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An assessment of laundry workers exposure to workplace hazards in secondary and tertiary health facilities in Benin-city, Nigeria

Abstract

Background: Healthcare workers are exposed to various occupational hazards that may threaten their health and safety, however, exposure to hazardous agents depends upon the job category and the work environment of the healthcare workers. Occupational safety and health hazards in healthcare facilities can be grouped geographically or according to location or service offered. In the laundry department, they include; contaminated laundry, noise, heat, lifting, sharps, slips, trips, falls and fire hazards. The most common accidents in industrial laundries involve chemical exposure, sharp objects left in soiled linen, slips from wet floors, exposure to pathogens in contaminated linen, among others. This study provides information on the exposure of hospital laundry workers to identified workplace hazards, as this would prove useful in order to establish appropriate interventions.

Methods: This study was a comparative cross-sectional study, conducted in six hospitals with a laundry department in Benin-city, composed of one available tertiary healthcare facility and five secondary healthcare facilities. The questionnaire was administered to the workers concerning their exposure to different workplace hazards. Due to the limited population size, sampling was not carried out, as the total population was used in the study. Of the 54 respondents eligible to participate in the study, only 50 were present and consented to participate in the study; a response rate of 92.6 %.

Results: Respondents were largely female (60%) with a mean age of 47.66 ± 11.19 years. Job tasks undertaken by respondents included: collecting, sorting, washing, drying, ironing, folding, labeling and delivering of laundry. While all the respondents handled clean linen, only 74% and 62% of respondents handled dirty and soiled linen respectively. Also, workplace hazards exposures reported were sharps (62%), ergonomic (40%), illumination (2%), noise (28%), electrical (50%), heat (38%) and chemical (68%) hazards.

Conclusion: Physical, chemical, biological, and ergonomic hazards were identified in all the health facilities. It is recommended that laundry workers be given regular education sessions to strengthen awareness on occupational health and safety risks associated with their job.

Keywords: hazards exposures, hospital laundry, health facilities, laundry workers

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Introduction

Occupational hazards refer to workplace factors with a potential for harm in terms of injury or ill health.[1,2] An estimated 100,000 people die from occupational illnesses, while about 400,000 new cases of occupational diseases are diagnosed every year.[3,4] This affects workers in various occupations as a result of their exposure to different types and varying degrees of hazards in the workplace. Hazards are classified in five categories: physical (noise, vibration, radiation, extremes of temperature, etc.), ergonomic (mechanical), chemical (solid, liquid, and vapors), and biological (bacteria, viruses, fungi, etc.), and psychosocial (psychological and social stressful factors). Exposure to any of these hazards can cause occupational diseases and work accidents.[5] Hazards are inherent in oil and gas, construction, manufacturing, health-care, agriculture and in every industrial and economic sector.[6] Every activity possesses inherent hazards. These hazards, if ignored, may pose significant health and safety risks to exposed individuals.[7] Hospitals are large, organizationally complex, system-driven institutions, employing a large number of workers from different professional streams. They are also potentially hazardous workplaces and expose their workers to a wide range of physical, chemical, biological, ergonomic, and psychological hazards.[8] Hospitals are not harmless workplaces[9] as hospital workers are exposed to various occupational hazards that may threaten their health and safety.

Globally, healthcare facilities (HCFs) employ over 59 million workers and offer a variety of services to clients and patients, and are classified as hazardous and high-risk workplace.[10,11] Healthcare facilities like other high-risk workplaces are characterized by a high level of exposure to hazardous agents, which significantly endangers the health and life of workers. Healthcare facilities around the world employ over 59 million workers who are exposed to a complex variety of health and safety hazards every day including, biological hazards, such as Tuberculosis, Hepatitis, Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS), Severe Acute Respiratory Syndrome (SARS); chemical hazards, such as,

