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## **ECONOMICS OF OCCUPATIONAL HEALTH IN RESIST DYED FABRICS (*ADIRE*) PRODUCTION IN ABEOKUTA, OGUN STATE, NIGERIA**

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### **ABSTRACT**

This study examined the occupational health hazards in resist dyed fabric production in Ogun State, Nigeria. Data were obtained by questionnaire method and focused among others on the socioeconomic characteristics of the respondents, illness episodes. The data were analysed by using the cost of illness procedure, contingent valuation method, and multiple regression model. It was found that 95% of *adire* producers are indigene of Ogun State. Body pain, skin ulceration and respiratory diseases accounted for 38.3%, 19.2% and 12.5% of the perceived illnesses association with dyed fabrics activities. An average cost of illness of ₦13301.17 estimated for the sample with time cost of illness accounting for 40.69% with producers losing an average of 15 man-days to illness during the period under consideration by the study. However, the mean WTP to avoid a recurrence of these illness episodes was estimated to be ₦567.98/month. It was also found that income, gender, level of education, financial cost of illness, time cost of illness, preventive cost of illness, and number of illness episode were the significant factors influencing the amounts respondents were willing to pay to avoid a recurrence of these illness episodes. The findings of this study can be vital input to the economic decision - making process for long - term sustainable vocational/ occupational health policy reform programme particularly for artisans in both rural and urban areas with a view to reducing occupational illnesses.

**KEYWORDS:** Occupational Health, Resist Dyed Fabrics, Cost of Illness, Ogun State

### **INTRODUCTION**

*Adire*, the patterned dyed cloth is extant and is practiced in almost all Yoruba towns in Southwestern Nigeria (Areo, 2013). Traditional dyeing with many indigenous plants as a vocation and art tradition especially indigo dyeing is a specialized art which has become a legacy of the Yoruba. Dyeing among the Yoruba is of two types: total-dyed cloth called *Amure*, without covering any part for dye resistance or pattern 'formation' and *Adire* which involves creating patterns on the fabric through any of a variety of available techniques before immersing the cloth inside dye. Indigo still remains the oldest natural dyestuff of world textile tradition and with Tyrian 'purple' it is believed to predate the time of Moses (Proctor, 1992; Gillow and Sentence, 1999). Indigo is by far the most popular and widely used, the favourite dye in indigenous Africa (Polakoff, 1982), and was up to the 1960s when synthetic dyes were introduced; it was used by the Yoruba dyers.

Pattern dyeing in one or more patterns is found in most parts of Africa with the formation of patterns with small and large circles found among the Yoruba and generally throughout West

Africa (Picton and Mack, 1997). *Adire*, patterned or resist-dyed cloth is a popular industry in many Yoruba towns and the name is coined from two Yoruba words; '*Adi*', meaning 'to tie' and '*re*' which means to dye'. The name *Adire* therefore, identifies the particular cloth produced by the people and the process of its production. The name according to Carr (2001) points to the cloth's origin or that which is tied and dyed, serve as a style designator and as a designation of the group of origin, identifying the culture, language, and an art tradition of the people (Tomtore, 2001). Certain notable and large Yoruba cities traditionally noted for *Adire* are Osogbo, Ibadan, Ede, Ondo and Abeokuta. There are several other centres, but they were either not as large or active or of international reckoning as the centres in the aforementioned five cities. Of all the centres, Osogbo is traditionally renowned as the home of indigo, and the "home of dyeing"; "*Osogbo ilu aro*" and the people are so good as dyers as to elicit the Yoruba saying "*Aro nbe l'Osogbo, omo eniyan ni mbe nile Ibadan* (Akinwumi, 2008). It is Indigo that pervades Osogbo, while large human population dominates Ibadan. At the peak of the demand for indigo-dyed fabric for export, many *Adire* producers in Abeokuta had to take their cloth to Osogbo for dyeing, while its neighbouring town of Ede supplied Abeokuta dyers with indigo balls, *elu*.

Historically, *Adire* making was introduced into Abeokuta, a town founded in 1830 by, Egba settlers of Ibadan who returned to Abeokuta, after fleeing from the result of the nineteenth century civil wars. *Adire* (resist dyed fabrics) is a popular design of cloth fabrics produced in Abeokuta and other Yoruba speaking towns in Southwest, Nigeria. *Adire* production has a long standing cultural history especially in its simplicity, aesthetics and cost effectiveness of production (Akinwunmi, 1981).

Adeakin (2009) posited that, skin diseases, such as allergic contact dermatitis, irritant dermatitis and inflammation of mucous membrane have been found to be associated with *adire* production. These have been associated with the effects of chemicals and dyes as major chemicals that are associated with the production and aesthetics of the fabrics (Ogunduyile, 2001). International Labour Organization (ILO, 2008) reported that more than 2 million people die from occupational accidents and work-related diseases such as dermatitis, itching, cough etc. accounting for a large number of occupational diseases (Grosick, 2004). 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). According to Haldiya, *et al.* (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.

