality.

### Results

A total of 100 questionnaires were administered on consenting respondents and were all retrieved on the spot giving a 100% response rate.

Table 1 shows that more males (95.0%) were engaged in this endeavour just as 47% of them were in the prime age range of 25–40 years. With 70% of respondents having secondary education, this endeavour is essentially a blue-collar job.

The bulk of the workers were blue collar, i.e., mortician 46.0% and cleaners 46.0%, respectively [Table 2].

Table 3 shows that variables such as safety training/talks were high, i.e., 93% and 97%, respectively, among the study group.

### Walk-through survey of the mortuaries

On arrival of the body to these morgues, a receptionist wearing a pair of wrist gloves receives and evaluates the corpse to ascertain its condition, i.e. the cause of death is as stated in a compulsory doctor-certified death certificate. The vehicles reception areas of both facilities are close to the body preparation area albeit screened from public view. Vehicles found in both facilities are cleaned of exudates although those in Ashes to Ashes are in a far better condition. Embalment with formalin inoculation and infusion is basically the method of preservation carried out in these facilities. Workers from these morgues are occasionally called up for services in other mortuaries, especially morgues owned by multinational companies where refrigeration is practised. Their duty in such cases is to embalm the corpses before refrigeration by the private morgues.

After evaluation by the receiving staff, the bill for embalming the body is stated based on the size and condition of the dead. The body is taken into the processing chamber/room which is poorly lit (pre-disposing workers to slips trips and falls), poorly ventilated 10 by 12 feet room with rough walls (risk for upper respiratory infections) and floor in the case of Kpainma as against a better lit and conducive chamber in Ashes to Ashes. One can sight a wooden work table about 3 feet tall, with visible blood stains-recipe for transmission of blood-borne pathogens and a trolley displaying some sharps such as scalpel, needles, short knife, sutures, etc., in the former. Water is readily available and dispensed from nearby sinks in both facilities and body wash areas are available.

Staff were seen carrying out procedures with the minimal use of available PPE in Kpainma; however, PPE use is better in Ashes to Ashes. On completion of the preparation, the bodies are then moved to an observation room, where they are left on a platform for draining and 'conditioning' adequately. They are then bagged, wrapped with cloth and tagged before transfer into a numbered triple deck bed inside the body dormitory (especially in Kpainma). At the end of the process, the workers un-don the PPE, bath and dress up in their private wears. The PPE are sent for disinfection and washing. Waste is disposed off periodically by refuse disposing company while the waste water drains into

**Table 1: Respondents' sociodemographics**

Variables	Frequency (n=100)	Percentage (100)
Gender		
Male	95	95.0
Female	5	5.0
Age group (years)		
<25	13	13.0
25-40	47	47.0
41-50	19	19.0
>50	21	21.0
Marital status		
Single	50	50.0
Married	47	47.0
Widower	3	3.0
Religion		
Christianity	100	100.0
Muslim	0	0.0
Others	0	0.0
Education status		
Primary	15	15.0
Secondary	70	70.0
Tertiary	15	15.0

**Table 2: Occupational history of respondents**

Variable	Frequency (n=100)	Percentage (100)
Previous employment		
Yes	30	30.0
No	70	70.0
Present employment		
Attendant/mortician	46	46.0
Assistant/cleaners	46	46.0
Admin officer	8	8.0
Work experience (years)		
1-3	26	26.0
4-6	45	45.0
>7	29	29.0

**Table 3: Respondents' safety practices towards hazards**

Variable	Frequency (n=100)	Percentage (100)
Hazard can be prevented by safety training		
Yes	100	100.0
No	0	0.0
Had safety training		
Yes	93	93.0
No	7	7.0
Safety talk prevents hazard		
Yes	97	97.0
No	3	3.0
PPE protects from hazards		
Yes	100	100
No	0	0.0
Use PPE		
Yes	97	97.0
No	3	3.0
How often		
Always	11	11.0
Sometimes	86	86.0
No time	3	3.0

PPE: Personal protective equipment

the septic tank within the facilities. Further inquiry failed to reveal how the refuse collected by the disposal companies is managed. This definitely causes for concern, especially bearing

mind the heavy reservoir of biological hazards, i.e., pathogens inherent in mortuary waste.

Gun-shot cases are handled and processed on police approval, and no specific measure is employed in handling such cases. Sharps such as scalpels, knives are kept on shelves in a store, while others such as needles are disposed off by the contractors. Chemical containers were seen stored in a separate room but not labelled in both facilities.

Hazard allowance is paid to staff of both facilities, while workers in Kpainma are occasionally offered evaporated liquid milk as remedial to the effects of the chemicals! Tetanus toxoid in an event of injury due to needle piercing or cuts by sharps; however, they are not vaccinated against other diseases such as HBV.