glutaraldehyde, ethylene oxide; physical hazards, such as noise, radiation, slips trips and falls; ergonomic hazards, such as heavy lifting; psychosocial hazards, such as shift work, violence and stress; fire and explosion hazards, such as using oxygen, alcohol sanitizing gels; and electrical hazards, such as frayed electrical cords.[12,13] Healthcare workers (HCWs) are exposed to various occupational hazards that may threaten their health and safety,[14] however, exposure to hazardous agents depends upon the job category and the work environment of the HCW.[15] Occupational safety and health (OSH) hazards in healthcare facilities can be grouped geographically or according to location or service offered. In the laundry department, they include; contaminated laundry, noise, heat, lifting, sharps, slips, trips, falls and fire hazards.[12] The most common accidents in industrial laundries involve chemical exposure, sharp objects left in soiled linen, slips from wet floors, exposure to pathogens in contaminated linen, among others.[16] A study by Kumar et al.,[17] identified various occupational hazards (physical, chemical, biological and ergonomic) associated with hospital laundry.[17] This study provides information on the exposure of hospital laundry workers to identified workplace hazards, as this would prove useful in order to establish appropriate interventions. The main objectives of the study were to assess the exposure of workers to hazards in the hospital laundry, as well as to compare the hazard exposures among the different hospital categories in Benin metropolis.

Methodology

Study design

This study was a comparative cross-sectional study

Geographical location of the study area

Benin City, the capital of Edo State, has a land area of 1,219.626km^2 and is bounded by latitude 6°20'North and longitude 5°39' East.

Study area

The study was conducted in hospitals with a laundry department, including the University of Benin Teaching Hospital (UBTH), Central Hospital Benin (CHB), Stella Obasanjo Hospital (SOH), St. Philomena Catholic Hospital (SPCH), Faith Medical Complex (FMC) and Ihenyen Hospital (IH), all in Benin-City. The University of Benin Teaching Hospital, Benin-city is a federal tertiary health facility located on the Benin-Lagos expressway with coordinate 6.3337^{0}N 5.60002^{0}E. It came into being in 1973 and boast facilities to accommodate over 500 in-patients. The other hospitals included in the study, that is, Central Hospital Benin, Stella Obasanjo Hospital, St. Philomena Catholic Hospital, Faith Medical Complex, and Ihenyen Hospital, are secondary care health facilities which provide a wide range of healthcare services.

Study population

The study was carried out among laundry workers in the health facilities. A minimum sample size of 42 respondents per group was required as calculated using the formula for sample size estimation of two proportions below:

$$N= \frac{(Z_a+Z_b)^2(p_1q_1+p_2q_2)}{(p_1-p_2)^2}$$

Where; N=sample size per group,

P=proportion of the attribute,

q=complement of 'p',

Z_a=1.96 (95% confidence level),

Z_b=0.84 (80% power),

P_1=0.646.[18]

P_2=0.342.[19]

Therefore, a total of 84 respondents was required for this study, however, due to the limited population size, sampling was not carried out, as the total population was used in the study. As presented in Table 1, of the 54 respondents eligible to participate in the study, only 50 were present and consented to participate in the study; a response rate of 92.6 %.

Inclusion criterion

I. Hospital laundry workers who consented to participate in the study.

Exclusion criteria

a) Hospital laundry workers who could not be met at the workplace or did not consent to participate in the study.

b) Workers in the tailoring unit of the laundry department.

Data collection and instrument

Data were collected via a survey. A semi-structured questionnaire was issued to the hospital laundry workers which provided data on their exposure to different workplace hazards. For respondents who were not literate, data was collected via interviews. The content of the questionnaire included; socio-demographic information, occupational information, and occupational exposures.

Data management and analysis

Statistical package for social science version 20 (SPSS 20) was used for data entry, management, and analysis. From the data gathered with the questionnaire, descriptive statistics were used to summarize data on the socio-demographic characteristics and exposure of respondents to workplace hazards, using frequency table and bar graph. Also, chi-square analysis was used to check for a relationship between hazard exposure of respondents and health facility indices. A confidence level of 95% was used, so that a P-value less than 0.05 ($P<0.05$) resulted in the rejection of the null hypothesis, thereby stating a significant relationship between the variables tested.

