

KNOWLEDGE, ATTITUDE AND PRACTICE ON THE USE OF PERSONAL PROTECTIVE EQUIPMENT BY TRADITIONAL RESIST FABRICS WORKERS IN ABEOKUTA, NIGERIA

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Abstract

Resist fabric techniques such as tie- dye, batik, adire- eleko e.t.c is a manual procedure that directly exposes workers to various synthetic dyes and chemical used. The aim of this study was to assess the level of knowledge, attitude and practice on the use of personal protective equipment by traditional resist fabric workers in Abeokuta. Cross sectional survey was used for this study to select 403 traditional resist fabric workers. The workers were interviewed by face-to-face questionnaire. The results indicate that the prevalence of good knowledge and appropriate attitude was low equal 3.7% and 4.2% respectively. The prevalence of using nose cover was 29%. Additionally, most of the workers know that synthetic dyes and chemicals used with it cause poisonous gas; 91.6% of the respondents have known that synthetic dyes and chemicals can cause harmful effect to their health, 80% of the respondents received the knowledge information by family, friends and neighbors while few of them receive if from radio. The study proposed appropriate recommendations in other to reduce the health effect of individual resist fabric workers and the community.

Word Count= **180 words**

Key words: traditional resist fabrics workers, Knowledge, attitude and practice, personal protective

Equipment, Dyes and Chemicals

Introduction

Fabrics in colours, such as blue, red, yellow, green and their combinations are made by impregnation of the cloth with certain colour substances called dyestuffs. Dyeing is an ancient art which predates written records. It was practiced during the Bronze age in Europe Adeniji, Ariwaodo, Mustapha & Ekundayo (2009). Primitive dyeing techniques include sticking plants to fabrics or rubbing crushed pigments into cloth. In the past, obtaining natural dyestuffs and mixing them to obtain the desired colour is a slow process. But today, dyeing is a complex, specializes science as nearly all dyestuffs are now produced from synthetic compounds. Due to progressive industrialization, workers are exposed to an increasing number of chemicals as a result of contact with synthetic dyes and chemicals which has resulted to occupational hazards such as dermatitis, hitching, cough etc which accounts for a large number of occupational diseases and could even exceed all industrial diseases put together (Stretcher & Rosenstock, 1997; Grosick, 2004).

Resist fabric techniques such as tie- dye, batik, adire- eleko e.t.c is a manual procedure that directly exposes workers to various synthetic dyes and chemical used. Adeakin (2009) states that skin diseases, such as allergic contact dermatitis, irritant dermatitis and inflammation of mucous

membranes, result from contact with synthetic dyes and chemicals, particularly acids, alkalies, oxidizing agents, detergents and solvent. Most of the labour force engaged in resist fabric techniques (tie- dye, batik machine design) in the tie-dye areas of Abeokuta are not provided with knowledge of occupational safety and health which is a cross-disciplinary area concern with protecting the safety, health and welfare of people engaged in the work (Ogunduyile, 2001). According to International labour Organization report 2008, every year more than 2 million people die from occupational accidents or work-related diseases in the world. By conservative estimate, there are 270 million occupational accidents and 160 million cases of occupational diseases. Hazardous substances such as sulfur dioxide, hydrogen sulphite, asbestos kill 100,000 workers worldwide each year (ILO, 2008). Whereas, the preventive medicine centers in the national occupational health network of Vietnam (Nguyen and Duybao, 2008) reports that of 1,186,283 workers in that country, the percentage of respiratory diseases, ophthalmopathy, otolopathy, skin diseases, and cancer were 31.7%, 6%, 2.2% 2.4% and 0.04% respectively.

In Nigeria, majority of people engaged in tie- dye, Batik and other related resist fabric decorations are unskilled and there are many hazards they are exposed to during waxing, bleaching and dyeing of fabrics involving contact with use of chemicals and synthetic dyes (Ogunduyile, 2001). These hazardous chemicals usually cause adverse health effect to the craftsmen. (Adeakin, 2004) reports that the number of workers who have disease related to occupational health, accident, and injuries are increasing. It was also reported that the rate of chemical emission in textile industries both traditional and industrial is increasing significantly and this emission is mainly produced due to interrupted processed such as boiling, bleaching, dyeing e.t.c) and equipment leakage (Yu, Lee & Wong, 2005). A large amount of vapour and chemicals are emitted into the air in the working environment during production and these can have a very significant impact on air quality and human health.

