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Mobility in Cleaners' Clothing and Ergonomics Challenges to Work Efficiency

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A B S T R A C T
Cleaners in the work place ensure the cleanliness of in and out the office surroundings with adequate clothes for hygiene, safety and efficient work performance. Therefore, this study investigated mobility in Cleaners' clothing and ergonomics challenges to work efficiency. Three purposes, research questions and hypotheses guided the study. Expo facto research design was adopted using survey research method for the study. Population was 2,961in Delta state civil service. Multi-stage sampling was utilized in the selection of 286 respondents and purposive sampling was used to select nine (9) users for movement analysis. Instrument for data collection were focus group discussion, observation checklist and structured questionnaire. Data collected were analysed with percentages, mean and standard deviation for the research questions, for the hypotheses; Analysis of variance (ANOVA) and t-test at 0.05 level of significance. Findings identified cleaners' tasks as; to sweep, mop floors, clean spills and windows, vacuum carpets, dust surfaces and ceilings, sanitize rest rooms among others. Also, the practicality and usability of available clothing in carrying out these duties in various movements, posture and positions were observed to be hard. This causes ergonomics challenges such as restriction of movements, ill- health, occupational hazards, lack of safety and inefficiency in tasks accomplishment. Conclusively, since the functions of cleaners are important for hygienic and safe work environment, the job should be done with adequate clothing use for good work productivity and at the same time minimizes work hazards.

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INTRODUCTION

A clean environment is very crucial to physical, healthy, psychological and economic wellbeing on humans. Daily people spend good amount of time in the workplace to perform their tasks or transact businesses for economic empowerment. This workplace and environment need to be kept clean by cleaners in order to be habitable for official /business activities. Having a clean and well-arranged office is good in providing a pleasant and welcoming office necessary for mood and mental health of the staff/user. A cleaner is responsible in cleaning surfaces in and around the office surroundings and environment to ensure cleanliness, hygiene and safety. Cleaners are employed in the home as domestic worker, or in workforce or industries (government or private; ministries/schools) for the job of keeping the area clean and orderly, cleaning dirt with tools, equipment or devices. Cleaners carry out range of duties to ensure clean workplace such as sweeping, vacuuming, dusting, mopping and waxing floors and other surfaces, remove broken glasses, clean spills and messes, (Indeed, 2023). Their responsibilities and duties of cleaning include; clean offices, hallways, scrubbing and sanitizing bathrooms and rest rooms, sweep and mop floors, clean windows, vacuum carpets and furniture, dust and polish surfaces, dispose trash bins, maintain and stock cleaning agents and tools (Jobzilla, 2024). Cleaning tools and equipment needed to perform the cleaning tasks for serene hygienic workplace and for the accomplishment of the organizational goals include; brooms and dust pan, brushes, mops and buckets, gloves, spray bottle, sponges, disinfectant, squeegees, wood and leather cleaner, ceiling brushes, vacuum cleaner, microfiber towels/napkins, duster, furniture polish among others. Cleaners wear various clothing that help to maintain and carry out cleaning tasks in offices and premises. These cleaners can be males, females and single or married, who most often double as messengers in the work place. So, they wear different sizes of clothes based on body figure, shape and equally to project image; every individual wants to maintain a pleasing appearance irrespective of the type of task performed.

In performing cleaning duties cleaners should wear Personal Protective Equipment (PPE) and be careful in this hygiene profession because of the cleaning agents (Oxwork, 2022). Nisbets (2023) posited that some cleaning agents are dangerous to the skin and eyes so wearing personal protective equipment are crucial to maintaining safety. They further, noted that waterproof aprons help to protect wearers' clothing, overalls or lab coat; they may have pockets to carry cleaning equipment and good for vacuuming, dusting and polishing tasks. In addition to their tasks, cleaners ensure and maintain clean workplace, make constant movement in working, sanitize and sterilize work tools and environment (Indeed, 2013). The operations constitute challenges in clothing selection and use. Cleaners in most workplaces do not use adequate clothing that can enhance mobility, practicality and usability for efficiency in performing their duties. The available clothing does not allow easy movement, postures/positions and are soiled by water and dust in the process of undertaking their functions. They need appropriate clothing that facilitates rather than impair their tasks and prevent hazards (Nisbets, 2023). Tesman

Health and Community Service (2014) opined that worker should act as role models and demonstrate appropriate use of safe clothing in workplace that is practical, respectful of culture and choices. Clothing protects individuals from environmental hazards, promotes health and safety and improves workers' job efficiency. It can also enhance or hinder body functions among different people and occupations. Apparel by its nature has some restrictive effects on the body movements that impede mobility in activities (Nzuta, 2017).