Ethical considerations

Ethical approval was obtained from the University of Benin Teaching Hospital (UBTH) ethical committee, the State Hospital Management Board, ring-road, Benin-city, as well as from the administrators of all the private hospitals included in the study. Furthermore, informed consent was obtained from laundry workers who participated in the study, after they were duly informed on all the processes involved in the research before the commencement. Also, the confidentiality of participants' identities was maintained, as survey questionnaires did not require participants to provide information on their identity. There was no maleficence from participants in this study as every participant was treated equally.

Table 1 Characteristics of the health facilities studied

S/N	Ownership	Type of health facility	Number of laundry workers	Number of respondents
1	Government	Tertiary	35	31
2	Government	Secondary	3	3
3	Government	Secondary	2	2
4	Private	Secondary	6	6
5	Private	Secondary	4	4
6	Private	Secondary	4	4
TOTAL			54	50

Results

Socio-demographic characteristics of respondents

As presented in Table 2, the study population was largely female (60%). The mean age (SD) of respondents was 47.66 ± 11.19 years, while 13 respondents (26%) were between 41 and 50 years. Among the various hospital categories, the government tertiary had more males (54.8%) than females (45.2%), whereas respondents in the private secondary (28.6%) and government secondary (40%) had most of their respondents between the ages of 51 and 60 years. The study revealed that there was an association between the sex of respondents and the health facility types (p=0.006) and hospital categories (p=0.023) as presented in Table 3. Furthermore, there was no significant difference in the age of respondents between the health facility types (p=0.285) and among the hospital categories (p=0.324) as presented in (Table 4) (Table 5) respectively. In addition, the respondents had an average of 8.48 ± 7.72 years of work experience in the hospital laundry, although, most respondents (50%) had worked in the hospital laundry for less than 5 years. Among the various hospital categories, most of the respondents in government tertiary (35.5%) had worked in the hospital laundry for 5 to 10 years. This is presented in Table 2. The study further revealed that there was a statistically significant difference in length of work experience between the health facility types (p=0.024) and among the various hospital categories (p=0.021), as presented in (Table 4) (Table 5) respectively.

Job tasks undertaken by the respondents

As presented in Figure 1, labeling of clean laundry for delivery was carried out by only 2 (4%) respondents, who are actually in the tertiary health facility, as labeling is not carried out in the secondary health facilities. Furthermore, few numbers of respondents (28%) were involved in ironing of laundry, while most respondents were involved in sorting (92%), folding (78%), collecting (76%) and delivering (76%) of laundry, as presented in Figure 1.