The harmful effect of synthetic dyestuffs on human health have been reported worldwide for several decades (Lipsett, (2001); ILO, (2008)). According to them, Poor health, safety, and waste management practices have been reported to pose several health hazards to textile workers as they are exposed to such conditions with no control over the length and frequency of exposure. Occupation health authorities around the world have established safety regulations and/or guidelines to limit workers' exposures to solvents at the worksite (Kishore, Hira, Lisa and Rao, 2008), both by controlling the air concentration of solvents in the work environment and by helping workers to avoid unnecessary exposures through safe practices and personal protective equipment (Amdur, Klaassem and Doull (1986). Theoretically, safe practices depend on having an appropriate attitude towards the health risks associated with exposure to dyes, which in turn depends on knowledge about the danger and harmful effects of dyes. According to Haldiya, Sachdev, Mathur & Saiyed (2005) millions of workers are occupationally exposed to dyes in the world , but little is known about their knowledge of and attitude toward the effects of dyes on their health.

Fabric dyer's knowledge, attitude, and practice toward the hazard of synthetic dyes have not been well assessed in Nigeria. There is a great concern that workers should be aware of the adverse effects of dyes if not handled properly as they are exposed to the same with no control over the length and frequency of exposure. This study aims to investigate the knowledge, attitude, and practice (KAP) on the use of personal protective equipment by traditional resist fabric Craftsmen in Abeokuta, Southwest. Nigeria.

Hazardous effects of dyeing on health and environment

The use of synthetic vat dyes, caustic soda and sodium hydro sulphite is on the high side among the traditional dyers in Nigeria. A close examination of the chemical composition of these materials shows that, their use poses a great danger to the users. Morse and Stanley (2009) observes that prolong and excessive exposure to harmful substance in the environment can result to disabling disease and death. Synthetic dye power consists of diazonium salt and naphthol compound which, if inhaled, could lead to serious sneezing, feeling of suffocation and other related discomforts. Alexander (1977) opines that caustic soda is injurious to human tissue. According to him the chemical is corrosive in nature and as such can burn and irritates. Anand and Kumar (1990) in this vein sounded a note of warning that the users of these corrosive chemicals need to be careful to avoid a fatal situation. This warning is not only relevant to Nigeria cottage dyers who often fail to use the required nose protectors but also to those of them who find no fault in dipping their hands into the mixture without using hand gloves Ogunduyile (2001).

Hawley (1981) and Saly (2002) observes that sodium hydrogen sulphite is toxic if administered regularly or in large doses over a period of time. Mekonnen, & Agonafir (2002) notes that chemical inhalation or ingestion often combines with body tissue which, eventually causes symptoms such as irritation of the respiratory track, aggravation of chronic bronchitis and asthma, besides the stench generated during heat setting in dyeing. Salvato and Joseph (1982) observes that such chemical could be injurious to the kidney which is often open to high rate of perfusion and active transport capabilities. Considering the various views held by experts in chemical analysis and health management, there are grounds for suspecting the existence of a number of health problems associated with exposure to chemicals through dyers constant use of caustic soda, hydrogen sulphite and dyes.

A visit to dyeing centers at Abeokuta reveals that dyers do not make use of protective goggles, respiratory protectors, hand gloves and aprons. In other words, the working environment of cottage dyers is far from being conducive. The traditional dyers adopt different techniques in arriving at the pattern they incorporate into their fabrics. These include twisting of the fabrics, knotting, stitching, folding, using of wax. Traditional dyers also make use of cassava starch as a resist agent on fabrics known as *adire- eleko*. Ade-ajayi (1994) notes that, the art of dyeing was at its peak in Nigeria by the middle of the nineteenth century and that demand was beyond the borders of Nigeria. However, there were no reported cases of evidences of deleterious effluents and residues generated during the process of using the locally prepared dyes and mordants until the introduction of synthetic dyes.