The harmful effect of synthetic dyes on human health has been reported worldwide for several decades (Lipsett, 2001; ILO, 2008). Occupational health authorities around the world have established safety regulations and guidelines to limit workers' exposures to solvents at the worksite (Kishore *et al.*, 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 *et al.*, 1986).

In Nigeria, majority of the people that engaged in resist dyed fabric decorations (tie-dye, Batik) are unskilled and there are many hazards they are exposed to at different stages of production. These stages include waxing, bleaching and dyeing and they involve contact with chemicals and synthetic dyes (Ogunduyile, 2001). These hazardous chemicals usually result to adverse health effect. This is because during the different processing stages of the fabrics, large amount of vapour

and chemicals are released into the air and these have significant impact on air quality and human health in the working environment.

Production of abrics involve the use of large quantitiesof synthetic caustic soda, vat dyes, and sodium hydro sulphite among other traditional resist dyed fabric ingredients in the study area. Examining these chemicals closely show that their use poses a great health danger because they consist of diazonium salt and naphtol compound which, if inhaled, could lead to serious sneezing, feeling of suffocation and other related discomforts. Morse and Stanley (2009), posited that prolonged and excessive exposure to these harmful substances in the environment can result in disabling diseases and death. Also, Alexander (1977) opined that caustic soda is injurious to human tissue because the chemical is corrosive in nature and can burn and irritates. Anand and Kumar (1990) also confirmed that users of these corrosive chemicals need to be careful to avoid fatal situations. This is not only relevant to Nigeria cottage dyers who often fail to use the required nose protectors but also to those textile producers who find no fault in dipping their hands into dye mixture without using hand gloves (Ogunduyile, 2001).

Against the above background, this study aims to investigate the occupational health in resist dyed fabric production in Ogun State, Nigeria. Specifically, the study sought to: describe the socioeconomic characteristics of producers and residents in the study area, identify various diseases prevalence, health seeking behaviours and coping strategies among resist dyed fabric producers. The study will also estimate economic burden due to diseases through the analysis of cost of illness among resist dyed fabrics producers in the study area and determine the factors influencing the amount respondents are willing to pay to avoid recurrence of the illness episodes.

## **METHODOLOGY**

### **Study Area**

The study was carried out in Abeokuta South Local Government Area, the foremost and major capital city of adire production in Nigeria. The study was conducted in the two major production locations in Abeokuta which are Itoku and Asero.

**Study Data:** In the context of this study, primary data were sourced with oral interviews conducted using structured questionnaire. The information sought among the respondents include socioeconomic characteristics, resist dye related illnesses (signs and symptoms) and willingness to pay to avoid a recurrence of these illness episodes. The questionnaire was administered to One Hundred and twenty (120) of the resist dyed fabrics producers.

**Sampling Technique:** Multistage sampling technique was employed in this study to select a cross section of 120 resist dyed fabric producers in the study areas. Two (2) production centres were purposively selected based on the fact that they are the major production centres in Abeokuta, Ogun State. Sixty (60) resist dyed fabrics producers were randomly selected from each of the two purposively selected production areas in the Abeokuta making a total of 120 producers for this study.

**Analytical technique:** Both quantitative (econometrics) and descriptive techniques were used in this study. The socio-economic characteristics of the fabric producers were analyzed using descriptive technique. Specifically, descriptive statistics were used to identify the most prevalent diseases associated with resist fabric production in the study area. The economic burden of occupational diseases was estimated using cost of illness procedure adopted by Sauerborn *et al.* (1996) as follows:

## a. Financial cost of illness

$$F_c = \sum_{j=0}^n (F_d + F_m + F_t + F_{su}) \quad (1)$$

## b. Time cost of illness

$$T_c = \sum_{j=0}^n [(T_{si} + a_{si}w) + (T_{ci} + a_{ci}w)] \quad (2)$$

## c. Economic cost of illness

$$E = \sum_{j=0}^n (F_t + T_t) \quad (3)$$

Preventive cost  $p_c$  was included to the above stated model, therefore the economic cost of illness adopted for this study is stated thus:

$$E = \sum_{j=0}^N (F_c + T_c + P_c) \quad (4)$$

$F_c$  = total financial cost of health care in a year (₦);  $F_d$  = financial cost of drugs, herbs etc (₦);  $F_m$  = financial cost of medical consultancy (₦);  $F_t$  = financial cost of travel (₦);  $F_{su}$  = financial cost of subsistence/feeding (₦);  $T_c$  = total time cost (number of days of forgone production);  $T_{si}$  = time cost of sick person (number of days of forgone production);  $T_{ci}$  = time cost of caregiver(s) (number of days of forgone production);  $w$  = wage rate (₦/day);  $n$  = number of illness episode;  $a$  = age of respondent;  $s$  = related to sick individual;  $c$  = related to caregiver