Exposure of respondents to hazards in the hospital laundry

Respondents (62%) reported that they came across sharps in the past year while carrying out their job tasks (Figure 2), with no observed association between sharps exposure and hospital categories (p=0.279) and the health facility types (p=0.936) (Table 6). Respondents (40%) reported that they did not carry out their job tasks in a comfortable posture as presented in Figure 2. While all the respondents in private secondary and government secondary hospitals reported that they did not carry out their job tasks in a comfortable posture, only 3.2% of respondents in the government tertiary hospital reported so. An association between ergonomic hazard exposure and health facility indices was observed (p=0.000) as presented in Table 6. Only 2% of respondents reported that they were unable to see details of their workplace clearly while carrying out their job tasks as presented in Figure 2, with no observed association between illumination hazard exposure and health facility types (p=0.429) and hospital categories (p=0.731) as presented in table 6. Respondents (28%) reported that they were unable to communicate easily while carrying out their job tasks (Figure 2). While none of the respondents in private secondary and government secondary hospitals reported that they were unable to communicate easily while carrying out their job tasks, 45.2% of respondents in the government tertiary hospital reported otherwise. An association between noise hazard exposure and hospital facility types (p=0.001) and hospital categories (p=0.003) was observed, as presented in Table 6. As presented in Figure 2, respondents (68%) reported that they made use of chemicals while carrying out their job tasks, however, among the various hospital categories, 51.6% of respondents in the government tertiary hospital, 80% of those in government secondary hospitals and all the respondents in private secondary hospitals reported so. An association between chemical hazard exposure and hospital facility types (p=0.002) and hospital categories (p=0.005) was observed, as presented in Table 6. As presented in Figure 2, respondents (38%) reported that equipment which released heat was present in their work-space, however, among the various hospital categories, 54.8% of respondents in the government tertiary hospital, 20% of those in government secondary hospitals and 7.1% of respondents in private secondary hospitals reported so. An association between heat hazard exposure and hospital facility types (p=0.002) and hospital categories (p=0.006) was observed, as presented in Table 6. Respondents (50%) reported that electrical equipment was present in their work-space as presented in Figure 2, with no observed association between electrical hazard exposure and hospital categories (p=0.678) and the health facility types (p=0.382) as presented in Table 6.

Exposure of respondents to microbiological hazards in linen

While all the respondents handled clean linen, only 74% and 62% of respondents handled dirty and soiled linen respectively, as presented in Figure 3. Among the various hospital categories, all the respondents in private secondary hospitals, 80% of those in government secondary hospitals and 61.3% of those in government tertiary hospital handled dirty linen, while 57.1% of respondents in private secondary hospitals, 80% of those in government secondary hospitals and 61.3% of those in government tertiary hospital handled soiled linen.

Table 2 Socio-demographic characteristics of respondents

Description of variables	PS		GS		GT		Total	
	n	%	n	%	n	%	n	%
The age range of respondents								
=<30 yrs.	2	14.3	0	0	2	6.5	4	8.0
31-40 yrs.	2	14.3	1	20.0	9	29.0	12	24.0
41-50 yrs.	3	21.4	1	20.0	9	29.0	13	26.0
51-60 yrs.	4	28.6	2	40.0	7	22.6	13	26.0
>60 yrs.	3	21.4	1	20.0	4	12.9	8	16.0
Mean age ± S.D.	48.21±12.50		54.40±10.16		46.32±10.65		47.66±11.19	
Sex of respondents								
Male	2	14.3	1	20.0	17	54.8	20	40.0
Female	12	85.7	4	80.0	14	45.2	30	60.0
Years of working experience in the hospital laundry								
=<5 yrs.	11	78.6	4	80.0	10	32.3	25	50.0
5-10 yrs.	3	21.4	0	0	11	35.5	14	28.0
11-15 yrs.	0	0	0	0	2	6.5	2	4.0
15-20 yrs.	0	0	0	0	5	16.1	5	10.0
>20 yrs.	0	0	1	20.0	3	9.7	4	8.0
Mean ± S.D.	3.71 ± 2.525		10.00±14.00		10.39±7.32		8.48 ± 7.72	

KEY: PS, private secondary

GS, government secondary

GT, government tertiary

Table 3 Measure of association between health facility indices and socio-demographic characteristics

Description of variables	Type of health facility		Hospital category	
	X^2	P-value	X^2	P-value
Sex of respondents	7.484	0.006	7.535	0.023

Table 4 Independent samples T-test of socio-demographic characteristics between health facility types

Description of variables	T	P-value	95% Confidence Interval of the Difference	
			Lower	Upper
Age of respondents	1.082	0.285	-3.023	10.062
Years of work experience in hospital laundry	-2.331	0.024	-9.348	-0.689

Table 5 ANOVA of socio-demographic characteristics among the various hospital categories

Description of variables	F	P-value
Age of respondents	1.153	0.324
Years of work experience in the hospital laundry	4.197	0.021

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Table 6 Measure of association among health facility indices and hazards exposure