Movement starts with a change in position to anatomical position, when standing with arms at the sides of the body and palms facing out (Thompson, 2010; Holland 2007). Cleaners engage in various tasks that require bending and stretching arms, lifting items, squatting pushing and pulling; so convenient work wear is crucial for protection, free movements and to maintain work efficiency. Azonuche, (2017) pointed that during movement the body expands and contracts at some areas around joints and are more extensive in one or more directions, with the clothing accommodating that expansion and contraction best if it follows the same direction. For example, when one's knee is bent, the leg increases in length over the knee cap and there is correspondingly decrease in length along the back of the knee. Therefore, for mobility the work clothing should freely move with the body, appropriate clothing design based on the perspective of body movements are intrinsically necessary for wearers to perform necessary tasks without being impaired by the apparel (Nwaoye et al, 2022). Clothing has to be practical, useful and allow physical body functions while achieving mobility, usability and comfort. The use of available clothes like gowns, wrapper and blouse or buba, shirts and skirts or trousers pose difficulty in attending to daily cleaning duties such as to sweep and mop floors, sweep surrounding outsides, clean windows, scrubbing and sanitizing restricts and interferes with mobility within and around the work place. To increase mobility in clothing select fabric that will freely move with the body and use garment design that promotes mobility as potential means (Watkin 1995). The fabric should be utilized to allow for maximum possible free movement for the wearer. Therefore, the ideal fabric for mobile clothing should be strictly, flexible, light in weight, thin and slippery (Ahsan, 2012). Fabric creates bulk and bag out which may interfere with movement when it does not return to their original form after stretch. Flexibility in clothing is important and every movement made by the user affects the set of clothing on the body and necessitates different garment contours. So adequate decisions should be taken concerning ease, the environment and activity of the wearer in clothing choice and use. Thus, the specific design system used to add mobility to a garment must be carefully chosen to relate to user needs (Watkins 1995). Appropriate length or width of garment segments are required to allow for the change in body dimensions during movements like walking, straddling, bending, reaching and climbing which are common in many types of work place. Ease of movement without stress or strain from apparels may lead to improved work efficiency (Choi & Ashdown, 2002). There should be work and garment relationship to accommodate muscular flexion and directions for mobility during various activities

Ergonomics is seen as studying "man -machine -environment" subject, which is based on physiology, psychology and combined with relevant knowledge, with the purpose of using the theory of human science; with the methods and production technology, which outcome is directly to serve for the production and the real life (Jianhua, 2008). Ergonomics deals with human interaction with work and environment for safety, comfort and productivity. It involves the design of best practices in work and equipment to minimize errors, injuries and illnesses. Ergonomics is concerned with finding ways to keep people safe, comfortable and productive by accommodating human characteristics capabilities and limitation in the product or process both at work and home rather than making the person adapt to fit the task (Ergonomics Occupational Safety and Health, 2019). Ergonomics being "the science of work: of the people who do it and the ways in which it is done, the tools and equipment they use, the places they work in, and the psychosocial aspects of the working situation" (Pheasant, 1996). It is paramount that work clothing should be suitable and adequate for workplace job demands, environment and weather conditions as well as ease of use, mobility and dressing and undressing. In collaboration, Gupta (2011) posited that "ergonomic considerations dictate that the mechanical characteristics of clothing match the motion, degree of freedom and movement of human joints". The areas where blood vessels lie are more sensitive to pressure; therefore, consideration has to be given to this fact as disregard can lead to the wearer experiencing unpleasant sensations such as rubbing, pressure development and restriction of movement (Kolisi, 2015**)**. Lindqvist and Thornquist (2014) posited "guidelines and directions on the body where the fabric plausibly falls and may drape in order not to fall off the body and not to restrain the body movements" for ergonomic clothing. Ergonomics is synonymous to human factor; in the clothing design and use for tasks, human factor, the work and environment should be considered to minimize ergonomic challenges rising from the use of work wear. These include; occupational safety and health/ injuries and ill-health, mobility restrictions, pressure in work positions and postures, tears in clothes, improper work postures (bending, stretching, lifting and arm raising), unsuitable clothing sizes, inappropriate garment designs among others. The aforementioned situations directly hamper cleaning tasks efficiency, accomplishment and productivity in the workplace.

