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Re-Visiting Environmental and Health Effects of Nichemtex Textile Industry on Residents.

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----------ABSTRACT----------
The study attempted an evaluation of environmental and health effect of Nichemtex Industry after ten (10) years a similar study was carried out. Textile industry is composed of a diverse, fragmented group of establishments that produce and or process textile-related products for further processing into apparel, home furnishing and industrial goods. These processes undoubtedly generate different kinds of wastes and discharge into the environment. These generated wastes and their effects on the environment were examined and evaluated in relation to the self-reported ill health of residents in the study area.

KEYWORDS : *Textile industry, Environmental problem, Health effects, Industrial wastes.*

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Methods : The study was conducted on Nichemtex industry plc based in Lisori (Abuja) village, Ikorodu, Lagos State. In carrying out the work, structured questionnaires that addressed issues of industrial pollutants, socio-economic and environmental factors were administered on two hundred respondents. Simple statistical techniques such as frequency distributions and percentages were adopted for data analysis.

Result : The study revealed that the activities in the industrial processes generated three major wastes: liquid, solid and gaseous; and that liquid constituted the highest waste. The generated liquid wastes were discharged into Lisori River and not much control measures were surmountable. It was further revealed that environmental related ill health were rampant, with skin rashes, malaria fever, and typhoid fever taking the lead.

Conclusion : The study concluded that effluent discharge from the industry was very high, coupled with offensive odour and polluted water. Despite this, the management of the industry did not take adequate care about the nuisance created by the industry. This probably resulted into a fairly pronounced environmental related ill health reported by the respondents. The study then suggested pollution prevention application (PPA) as a measure to reduce the degree of menace posed by the industry in the study area.

I. INTRODUCTION

Textile industry which is one of the oldest in the world is comprised of a diverse, fragmented group of establishments that produce and or process textile-related products for further processing into apparel, home furnishings and industrial goods. In the early seventeenth century of colonial America, textiles were primarily manufactured in New England homes. Flax and wool were the major fibers used, however, cotton, grown primarily on southern plantations, became increasingly important [1]. The improvement that occurred in the manufacturing industry in Europe in the eighteen and nineteenth centuries during the industrial revolution brought about the transition from domestic system to the factory system. Since the improvement, the environment in which man lives has been seriously competing with the waste generated by industries worldwide. This especially has affected the textile industries as the manufacturing activities go along with the use of chemicals in the pretreatment, dyeing, and other processes to provide the final product with desired visual and functional properties. Nigeria has witnessed rapid urban growth and technology advancement in the past few years that have brought about increasing industrial development. This invariably has brought about various forms of environmental problems in the form of pollution and deforestation among others. The environmental pollution are produced in the form of solids, liquids, gases and air-borne particulate matter, which are emitted into the environment and in most cases, result to negative effects on human health.

According to Hazardous Substance Research Centre (HRSC) [2], hazardous waste that are generated by most textile manufacturing plants include spent solvents and surfactants, polychlorinated biphenyls (PCBs) from transformers and other machinery, asbestos from spinning machines or structures, bleaching products such as hydrogen peroxide, phosphates from detergents or water softeners, insecticides, phenol (a manmade substance used to make synthetics such as nylon), underground storage tank contents, waste oil, and other petroleum products. Others are solvents used to clean machinery and for dyeing, fishing, dry-cleaning, and other special operations, and they include tetrachloroethylene (PCE), trichloroethylene (TCE), benzene, and ethylene dichloride. It was stresses further that, these when released into the environment also cause a lot health hazards to the people around. Health effects due to overexposure by inhalation, ingestion, or contact with these solvents include dizziness, headache, nausea, lung effects, liver and kidney diseases, unconsciousness, and even death. For example, *Toluene*, *Methyl Ethyl Ketone* and *Xylene*(mixed isomers) are commonly used in textile manufacturing processes, either in solvent coating operations or in printing operations.Hiremath [3] opined that the mass production of textile goods without any effect on the environment seems utopian in these days as the available manufacturing technologies consume many different chemicals, as well as high qualities of water and energy. Breathing moderate amounts of methyl ethyl ketone (MEK) for a short period of time often cause adverse effects on the nervous system ranging from headaches, dizziness, nausea, and numbness in the fingers and toes, to unconsciousness. Its vapours are irritating to the skin, nose and throat, and can damage the eyes. However, repeated exposure to high amounts may cause liver and kidney defects. On the other hand, inhalations of toluene can cause headaches, confusion, weakness, and memory loss. It may also affect the way the kidneys and liver function. Short term exposure of human to high level of xylems can as well cause irritation of skin, eyes, nose, and throat, difficult in-breathing, impaired memory, and possible changes in the liver and kidneys.