Description of variables	Type of health facility		Hospital category	
	X^2	P-value	X^2	P-value
Sharps	0.007	0.936	2.551	0.279
Ergonomic hazard	45.968	0.000	45.968	0.000
Illumination hazard	0.625	0.429	0.625	0.731
Noise hazard	11.918	0.001	11.918	0.003
Chemical hazard	10.068	0.002	10.745	0.005
Heat hazard	9.818	0.002	10.076	0.006
Electrical hazard	0.764	0.382	0.776	0.678

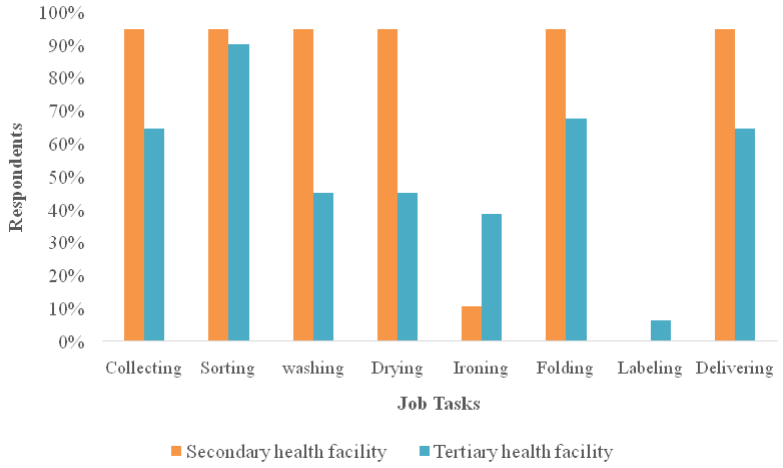

Figure 1 Job tasks undertaken by the respondents.

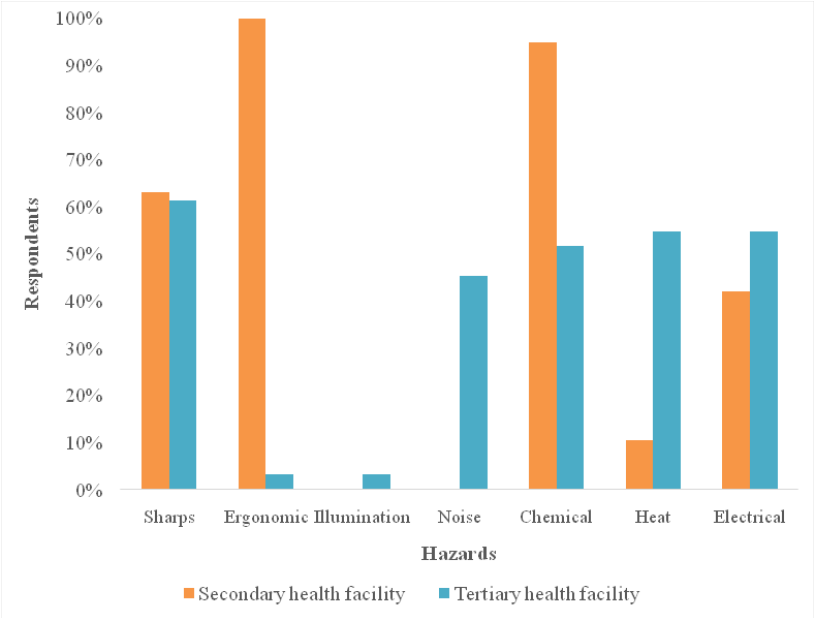

Figure 2 Exposure of respondents to hazards in the hospital laundry.