Theoretically the study is anchored on protection and modesty theory. The protection theory was propounded by Westermark and Havelock Ellis in 1828. This is based on the need for protection against weather, element, insects and hazards. Here clothing is worn for physical and socio- psychological reasons. In line with this theory, this study looks the available clothing qualities for protection and safety, breathability for greater freedom of movement. In the work environment clothing is often overlooked aspect of work efficiency, despite bring regarded as the most important artifacts close to the body that has ability to impact on a person's immediate bodily comfort and job productivity. Clothing that is appropriate for the work environment adds another dimension for workers because of its importance in professional work performance. For

instance, cleaners utilize various types of clothes while carrying out cleaning tasks in different offices, often assuming different postures such as bending, sitting, and torso twisting, while undertaking several movements during task performance. However, performing tasks with available clothing often restricts movement and posture within the work area, causing discomfort and exposing workers to injuries, dirt, stains, and ill-health (Emegha, Bosah, & Idigo, 2025). These occupational challenges reflect broader systemic concerns about workplace efficiency and well-being, which have been linked to governance and institutional effectiveness in Nigeria (Okonkwo & Idigo, 2024). Similarly, economic relations and socio-political structures that shape development outcomes also indirectly influence workplace standards, including occupational safety and clothing use (Idigo, 2024a; Idigo, 2024b).

LITERATURE REVIEW

Observations and available literature revealed that Cleaners lack adequate clothing for their jobs, available clothing does not reflect clothing needs to effectively perform assigned duties. Studies have investigated ergonomics and mobility in work wears; Kolisi (2015) studied ergonomic considerations for the design of women's functional protective wear for the local construction industry. Lindqvist and Thornquist (2014) investigated construction technology for ergonomic clothing with body approximation system. Ogbodu and Nweyilobu (2023) examined application of ergonomics principles amongst fashion designers. Thompson, (2010); Agbo and Igbo, (2017); Nwoye et al, (2022) assessed users' mobility in developed functional apparels for cosmetologist, bedridden wheelchair females and fishmongers respectively. The available clothing used by the cleaners is of various designs/ styles and types with fashion outlooks, which may not be appropriate for their kind of tasks/duties. But to the knowledge of the researcher no study has been carried out on mobility in cleaners' work clothing and ergonomics challenges to work efficiency. This study would benefit the cleaners, office managers, clothing and textiles students and garment makers to see the need to develop job related functional clothing for cleaning duties. Therefore, this study examined the mobility in cleaners' work clothing and ergonomics challenges to work efficiency.

Specifically, the purpose of study was to:

1. identified the duties of cleaners in the workplace;
2. assessed the practicality and usability of various sizes of available clothing based on mobility;
3. ascertained ergonomics challenges in the use of available clothing.

Research questions

1. What are the duties of cleaners in the workplace?
2. What is the mean rating of various sizes of users on the practicality and usability of available clothing based on mobility?
3. What are the ergonomics challenges in the use of available clothing?

Hypotheses

1. There is no significant difference in the mean rating of male and female cleaners on cleaning duties in the work place.

2. There is no significant difference in the mean rating of small, medium and large size-based cleaners on the practicality and usability of available clothing based on mobility?

There is no significant difference in the mean rating of single and married cleaners on ergonomics challenges in the use of available clothing.

METHODOLOGY

The area for the study was Delta state, Southern Nigeria. Expo facto research design was adopted utilizing focus group discussion and descriptive survey research method for the study.

The population was all the junior staff in civil service in the state ministries and directorates; with a total size of 2,961 (Civil Service Commission, 2017).

A multi-stage sampling technique was employed to select a sample size of 286 cleaners (females=219, males=67) from the ministries and directorates through the civil service commission. This was used in order to meet the needs as well as give a fair representation of the subject in the work places. Firstly, through stratified random sampling technique one ministry and directorate each was selected viz; Ministry of Education (higher education and post primary education) and Local government commission. Secondly, convenience sampling technique was employed to select; two tertiary institutions from higher education and 50 secondary schools from post primary education, two local government councils from local government commission.

Thirdly, simple random sampling was used to select; tertiary institutions=60, secondary schools=195, local government council=31 subjects. Fourthly, 9 User models were purposively selected they gave their consent and utilize the available clothing to engage in daily cleaning duties in the work places.