In the Southern part of Nigeria, the women practice the craft amidst a battery of large earthenware pots, and lay out the finished fabrics on line in the courtyard or floor. Most dyers also make use of modern chemicals, which are disposed carelessly. Bye- products from dyes are thrown around the premises indiscriminately without due regards for the environment. This makes the environment unsightly and act as hindrance against environmental aesthetics Aimson (1999); Parimalam, Kamalamma & Ganguli (2007). The coloured highly alkaline and surfactant waste products from dyeing processes are toxic and have every potentials to contaminate the earth surface and human health.

Previous Study on knowledge, Attitude, and Practice (KAP) and Personal Protective Equipment (PPE).

There have been numerous studies on knowledge, attitude, and practice (KAP) as well as personal protective equipment (PPE). In 2005, a study on knowledge, attitude and practice

regarding organic solvents among printing workers was carried out by Ignatius, Nga and Wong (2005). The study aimed at finding out the prevalence of good knowledge, appropriate attitude and safe practice among printing workers exposed to organic solvents, and to see if safe practice was influenced by the knowledge of and the attitude towards the harmful effects of organic solvents or not. The survey was conducted in a sample of 501 male printing workers from 28 factories in Hong Kong. In order to find out the knowledge of and attitude towards the harmful effects of organic solvents as well as the good practices adopted by the workers when handling solvents, a questionnaire was adopted for the study. Besides, multiple logistic regression analysis was conducted to identify the major factors that influenced the knowledge, attitude and practice of workers. The study found out that, good knowledge of printing workers was positively associated with awareness of the relevant legislation and past drinking behavior are negatively associated with current smoking. Moreover, appropriate attitude depended on having good knowledge and younger age. However, safe practice was found not to depend on knowledge and attitude, but was positively associated with being informed of safety precautions and being supplied with chemical information by supervisors.

Paramasivam, Narayani, and Anind (2007) conducts a study on Knowledge, attitude and Practices related to occupational health problems among Garment workers in Tamil Nadu, India. The study aimed at assessing the level of awareness of health problem among garment workers and their attitudes and practices to prevent the same. The workers were employed in three different sections i.e. cutting, stitching and finishing. As these workers perform repetitive tasks throughout the workday, they face several work related problems. A cross sectional study (n=216) was used in which the workers employed in the three sections had high level of knowledge of the health problems, but the knowledge of personal protective equipment differed by section. The study result shows that more than half of the workers in all the sections were aware of the benefits of Personal Protective Equipment (PPE), but a few workers in the cutting section were using Personal Protective Equipment (PPE). The result of the study also shows that there was a wide gap between their knowledge level and practice with protective devices.

A Knowledge, attitude and Practices (KAP) survey was conducted in South America by Kishore et al (2008) on effectiveness of an educated program to promote pesticide safety among pesticide handlers of South America. It aimed to assess occurrence of poisoning and effectiveness of educational interventions among pesticide handlers in areas having high occurrence of occupational poisoning. In the study, two provinces were identified by spot mapping and targeted for a public education program on safe handling of pesticides, the impact of which was assessed using a knowledge, attitude and practice (KAP) questionnaire. The education was provided using a structured individualized training program to 74 pesticide handlers. Three point KAP assessments were carried out at baseline, immediately after training and after 1 month of training. The study found out that educational intervention among pesticide handlers improved the KAP score for safe pesticide handling. Besides, it was recommended that continuous education and training programs for agricultural workers would promote awareness and minimize the hazards of occupational pesticide exposure.

Materials and Methods

The present study was taking up in the two major location of Abeokuta which are Itoku and Asero where the making of resist fabrics production is famous. Resist fabrics production (tie-dye, batik, tritik) is an exclusive design made by traditional textile workers (craftsmen) in Abeokuta and is recognized as traditional art all over Nigeria. As per the records of the dyeing association, there are around 50 micro units employing about 15-20 employee per unit. The

researcher met the owners and workers and the purpose of the study was clearly explained to them and the willingness to participate in the study was confirmed orally. Thus 403 workers employed in 32 units were purposively selected to participate in the study.

A combination of several methods was used to assess the KAP of the workers. Primary data collection was done by interviewing the workers followed by other methods such as observation, records, and reports maintained in the units. The interview schedule was prepared in English but was communicated to them in their local dialect. Questions on socio-economic background, awareness of occupational health, and details on the use of PPE were formulated and pretested among the workers who did not form a part of the study. The pretested schedule was suitably modified incorporating the suggestions by the experts in the relevant field, and workers in the units.