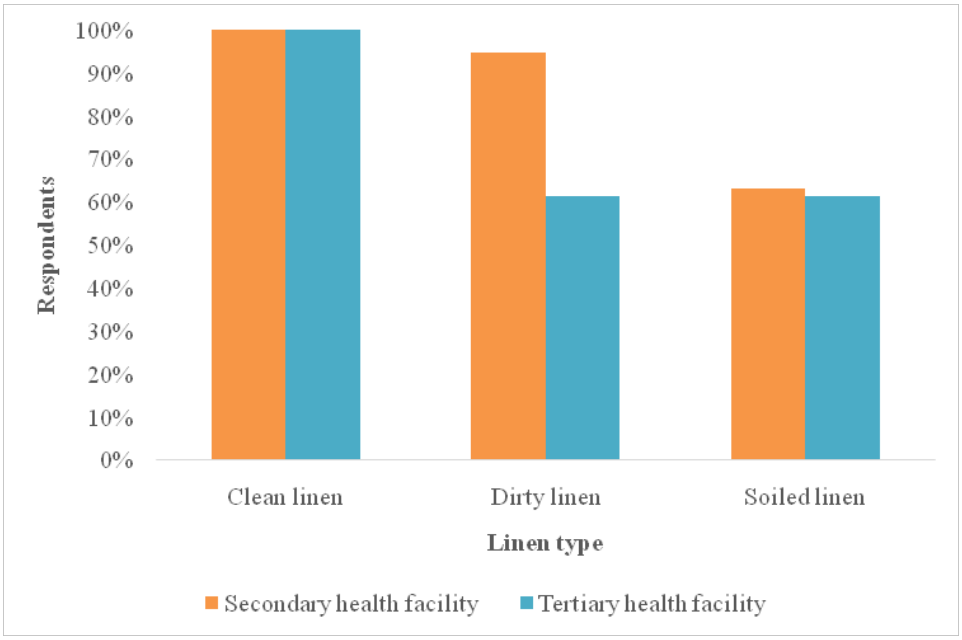

Figure 3 Exposure of respondents to microbiological hazards in linen.

Discussion

Socio-demographic characteristics of respondents

Although the study population was largely female, however, the male to female ratio among respondents in the tertiary health facility was almost equal as opposed to respondents in secondary health facilities, where respondents included more females than males. The reason for the equal male to female ratio in the tertiary health facility may be as a result of the complexities in the laundry department, which makes some tasks more suited for females to carry out, and others more suited for the males to carry out, hence, a division of labor. However, females are more in number than males in the secondary health facility because the laundry operation is basically done manually, with females believed to wash better than males, leaving the males to carrying out only the tasks of ironing and supervising. This observation is in contrast with those of Kumar et al.,[17] who observed that workers studied in the laundry department of a tertiary health facility comprised mostly males than females, stating that the difference was because the activities in the Laundry Department demanded more physical activity such as lifting clothes, pushing linen in trolleys, and handling machines.[17] Respondents in the tertiary health facility were more educated than those in the secondary and this may be as a result of the washing process in the laundry, which is basically mechanized in the tertiary health facility, as opposed to the secondary health facility, where it is basically carried out manually. Also, respondents in the tertiary health facility were observed to have worked in the hospital laundry longer and thus had more work experience than those in the secondary health facility.

Job tasks undertaken by the respondents

It was observed that almost all of the workers in the secondary health facility were involved in all the job tasks, except ironing of laundry, which was only carried out by the males, however, in the tertiary health facility, there seemed to be a form of division of labor, as a group of workers carried out a set of tasks as opposed to all of the workers carrying out all the different job tasks.