## Discussion

Mortuaries could be very unsafe places to work given the various hazards associated to working there. The researchers' findings show that despite the high (96%) level of awareness of these hazards and safety talks given among the mortuary workers, the problems caused by the hazards still persist. Biological (from body parts, exudates and even blood) and chemical hazards (from especially formalin ranging from respiratory symptoms to chemical dermatitis) were seen during work through. The study shows that despite the high level of slips, trips and falls by (94%) of the participants at least in one occasion, there was no incidence of fracture, dislocations or disabilities. Wet floors, obstructions, poorly lightings, poor housekeeping, slippery floors and manual lifting of bodies are the main complaints resulting in slips, trips and falls.

Exposure to chemical substances [Table 4] such as formalin through inhalation and direct skin contact accounted for 58% response. However, the major resultant effect of this exposure was skin rashes in 29% respondents. The explanation to this is that despite the relatively high formalin concentration and poor labelling regulation, good ventilation in and around the facilities markedly reduced its irritating and damaging effects on the nasal membrane and eyes. No participant complained of respiratory problems primarily caused by chemical hazards; however, there was a complaint of skin lesions in 29% of the workers. Skin contact allergy was identified by the researcher in the study, could be attributed to exposure to various hazards mainly chemicals such as formalin, solvents and detergents.

Comparatively, needle pricks and sharps injuries were reported by 91% of the participants, which is higher than the findings of 73.5% of mortuary attendants in teaching hospitals in South West Nigeria.<sup>14</sup> Non-adherence to precautions of sharps

**Table 4: Respondents' attitude towards hazards in the mortuaries**

Variable	Frequency (n=100)	Percentage (100)
Had workplace accident?		
Yes	94	94.0
No	6	6.0
Accident type*		
Slips, trips and fall	94	94.0
Electric	8	8.0
Formalin and chemicals splash/contact	58	58.0
Others	1	1.0
Injury type		
Puncture wound	91	91.0
Electrocution	4	4.0
Disability	0	0.0
Skin rashes/allergy	29	29.0
Report accident		
Yes	94	94.0
No	6	6.0
Absent from work		
Yes	15	15.0
No	85	85.0
Days of absence (n=15)		
1 day	6	6.0
2-7 days	8	8.0
Equal or less than a month	1	1.0

\*This did not total 100 as some hazards were checked more than once. Most respondents (94.0%) accepted having had a workplace accident with 91% of them being mainly puncture injuries

handling, improper use of hand gloves are some possible factors associated with this high prevalence of sharp inoculations. Direct contact due to spillage of body fluids may result in infection. Such exposure was attributed to failure to adhere to the proper hygiene practices, inadequate space for working, improper body handling. In Maryland, 19% of participants reported at least one blood-borne exposure in a period of 6 months, while their counterparts in South West Nigeria teaching hospitals reported 85.5% of exposure to blood pathogens.<sup>14,15</sup>

Electricity hazards are among the least among mortuary attendants, accounting for 4% exposure by respondents in the study. Bad electric fittings/connections, wet surfaces close to electrical appliances, especially during cleaning, are to blame.

Pain on the back, neck and arms was rarely reported despite claims by the workers that their job is physically demanding. Contributing factors such as poor posture due to inappropriate bench height, static, awkward or sustained postures and lifting heavy weights/the deceased did not result in such complaints. Psychosocial hazards such as work-induced stress, stigmatisation, depression and substance abuse are common complaints among workers in the facilities. Interaction with the bereaved relatives of the deceased is a common source of psychological hazards.

It was observed that vaccination against illnesses such as HBV was not done, except for occasional inoculations of tetanus

vaccine when an attendant has an injury. This was very poor as compared to a study among mortuary attendants in South West Nigeria, where 53.3% of the respondents had received at least one dose of hepatitis B vaccine. Mortuary workers who have not been vaccinated are at risk of infection on exposure to contaminated or infected fluids, bodies or fomites. There are many possible reasons for the low vaccine coverage, the most common being unavailability of the vaccine at the facilities due to non-inclusion of vaccination in the facilities fiscal plan. Other potential reasons observed may include lack of knowledge about severity and vaccine efficacy and low-risk perception and time. However, no respondent complained of developing serious illness attributable to an infectious agent.

The study showed that 96% of respondents had, in some point, reported cases of hazards encountered in course of their duty while 15% were absent from duty. It was also observed that a number of responses indicate that no action was taken by management after exposures were reported.

In all, there was a lot of apprehension on the part of the mortuary owners as they felt this academic 'intrusion' may put their business in a bad light. Researchers were, however, able to see through the 'window dressing', especially during the walk-through survey.

### Conclusion

The need for protecting healthcare employees and indeed mortuary workers can never be overemphasised going by the spectrum of hazards they face on daily basis. The study showed from the walk-through survey that mortuary workers are faced with biological (blood and exudates), chemical (formalin), mechanical (slips, trips and falls), etc., but with major influences from needle prick/cuts, slips, trips and falls, chemicals/formalin contacts and electricity, these lead to incidence of puncture/cuts injuries, skin lesions and allergies, some cases of electrocution, etc. However, it is worthy to note that rules and policies are limited in their ability to prevent harm and require mindfulness by those who are supposed to follow them to be effective.