However, Contingent Valuation Method (CVM) was used to elicit willingness to pay (WTP) to avoid a recurrence of the illness episode. Each respondent was asked to describe their most recent illness episode whether he/she would pay a stated amount to avoid a recurrence of the episode. The answers to this question enabled us to estimate willingness to pay to avoid illness as a function of the socio-economic characteristics of the respondents. The determinants of the WTP to avoid a recurrence of the illness episode were estimated by multiple regression analysis. The model specifications are as follows:

$$WTP = f(B_i X_i) + e_t \quad (5)$$

Where

$WTP$  = amount willing to pay;  $\beta_i$  = vector of estimated parameters;  $X_i$  = vector of socio economic and cost of illness variables;  $X_1$  = income (₦);  $X_2$  = gender (0=male, 1=female);  $X_3$  = education level (years);  $X_4$  = household size;  $X_5$  = age (years);  $X_6$  = marital status (0=no, 1=yes);  $X_7$  = financial cost of illness (₦);  $X_8$  = time cost of illness (number of days of forgone production);  $X_9$  = preventive cost of illness (₦);  $X_{10}$  = number of illness episode.

## RESULTS AND DISCUSSION

### Socioeconomic characteristics of resist dyed fabric producers

It was revealed from Table 1 that more than half (51.7%) of the sampled resist fabric producers were female and were mostly indigenes of the area with a modal age group of 36-45 years. This is in line with Areo (2013) who posited that resist dyed fabrics are specialized art which has become a legacy of the Yoruba women, and a hereditary craft passed from mothers to daughters. The business of *Adire* was originally a female prerogative (Areo and Areo, 2014). Also, a majority (83.3%) of the producers were married with a mean of 5 people for household size. Approximately

44.2% of the sampled producers had a secondary education with mean work experience of 10years. It was revealed that majority 71.1% had a monthly mean income of ₦45,000.

**Table 1: Socioeconomic Characteristics of Resist Dyed Fabric Producers**

Characteristics	Frequency	Percentage
Age		
26-35years	10	8.3
36-45years	51	42.5
46-55years	39	32.5
56years above	20	16.7
Total	120	100.0
Gender		
Male	58	48.3
Female	62	51.7
Total	120	100.0
Marital status		
Married	100	83.3
Single	10	8.3
Divorce	1	.8
Separated	9	7.5
Total	120	100.0
Household size		
1-3	32	26.7
4-6	73	60.8
7 and above	15	12.5
Total	120	100.0
Level of Education		
Primary	35	29.2
Secondary	53	44.2
Post-secondary	32	26.7
Total	120	100.0
Work experience		
1-10years	72	60.0
11-20years	43	35.8
21-30years	4	3.3
31 above	1	.8
Total	120	100.0
Income		
₦10000-30000	32	26.7
₦31000-50000	54	45.0
₦51000-70000	19	15.8
₦71000-90000	10	8.3
₦91000 above	5	4.2
Total	120	100.0
Indigene		
Yes	114	95.0
No	6	5.0

Total

120

100.0

*Source: Field Survey, 2015***Estimate of Occupational Health: Illness Episodes, Health Seeking Behaviours and Coping Strategies**

There are 239 illness episodes among the sampled resist fabric producers within the period covered by the study. Approximately 38.3% of the total illness episodes were due to back pain and 35.86% accounted for respiratory diseases (Table 2). Skin ulceration and skin rashes accounted for 10.4% and 10.9% respectively. Other diseases occurred less frequently.

Also, various health seeking behaviours were observed among the sampled resist fabric producers. Local herbs accounted for 50% and were the first line of treatment that were very common. However, sampled resist fabric producers sought orthodox treatment (22.5%) when they observed that the ailment is not responding to herbal treatments. Besides, 27.5% of the sampled resist fabric producers sought a combination of herbal and orthodox in combating their illness episodes. This underscores the importance of health education among resist fabric producers and the need for government to make available health workers for sensitization as well as making available health care delivery in the study area. It was also revealed that most of the sampled resist fabric producers do not employ any particular strategy. However, among those that employed coping strategies, labour substitution from family accounted for 48.33% while hired labour accounted for 32.50%.