Since the 1950s, growing environmental awareness and concerns had focused much attention on the interaction between development actions and their resultant environmental consequences [4]. In developed countries, this has led to the agitation of explicit consideration of environmental factors in the decision – making process. A similar situation seems to be occurring in most developing countries, especially in Nigeria, but in this case it will be the responsibilities of the professionals in the Environment and Health Departments in Government Agencies to make such agitation. The involvement and agitation of these professionals 'in part' gave birth to Federal Environmental Protection Agency (FEPA) and the subsequent State's Environmental Protection Agency in all the states of Nigeria. It is important to note that the pace of industrialization and urbanization has far out – stripped government's ability to cope with the side effects of these development, coupled with the fact that the state of health of an individual or population depends upon complex interactions of the physical, biological, political and social domains.Van den [5], Lubick [6], Bouwuan et al [7] and WHO [8] among others have stressed on the negative effects of DDT and other chlorinated hydrocarbons used as pesticides and herbicides, which annually threaten many species of animal lives and human being. For example, fibre processing in the textile industry involves the use of a number of inorganic substances as chemical processes. These include secondary liquor for removing fats, waxes and oil from fabric contain detergents (and hence, phosphate = PH) and caustic soda. Rinsing after scoring involves the use of hydro chronic acid. So, also common bleaching agents used in the textile industry are inorganic substances such as peroxide and hydrochloride. In the end, the wastewater from textile industry therefore contains a variety of inorganic substances [9], which has some negative effect on aquatic species and human health.

Hossain,et al [10] and Kann et al [11] in their various works discovered that wastewater effluents discharged from textile factories are chromium, leads, zinc, copper, oils, gasses and waxes. These are into thousands of inorganic and organic acids, fats, oils, bleaching agents, dyes, pigments, phenolic compounds, turning agents, sulphides, ammonia among others, which are toxic in nature. It was further substantiated by Ademoroti [12] that industrial wastes discharged into surface water bodies contain large quantities of raw materials, intermediate products, final products, co-products and by products, and of the auxiliary or processing chemicals used. These of course can be toxic, flammable or non biodegradable. Industrial effluents discharged into such media could easily facilitate increase in temperatures, reduce amount of oxygen available and alter the chemical condition of natural waters. This in the end could lead to widespread destruction of living organisms and other life supporting resources and processes In a study carried out by Kevin et al [13] to investigate the hazardous chemical discharged from two textile manufacturing industries, and chemical contamination of nearby canals connecting the lower chao phraya river, Thailand, it was discovered that the canals have been currently contaminated with a range of toxic metal and hazardous pollutants. It is worth noting that textile industrial pollutants could be solid, liquid or gaseous in the form of organic substances, sodium salts (Na), free chloride and peroxides are some of the products of textile production. Other inorganic pollutants are oxides of Nitrogen ($N0_2$), which have dangerous effects on health.

Health impacts of carbonmonoxides (CO) for example, are due to decreases in the oxygen carrying capacity of blood and of disruption in cytochroness functions. In human beings especially, the exposure begins with low-level of headaches, fatigue and feverish conditions.