It is recommended that the individuals involved in the mortuary should be aware of the hazards and risks associated with such

work not only for them but also for Public Health and the environment; therefore, significant steps should be taken at all times to minimise these risks. It is recommended that PPE is provided and its use enforced. There is a need for a good reporting system for mortuary accidents and vaccination of all workers against all possible workplace biological hazards.

### Financial support and sponsorship

Nil.

### Conflicts of interest

There are no conflicts of interest.

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# Mortuary-inspection Checklist

## A MORTUARY PREMISES DETAILS

Premises Name: \_\_\_\_\_

Address: \_\_\_\_\_

Owner Name: \_\_\_\_\_

Registration details complete? Yes  No

## B INSPECTION DETAILS

### 1. Premises generally

- Only approved mortuary being used for body preparation? Yes  No
- Only approved mortuary being used for body storage? Yes  No
- Bodies not stored in a vehicle? Yes  No
- Holding room being used for body storage only? Yes  No
- Bodies not stored/prepared at a hospital? Yes  No

### 2. Facilities for body preparation rooms

- Vehicle reception area adjacent to body preparation room? Yes  No
- Vehicle reception area screened from public view? Yes  No
- Hand wash basin with adequate hot and cold water and hands-free operation? Yes  No
- Sufficient slabs, tables and fittings? Yes  No
- Slabs, tables and fittings impervious and drained for cleaning? Yes  No
- Refrigerated body storage facilities for at least two adults? Yes  No
- Temperature: \_\_\_\_\_ °C. Less than 5°C? Yes  No
- Impervious container with lids; hands-free operation for solid wastes? Yes  No
- Only bodies stored in body refrigerator? Yes  No

### 3. Vehicles

- Hearse: Make, model and registration \_\_\_\_\_
- Collection vehicle: Make, model and registration \_\_\_\_\_
- Bodies placed only in vehicle body area? Yes  No
- Vehicle body area not used for other purposes? Yes  No
- Vehicles clean of exudates? Yes  No
- Unembalmed bodies transported <8 h? Yes  No
- Body bags supplied in vehicle? Yes  No
- Protective clothing in vehicle? Yes  No

### 4. Mortuary register of body preparation

- Register sighted? Yes  No
- Entries complete for disposed bodies? Yes  No
- Entries reconciled with each body prepared? Yes  No

### 5. Retention of bodies

- All bodies held in a mortuary or holding room? And Yes  No
- All bodies kept under refrigeration? Yes  No
- Reason for anybody not in refrigeration? Yes  No

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**6. Embalming of bodies**

- Any embalmed bodies on premises? Yes  No
- Name and qualification of embalmer? Qualification recognized? Yes  No
- Embalmer aware of Australian Guidelines for the Prevention of Infection in Healthcare? Yes  No
- Embalmer aware of NSW Health Infection Control Policy? Yes  No

**7. Body bags**

All bodies in body bags and identified? Yes  No

**8. Body viewing**

- Bodies made available for viewing? Yes  No
- Funeral Director aware of body viewing conditions? Yes  No

**9. Chemical hazards**

- Are employees trained in safe handling of chemicals? Yes  No
- Are employees aware of potential hazards posed by chemicals used in workplace? Yes  No
- Are eye wash and safety showers available? Yes  No
- Are chemical containers adequately labelled? Yes  No

**10. Biological Hazards**

- Are employees aware of potential biological hazards? Yes  No
- Employees trained on safety practices such as:
  - i. Appropriate hand washing Yes  No
  - ii. Proper use of personal protective equipment Yes  No
  - iii. Vaccination (esp-hepatitis B virus) Yes  No
  - iv. Needle-prick exposure/management Yes  No

**11. Facilities available**

- i. Hand washing sinks Yes  No
- ii. Biohazard tags and labels Yes  No
- iii. Needle/sharps containers Yes  No
- iv. Detergents/cleaning agents Yes  No
- v. Adequate wastes disposed containers Yes  No

**12. Physical hazards**

- Are areas, doors, aiseways properly designated and marked? Yes  No
- Electric wires and appliances appropriately installed? Yes  No
- Is the power shut-off within reach? Yes  No
- Are surfaces adequately cleaned and dry? Yes  No
- Fire extinguishers installed appropriately? Yes  No
- Facility adequately ventilated? Yes  No

**13. Mechanical hazards**

- Is there a regular program of inspection of equipment? Yes  No
- Proper traffic management around workplace Yes  No
- Are tools, instruments machinery shaped, positioned and handled so that tasks can be performed comfortably? Yes  No
- Are operating controls clearly identified? Yes  No

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### C. RECOMMENDATIONS

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Researcher: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

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