Instrument used to collect data was Focus group discussion to gather information from the cleaners on their duties, types of clothes worn to perform tasks of cleaning and challenges faced in the use of the available clothing. The discussion, responses and suggestions of the focus group, reviewed literature and purposes of the study were used to develop the questionnaire titled Mobility in cleaners' work clothing: ergonomics challenges to work efficiency (MCWCECWE) to collect information from the subjects. The questionnaire has two parts; part 1 was used to collect demographic information of the subjects. The part 11 was in three sub-sections; Section A had 19 items of observation checklist (OCL) of duties of cleaners rated on 2-point scale of Yes (Y) =1 and No (N) = 0 for the items. Section B contains 14 items on movement analysis. This movement analysis scale as outlined in American Society for Textiles and Materials (ASTM F 1154) adapted from Fowler. (2003) was validated to measure movements of cleaners. The practicality and usability of available clothing in movements are rated on a four-point rating scale of Very Easy = 4, Easy = 3, Hard = 2 and Vey Hard = 1. Section C had 11 items on ergonomics challenges in the use of available work clothing on four-point rating scale of Strongly Agree (SA)=4, Agree (A)=3, Disagree (D)=2 and Strongly Disagree (SD)=1.

The questionnaire was face validated by three lecturers in Clothing and textiles and Measurement and evaluation from Ignatius Ajuru University, Port Harcourt who ascertained the appropriateness, relevance and clarity of the instrument used to collect data based on the study purpose. A copy of the instrument was finally made from their corrections and suggestions.

Twenty (20) cleaners not involved in the study were used to collect data to determine internal consistency reliability of the instruments using test retest. Kuder Richardson 20 and Cronbach Alpha reliability coefficient index were used to determine the internal consistency of the instruments on the data obtained. The Kuder Richardson 20 coefficient obtained for (OCL cleaners' tasks) = 0.86, Cronbach Alpha coefficient obtained for (section B and C) are; practicality and usability of work clothing = 0.78 and ergonomics challenges= 0.84.

Two hundred and eighty-six (286) copies of questionnaire were administered to the sampled subjects with the help of six research assistants in their workplaces on scheduled visits. The questionnaire was filled and returned at the same time and all were retrieved.

To analyse data collected, frequency percentages, mean and standard deviation were used for the research questions 1 – 3 (for the cleaners' duties, practicality and usability of available clothing and ergonomics challenges of clothing respectively) A cut off mean of 2.50 -4.00 were regarded as strongly agreed while 1.00-2.49 were regarded as strongly disagreed, 4 is considered as very easy, 3 as easy, 2 as hard and 1 as very hard. Chi^2, Analysis of variance (ANOVA) and t-test for hypotheses1, 2 and 3 respectively at 0.05 significance level.

RESULT AND DISCUSSION

Research question 1: What are the duties of cleaners in the workplace?

Table 1: Percentage of Responses of Cleaners on Duties Performed in the Workplace

S/n	Duties of cleaners	F (%)	Remark
1.	Sweeping	286(100)	Yes
2.	Vacuuming of carpets and furniture	256(89)	Yes
3.	Dusting surfaces	284(99.30)	Yes
4.	Mopping floors	282(98.60)	Yes
5	Polishing floors and other surfaces	260(90.91)	Yes
6.	Remove broken glasses	270(94.41)	Yes
7.	Clean spills and messes	282(98.60)	Yes
8.	Cleaning and sanitizing toilets	286(100)	Yes
9.	Clean offices and hallways	286(100)	Yes
10.	Clean windows	284(99.30)	Yes
11.	Dispose trash bins	283(98.95)	Yes
12.	Dust surfaces	286(100)	Yes
13.	Fetch water for cleaning	279(97.55)	Yes
14.	Maintain tools	282(98.60)	Yes

15.	Stock cleaning agents	278(98.23)	Yes
16	Cleaning/picking round the office surrounding and environment	278(98.23)	Yes
17.	Ensure hygiene and safety	278(98.23)	Yes
18.	Burning of dirt gathered around the surrounding	275(96.15)	Yes
19.	Removing cobwebs from the ceiling	276(96.50)	Yes

N= 286, F=Frequency, %-Percentage

Result in table I showed some 286(100%) respondents identified duties performed as sweeping, cleaning offices and dusting surfaces, cleaning and sanitizing toilets, 284(99.30%) clean windows, 283(98.95%) dispose trash bins, other 282(98.60%) mop floors, clean spills and messes, and maintain tools, another 278(98.23) stock cleaning agents, cleaning of surrounding and ensure hygiene and safety among others. Therefore, cleaners identified all the duties as tasks performed in the work places.

Research question 2: What is the mean rating of various sizes of users on practicality and usability of available work clothing based on mobility?