Data were gathered from the respondents by a face-to-face confidential interview with the workers at the worksite. This enabled the workers to provide information about the health problem, work organization, environment, use of protective devices, etc. The interview for each worker took about 20-25 min. the data collected were analyzed using SPSS 11.0 with respect to knowledge, awareness level, attitude, and practice in preventing hazards.

Results

Four hundred and three participants (n=403, 95.95%) were consented to complete the face-to-face questionnaires. The majority of the participants were male (59.8%). Long working hours and inconvenient worksite may be the reasons for less number of women opting for this work and high percent of men. The dyeing units were therefore predominately male dominated. The age ranged from 20 to 70 years and the average age of the participants was 43 years with a standard deviation of 10.66. Forty-six percent of the workers had secondary school education, followed by 34% with primary school-level education, 9% were illiterate, 8% had higher secondary level education, and only 2% had college- level education The average working year of the respondents was 19 years with standard deviation of 10.6 varied from 1-50 years. Average working duration was 11 months per year with standard deviation of 1.7 and the average dyeing time was 9 hours per day.

From table 1, it is clear that 91.6% of the respondents have known that the use of dyes and chemicals (hydrogen- sulphite and caustic soda) can cause harmful effect to their health while 8.4 have not known about this. Most of the respondents (79.95%) received the knowledge from family and friends; while 28.73% of which received from radio. The other small percentage receives from newspapers and magazines, billboards, health workers, posters and other printed materials as shown in table 1.

Table 1: Number and percentages of the respondents receiving information about dyes and chemicals

Information Source	Respondents receiving the information	
	(n=369)	(%)
Newspapers and magazines	30	8.13
Radio	106	28.73
Billboards	52	14.09
Posters and other printed materials	1	0.27
Health workers	3	0.81
Family, friends, neighbors and colleagues	29.5	79.95
Others	45	12.20

Knowledge on using personal protective equipment (PPE)

Participant answer a total of 16 questions, with each correct answer given one point of 16 points. The average knowledge score from the respondents was 7.2 (Sd=3.24) out of possible 16 points. The knowledge score was in the range of 0-16. While, only 5 respondents were able to answer all the questions correctly.

Table 2: Distribution of Knowledge level on using personal protective equipment

Knowledge	Number (N=403)	Percentage (%)
High (13- 16 score)	15	3.72
Moderate (10- 12 score)	73	18.11
Low (0-9 score)	315	78.16

The distribution of the knowledge on using PPE of the respondents showed that 78.16% of subjects had “low knowledge”, 18.11% of them had “moderate knowledge” while only 3.725% of the respondents had “high knowledge as shown in table 2.

Many of the respondents (86.35) knew that dyes, hydrogen sulphite and caustic soda can cause some poisonous gas. Only a small number of the respondents (26.80%) knew about the health effect of the dyes and the chemicals they use as not only poisonous to respiratory organs but also other parts of the body. Nearly half of them (41.44%) knew that the gas from burning chemicals is poisonous to skin as expressed in table 3.

Table 3: Number and percentage of appropriate knowledge for using PPE by respondents

Items	Number	Percentage
Mixing of hydrogen sulphite & caustic soda causes some poisonous gas	384	86.35
The current process of mixing hydrogen sulphite & caustic soda is safe for workers	214	53.10
The poisonous element of synthetic dyes & chemicals is causing the gas H ₂ S	138	34.24
The poisonous element of synthetic dye & chemicals is causing the gas SO ₂	153	37.97
The gas from dye & chemical mixing is only poisonous to respiratory organs	108	26.80
The gas from dye & chemical mixing is not poisonous to skin	167	41.44
Wearing gloves does not play the role of poisonous preventive for my skin	134	33.25
Wearing face masks or clothing is enough at work	140	34.74
I need to wear glasses to avoid effect of dyes and chemicals on eye	206	51.12
I need to wear face masks & nose cover to avoid effect of dyes and chemicals on respiratory	209	51.86
Wearing face masks, nose cover, glove & clothing can prevent the gas from the chemicals	227	56.33
Wearing only clothing can prevent effect of hydrogen sulphite & caustic soda on skin	167	41.44