**Table 2: Frequency Distribution of Occupational Health Status and Coping Strategies adopted by Adire Producers**

Illnesses Episode	Frequency	Percent
<b>Body Pain</b>	<b>92</b>	<b>38.34</b>
Skin Ulceration	25	10.41
Skin rashes	26	10.85
Respiratory Diseases	86	35.86
Swelling of skin	7	2.95
Premature deliveries	3	1.25
Total	239	100.00
<b>Health Seeking Behaviour</b>		
Local Herbs only	60	50.00
Orthodox only	27	22.50
Both	33	27.50
Total	120	100.0
<b>Coping Strategies</b>		
None	23	19.17
Hired labour	39	32.50
Labour substitution from family	58	48.33
Total	120	100.00

*Source: Field Survey, 2015***Estimate of economic burden of diseases**

According to CDCP (2008), the cost of illness provides the monetary estimate of the economic burden of disease. The average producers COI was ₦13301.17 with 40.69% accounted for time cost of illness.

**Table 3: Average cost of illness among resist fabric producers**

Cost item	Cost (₦)	% of Total
Financial cost of Drugs and Herbs	2283.57	17.17
Financial cost of Consultancy	2891.33	21.74
Financial cost of travel	461.67	3.47
Cost of Subsistence (Feed)	750.61	5.64
Time cost of Sick Person	3112.31	23.40
Time cost of Caregiver	2299.67	17.29
Prevention Cost	1502.01	11.29
Total	13301.17	100.0

Source: Field Survey, 2015

### Respondents Willingness to Pay and Determinants

Table 4 showed the distribution of the willingness to pay to avoid a recurrence of these illness episodes. Approximately 53.3% of the respondents were not willing to pay. However, for the respondents who are willing to pay were further requested to state the maximum WTP. The mean WTP to avoid a recurrence of these illness episodes was estimated to be ₦505.08 per month.

**Table 4: Percentage Response of Producers Willingness to Pay**

Response	Frequency	Percent
Yes	56	46.7
No	64	53.3
Total	120	100.0

Source: Field Survey, 2015

The multiple regression analysis was used to obtain the as specified in the methodology. The result of the regression is. The results obtained for parameter estimates as shown in Table 5 revealed that income ( $p < 0.1$ ), gender ( $p < 0.01$ ), level of education ( $p < 0.05$ ), financial cost of illness ( $p < 0.01$ ), time cost of illness ( $p < 0.01$ ), preventive cost of illness ( $p < 0.1$ ) and number of illness episode ( $p < 0.01$ ) were the significant factors influencing respondents willingness to pay. Other variables such as marital status, household size, age and marital status do not significantly influence the amount respondents are willing to pay. The coefficients of level of education, financial cost of illness and preventive cost of illness were negatively related to the willingness to pay to avoid a recurrence of these illness episodes and were statistically significant at 10%, 5% and 1% respectively, this implies that the likelihood of respondents to pay to avoid a recurrence of these illness episodes decreases as the level of education, financial cost of illness and preventive cost of illness increases. The coefficient of income, time cost of income and number of illness episode were thereafter significant at 10%, 1% and 1% and were positively related to the amount a respondent is willing to pay.



**Table 5: Determinants of Willingness to Pay**

Variables	Coefficients	Standard Error	Significant
Constant	-0.647	0.598	0.610
Income	.0747*	.394	.058
Gender	2.289***	.659	.001
Level of education	-.725**	.327	.027
Household size	0.049	.505	.922
Age	0.078	.360	.829
Marital status	-0.086	.297	.772
Financial cost of illness	-.283***	.092	.003
Time cost of illness	.271***	.095	.001
Preventive cost of illness	-0.002*	0.011	.073
Number of illness episode	1.267***	.452	.014
R <sup>2</sup>			0.836
Adjusted R <sup>2</sup>			0.817
F-value			4.74

*Source: Field Survey, 2015* \*\*\*, \*\*, \* significant at 1%, 5%, 10% respectively

## CONCLUSION AND RECOMMENDATION

The general conclusion from this is that various occupational health issues exist in resist dyed fabric production across the study area even though some of the illnesses are common in the two location, which are as a result of regular contact with synthetic dyes and chemicals which have resulted to occupational health hazards such as dermatitis, hitching, cough etc accounting for a large number of occupational diseases with 35.86% accounted for respiratory diseases such as cough, catarrh, asthma, sneezing. These whole problems are as a result of negligence and lack of proper planning both by governments and individuals. In order to avoid reoccurrence of these illness episodes, majority of the respondents were willing to pay to avoid a reoccurrence of the identified illness episodes, though at different prices with mean amount of ₦567.98/month. To a very large extent, government still remains a major stakeholder in terms of provision of certain environmental goods as well as guideline to ensure strict compliance with environmental rules. The recommendation that ensued from this study is that since the respondents' monthly income, gender and number of illness episode have a positive relationship with amount of WTP. Thus, eradication of industrial pollution (increase in consumption of environmental goods) with the view to reducing illness episode associated with resist dyed fabrics could be accelerated through a policy instruments that will increase producers' income reasonably.

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