Table 2. Mean Responses and Standard Deviation Ratings of Various Sizes of Users on the Practicality and Usability of Available Clothing Based on Mobility/Postures

s/n	Movement analysis interview schedule for task performance	$\bar{x}$	SD	Remarks
1	Bending-based: bend down to sweep and return, bend to pick dirt and return, bend down to pack dirt and return, bend down to wash toilet. Repeat movement twice.	2.39	0.63	Hard
2	Arm stretching-stand erect, stretch arm forward dust surface, empty trash bin and return, sweep with long broom and return. Repeat movement twice.	2.30	0.73	Hard
3	Torso twists-stand erect, extend your arm perpendicular to the left side and return. Twist torso and arm to the right and return. Repeat movement twice.	2.28	0.74	Hard
4	Cross body area reaches-stand erect, reach arm across chest, shoulder and return. Repeat movement twice.	2.29	0.83	Hard
5	Sitting-stand erect, sit on a chair and stand up. Repeat movement twice.	3.38	0.67	Easy
6	Walking-stand erect, walk a distance for two minutes and return. Repeat movement twice.	2.39	0.63	Hard
7	Lifting up-stand erect, lift items from the floor and place them on the shelf, carry bucket of water. Repeat movement twice.	2.26	0.70	Hard
8	Mop floor, clean spills, polish floor and return.	1.29	0.33	Very

	Repeat movement twice.			Hard
9	Vacuum carpet and return. Repeat movement twice.	2.49	0.83	Hard
10	Arm raising-stand erect. Raise your arm overhead, dust/ clean cobwebs from the ceiling, clean windows, and then bend elbow and return. Repeat movement twice.	1.39	0.73	Very Hard
11	Elbow bent stand erect, carry water, bend elbow and pour out water and return. Repeat twice.	2.10	0.63	Hard
12	Ability to use clothing to perform tasks	2.40	0.70	Hard
13	Comfortable using clothes to perform tasks	2.00	0.79	Hard

Source: Adapted from Fowler (2003), Basic body and task related movements. ASTM F 1154 – 99. $\bar{X}$=mean, SD=standard deviation

Result in table 2 showed the mean responses and standard deviation of the body movements and task – related movements while wearing the available clothing, 13 items had mean range from 2.00 -2.49, this indicates that movements in available clothes are hard to perform tasks and not comfortable in bending, arm stretching, torso twist, lifting up among others. While very hard in 2 items mean are 1.29 and 1.39 that is to mop floor and arm raising, but easy in sitting with 3.38 mean.

Research question 3: What are the ergonomics challenges in the use of available clothing?

Table 3. Mean Responses and Standard Deviation Ratings of Cleaners on the Ergonomics Challenges in the use of Available Clothing

S/n	Ergonomics challenges in clothing	$\bar{X}$	SD	Remarks
1.	Lack of occupational safety	2.45	0.72	SA
2.	Poor/ill- health	2.32	0.67	SA
3.	Injuries	2.26	0.80	SA
4.	Lack of comfort	2.31	0.69	SA
5.	Restriction in movement	2.15	0.76	SA
6.	Pressure in working postures and positions	2.42	0.70	SA
7.	Clothing tears and wears	2.16	0.79	SA
8.	Improper work postures (bending, stretching and arm raising)	2.30	0.68	SA
9.	Inappropriate clothing sizes	1.70	0.74	SA
10.	Inappropriate garment designs	2.48	0.84	SA
11.	Inefficiency in tasks performance	2.35	0.78	SA

$\bar{X}$=mean, SD=standard deviation

Result in table 3 showed that all items have mean range from 1.70 – 2.48 meaning that the cleaners strongly agreed that lack of occupational safety, poor/ill health, injuries, lack of comfort, movement restriction, pressure in working postures, improper work postures, garment tears among others are ergonomics challenges in clothing that impact work efficiency.

Hypothesis 1: There is no significant difference in the mean rating of male and female cleaners on cleaning duties in the work place.