Attitude of respondents on using personal protective equipment

The distribution of attitude on using PPE of respondents shows that 4.22% of the respondents had “positive attitude”, 68.98% of them had “neutral attitude”, while 26.8% had “negative

attitude”. The average attitude score for all respondents were 25.8 (SD=3.42) out of possible 40 points as shown in table 4

Table 4: Distribution of attitude levels towards using PPE of the respondents

Level of attitude	Number	Percentage
	N=403	(%)
Positive (32-40 scores)	17	4.22
Neutral (24-31 scores)	278	68.98
Negative (00-23 scores)	108	26.80

Approximately half of the respondents’ attitudes agree with the idea that chemicals and dye use is very dangerous (56.33%). 50.12% of respondents agreed that having respiratory organs checked by medical workers annually is necessary. 54.09% agreed that workers need to be trained of using PPE, while majority of them 51.12% agreed that face mask is not enough to protect themselves from dye chemicals fumes. Among the respondents, 29% had been using at least one kind of personal protective equipment, while 71% had never used PPE.

Practice about using personal Protective equipment

Respondents were allowed to select more than one type of PPE that they had used to protect themselves during resist dyeing process. Among them, 29% of respondents are using at least one kind of PPE. 100% of them had absolutely used respirator, while 27.355 used hand and arm protection. 11.11% used Eye protector, only 2.56% of them used foot protector and 1.71% of them used clothing respectively as shown in table 5.

Table 5: Percentages of respondents using PPE of each individual type

Type of PPE	Number	Percentage
	N=117	(%)
Respirator (nose cover)	117	100.00
Hand and arm protection	32	27.35
Eye protectors	13	11.11
Foot protector	3	2.56
Clothing	2	1.71

Table 6 showed that, respondents had fair level of practice more than good level of practice (53% compare to 47% with respirator (nose cover); 56.2% compare to 43.8% with hand and arm protector). None of the respondents had poor practice.

Table 6: Distribution of practice on using PPE by the respondents

Type of PPE	Practice		
	Poor	Fair	Good
	No. (%)	No. (%)	No. (%)
Respirator (nose cover) n=117		62 (53.0)	55 (47.0)
Hand and arm protection (gloves) n=32		18 (56.2)	14 (43.8)
Eye protectors glasses) n=13		10 (76.9)	3 (23.1)

Knowledge, attitude and practice regarding to the use of personal protective equipments

Knowledge, attitude and practice regarding to the use of personal protective equipments were also treated as continuous variable, and correlation coefficients were computed. Knowledge on

PPE using was not regarded as a significant correlation with level of respirator use (spearman’s rho, $p= 0.928$). In comparison, attitude was regarded as highly significant correlation with the level of respirator using (spearman’s rho, $p<0.01$), as shown in table 7a and attitude also had a statistically significant correlation with knowledge on using PPE (pearson correlation, $P<0,05$) as shown in table 7b

Table 7: Correlation between knowledge score and respirator using

Variables	Respirator (nose cover) using	
	Spearman’s rho	<i>p-value</i>
Knowledge	0.008	0.928

Table 7a: Correlation between attitude score and practice on using respirator

Variables	Respirator (nose cover) using	
	Spearman’s rho	<i>p-value</i>
Knowledge	0.250	0.006*

* correlation was significant at the 0.01 level

Table 7b: Correlation between knowledge score and attitude score

Variables	Attitude	
	Pearson correlation	<i>p-value</i>
Knowledge	0.11	0.029*

*correlation was significant at the 0.01 level

Discussion

The making of resist fabric design involves many stages and the whole process is labor oriented which can be broadly divided into making the design on the fabrics and dyeing of fabrics. In the case of batik printing, melted wax is applied on fabrics as per design requirements using either a block or a brush. In the dyeing process, the fabric is first tied using a thick rope at the borders and they are dyed first and then rinsed in water and later sundried (Akintayo, 2010). All of these processes involve the workers getting in contact with dyes and chemicals

The result of the study reveals that majority of craftsmen in the study area obtained information on chemicals via several informal sources (from family, friends and mass media) similar to other studies in the field of cottage industry (Ignatius, Nga and Wong, 2005). The source of the information related to the industry and occupational hazards was traditional and was usually transferred one by one as respondents in the study received the knowledge from their families, friends, and neighbors approximately 80% rather than from radio (28.7%).