In another discovery made by Schwartz [14], the major health concern associated with exposure to high concentration of SO_2 includes effects on breathing, respiratory illness, alteration in pulmonary defenses and aggregation of existing cardiovascular diseases. Jaiswal [15] in his study on respiratory status of textile workers in sIndia discovered that, the risk of deceloping respiratory problem is higher among workers in the scouring section than those in non-dusty sections. MassDep [15] also asserted that long-term exposure to SO_2 can cause respiratory illness, alter the lung's defense mechanisms and aggravate existing cardiovascular or lung disease.

Furthermore, important consideration must be given to noise pollution, which is an attribute of any industry. Noise is an unwanted sound, causing interference in any given communication system. It is worth noting therefore, that industrial activities in the form of production process through plants and machines contribute immensely to noise pollution in many Nigerian cities. However, Federal Environmental Protection Agency (FEPA) recommended in Nigeria that daily exposure to noise for workers should not exceed 90dB daily for a 8-hours working period [16]. In the earlier study on the health effects of this same Nichemtex Textile Industry on residents, Olawuni [17], revealed that there existed a very significant degree of environmental problems in Lasori (Abuja) village, Lagos State, where the industry is located, especially in the area of liquid waste generation. It is the opinion of the author that, between 2002 when the previous study was carried out and 2010 – a period of eight (8) years interval, there must have been changes in the textile industry, probably in the areas of operational procedure, effluent discharge and environmental management options, among others. This work then attempts to examine the types, magnitude and treatment of generated wastes by Nichentex Textile Industry Plc, and evaluates the various impacts of the industry's pollutants on the local environment, It will also examine the identified problems on environmental related ill-health of the surrounding residents, between year 2002 and 2010.

Study Area

Nichemtex industry plc was incorporated in Nigeria as a public company, on 3rd August 1971. It is located in Lasori (Abuja) village, Ikorodu, Lagos State, and about the largest industry in the area, covering an area of 143.43 acres of land with over 8 ,000 employers. The objectives of the owners of the industry, Cha Chin Mining Limited, the Federal Government of Nigeria, the Lagos state government and the Nigerian Industrial Development Bank Limited, were to establish and operate an integrated synthetic fibre and textile plant to supply synthetic fibre and fabrics to the Nigerian market. It was observed by the researcher that, apart from a polyester / cotton, spinning and weaving mill, which the company operates at present, the construction of polyester stable fibre plant has recently been completed.

It is indeed a highly operative company that requires a thorough environmental consideration, when one looks at the level of operations, especially the types of chemicals used, and the likely after effects on the residents of Lasori (Abuja) village, which inhabits over 12,000 residents.

Methodology

In carrying out this study, two hundred structured questionnaires, which addressed issues of industrial pollutant, residents' social economic factors and other environmental factors, were administered. A total of two thousand and three buildings situated very close to the industry were identified in the study. Using a 10% sample size, a total of two hundred questionnaires were systematically administered on the respondents. Having selected the first building randomly, using random table, others take the form of selecting one out of every ten houses, targeting the household heads in every selected building. Simple statistical analytical techniques, such as frequency distribution and percentages were adopted for data analysis.

Discussion and Findings

The study revealed that (49.0%) of the respondents had primary education followed by both junior and senior secondary school education with 38.0%, and 11.0% with no formal education as shown in Table 1.

Table 1: Education Background of Respondents.

Educational Background	No. of Respondents	Percentage (%)
No formal Education	22	11%
Primary School	98	49%
Junior Secondary School	52	26%
Senior Secondary School	24	12%
Higher education	4	2%
Total	200	100%

Table 2: Occupational Distribution

Occupation	No. of Respondents	Percentage (%)
Farmer	74	37%
Trader	32	16%
Artisan	39	19.5%
Casual Worker	42	21%
Civil Servant	13	6.5%
Total	200	100%

Table 3: Marital Status

Marital Status	No. of Respondents	Percentage (%)
Single	18	9%
Married	164	82%
Divorced	12	6%
Widow(er)	6	3%
Total	200	100%

The respondent's educational background goes along with the predominant occupation they engaged in. Table 2 revealed that (37%) of the respondents are engaged in farming activities, 21.0% in casual work, 19.5%, Artisan and 16.0% Traders. Similarly, Table 3 showed that (82.0%) of the respondents are married. Generally, the activities of Nichemtex Industry in the area generated three major wastes, in the form of liquid, solid and gaseous. Out of the three major generated wastes, liquid waste constitutes 51.5%, solid 13.5%) and gaseous (35.0%) (Table 4).