Exposure of respondents to hazards in the hospital laundry

The workers were exposed to a range of occupational hazards prevalent in the Laundry Department as previously observed by Kumar et al.,[17] Majority of respondents in both secondary and tertiary health facilities alike reported that they came across sharps in the past year while carrying out their job tasks. Pyrek noted that airborne transmission notwithstanding, the real threat posed by contaminated linen is avoiding injuries from sharps, as laundry workers are constantly exposed to sharps which are usually hidden in contaminated laundry brought in from the wards and operating theatre.[16] While all the respondents in the secondary health facility reported that they did not carry out their job tasks in a comfortable posture, the majority of respondents in the tertiary health facility reported otherwise. This may be due to the laundering process in the secondary health facility, which is basically done manually, resulting in greater movement of the body as opposed to being done mechanically in the tertiary health facility with less body twisting and movement. Muslim et al.,[20] showed in a research that in every single activity of laundry workers in Indonesia, the positions were not ergonomic. Based on the posture assessment in the research, they concluded that there was a need for improvement in the laundry workers' posture.[20] Majority of respondents in both secondary and tertiary health facilities alike reported that they were able to see details of their workplace clearly while carrying out their job tasks and therefore were not exposed to hazards associated with

illumination. This in contrast with a study by Imam et al.,[21] in a tertiary hospital in Egypt, who reported that majority of the support workers (non-health service providers) could not see without straining their eyes.[21] About half of respondents in the tertiary health facility reported that they were unable to communicate easily while carrying out their job tasks as a result of exposure to noise, unlike respondents in the secondary health facility, who all reported otherwise. This is as a result of the use of heavy machinery in the laundering process in the tertiary health facility and is supported by Imam et al.,[21] who observed that noise levels were above the standard of OSHA in the laundry of a tertiary hospital in Egypt.[21]

Almost all of the respondents in the secondary health facility reported that they made use of chemicals while carrying out their job tasks, as opposed to about half of the respondents in the tertiary health facility. This is because almost all of the workers in the secondary health facility were involved in the washing tasks, whereas only a group of workers in the tertiary were involved in the task which was mechanized and required an understanding of the machine's technical operation. Sukumar & Karthiga,[22] observed that healthcare workers are exposed to a wide variety of chemicals depending on the type of chemical products used.[22] About half of the respondents in the tertiary health facility reported that equipment which released heat was present in their work-space, whereas the majority of the respondents in secondary hospitals reported otherwise. This is because the major heat-emitting equipment in the secondary health facility is the pressing iron as compared to the driers and other heavy machinery in the tertiary health facility. Hasselhorn et al.,[23] noted that workers in hospital kitchens, laundry rooms, and sterilization units are the main groups that are exposed to heat-related hazard in a hospital setting.[23]

Exposure of respondents to microbiological hazards in linen

In the laundry, a respondent usually handled more than one type of linen. Although they all handled clean linen, only a number of them handled dirty and soiled linen. Hence, exposure to the various pathogens is dependent on the type of linen they handled, which is dependent on the type of activity being carried out by the respondent. In a study by Kumar et al.,[17] it was also noted that the exposure to biological hazards varied depending upon the type of activity.[17]

Conclusion

Physical, chemical, biological, and ergonomic hazards were identified in all the health facilities, with laundry workers exposed to these hazards. However, exposures of laundry workers to occupational hazards in the tertiary health facility is significantly different from that of the secondary health facilities. Furthermore, mechanization appeared to play a significant role in hazards exposures among laundry workers in the tertiary than in the secondary health facilities.

Recommendations

Based on findings from this study, it is recommended that secondary health facilities employ a division-of-labor system, rather than requiring all the workers to carry out all the different job tasks, as this would reduce the number of workers exposed to the hazards inherent in each job task. Also, laundry workers should be given regular education sessions to strengthen awareness on the occupational health and safety risks associated with their occupation.

Limitations

A. Most of the respondents in the secondary health facility were not as literate as those in the tertiary health facility, and therefore, needed some help in providing responses to the questionnaire. This may have resulted in some form of bias when explaining the questions to the respondents and noting their responses.

B. Only one tertiary healthcare facility was compared with five secondary health facilities, and this does not provide a suitable ground for proper comparative analysis. Although total sampling was used in the study, the study population was not large enough to carry out more valid comparative analysis.

C. The various psychosocial hazards which laundry workers may be exposed to were not assessed.

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None.

Conflict of interest

The author declares that there is no conflict of interest in publishing the article.

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