The study shows that, in the dyeing of fabric to be design on, hydrogen sulphite and caustic soda are the most chemicals that have the most adverse harmful effects on the craftsmen. The study also reveals that there are many ways for the workers to protect themselves from the harmful effects of these chemicals and that one of the important ways to protect the workers from the gas of chemicals is the use of PPE. This result is in line with another literature on KAP regarding organic solvents among printing workers in Hong Kong (Hathaway, Proctor and Hughes, 2006) which reported that the workers in the printing industry in which many chemicals are used had a good knowledge (62%) about the harmful effect of the chemicals in printing which was excellent and 91.6% respondents knew that chemicals used in the industry have harmful effects to their health.

There were many reasons observed why the respondents were not using PPE. The study reveals that, majority of the craftsmen in this study was not using PPE because they believed that the use of PPE are uncomfortable similar to the result of the survey conducted in Hong Kong (Lipsett, 2001). The study shows that, among the traditional resist fabrics craftsmen in Abeokuta, chemicals pollutants may have diverse harmful effects which affect the craftsmen in many system such as eyes, skin and upper respiratory tract. In this study 71.2% had at least one symptom such as cough, sore throat and redness of the eyes. In this study, knowledge level on using PPE was significant association with all of the socio-demographic characteristics i.e. age ($p < 0.01$), gender ($p < 0.05$), level of education ($p < 0.05$). It is easy to understand that the more workers have high education, the more they have knowledge. The elder workers can learn self-protecting knowledge from experiences in their work. The result also showed that attitude was significant association with level of education and aging group ($P < 0.05$).

A number of studies related to KAP of different category of workers have been reported in the literature, but this is the first systematic study to reveal KAP and the underlying factors that influence the health problems of the craftsmen in Nigeria. Earlier study (Collishaw, 2003) on knowledge, attitude, and practice regarding organic solvents among 501 printing workers in 28 factories in Hong Kong revealed a low level of knowledge (20.4%), appropriate attitude (38.4%), and safe practice (22%) among the workers. Safe practice did not depend on knowledge and attitude but was positively associated with being informed of safety precautions and being supplied with chemical information by supervisors. Another study (Robson & Toscano, 2007) also reports a huge gap between the knowledge and practice of salt workers with protective devices. KAP related to occupational health problems among garment workers in Tamil Nadu, India, revealed that the workers employed in the three sections had high levels of knowledge of health problems, but the knowledge of PPE differed by section. There was a wide gap between their knowledge level and practice of using protective devices. (Yassin, Abu-Mourad and Safi (2002) The KAP study of pesticide sprayers (Mekonnen & Agonafir, 2002) in agricultural farms indicated that careful working was considered to be very important by 93% of the pesticide sprayers while 7% suggested the use of personal protective devices (PPD). The hygiene and sanitation practices of the sprayers require much improvement with attitudinal change along with the provision of better facilities and infrastructure.

Conclusion

The above studies clearly indicate that although all the workers had knowledge regarding the occupational hazards irrespective of the nature of the occupation they are engaged in, their attitudinal approach toward the betterment of the work environment is positive. But because of lack of provision in the worksite, they are unable to practice. Making workers aware of the occupational hazards and motivating them to use PPE while at work is the need of the hour.

Recommendations

Base on the findings of this study, the following issues should be considered for improving knowledge of craftsmen of harmful effect of dyes and chemical and the importance of using PPE at work:

Public education is necessary to address the knowledge gap revealed in the study. Therefore education programs should be organized for improving knowledge about effects of dyes and chemicals and it should be focus mainly on increasing the awareness of the people on the importance of using PPE at work.

Local government authority should through the mass media like the radio station in the state, state press, e.t.c raise the awareness and knowledge of the people and that of the craftsmen, in

particular, not only harmful effects of chemical but also other health information. Besides, basic knowledge of good effects of using PPE to protect the traditional resist fabric craftsmen from their work should also be given to them.

Free publishing materials concerning to education, training and specific information written in local dialects on occupational health should be offered.

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