Table 4. Percentage and Chi-Square (X^2) Analysis of Responses of Male and Female Cleaners on the Mean Rating of Duties in Workplace.

s/n	Cleaners' duties.	Male Female		X^2 value	Sig.	Remarks
		Yes	Yes			
1.	Sweeping	64	204	0.018	0.878	NS
2.	Vacuuming of carpets and furniture	63	201	0.885	0.360	NS
3.	Dusting surfaces	65	208	0.522	0.442	NS
4.	Mopping floor	62	204	0.572	0.447	NS
5.	Polishing floors and surfaces	64	205	0.389	0.533	NS
6	Remove broken glasses	63	103	0.317	0.673	NS
7	Clean spills and messes	60	200	0.103	0.769	NS
8	Clean offices and hallways	65	208	0.062	0.829	NS
9	Cleaning and sanitizing toilets	60	182	0.083	0.812	NS
10	Clean windows	60	202	0.545	0.560	NS
11	Dispose trash bins	62	148	1.128	0.283	NS
12	Dust surfaces	60	198	1.183	0.267	NS
13	Fetch water for cleaning	60	204	1.059	0.141	NS
14	Maintain tools	58	190	1.49	0.21	NS
15	Stock cleaning agents	52	200	0.076	0.196	NS
16	Cleaning/picking round the office surrounding and environment	60	204	0.060	0.262	NS
17	Ensure hygiene and safety	68	199	0.091	0.431	NS
18	Burning of dirt gathered round the surrounding	61	204	0.241	0.524	NS
19	Removing cobwebs from the ceiling	56	210	0.452	0.732	NS

N = 286, M=Male, X^2 value= Calculated chi value, Sig.= 0.05 significance level, NS= Not significant

The result in table 4 showed that there was no significance difference in the mean responses of male and female cleaners on all items. Since their

probability value ranges from 0.018 to 1.495 which are more than 0.05 level of significance (P> 0.05). Therefore, the null hypothesis of no significance difference was accepted at 0.05 level of significance for the items. This implies that male and female cleaners significantly did not differ in the duties performed in workplace.

Hypothesis 2: There is no significant difference in the mean rating of small, medium and large size-based cleaners on the practicality and usability of available clothing based on mobility?

Table 5. Analysis of Variance (ANOVA) Analyses of the Responses of Small, Medium, and Large Size-based Users on practicality and usability of clothing based on mobility

s/n		SSb	SSw	MSb	MSw	Dfb	Dfw	F	Sig.	Decision
1	Bending-based: bend down to sweep and return, bend to pick dirt and return, bend down to pack dirt and return, bend down to wash toilet. Repeat movement twice.	0.20	0.57	0.11	0.11	2	6	1.00	0.40	NS
2	Arm stretching-stand erect, stretch arm forward dust surface, empty trash bin and return, sweep with long broom and return. Repeat movement twice.	0.22	0.57	0.11	0.11	2	6	1.00	0.42	NS
3	Torso twists-stand erect, extend your arm perpendicular to the left side and return. Twist torso and arm to the right and return. Repeat movement twice.	0.22	1.23	0.11	0.22	2	6	0.50	0.63	NS
4	Cross body area reaches-stand erect, reach arm across chest, shoulder and return. Repeat movement twice.	0.20	0.57	0.11	0.11	2	6	1.00	0.40	NS
5	Sitting -stand erect, sit on a chair and stand up. Repeat movement twice.	0.22	0.67	0.11	0.11	2	6	1.00	0.42	NS
6	Walking -stand erect, walk a distance for two minutes and return. Repeat movement twice.	0.22	0.67	0.11	0.11	2	6	1.00	0.42	NS
7	Lifting up-stand erect, lift items from the floor and place them on the shelf, carry bucket of water.	0.00	0.00	0.00	0.00	2	6	0.50	0.63	NS

	Repeat movement twice.									
8	Mop floor, clean spills, polish floor and return. Repeat movement twice.	0.00	0.00	0.00	0.00	2	6	0.50	0.63	NS
9	Vacuum carpet and return. Repeat movement twice.	0.89	0.67	0.44	0.11	2	6	4.00	0.08	NS
10	Arm raising-stand erect. Raise your arm overhead, dust/ clean cobwebs from the ceiling, clean windows, and then bend elbow and return. Repeat movement twice.	0.67	1.30	0.33	0.21	2	6	1.50	0.30	NS
11	Elbow bent stand erect, carry water, bend elbow and pour out water and return. Repeat twice.	0.22	1.43	0.11	0.22	2	6	0.50	0.63	NS
12	Ability to use clothing to perform tasks	0.22	0.67	0.11	0.11	2	6	1.00	0.42	NS
13	Comfortable using clothes to perform tasks	0.22	0.67	0.11	0.11	2	6	1.00	0.42	NS

Key: NS = Not Significant, S = Significant, df = Degree of freedom, F = Calculated value of ANOVA using SPSS, SSb = Sum of Squares between groups, SSw = Sum of Squares within groups, MSb = Mean of Squares between groups, MSw = Mean of Squares within groups, n_1 = number of small size-based users (3), n_2 = number of medium size-based users (3), n_3 = number of large size-based users (3), Level of Significance = 0.05.