Table 4: Nature of Waste Generated

Nature	No of respondents	Percentage
Soild	27	13.5
Liguid	103	51.5
Gaseous	70	35.0
Total	200	100.0

There are other notable environmental problems which are ill health related as rated by the respondents in the study area. These are air pollution, noise pollution, surface water pollution underground water pollution, flooding, offensive odour, solid waste, effluent waste and food poisoning among others. For example, using Likert Scale to rate the environmental problems generated by the industry,

Table 5: Environmental Problem

Env. problem	Very Significant (5)	Significant (4)	Just Significant (3)	Not Significant (2)	Not at all Significant (1)	Total	Ranking
Air pollution	64 (420)	62 (248)	32 (96)	15 (30)	7 (7)	801	4.01
Noise Pollution	87 (435)	63 (252)	38 (114)	8 (16)	4 (4)	821	4.10
Surface water pollution	102 (510)	68 (272)	15 (54)	7 (14)	5 (5)	855	4.28
Under Ground w water pollution	75 (375)	80 (320)	30 (90)	10 (20)	5 (5)	810	4.05
Flooding	20 (100)	80 (120)	20 (60)	102 (204)	28 (28)	512	2.56
Offensive odour	92 (460)	76 (304)	30 (900	2 (4)	0 (0)	858	4.29
Solid waste	60 (300)	48)192)	52 (156)	28 (56)	12 (12)	716	3.58
Effluent waste	108 (400)	63 (252)	20 (60)	6 (12)	3 (3)	867	4.34
Food poison	80 (400)	87 (348)	22 (81)	3 (6)	3 (3)	838	4.19
Total							35.40

Mean Ranking: 35.40÷9 = 3.82

Table 5 revealed that effluent waste has the highest rating (4.34), offensive odour has 4.29; polluted surface water has 4.28 while food poisoning has 4.19. The identified environmental problems in the study area have a mean ranking of 3.93 and most of the environmental problems ranked have higher figure than the mean ranking (3.93), suggesting a significant environmental problem in the area.

Table 6: Method of Waste disposal

Method	No of respondents	Percentage
Water bodies	143	71.5
Burning	19	9.5
Buried	38	19.0
Total	200	100.0

It was evident from Table 6 that effluents generated from the industry were claimed to be discharged into nearby Lisori River by 71.5% of the respondent, and this river was equally regarded in Table 7 by 81.5% of the respondent as the only major river and source of water supply for domestic use in the study area.

Table 7: Source of Water Supply

Source	No of respondents	Percentage
Stream/river (Lisori)	168	81.5
Well	27	13.5
Pipe borne waste	4	2.0
Bore hole	1	0.5%
Total	200	100%

Despite the discharge, the company management did not show much concern about the inherent environmental problems generated by the industry. For example in Table 8, 52.5% of the respondents claimed, the management showed non-chalant attitude and 42.5% claimed they were very uncooperative, leaving the environmental problem unattended to.

Table 8: Reaction of the Company

Reaction	No of respondents	Percentage
Non chalant attitude	105	52.5
Clean up	2	01.0
Provision of facilities	8	04.0
Uncooperative	85	42.5
Total	200	100.0

It is further shown in Table 9 by a vast majority (96.0%) that industrial pollution in the area usually leads to ill health. These are mostly environmental related ill health as reported by respondents in the study area. As shown on Table 10, identified environmental related ill health include headache, catarrh, cough, malarial fever, typhoid fever, diarrhoea, dysentery, cholera, eye imitation, skin diseases and stomach ache. The table further revealed that, a total of 71.9% of the respondents had one or more reported incidence of environmental related ill health, which may have occurred as a result of environmental problems in the area. Close to one tenth (8.7%) had skin rashes, (8.55%) had malaria fever, (8.27%) had typhoid fever and (7.36%), headache among others.