The result in table 5 showed that there was no significance difference in the mean responses of small, medium, and large size-based users on all items. Since their probability value ranges from 0.08 to 0.63 which are more than 0.05 level of significance (P> 0.05). Therefore, the null hypothesis of no significance difference was not rejected at 0.05 level of significance for these items. The implication of this is that small, medium, and large size-based users did not significantly differ in their responses on the practicality and usability based on mobility in available clothing.

Hypothesis 3: There is no significant difference in the mean rating of single and married cleaners on ergonomics challenges in the use of available clothing.

Table 6. T-Test Analyses of Responses of Single and Married Cleaners on the Ergonomics Challenges in the use of Available Clothing

s/n	**Ergonomics challenges**	**Single (n = 105)**	**Married (n = 181)**	**Df**	**t-value**	**Sig.**	**Decision**

		$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2				
1	Lack of occupational safety	2.20	0.67	2.10	0.66	284	0.650	0.466	NS
2	Poor/ill- health	2.48	0.53	2.12	0.75	284	4.997	0.000	S
3	Injuries	2.40	0.63	2.40	0.57	283	1.598	0.113	NS
4	Lack of comfort	2.42	0.83	2.48	0.60	284	0.240	0.800	NS
5	Restriction in movement	2.38	0.69	2.47	0.48	284	0.570	0.385	NS
6	Pressure in working postures and positions	2.37	0.74	2.41	0.56	282	1.616	0.056	NS
7	Clothing tears and wears	2.32	0.84	2.33	0.67	284	1.264	0.001	S
8	Improper work postures	2.38	0.63	2.45	0.65	282	1.052	0.002	S
9	Inappropriate clothing sizes	2.44	0.73	2.29	0.60	282	1.548	0.117	NS
10	Inappropriate garment designs	2.20	0.83	2.91	0.80	274	1.016	0.242	NS
11	Inefficiency in tasks performance	2.35	0.50	2.02	0.78	274	1.258	0.020	S

Key: NS = Not Significant, S = Significant, df = Degree of freedom, t-value = Calculated value of t-test using SPSS, S.D = Standard Deviation, $\bar{X}_1$= Mean for singles, $\bar{X}_2$ = Mean for married, n_1 = number of singles, n_2 = number of married, Level of Significance = 0.05.

The t-test result in table 5 shows that there was a significant difference in the mean responses of singles and married on ergonomics challenges of available clothing on 4 items (2, 7, 8 and 11). Since their probability values ranges from 0.000 to 0.020, which are less than 0.05 level of significance (P< 0.05). Therefore, the null hypothesis of no significance difference at 0.05 level of significance was rejected for the items. The result also showed that there was no significance difference in the mean responses of singles and married on 7 items (1, 3 to 6, 9, 10, and 13). Since their probability values ranges from 0.056 to 0.800, which are more than 0.05 level of significance (P> 0.05). Therefore, the null hypothesis of no significance difference was accepted at 0.05 level of significance for these items. The implication of this is that singles and married did not significantly differ in their responses on 7 items on the ergonomics challenges of available clothing but, significantly differed on 4 items.

Finding identified duties performed as sweeping, cleaning offices and dusting surfaces, cleaning and sanitizing toilets, cleaning windows, to dispose trash bins, mop floors, clean spills and messes among others. This agreed with ZipRecruiter (2024); Peters (2021) who outlined cleaning duties to include; general sweeping, scrubbing and mopping floors, vacuuming of carpets, cleaning windows, polish furniture, dust ceilings, sanitize toilets and empty trash bins. Cleaning involves the mechanical or physical removal of organic

matter including dirt, debris, fluids to make it clean in foyers, offices, corridors and other low environments (National Standards of Healthcare Cleanliness, 2021). In collaboration, Karcher (2023) buttressed that the cleaning of surface ensures attractive appearance of rooms and environments, preserve values for sustainability and prevents contacting infections. Cleaning is prerequisite to disinfecting; sterilizing surfaces and object in order to deactivate organic matters that can impact cleanliness, health and safety of individuals. Good sanitary condition of workplace can easily be seen in the beauty and clean appearance of its environment. Male and female cleaners significantly did not differ in the duties performed in workplace. This is not surprising, maintaining the cleanliness and hygiene for health is the duty of all and not exclusively for any gender but necessary to create healthy and aesthetically pleasing environments.

Finding indicates that mobility/movements in available clothes are hard and difficult to perform tasks; not comfortable in bending, arm stretching, torso twist, lifting up among others. This is because the available clothing was not specifically designed to meet tasks requirements as in the case of functional and protective garments. Finding agreed with Nwonye, et al (2022) who stated that Fish mongers' mobility challenges associated with handling of tools, lifting up objects, bending and skin irritation; demand apparel design that does not impede movements and postures. Furthermore, work clothing has to be suitable for job demands, conditions in workplace and weather conditions Kolisi (2015). Often times workers have reported fatigue and symptoms that may become intense during working and build up to the condition of Musculoskeletal Disorders (MSDs) due to imposing physical mobility exertion such as walking, arm raising and lowering and poor posture (Olafimihan et al, 2020). Gupta (2011) noted that mechanical characteristics of clothing should match the motion, degree of freedom, range of motion and force and movement of human joints. Clothes for cleaning tasks should be functional to allow mobility in various working postures, efficient and safe work activities. Finding of this present study is not in consonance with that of Azonuche, (2017) who reported that functional clothing movement analysis for bending, arm stretching, torso twist, cross body reaches and lifting items were very easy and did not affect the movements (Thompson, 2010). This is because functional clothing does not hinder mobility necessary for carrying out tasks. The small, medium, and large size-based users did not significantly differ in their responses on the practicality and usability based on mobility in available clothing. Since the available clothing does not have tasks –related design features but instead most of them irrespective of sizes had fashionable styles that lack features such as large armholes and loose fitting for ease to allow arm raising, bending, sitting, torso twist, cross body area reaches and other body movements. Dunne (2004) posited that design features of functional garment take into account situation specific movements required for the accomplishment of a task. To ensure work efficiency consideration should not only be given to work, the working environment and the differences in body structure of the user of the work garment.

Furthermore, finding indicated that lack of occupational safety, health problems, injuries, lack of comfort, movement restrictions, pressure in working postures, improper work postures, garment tears among others are ergonomics challenges in available clothing that impact work efficiency. This finding is in line with Kolisi (2015) who posited that uncomfortable protective work wear can contribute to lack of productivity in the work place; hence 3D body scan data are helpful in better understanding of issues relating to mobility and restrictions imposed by the clothing. In support Olafimihan et al (2020) stressed that 'the workers are chronically exposed to diverse occupational hazards leading to health problems. 'Occupational hazards among street sweepers or cleaners are a cause for concern in that such occupational hazards could be physical, chemical, biological, psychosocial or ergonomics hazards' (Ofonime & Ukeme, 2020). The "occupational risks faced in cleaning affect the performance of their duties, among which are the musculoskeletal disorders that can trigger long-term disabilities and may keep them away from work indefinitely" (Araújo et al, 2016). Personal protective equipment (PPE) or functional clothing are worn to reduce the exposure to hazards that cause serious workplace injuries, illnesses, discomfort and immobility, such as uniform, safety footwear, gloves and high visibility clothing that enhance efficiency of work performance. (Patel & Utsuk, 2020). The singles and married did not significantly differ in their responses on some items on the ergonomics challenges of available clothing but, significantly differed on other few items. From the fore going analyses marital status can be a factor in these differences; those that are single may wear more fashionable clothing that are tight fitting, restrict proper work postures and cause garment wears and tears. Patel and Utsuk (2020) identified lack of knowledge of hygiene and inability to wear appropriate work clothing as posing ergonomics challenges to the cleaners' work productivity; therefore, garments that are ergonomically designed are crucial to boosting their efficiency and performance.

CONCLUSION AND RECOMMEDATIONS

The duties of Cleaners in the workplace are paramount to health and job productivity. The use of adequate tools, postures, positions and clothing minimize occupational hazards, ensure safety and increase work performance. The study identified their functions as sweeping, mopping, cleaning and sanitizing; involving several movements with the use of available clothing which make tasks difficult and hard due to the styles and designs. These are ergonomically challenging and cause lack of occupational safety, health issues, discomfort, movement restrictions among others. Therefore, the use of adequate clothing minimizes these challenges and difficulties encountered in carrying out tasks thereby increasing work efficiency.

From these findings it was recommended that:

1. Functional garments that are tasks related should be made available for the cleaning duties in the work places for comfort, job efficiency and productivity.

Cleaners should perform their duties using appropriate positions and postures to mitigate the impacts of occupational hazards encountered in carrying out the assigned functions.

FURTHER STUDY

This study still has limitations, so further research on this topic is needed "Mobility in Cleaners' Clothing and Ergonomics Challenges to Work Efficiency"

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