Table 9: Effect of the Industry on Health.

Option	No of respondents	Percentage
Yes	192	96.0%
No	8	4%
Total	200	100.0

Table 10: Self Reported Environmental Related Ill Health

	Headache	Catarrh	Cough	Malaria Fever	Typhoid Fever	Diarrhea	dysentery	Cholera	Eye Irritation	Skin rashest	Stomachache	Total
Yes	162	102	152	188	182	141	141	102	138	191	82	1581
%total	7.36	4.6	6.9	8.55	8.27	6.4	6.4	4.6	6.27	8.7	3.7	71.9
No	78	98	48	12	18	59	59	98	62	9	118	619
%total	3.5	4.5	2.2	0.6	0.8	2.6	2.6	4.5	2.8	0.4	5.4	28.1
Total	200	200	200	200	200	200	200	200	200	200	200	2200

The above findings tend to support the argument made by one of the residents (Mrs. Bisi Usman) in the study area, as reported by Emmanuel M in a newspaper 'The Sun' of Saturday June 30th, 2007. Mrs Bisi Usman, a resident of the Lasori (also called Abuja) community, reported that the waste chemicals is usually discharged into the village river - lesion, and that when it rains, the flood in its dark-coloured characteristics, will push the sludge from the river into homes of nearby residents. In addition this discharge came with different odours (Table 4) which in most cases often sting the eyes and nostrils. It is worth noting that, these, when taken through respiratory track may cause irritation, loss of appetite, giddiness, nausea and anorexia among others, and through lungs when these chemicals enter straight into blood stream and the general circulation could effect the living system adversely. The above reports corroborated the high rating of effluent waste generation from the industry (Table 5) and the records of self reported ill health incidences, presented in Table 10. Also the reason for a high figure (191) and high percentage (8.7%) for skin rashes among the respondents as shown on Table 10 is understandable, going by the above report.

Conclusion and Recommendations. : In this study, it was discovered that out of the three major types of wastes generated by the industry, liquid wastes are the highest (51.5%). Effluent discharge from the industry was also rated high (4.34), followed by offensive odour (4.29) and polluted water (4.28). Attitude of the management of the industry was found to be non-chalant (52.5%) and uncooperative (42.5%), despite the pronounced environmental problems in the area. The various discharges from the industry may have contributed to self reported environmental related ill health among respondents; especially, the skin rashes, malaria, typhoid fever and headache among others. The study then recommends that since textile manufacturing is a chemically intensive process, a primary focus for pollution prevention should be adopted. However, pollution prevention application (PPA) in the textile industries is considered appropriate as opined by US. EPA/SEMARNAP Pollution Prevention Work Group in the year 1996. The application of pollution prevention could be in different formats. It could be in form of chemical substitution, equipment upgrades, water conservation and reuse, solid waste reduction, energy conservation or process modification. By replacing solvents for instance, facilities can reduce waste; reduce costs associated with treatment systems, and increase workers' safety. This is one of the best methods to prevent pollution. Some textile chemicals that can be substituted include desizing agents, dyes, and auxiliaries. Also, replacing enzymes with hydrogen peroxide to desize starch can be cost-effective [18]. This method produces carbon dioxide and water as wastes instead of hydrolyzed starch, which increases biological oxygen demand (BOD) load. Copper-free dyes can again be used to reduce metal loading of wastewater, although this may sacrifice the range of color shades that can be achieved. Furthermore, improved fixation reactive can be used to reduce unreacted and degraded dye in spent bath and improve the reuse potential of wash water. High-temperature reactions can also be used in dyeing for simultaneous application of disperse and reactive dyes. This reduces energy use and eliminates the caustic bath required after disperse dyeing. Finally, auxiliaries, such as phosphates, can be substituted with acetic acid and EDTA to reduce phosphorus load in wastewater. New washing agents can also be used to increase wash efficiency, decrease water consumption, and improve fastness of reactive [19].

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